

Chevron Environmental Management Company

**PROGRESS REPORT NO. 123**  
**SECOND SEMI-ANNUAL 2017**

Former Unocal Seattle  
Marketing Terminal 0724  
3001 Elliott Avenue  
Seattle, Washington

February 21, 2018

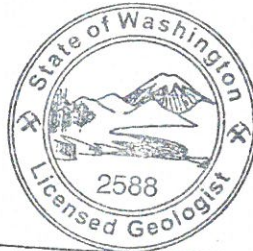
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**PROGRESS REPORT  
NO. 123  
SECOND SEMI-  
ANNUAL 2017**

Former Unocal Seattle Marketing  
Terminal 0724

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Company

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## CONTENTS

1	Introduction .....	1-3
2	Background .....	1-3
2.1	Site Description .....	1-3
2.2	Site History .....	1-3
3	Groundwater Compliance Monitoring .....	1-7
3.1	Historical LNAPL Monitoring Program .....	1-7
3.2	Second Semi-Annual 2017 Groundwater Monitoring .....	1-8
3.2.1	Third Quarter 2017 Groundwater Monitoring .....	1-8
3.2.2	Fourth Quarter 2017 Groundwater Monitoring .....	1-8
3.2.3	Groundwater Monitoring Results .....	1-9
3.2.4	Laboratory Data Verification Results .....	1-10
4	Remedial Activities .....	1-10
4.1	Upper Yard and Elliott Avenue LNAPL Removal .....	1-10
4.2	Lower Yard LNAPL Recovery .....	1-11
4.3	Offsite Area Remediation System .....	1-11
5	Conclusions .....	1-11
6	References .....	1-12

## TABLES

Table 1. Monitoring Well History

Table 2. Summary of Groundwater Elevation Data

Table 3. Summary of Groundwater Analytical Data

Table 4. Summary of Groundwater Compliance as of Second Semi-Annual 2017

## FIGURES

Figure 1. Site Location Map

Figure 2. Site Map

Figure 3. Groundwater Elevations - November 7, 2017

Progress Report No. 123  
Second Semi-Annual 2017

Figure 4. Groundwater Analytical Summary Map - November 8, 2017

Figure 5. Groundwater cPAH Data - November 8, 2017

## **APPENDICES**

Appendix A. Standard Operating Procedure

Appendix B. Field Data Sheets

Appendix C. Historical Groundwater Analytical Results

Appendix D. Historical Trends Graphs

Appendix E. Laboratory Report and Chain of Custody Forms

Appendix F. Data Validation Report

## 1 INTRODUCTION

On behalf of Chevron Environmental Management Company (Chevron), Arcadis U.S., Inc. (Arcadis) has prepared this report to document the second semi-annual 2017 groundwater sampling results for the former Seattle Marketing Terminal (Unocal 0724) located at 3001 Elliott Avenue in Seattle, Washington. The site and surrounding area are shown in **Figure 1**. This report summarizes the results of the groundwater gauging and sampling events conducted on November 7 and 8, 2017 by Arcadis.

## 2 BACKGROUND

### 2.1 Site Description

The site was operated by the Union Oil Company of California (Unocal) as a bulk fuel distribution facility from the early 1900s to approximately 1975. Leaded and unleaded gasoline, diesel, lube oil, motor oils and petroleum-based solvents (non-chlorinated) were stored at the site. In the 1980s, the above-ground site structures were demolished. The site is defined in Order on Consent DE88-N223 and is divided into four contiguous areas: Upper Yard, Elliott Avenue, Lower Yard and the Offsite Area. The Upper Yard consists of the approximate area between Elliott Avenue and Western Avenue to the east and west, and Bay Street and Broad Street to the north and south. The Elliott Avenue area includes the length of Elliott Avenue between Bay Street and Broad Street. The Lower Yard consists of the area between Elliott Avenue and the Burlington Northern Santa Fe (BNSF) railroad tracks to the east and west, and Bay Street and Broad Street to the north and south. The Offsite Area generally comprises the BNSF railroad tracks right-of-way and Alaskan Way between Bay Street and Broad Street. A site map is included as **Figure 2**.

### 2.2 Site History

Chevron, on behalf of Unocal, is conducting cleanup of the site as required by Order on Consent DE88-N223 and Amendments 1 through 5. The initial Order on Consent was signed by Unocal and the Washington State Department of Ecology (Ecology) in December 1988. In July 1995, Amendment No. 4 was signed and contains cleanup targets and remedial action levels (RALs) for groundwater in the Upper Yard, Elliott Avenue, Lower Yard, and Offsite Area. Cleanup activities conducted by Unocal at the site included: an excavation with onsite treatment and offsite disposal of approximately 50,000 tons of soil from the Upper Yard; light non-aqueous phase liquid (LNAPL) recovery; and groundwater remediation (pump and treat) and excavation and disposal of approximately 45,000 tons of soil from Elliott Avenue and the Offsite Area.

In addition, Unocal excavated approximately 60,000 tons of soil exceeding the total petroleum hydrocarbon (TPH) RAL and removed and treated petroleum-containing groundwater (GeoEngineers, 1998). Petroleum-containing soils were typically excavated to depths of 15 to 20 feet below ground surface. The Lower Yard excavation was backfilled with clean fill material and moderately impacted petroleum-containing soils from the Upper and Lower Yards. The upper 95 percent confidence level of the mean for TPH concentrations remaining in these impacted Lower Yard soils used for backfill was below the RAL of 7,500 milligrams per kilogram (mg/kg) (GeoEngineers, 1998). Several feet of imported rock were placed at the base of the

excavation. According to Unocal, the average TPH concentration in these backfill soils was approximately 1,000 mg/kg (SAM, 1999).

The Upper Yard and Lower Yard properties of the site were sold by Unocal to the Trust for Public Land for the Seattle Art Museum (SAM) in 1999. In 2004, SAM began construction for redevelopment of the property, including the Offsite Area (which is owned by the City of Seattle Parks and Recreation), as the Olympic Sculpture Park (OSP). SAM entered a Pre-Purchaser Agreement with Ecology prior to their purchase of the property. As part of the agreement, SAM submitted remediation design reports to Ecology for the OSP. As provided in a January 17, 2008, letter, Ecology indicated that the terms of the Pre-Purchaser Agreement were satisfied. A Stipulation and Order of Dismissal (No. 99-2-50226-4SEA) was issued on October 31, 2008.

In conjunction with the OSP construction in the Offsite Area, Unocal conducted a “hot spot” excavation from July to October of 2005. The goal of this remedial action was to remove a source area of petroleum hydrocarbons and LNAPL in soil. Approximately 4,435 tons of petroleum-impacted soils were removed during the “hot spot” excavation (GeoEngineers, January 2006). Following the soil removal, the excavation was backfilled and the surface was restored with asphalt pavement.

On October 4, 2009, Arcadis submitted the *Work Plan for LNAPL Mobility Assessment, Natural Attenuation Monitoring and Surfactant Application Pilot Testing* to Ecology (October 2009 Work Plan). The October 2009 Work Plan was prepared in response to a letter from Ecology to Chevron dated June 8, 2009, requesting that Chevron assess the monitoring well network, address options for active remediation in the Offsite Area, conduct several short-term multiphase extraction (MPE) events on monitoring well MW-204 and on wells where LNAPL is observed in the Elliott Avenue Area and the Offsite Area and to further evaluate unfiltered/filtered samples of carcinogenic polycyclic aromatic hydrocarbons (cPAHs). This work plan outlined proposed activities to evaluate the monitoring well network, evaluate remedial alternatives for the site, and discussed the potential risk of cPAH concentrations remaining in groundwater in the Offsite Area. Specific areas addressed included LNAPL located in the Elliott Avenue Area, LNAPL along the railroad tracks and dissolved-phase concentrations in the Offsite Area.

Ecology approved the October 2009 Work Plan, with specific comments, on November 16, 2009. Following meetings with stakeholders and Ecology, Arcadis submitted the *Revised Work Plan for LNAPL Mobility Assessment, Natural Attenuation Monitoring and Surfactant Application Pilot Testing* (January 2010 Revised Work Plan) to Ecology on January 19, 2010.

On December 8, 2009, Ecology submitted a letter to Chevron approving the cancellation of fourth quarter 2009 groundwater compliance monitoring. In addition, Ecology recommended conducting semi-annual groundwater compliance monitoring for 2010 and quarterly monitoring for visual inspection, measurement and removal (if applicable) at monitoring wells MW-30 and MW-61A-R and recovery wells RW-1 through RW-3 and RW-21. Monitoring well MW-61A-R is a replacement for well MW-61A, which was originally an Upper Yard monitoring well. However, MW-61A-R is located in the Elliott Avenue right-of-way (ROW) and is currently referred to as an Elliott Avenue Area monitoring well.

On March 19, 2010, Ecology approved the January 2010 Revised Work Plan with additional specific comments. Following additional meetings, Arcadis submitted the *Addendum to the Revised Work Plan for LNAPL Mobility Assessment, Natural Attenuation Monitoring and Surfactant Application Pilot Testing* (May 2010 Addendum to the Revised Work Plan) on May 3, 2010, to address the additional stakeholder and

Ecology comments on the January 2010 Revised Work Plan. On May 18, 2010, Ecology approved the May 2010 Addendum to the Revised Work Plan via electronic mail. Field work to implement the May 2010 Addendum to the Revised Work Plan began in the summer of 2010.

Arcadis submitted the *2010 Summary Report and Risk Evaluation* on February 1, 2011 with the following recommendations and responses from Ecology:

- Continue quarterly gauging and semi-annual groundwater monitoring of wells MW-30, MW-61A-R, RW-3 and RW-21. Ecology concurred; both gauging and groundwater monitoring are ongoing for monitoring wells MW-30 and MW-61A-R. Recovery wells RW-3 and RW-21 were decommissioned with Ecology approval in June 2014 (discussed below).
- Continue semi-annual groundwater monitoring of wells MW-200 through MW-207. Ecology concurred: semi-annual groundwater monitoring is ongoing.
- Remove dissolved lead from the list of site constituents of concern. Dissolved lead has not been detected at the site since November 2007 and monitoring wells in the Offsite Area have at least 12 consecutive monitoring events without a dissolved-lead concentration exceedance. The few concentrations that were detected remained more than two orders of magnitude below the site RAL. Ecology concurred: effective second semi-annual 2011 monitoring event, lead is no longer a constituent of concern.
- Abandon piezometers PZ-61A-R, PZ-203, and PZ-204 in place. Ecology recommended maintaining and gauging piezometers through quarterly gauging during next two semi-annual monitoring events, then to re-evaluate. Piezometers PZ-61A-R, PZ-203, and PZ-204 were decommissioned in June 2014 with the approval of Ecology (discussed below).
- Abandon Trench D extraction wells RW-1, RW-2, RW-5 through RW-13 and RW-15 in place. Ecology recommended maintaining and quarterly gauging of Trench D extraction wells through the next two semi-annual monitoring events, then to re-evaluate. Quarterly gauging of extraction wells RW-1, RW-2, RW-5 through RW-13 and RW-15 for two additional semi-annual monitoring events was fulfilled. The Trench D extraction wells were decommissioned in June 2014, as discussed below.
- The LNAPL occasionally observed in wells RW-3, RW-21 or MW-30 is not mobile. Arcadis does not recommend further remedial operations on these wells unless quarterly gauging activities indicates a change in the volume or type of LNAPL present in the wells compared to historical observations. Ecology concurred and recommended continuing quarterly gauging through two semi-annual monitoring events and then to re-evaluate. Quarterly gauging of RW-3, RW-21 and MW-30 for two semi-annual monitoring events was fulfilled. Recovery wells RW-3 and RW-21 were decommissioned in June 2014 with the approval of Ecology (discussed below).
- Add monitoring well MW-205 to the quarterly gauging program. Ecology concurred: MW-205 was gauged quarterly as part of the quarterly gauging program ending in 2014.

- If LNAPL is observed and is recoverable, submit a sample for chemical testing and possible mobility parameter analysis. Ecology concurred. Recoverable thicknesses of LNAPL were observed in Trench D wells PZ-4.5, PZ-6, PZ-10.5, PZ-11.5, and PZ-13 in February 2014. Samples of the LNAPL were submitted for chemical analysis and in some cases, mobility parameter analysis. The results of these analyses were submitted in the Trench D Recovery System Decommissioning Summary and Recommendation for Replacement Well Installation” (Arcadis July, 2014).

In December 2012, Chevron submitted a revised Draft Amendment to the Order to Ecology. The proposed Amendment, which was prepared with the input of the City of Seattle and the SAM, recommended abandonment of the Trench D recovery wells and piezometers, installation of up to five replacement wells along the Trench D area, and additional groundwater monitoring. At the request of Ecology, Arcadis submitted the “Work Plan for Decommissioning Trench D Recovery System and Three Piezometers Installed in 2010” (Arcadis, May 2013). This work plan describes a scope of work to decommission remaining wells and equipment associated with Trench D, as well as the piezometers installed as part of the 2010 site assessment activities. This work plan was approved by Ecology in email correspondence dated July 29, 2013.

The decommissioning work was conducted in two phases. Phase I was conducted from February 21 to 25, 2014 and included the following activities:

- Prepared the site to allow access for equipment and vehicles.
- Removed the remediation system compound and equipment.
- Attempted to locate missing piezometers and recovery wells.
- Gauged recovery wells and piezometers.
- Received variance approval for well abandonment.

Separate LNAPL sampling events were completed between the two phases of decommissioning work on February 26 and May 5, 2014.

Phase II was conducted from June 9 to 13, 2014 and included the following activities:

- Gauged recovery wells and piezometers.
- Vacuum extraction of fluids from each recovery well and piezometer located along Trench D.
- Decommissioned recovery wells, piezometers, 2-inch lateral remediation system piping, and a 6-foot long by 4-foot wide recovery vault where the piping entered the former remediation system.
- Decommissioned of piezometers installed in 2010 (PZ-61A-R, PZ-203, and PZ-204).
- Disposed of waste materials generated by the above activities.

A report of the Trench D decommissioning activities, LNAPL summary and work plan for the installation of the replacement monitoring wells was submitted under separate cover "Trench D Recovery System Decommissioning Summary and Recommendation for Replacement Well Installation" (Arcadis July, 2014).

At the request of Ecology, Arcadis submitted a work plan for the installation of up to six additional monitoring wells in the Offsite Area. The work plan was approved by Ecology in correspondence dated May 29, 2015. The work plan was implemented in January 2016. A report documenting installation activities was submitted to Ecology on April 29, 2016.

## 3 GROUNDWATER COMPLIANCE MONITORING

### 3.1 Historical LNAPL Monitoring Program

During a comprehensive gauging event in September 2007, prior to well abandonment, LNAPL was observed in recovery well RW-21, located on the eastern side of the BNSF railroad tracks. Recovery well RW-21 was part of the Trench C remediation system and does not serve as a compliance well for the Lower Yard. Due to the presence of LNAPL, recovery well RW-21 was gauged on a bi-monthly basis between October 2007 and November 2009. Less than one-tenth of an inch of LNAPL was present in RW-21 in each of the gauging events prior to well redevelopment in December 2007. Due to the viscous nature of the LNAPL, the LNAPL thickness could not be accurately measured using an oil/water interface probe and a disposable bailer was used to confirm the presence of LNAPL. Observations of the interior casing of recovery well RW-21 indicated that a tar-like substance was present inside the well casing. Recovery well RW-21 was re-developed in January 2008 with a surge block and vacuum truck and in October 2008, the polyvinyl chloride (PVC) casing of recovery well RW-21 was cleaned with absorbent pads and re-developed using a vacuum truck.

Recovery wells RW-1 through RW-3 and RW-21 were added to a bi-monthly gauging program in 2007 as discussed with Ecology (November 2, 2007 phone conversation) to monitor for the presence of LNAPL from recovery well RW-21. Following Ecology's approval in November 2009, recovery wells RW-1 through RW-3 and RW-21 were reduced to quarterly gauging. Recovery wells RW-5 through RW-13 and RW-15 were also included in the gauging program during compliance monitoring events. However, recovery wells RW-12 and RW-15 could not be located between 2010 and Trench D abandonment activities in 2015 and are suspected to have been destroyed during maintenance activities along the BNSF ROW.

Field crews had been unable to locate five of the recovery wells, so a site visit was conducted on January 9th, 2013 with the intention of locating the missing wells. RW-6 was rediscovered, but RW-4, RW-12, RW-14 and RW-15 were not located during this visit. Accordingly, these recovery wells were not included in quarterly gauging events.

Recovery wells and associated piezometers in Trench D were decommissioned with the approval of Ecology in June 2014. During the Trench D decommissioning activities, a soil vacuum truck was used to try to locate RW-4 and RW-12, but they could not be found. The locations of RW-14 and RW-15 were surrounded by utilities so the soil vacuum locating activities could not be conducted in that area. The recovery wells and piezometers that were located along Trench D were decommissioned in the first half of 2014.

Semi-annual gauging was conducted on November 7, 2017. During this event, monitoring wells MW-30, MW-61A-R, MW-70R, and MW-200 through MW-207 were gauged to determine the presence of LNAPL. Monitoring wells MW-209 through MW-211 were not gauged due to access limitations; updated access negotiations are ongoing with BNSF. Measurable LNAPL was observed in MW-61A-R during the November 2017 event. No LNAPL was observed in any of the remaining wells during the gauging event. During the November 2017 event, gauging activities were conducted at low tide to ensure that groundwater levels were within the monitoring well screen intervals. Monitoring well history is summarized in **Table 1** and gauging is summarized in **Table 2**.

## 3.2 Second Semi-Annual 2017 Groundwater Monitoring

### 3.2.1 Third Quarter 2017 Groundwater Monitoring

During the third quarter 2017, no gauging or sampling event was conducted by Arcadis due to an expired access agreement with BNSF. Arcadis and Chevron are currently in negotiation with BNSF to renew the access agreement.

### 3.2.2 Fourth Quarter 2017 Groundwater Monitoring

On November 7 and 8, 2017 Arcadis conducted a groundwater gauging and sampling event at the site. During the gauging event, monitoring wells MW-30, MW-61A-R, MW-70R, and MW-200 through MW-207 were gauged with an oil/water interface probe to determine depth to water and LNAPL thickness. Measurable LNAPL was observed in MW-61A-R during the November event. MW-209 through MW-211 were not gauged due to access issues along the BNSF right of way. Gauging is summarized in **Table 2**.

Monitoring wells MW-30, MW-70R, and MW- 200 through MW-207 were purged and sampled with a peristaltic pump in general accordance with the procedures outlined in *Low-Flow Groundwater Purging and Sampling Procedures for Monitoring Wells* (Arcadis, 2009). This standard operating procedure (SOP) is included in **Appendix A**. Note that at the request of site stakeholders, tubing placement deviated from specifications in the SOP; tubing was placed within 6-inches of the groundwater surface in each monitoring well. Groundwater levels were conducted from each well prior to purging to assure the tubing was placed correctly. New, disposable Teflon-lined polyethylene tubing was used for sampling. Water quality parameters including temperature, pH, electrical conductivity, dissolved oxygen and oxidation/reduction potential were measured approximately every three minutes using an In-Situ® Aqua Troll 600 low-flow groundwater sampling system and were recorded on the field data sheets included in **Appendix B**. Monitoring wells MW-209 through MW-211 were not sampled during the November 2017 event due to access issues along the BNSF right of way.

Samples were collected in clean, laboratory-supplied containers with appropriate preservatives and were stored in iced coolers. Samples were then shipped via overnight delivery, under chain-of-custody procedures, to Eurofins Lancaster Laboratories in Lancaster, Pennsylvania. Groundwater samples from the November 2017 event were analyzed for the following:

- Total petroleum hydrocarbons as gasoline (TPH-G) by Northwest Method NWTPH-Gx extended range;

- Total petroleum hydrocarbons as diesel and heavy oil (TPH-D and TPH-O) by Northwest Method NWTPH-Dx extended range with silica gel cleanup;
- Benzene, toluene, ethylbenzene, and total xylenes (BTEX) by United States Environmental Protection Agency (USEPA) Method 8021B; and
- Benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-c,d)pyrene collectively referred to as carcinogenic polycyclic aromatic hydrocarbons (cPAHs) by USEPA Method 8270C SIM.

### 3.2.3 Groundwater Monitoring Results

Depths to groundwater measured during the fourth quarter 2017 groundwater monitoring event ranged from 8.69 feet below top of casing (btoc) in monitoring well MW-200 to 21.89 feet btoc in monitoring well MW-205. Groundwater elevations ranged from 4.97 feet above mean sea level in monitoring well MW-206 to 7.51 feet above mean sea level in monitoring well MW-61A-R. These measurements indicate groundwater is generally flowing in a southwesterly direction, towards Elliott Bay, and are consistent with historical data. Groundwater gauging was conducted at low tide during the November 2017 event and water levels were within screened intervals for all wells, with the exception of MW-206. Current groundwater elevations are included in **Table 2** and historical groundwater elevations are presented in **Appendix C**. Groundwater elevations and contours from the fourth quarter sampling event are shown on **Figure 3**.

During the fourth quarter 2017 event, groundwater analytical results indicate that no exceedances of the applicable BTEX, TPH-G, TPH-D, and TPH-O RALs were detected in the samples collected from monitoring wells MW-30, MW-70R, and MW-200 through MW-207. Benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, indeno(1,2,3-c,d)pyrene, and dibenz(a,h)anthracene was detected at 0.064 micrograms per liter ( $\mu\text{g/L}$ ), 0.037  $\mu\text{g/L}$ , 0.11  $\mu\text{g/L}$ , 0.096  $\mu\text{g/L}$ , 0.072  $\mu\text{g/L}$ , 0.081  $\mu\text{g/L}$ , and 0.088  $\mu\text{g/L}$ , respectively, in the sample collected from MW-200. The cPAH concentrations detected in the sample from MW-200 during this event were anomalous; these were the first detectable exceedances of cPAHs in samples collected from this well over more than ten years of sampling events. MW-209 through MW-211 were not sampled during the November 2017 event due to access issues along the BNSF right of way.

Historical trend graphs for MW-30, MW-70R, MW-200 through MW-207, and MW-209 through MW-211 are provided in **Appendix D**. Analytical results for TPH-G, TPH-D, TPH-O, and BTEX, are summarized in **Table 3** and on **Figure 4**; results for cPAHs are summarized in **Table 3** and on **Figure 5**. Historical analytical results are presented in **Appendix C**.

As of the November 2017 event, four monitoring wells (MW-202, MW-203, MW-205, and MW-206) have met a minimum of thirteen consecutive sampling events in compliance with the RALs established for the site. A summary of groundwater compliance as of the November 2017 event is included in **Table 4**.

### 3.2.4 Laboratory Data Verification Results

A trip blank sample for BTEX and GRO analysis was submitted with the groundwater samples for the fourth quarter 2017 sampling event. Analyte concentrations did not exceed their respective method detection limits (MDLs) in the trip blanks.

A duplicate sample was collected during the fourth quarter 2017 sampling event and was submitted to the laboratory for quality assurance purposes. During the fourth quarter 2017 sampling event, the duplicate sample was collected from monitoring well MW-207. The duplicate sample was submitted for the same analyses as the parent sample. The duplicate analytical results were comparable to the parent samples collected from MW-207.

All coolers were received in good condition within temperature requirements. The laboratory report and chain of custodies are provided in **Appendix E**. Because of the anomalous cPAHs concentrations in the sample collected from MW-200, Arcadis conducted a review of the laboratory analytical data collected during the November 2017 groundwater monitoring event. The review did not identify any issues with the laboratory analysis that may explain the anomalous results for the MW-200 sample. A data validation report for the November 2017 data is presented in **Appendix F**.

## 4 REMEDIAL ACTIVITIES

### 4.1 Upper Yard and Elliott Avenue LNAPL Removal

Monitoring well MW-61A-R was re-developed on September 3, 2008 using a disposable bailer and a vacuum truck to remove sediment and LNAPL which may have accumulated in the well and/or sand pack. Approximately ten well volumes of groundwater and residual LNAPL were removed. The re-development water and recovered LNAPL were collected in the vacuum truck and transported to an approved facility for recycling. The amount of LNAPL recovered was not quantified. Mobile multi-phase extraction (MPE) was initiated in August 2009 in monitoring wells MW-30 and MW-61A-R. Observations made during MPE operations indicate that short term MPE does not influence the groundwater table and subsurface vapor flow. MPE was determined to be an ineffective method to address the remaining LNAPL and dissolved-phase impacts at the site due to the minimal remaining hydrocarbon impacts at the site and associated low MPE mass removal rate.

To assess persistent measurable LNAPL observed during groundwater monitoring, a surfactant-enhanced LNAPL recovery pilot test was performed on monitoring well MW-61A-R in July 2010. Approximately 200 gallons of surfactant were injected into MW-61A-R. The surfactant solution was allowed to remain in the formation for approximately 24 hours and then approximately 900 gallons of fluids were extracted. Monitoring was completed weekly for the first month after extraction. After weekly monitoring was completed, monthly monitoring was initiated and quarterly monitoring is ongoing. A complete summary of the surfactant-enhanced LNAPL recovery pilot test was submitted in the *2010 Summary Report and Risk Evaluation* on February 1, 2011.

Monitoring wells MW-61A-R and MW-30 were gauged during the November 2017 gauging and sampling event with an oil/water interface probe to determine if LNAPL was present. LNAPL was measured in

monitoring well MW-61A-R during the November 2017 event. Due to the presence of LNAPL in monitoring well MW-61A-R, it was not sampled during the November 2017 event.

## 4.2 Lower Yard LNAPL Recovery

LNAPL was observed in recovery well RW-21 during the September 2013 groundwater monitoring event (visually observed on oil/water interface probe, a measurable thickness was not present). This recovery well, as well as the downgradient Trench D recovery wells (RW-1 through RW-3), were included in the quarterly gauging program. Manual LNAPL recovery from RW-21 had been unsuccessful due to the highly-viscous nature of the LNAPL. LNAPL has not been observed in recovery wells RW-1 and RW-2 since the gauging program was implemented, and has not been observed in RW-3 since the first semi-annual groundwater monitoring event of 2013. Wells RW-1, RW-2 and RW-21 were decommissioned in 2014 during the Trench D decommissioning activities.

## 4.3 Offsite Area Remediation System

A groundwater extraction system was installed in the offsite area in 1989. The system included 24 extraction wells located along the BNSF right-of-way. In November and December 2006, the underground piping was severely damaged during the construction of the OSP, rendering the system inoperable.

From 1989 to November 2006, approximately 29,244,966 gallons of water and 4,809 gallons of LNAPL were recovered and treated by the groundwater extraction system. The extraction system last recovered LNAPL in fourth quarter 2004; no LNAPL was recovered during the last two years of operation. The associated Trench D recovery wells were gauged semi-annually until they were decommissioned in June 2014. The oil water separator was rehabilitated in May 2010 for use in disposal of purge water generated from routine groundwater sampling events and for well redevelopment and hydraulic conductivity testing approved by Ecology. The oil water separator was decommissioned during the June 2014 Trench D decommissioning activities and the King County Major Discharge Authorization Number 529-04 was discontinued.

Throughout the third and fourth quarter of 2011, monitoring well MW-205 was gauged on a bi-weekly (every other week) basis. During these events, no LNAPL or sheen was observed. Gauging was reduced to quarterly as of the first semi-annual 2012 reporting period at this location and continued on a quarterly basis through 2013. No LNAPL was observed in MW-205 during the November 2017 gauging and groundwater monitoring activities.

## 5 CONCLUSIONS

Gauging and groundwater monitoring was conducted on November 7 and 8, 2017. During the fourth quarter sampling event, there were no exceedances of BTEX, TPH-G, TPH-D, or TPH-O RALs in samples collected from monitoring wells MW-30, MW-70R, or MW-200 through MW-207. There were exceedances of Benz(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, indeno(1,2,3-c,d)pyrene, and dibenz(a,h)anthracene RALs in the sample collected from monitoring wells MW-200, but these results are anomalous with more than 10 years of historical results. Analytical results are summarized in **Table 3**, **Figure 4**, and **Figure 5**. Historical analytical results are presented in **Appendix C**. LNAPL was

found in monitoring well MW-61A-R during the November 2017 gauging and sampling event and therefore was not sampled.

As of the November 2017 event, four monitoring wells (MW-202, MW-203, MW-205, and MW-206,) have met a minimum of thirteen consecutive sampling events in compliance with the RALs established for the site. Monitoring wells MW-202, MW-203, MW-206, and MW-207 have met twenty-seven consecutive sampling events in compliance with the petroleum hydrocarbon constituent RALs. MW-70R has met seven consecutive sampling events in compliance with the RALs established for the site. A summary of groundwater compliance as of the November 2017 event is included in **Table 4**.

## 6 REFERENCES

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# TABLES



Table 1

**Monitoring Well History**  
Former Unocal Seattle Marketing Terminal  
3001 Elliott Avenue  
Seattle, Washington

Well ID	Installation Date	Compliance Parameters	Compliance/Removal Date
<b>Upper Yard</b>			
MW-37	06/1990	<b>LNAPL-TPH - BTEX (MW-61A-R)</b>	12/1995
MW-38	06/1990		1992
MW-39	06/1990		1992
MW-40	06/1990		1992
MW-58	09/1995		01/2004
MW-61	1995		1997
MW-61A	01/1998		01/2004
<b>MW-61A-R</b>	<b>03/2006</b>		<b>LNAPL</b>
MW-62	1995		1997
MW-62A	01/1998		01/2004
MW-63	1995		1997
MW-63A	01/1998		01/2004
MW-64	1995		01/2004
<b>Elliott Avenue</b>			
<b>MW-30</b>	<b>1989</b>	<b>LNAPL - TPH - BTEX (MW-30)</b>	<b>sampled</b>
MW-31	1989		12/2003
MW-32	1989		04/1991
MW-59	03/1998		<i>no data</i>
MW-65	03/1998		ABANDONED 12/07
MW-66	03/1998		ABANDONED 12/07
MW-69	<i>no data</i>		<i>no data</i>
<b>Lower Yard</b>			
MW-1	<i>no data</i>	<b>No wells in Lower Yard currently sampled for compliance parameters</b>	1998
MW-2	<i>no data</i>		1998
MW-18	<i>no data</i>		1998
MW-22	<i>no data</i>		1998
MW-23	<i>no data</i>		1998
MW-33	<i>no data</i>		1998
MW-34	<i>no data</i>		1998
MW-35	<i>no data</i>		1998
MW-49	<i>no data</i>		1998
MW-50	<i>no data</i>		1998
MW-51	<i>no data</i>		1998
MW-53	<i>no data</i>		1998
MW-54	<i>no data</i>		1998
MW-55	<i>no data</i>		1998
MW-56	<i>no data</i>		1998

Table 1

**Monitoring Well History**  
Former Unocal Seattle Marketing Terminal  
3001 Elliott Avenue  
Seattle, Washington

Well ID	Installation Date	Compliance Parameters	Compliance/Removal Date
<b>Lower Yard (continued)</b>			
MW-57	<i>no data</i>	<b>No wells in Lower Yard currently sampled for compliance parameters</b>	1998
MW-60	<i>no data</i>		1998
MW-81	09/1998		06/2002
MW-82	09/1998		06/2002
MW-83	09/1998		06/2002
MW-84	09/1998		06/2002
MW-85	09/1998		06/2002
MW-86	09/1998		06/2002
<b>Offsite Area</b>			
MW-8	01/1989	<b>LNAPL - TPH - BTEX - PAHs (MW-70R)</b>	10/2005
MW-9	<i>no data</i>		07/2005
MW-10	01/1989		10/2005
MW-20	01/1989		10/2005
MW-25	01/1989		10/2005
MW-26	01/1989		10/2005
MW-27	01/1989		damaged 2006
MW-27R	12/2006		ABANDONED 12/07
MW-34	10/1989		<i>no data</i>
MW-35	10/1989		<i>no data</i>
MW-36	10/1989		07/2005
MW-41	10/1990		12/2002
MW-42	10/1990		12/1991
MW-43	10/1990		12/1991
MW-44	<i>no data</i>		<i>no data</i>
MW-52	06/1998		10/2005
MW-67	03/1998		10/2005
MW-68	03/1998		07/2005
MW-69	03/1998		<i>no data</i>
MW-70	03/1998		10/2005
<b>MW-70R</b>	<b>09/2016</b>		<b>sampled</b>
MW-71	03/1998		10/2005
MW-72	03/1998		07/2005
MW-76	03/1998		10/2005

Table 1

**Monitoring Well History**  
Former Unocal Seattle Marketing Terminal  
3001 Elliott Avenue  
Seattle, Washington

Well ID	Installation Date	Compliance Parameters	Compliance/Removal Date
<b>Offsite Area- Amendment No. 4 Point of Compliance monitoring wells</b>			
<b>MW-200</b>	<b>10/2006</b>	<b>LNAPL - TPH - BTEX - PAHs (MW-200 to MW-207, MW-209 to MW-11)</b>	<b>sampled</b>
<b>MW-201</b>	<b>10/2006</b>		<b>sampled</b>
<b>MW-202</b>	<b>10/2006</b>		<b>sampled</b>
<b>MW-203</b>	<b>10/2006</b>		<b>sampled</b>
<b>MW-204</b>	<b>10/2006</b>		<b>sampled</b>
<b>MW-205</b>	<b>10/2006</b>		<b>sampled</b>
<b>MW-206</b>	<b>10/2006</b>		<b>sampled</b>
<b>MW-207</b>	<b>10/2006</b>		<b>sampled</b>
MW-209	09/2016		not sampled in 3Q17 or 4Q17
MW-210	09/2016		not sampled in 3Q17 or 4Q17
MW-211	09/2016		not sampled in 3Q17 or 4Q17

**Notes:**

LNAPL = Light non-aqueous phase liquid

TPH = Total petroleum hydrocarbons

BTEX = Benzene, Toluene, Ethylbenzene and Xylenes (Total)

PAHs = Polycyclic Aromatic Hydrocarbons

Items in bold represent compliance wells sampled in the most recent sampling event.

**Table 2**  
**Summary of Groundwater Elevation Data**

Former Unocal Seattle Marketing Terminal  
3001 Elliott Avenue  
Seattle, Washington

Well Number <sup>1</sup> (Well Casing Elevation)	Date Measured	Time Measured (hr:min)	Depth to Groundwater <sup>2</sup> (feet)	Depth to LNAPL <sup>3</sup> (feet)	LNAPL Thickness <sup>3</sup> (feet)	Groundwater Elevation <sup>4</sup> (feet)	Top of Well Screen Elevation <sup>5</sup> (feet)
MW-30	11/07/17	13:18	13.97	--	--	6.88	15.85
MW-61A-R	11/07/17	13:25	14.93	14.84	0.09	7.51	--
MW-200	11/07/17	12:51	8.69	--	--	5.67	9.36
MW-201	11/07/17	12:46	9.32	--	--	5.54	9.86
MW-202	11/07/17	12:55	9.00	--	--	5.58	6.78
MW-203	11/07/17	12:40	11.86	--	--	5.69	7.05
MW-204	11/07/17	12:04	17.98	--	--	5.95	6.58
MW-205	11/07/17	11:59	21.89	--	--	6.00	9.89
MW-206	11/07/17	12:59	10.18	--	--	4.97	4.15
MW-207	11/07/17	13:04	10.21	--	--	5.19	5.90
MW-209	11/07/17	--	NG	--	--	--	--
MW-210	11/07/17	--	NG	--	--	--	--
MW-211	11/07/17	--	NG	--	--	--	--
MW-70R	11/07/17	13:09	10.32	--	--	5.29	11.61

**Notes:**

<sup>1</sup>Well casing elevations listed in feet above mean sea level. Approximate monitoring well locations are shown in Figure 2.

<sup>2</sup>Below top of casing.

<sup>3</sup>Light non-aqueous phase liquid

<sup>4</sup>Elevation referenced to city of Seattle datum.

<sup>5</sup>Top of well screen elevation data from historic records.

"--" = not measured or not obtainable

NG = Not Gauged during fourth quarter 2017 due to access issues.

**Table 3  
Summary of Groundwater Analytical Data**

Former Unocal Seattle Marketing Terminal  
3001 Elliott Avenue  
Seattle, Washington

		Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Indeno(1,2,3-cd)Pyrene	Naphthalene	Gasoline (C7-C12 Petroleum Hydrocarbons)	Diesel (C12-C24 DRO w/Si Gel)	Heavy Oil (C24-C40 w/Si Gel)	Benzene	Ethylbenzene	Toluene	Xylene (total)
Remedial Action Levels		0.03	0.03	0.03	0.03	0.03	0.03	0.03	NE	1	10	15	40	1,400	14,300	4,400
Location	Sample Date	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(mg/L)	(mg/L)	(mg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
MW-30	11/8/2017	--	--	--	--	--	--	--	--	<0.050	<b>0.250</b>	<0.100	<0.5	<0.5	<0.5	<1.5
MW-70-R	11/8/2017	<b>0.018</b>	<b>0.015</b>	<b>0.026</b>	<b>0.018</b>	<b>0.019</b>	<b>0.019</b>	<b>0.015</b>	--	<0.050	<0.047	<0.100	<0.5	<0.5	<0.5	<1.5
MW-200	11/8/2017	<b>0.064</b>	<b>0.037</b>	<b>0.11</b>	<b>0.096</b>	<b>0.072</b>	<b>0.081</b>	<b>0.088</b>	--	<b>0.530</b>	<b>0.076</b>	<0.110	<4.0	<0.5	<0.5	<1.5
MW-201	11/8/2017	<b>0.018</b>	<0.010	<0.010	<0.010	<b>0.019</b>	<0.010	<0.010	--	<b>0.370</b>	<b>0.053</b>	<0.110	<3.0	<b>0.5</b>	<0.5	<1.5
MW-202	11/8/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<b>0.021</b>	<0.010	--	<0.050	<0.046	<0.100	<0.5	<0.5	<0.5	<1.5
MW-203	11/8/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	<0.050	<0.046	<0.100	<0.5	<0.5	<0.5	<1.5
MW-204	11/8/2017	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	--	<b>1.000</b>	<b>0.160</b>	<0.100	<0.9	<b>1.2</b>	<b>1.2</b>	<b>2.3</b>
MW-205	11/8/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	<b>0.071</b>	<0.046	<0.100	<0.5	<0.5	<0.5	<1.5
MW-206	11/8/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	<0.050	<0.048	<0.110	<0.5	<0.5	<0.5	<1.5
MW-207	11/8/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	<0.050	<0.046	<0.110	<0.5	<0.5	<0.5	<1.5
DUP	11/8/2017	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	<0.050	<0.046	<0.110	<0.5	<0.5	<0.5	<1.5
MW-209 <sup>1</sup>	11/8/2017	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-210 <sup>1</sup>	11/8/2017	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-211 <sup>1</sup>	11/8/2017	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:

Shaded concentrations are greater than corresponding Remedial Action Levels

-- = Not analyzed

<0.50 = Not detected at or above the remedial action level

µg/L = Micrograms per liter

mg/L = Milligrams per liter

DUP = duplicate

NE = Not Established

<sup>1</sup> = Well not sampled during fourth quarter 2017 due to access issues

**Table 4**  
**Summary of Groundwater Compliance as of Second Semi-Annual 2017**

Former Unocal Seattle Marketing Terminal  
 3001 Elliott Avenue  
 Seattle, Washington

Monitoring Well	Petroleum Constituents and Sheen (BTEX, Gasoline-range, Diesel-range)		cPAHs		Lead	
	Current Sampling Interval	Consecutive Sampling Events in Compliance <sup>1</sup>	Current Sampling Interval	Consecutive Sampling Events in Compliance <sup>1</sup>	Current Sampling Interval	Consecutive Sampling Events in Compliance <sup>1</sup>
<b>Upper Yard</b>						
MW-61A-R	semi-annually	0	none	N/A	none	N/A
<b>Elliott Avenue</b>						
MW-30	semi-annually	1	none	1 <sup>11</sup>	none	N/A
<b>Offsite Area- Amendment No. 4 Point of Compliance monitoring wells</b>						
MW-70R	quarterly	7	quarterly	7	none	N/A
MW-200	semi-annually	16 <sup>7</sup>	semi-annually <sup>2</sup>	0 <sup>4,5,8</sup>	none	13
MW-201	semi-annually	15 <sup>7</sup>	semi-annually <sup>2</sup>	3	none	13
MW-202	semi-annually	27	semi-annually <sup>2</sup>	23 <sup>3,4,10</sup>	none	13
MW-203	semi-annually	27	semi-annually <sup>2</sup>	27 <sup>4,8</sup>	none	13
MW-204	semi-annually	1	semi-annually <sup>2</sup>	27 <sup>4,8,10</sup>	none	13
MW-205	semi-annually	13	semi-annually <sup>2</sup>	13 <sup>4,8</sup>	none	13
MW-206	semi-annually	27	semi-annually <sup>2</sup>	27 <sup>4,6,8</sup>	none	13
MW-207	semi-annually	27	semi-annually <sup>2</sup>	3	none	13
MW-209 <sup>12</sup>	quarterly	0	quarterly	6	none	N/A
MW-210 <sup>12</sup>	quarterly	0	quarterly	0	none	N/A
MW-211 <sup>12</sup>	quarterly	6	quarterly	6	none	N/A

**Notes:**

<sup>1</sup>"Consecutive events" are number of consecutive sampling events prior to and including the current reporting period that are in compliance with the groundwater remediation action levels. Events prior to 3/97 are not counted. Refer to progress reports for results.

<sup>2</sup>Quarterly sampling beginning June 2007. Semi-annual sampling beginning 2010.

<sup>3</sup>Field-Filtered sample below RAL.

<sup>4</sup>Field-Filtered and Un-Filtered samples below RAL.

<sup>5</sup>9/3/08 laboratory reporting limit above RAL.

<sup>6</sup>Confirmation samples indicate erroneous 9/4/08 field-filtered data.

<sup>7</sup>Sheen noted on groundwater during well redevelopment in August 2010.

<sup>8</sup>First Semi-Annual 2011 laboratory reporting limit above RAL.

<sup>9</sup>First Semi-Annual 2012 laboratory reporting limit above RAL.

<sup>10</sup>Second Semi-Annual 2012 laboratory reporting limit above RAL.

<sup>11</sup>MW-30 analyzed for cPAHs only during the First Semi-Annual 2013 sampling event.

<sup>12</sup>Monitoring well not sampled during third quarter or fourth quarter 2017 due to access issues.

BTEX = benzene, toluene, ethylbenzene, xylenes

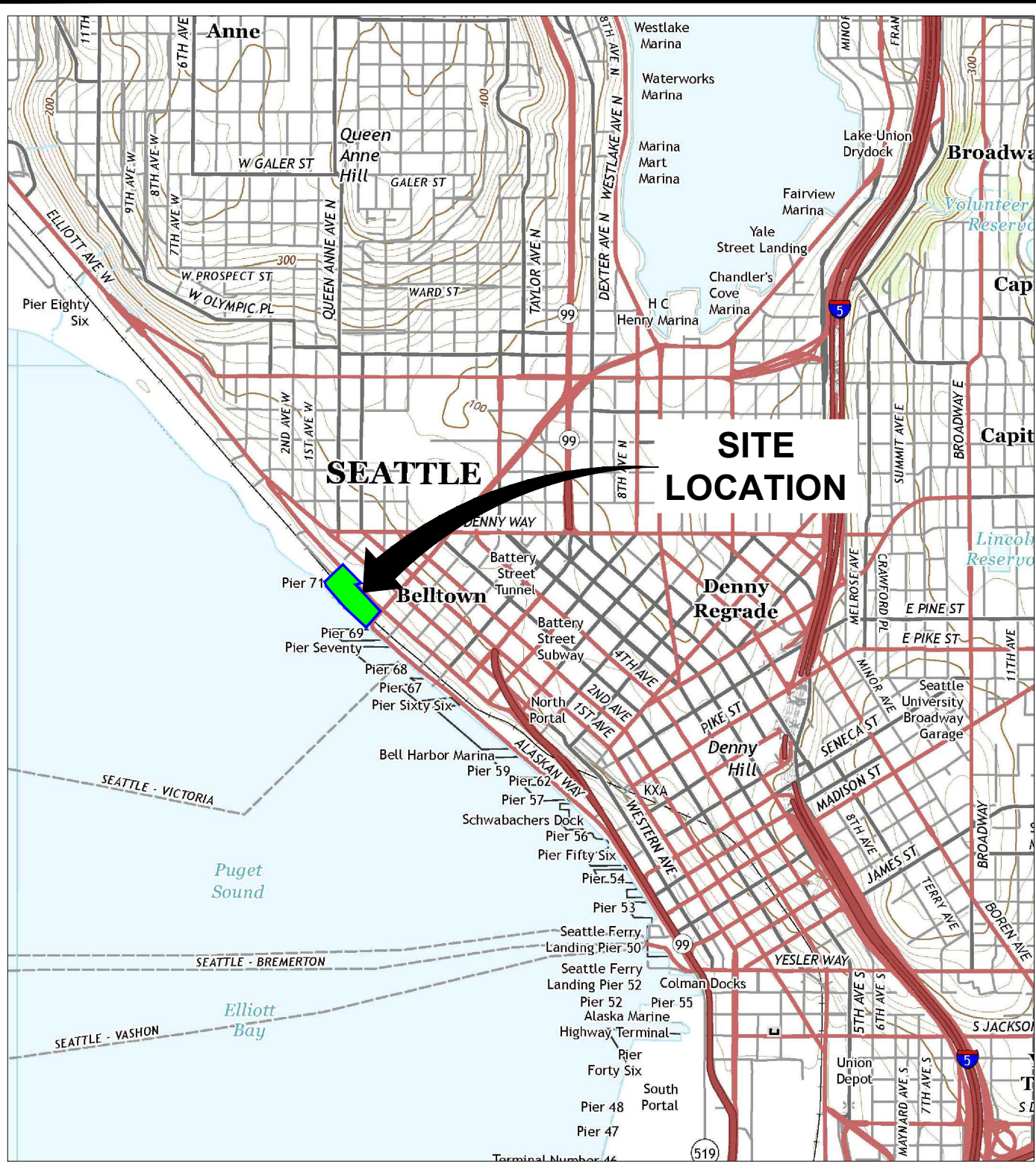
cPAHs = carcinogenic polycyclic aromatic hydrocarbons

N/A = not applicable

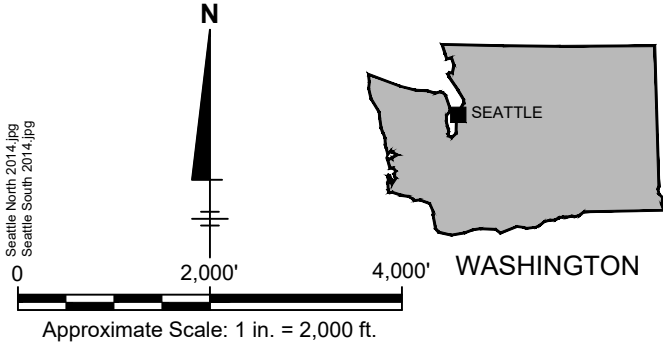
# FIGURES




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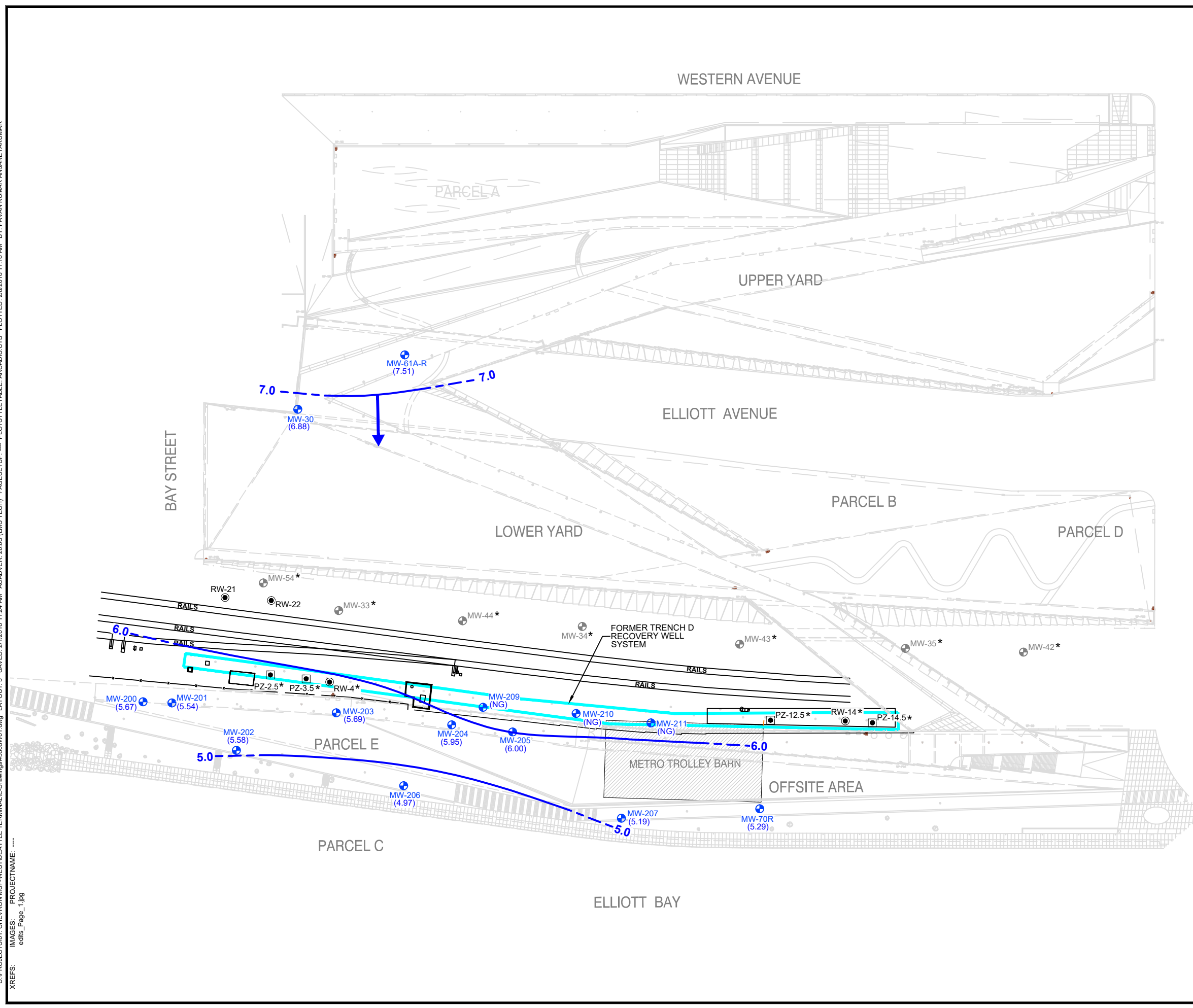
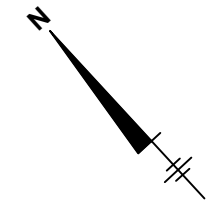
REFERENCE: BASE MAP USGS 7.5. MIN. TOPO. QUAD., SEATTLE SOUTH AND SEATTLE NORTH, WASHINGTON, 2014.



FORMER UNOCAL SEATTLE MARKETING TERMINAL SEATTLE, WASHINGTON	
<b>GROUNDWATER MONITORING REPORT SECOND SEMI-ANNUAL 2017</b>	
<b>SITE LOCATION MAP</b>	
 <b>ARCADIS</b> <small>Design &amp; Consultancy for natural and built assets</small>	FIGURE <b>1</b>

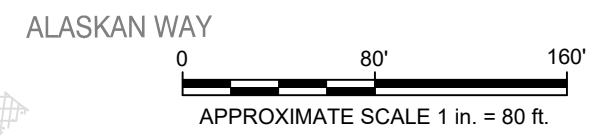


CITY: SAN RAFAEL, CA DIV/GROUP: ENVCAD DB: J. HARRIS, LD: E. MURESAN  
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- LEGEND**
- MW-210 ● MONITORING WELL
  - RW-14 ● RECOVERY WELL
  - PZ-14.5 ■ PIEZOMETER
  - FORMER TRENCH D RECOVERY WELL SYSTEM
  - \* UNABLE TO LOCATE
  - (7.51) WATER-TABLE ELEVATION (FEET)
  - GROUNDWATER CONTOUR LINE (FEET, DASHED WHERE INFERRED)
  - GROUNDWATER FLOW DIRECTION
  - (NG) NOT GAUGED, NO ACCESS

- NOTES:**
1. HORIZONTAL DATUM: WASHINGTON COORDINATE SYSTEM NORTH ZONE (NAD 83/98).
  2. VERTICAL DATUM: N.A.V.D. 88. (PROJECT BENCHMARK WCCS SURVEY CONTROL POINT 1420 AKA CITY OF SEATTLE 5022 ELEV. = 16.11).
  3. HORIZONTAL & VERTICAL CONTROL WAS ESTABLISHED BY VRSN GPS. NOTE: CONTROL WAS BASED ON THE VRSN NETWORK (VIRTUAL REFERENCE STATION NETWORK). STATION S5HO WAS USED WITH VALUES OF N 252393.37 E 1275429.81.
  4. WELL LOCATIONS SURVEYED BY OTAK ON MAY 28, 2008 AND FEBRUARY 16, 2016.
  5. SITE MAPPING SURVEYED BY OTAK ON APRIL 30, 2013. THE PURPOSE OF THIS SURVEY IS TO SHOW PLANIMETRIC FEATURES AND LOCATED UNDERGROUND UTILITIES IN THE VICINITY OF MONITORING AND RECOVERY WELLS.
  6. MONITORING WELLS WERE GAUGED DURING INCOMING LOW TIDE.



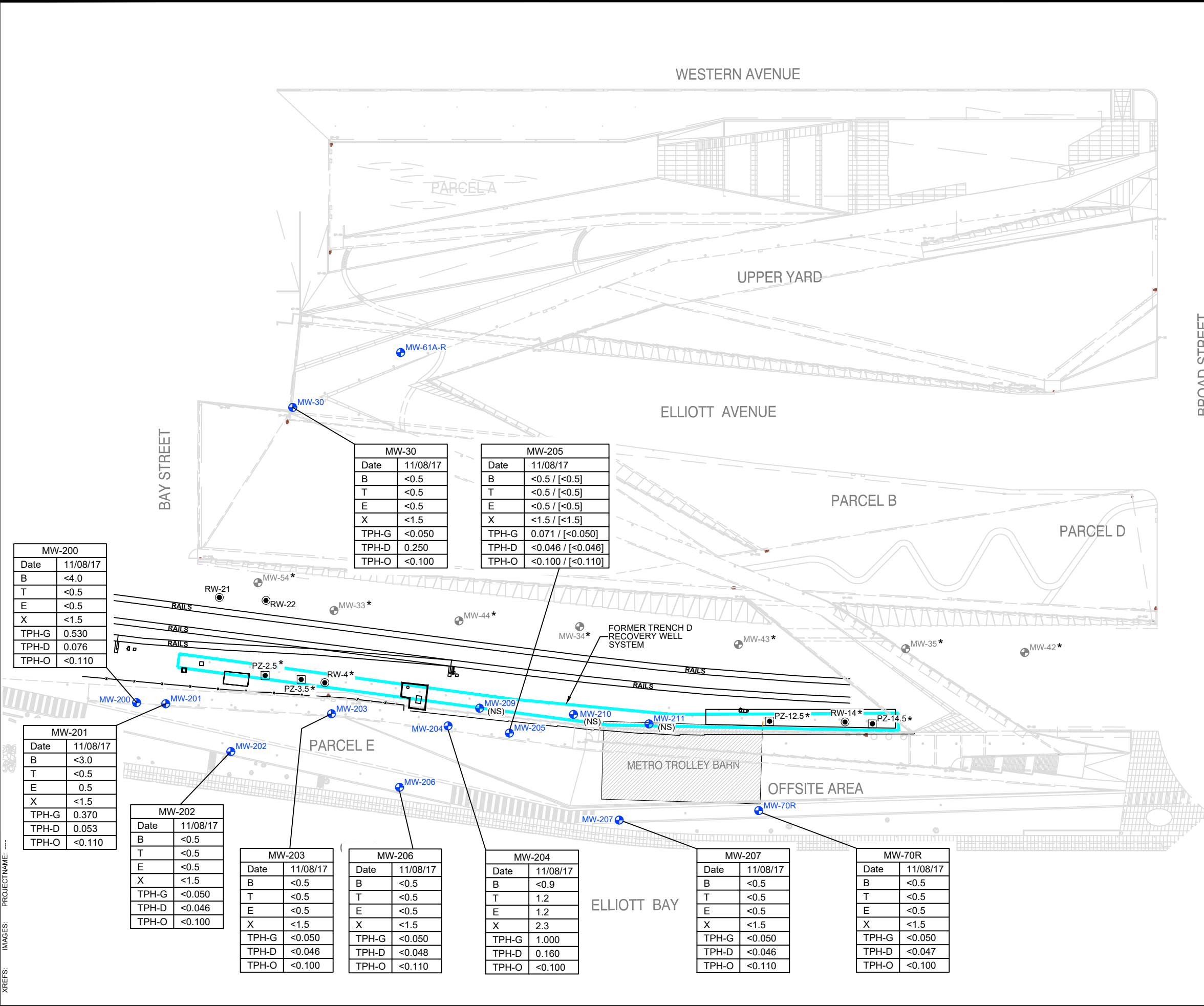
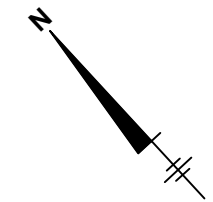
FORMER UNOCAL SEATTLE MARKETING TERMINAL  
 SEATTLE, WASHINGTON  
**GROUNDWATER MONITORING REPORT  
 SECOND SEMI-ANNUAL 2017**

**GROUNDWATER ELEVATIONS  
 NOVEMBER 07, 2017**

**ARCADIS** Design & Consultancy  
 for natural and built assets

FIGURE  
**3**

CITY: SAN RAFAEL, CA DIV/GRUP: ENV/CAD DB: J. HARRIS D:\PROJECTS\01\_CHEVRON MSP-WEST\SEATTLE TERMINAL\E-Drawings\4536301.dwg LAYOUT: 4 - SAVED: 2/8/2018 11:24 AM ACADVER: 20.05 (LMS TECH) PAGES: 10 PAGES/SETUP: --- PLOTTED: 2/8/2018 11:31 AM BY: PAVAN KUMAR ANJANEYAKUMAR XREFS: IMAGES: PROJECTNAME: ---



**LEGEND**

- MW-210 ● MONITORING WELL
- RW-14 ● RECOVERY WELL
- PZ-14.5 ■ PIEZOMETER
- FORMER TRENCH D RECOVERY WELL SYSTEM
- \* UNABLE TO LOCATE
- (NS) NOT SAMPLED, NO ACCESS

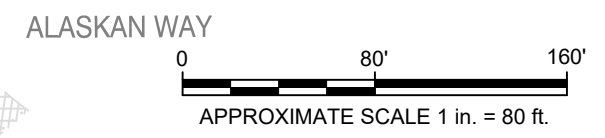
SAMPLE LOCATION	
DATE	SAMPLE DATE
B	BENZENE
T	TOLUENE
E	ETHYLBENZENE
X	TOTAL XYLENES
TPH-G	TPH GASOLINE
TPH-D	TPH DIESEL
TPH-O	TPH HEAVY OIL

BTEX RESULTS REPORTED IN MICROGRAMS PER LITER (µg/L). TPH-G, TPH-D, AND TPH-O RESULTS REPORTED IN MILLIGRAMS PER LITER (mg/L).

TPH = TOTAL PETROLEUM HYDROCARBON  
 <1.50 / [<1.50] = DUPLICATE SAMPLE

**NOTES:**

1. HORIZONTAL DATUM: WASHINGTON COORDINATE SYSTEM NORTH ZONE (NAD 83/98).
2. VERTICAL DATUM: N.A.V.D. 88. (PROJECT BENCHMARK WCCS SURVEY CONTROL POINT 1420 AKA CITY OF SEATTLE 5022 ELEV. = 16.11).
3. HORIZONTAL & VERTICAL CONTROL WAS ESTABLISHED BY VRSN GPS. NOTE: CONTROL WAS BASED ON THE WSRN NETWORK (VIRTUAL REFERENCE STATION NETWORK). STATION SSHA WAS USED WITH VALUES OF N 252393.37 E 1275429.81.
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MW-200	
Date	11/08/17
B	<4.0
T	<0.5
E	<0.5
X	<1.5
TPH-G	0.530
TPH-D	0.076
TPH-O	<0.110

MW-30	
Date	11/08/17
B	<0.5
T	<0.5
E	<0.5
X	<1.5
TPH-G	<0.050
TPH-D	0.250
TPH-O	<0.100

MW-205	
Date	11/08/17
B	<0.5 / [<0.5]
T	<0.5 / [<0.5]
E	<0.5 / [<0.5]
X	<1.5 / [<1.5]
TPH-G	0.071 / [<0.050]
TPH-D	<0.046 / [<0.046]
TPH-O	<0.100 / [<0.110]

MW-201	
Date	11/08/17
B	<3.0
T	<0.5
E	0.5
X	<1.5
TPH-G	0.370
TPH-D	0.053
TPH-O	<0.110

MW-202	
Date	11/08/17
B	<0.5
T	<0.5
E	<0.5
X	<1.5
TPH-G	<0.050
TPH-D	<0.046
TPH-O	<0.100

MW-203	
Date	11/08/17
B	<0.5
T	<0.5
E	<0.5
X	<1.5
TPH-G	<0.050
TPH-D	<0.046
TPH-O	<0.100

MW-206	
Date	11/08/17
B	<0.5
T	<0.5
E	<0.5
X	<1.5
TPH-G	<0.050
TPH-D	<0.048
TPH-O	<0.110

MW-204	
Date	11/08/17
B	<0.9
T	1.2
E	1.2
X	2.3
TPH-G	1.000
TPH-D	0.160
TPH-O	<0.100

MW-207	
Date	11/08/17
B	<0.5
T	<0.5
E	<0.5
X	<1.5
TPH-G	<0.050
TPH-D	<0.046
TPH-O	<0.110

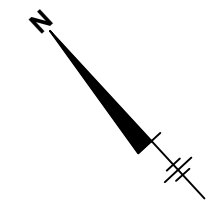
MW-70R	
Date	11/08/17
B	<0.5
T	<0.5
E	<0.5
X	<1.5
TPH-G	<0.050
TPH-D	<0.047
TPH-O	<0.100

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**GROUNDWATER MONITORING REPORT  
 SECOND SEMI-ANNUAL 2017**

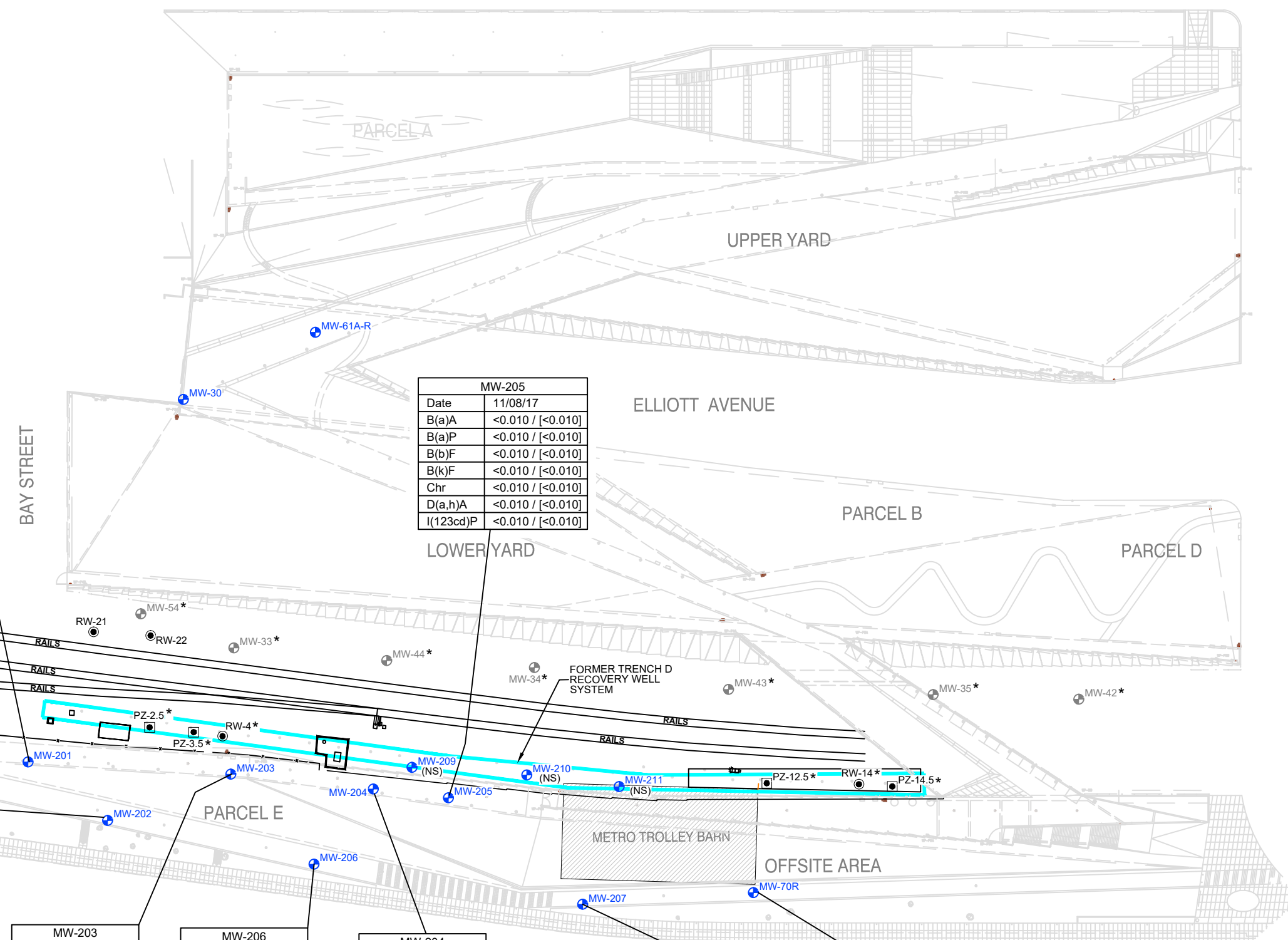
**GROUNDWATER ANALYTICAL  
 SUMMARY MAP  
 NOVEMBER 08, 2017**



CITY: SAN RAFAEL, CA DIV/GROUP: ENV/CAD DB: J. HARRIS D:\PROJECTS\01 - CHEVRON MSP - WEST SEATTLE TERMINAL\E-Drawings\45836302.dwg LAYOUT: 5 - SAVED: 2/8/2018 11:27 AM ACADVER: 20.05 (LMS TECH) PAGES: 5 PLOTTED: 2/8/2018 11:32 AM BY: PAVAN KUMAR ANJANEYAKUMAR



WESTERN AVENUE



BROAD STREET

ALASKAN WAY

**LEGEND**

- MW-210 MONITORING WELL
- RW-14 RECOVERY WELL
- PZ-14.5 PIEZOMETER
- FORMER TRENCH D RECOVERY WELL SYSTEM
- \* UNABLE TO LOCATE
- (NS) NOT SAMPLED, NO ACCESS

SAMPLE LOCATION	
DATE	SAMPLE DATE
B(a)A	Benzo(a)anthracene
B(a)P	Benzo(a)pyrene
B(b)F	Benzo(b)fluoranthene
B(k)F	Benzo(k)fluoranthene
Chr	Chrysene
D(a,h)A	Dibenzo(a,h)anthracene
I(123cd)P	Indeno(1,2,3-cd)pyrene

RESULTS REPORTED IN MICROGRAMS PER LITER (µg/L)

BOLDED RESULTS ARE GREATER THAN SITE REMEDIAL ACTION LEVELS (RALs)

<0.010 / [<0.010] = DUPLICATE SAMPLE

cPAH = CARCINOGENIC POLYNUCLEAR AROMATIC HYDROCARBONS

**NOTES:**

1. HORIZONTAL DATUM: WASHINGTON COORDINATE SYSTEM NORTH ZONE (NAD 83/98).
2. VERTICAL DATUM: N.A.V.D. 88. (PROJECT BENCHMARK WCCS SURVEY CONTROL POINT 1420 AKA CITY OF SEATTLE 5022 ELEV. = 16.11).
3. HORIZONTAL & VERTICAL CONTROL WAS ESTABLISHED BY VRSN GPS. CONTROL WAS BASED ON THE WSRN NETWORK (VIRTUAL REFERENCE STATION NETWORK). STATION S800 WAS USED WITH VALUES OF N 252363.37 E 1275429.81.
4. WELL LOCATIONS SURVEYED BY OTAK ON MAY 28, 2008 AND FEBRUARY 16, 2016.
5. SITE MAPPING SURVEYED BY OTAK ON APRIL 30, 2013. THE PURPOSE OF THIS SURVEY IS TO SHOW PLANIMETRIC FEATURES AND LOCATED UNDERGROUND UTILITIES IN THE VICINITY OF MONITORING AND RECOVERY WELLS.



MW-201	
Date	11/08/17
B(a)A	0.018
B(a)P	<0.010
B(b)F	<0.010
B(k)F	<0.010
Chr	0.019
D(a,h)A	<0.010
I(123cd)P	<0.010

MW-205	
Date	11/08/17
B(a)A	<0.010 / [<0.010]
B(a)P	<0.010 / [<0.010]
B(b)F	<0.010 / [<0.010]
B(k)F	<0.010 / [<0.010]
Chr	<0.010 / [<0.010]
D(a,h)A	<0.010 / [<0.010]
I(123cd)P	<0.010 / [<0.010]

MW-200	
Date	11/08/17
B(a)A	<b>0.064</b>
B(a)P	<b>0.037</b>
B(b)F	<b>0.11</b>
B(k)F	<b>0.096</b>
Chr	<b>0.072</b>
D(a,h)A	<b>0.081</b>
I(123cd)P	<b>0.088</b>

MW-202	
Date	11/08/17
B(a)A	<0.010
B(a)P	<0.010
B(b)F	<0.010
B(k)F	<0.010
Chr	<0.010
D(a,h)A	0.021
I(123cd)P	<0.010

MW-203	
Date	11/08/17
B(a)A	<0.010
B(a)P	<0.010
B(b)F	<0.010
B(k)F	<0.010
Chr	<0.010
D(a,h)A	<0.010
I(123cd)P	<0.010

MW-206	
Date	11/08/17
B(a)A	<0.010
B(a)P	<0.010
B(b)F	<0.010
B(k)F	<0.010
Chr	<0.010
D(a,h)A	<0.010
I(123cd)P	<0.010

MW-204	
Date	11/08/17
B(a)A	<0.011
B(a)P	<0.011
B(b)F	<0.011
B(k)F	<0.011
Chr	<0.011
D(a,h)A	<0.011
I(123cd)P	<0.011

MW-207	
Date	11/08/17
B(a)A	<0.010
B(a)P	<0.010
B(b)F	<0.010
B(k)F	<0.010
Chr	<0.010
D(a,h)A	<0.010
I(123cd)P	<0.010

MW-70R	
Date	11/08/17
B(a)A	0.018
B(a)P	0.015
B(b)F	0.026
B(k)F	0.018
Chr	0.019
D(a,h)A	0.019
I(123cd)P	0.015

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SECOND SEMI-ANNUAL 2017**

**GROUNDWATER cPAH DATA  
NOVEMBER 08, 2017**



FIGURE

**5**

# APPENDIX A

## Standard Operating Procedure



**Appendix A**


Standard Operating Procedure

**Low-Flow Groundwater  
Purging and Sampling  
Procedures for Monitoring  
Wells**

Rev. #: 3

Rev Date: March 9, 2009

**Approval Signatures**

Prepared by:  Date: 3/9/2009

Reviewed by:  Date: 3/9/2009  
(Technical Expert)

## I. Scope and Application

Groundwater samples will be collected from monitoring wells to evaluate groundwater quality. The protocol presented in this standard operating procedure (SOP) describes the procedures to be used to purge monitoring wells and collect groundwater samples. This protocol has been developed in accordance with the United States Environmental Protection Agency (USEPA) Region I Low Stress (Low Flow) Purging and Sampling Procedures for the Collection of Groundwater Samples from Monitoring Wells (USEPA SOP No. GW0001; July 30, 1996). Both filtered and unfiltered groundwater samples may be collected using this low-flow sampling method. Filtered samples will be obtained using a 0.45-micron disposable filter. No wells will be sampled until well development has been performed in accordance with the procedures presented in the SOP titled Monitoring Well Development, unless that well has been sampled or developed within the prior 1-year time period. Groundwater samples will not be collected within 1 week following well development.

## II. Personnel Qualifications

ARCADIS personnel directing, supervising, or leading groundwater sample collection activities should have a minimum of 2 years of previous groundwater sampling experience. ARCADIS personnel providing assistance to groundwater sample collection and associated activities should have a minimum of 6 months of related experience or an advanced degree in environmental sciences, engineering, hydrogeology, or geology.

The supervisor of the groundwater sampling team will have at least 1 year of previous supervised groundwater sampling experience.

Prior to mobilizing to the field, the groundwater sampling team should review and be thoroughly familiar with relevant site-specific documents including but not limited to the site work plan, field sampling plan, QAPP, HASP, and historical information. Additionally, the groundwater sampling team should review and be thoroughly familiar with documentation provided by equipment manufacturers for all equipment that will be used in the field prior to mobilization.

## III. Equipment List

Specific to this activity, the following materials (or equivalent) will be available:

- Health and safety equipment (as required in the site Health and Safety Plan [HASP]).

- Site Plan, well construction records, prior groundwater sampling records (if available).
- Sampling pump, which may consist of one or more of the following:
  - submersible pump (e.g., Grundfos Redi-Flo 2);
  - peristaltic pump (e.g., ISCO Model 150); and/or
  - bladder pump (e.g., Marschalk System 1, QED Well Wizard, etc.).
- Appropriate controller and power source for pump:
  - Submersible and peristaltic pumps require electric power from either a generator or a deep cell battery.
  - Submersible pumps such as Grundfos require a pump controller to run the pump
  - Bladder pumps require a pump controller and a gas source (e.g., air compressor or compressed N<sub>2</sub> or CO<sub>2</sub> gas cylinders).
- Teflon<sup>®</sup> tubing or Teflon<sup>®</sup>-lined polyethylene tubing of an appropriate size for the pump being used. For peristaltic pumps, dedicated Tygon<sup>®</sup> tubing (or other type as specified by the manufacturer) will also be used through the pump apparatus.
- Water-level probe (e.g., Solinst Model 101).
- Water-quality (temperature/pH/specific conductivity/ORP/turbidity/dissolved oxygen) meter and flow-through measurement cell. Several brands may be used, including:
  - YSI 6-Series Multi-Parameter Instrument;
  - Hydrolab Series 3 or Series 4a Multiprobe and Display; and/or
  - Horiba U-10 or U-22 Water Quality Monitoring System.
- Supplemental turbidity meter (e.g., Horiba U-10, Hach 2100P, LaMotte 2020). Turbidity measurements collected with multi-parameter meters have been shown to sometimes be unreliable due to fouling of the optic lens of the

turbidity meter within the flow-through cell. A supplemental turbidity meter will be used to verify turbidity data during purging if such fouling is suspected. Note that industry improvements may eliminate the need for these supplemental measurements in the future.

- Appropriate water sample containers (supplied by the laboratory).
- Appropriate blanks (trip blank supplied by the laboratory).
- 0.45-micron disposable filters (if field filtering is required).
- Large glass mixing container (if sampling with a bailer).
- Teflon<sup>®</sup> stirring rod (if sampling with a bailer).
- Cleaning equipment.
- Groundwater sampling log (attached) or bound field logbook.

Note that in the future, the client may acquire different makes/models of some of this equipment if the listed makes/models are no longer available, or as a result of general upgrades or additional equipment acquisitions. In the event that the client uses a different make/model of the equipment listed, the client will use an equivalent type of equipment (e.g., pumps, flow-through analytical cells) and note the specific make/model of the equipment used during a sampling event on the groundwater sampling log. In addition, should the client desire to change to a markedly different sampling methodology (e.g., discrete interval samplers, passive diffusion bags, or a yet to be developed technique), the client will submit a proposed SOP for the new methodology for USEPA approval prior to implementing such a change.

The maintenance requirements for the above equipment generally involve decontamination or periodic cleaning, battery charging, and proper storage, as specified by the manufacturer. For operational difficulties, the equipment will be serviced by a qualified technician.

#### **IV. Cautions**

If heavy precipitation occurs and no cover over the sampling area and monitoring well can be erected, sampling must be discontinued until adequate cover is provided. Rain water could contaminate groundwater samples.

Do not use permanent marker or felt-tip pens for labels on sample container or sample coolers – use indelible ink. The permanent markers could introduce volatile constituents into the samples.

It may be necessary to field filter some parameters (e.g., metals) prior to collection, depending on preservation, analytical method, and project quality objectives.

Store and/or stage empty and full sample containers and coolers out of direct sunlight.

To mitigate potential cross-contamination, groundwater samples are to be collected in a pre-determined order from least impacted to impacted based on previous analytical data. If no analytical data are available, samples are collected in order of upgradient, then furthest downgradient to source area locations.

Be careful not to over-tighten lids with Teflon liners or septa (e.g., 40 mL vials). Over-tightening can cause the glass to shatter or impair the integrity of the Teflon seal.

## **V. Health and Safety Considerations**

Use caution and appropriate cut resistant gloves when tightening lids to 40 mL vials. These vials can break while tightening and can lacerate hand. Amber vials (thinner glass) are more prone to breakage.

If thunder or lightning is present, discontinue sampling and take cover until 30 minutes have passed after the last occurrence of thunder or lightning.

Use caution when removing well caps as well may be under pressure, cap can dislodge forcefully and cause injury.

Use caution when opening protective casing on stickup wells as wasps frequently nest inside the tops of the covers. Also watch for fire ant mounds near well pads when sampling in the south or western U.S.

## **VI. Procedure**

Groundwater will be purged from the wells using an appropriate pump. Peristaltic pumps will initially be used to purge and sample all wells when applicable. If the depth to water is below the sampling range of a peristaltic pump (approximately 25 feet), submersible pumps or bladder pumps will be used provided the well is constructed with a casing diameter greater than or equal to 2 inches (the minimum well diameter capable of accommodating such pumps). Bladder pumps are preferred over peristaltic and submersible pumps if sampling of VOCs is required to prevent volatilization. For

smaller diameter wells where the depth to water is below the sampling range of a peristaltic pump, alternative sampling methods (i.e., bailing or small diameter bladder pumps) will be used to purge and sample the groundwater. Purge water will be collected and containerized.

1. Calibrate field instruments according to manufacturer procedures for calibration.
2. Measure initial depth to groundwater prior to placement of pumps.
3. Prepare and install pump in well: For submersible and non-dedicated bladder pumps, decontaminate pump according to site decontamination procedures. Non-dedicated bladder pumps will require a new Teflon<sup>®</sup> bladder and attachment of an air line, sample discharge line, and safety cable prior to placement in the well. Attach the air line tubing to the air port on the top of the bladder pump. Attach the sample discharge tubing to the water port on the top of the bladder pump. Care should be taken not to reverse the air and discharge tubing lines during bladder pump set-up as this could result in bladder failure or rupture. Attach and secure a safety cable to the eyebolt on the top of bladder pump (if present, depending on pump model used). Slowly lower pump, safety cable, tubing, and electrical lines into the well to a depth corresponding to the approximate center of the saturated screen section of the well. Take care to avoid twisting and tangling of safety cable, tubing, and electrical lines while lowering pump into well; twisted and tangled lines could result in the pump becoming stuck in the well casing. Also, make sure to keep tubing and lines from touching the ground or other surfaces while introducing them into the well as this could lead to well contamination. If a peristaltic pump is being used, slowly lower the sampling tubing into the well to a depth corresponding to the approximate center of the saturated screen section of the well. The pump intake or sampling tube must be kept at least 2 feet above the bottom of the well to prevent mobilization of any sediment present in the bottom of the well.
4. Connect the pump to other equipment. If using a bladder pump, the discharge water line should be connected to the bottom inlet port on the flow-through cell connected to the water quality meter. Connect the air line to the pump controller output port. The pump controller should then be connected to a supply line from an air compressor or compressed gas cylinder using an appropriate regulator and air hose. Take care to tighten the regulator connector onto the gas cylinder (if used) to prevent leaks. Teflon tape may be used on the threads of the cylinder to provide a tighter seal. Once the air compressor or gas cylinder is connected to the pump controller, turn on the compressor or open the valve on the cylinder to begin the gas flow. Turn on the pump controller if an on/off switch

is present and verify that all batteries are charged and fully operating before beginning to pump.

5. Measure the water level again with the pump in the well before starting the pump. Start pumping the well at 200 to 500 milliliters (mL) per minute (or at lower site-specific rate if specified). The pump rate should be adjusted to cause little or no water level drawdown in the well (less than 0.3 feet below the initial static depth to water measurement) and the water level should stabilize. The water level should be monitored every 3 to 5 minutes (or as appropriate, lower flow rates may require longer time between readings) during pumping if the well diameter is of sufficient size to allow such monitoring. Care should be taken not to break pump suction or cause entrainment of air in the sample. Record pumping rate adjustments and depths to water. If necessary, pumping rates should be reduced to the minimum capabilities of the pump to avoid pumping the well dry and/or to stabilize indicator parameters. A steady flow rate should be maintained to the extent practicable. Groundwater sampling records from previous sampling events (if available) should be reviewed prior to mobilization to estimate the optimum pumping rate and anticipated drawdown for the well in order to more efficiently reach a stabilized pumping condition.

If the recharge rate of the well is very low, alternative purging techniques should be used, which will vary based on the well construction and screen position. For wells screened across the water table, the well should be pumped dry and sampling should commence as soon as the volume in the well has recovered sufficiently to permit collection of samples. For wells screened entirely below the water table, the well should be pumped until a stabilized level (which may be below the maximum displacement goal of 0.3 feet) can be maintained and monitoring for stabilization of field indicator parameters can commence. If a lower stabilization level cannot be maintained, the well should be pumped until the drawdown is at a level slightly higher than the bentonite seal above the well screen. Sampling should commence after one well volume has been removed and the well has recovered sufficiently to permit collection of samples.

During purging, monitor the field indicator parameters (e.g., turbidity, temperature, specific conductance, pH, etc.) every 3 to 5 minutes (or as appropriate). Field indicator parameters will be measured using a flow-through analytical cell or a clean container such as a glass beaker. Record field indicator parameters on the groundwater sampling log. The well is considered stabilized and ready for sample collection when turbidity values remain within 10% (or within 1 NTU if the turbidity reading is less than 10 NTU), the specific conductance and temperature values remain within 3%, and pH remains within 0.1 units for three consecutive readings collected at 3- to 5-minute intervals (or

other appropriate interval, alternate stabilization goals may exist in different geographic regions, consult the site-specific Work Plan for stabilization criteria). If the field indicator parameters do not stabilize within 1 hour of the start of purging, but the groundwater turbidity is below the goal of 50 NTU and the values for all other parameters are within 10%, the well can be sampled. If the parameters have stabilized but the turbidity is not in the range of the 50 NTU goal, the pump flow rate should be decreased to a minimum rate of 100 mL/min to reduce turbidity levels as low as possible. If dissolved oxygen values are not within acceptable range for the temperature of groundwater (Attachment 1), then check for and remove air bubbles on probe or in tubing. If the dissolved oxygen value is 0.00 or less, then the meter should be serviced and re-calibrated.

During extreme weather conditions, stabilization of field indicator parameters may be difficult to obtain. Modifications to the sampling procedures to alleviate these conditions (e.g., measuring the water temperature in the well adjacent to the pump intake) will be documented in the field notes. If other field conditions exist that preclude stabilization of certain parameters, an explanation of why the parameters did not stabilize will also be documented in the field logbook.

6. Complete the sample label and cover the label with clear packing tape to secure the label onto the container.
7. After the indicator parameters have stabilized, collect groundwater samples by diverting flow out of the unfiltered discharge tubing into the appropriate labeled sample container. If a flow-through analytical cell is being used to measure field parameters, the flow-through cell should be disconnected after stabilization of the field indicator parameters and prior to groundwater sample collection. Under no circumstances should analytical samples be collected from the discharge of the flow-through cell. When the container is full, tightly screw on the cap. Samples should be collected in the following order: VOCs, TOC, SVOCs, metals and cyanide, and others (or other order as defined in the site-specific Work Plan).
8. If sampling for total and filtered metals and/or PCBs, a filtered and unfiltered sample will be collected. Install an in-line, disposable 0.45-micron particle filter on the discharge tubing after the appropriate unfiltered groundwater sample has been collected. Continue to run the pump until an initial volume of "flush" water has been run through the filter in accordance with the manufacturer's directions (generally 100 to 300 mL). Collect filtered groundwater sample by diverting flow out of the filter into the appropriately labeled sample container. When the container is full, tightly screw on the cap.

9. Secure with packing material and store at 4°C in an insulated transport container provided by the laboratory.
10. Record on the groundwater sampling log or bound field logbook the time sampling procedures were completed, any pertinent observations of the sample (e.g., physical appearance, and the presence or lack of odors or sheens), and the values of the stabilized field indicator parameters as measured during the final reading during purging (Attachment 2 – Example Sampling Log).
11. Turn off the pump and air compressor or close the gas cylinder valve if using a bladder pump set-up. Slowly remove the pump, tubing, lines, and safety cable from the well. Do not allow the tubing or lines to touch the ground or any other surfaces which could contaminate them. .
12. If tubing is to be dedicated to a well, it should be folded to a length that will allow the well to be capped and also facilitate retrieval of the tubing during later sampling events. A length of rope or string should be used to tie the tubing to the well cap. Alternatively, if tubing and safety line are to be saved and reused for sampling the well at a later date they may be coiled neatly and placed in a clean plastic bag that is clearly labeled with the well ID. Make sure the bag is tightly sealed before placing it in storage.
13. Secure the well and properly dispose of personal protective equipment (PPE) and disposable equipment.
14. Complete the procedures for packaging, shipping, and handling with associated chain-of-custody.
15. Complete decontamination procedures for flow-through analytical cell and submersible or bladder pump, as appropriate.
16. At the end of the day, perform calibration check of field instruments.

If it is not technically feasible to use the low-flow sampling method, purging and sampling of monitoring wells may be conducted using the bailer method as outlined below:

1. Don appropriate PPE (as required by the HASP).
2. Place plastic sheeting around the well.
3. Clean sampling equipment.

4. Open the well cover while standing upwind of the well. Remove well cap and place on the plastic sheeting. Insert PID probe approximately 4 to 6 inches into the casing or the well headspace and cover with gloved hand. Record the PID reading in the field log. If the well headspace reading is less than 5 PID units, proceed; if the headspace reading is greater than 5 PID units, screen the air within the breathing zone. If the breathing zone reading is less than 5 PID units, proceed. If the PID reading in the breathing zone is above 5 PID units, move upwind from well for 5 minutes to allow the volatiles to dissipate. Repeat the breathing zone test. If the reading is still above 5 PID units, don appropriate respiratory protection in accordance with the requirements of the HASP. Record all PID readings. For wells that are part of the regular weekly monitoring program and prior PID measurements have not resulted in a breathing zone reading above 5 PID units, PID measurements will be taken monthly.
5. Measure the depth to water and determine depth of well by examining drilling log data or by direct measurement. Calculate the volume of water in the well (in gallons) by using the length of the water column (in feet), multiplying by 0.163 for a 2-inch well or by 0.653 for a 4-inch well. For other well diameters, use the formula:  
  
$$\text{Volume (in gallons)} = \bullet \text{ TIMES well radius (in feet) squared TIMES length of water column (in feet) TIMES 7.481 (gallons per cubic foot)}$$
6. Measure a length of rope or twine at least 10 feet greater than the total depth of the well. Secure one end of the rope to the well casing and secure the other end to the bailer. Test the knots and make sure the rope will not loosen. Check bailers so that all parts are intact and will not be lost in the well.
7. Lower bailer into well and remove one well volume of water. Contain all water in appropriate containers.
8. Monitor the field indicator parameters (e.g., turbidity, temperature, specific conductance, and pH). Measure field indicator parameters using a clean container such as a glass beaker or sampling cups provided with the instrument. Record field indicator parameters on the groundwater sampling log.
9. Repeat Steps 7 and 8 until three or four well volumes have been removed. Examine the field indicator parameter data to determine if the parameters have stabilized. The well is considered stabilized and ready for sample collection when turbidity values remain within 10% (or within 1 NTU if the turbidity reading is less than 10 NTU), the specific conductance and temperature values remain

within 3%, and pH remains within 0.1 units for three consecutive readings collected once per well volume removed.

10. If the field indicator parameters have not stabilized, remove a maximum of five well volumes prior to sample collection. Alternatively, five well volumes may be removed without measuring the field indicator parameters.
11. If the recharge rate of the well is very low, wells screened across the water table may be bailed dry and sampling should commence as soon as the volume in the well has recovered sufficiently to permit collection of samples. For wells screened entirely below the water table, the well should only be bailed down to a level slightly higher than the bentonite seal above the well screen. The well should not be bailed completely dry, to maintain the integrity of the seal. Sampling should commence as soon as the well volume has recovered sufficiently to permit sample collection.
12. Following purging, allow water level in well to recharge to a sufficient level to permit sample collection.
13. Complete the sample label and cover the label with clear packing tape to secure the label onto the container.
14. Slowly lower the bailer into the screened portion of the well and carefully retrieve a filled bailer from the well causing minimal disturbance to the water and any sediment in the well.
15. The sample collection order (as appropriate) will be as follows:
  - a. VOCs;
  - b. TOC;
  - c. SVOCs;
  - d. metals and cyanide; and
  - e. others.
16. When sampling for volatiles, collect water samples directly from the bailer into 40-mL vials with Teflon<sup>®</sup>-lined septa.

17. For other analytical samples, remove the cap from the large glass mixing container and slowly empty the bailer into the large glass mixing container. The sample for dissolved metals and/or filtered PCBs should either be placed directly from the bailer into a pressure filter apparatus or pumped directly from the bailer with a peristaltic pump, through an in-line filter, into the pre-preserved sample bottle.
18. Continue collecting samples until the mixing container contains a sufficient volume for all laboratory samples.
19. Mix the entire sample volume with the Teflon<sup>®</sup> stirring rod and transfer the appropriate volume into the laboratory jar(s). Secure the sample jar cap(s) tightly.
20. If sampling for total and filtered metals and/or PCBs, a filtered and unfiltered sample will be collected. Sample filtration for the filtered sample will be performed in the field using a peristaltic pump prior to preservation. Install new medical-grade silicone tubing in the pump head. Place new Teflon<sup>®</sup> tubing into the sample mixing container and attach to the intake side of pump tubing. Attach (clamp) a new 0.45-micron filter (note the filter flow direction). Turn the pump on and dispense the filtered liquid directly into the laboratory sample bottles.
21. Secure with packing material and store at 4°C in an insulated transport container provided by the laboratory.
22. After sample containers have been filled, remove one additional volume of groundwater. Measure the pH, temperature, turbidity, and conductivity. Record on the groundwater sampling log or bound field logbook the time sampling procedures were completed, any pertinent observations of the sample (e.g., physical appearance, and the presence or lack of odors or sheens), and the values of the field indicator parameters.
23. Remove bailer from well, secure well, and properly dispose of PPE and disposable equipment.
24. If a bailer is to be dedicated to a well, it should be secured inside the well above the water table, if possible. Dedicated bailers should be tied to the well cap so that inadvertent loss of the bailer will not occur when the well is opened.
25. Complete the procedures for packaging, shipping, and handling with associated chain-of-custody.

## VII. Waste Management

Materials generated during groundwater sampling activities, including disposable equipment, will be placed in appropriate containers. Containerized waste will be disposed of by the client consistent with the procedures identified in the HASP.

## VIII. Data Recording and Management

Initial field logs and chain-of-custody records will be transmitted to the ARCADIS PM at the end of each day unless otherwise directed by the PM. The groundwater team leader retains copies of the groundwater sampling logs.

## IX. Quality Assurance

In addition to the quality control samples to be collected in accordance with this SOP, the following quality control procedures should be observed in the field:

- Collect samples from monitoring wells in order of increasing concentration, to the extent known based on review of historical site information if available.
- Equipment blanks should include the pump and tubing (if using disposable tubing) or the pump only (if using tubing dedicated to each well).
- Collect equipment blanks after wells with higher concentrations (if known) have been sampled.
- Operate all monitoring instrumentation in accordance with manufacturer's instructions and calibration procedures. Calibrate instruments at the beginning of each day and verify the calibration at the end of each day. Record all calibration activities in the field notebook.
- Clean all groundwater sampling equipment prior to use in the first well and after each subsequent well using procedures for equipment decontamination.

## X. References

United States Environmental Protection Agency (USEPA). 1986. RCRA Groundwater Monitoring Technical Enforcement Guidance Document (September 1986).

USEPA Region II. 1998. *Ground Water Sampling Procedure Low Stress (Low Flow) Purging and Sampling*.

USEPA. 1991. Handbook Groundwater, Volume II Methodology, Office of Research and Development, Washington, DC. USEPN62S, /6-90/016b (July, 1991).

U.S. Geological Survey (USGS). 1977. National Handbook of Recommended Methods for Water-Data Acquisition: USGS Office of Water Data Coordination. Reston, Virginia.

**Attachment 1**

**Groundwater Sampling Log**



**Attachment 2**

**Oxygen Solubility in Fresh Water**

<b>Temperature (degrees C)</b>	<b>Dissolved Oxygen (mg/L)</b>
0	14.6
1	14.19
2	13.81
3	13.44
4	13.09
5	12.75
6	12.43
7	12.12
8	11.83
9	11.55
10	11.27
11	11.01
12	10.76
13	10.52
14	10.29
15	10.07
16	9.85
17	9.65
18	9.45
19	9.26
20	9.07
21	8.9
22	8.72
23	8.56
24	8.4
25	8.24
26	8.09
27	7.95
28	7.81
29	7.67
30	7.54
31	7.41
32	7.28
33	7.16
34	7.05
35	6.93

Reference: Vesilind, P.A., *Introduction to Environmental Engineering*, PWS Publishing Company, Boston, 468 pages (1996).

# APPENDIX B

Field Data Sheets



# Low-Flow Test Report:

**Test Date / Time:** 11/8/2017 12:12:12 PM

**Project:** Seattle Terminal 4Q17 GWM

**Operator Name:** RB/EK

<b>Location Name: MW-30</b> <b>Latitude: 47.61702</b> <b>Longitude: -122.35644</b> <b>Well Diameter: 4 in</b> <b>Casing Type: PVC</b> <b>Screen Length: 25 ft</b> <b>Top of Screen: 5 ft</b> <b>Total Depth: 30 ft</b> <b>Initial Depth to Water: 13.96 ft</b>	<b>Pump Type: Geopump</b> <b>Tubing Type: 0.25" OD poly tubing</b> <b>Pump Intake From TOC: 14.02 ft</b> <b>Estimated Total Volume Pumped: 1.5 gal</b> <b>Flow Cell Volume: 130 ml</b> <b>Final Flow Rate: 200 ml/min</b> <b>Final Draw Down: 0.09 ft</b>	<b>Instrument Used: Aqua TROLL 600 Vented</b> <b>Serial Number: 466472</b>
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**Test Notes:**

Final RDO = 0.07 mg/ L

**Weather Conditions:**

Cloudy

**Low-Flow Readings:**

Date Time	Elapsed Time	pH	Temperature	Specific Conductivity	RDO Concentration	ORP	Depth To Water	Flow
		+/- 10 %	+/- 10 %	+/- 15 %	+/- 10 %	+/- 15		
11/8/2017 12:12 PM	00:00	7.14 pH	13.00 °C	734.58 µS/cm	1.15 mg/L	-96.5 mV	13.96 ft	200.00 ml/min
11/8/2017 12:15 PM	03:00	7.15 pH	13.41 °C	724.23 µS/cm	0.24 mg/L	-111.6 mV	13.96 ft	200.00 ml/min
11/8/2017 12:18 PM	06:00	7.12 pH	13.53 °C	721.30 µS/cm	0.13 mg/L	-117.3 mV	13.96 ft	200.00 ml/min
11/8/2017 12:21 PM	09:00	7.12 pH	13.58 °C	723.20 µS/cm	0.10 mg/L	-121.4 mV	13.96 ft	200.00 ml/min
11/8/2017 12:24 PM	12:00	7.12 pH	13.60 °C	725.48 µS/cm	0.08 mg/L	-124.9 mV	13.96 ft	200.00 ml/min
11/8/2017 12:27 PM	15:00	7.13 pH	13.63 °C	728.46 µS/cm	0.07 mg/L	-128.1 mV	13.96 ft	200.00 ml/min
11/8/2017 12:30 PM	18:00	7.13 pH	13.64 °C	729.08 µS/cm	0.07 mg/L	-131.0 mV	13.96 ft	200.00 ml/min
11/8/2017 12:33 PM	21:00	7.13 pH	13.65 °C	730.65 µS/cm	0.06 mg/L	-133.3 mV	13.96 ft	200.00 ml/min
11/8/2017 12:36 PM	24:00	7.13 pH	13.65 °C	730.42 µS/cm	0.05 mg/L	-134.7 mV	13.96 ft	200.00 ml/min
11/8/2017 12:39 PM	27:00	7.13 pH	13.67 °C	729.97 µS/cm	0.05 mg/L	-135.9 mV	13.96 ft	200.00 ml/min
11/8/2017 12:42 PM	30:00	7.14 pH	13.67 °C	733.32 µS/cm	0.05 mg/L	-136.3 mV	13.96 ft	200.00 ml/min

**Samples**

Sample ID:	Description:
MW-30	1245

# Low-Flow Test Report:

**Test Date / Time:** 11/8/2017 1:20:32 PM  
**Project:** Seattle Terminal 4Q17 GWM (4)  
**Operator Name:** RB/EK

<b>Location Name: MW-70R</b> <b>Latitude: 47.6154</b> <b>Longitude: -122.35594</b> <b>Well Diameter: 2 in</b> <b>Casing Type: PVC</b> <b>Screen Length: 12 ft</b> <b>Top of Screen: 4 ft</b> <b>Total Depth: 16 ft</b> <b>Initial Depth to Water: 9.42 ft</b>	<b>Pump Type: Geopump</b> <b>Tubing Type: 0.25" OD POLY</b> <b>Pump Intake From TOC: 9.8 ft</b> <b>Estimated Total Volume Pumped: 1 gal</b> <b>Flow Cell Volume: 130 ml</b> <b>Final Flow Rate: 150 ml/min</b> <b>Final Draw Down: 0.18 ft</b>	<b>Instrument Used: Aqua TROLL 600 Vented</b> <b>Serial Number: 457166</b>
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**Test Notes:**  
 Final RDO = 0.73 mg/L

## Low-Flow Readings:

Date Time	Elapsed Time	pH	Temperature	Specific Conductivity	RDO Concentration	ORP	Depth To Water	Flow
		+/- 10 %	+/- 10 %	+/- 15 %	+/- 10 %	+/- 15		
11/8/2017 1:20 PM	00:00	6.79 pH	14.73 °C	27,409 µS/cm	1.42 mg/L	143.9 mV	9.42 ft	150.00 ml/min
11/8/2017 1:23 PM	03:00	6.81 pH	14.90 °C	29,385 µS/cm	0.87 mg/L	130.2 mV	9.42 ft	150.00 ml/min
11/8/2017 1:26 PM	06:00	6.82 pH	14.97 °C	29,413 µS/cm	0.75 mg/L	122.2 mV	9.42 ft	150.00 ml/min
11/8/2017 1:29 PM	09:00	6.83 pH	15.02 °C	29,551 µS/cm	0.72 mg/L	116.2 mV	9.42 ft	150.00 ml/min
11/8/2017 1:32 PM	12:00	6.83 pH	15.06 °C	29,608 µS/cm	0.72 mg/L	111.6 mV	9.42 ft	150.00 ml/min
11/8/2017 1:35 PM	15:00	6.83 pH	15.07 °C	29,615 µS/cm	0.70 mg/L	107.5 mV	9.42 ft	150.00 ml/min

## Samples

Sample ID:	Description:
MW-70R	1335

# Low-Flow Test Report:

Test Date / Time: 11/8/2017 10:56:38 AM

Project: Seattle Terminal 4Q17 GWM (3)

Operator Name: RB/EK

<b>Location Name: MW-200</b> <b>Latitude: 47.61671</b> <b>Longitude: -122.35739</b> <b>Well Diameter: 2 in</b> <b>Casing Type: PVC</b> <b>Screen Length: 18.9 ft</b> <b>Top of Screen: 5 ft</b> <b>Total Depth: 23.9 ft</b> <b>Initial Depth to Water: 8.78 ft</b>	<b>Pump Type: Geopump</b> <b>Tubing Type: 0.25" OD POLY</b> <b>Pump Intake From TOC: 9.2 ft</b> <b>Estimated Total Volume Pumped: 1 gal</b> <b>Flow Cell Volume: 130 ml</b> <b>Final Flow Rate: 150 ml/min</b> <b>Final Draw Down: 0.21 ft</b>	<b>Instrument Used: Aqua TROLL 600 Vented</b> <b>Serial Number: 457166</b>
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## Test Notes:

Final RDO = 0.54 mg/L

RDO did not stabilize

## Weather Conditions:

Overcast

## Low-Flow Readings:

Date Time	Elapsed Time	pH	Temperature	Specific Conductivity	RDO Concentration	ORP	Depth To Water	Flow
		+/- 10 %	+/- 10 %	+/- 15 %	+/- 10 %	+/- 15		
11/8/2017 10:56 AM	00:00	6.98 pH	15.25 °C	2,115.6 µS/cm	0.27 mg/L	-54.4 mV	8.78 ft	150.00 ml/min
11/8/2017 10:59 AM	03:00	6.99 pH	15.01 °C	2,126.0 µS/cm	0.17 mg/L	-83.1 mV	8.78 ft	150.00 ml/min
11/8/2017 11:02 AM	06:00	6.99 pH	14.98 °C	2,133.4 µS/cm	0.16 mg/L	-86.5 mV	8.78 ft	150.00 ml/min
11/8/2017 11:05 AM	09:00	7.00 pH	15.08 °C	2,129.7 µS/cm	0.21 mg/L	-93.5 mV	8.78 ft	150.00 ml/min
11/8/2017 11:08 AM	12:00	7.00 pH	15.15 °C	2,135.5 µS/cm	0.23 mg/L	-97.8 mV	8.78 ft	150.00 ml/min
11/8/2017 11:11 AM	15:00	7.00 pH	15.19 °C	2,136.5 µS/cm	0.26 mg/L	-99.6 mV	8.78 ft	150.00 ml/min
11/8/2017 11:14 AM	18:00	7.00 pH	14.80 °C	2,058.4 µS/cm	0.12 mg/L	-102.9 mV	8.78 ft	150.00 ml/min
11/8/2017 11:17 AM	21:00	7.00 pH	14.88 °C	2,036.7 µS/cm	0.10 mg/L	-106.6 mV	8.78 ft	150.00 ml/min
11/8/2017 11:20 AM	24:00	7.00 pH	14.77 °C	2,040.3 µS/cm	0.12 mg/L	-106.7 mV	8.78 ft	150.00 ml/min
11/8/2017 11:23 AM	27:00	7.00 pH	14.96 °C	2,037.5 µS/cm	0.05 mg/L	-109.9 mV	8.78 ft	150.00 ml/min
11/8/2017 11:26 AM	30:00	7.00 pH	14.93 °C	2,037.9 µS/cm	0.08 mg/L	-114.8 mV	8.78 ft	150.00 ml/min
11/8/2017 11:29 AM	33:00	7.01 pH	14.88 °C	2,043.4 µS/cm	0.11 mg/L	-114.7 mV	8.78 ft	150.00 ml/min

11/8/2017 11:32 AM	36:00	7.01 pH	14.82 °C	2,046.7 µS/cm	0.14 mg/L	-115.4 mV	8.78 ft	150.00 ml/min
11/8/2017 11:35 AM	39:00	7.01 pH	14.75 °C	2,030.4 µS/cm	0.15 mg/L	-113.0 mV	8.78 ft	150.00 ml/min
11/8/2017 11:38 AM	42:00	7.01 pH	14.68 °C	2,114.2 µS/cm	0.45 mg/L	-111.0 mV	8.78 ft	150.00 ml/min
11/8/2017 11:41 AM	45:00	7.02 pH	13.98 °C	2,037.3 µS/cm	0.55 mg/L	-100.9 mV	8.78 ft	150.00 ml/min

## Samples

Sample ID:	Description:
MW-200	1145

# Low-Flow Test Report:

**Test Date / Time:** 11/8/2017 9:35:57 AM  
**Project:** Seattle Terminal 4Q17 GWM (2)  
**Operator Name:** RB/EK

<b>Location Name: MW-201</b> <b>Latitude: 47.6167</b> <b>Longitude: -122.35749</b> <b>Well Diameter: 2 in</b> <b>Casing Type: PVC</b> <b>Screen Length: 14.8 ft</b> <b>Top of Screen: 5 ft</b> <b>Total Depth: 19.8 ft</b> <b>Initial Depth to Water: 9.68 ft</b>	<b>Pump Type: Geopump</b> <b>Tubing Type: 0.25" OD POLY</b> <b>Pump Intake From TOC: 10 ft</b> <b>Estimated Total Volume Pumped: 2 gal</b> <b>Flow Cell Volume: 130 ml</b> <b>Final Flow Rate: 150 ml/min</b> <b>Final Draw Down: 0.15 ft</b>	<b>Instrument Used: Aqua TROLL 600 Vented</b> <b>Serial Number: 457166</b>
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## Test Notes:

Final RDO = -0.01 mg/L  
 RDO did not stabilize.

## Weather Conditions:

Overcast

## Low-Flow Readings:

Date Time	Elapsed Time	pH	Temperature	Specific Conductivity	RDO Concentration	ORP	Depth To Water	Flow
		+/- 10 %	+/- 10 %	+/- 15 %	+/- 10 %	+/- 15		
11/8/2017 9:35 AM	00:00	6.81 pH	15.60 °C	969.33 µS/cm	0.70 mg/L	-41.6 mV	9.68 ft	150.00 ml/min
11/8/2017 9:38 AM	03:00	6.83 pH	15.54 °C	991.22 µS/cm	0.17 mg/L	-81.2 mV	9.68 ft	150.00 ml/min
11/8/2017 9:41 AM	06:00	6.83 pH	15.56 °C	1,008.7 µS/cm	0.09 mg/L	-95.3 mV	9.68 ft	150.00 ml/min
11/8/2017 9:44 AM	09:00	6.83 pH	15.58 °C	1,000.4 µS/cm	0.11 mg/L	-102.8 mV	9.68 ft	150.00 ml/min
11/8/2017 9:47 AM	12:00	6.83 pH	15.48 °C	989.13 µS/cm	0.08 mg/L	-109.0 mV	9.68 ft	150.00 ml/min
11/8/2017 9:50 AM	15:00	6.83 pH	15.55 °C	991.44 µS/cm	0.05 mg/L	-114.6 mV	9.68 ft	150.00 ml/min
11/8/2017 9:53 AM	18:00	6.83 pH	15.66 °C	992.94 µS/cm	0.06 mg/L	-119.2 mV	9.68 ft	150.00 ml/min
11/8/2017 9:56 AM	21:00	6.83 pH	15.67 °C	989.36 µS/cm	0.04 mg/L	-123.7 mV	9.68 ft	150.00 ml/min
11/8/2017 9:59 AM	24:00	6.83 pH	15.69 °C	981.91 µS/cm	0.03 mg/L	-127.2 mV	9.68 ft	150.00 ml/min
11/8/2017 10:02 AM	27:00	6.82 pH	15.77 °C	981.06 µS/cm	0.04 mg/L	-129.6 mV	9.68 ft	150.00 ml/min
11/8/2017 10:05 AM	30:00	6.83 pH	15.78 °C	979.23 µS/cm	0.02 mg/L	-133.4 mV	9.68 ft	150.00 ml/min
11/8/2017 10:08 AM	33:00	6.83 pH	15.79 °C	972.21 µS/cm	0.01 mg/L	-135.9 mV	9.68 ft	150.00 ml/min

11/8/2017 10:11 AM	36:00	6.83 pH	15.81 °C	964.73 µS/cm	0.00 mg/L	-138.3 mV	9.68 ft	150.00 ml/min
11/8/2017 10:14 AM	39:00	6.83 pH	15.78 °C	963.91 µS/cm	-0.01 mg/L	-139.8 mV	9.68 ft	150.00 ml/min
11/8/2017 10:17 AM	42:00	6.83 pH	15.72 °C	960.17 µS/cm	-0.01 mg/L	-141.9 mV	9.68 ft	150.00 ml/min
11/8/2017 10:20 AM	45:00	6.83 pH	15.79 °C	960.36 µS/cm	-0.01 mg/L	-143.9 mV	9.68 ft	150.00 ml/min

## Samples

Sample ID:	Description:
MW-201	1020

# Low-Flow Test Report:

Test Date / Time: 11/8/2017 2:55:59 PM

Project: Seattle Terminal 4Q17 GWM

Operator Name: RB/EK

<b>Location Name: MW-202</b> <b>Latitude: 47.61658</b> <b>Longitude: -122.35728</b> <b>Well Diameter: 2 in</b> <b>Casing Type: PVC</b> <b>Screen Length: 19.55 ft</b> <b>Top of Screen: 7.8 ft</b> <b>Total Depth: 27.35 ft</b> <b>Initial Depth to Water: 8.7 ft</b>	<b>Pump Type: Geopump</b> <b>Tubing Type: 0.25" OD poly tubing</b> <b>Pump Intake From TOC: 9.3 ft</b> <b>Estimated Total Volume Pumped: 1 gal</b> <b>Flow Cell Volume: 130 ml</b> <b>Final Flow Rate: 200 ml/min</b> <b>Final Draw Down: 0.1 ft</b>	<b>Instrument Used: Aqua TROLL 600 Vented</b> <b>Serial Number: 466472</b>
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## Test Notes:

Final RDO=0.11 mg/L

## Weather Conditions:

Rain

## Low-Flow Readings:

Date Time	Elapsed Time	pH	Temperature	Specific Conductivity	RDO Concentration	ORP	Depth To Water	Flow
		+/- 10 %	+/- 10 %	+/- 15 %	+/- 10 %	+/- 15		
11/8/2017 2:55 PM	00:00	7.06 pH	13.84 °C	34,897 µS/cm	0.14 mg/L	-135.1 mV	8.70 ft	200.00 ml/min
11/8/2017 2:58 PM	03:00	7.06 pH	13.82 °C	34,937 µS/cm	0.13 mg/L	-135.1 mV	8.70 ft	200.00 ml/min
11/8/2017 3:01 PM	06:00	7.06 pH	13.84 °C	34,944 µS/cm	0.13 mg/L	-134.8 mV	8.70 ft	200.00 ml/min
11/8/2017 3:04 PM	09:00	7.07 pH	13.78 °C	34,948 µS/cm	0.12 mg/L	-135.3 mV	8.70 ft	200.00 ml/min
11/8/2017 3:07 PM	12:00	7.07 pH	13.75 °C	34,967 µS/cm	0.11 mg/L	-135.6 mV	8.70 ft	200.00 ml/min
11/8/2017 3:10 PM	15:00	7.07 pH	13.71 °C	34,971 µS/cm	0.11 mg/L	-135.7 mV	8.70 ft	200.00 ml/min

## Samples

Sample ID:	Description:
MW-202	1515

# Low-Flow Test Report:

**Test Date / Time:** 11/8/2017 9:34:45 AM

**Project:** Seattle Terminal 4Q17 GWM

**Operator Name:** RB/EK

<p><b>Location Name: MW-203</b>  <b>Latitude: 47.61597</b>  <b>Longitude: -122.35647</b>  <b>Well Diameter: 2 in</b>  <b>Casing Type: PVC</b>  <b>Screen Length: 15 ft</b>  <b>Top of Screen: 10.5 ft</b>  <b>Total Depth: 25.5 ft</b>  <b>Initial Depth to Water: 11.99 ft</b></p>	<p><b>Pump Type: Geopump</b>  <b>Tubing Type: 0.25" OD poly tubing</b>  <b>Pump Intake From TOC: 12.5 ft</b>  <b>Estimated Total Volume Pumped: 1.5 gal</b>  <b>Flow Cell Volume: 130 ml</b>  <b>Final Flow Rate: 200 ml/min</b>  <b>Final Draw Down: 0.01 ft</b></p>	<p><b>Instrument Used: Aqua TROLL 600 Vented</b>  <b>Serial Number: 466472</b></p>
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**Test Notes:**

Final RDO= 0.10 mg/L

**Weather Conditions:**

Cloudy

**Low-Flow Readings:**

Date Time	Elapsed Time	pH	Temperature	Specific Conductivity	RDO Concentration	ORP	Depth To Water	Flow
		+/- 10 %	+/- 10 %	+/- 15 %	+/- 10 %	+/- 15		
11/8/2017 9:34 AM	00:00	7.08 pH	15.39 °C	10,922 µS/cm	1.34 mg/L	-53.7 mV	11.99 ft	200.00 ml/min
11/8/2017 9:37 AM	03:00	7.13 pH	15.78 °C	11,310 µS/cm	0.28 mg/L	-94.1 mV	11.99 ft	200.00 ml/min
11/8/2017 9:40 AM	06:00	7.14 pH	16.05 °C	11,651 µS/cm	0.18 mg/L	-108.7 mV	11.99 ft	200.00 ml/min
11/8/2017 9:43 AM	09:00	7.14 pH	16.15 °C	11,957 µS/cm	0.14 mg/L	-117.8 mV	11.99 ft	200.00 ml/min
11/8/2017 9:46 AM	12:00	7.14 pH	16.23 °C	12,093 µS/cm	0.13 mg/L	-123.0 mV	11.99 ft	200.00 ml/min
11/8/2017 9:49 AM	15:00	7.15 pH	16.28 °C	12,119 µS/cm	0.11 mg/L	-127.9 mV	11.99 ft	200.00 ml/min
11/8/2017 9:52 AM	18:00	7.14 pH	16.35 °C	12,451 µS/cm	0.10 mg/L	-131.4 mV	11.99 ft	200.00 ml/min
11/8/2017 9:55 AM	21:00	7.14 pH	16.38 °C	12,480 µS/cm	0.09 mg/L	-134.3 mV	11.99 ft	200.00 ml/min
11/8/2017 9:58 AM	24:00	7.14 pH	16.44 °C	12,686 µS/cm	0.10 mg/L	-136.5 mV	11.99 ft	200.00 ml/min

**Samples**

Sample ID:	Description:
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MW-203	1000
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Created using VuSitu from In-Situ, Inc.

# Low-Flow Test Report:

**Test Date / Time:** 11/8/2017 8:12:04 AM

**Project:** Seattle Terminal 4Q17 GWM

**Operator Name:** RB/EK

<p><b>Location Name: MW-204</b>  <b>Latitude: 47.61629</b>  <b>Longitude: -122.35687</b>  <b>Well Diameter: 2 in</b>  <b>Casing Type: PVC</b>  <b>Screen Length: 13.55 ft</b>  <b>Top of Screen: 17.35 ft</b>  <b>Total Depth: 30.9 ft</b>  <b>Initial Depth to Water: 18.78 ft</b></p>	<p><b>Pump Type: Geopump</b>  <b>Tubing Type: 0.25" OD POLY</b>  <b>Pump Intake From TOC: 19.1 ft</b>  <b>Estimated Total Volume Pumped: 2.5 gal</b>  <b>Flow Cell Volume: 130 ml</b>  <b>Final Flow Rate: 150 ml/min</b>  <b>Final Draw Down: 0.41 ft</b></p>	<p><b>Instrument Used: Aqua TROLL 600 Vented</b>  <b>Serial Number: 457166</b></p>
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**Test Notes:**

Final RDO = 0.03 mg/L

DO did not stabilize

**Weather Conditions:**

Overcast

**Low-Flow Readings:**

Date Time	Elapsed Time	pH	Temperature	Specific Conductivity	RDO Concentration	ORP	Depth To Water	Flow
		+/- 10 %	+/- 10 %	+/- 15 %	+/- 10 %	+/- 15		
11/8/2017 8:12 AM	00:00	6.83 pH	13.58 °C	460.17 µS/cm	0.88 mg/L	-42.7 mV	18.78 ft	150.00 ml/min
11/8/2017 8:15 AM	03:00	6.86 pH	13.67 °C	453.36 µS/cm	0.11 mg/L	-57.7 mV	18.78 ft	150.00 ml/min
11/8/2017 8:18 AM	06:00	6.87 pH	13.74 °C	453.79 µS/cm	0.11 mg/L	-67.4 mV	18.78 ft	150.00 ml/min
11/8/2017 8:21 AM	09:00	6.86 pH	13.71 °C	456.98 µS/cm	0.08 mg/L	-72.8 mV	18.78 ft	150.00 ml/min
11/8/2017 8:24 AM	12:00	6.87 pH	13.85 °C	439.59 µS/cm	0.10 mg/L	-77.6 mV	18.78 ft	150.00 ml/min
11/8/2017 8:27 AM	15:00	6.87 pH	13.80 °C	458.11 µS/cm	0.09 mg/L	-81.4 mV	18.78 ft	150.00 ml/min
11/8/2017 8:30 AM	18:00	6.86 pH	13.82 °C	461.67 µS/cm	0.08 mg/L	-83.7 mV	18.78 ft	150.00 ml/min
11/8/2017 8:33 AM	21:00	6.86 pH	13.77 °C	461.36 µS/cm	0.08 mg/L	-86.1 mV	18.78 ft	150.00 ml/min
11/8/2017 8:36 AM	24:00	6.87 pH	13.77 °C	455.98 µS/cm	0.07 mg/L	-88.4 mV	18.78 ft	150.00 ml/min
11/8/2017 8:39 AM	27:00	6.85 pH	13.78 °C	448.15 µS/cm	0.05 mg/L	-90.9 mV	18.78 ft	150.00 ml/min
11/8/2017 8:42 AM	30:00	6.87 pH	13.89 °C	459.53 µS/cm	0.08 mg/L	-92.7 mV	18.78 ft	150.00 ml/min
11/8/2017 8:45 AM	33:00	6.86 pH	13.82 °C	454.35 µS/cm	0.04 mg/L	-94.5 mV	18.78 ft	150.00 ml/min

11/8/2017 8:48 AM	36:00	6.87 pH	13.85 °C	457.71 µS/cm	0.07 mg/L	-95.2 mV	18.78 ft	150.00 ml/min
11/8/2017 8:51 AM	39:00	6.86 pH	13.83 °C	456.12 µS/cm	0.03 mg/L	-96.7 mV	18.78 ft	150.00 ml/min
11/8/2017 8:54 AM	42:00	6.86 pH	13.77 °C	460.04 µS/cm	0.05 mg/L	-97.5 mV	18.78 ft	150.00 ml/min
11/8/2017 8:57 AM	45:00	6.86 pH	13.84 °C	450.92 µS/cm	0.03 mg/L	-98.5 mV	18.78 ft	150.00 ml/min

## Samples

Sample ID:	Description:
MW-204	900

# Low-Flow Test Report:

Test Date / Time: 11/8/2017 8:14:10 AM

Project: Seattle Terminal 4Q17 GWM

Operator Name: RB/EK

<b>Location Name: MW-205</b> <b>Latitude: 47.61572</b> <b>Longitude: -122.35656</b> <b>Well Diameter: 2 cm</b> <b>Casing Type: PVC</b> <b>Screen Length: 20.5 ft</b> <b>Top of Screen: 18 ft</b> <b>Total Depth: 38.5 ft</b> <b>Initial Depth to Water: 22.62 ft</b>	<b>Pump Type: Geopump</b> <b>Tubing Type: 0.25" OD poly tubing</b> <b>Pump Intake From TOC: 23 ft</b> <b>Estimated Total Volume Pumped: 1.5 gal</b> <b>Flow Cell Volume: 130 ml</b> <b>Final Flow Rate: 200 ml/min</b> <b>Final Draw Down: 0.03 ft</b>	<b>Instrument Used: Aqua TROLL 600 Vented</b> <b>Serial Number: 466472</b>
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## Test Notes:

Final RDO= 0.10 mg/L

## Weather Conditions:

Cloudy

## Low-Flow Readings:

Date Time	Elapsed Time	pH	Temperature	Specific Conductivity	RDO Concentration	ORP	Depth To Water	Flow
		+/- 10 %	+/- 10 %	+/- 15 %	+/- 10 %	+/- 15		
11/8/2017 8:14 AM	00:00	7.22 pH	13.27 °C	652.06 µS/cm	1.18 mg/L	-8.2 mV	22.62 ft	200.00 ml/min
11/8/2017 8:17 AM	03:00	7.26 pH	13.56 °C	631.33 µS/cm	0.31 mg/L	-83.8 mV	22.62 ft	200.00 ml/min
11/8/2017 8:20 AM	06:00	7.32 pH	13.65 °C	626.53 µS/cm	0.21 mg/L	-102.6 mV	22.62 ft	200.00 ml/min
11/8/2017 8:23 AM	09:00	7.35 pH	13.65 °C	623.67 µS/cm	0.18 mg/L	-114.0 mV	22.62 ft	200.00 ml/min
11/8/2017 8:26 AM	12:00	7.37 pH	13.74 °C	623.40 µS/cm	0.14 mg/L	-122.1 mV	22.62 ft	200.00 ml/min
11/8/2017 8:29 AM	15:00	7.38 pH	13.66 °C	618.48 µS/cm	0.13 mg/L	-128.8 mV	22.62 ft	200.00 ml/min
11/8/2017 8:32 AM	18:00	7.38 pH	13.66 °C	623.25 µS/cm	0.09 mg/L	-133.7 mV	22.62 ft	200.00 ml/min
11/8/2017 8:35 AM	21:00	7.37 pH	13.62 °C	627.83 µS/cm	0.09 mg/L	-137.6 mV	22.62 ft	200.00 ml/min
11/8/2017 8:38 AM	24:00	7.37 pH	13.64 °C	633.01 µS/cm	0.10 mg/L	-140.9 mV	22.62 ft	200.00 ml/min

## Samples

Sample ID:	Description:
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MW-205	845
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Created using VuSitu from In-Situ, Inc.

# Low-Flow Test Report:

**Test Date / Time:** 11/8/2017 2:02:17 PM

**Project:** Seattle Terminal 4Q17 GWM (5)

**Operator Name:** RB/EK

<b>Location Name:</b> MW-206 <b>Latitude:</b> 47.6162 <b>Longitude:</b> -122.35705 <b>Well Diameter:</b> 2 ft <b>Casing Type:</b> PVC <b>Screen Length:</b> 14.8 ft <b>Top of Screen:</b> 11 ft <b>Total Depth:</b> 25.8 ft <b>Initial Depth to Water:</b> 9.58 ft	<b>Pump Type:</b> Geopump <b>Tubing Type:</b> 0.25" OD POLY <b>Pump Intake From TOC:</b> 11.5 ft <b>Estimated Total Volume Pumped:</b> 2.5 gal <b>Flow Cell Volume:</b> 130 ml <b>Final Flow Rate:</b> 150 ml/min <b>Final Draw Down:</b> 0.52 ft	<b>Instrument Used:</b> Aqua TROLL 600 <b>Vented</b> <b>Serial Number:</b> 457166
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## Test Notes:

Submerged screen at low tide (1403). Submerged at sample time (1450). RDO did not stabilize.

Final RDO = 0.23 mg/L

## Weather Conditions:

Light rain

## Low-Flow Readings:

Date Time	Elapsed Time	pH	Temperature	Specific Conductivity	RDO Concentration	ORP	Depth To Water	Flow
		+/- 10 %	+/- 10 %	+/- 15 %	+/- 10 %	+/- 15		
11/8/2017 2:02 PM	00:00	6.94 pH	12.51 °C	40,952 µS/cm	2.15 mg/L	125.7 mV	9.58 ft	150.00 ml/min
11/8/2017 2:05 PM	03:00	6.92 pH	12.43 °C	41,997 µS/cm	2.15 mg/L	126.4 mV	9.58 ft	150.00 ml/min
11/8/2017 2:08 PM	06:00	6.92 pH	12.44 °C	42,207 µS/cm	1.87 mg/L	125.9 mV	9.58 ft	150.00 ml/min
11/8/2017 2:11 PM	09:00	6.92 pH	12.43 °C	42,216 µS/cm	1.64 mg/L	124.7 mV	9.58 ft	150.00 ml/min
11/8/2017 2:14 PM	12:00	6.92 pH	12.43 °C	42,357 µS/cm	1.29 mg/L	123.1 mV	9.58 ft	150.00 ml/min
11/8/2017 2:17 PM	15:00	6.92 pH	12.44 °C	42,450 µS/cm	1.00 mg/L	120.6 mV	9.58 ft	150.00 ml/min
11/8/2017 2:20 PM	18:00	6.92 pH	12.44 °C	42,736 µS/cm	0.86 mg/L	117.6 mV	9.58 ft	150.00 ml/min
11/8/2017 2:23 PM	21:00	6.92 pH	12.44 °C	42,254 µS/cm	0.73 mg/L	121.4 mV	9.58 ft	150.00 ml/min
11/8/2017 2:26 PM	24:00	6.92 pH	12.45 °C	42,252 µS/cm	0.63 mg/L	111.3 mV	9.58 ft	150.00 ml/min
11/8/2017 2:29 PM	27:00	6.92 pH	12.45 °C	42,227 µS/cm	0.57 mg/L	107.7 mV	9.58 ft	150.00 ml/min
11/8/2017 2:32 PM	30:00	6.92 pH	12.45 °C	42,121 µS/cm	0.48 mg/L	104.1 mV	9.58 ft	150.00 ml/min

11/8/2017 2:35 PM	33:00	6.93 pH	12.45 °C	41,764 µS/cm	0.44 mg/L	100.3 mV	9.58 ft	150.00 ml/min
11/8/2017 2:38 PM	36:00	6.93 pH	12.45 °C	41,445 µS/cm	0.38 mg/L	96.5 mV	9.58 ft	150.00 ml/min
11/8/2017 2:41 PM	39:00	6.93 pH	12.40 °C	41,189 µS/cm	0.34 mg/L	92.6 mV	9.58 ft	150.00 ml/min
11/8/2017 2:44 PM	42:00	6.93 pH	12.38 °C	40,968 µS/cm	0.29 mg/L	89.1 mV	9.58 ft	150.00 ml/min
11/8/2017 2:47 PM	45:00	6.93 pH	12.33 °C	40,780 µS/cm	0.25 mg/L	85.9 mV	9.58 ft	150.00 ml/min
11/8/2017 2:50 PM	48:00	6.93 pH	12.33 °C	40,607 µS/cm	0.23 mg/L	82.0 mV	9.58 ft	150.00 ml/min

## Samples

Sample ID:	Description:
MW-206	1450

# Low-Flow Test Report:

**Test Date / Time:** 11/8/2017 1:29:42 PM  
**Project:** Seattle Terminal 4Q17 GWM (2)  
**Operator Name:** RB/EK

<p><b>Location Name: MW-207</b>  <b>Latitude: 47.61559</b>  <b>Longitude: -122.35626</b>  <b>Well Diameter: 2 in</b>  <b>Casing Type: PVC</b>  <b>Screen Length: 13.77 ft</b>  <b>Top of Screen: 9.5 ft</b>  <b>Total Depth: 23.27 ft</b>  <b>Initial Depth to Water: 9.33 ft</b></p>	<p><b>Pump Type: Geopump</b>  <b>Tubing Type: 0.25" OD poly tubing</b>  <b>Pump Intake From TOC: 14.02 ft</b>  <b>Estimated Total Volume Pumped: 1.5 ml</b>  <b>Flow Cell Volume: 130 ml</b>  <b>Final Flow Rate: 200 ml/min</b>  <b>Final Draw Down: 0.2 ft</b></p>	<p><b>Instrument Used: Aqua TROLL 600 Vented</b>  <b>Serial Number: 466472</b></p>
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**Test Notes:**

Submerged screen at start of pumping 35 minutes before low tide. At time of sampling, screen is no longer submerged.

Final RDO= 0.55 mg/L

**Weather Conditions:**

Overcast

**Low-Flow Readings:**

Date Time	Elapsed Time	pH	Temperature	Specific Conductivity	RDO Concentration	ORP	Depth To Water	Flow
		+/- 10 %	+/- 10 %	+/- 15 %	+/- 10 %	+/- 15		
11/8/2017 1:29 PM	00:00	6.81 pH	13.49 °C	36,899 µS/cm	2.64 mg/L	68.9 mV	9.33 ft	200.00 ml/min
11/8/2017 1:32 PM	03:00	6.82 pH	13.24 °C	37,239 µS/cm	1.42 mg/L	60.1 mV	9.33 ft	200.00 ml/min
11/8/2017 1:35 PM	06:00	6.81 pH	13.65 °C	37,153 µS/cm	0.75 mg/L	52.0 mV	9.33 ft	200.00 ml/min
11/8/2017 1:38 PM	09:00	6.81 pH	13.68 °C	37,101 µS/cm	0.68 mg/L	48.2 mV	9.33 ft	200.00 ml/min
11/8/2017 1:41 PM	12:00	6.82 pH	13.69 °C	36,990 µS/cm	0.61 mg/L	45.5 mV	9.33 ft	200.00 ml/min
11/8/2017 1:44 PM	15:00	6.82 pH	13.72 °C	36,703 µS/cm	0.55 mg/L	43.6 mV	9.33 ft	200.00 ml/min
11/8/2017 1:47 PM	18:00	6.82 pH	13.75 °C	36,863 µS/cm	0.45 mg/L	41.6 mV	9.33 ft	200.00 ml/min
11/8/2017 1:50 PM	21:00	6.82 pH	13.75 °C	36,834 µS/cm	0.47 mg/L	41.0 mV	9.33 ft	200.00 ml/min
11/8/2017 1:53 PM	24:00	6.83 pH	13.63 °C	36,752 µS/cm	0.53 mg/L	41.3 mV	9.33 ft	200.00 ml/min
11/8/2017 1:56 PM	27:00	6.83 pH	13.61 °C	36,718 µS/cm	0.53 mg/L	42.5 mV	9.33 ft	200.00 ml/min
11/8/2017 1:59 PM	30:00	6.84 pH	13.59 °C	36,524 µS/cm	0.56 mg/L	43.1 mV	9.33 ft	200.00 ml/min

**Samples**

Sample ID:	Description:
MW-207	1405
DUP-1	

11/7/2017

4Q17 - GWM

E. Krueger  
R. Bruchka

1010 - ANA onsite, don PPE, calibrate equipment, review HASP/JSA's & SOW

PID

1030 - 0.0 ppm

1130 - 0.0 ppm

1230 - 0.0 ppm

1330 - 0.0 ppm

1430 - 0.0 ppm

1030 - Assemble new sampling utility cart

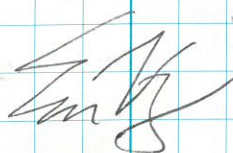
1150 - Begin gauging round

Well ID	PID	DTW	DTP	Time	Notes
MW-30	0.2 ppm	13.97	—	1318	4" sock in well
MW-61AR	14.6 ppm	14.93	14.84	1325	2" sock in well was replaced
MW-70R	0.0 ppm	10.32	—	1309	water
MW-200	0.0 ppm	8.69	—	1251	Buried, water
MW-201	0.0 ppm	9.32	—	1246	Buried
MW-202	0.0 ppm	9.00	—	1255	1/3 bolts, water
MW-203	0.0 ppm	11.86	—	1240	Buried, water
MW-204	0.0 ppm	17.98	—	1204	Buried
MW-205	0.0 ppm	21.89	—	1159	Buried, water
* MW-206	0.0 ppm	10.18	—	1259	1/3 bolts, water
MW-207	0.0 ppm	10.21	—	1304	water

\* MW-206 - encountered submerged screen, well was gauged at low tide (1308 was low tide)

1400 - End gauging round

1420 - Arcadis off site

 11/7/17

11-08-2017

4Q17 - GWM

E. Krueger  
R. Brauchka

- 0700 - Arcadis on site. Conduct H&S tailgate meeting. Review HASP, JSAs and today's SOW.
- 0715 - Pack up sampling carts w/ equipment
- 0745 - Begin sampling round
- 0845 - Sample MW-205
- 0900 - Sample MW-204
- 1000 - Sample MW-203
- 1020 - Sample MW-201
- 1145 - Sample MW-200
- 1245 - Sample MW-30
- 1335 - Sample MW-70R
- 1405 - Sample MW-207 (DUP-1 collected)
- 1450 - Sample MW-206
- 1515 - Sample MW-202
- 1540 - End sampling round. Begin decon & demob of equipment and site
- 1600 - Remove existing sock from MW-30 and replace w/ a new sock
- 1645 - Arcadis off site

Air Log

0700 0.0 ppm

0800 0.0 ppm

0900 0.0 ppm

1000 0.0 ppm

1100 0.0 ppm

1200 0.0 ppm

1300 0.0 ppm

1400 0.0 ppm

1500 0.0 ppm

1600 0.0 ppm

Methodology: Samples were collected using low flow techniques w/ dedicated polyethane tubing, a geopump peristaltic pump, and a AquaTroll 600 multimeter. All wells were gauged using a 100 ft. oil/water interface probe. All wells were gauged and sampled when water levels were w/in screened interval. The polyethane tubing was placed in each well such that the intake depth was six inches below water level, wells were purged at a rate of 150-200 mL/min, until parameters so stabilized or 45 minutes if parameters didn't stabilize. All samples were collected in Lancaster Labs bottleware and immediately stored on ice. Coolers were packed w/ fresh ice and sent to Lancaster on Thursday, November 9<sup>th</sup> via priority overnight.

Samples were collected from MW-30, MW-70R, & MW-200 through MW-207. LNAPL was detected in MW-61A-R, so no sample was taken. Each sample was analyzed for GRO, DRO/HO, BTEX and cPAtts

Drum Inventory: During sampling activities, 20 gallons of purge water was produced, and stored in one 25 gallon steel drum. On Thursday, November 9<sup>th</sup>, the drum was delivered to Emerald Services in Seattle for proper disposal

ETK 11/8/17

# APPENDIX C

## Historical Groundwater Analytical Results





**Appendix C  
Summary of Historical Groundwater Elevation Data**

Former Unocal Seattle Marketing Terminal  
3001 Elliott Avenue  
Seattle, Washington

Well Number <sup>1</sup> (Well Casing Elevation)	Date Measured	Time Measured (hr:min)	Depth to Groundwater <sup>2</sup> (feet)	Depth to LNAPL <sup>3</sup> (feet)	LNAPL Thickness <sup>3</sup> (feet)	Groundwater Elevation <sup>4</sup> (feet)	Top of Well Screen Elevation <sup>5</sup> (feet)	
MW-30 (continued) (20.85) <sup>8</sup>	08/20/09	8:41	14.18	--	--	6.67	--	
	09/10/09	10:11	14.15	--	--	6.70	--	
	09/23/09	9:33	14.07	Sheen	--	6.78	--	
	10/08/09	9:49	14.21	--	--	6.64	--	
	10/19/09	9:20	14.13	--	--	6.72	--	
	11/12/09	9:33	12.43	--	--	8.42	--	
	03/24/10	9:48	12.98	Sheen	--	7.87	--	
	04/13/10	10:31	12.98	Sheen	--	7.87	--	
	05/26/10	9:15	13.36	Sheen	--	7.49	--	
	07/28/10	14:40	14.11	--	--	6.74	--	
	08/05/10	11:49	14.10	--	--	6.75	--	
	08/13/10	10:10	13.90	--	--	6.95	--	
	08/18/10	8:36	13.92	--	--	6.93	--	
	09/21/10	10:29	13.30	--	--	7.55	--	
	10/11/10	11:01	13.40	--	--	7.45	--	
	11/19/10	14:54	12.41	--	--	8.44	--	
	03/04/11	9:44	12.54	Sheen	--	8.31	--	
	04/25/11	10:50	12.80	Sheen	--	8.05	--	
	09/21/11	9:32	13.55	--	--	7.30	--	
	11/21/11	11:00	13.74	--	--	7.11	--	
	02/20/12	8:59	13.16	--	--	7.69	--	
	04/17/12	11:55	12.90	Sheen	--	7.95	--	
	10/10/12	12:10	14.41	--	--	6.44	--	
	12/24/12	11:40	13.00	--	--	7.85	--	
	01/08/13	14:20	11.88	--	--	8.97	--	
	04/30/13	10:55	13.34	--	--	7.51	--	
	09/19/13	9:54	13.74	--	--	7.11	--	
	11/22/13	9:15	14.61	--	--	6.24	--	
	06/23/14	10:27	14.04	--	--	6.81	--	
	09/10/14	9:10	14.82	--	--	6.03	--	
	12/15/14	13:27	11.38	--	--	9.47	--	
	06/17/15	11:25	13.90	--	--	6.95	--	
	12/09/15	10:39	10.00	--	--	10.85	--	
02/16/16	9:20	10.89	--	--	9.96	--		
06/13/16	8:40	13.79	LNAPL	--	7.06	--		
09/22/16	13:13	14.35	--	--	6.50	--		
01/12/17	12:44	--	LNAPL	--	--	--		
03/27/17	13:13	10.71	LNAPL	--	10.14	15.85		
06/16/17	9:46	13.39	13.38	--	7.46	15.85		
	<b>11/07/17</b>	<b>13:18</b>	<b>13.97</b>	--	--	<b>6.88</b>	<b>15.85</b>	
MW-34 (5.33)	12/11/02	13:45	9.45	NR	NR	-4.12	--	
	03/20/03	11:43	6.99	NR	NR	-1.66	--	
	07/03/03	8:29	9.02	NR	NR	-3.69	--	
	09/18/03	9:55	9.57	NR	NR	-4.24	--	
	12/02/03	11:45	7.00	NR	NR	-1.67	--	
	03/09/04	12:15	8.42	NR	NR	-3.09	--	
	06/03/04	11:25	8.95	NR	NR	-3.62	--	
	09/03/04	13:53	8.63	NR	NR	-3.30	--	
	12/06/04	9:45	9.48	NR	NR	-4.15	--	
	03/04/05	13:55	8.87	NR	NR	-3.54	--	
	06/03/05	--	9.08	NR	NR	-3.75	--	
	09/01/05	9:08	9.38	NR	NR	-4.05	--	
	12/01/05	10:49	6.72	NR	NR	-1.39	--	
	03/02/06	10:50	9.25	NR	NR	-3.92	--	
	06/06/06	9:20	8.82	NR	NR	-3.49	--	
	09/15/06	--	8.66	NR	NR	-3.33	--	
	03/07/07	--	--	NR	NR	--	--	
	02/13/08	--	--	Well Possibly Removed During Previous Excavation Activities				
MW-35 (5.11)	12/11/02	13:35	9.29	NR	NR	-4.18	--	
	03/20/03	11:42	7.65	NR	NR	-2.54	--	
	07/03/03	--	--	NR	NR	--	--	
	09/18/03	--	--	NR	NR	--	--	
	12/02/03	--	--	NR	NR	--	--	
	03/09/04	--	--	NR	NR	--	--	
	06/03/04	--	--	NR	NR	--	--	
	09/03/04	--	--	NR	NR	--	--	
	12/06/04	--	--	NR	NR	--	--	
	03/04/05	--	--	NR	NR	--	--	
	06/03/05	--	--	NR	NR	--	--	
	09/01/05	--	--	NR	NR	--	--	
	12/01/05	--	--	NR	NR	--	--	
	03/02/06	--	--	NR	NR	--	--	
	06/06/06	--	--	NR	NR	--	--	
09/15/06	--	--	NR	NR	--	--		
03/07/07	--	--	NR	NR	--	--		
02/13/08	--	--	Well Possibly Removed During Previous Excavation Activities					--
MW-42 (5.20)	12/11/02	13:30	9.38	NR	NR	-4.18	--	
	03/20/03	11:50	7.86	NR	NR	-2.66	--	
	07/03/03	8:11	9.44	NR	NR	-4.24	--	
	09/18/03	10:21	10.92	NR	NR	-5.72	--	
	12/02/03	11:36	9.14	NR	NR	-3.94	--	
	03/09/04	10:09	8.58	NR	NR	-3.38	--	
	06/03/04	11:10	9.19	NR	NR	-3.99	--	
	09/03/04	14:01	9.02	NR	NR	-3.82	--	
12/06/04	9:48	9.43	NR	NR	-4.23	--		

**Appendix C  
Summary of Historical Groundwater Elevation Data**

Former Unocal Seattle Marketing Terminal  
3001 Elliott Avenue  
Seattle, Washington

Well Number <sup>1</sup> (Well Casing Elevation)	Date Measured	Time Measured (hr:min)	Depth to Groundwater <sup>2</sup> (feet)	Depth to LNAPL <sup>3</sup> (feet)	LNAPL Thickness <sup>3</sup> (feet)	Groundwater Elevation <sup>4</sup> (feet)	Top of Well Screen Elevation <sup>5</sup> (feet)	
MW-42 Continued  (5.20)	03/04/05	13:56	8.99	NR	NR	-3.79	--	
	06/03/05	--	9.24	NR	NR	-4.04	--	
	09/01/05	9:00	9.55	NR	NR	-4.35	--	
	12/01/05	10:54	8.91	NR	NR	-3.71	--	
	03/02/06	10:45	9.25	NR	NR	-4.05	--	
	06/06/06	9:28	8.93	NR	NR	-3.73	--	
	09/15/06	--	8.87	NR	NR	-3.67	--	
	03/07/07	--	--	--	NR	--	--	
	02/13/08	Well Possibly Removed During Previous Excavation Activities						
	MW-43 (4.94)	12/11/02	13:40	9.06	NR	NR	-4.12	--
03/20/03		11:30	7.10	NR	NR	-2.16	--	
07/03/03		8:15	8.86	NR	NR	-3.92	--	
09/18/03		--	--	NR	NR	--	--	
12/02/03		--	--	NR	NR	--	--	
03/09/04		--	--	NR	NR	--	--	
06/03/04		--	--	NR	NR	--	--	
09/03/04		--	--	NR	NR	--	--	
12/06/04		--	--	NR	NR	--	--	
03/04/05		--	--	NR	NR	--	--	
06/03/05		--	--	NR	NR	--	--	
09/01/05		--	--	NR	NR	--	--	
12/01/05		--	--	NR	NR	--	--	
03/02/06		--	--	NR	NR	--	--	
06/06/06		--	--	NR	NR	--	--	
09/15/06		--	--	NR	NR	--	--	
03/07/07		--	--	--	NR	--	--	
02/13/08	Well Possibly Removed During Previous Excavation Activities							
MW-44 (5.46)	12/11/02	--	--	NR	NR	--	--	
	03/20/03	--	--	NR	NR	--	--	
	07/03/03	--	--	NR	NR	--	--	
	09/18/03	--	--	NR	NR	--	--	
	12/02/03	--	--	NR	NR	--	--	
	03/09/04	--	--	NR	NR	--	--	
	06/03/04	--	--	NR	NR	--	--	
	09/03/04	--	--	NR	NR	--	--	
	12/06/04	--	--	NR	NR	--	--	
	03/04/05	--	--	NR	NR	--	--	
	06/03/05	--	--	NR	NR	--	--	
	09/01/05	--	--	NR	NR	--	--	
	12/01/05	--	--	NR	NR	--	--	
	03/02/06	--	--	NR	NR	--	--	
	06/06/06	--	--	NR	NR	--	--	
09/15/06	--	--	NR	NR	--	--		
03/07/07	--	--	--	NR	--	--		
MW-61A-R <sup>b</sup> (13.35)  (22.44) <sup>b</sup>	03/02/06	--	15.15 <sup>b</sup>	NR	NR	-1.81	1.91	
	06/06/06	8:00	14.96	NR	NR	-1.61	--	
	09/15/06	--	14.26	NR	NR	-0.91	--	
	03/07/07	8:44	14.04	--	NR	-0.69	--	
	06/07/07	9:15	14.36	--	NR	-1.01	--	
	07/10/07	9:50	14.84	--	NR	-1.49	--	
	07/25/07	11:40	14.55	--	NR	-1.20	--	
	08/22/07	9:40	14.72	--	NR	-1.37	--	
	09/06/07	9:55	14.90	--	NR	-1.55	--	
	09/26/07	9:16	15.09	--	NR	-1.74	--	
	10/11/07	8:00	14.82	--	NR	-1.47	--	
	11/01/07	9:55	14.81	--	NR	-1.46	--	
	11/16/07	15:30	14.59	--	NR	-1.24	--	
	11/26/07	13:48	14.40	--	NR	-1.05	--	
	12/19/07	9:35	13.83	--	NR	-0.48	--	
	01/03/08	8:41	12.93	--	NR	0.42	--	
	01/17/08	9:00	12.76	--	NR	0.59	--	
	02/12/08	9:24	13.65	--	NR	-0.30	--	
	03/03/08	9:24	14.14	--	NR	-0.79	--	
	03/17/08	9:23	14.49	--	NR	-1.14	--	
	04/01/08	9:10	14.22	--	14.21	0.01	-0.87	
	04/14/08	9:06	14.41	--	14.39	0.02	-1.06	
	04/28/08	9:36	14.70	--	14.64	0.06	-1.35	
	05/13/08	9:29	14.88	--	--	--	7.56	
	05/27/08	13:53	14.93	--	Sheen	--	7.51	
	06/10/08	10:20	14.73	--	--	--	7.71	
	06/24/08	9:41	14.92	--	--	--	7.52	
	07/07/08	9:56	14.70	--	--	--	7.74	
	07/22/08	9:34	14.72	--	14.70	0.02	7.72	
	08/12/08	9:50	14.75	--	14.68	0.07	7.69	
09/03/08	--	15.58	--	15.56	0.02	6.86		
09/26/08	--	14.89	--	14.79	0.10	7.55		
10/17/08	9:03	15.12	--	14.92	0.20	7.32		
10/29/08	8:50	15.21	--	15.00	0.21	7.23		
11/12/08	10:51	13.95	--	13.81	0.14	8.49		
12/03/08	12:52	14.25	--	14.19	0.06	8.19		
01/06/09	9:40	13.12	--	12.99	0.13	9.32		
01/20/09	12:50	13.06	--	13.01	0.05	9.38		
02/03/09	9:43	14.40	--	13.88	0.52	8.04		
02/17/09	11:20	14.30	--	13.80	0.50	8.14		
03/12/09	12:16	14.20	--	14.05	0.15	8.24		

**Appendix C  
Summary of Historical Groundwater Elevation Data**

Former Unocal Seattle Marketing Terminal  
3001 Elliott Avenue  
Seattle, Washington

Well Number <sup>1</sup> (Well Casing Elevation)	Date Measured	Time Measured (hr:min)	Depth to Groundwater <sup>2</sup> (feet)	Depth to LNAPL <sup>3</sup> (feet)	LNAPL Thickness <sup>3</sup> (feet)	Groundwater Elevation <sup>4</sup> (feet)	Top of Well Screen Elevation <sup>5</sup> (feet)
MW-61A-R (continued)  (22.44) <sup>8</sup>	03/25/09	8:50	14.01	13.91	0.10	8.43	--
	04/08/09	10:21	13.81	13.71	0.10	8.63	--
	04/30/09	10:12	14.14	13.95	0.19	8.30	--
	05/12/09	10:51	13.66	13.64	0.02	8.78	--
	05/26/09	14:15	13.74	--	--	8.70	--
	06/09/09	9:46	13.40	--	--	9.04	--
	06/25/09	9:47	14.14	13.94	0.20	8.30	--
	07/07/09	9:40	14.18	14.15	0.03	8.26	--
	07/13/09	8:14	14.88	14.87	0.01	7.56	--
	08/05/09	6:45	14.68	14.39	0.29	7.76	--
	08/06/09	9:29	14.64	14.62	0.02	7.80	--
	08/20/09	8:51	14.85	14.84	0.01	7.59	--
	09/10/09	10:15	14.84	14.78	0.06	7.60	--
	09/23/09	9:37	14.89	14.81	0.08	7.55	--
	10/08/09	9:39	15.01	14.94	0.07	7.43	--
	10/19/09	9:05	14.98	14.91	0.07	7.46	--
	11/12/09	9:36	12.85	12.80	0.05	9.59	--
	03/24/10	9:54	13.20	12.95	0.25	9.24	--
	04/13/10	10:37	13.06	12.95	0.11	9.38	--
	05/26/10	9:06	13.91	13.76	0.15	8.53	--
	07/28/10	14:56	14.78	--	--	7.66	--
	08/05/10	11:28	14.79	--	--	7.65	--
	08/13/10	9:38	13.62	--	--	8.82	--
	08/13/10	10:37	13.61	--	--	8.83	--
	08/13/10	10:42	13.61	--	--	8.83	--
	08/13/10	15:42	13.64	--	--	8.80	--
	08/18/10	8:55	14.70	--	--	7.74	--
	09/21/10	10:42	15.35	--	--	7.09	--
	10/11/10	11:20	14.35	14.31	0.04	8.09	--
	11/19/10	15:25	13.30	13.19	0.11	9.14	--
	03/04/11	10:04	12.80	12.63	0.17	9.64	--
	04/25/11	11:20	12.70	Sheen <sup>10</sup>	--	9.74	--
	09/21/11	9:45	14.65	14.10	0.55	7.79	--
	11/21/11	11:05	14.82	14.26	0.56	7.62	--
	02/20/12	9:15	13.55	13.15	0.40	8.89	--
	04/17/12	12:10	13.18	12.79	0.39	9.26	--
	10/10/12	12:25	14.80	14.39	0.41	7.64	--
	12/24/12	11:28	12.61	12.20	0.41	9.83	--
	01/08/13	14:30	11.84	11.74	0.10	10.60	--
	04/30/13	11:10	13.59	13.35	0.24	8.85	--
	09/19/13	9:48	14.45	14.40	0.05	7.99	--
	11/22/13	9:25	15.28	15.22	0.06	7.16	--
	06/23/14	10:36	14.60	--	--	7.84	--
	06/24/14	--	14.80	14.61	0.19	7.64	--
	09/10/14	9:30	14.92	--	--	7.52	--
	12/15/14	13:35	11.71	--	--	10.73	--
	12/16/14	15:25	11.90	11.81	0.01	10.54	--
	06/17/15	11:15	14.79	14.78	0.01	7.65	--
	12/09/15	10:45	10.99	10.98	0.01	11.45	--
	02/16/16	9:15	11.08	--	--	11.36	--
06/13/16	8:30	14.40	--	--	8.04	--	
09/22/16	13:21	15.00	--	--	7.44	--	
01/12/17	13:09	12.26	--	--	10.18	--	
03/27/17	13:22	10.62	--	--	11.82	--	
06/16/17	9:41	14.73	13.84	0.89	7.71	--	
	<b>11/07/17</b>	<b>13:21</b>	<b>14.93</b>	<b>14.84</b>	<b>0.09</b>	<b>7.51</b>	--
PZ-7.5	04/30/13	9:45	7.18	--	--	UK	--
	09/15/13	8:46	7.19	--	--	UK	--
	11/22/13	9:27	8.03	--	--	UK	--
	06/11/14						
				Well Decommissioned			
PZ-9.5	04/30/13	9:53	9.00	--	--	UK	--
	09/15/13	8:52	9.86	--	--	UK	--
	11/22/13	9:37	9.86	--	--	UK	--
	06/10/14						
				Well Decommissioned			
PZ-61A-R <sup>11</sup>	09/21/10	10:36	14.05	--	--	UK	--
	09/28/09	8:50	14.04	--	--	UK	--
	10/11/10	11:12	14.18	--	--	UK	--
	03/04/11	9:55	12.46	--	--	UK	--
	04/25/11	11:30	13.05	0.27	12.78	UK	--
	09/21/11	9:40	14.18	14.17	0.01	UK	--
	11/21/11	11:10	14.34	--	--	UK	--
	02/20/12	9:10	13.28	13.18	0.10	UK	--
	04/17/12	12:05	12.84	--	--	UK	--
	10/10/12	12:30	14.89	--	--	UK	--
	12/24/12	11:31	12.66	--	--	UK	--
	01/08/13	14:31	11.73	--	--	UK	--
	04/30/13	11:05	13.38	--	--	UK	--
	09/19/13	9:51	14.10	--	--	UK	--
	11/22/13	9:30	15.01	--	--	UK	--
		06/12/14					
				Well Decommissioned			
PZ-203 <sup>11</sup>	09/21/10	11:24	13.29	--	--	UK	--
	04/25/11	13:50	11.80	--	--	UK	--
	09/21/11	10:29	13.67	--	--	UK	--
	11/21/11	10:24	12.60	--	--	UK	--
	02/20/12						
				UNABLE TO LOCATE			

**Appendix C  
Summary of Historical Groundwater Elevation Data**

Former Unocal Seattle Marketing Terminal  
3001 Elliott Avenue  
Seattle, Washington

Well Number <sup>1</sup> (Well Casing Elevation)	Date Measured	Time Measured (hr:min)	Depth to Groundwater <sup>2</sup> (feet)	Depth to LNAPL <sup>3</sup> (feet)	LNAPL Thickness <sup>3</sup> (feet)	Groundwater Elevation <sup>4</sup> (feet)	Top of Well Screen Elevation <sup>5</sup> (feet)
PZ-203 <sup>11</sup> (continued)	04/17/12	12:25	13.00	--	--	UK	--
	10/10/12			UNABLE TO LOCATE			
	12/24/12	10:39	14.52	--	--	UK	--
	01/08/13	15:25	10.13	--	--	UK	--
	04/30/13	10:26	11.53	--	--	UK	--
	09/19/13	9:27	12.30	--	--	UK	--
	11/22/13	10:10	12.03	--	--	UK	--
	06/12/14			Well Decommissioned			
PZ-204 <sup>11</sup>	09/21/10	11:32	19.02	--	--	UK	--
	04/25/11	14:05	17.67	--	--	UK	--
	09/21/11	10:18	19.34	--	--	UK	--
	11/21/11	10:30	18.71	--	--	UK	--
	02/20/12			UNABLE TO LOCATE			
	04/17/12	11:35	18.23	--	--	UK	--
	10/10/12			UNABLE TO LOCATE			
	12/24/12	10:21	16.65	--	--	UK	--
	01/08/13	15:15	16.82	--	--	UK	--
	04/30/13	10:34	17.75	--	--	UK	--
	09/19/13	9:21	18.40	--	--	UK	--
	11/22/13	9:55	18.80	--	--	UK	--
	06/12/14			Well Decommissioned			
	MW-65 (10.83)	12/11/02	14:03	14.69	NR	NR	-3.86
03/20/03		10:44	10.09	NR	NR	0.74	--
07/03/03		11:12	13.85	NR	NR	-3.02	--
09/18/03		10:40	14.15	NR	NR	-3.32	--
12/02/03		11:14	12.38	NR	NR	-1.55	--
03/09/04		10:50	13.63	NR	NR	-2.80	--
06/03/04		11:42	14.24	NR	NR	-3.41	--
09/03/04		14:08	13.77	NR	NR	-2.94	--
12/06/04		9:32	14.59	NR	NR	-3.76	--
03/04/05		14:04	14.06	NR	NR	-3.23	--
06/03/05		--	14.14	NR	NR	-3.31	--
09/01/05		9:55	14.67	NR	NR	-3.84	--
12/01/05		11:19	12.05	NR	NR	-1.22	--
03/02/06		11:12	14.28	NR	NR	-3.45	--
06/06/06		8:26	13.83	NR	NR	-3.00	--
09/15/06		--	13.90	NR	NR	-3.07	--
03/07/07		8:51	13.63	--	--	-2.80	--
06/07/07		8:30	13.69	--	--	-2.86	--
09/26/07		9:27	14.29	--	--	-3.46	--
11/26/07		10:00	13.62	--	--	-2.79	--
12/03/07			Well Decommissioned				
MW-66 (11.62)	12/11/02	14:15	15.36	NR	NR	-3.74	--
	03/20/03	13:04	12.21	NR	NR	-0.59	--
	07/03/03	11:22	14.73	NR	NR	-3.11	--
	09/18/03	10:34	15.25	NR	NR	-3.63	--
	12/02/03	11:27	11.99	NR	NR	-0.37	--
	03/09/04	11:02	13.67	NR	NR	-2.05	--
	06/03/04	11:45	14.78	NR	NR	-3.16	--
	09/03/04	14:12	14.16	NR	NR	-2.54	--
	12/06/04	9:39	15.22	NR	NR	-3.60	--
	03/04/05	14:01	14.54	NR	NR	-2.92	--
	06/03/05	--	14.69	NR	NR	-3.07	--
	09/01/05	10:10	15.31	NR	NR	-3.69	--
	12/01/05	11:26	11.78	NR	NR	-0.16	--
	03/02/06	11:20	14.77	NR	NR	-3.15	--
	06/06/06	8:15	14.35	NR	NR	-2.73	--
	09/15/06	--	14.39	NR	NR	-2.77	--
03/07/07	9:00	14.11	--	--	-2.49	--	
09/26/07	9:36	14.97	--	--	-3.35	--	
11/26/07	13:42	14.23	--	--	-2.61	--	
12/03/07			Well Decommissioned				
MW-200 <sup>6</sup> (4.78)  (14.36) <sup>8</sup>	03/07/07	9:45	8.88	--	--	-4.10	-0.22
	06/07/07	15:53	9.26	--	--	-4.48	--
	07/06/07	10:00	9.76	--	--	-4.98	--
	09/26/07	8:08	9.43	--	--	-4.65	--
	11/26/07	14:48	8.54	--	--	-3.76	--
	02/13/08	11:15	8.57	--	--	-3.79	--
	05/13/08	10:16	10.02	--	--	4.34	9.36
	09/03/08	--	9.56	--	--	4.80	--
	12/03/08	12:10	9.11	--	--	5.25	--
	02/17/09	10:43	8.28	--	--	6.08	--
	05/12/09	12:02	8.95	--	--	5.41	--
	05/26/09	13:54	9.40	--	--	4.96	--
	09/10/09	10:39	9.74	--	--	4.62	--
	04/13/10	11:21	9.23	--	--	5.13	--
	06/16/10	10:05	9.10	--	--	5.26	--
	08/12/10	9:45	8.92	Sheen	--	5.44	--
	09/14/10	1:48	9.31	--	--	5.05	--
	09/14/10	1:53	9.31	--	--	5.05	--
	09/15/10	15:03	9.34	--	--	5.02	--
	09/15/10	15:05	9.33	--	--	5.03	--
09/15/10	15:10	9.31	--	--	5.05	--	
09/15/10	15:15	9.29	--	--	5.07	--	
09/15/10	15:20	9.28	--	--	5.08	--	

**Appendix C  
Summary of Historical Groundwater Elevation Data**

Former Unocal Seattle Marketing Terminal  
3001 Elliott Avenue  
Seattle, Washington

Well Number <sup>1</sup> (Well Casing Elevation)	Date Measured	Time Measured (hr:min)	Depth to Groundwater <sup>2</sup> (feet)	Depth to LNAPL <sup>3</sup> (feet)	LNAPL Thickness <sup>3</sup> (feet)	Groundwater Elevation <sup>4</sup> (feet)	Top of Well Screen Elevation <sup>5</sup> (feet)
MW-200 (continued)	09/15/10	15:25	9.26	--	--	5.10	--
	09/15/10	15:35	9.38	--	--	4.98	--
(14.36) <sup>5</sup>	09/15/10	15:39	9.49	--	--	4.87	--
	09/15/10	15:45	9.58	--	--	4.78	--
	09/15/10	15:50	9.66	--	--	4.70	--
	09/15/10	15:55	9.70	--	--	4.66	--
	09/15/10	16:00	9.74	--	--	4.62	--
	09/15/10	16:05	9.76	--	--	4.60	--
	09/15/10	16:10	9.79	--	--	4.57	--
	09/15/10	16:16	9.82	--	--	4.54	--
	09/15/10	16:28	9.80	--	--	4.56	--
	09/15/10		9.69	--	--	4.67	--
	09/15/10	16:36	9.56	--	--	4.80	--
	09/15/10	16:40	9.50	--	--	4.86	--
	09/15/10	16:46	9.43	--	--	4.93	--
	09/15/10	16:55	9.35	--	--	5.01	--
	09/15/10	17:05	9.27	--	--	5.09	--
	09/15/10	17:20	9.21	--	--	5.15	--
	09/15/10	17:29	9.20	--	--	5.16	--
	09/21/10	11:14	9.50	--	--	4.86	--
	09/22/10	11:00	9.40	--	--	4.96	--
	04/26/11	10:45	9.30	--	--	5.06	--
	09/21/11	10:45	10.15	--	--	4.21	--
	11/21/11			Unable to Gauge due to rain fillup of well			
	02/20/12			UNABLE TO LOCATE			
	04/17/12	14:00	9.78	--	--	4.58	--
	10/10/12	11:35	10.35	--	--	4.01	--
	12/24/12	10:54	7.94	--	--	6.42	--
	01/08/13	15:40	7.83	--	--	6.53	--
	04/30/13	10:21	8.62	--	--	5.74	--
	09/19/13	9:33	9.40	--	--	4.96	--
	11/22/13	10:30	9.82	--	--	4.54	--
	06/23/14	9:52	9.61	--	--	4.75	--
	12/15/14	12:59	8.00	--	--	6.36	--
	06/17/15	10:25	8.51	--	--	5.85	--
	12/09/15	10:08	5.89	--	--	8.47	--
	01/15/16	16:47	8.16	--	--	6.20	--
	02/16/16	8:40	8.25	--	--	6.11	--
	06/13/16	9:10	9.75	--	--	4.61	--
	09/22/16	12:42	9.20	--	--	5.16	--
	01/12/17	11:15	8.06	--	--	6.30	--
	03/27/17	12:55	8.58	--	--	5.78	9.36
	06/16/17	8:44	8.90	--	--	5.46	9.36
	11/07/17	12:51	8.69	--	--	5.67	9.36
MW-201 <sup>6</sup> (5.28)	03/07/07	9:55	9.41	Sheen	--	-4.13	0.28
	06/07/07	16:35	9.79	--	--	-4.51	--
	07/06/07	11:00	10.27	--	--	-4.99	--
	09/26/07	8:20	9.97	--	--	-4.69	--
	11/27/07	14:38	9.04	--	--	-3.76	--
	02/12/08	10:24	9.65	--	--	-4.37	--
(14.86) <sup>5</sup>	05/13/08	10:24	10.34	--	--	4.52	9.86
	09/03/08	--	10.08	--	--	4.78	--
	12/03/08	12:17	9.66	--	--	5.20	--
	02/17/09	10:37	8.82	--	--	6.04	--
	05/12/09	12:13	9.52	--	--	5.34	--
	05/26/09	13:50	9.90	--	--	4.96	--
	08/11/09	9:02	10.31	--	--	4.55	--
	08/28/09	14:50	10.21	--	--	4.65	--
	09/10/09	10:42	10.29	--	--	4.57	--
	04/13/10	11:17	9.75	--	--	5.11	--
	08/11/10	14:45	10.68	Sheen	--	4.18	--
	09/14/10	13:55	9.89	--	--	4.97	--
	09/14/10	14:00	9.89	--	--	4.97	--
	09/14/10	15:05	10.04	--	--	4.82	--
	09/14/10	15:07	10.02	--	--	4.84	--
	09/14/10	15:19	9.92	--	--	4.94	--
	09/14/10	15:26	9.89	--	--	4.97	--
	09/14/10	15:36	9.86	--	--	5.00	--
	09/17/10	18:14	9.59	--	--	5.27	--
	09/17/10	20:07	9.36	--	--	5.50	--
	09/21/10	11:18	10.06	--	--	4.80	--
	04/25/11	13:15	9.22	--	--	5.64	--
	09/21/11	10:40	10.81	--	--	4.05	--
	11/21/11	10:15	10.17	--	--	4.69	--
	02/20/12	11:20	9.68	--	--	5.18	--
	04/17/12	11:20	10.11	--	--	4.75	--
	10/10/12	11:45	10.91	--	--	3.95	--
	12/24/12	10:47	8.35	--	--	6.51	--
	01/08/13	15:35	8.35	--	--	6.51	--
	04/30/13	10:23	9.14	--	--	5.72	--
	09/19/13	9:30	9.90	--	--	4.96	--
	11/22/13	10:20	10.27	--	--	4.59	--
	06/23/14	9:56	10.14	--	--	4.72	--
	12/15/14	12:51	8.60	--	--	6.26	--
	06/17/15	10:20	8.99	--	--	5.87	--

**Appendix C  
Summary of Historical Groundwater Elevation Data**

Former Unocal Seattle Marketing Terminal  
3001 Elliott Avenue  
Seattle, Washington

Well Number <sup>1</sup> (Well Casing Elevation)	Date Measured	Time Measured (hr:min)	Depth to Groundwater <sup>2</sup> (feet)	Depth to LNAPL <sup>3</sup> (feet)	LNAPL Thickness <sup>3</sup> (feet)	Groundwater Elevation <sup>4</sup> (feet)	Top of Well Screen Elevation <sup>5</sup> (feet)
MW-201 (continued)	12/09/15	10:14	6.59	--	--	8.27	--
	01/15/16	16:56	8.85	--	--	6.01	--
	02/16/16	8:35	8.91	--	--	5.95	--
	06/13/16	9:15	10.39	--	--	4.47	--
(14.86) <sup>8</sup>	09/22/16	12:45	9.86	--	--	5.00	--
	01/12/17	11:37	9.72	--	--	5.14	--
	03/27/17	12:52	9.25	--	--	5.61	9.86
	06/16/17	8:42	9.55	--	--	5.31	9.86
	<b>11/07/17</b>	<b>12:46</b>	<b>9.32</b>	--	--	<b>5.54</b>	<b>9.86</b>
MW-202 <sup>8</sup> (5.01)	03/07/07	9:25	8.79	--	--	-3.78	-2.74
	06/07/07	14:53	9.52	--	--	-4.51	--
	07/06/07	10:05	10.16	--	--	-5.15	--
	09/26/07	7:48	9.59	--	--	-4.58	--
	11/26/07	15:16	8.43	--	--	-3.42	--
	02/12/08	10:26	8.59	--	--	-3.58	--
(14.58) <sup>8</sup>	05/13/08	10:06	10.20	--	--	4.38	6.83
	09/03/08	--	9.61	--	--	4.97	--
	12/03/08	11:55	8.86	--	--	5.72	--
	02/17/09	10:32	8.15	--	--	6.43	--
	05/12/09	11:58	9.77	--	--	4.81	--
	05/26/09	13:56	10.84	--	--	3.74	--
	08/11/09	9:25	9.96	--	--	4.62	--
	08/28/09	14:29	9.85	--	--	4.73	--
	09/10/09	10:58	9.90	--	--	4.68	--
	04/13/10	11:23	10.17	--	--	4.41	--
	06/16/10	9:58	8.95	--	--	5.63	--
	08/11/10	11:45	10.00	--	--	4.58	--
	08/16/10	14:40	8.46	--	--	6.12	--
	08/16/10	14:43	8.46	--	--	6.12	--
	08/16/10	14:45	9.01	--	--	5.57	--
	08/16/10	14:57	9.02	--	--	5.56	--
	08/16/10	14:48	9.06	--	--	5.52	--
	08/16/10	14:49	9.13	--	--	5.45	--
	08/16/10	14:50	9.14	--	--	5.44	--
	08/16/10	14:51	9.13	--	--	5.45	--
	08/16/10	14:56	9.19	--	--	5.39	--
	08/16/10	14:56	8.75	--	--	5.83	--
	08/16/10	14:57	8.60	--	--	5.98	--
	08/16/10	14:57	8.59	--	--	5.99	--
	08/16/10	14:58	8.53	--	--	6.05	--
	08/18/10	9:12	11.12	--	--	3.46	--
	09/17/10	14:32	18.86	--	--	-4.28	--
	09/17/10	16:18	9.18	--	--	5.40	--
	09/17/10	17:52	8.83	--	--	5.75	--
	09/21/10	11:10	10.55	--	--	4.03	--
	09/22/10	9:30	9.66	--	--	4.92	--
	04/25/11	14:40	9.32	--	--	5.26	--
	09/21/11	10:47	10.90	--	--	3.68	--
	11/21/11	9:56	10.03	--	--	4.55	--
	02/20/12	11:29	9.61	--	--	4.97	--
	04/17/12	11:00	10.30	--	--	4.28	--
	10/10/12	11:50	11.00	--	--	3.58	--
	12/24/12	11:00	7.85	--	--	6.73	--
	01/08/13	15:45	7.59	--	--	6.99	--
	04/30/13	10:18	8.75	--	--	5.83	--
	09/19/13	9:36	10.12	--	--	4.46	--
	11/22/13	10:40	7.00	--	--	7.58	--
	06/23/14	9:45	10.65	--	--	3.93	--
	12/15/14	13:06	7.41	--	--	7.17	--
	06/17/15	10:35	8.84	--	--	5.74	--
	12/09/15	10:00	6.61	--	--	7.97	--
	01/15/16	16:32	9.06	--	--	5.52	--
	02/16/16	8:45	8.37	--	--	6.21	--
	06/13/16	9:05	10.65	--	--	3.93	--
	09/22/16	12:38	9.21	--	--	5.37	--
	01/12/17	10:32	8.32	--	--	6.26	--
	03/27/17	12:56	9.44	--	--	5.14	6.78
	06/16/17	8:47	9.43	--	--	5.15	6.78
	<b>11/07/17</b>	<b>12:55</b>	<b>9.00</b>	--	--	<b>5.58</b>	<b>6.78</b>
MW-203 <sup>8</sup> (7.98)	03/07/07	--	11.86	--	--	-3.88	-2.52
	06/07/07	13:54	12.45	--	--	-4.47	--
	07/06/07	11:01	13.07	--	--	-5.09	--
	09/26/07	8:30	12.69	--	--	-4.71	--
	11/26/07	14:33	11.56	--	--	-3.58	--
	02/12/08	10:05	12.29	--	--	-4.31	--
(17.55) <sup>8</sup>	05/13/08	10:32	13.56	--	--	3.99	7.05
	09/03/08	--	13.40	--	--	4.15	--
	12/03/08	12:26	11.76	--	--	5.79	--
	02/17/09	10:47	11.00	--	--	6.55	--
	05/12/09	12:21	12.81	--	--	4.74	--
	05/26/09	13:45	13.51	--	--	4.04	--
	08/28/09	15:14	12.67	--	--	4.88	--
	09/10/09	10:45	12.99	--	--	4.56	--
	04/13/10	11:12	12.92	--	--	4.63	--
	07/21/10	16:30	12.59	--	--	4.96	--

**Appendix C  
Summary of Historical Groundwater Elevation Data**

Former Unocal Seattle Marketing Terminal  
3001 Elliott Avenue  
Seattle, Washington

Well Number <sup>1</sup> (Well Casing Elevation)	Date Measured	Time Measured (hr:min)	Depth to Groundwater <sup>2</sup> (feet)	Depth to LNAPL <sup>3</sup> (feet)	LNAPL Thickness <sup>3</sup> (feet)	Groundwater Elevation <sup>4</sup> (feet)	Top of Well Screen Elevation <sup>5</sup> (feet)
MW-203 Continued		08/11/10	11:12	11.68	--	5.87	--
		08/11/10	11:28	11.89	--	5.66	--
		08/11/10	11:29	11.84	--	5.71	--
		08/13/10	16:15	13.10	--	4.45	--
		08/16/10	7:12	13.96	--	3.59	--
		08/16/10	7:13	13.96	--	3.59	--
(17.55) <sup>6</sup>		09/02/10	14:45	12.76	--	4.79	--
		09/02/10	14:55	12.71	--	4.84	--
		09/02/10	15:10	12.31	--	5.24	--
		09/02/10	15:33	12.56	--	4.99	--
		09/15/10	6:47	14.20	--	3.35	--
		09/16/10	15:55	12.02	--	5.53	--
		09/16/10	16:00	12.01	--	5.54	--
		09/16/10	16:11	11.95	--	5.60	--
		09/16/10	16:20	11.90	--	5.65	--
		09/21/10	11:28	13.54	--	4.01	--
		04/25/11	13:45	12.06	--	5.49	--
		09/21/11	14:26	12.68	--	4.87	--
		11/21/11	10:21	11.69	--	5.86	--
		02/20/12	11:14	12.25	--	5.30	--
		04/17/12	13:45	13.39	--	4.16	--
		10/10/12	11:20	14.18	--	3.37	--
		12/24/12	10:35	9.67	--	7.88	--
		01/08/13	15:30	10.34	--	7.21	--
		04/30/13	10:28	11.76	--	5.79	--
		09/19/13	9:39	12.81	--	4.74	--
		11/22/13	10:05	12.48	--	5.07	--
		06/23/14	10:04	13.68	--	3.87	--
		12/15/14	12:46	10.46	--	7.09	--
		06/17/15	10:15	11.94	--	5.61	--
		12/09/15	10:19	9.63	--	7.92	--
		01/15/16	16:16	11.89	--	5.66	--
		02/16/16	8:30	11.48	--	6.07	--
		06/13/16	9:20	13.62	--	3.93	--
		09/22/16	12:50	12.01	--	5.54	--
		01/12/17	11:50	11.40	--	6.15	--
		03/27/17	12:50	12.41	--	5.14	7.05
		06/16/17	8:38	12.31	--	5.24	7.05
		<b>11/07/17</b>	<b>12:40</b>	<b>11.86</b>	--	<b>5.69</b>	<b>7.05</b>
MW-204 <sup>6</sup> (14.38)		03/07/07	10:15	18.12	--	-3.74	-2.87
		06/07/07	14:50	18.52	--	-4.14	--
		07/06/07	11:40	19.03	--	-4.65	--
		09/26/07	8:37	18.85	--	-4.47	--
		11/26/07	14:29	17.78	--	-3.40	--
		02/12/08	10:03	18.00	--	-3.62	--
(23.93) <sup>6</sup>		05/13/08	10:38	19.43	--	4.50	6.88
		09/03/08	--	18.76	--	5.17	--
		10/01/08	10:25	18.40	--	5.53	--
		10/17/08	9:29	18.72	--	5.21	--
		12/03/08	12:31	18.06	--	5.87	--
		02/17/09	10:54	17.42	--	6.51	--
		05/12/09	12:41	19.81	--	4.12	--
		05/26/09	13:41	19.20	--	4.73	--
		07/13/09	8:18	19.82	--	4.11	--
		08/04/09	--	18.88	--	5.05	--
		08/06/09	9:36	18.33	--	5.60	--
		08/20/09	9:02	18.21	--	5.72	--
		09/10/09	10:47	19.02	--	4.91	--
		04/13/10	10:59	18.71	--	5.22	--
		06/16/10	10:15	18.06	--	5.87	--
		08/11/10	16:16	18.65	--	5.28	--
		08/12/10	12:31	18.11	--	5.82	--
		08/12/10	12:34	18.12	--	5.81	--
		08/12/10	16:13	18.95	--	4.98	--
		08/12/10	16:15	18.94	--	4.99	--
		08/12/10	16:17	18.90	--	5.03	--
		08/13/10	16:25	18.79	--	5.14	--
		08/14/10	7:17	19.70	--	4.23	--
		08/14/10	7:18	19.70	--	4.23	--
		09/02/10	14:33	18.93	--	5.00	--
		09/02/10	14:35	18.93	--	5.00	--
		09/02/10	14:39	18.93	--	5.00	--
		09/02/10	15:37	18.73	--	5.20	--
		09/02/10	17:35	18.57	--	5.36	--
		09/14/10	11:58	18.91	--	5.02	--
		09/14/10	12:37	18.70	--	5.23	--
		09/14/10	12:46	18.65	--	5.28	--
		09/16/10	7:10	19.67	--	4.26	--
		09/16/10	7:12	19.67	--	4.26	--
		09/16/10	7:13	19.67	--	4.26	--
		09/16/10	7:14	19.68	--	4.25	--
		09/16/10	7:15	19.68	--	4.25	--
		09/16/10	7:17	19.69	--	4.24	--
		09/16/10	7:19	19.69	--	4.24	--
		09/16/10	7:21	19.70	--	4.23	--

**Appendix C  
Summary of Historical Groundwater Elevation Data**

Former Unocal Seattle Marketing Terminal  
3001 Elliott Avenue  
Seattle, Washington

Well Number <sup>1</sup> (Well Casing Elevation)	Date Measured	Time Measured (hr:min)	Depth to Groundwater <sup>2</sup> (feet)	Depth to LNAPL <sup>3</sup> (feet)	LNAPL Thickness <sup>3</sup> (feet)	Groundwater Elevation <sup>4</sup> (feet)	Top of Well Screen Elevation <sup>5</sup> (feet)	
MW-204 Continued  (23.93) <sup>6</sup>	09/16/10	7:23	19.70	--	--	4.23	--	
	09/16/10	7:25	19.71	--	--	4.22	--	
	09/16/10	7:27	19.72	--	--	4.21	--	
	09/16/10	7:29	19.72	--	--	4.21	--	
	09/16/10	7:30	19.75	--	--	4.18	--	
	09/17/10	14:30	18.93	--	--	5.00	--	
	09/17/10	16:20	18.47	--	--	5.46	--	
	09/17/10	19:57	18.26	--	--	5.67	--	
	09/21/10	11:35	19.18	--	--	4.75	--	
	04/25/11	14:15	18.07	--	--	5.86	--	
	09/21/11	10:22	19.62	--	--	4.31	--	
	11/21/11	10:30	18.71	--	--	5.22	--	
	02/20/12	10:53	17.99	--	--	5.94	--	
	04/17/12	13:25	19.03	--	--	4.90	--	
	10/10/12	11:10	19.87	--	--	4.06	--	
	12/24/12	10:16	16.73	--	--	7.20	--	
	01/08/13	15:20	16.69	--	--	7.24	--	
	04/30/13	10:40	17.97	--	--	5.96	--	
	09/19/13	9:18	18.63	--	--	5.30	--	
	11/22/13	9:50	18.95	--	--	4.98	--	
	06/23/14	10:13	19.51	--	--	4.42	--	
	12/15/14	12:37	16.71	--	--	7.22	--	
	06/17/15	10:10	18.20	--	--	5.73	--	
	12/09/15	10:24	15.49	--	--	8.44	--	
	01/15/16	15:44	17.59	--	--	6.34	--	
	02/16/16	8:20	17.31	--	--	6.62	--	
	06/13/16	9:25	19.42	--	--	4.51	--	
	09/22/16	12:53	18.41	--	--	5.52	--	
	01/12/17	12:09	17.43	--	--	6.50	--	
	03/27/17	12:45	17.99	--	--	5.94	6.58	
06/16/17	8:27	18.39	--	--	5.54	6.58		
	<b>11/07/17</b>	<b>12:04</b>	<b>17.98</b>	--	--	<b>5.95</b>	<b>6.58</b>	
MW-205 <sup>6</sup> (18.43)  (27.89) <sup>6</sup>	03/07/07	10:30	22.20	Sheen	--	-3.77	0.43	
	06/07/07	15:45	22.45	--	--	-4.02	--	
	07/06/07	11:47	22.93	--	--	-4.50	--	
	09/26/07	8:46	22.83	--	--	-4.40	--	
	11/26/07	14:23	21.76	--	--	-3.33	--	
	02/12/08	10:01	21.78	--	--	-3.35	--	
	05/13/08	10:43	23.38	--	--	4.51	9.89	
	09/03/08	--	22.68	--	--	5.21	--	
	12/03/08	12:36	22.01	--	--	5.88	--	
	02/17/09	10:59	21.40	--	--	6.49	--	
	05/12/09	12:47	22.73	--	--	5.16	--	
	05/26/09	13:36	23.06	--	--	4.83	--	
	08/04/09	--	22.84	--	--	5.05	--	
	08/28/09	15:34	22.71	--	--	5.18	--	
	09/10/09	10:46	23.01	--	--	4.88	--	
	04/13/10	11:07	22.62	--	--	5.27	--	
	08/13/10	8:45	22.31	--	--	5.58	--	
	08/16/10	14:18	21.50	--	--	6.39	--	
	08/16/10	12:22	21.75	--	--	6.14	--	
	09/14/10	11:59	22.66	--	--	5.23	--	
	09/16/10	9:24	24.00	--	--	3.89	--	
	09/16/10	9:25	24.00	--	--	3.89	--	
	09/16/10	9:28	24.00	--	--	3.89	--	
	09/16/10	15:05	22.42	--	--	5.47	--	
	09/17/10	13:43	23.12	--	--	4.77	--	
	09/17/10	13:48	23.11	--	--	4.78	--	
	09/17/10	13:55	23.05	--	--	4.84	--	
	09/17/10	14:00	23.05	--	--	4.84	--	
	09/17/10	14:04	23.02	--	--	4.87	--	
	09/17/10	14:09	23.03	--	--	4.86	--	
	09/17/10	14:19	22.96	--	--	4.93	--	
	09/17/10	14:26	22.92	--	--	4.97	--	
	09/21/10	11:40	23.15	--	--	4.74	--	
	09/28/10	8:15	23.05	--	Sheen <sup>6</sup>	--	4.84	--
	10/11/10	10:48	21.89	--	--	6.00	--	
	11/19/10	16:51	22.81	--	--	5.08	--	
	03/04/11	10:32	21.98	--	--	5.91	--	
	04/25/11	14:20	22.04	--	--	5.85	--	
	04/26/11	13:40	--	--	LNAPL	--	--	
	05/12/11	7:49	22.68	--	--	5.21	--	
	06/03/11	11:33	22.70	--	--	5.19	--	
	06/09/11	14:48	22.66	--	Sheen	--	5.23	
	09/21/11	10:13	23.60	--	--	4.29	--	
	09/30/11	13:50	22.26	--	--	5.63	--	
	10/06/11	14:35	22.31	--	--	5.58	--	
	10/14/11	6:15	22.61	--	--	5.28	--	
	10/21/11	6:30	22.40	--	--	5.49	--	
10/28/11	13:40	22.53	--	--	5.36	--		
11/04/11	13:05	22.42	--	--	5.47	--		
11/10/11	14:35	22.18	--	--	5.71	--		
11/21/11	10:43	22.76	--	--	5.13	--		
02/20/12	11:10	22.32	--	--	5.57	--		
04/17/12	11:45	23.03	--	--	4.86	--		

**Appendix C  
Summary of Historical Groundwater Elevation Data**

Former Unocal Seattle Marketing Terminal  
3001 Elliott Avenue  
Seattle, Washington

Well Number <sup>1</sup> (Well Casing Elevation)	Date Measured	Time Measured (hr:min)	Depth to Groundwater <sup>2</sup> (feet)	Depth to LNAPL <sup>3</sup> (feet)	LNAPL Thickness <sup>3</sup> (feet)	Groundwater Elevation <sup>4</sup> (feet)	Top of Well Screen Elevation <sup>5</sup> (feet)
MW-205 (continued)  (27.89) <sup>8</sup>	10/10/12	11:00	23.80	--	--	4.09	--
	12/24/12	10:10	20.73	--	--	7.16	--
	01/08/13	15:00	20.73	--	--	7.16	--
	04/30/13	10:45	21.91	--	--	5.98	--
	09/19/13	9:15	22.33	--	--	5.56	--
	11/22/13	9:40	22.69	--	--	5.20	--
	06/23/14	10:17	23.50	--	--	4.39	--
	12/15/14	12:30	20.78	--	--	7.11	--
	06/17/15	10:05	22.22	--	--	5.67	--
	12/09/15	10:27	19.51	--	--	8.38	--
	01/15/16	16:10	21.56	--	--	6.33	--
	02/16/16	8:10	21.28	--	--	6.61	--
	06/13/16	9:30	23.37	--	--	4.52	--
	09/22/16	12:58	22.31	--	--	5.58	--
	01/12/17	12:29	21.34	--	--	6.55	--
	03/27/17	12:40	19.89	--	--	8.00	9.89
	06/16/17	8:22	22.33	--	--	5.56	9.89
	<b>11/07/17</b>	<b>11:59</b>	<b>21.89</b>	<b>--</b>	<b>--</b>	<b>6.00</b>	<b>9.89</b>
MW-206 <sup>6</sup> (5.59)  (15.15) <sup>8</sup>	03/07/07	9:15	9.15	--	--	-3.56	-5.41
	06/07/07	13:26	10.24	--	--	-4.65	--
	07/06/07	9:22	10.84	--	--	-5.25	--
	09/26/07	7:35	10.21	--	--	-4.62	--
	11/26/07	15:08	8.47	--	--	-2.88	--
	02/12/08	10:28	8.69	--	--	-3.10	--
	05/13/08	9:59	11.80	--	--	3.35	4.15
	09/03/08	--	9.91	--	--	5.24	--
	10/01/08	9:30	9.21	--	--	5.94	--
	12/03/08	11:51	8.78	--	--	6.37	--
	02/17/09	10:29	8.28	--	--	6.87	--
	05/12/09	11:47	11.83	--	--	3.32	--
	05/26/09	13:59	13.30	--	--	1.85	--
	08/11/09	9:38	10.02	--	--	5.13	--
	08/28/09	14:07	9.78	--	--	5.37	--
	09/10/09	11:14	9.81	--	--	5.34	--
	04/13/10	11:27	12.60	--	--	2.55	--
	08/11/10	17:30	13.10	--	--	2.05	--
	08/16/10	11:52	9.70	--	--	5.45	--
	08/16/10	12:26	8.60	--	--	6.55	--
	08/18/10	9:07	13.10	--	--	2.05	--
	09/17/10	16:12	8.69	--	--	6.46	--
	09/17/10	17:55	10.03	--	--	5.12	--
	09/21/10	11:07	12.65	--	--	2.50	--
	09/22/10	9:20	11.09	--	--	4.06	--
	04/25/11	14:50	10.84	--	--	4.31	--
	09/21/11	10:52	11.00	--	--	4.15	--
	11/21/11	9:50	10.20	--	--	4.95	--
	02/20/12	11:32	11.31	--	--	3.84	--
	04/17/12	10:55	12.45	--	--	2.70	--
	10/10/12	12:00	10.65	--	--	4.50	--
	12/24/12	11:10	8.45	--	--	6.70	--
	01/08/13	15:48	8.47	--	--	6.68	--
	04/30/13	10:15	9.64	--	--	5.51	--
	09/19/13	9:42	12.46	--	--	2.69	--
11/22/13	10:50	9.22	--	--	5.93	--	
06/23/14	9:41	13.04	--	--	2.11	--	
12/15/14	13:13	7.09	--	--	8.06	--	
06/17/15	10:45	10.67	--	--	4.48	--	
12/09/15	9:54	7.86	--	--	7.29	--	
02/16/16	8:50	8.51	--	--	6.64	--	
06/13/16	9:00	12.46	--	--	2.69	--	
09/22/16	12:34	8.90	--	--	6.25	--	
01/12/17	10:24	9.45	--	--	5.70	--	
03/27/17	12:58	11.59	--	--	3.56	4.15	
06/16/17	8:50	11.59	--	--	3.56	4.15	
	<b>11/07/17</b>	<b>12:59</b>	<b>10.18</b>	<b>--</b>	<b>--</b>	<b>4.97</b>	<b>4.15</b>
MW-207 <sup>6</sup> (5.82)  (15.40) <sup>8</sup>	03/07/07	10:40	10.64	--	--	-4.82	-3.68
	06/07/07	17:10	10.53	--	--	-4.71	--
	07/06/07	9:10	11.20	--	--	-5.38	--
	09/26/07	7:25	10.30	--	--	-4.48	--
	11/26/07	15:03	8.84	--	--	-3.02	--
	02/12/08	10:31	8.90	--	--	-3.08	--
	05/13/08	9:53	12.07	--	--	3.33	5.90
	09/03/08	--	10.14	--	--	5.26	--
	10/01/08	8:10	9.51	--	--	5.89	--
	12/03/08	11:46	9.05	--	--	6.35	--
	02/17/09	10:25	8.40	--	--	7.00	--
	05/12/09	11:43	11.70	--	--	3.70	--
	05/26/09	14:03	13.52	--	--	1.88	--
	08/11/09	9:46	10.41	--	--	4.99	--
	08/28/09	13:45	10.35	--	--	5.05	--
	09/10/09	11:25	10.20	--	--	5.20	--
	04/13/10	11:30	12.43	--	--	2.97	--
06/16/10	9:54	9.70	--	--	5.70	--	
08/13/10	13:30	12.52	--	--	2.88	--	
08/16/10	11:22	10.35	--	--	5.05	--	







**Appendix C  
Summary of Historical Groundwater Elevation Data**

Former Unocal Seattle Marketing Terminal  
3001 Elliott Avenue  
Seattle, Washington

Well Number <sup>1</sup> (Well Casing Elevation)	Date Measured	Time Measured (hr:min)	Depth to Groundwater <sup>2</sup> (feet)	Depth to LNAPL <sup>3</sup> (feet)	LNAPL Thickness <sup>3</sup> (feet)	Groundwater Elevation <sup>4</sup> (feet)	Top of Well Screen Elevation <sup>5</sup> (feet)	
RW-3 (continued)	04/30/13	9:28	8.49	LNAPL on probe	--	5.81	--	
	09/15/13	8:31	8.65	--	--	5.65	--	
	11/22/13	8:10	9.55	--	--	4.75	--	
	02/25/14	11:15	7.67	--	--	6.63	--	
	05/05/14	8:04	7.50	--	--	6.80	--	
	06/12/14							
RW-4	UNABLE TO LOCATE							
RW-5 (13.9) <sup>6</sup>	09/13/07	--	8.6	--	--	5.30	--	
	11/01/07	11:00	9.4	--	--	4.50	--	
	11/26/07	12:05	7.89	--	--	6.01	--	
	12/07/07	11:45	6.4	--	--	7.50	--	
	12/19/07	9:15	2.2	--	--	11.70	--	
	(13.9) <sup>6</sup>	05/13/08	9:01	8.72	--	--	5.18	--
	09/03/08	--	8.74	--	--	5.16	--	
	12/03/08	11:16	8.45	--	--	5.45	--	
	02/17/09	9:14	7.77	Sheen	--	6.13	--	
	05/12/09	9:12	7.48	--	--	6.42	--	
	05/26/09	13:15	7.94	--	--	5.96	--	
	09/10/09	9:44	8.95	--	--	4.95	--	
	04/13/10	10:07	7.75	--	--	6.15	--	
	09/21/10	9:52	7.82	--	--	6.08	--	
	04/25/11				UNABLE TO LOCATE			
	09/21/11	8:48	8.52	--	--	5.38	--	
	11/21/11	8:49	8.52	--	--	5.38	--	
	02/20/12	10:02	7.85	--	--	6.05	--	
	04/17/12	9:35	7.82	--	--	6.08	--	
	10/10/12	10:02	9.00	--	--	4.90	--	
	12/24/12				UNABLE TO ACCESS			
	01/08/13	13:44	6.90	--	--	7.00	--	
	04/30/13	9:35	7.75	--	--	6.15	--	
09/15/13	8:34	8.00	--	--	5.90	--		
11/22/13	8:15	9.20	--	--	4.70	--		
02/25/14	11:35	7.43	--	--	6.47	--		
05/05/14	09:27	7.23	--	--	6.67	--		
06/11/14								
RW-6 (13.9) <sup>6</sup>	05/13/08 <sup>7</sup>	8:58	8.35	--	--	5.55	--	
	09/03/08	--	8.14	--	--	5.76	--	
	12/03/08	11:13	7.95	--	--	5.95	--	
	02/17/09	9:17	7.80	--	--	6.10	--	
	05/12/09	9:10	7.57	--	--	6.33	--	
	05/26/09	13:12	7.65	--	--	6.25	--	
	09/10/09	9:43	7.90	--	--	6.00	--	
	04/13/10	10:05	7.42	--	--	6.48	--	
	09/21/10	9:50	6.74	--	--	7.16	--	
	04/25/11			UNABLE TO LOCATE				
	09/21/11			UNABLE TO LOCATE				
	11/21/11			UNABLE TO LOCATE				
	02/20/12			UNABLE TO LOCATE				
	04/17/12			UNABLE TO LOCATE				
	10/10/12			UNABLE TO LOCATE				
	12/24/12			UNABLE TO ACCESS				
	01/08/13	13:45	6.87	--	--	7.03	--	
	04/30/13	9:40	7.60	--	--	6.30	--	
	09/15/13	8:40	7.73	--	--	6.17	--	
	11/22/13	8:20	8.02	--	--	5.88	--	
	02/25/14	11:25	6.98	--	--	6.92	--	
	05/05/14	09:36	7.02	--	--	6.88	--	
	06/11/14							
RW-7 (14.2) <sup>8</sup>	09/13/07	--	8.75	--	--	5.45	--	
	11/01/07	11:20	9.3	--	--	4.90	--	
	11/26/07	12:07	8.1	--	--	6.10	--	
	12/07/07	11:40	6.45	--	--	7.75	--	
	12/07/07	9:10	6.4	--	--	7.80	--	
	05/13/08	8:43	8.80	--	--	5.40	--	
	09/03/08	--	8.84	--	--	5.36	--	
	12/03/08	11:11	8.60	--	--	5.60	--	
	02/17/09	9:20	8.95	--	--	5.25	--	
	05/12/09	9:08	7.41	--	--	6.79	--	
	05/26/09	13:10	7.81	--	--	6.39	--	
	08/04/09	--	8.18	--	--	6.02	--	
	09/10/09	9:40	8.83	--	--	5.37	--	
	04/13/10	10:03	7.78	--	--	6.42	--	
	09/21/10	9:47	7.88	--	--	6.32	--	
	04/25/11	9:40	7.62	--	--	6.58	--	
	09/21/11	8:51	8.49	--	--	5.71	--	
	11/21/11	8:56	4.62	--	--	9.58	--	
	02/20/12	10:04	7.92	--	--	6.28	--	
	04/17/12	9:40	7.87	--	--	6.33	--	
	10/10/12	10:07	8.99	--	--	5.21	--	
	12/24/12			UNABLE TO ACCESS				
	01/08/13	13:46	6.24	--	--	7.96	--	
	04/30/13	9:43	7.92	--	--	6.28	--	
	09/15/13	8:40	8.08	--	--	6.12	--	
	11/22/13	8:25	8.95	--	--	5.25	--	
	02/25/14	11:15	7.40	--	--	6.80	--	

**Appendix C  
Summary of Historical Groundwater Elevation Data**

Former Unocal Seattle Marketing Terminal  
3001 Elliott Avenue  
Seattle, Washington

Well Number <sup>1</sup> (Well Casing Elevation)	Date Measured	Time Measured (hr:min)	Depth to Groundwater <sup>2</sup> (feet)	Depth to LNAPL <sup>3</sup> (feet)	LNAPL Thickness <sup>3</sup> (feet)	Groundwater Elevation <sup>4</sup> (feet)	Top of Well Screen Elevation <sup>5</sup> (feet)
RW-7 (continued)	05/05/14 06/11/14	09:46	7.40	--	--	6.80	--
				Well Decommissioned			
RW-8 (13.9) <sup>6</sup>	09/13/07	--	8.75	--	--	5.15	--
	11/01/07	11:25	8.9	--	--	5.00	--
	11/26/07	12:09	7.9	--	--	6.00	--
	12/07/07	12:35	6.07	--	--	7.83	--
	12/19/07	9:05	7.18	--	--	6.72	--
	05/13/08	8:39	8.59	--	--	5.31	--
	09/03/08	--	8.53	--	--	5.37	--
	12/03/08	11:09	8.20	--	--	5.70	--
	02/17/09	9:24	7.70	--	--	6.20	--
	05/12/09	9:05	7.41	--	--	6.49	--
(13.9) <sup>6</sup>	05/26/09	13:07	7.59	--	--	6.31	--
	09/10/09	9:38	8.61	--	--	5.29	--
	04/13/10	10:00	7.39	--	--	6.51	--
	09/21/10	9:43	7.58	--	--	6.32	--
	04/25/11	9:45	7.21	--	--	6.69	--
	09/21/11	8:53	8.15	--	--	5.75	--
	11/21/11	9:03	8.24	--	--	5.66	--
	02/20/12	10:05	7.55	--	--	6.35	--
	04/17/12	9:45	7.56	--	--	6.34	--
	10/10/12	10:10	8.61	--	--	5.29	--
	12/24/12			UNABLE TO ACCESS			
	01/08/13	13:54	6.65	--	--	7.25	--
	04/30/13	9:48	7.52	--	--	6.38	--
	09/15/13	8:43	7.71	--	--	6.19	--
	11/22/13	8:30	8.55	--	--	5.35	--
	02/25/14	11:00	7.00	--	--	6.90	--
	05/05/14	10:04	7.11	--	--	6.79	--
	06/11/14			Well Decommissioned			
RW-9 (14.1) <sup>6</sup>	09/13/07	--	8.45	--	--	5.65	--
	11/01/07	11:30	7.4	--	--	6.70	--
	11/26/07	12:11	7.44	--	--	6.66	--
	12/07/07	11:32	5.55	--	--	8.55	--
	12/19/07	9:00	6.15	--	--	7.95	--
	05/13/08	8:33	8.61	--	--	5.49	--
	09/03/08	--	7.38	--	--	6.72	--
	12/03/08	11:06	6.95	--	--	7.15	--
	02/17/09	9:27	6.80	--	--	7.30	--
	05/12/09	9:03	7.22	--	--	6.88	--
	05/26/09	13:04	10.06	--	--	4.04	--
	09/10/09	9:34	7.47	--	--	6.63	--
	04/13/10	9:57	8.28	--	--	5.82	--
	09/21/10	9:40	8.47	--	--	5.63	--
	04/25/11	9:50	7.29	--	--	6.81	--
	09/21/11	8:54	8.20	--	--	5.90	--
	11/21/11	9:08	7.68	--	--	6.42	--
	02/20/12	10:07	7.78	--	--	6.32	--
	04/17/12	9:50	8.02	--	--	6.08	--
	10/10/12	10:15	8.35	--	--	5.75	--
	12/24/12			UNABLE TO ACCESS			
	01/08/13	13:55	5.55	--	--	8.55	--
	04/30/13	9:51	7.02	--	--	7.08	--
	09/15/13	8:49	8.88	--	--	5.22	--
	11/22/13	8:35	7.06	--	--	7.04	--
	02/25/14	10:50	6.28	--	--	7.82	--
	05/05/14	10:18	6.70	--	--	7.40	--
	06/10/14			Well Decommissioned			
RW-10 (14.3) <sup>6</sup>	09/13/07	--	8.9	--	--	5.40	--
	11/01/07	11:40	8.7	--	--	5.60	--
	11/26/07	12:12	7.89	--	--	6.41	--
	12/07/07	11:29	6.26	--	--	8.04	--
	12/19/07	8:55	7.25	--	--	7.05	--
	05/13/08	8:31	8.86	--	--	5.44	--
	09/03/08	--	8.41	--	--	5.89	--
	12/03/08	11:03	7.87	--	--	6.43	--
	02/17/09	9:28	7.90	--	--	6.40	--
	05/12/09	9:01	7.47	--	--	6.83	--
	05/26/09	13:02	8.95	--	--	5.35	--
	09/10/09	9:32	8.58	--	--	5.72	--
	04/13/10	9:55	7.80	--	--	6.50	--
	09/21/10	9:38	8.12	--	--	6.18	--
	04/25/11	9:51	6.70	--	--	7.60	--
	09/21/11	8:56	8.76	--	--	5.54	--
	11/21/11	9:14	8.42	--	--	5.88	--
	02/20/12	10:10	7.75	--	--	6.55	--
	04/17/12	9:53	7.90	--	--	6.40	--
	10/10/12	10:18	9.09	--	--	5.21	--
	12/24/12			UNABLE TO ACCESS			
	01/08/13	13:59	6.32	--	--	7.98	--
	04/30/13	9:51	7.46	--	--	6.84	--
	09/15/13	8:55	8.66	--	--	5.64	--
	11/22/13	8:40	8.22	--	--	6.08	--
	02/25/14	10:38	7.07	--	--	7.23	--
	05/05/14	10:33	7.22	--	--	7.08	--

**Appendix C  
Summary of Historical Groundwater Elevation Data**

Former Unocal Seattle Marketing Terminal  
3001 Elliott Avenue  
Seattle, Washington

Well Number <sup>1</sup> (Well Casing Elevation)	Date Measured	Time Measured (hr:min)	Depth to Groundwater <sup>2</sup> (feet)	Depth to LNAPL <sup>3</sup> (feet)	LNAPL Thickness <sup>3</sup> (feet)	Groundwater Elevation <sup>4</sup> (feet)	Top of Well Screen Elevation <sup>5</sup> (feet)
RW-10 (continued)	06/10/14						
					Well Decommissioned		
RW-11 (14.1) <sup>8</sup>	12/07/07	11:14	6.5	--	--	7.60	--
	12/19/07	8:50	7.6	--	--	6.50	--
	05/13/08	8:28	8.86	--	--	5.24	--
	09/03/08	--	8.79	--	--	5.31	--
	12/03/08	11:01	8.26	--	--	5.84	--
	02/17/09	9:31	7.80	--	--	6.30	--
	05/12/09	8:59	7.64	--	--	6.46	--
	05/26/09	12:59	8.33	--	--	5.77	--
	09/10/09	9:29	8.61	--	--	5.49	--
	04/13/10	9:53	7.85	--	--	6.25	--
	09/21/10	9:35	7.98	--	--	6.12	--
(14.1) <sup>8</sup>	04/25/11	9:55	7.46	--	--	6.64	--
	09/21/11	8:57	8.77	--	--	5.33	--
	11/21/11	9:20	8.52	--	--	5.58	--
	02/20/12	10:11	7.92	--	--	6.18	--
	04/17/12	10:00	7.90	--	--	6.20	--
	10/10/12	10:21	9.12	--	--	4.98	--
	12/24/12				UNABLE TO ACCESS		
	01/08/13	14:00	6.74	--	--	7.36	--
	04/30/13	9:54	7.73	--	--	6.37	--
	09/15/13	8:58	8.50	--	--	5.60	--
	11/22/13	8:45	8.90	--	--	5.20	--
	02/25/14	10:30	7.40	--	--	6.70	--
	05/05/14	10:45	7.51	--	--	6.59	--
	06/10/14				Well Decommissioned		
RW-12 (14.0) <sup>8</sup>	12/07/07	11:08	6.78	--	--	7.22	--
	12/19/07	8:40	7.88	--	--	6.12	--
	05/13/08	8:25	8.97	--	--	5.03	--
	09/03/08	--	9.02	--	--	4.98	--
	12/03/08	10:48	8.56	--	--	5.44	--
	02/17/09	9:33	7.85	--	--	6.15	--
	05/12/09	8:56	7.76	--	--	6.24	--
	05/26/09	12:55	8.37	--	--	5.63	--
	09/10/09	9:27	9.22	--	--	4.78	--
	04/13/10	9:50	7.93	--	--	6.07	--
	09/21/10				UNABLE TO LOCATE		
	04/25/11				UNABLE TO LOCATE		
	09/21/11				UNABLE TO LOCATE		
	11/21/11				UNABLE TO LOCATE		
	02/20/12				UNABLE TO LOCATE		
	04/17/12				UNABLE TO LOCATE		
	10/10/12				UNABLE TO LOCATE		
	12/24/12				UNABLE TO ACCESS		
	01/08/13				UNABLE TO LOCATE		
	04/30/13				UNABLE TO LOCATE		
	09/15/13				UNABLE TO LOCATE		
	11/22/13				UNABLE TO LOCATE		
	06/09/14				UNABLE TO LOCATE DURING FINAL DECOMMISSIONING ACTIVITIES		
RW-13 (14.1) <sup>8</sup>	12/07/07	11:05	6.83	--	--	7.27	--
	12/19/07	8:35	7.5	--	--	6.60	--
	05/13/08	8:22	9.01	--	--	5.09	--
	09/03/08	--	9.05	--	--	5.05	--
	12/03/08	10:45	8.64	--	--	5.46	--
	02/17/09	9:36	8.22	--	--	5.88	--
	05/12/09	8:53	7.85	--	--	6.25	--
	05/26/09	12:53	8.48	--	--	5.62	--
	09/10/09	9:22	8.89	--	--	5.21	--
	04/13/10	9:47	8.01	--	--	6.09	--
	09/21/10	9:30	8.15	--	--	5.95	--
	04/25/11	10:00	7.51	--	--	6.59	--
	09/21/11	9:00	8.99	--	--	5.11	--
	11/21/11	9:27	8.56	--	--	5.54	--
	02/20/12	10:13	8.24	--	--	5.86	--
	04/17/12	10:04	8.21	--	--	5.89	--
	10/10/12	10:25	9.47	--	--	4.63	--
	12/24/12				UNABLE TO ACCESS		
	01/08/13	14:02	7.07	--	--	7.03	--
	04/30/13	9:56	7.96	--	--	6.14	--
	09/15/13	9:01	8.68	--	--	5.42	--
	11/22/13	8:50	9.25	--	--	4.85	--
	02/25/14	10:00	8.16	--	--	5.94	--
	05/05/14	11:00	7.65	--	--	6.45	--
	06/10/14				Well Decommissioned		
RW-14					UNABLE TO LOCATE		
RW-15 (13.9) <sup>8</sup>	09/13/07	--	8.83	--	--	5.07	--
	11/01/07	11:50	9	--	--	4.90	--
	11/26/07	12:18	8.4	--	--	5.50	--
	12/07/07	10:56	6.55	--	--	7.35	--
	12/19/07	8:25	6.31	--	--	7.59	--
	05/13/08	8:17	8.97	--	--	4.93	--
	09/03/08	--	8.52	--	--	5.38	--
	12/03/08	10:40	8.31	--	--	5.59	--
	02/17/09	9:44	8.24	--	--	5.66	--
	05/12/09	8:50	8.19	--	--	5.71	--

**Appendix C**  
**Summary of Historical Groundwater Elevation Data**

Former Unocal Seattle Marketing Terminal  
3001 Elliott Avenue  
Seattle, Washington

Well Number <sup>1</sup> (Well Casing Elevation)	Date Measured	Time Measured (hr:min)	Depth to Groundwater <sup>2</sup> (feet)	Depth to LNAPL <sup>3</sup> (feet)	LNAPL Thickness <sup>3</sup> (feet)	Groundwater Elevation <sup>4</sup> (feet)	Top of Well Screen Elevation <sup>5</sup> (feet)	
RW-15 (continued)	05/26/09	12:48	8.25	--	--	5.65	--	
	09/10/09	9:20	5.52	--	--	8.38	--	
	04/13/10	9:45	7.88	--	--	6.02	--	
	09/21/10				UNABLE TO LOCATE			
	04/25/11				UNABLE TO LOCATE			
	09/21/11				UNABLE TO LOCATE			
	11/21/11				UNABLE TO LOCATE			
	2/20/12				UNABLE TO LOCATE			
	04/17/12				UNABLE TO LOCATE			
	10/10/12				UNABLE TO LOCATE			
	12/24/12				UNABLE TO LOCATE			
	01/08/13				UNABLE TO LOCATE			
	(13.9) <sup>6</sup>	04/30/13			UNABLE TO LOCATE			
		09/15/13			UNABLE TO LOCATE			
		11/22/13			UNABLE TO LOCATE			
		06/09/14			UNABLE TO LOCATE DURING FINAL DECOMMISSIONING ACTIVITIES			
RW-21 (5.87)	09/13/07	--	9.85	Sheen	--	5.45	--	
	11/01/07	10:35	9.90	7.90	2.00	7.00	--	
	11/26/07	12:23	--	Sheen	--	--	--	
	12/07/07	9:40	6.90	Sheen	--	8.40	--	
	12/19/07	--	7.79	--	--	7.51	--	
	01/03/07	9:25	7.88	--	--	7.42	--	
	01/30/07	8:44	8.67	--	--	6.63	--	
	02/12/08	9:11	8.80	--	--	6.50	--	
	03/03/08	9:10	9.25	--	--	6.05	--	
	03/17/08	9:07	9.21	--	--	6.09	--	
	04/01/08	9:05	9.09	--	--	6.21	--	
	04/14/08	8:55	9.32	--	--	5.98	--	
	04/28/08	9:24	9.33	--	--	5.97	--	
	(15.3) <sup>6</sup>	05/13/08			UNABLE TO ACCESS			
		05/27/08	11:20	9.45	--	--	5.85	--
		06/10/08	10:45	9.21	--	--	6.09	--
		06/24/08	9:29	9.49	--	--	5.81	--
		07/07/08	9:39	9.19	--	--	6.11	--
		07/22/08	9:00	9.38	--	--	5.92	--
		08/12/08	9:36	9.35	--	--	5.95	--
		09/03/08	--	9.36	Sheen	--	5.94	--
		10/08/08	8:30	9.72	Sheen	--	5.58	--
		10/17/08	8:41	9.50	--	--	5.80	--
		10/29/08	8:31	9.58	--	--	5.72	--
		11/12/08	9:27	7.83	--	--	7.47	--
		12/03/08	10:10	9.22	9.20	0.02	6.10	--
		01/06/09	9:26	7.89	Sheen	--	7.41	--
		01/20/09	12:29	8.56	8.55	0.01	6.75	--
		02/03/09	9:24	9.20	Sheen	--	6.10	--
		02/17/09	9:50	9.05	Sheen	--	6.25	--
		03/12/09	11:31	9.16	Sheen	--	6.14	--
		03/25/09	9:24	9.01	Sheen	--	6.29	--
		04/08/09	9:57	8.91	8.90	0.01	6.40	--
		04/30/09	9:49	8.88	Sheen	--	6.42	--
		05/12/09	9:43	8.45	8.44	0.01	6.86	--
		05/26/09	14:48	8.82	--	--	6.48	--
		06/09/09	9:26	8.64	--	--	6.66	--
		06/25/09	9:29	8.68	--	--	6.62	--
		07/07/09	9:26	8.95	Sheen	--	6.35	--
		07/13/09	8:05	9.45	--	--	5.85	--
		08/05/09	6:45	8.96	Sheen	--	6.34	--
		08/06/09	9:18	9.06	--	--	6.24	--
		08/20/09	8:34	9.15	--	--	6.15	--
		09/10/09	9:57	9.28	--	--	6.02	--
		09/23/09	9:21	9.25	Sheen	--	6.05	--
		10/08/09	9:16	9.31	Sheen	--	5.99	--
		10/19/09	9:50	9.23	Sheen	--	6.07	--
		11/12/09	9:19	7.82	Sheen	--	7.48	--
		03/24/10	9:37	8.62	Sheen	--	6.68	--
		04/13/10	10:19	8.61	Sheen	--	6.69	--
		05/26/10	9:32	8.73	Sheen	--	6.57	--
		09/21/10	10:05	8.46	Sheen	--	6.84	--
	11/19/10	16:01	9.21	Sheen	--	6.09	--	
	03/04/11	9:31	8.18	Sheen	--	7.12	--	
	04/25/11	8:50	8.50	8.49	0.01	6.81	--	
	09/21/11	9:18	9.20	LNAPL on probe	--	6.10	--	
	11/21/11	9:34	9.03	--	--	6.27	--	
	02/20/12	10:23	8.76	LNAPL on probe	--	6.54	--	
	04/17/12	10:10	8.65	--	--	6.65	--	
	10/10/12	9:20	9.70	LNAPL on probe	--	5.60	--	
	12/24/12			UNABLE TO ACCESS				
	01/08/13			UNABLE TO ACCESS				
	04/30/13	10:00	8.74	Tar on probe	--	6.56	--	
	09/19/13	10:10	9.43	Tar on probe	--	5.87	--	
	11/22/13	8:55	10.23	--	--	5.07	--	
	06/12/14			Well Decommissioned				

**Notes:**  
<sup>1</sup>Well casing elevations listed in feet above mean sea level. Approximate monitoring well locations are shown in Figure 2.      "--" = not measured or not obtainable  
<sup>2</sup>Below top of casing.

**Appendix C  
Summary of Historical Groundwater Elevation Data**

Former Unocal Seattle Marketing Terminal  
3001 Elliott Avenue  
Seattle, Washington

<b>Well Number<sup>1</sup> (Well Casing Elevation)</b>	<b>Date Measured</b>	<b>Time Measured (hr:min)</b>	<b>Depth to Groundwater<sup>2</sup> (feet)</b>	<b>Depth to LNAPL<sup>3</sup> (feet)</b>	<b>LNAPL Thickness<sup>3</sup> (feet)</b>	<b>Groundwater Elevation<sup>4</sup> (feet)</b>	<b>Top of Well Screen Elevation<sup>5</sup> (feet)</b>
--	--------------------------	---------------------------------------	--	--	---	---	--

<sup>3</sup>Light non-aqueous phase liquid

<sup>4</sup>Elevation referenced to city of Seattle datum.

<sup>5</sup>Top of well screen elevation data from historic records.

<sup>6</sup>TOC elevations for wells MW-200 to 207, MW-27R, and MW-61A-R were surveyed using an arbitrary datum point, 9.65 feet lower than the datum from the upper well survey.

<sup>7</sup>Depth to water was measured with pump in well.

<sup>8</sup>Survey by OTAK 5/27/08.

<sup>9</sup>Groundwater elevation recorded prior to pump testing at the site. Sheen observed on extracted groundwater during hydraulic conductivity testing on well MW-205.

<sup>10</sup>LNAPL indicated in field notes, measurement not taken

<sup>11</sup>TOC elevations for wells PZ-61A-R, PZ-203, and PZ-204 unknown.

NR = Not reported.

UK = TOC elevations unknown.

Bolded data are for the current reporting period.

**Appendix C**  
**Historical Summary of Groundwater Analytical Data**  
**Total Petroleum Hydrocarbons**

Former Unocal Seattle Marketing Terminal  
 3001 Elliott Avenue  
 Seattle, Washington

Monitoring Well <sup>1</sup>	Date Sampled	LNAPL <sup>2</sup>	BTEX (EPA Method 8020 or 8021B) (µg/L)				TPH (EPA Method 418.1) (mg/L)	NWTPH-Gx (mg/L)	NWTPH-D Extended <sup>3</sup> (mg/L)		Dissolved Lead (EPA 6000/7000 Series Method) (µg/L)
			B	T	E	X		Gasoline C <sub>7</sub> - C <sub>12</sub>	Diesel C <sub>12</sub> - C <sub>24</sub>	Heavy Oil >C <sub>24</sub>	
Upper Yard RALs		No visible sheen	40	14,300	1,400	4,400	--	1	10	15	50
Upper Yard											
MW-37	06/01/90	--	<0.5	<0.5	<0.5	<0.5	<1	--	--	--	<5
	10/16/90	--	<0.5	<0.5	<0.5	<0.5	<1	--	--	--	<5
	01/17/91	--	<0.5	<0.5	<0.5	<0.5	--	<1	<1	--	<5
	04/16/91	--	<0.5	<0.5	<0.5	<0.5	--	<1	<1	--	<2
	09/15/95	ND	<0.50	<0.50	<0.50	<1.0	--	<1.0	<1.0	<0.75	--
	12/14/95	ND	<0.50	<0.50	<0.50	<1.0	--	<0.05	<0.27	<0.75	--
MW-38	06/01/90	--	<0.5	<0.5	<0.5	<0.5	<1	--	--	--	<5
	10/16/90	--	<0.5	<0.5	<0.5	<0.5	<1	--	--	--	<5
	01/17/91	--	<0.5	<0.5	<0.5	<0.5	--	<1	<1	--	<5
	04/16/91	--	<0.5	<0.5	<0.5	<0.5	--	<1	<1	--	<2
MW-39	01/17/91	--	<0.5	0.5	0.6	2.2	--	<1	<1	--	<5
	04/16/91	--	<0.5	<0.5	<0.5	<0.5	--	<1	<1	--	--
MW-40	06/01/90	--	<0.5	<0.5	<0.5	<0.5	<1	--	--	--	<5
	10/16/90	--	<0.5	1.0	0.6	<0.5	<1	--	--	--	<5
	01/17/91	--	<0.5	<0.5	<0.5	<0.5	--	<1	<1	--	<5
	04/16/91	--	<0.5	<0.5	<0.5	<0.5	--	<1	<1	--	--
MW-61A	03/13/98	ND	<0.500	<0.500	<0.500	<1.00	--	0.956	2.14	<0.750	--
	06/18/98	ND	<2.50	<2.50	<2.50	<5.00	--	1.01	3.49	<0.750	--
	09/03/98	ND	<0.500	<0.500	<0.500	<0.500	--	0.396	1.85	<0.750	<1.00
Duplicate	12/15/98	Sheen	<2.50	<2.50	2.82	12.8	--	10.2	146/73.0	<30.8/15.8	--
	12/15/98	Sheen	<2.50	<2.50	2.50	5.81	--	2.93	32.3/14.6	<8.25/4.25	--
Duplicate	03/23/99	Sheen	<0.500	<0.500	2.56	13.8	--	4.34	39.7/32.7	<8.25/4.25	--
	03/23/99	Sheen	<2.50	<2.50	<2.50	<5.00	--	1.56	52.8/42.1	<5.00/2.50	<1.00
Duplicate	07/01/99	ND	<0.500	<0.500	<0.500	<3.70	--	1.38 <sup>6</sup>	4.43/2.08	<0.750/0.750	--
Duplicate	07/01/99	ND	<0.500	<1.00	<1.40	<5.00	--	1.38 <sup>6</sup>	4.45/3.08	<0.750/0.750	--
Duplicate	09/29/99	Sheen	<0.500	<5.00	<5.00	<1.00	--	2.16 <sup>5</sup>	7.57/4.04	<0.750/0.750	--
Duplicate	09/29/99	Sheen	<0.500	<0.500	<5.00	<1.00	--	2.80 <sup>5</sup>	19.7/2.1	0.758/1.57	--
Duplicate	12/16/99	Sheen	<0.500	<5.00	<3.50	<17.00	--	7.61	33.4/30.1	<15.8/8.25	--
Duplicate	01/04/00 <sup>9</sup>	Sheen	<0.500	<5.00	<5.00	<4.15	--	1.40	12.18/29	<1.34/1.34	--
Duplicate	03/21/00	ND	<0.500	<0.500	<0.550	<1.85	--	0.831	13.17	<0.750 <sup>7</sup>	--
Duplicate	03/21/00	ND	<0.500	<0.500	<0.720	<3.40	--	1.05	6.36 <sup>7</sup>	<0.750 <sup>7</sup>	--
Duplicate	06/22/00 <sup>8</sup>	ND	0.779	<0.500	<0.500	2.32	--	1.00	4.23/3.38	<0.750/0.750	<1.00
Duplicate	06/22/00	ND	0.880	<0.500	0.591	2.46	--	0.836	5.99/4.13	<0.750/0.750	--
Duplicate	09/14/00	ND	<0.500	<0.500	<0.704	<3.11	--	1.36	2.49/1.50	<0.750/0.750	--
Duplicate	09/14/00	ND	<0.500	<0.500	0.986	<3.21	--	1.00	5.00/3.13	<0.750/0.750	--
Duplicate	12/21/00	ND	<0.500	<1.24	<0.500	<3.87	--	1.18	4.62/2.48	<0.750/0.750	--
Duplicate	12/21/00 <sup>7</sup>	ND	<0.500	<0.500	<0.500	<1.00	--	0.721	5.64/3.81	<0.750/0.750	--
Duplicate	03/14/01	ND	<0.565	<0.500	<1.38	<4.31	--	0.652	2.55/1.28	<0.750/0.750	--
Duplicate	03/14/01	ND	<0.500	<0.500	<0.500	<1.12	--	0.498	1.82/0.668	<0.750/0.750	--
Duplicate	06/21/01	ND	<0.500	0.855	<0.500	1.14	--	0.773	2.45/1.55	<0.750/0.750	<1.00
Duplicate	06/21/01	ND	<0.500	<0.500	<0.500	2.61	--	0.676	1.80/1.04	<0.750/0.750	--
Duplicate	09/25/01	Sheen	<0.500	<0.500	<0.500	2.62	--	0.839	14.3/11.3	<8.25/4.25	--
Duplicate	09/25/01	Sheen	<0.500	0.923	0.592	4.22	--	0.918	5.12/4.47	<0.750/0.750	--
Duplicate	12/19/01	Sheen	0.825	<2.00	<1.00	<1.50	--	2.54	19.4/14.8 <sup>10</sup>	<3.00/3.00 <sup>10</sup>	--
Duplicate	03/26/02	Sheen	<0.500	<0.500	<0.500	1.24	--	0.414	1.38/0.615	<0.750/0.750	--
Duplicate	03/26/02	Sheen	<0.500	<0.500	<0.500	1.85	--	0.592	1.99/0.847	<0.750/0.750	--
Duplicate	06/19/03	Sheen	<0.500	<0.500	<0.500	<1.00	--	0.360	1.43	<0.750	--
Duplicate	09/18/03	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.728	<0.750	--
Duplicate	12/03/03	Sheen	<0.500	<0.500	<0.500	1.22	--	0.604	2.46	<0.750	--
Duplicate	12/03/03	Sheen	<0.500	<0.500	<0.500	1.30	--	0.701	2.35	<0.750	--
MW-61A-R	03/02/06	Sheen/LNAPL	--	--	--	<1.00	--	--	--	--	--
	06/06/06	Sheen	<2.50	<2.50	7.64	7.48	--	3.92	20.6	<3.75	--
	09/15/06	Sheen	396	79.7	26.4	243	--	17.2	200	<142	--
	03/07/07	ND	<0.5	<0.5	0.5	<1.5	--	0.18	0.29	<0.095	--
	06/08/07	ND	<0.500	<2.0 <sup>16</sup>	1.500	1.7	--	0.400	0.600	<0.095	<0.037
	09/26/07	ND	<0.5	<0.5	1.4	<1.5	--	0.430	0.770	0.120	--
	11/28/07	ND	<0.5	<0.5	0.9	<1.5	--	0.410	0.340	<0.100	--
	11/28/07	ND	<0.5	<0.5	0.9	<1.5	--	0.400	0.670	0.370	--
	02/13/08	ND	<0.500	<0.500	0.980	1.14	--	0.455	0.308	<0.485	--
	05/14/08	ND	<0.500	<0.500	1.24	1.43	--	0.363	0.406	<0.472	--
	09/04/08	Sheen	<0.500	1.16	3.58	1.13	--	0.933	0.380	<0.490	--
	12/03/08	LNAPL	--	--	--	--	--	--	--	--	--
	02/18/09	Sheen	<0.500	<0.500	<0.500	1.32	--	0.490	0.830	<0.481	--
	09/10/09	LNAPL	--	--	--	--	--	--	--	--	--
	04/14/10	--	--	--	--	--	--	--	--	--	--
	09/23/10	ND	<0.50	<0.50	0.68	<2.0	--	0.76	1.5	<0.26	--
	04/25/11	LNAPL	--	--	--	--	--	--	--	--	--
	09/21/11	LNAPL	--	--	--	--	--	--	--	--	--
	04/18/12	LNAPL	--	--	--	--	--	--	--	--	--
	10/10/12	LNAPL	--	--	--	--	--	--	--	--	--
	04/30/13	LNAPL	--	--	--	--	--	--	--	--	--
	09/19/13	LNAPL	--	--	--	--	--	--	--	--	--
	06/24/14	LNAPL	--	--	--	--	--	--	--	--	--
	12/16/15	LNAPL	--	--	--	--	--	--	--	--	--
	06/17/15	LNAPL	--	--	--	--	--	--	--	--	--
	12/09/15	LNAPL	--	--	--	--	--	--	--	--	--
	06/15/16	ND	<0.5	<0.5	<0.5	<1.5	--	0.220	0.120	<0.067	--
	01/13/17	ND	<0.5	<0.5	0.5	2	--	1.000	0.490	<0.074	--
	06/16/17	LNAPL	--	--	--	--	--	--	--	--	--
	11/08/17	LNAPL	--	--	--	--	--	--	--	--	--
MW-62A	03/13/98	ND	<0.500	<0.500	<0.500	<1.00	--	0.288	<0.250	<0.750	--
	06/18/98	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--
	09/03/98	ND	<1.00	<0.500	0.901	2.79	--	0.134	<0.250	<0.750	<1.00
	12/14/98	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--
	03/23/99	ND	10.8	<5.00	<5.00	<10.0	--	<0.500	0.371/0.250	<0.750/0.750	--
	07/01/99	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.311/0.250	<0.750/0.750	1.09
	09/29/99	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.709/0.250	<0.750/0.750	--
	12/16/99	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--
	03/21/00	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--
	06/22/00	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	<1.00
	09/14/00	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.376/0.250	<0.750/0.750	--
	12/21/00 <sup>9</sup>	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--
	03/14/01	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--
	06/21/01	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	<1.00
	09/25/01										

**Appendix C**  
**Historical Summary of Groundwater Analytical Data**  
**Total Petroleum Hydrocarbons**

Former Unocal Seattle Marketing Terminal  
3001 Elliott Avenue  
Seattle, Washington

Monitoring Well <sup>1</sup>	Date Sampled	LNAPL <sup>2</sup>	BTEX (EPA Method 8020 or 8021B) (µg/L)				TPH (EPA Method 418.1) (mg/L)	NWTPH-Gx (mg/L)		NWTPH-D Extended <sup>3</sup> (mg/L)		Dissolved Lead (EPA 6000/7000 Series Method) (µg/L)
			B	T	E	X		Gasoline C <sub>7</sub> - C <sub>12</sub>	Diesel C <sub>12</sub> - C <sub>24</sub>	Heavy Oil >C <sub>24</sub>		
MW-63A (continued)	06/21/01	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	<1.00	
	09/25/01	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	12/18/01	ND	<0.500	<2.00	<1.00	<1.50	--	<0.100	0.468<0.250 <sup>10</sup>	<0.750<0.750 <sup>10</sup>	--	
	03/26/02	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.379<0.250	<0.750<0.750	--	
	06/19/02	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.299<0.250	<0.750<0.750	<1.00	
	12/13/02	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.514	<0.750	--	
	12/03/03	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	06/18/98	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
MW-64	09/03/98	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	<1.00	
	12/14/98	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.325<0.250	<0.750<0.750	--	
	03/23/99	ND	<0.500	<0.500	<0.500	2.42	--	<0.0500	0.354<0.250	<0.750<0.750	--	
	07/01/99	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.319<0.250	<0.750<0.750	1.09	
	09/29/99	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.448<0.564	<0.750<0.169	--	
	01/04/00 <sup>8</sup>	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250<0.250	<0.750<0.750	--	
	03/21/00	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.255 <sup>7</sup>	<0.750	--	
	06/22/00 <sup>8</sup>	ND	<0.500	1.39	0.654	5.39	--	0.0908	0.315<0.487	<0.750<1.46	<1.00	
	07/25/00	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	<1.00	
	09/14/00	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	12/21/00	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.298<0.250	<0.750<0.750	--	
	03/14/01	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	06/21/01	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	<1.00	
	09/25/01	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.263<0.250 <sup>11</sup>	<0.750<0.750 <sup>11</sup>	--	
	12/18/01	ND	<0.500	<2.00	<1.00	<1.50	--	<0.100	0.372<0.250 <sup>10</sup>	<0.750<0.750 <sup>10</sup>	--	
	03/26/02	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	<1.00	
	06/19/02	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.499<0.250	<0.750<0.750	<1.00	
	12/13/02	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.38	<0.750	--	
	12/03/03	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.379	<0.750	--	
	Elliott Avenue RALs		No visible sheen	40	14,300	1,400	4,400	--	7	10	15	50
	Elliott Avenue											
	MW-30 <sup>12</sup>	01/31/89	--	4.0	0.6	<0.5	<0.5	6	<5	--	--	--
		04/27/89	--	5.0	<0.5	0.6	<0.5	0.37	<5	--	--	--
		07/25/89	--	8.0	4.9	17.0	11.1	13	<5	--	--	--
10/26/89		LNAPL	--	--	--	--	--	--	--	--	--	
01/16/90		LNAPL	--	--	--	--	--	--	--	--	--	
04/16/90		LNAPL	--	--	--	--	--	--	--	--	--	
07/25/90		LNAPL	--	--	--	--	--	--	--	--	--	
09/20/90		--	--	--	--	--	1	--	--	--	--	
10/16/90		--	<5.0	<5.0	<5.0	<5.0	10	--	--	--	28	
01/17/91		--	<0.5	<0.5	0.6	3.5	24	2	13	--	<5	
04/16/91		--	<0.5	<0.5	<0.5	<0.5	--	--	--	--	<2	
09/17/91		LNAPL	--	--	--	--	--	<1	<1	--	--	
12/10/91		LNAPL	--	--	--	--	--	--	--	--	--	
01/29/92		--	<0.5	<0.5	<0.5	<0.5	--	--	--	--	--	
03/13/98		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.341	<0.750	--	
03/13/98		ND	<0.500	<0.500	<0.500	<1.00	--	0.0522	<0.250	<0.750	--	
06/29/98		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	<1.00	
06/29/98		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
09/04/98		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.575	<0.750	--	
09/04/98		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.416	<0.750	--	
12/15/98		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.900<0.310	<0.750<0.750	--	
03/24/99		Sheen	<0.500	<0.500	<0.500	<1.00	--	<0.0500	1.470<0.590	1.39<0.750	--	
07/01/99		Sheen	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.528<0.250	<0.750<0.750	<1.00	
09/29/99		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	1.12<0.454	1.19<1.36	--	
12/15/99		Sheen	<0.500	<0.500	<0.500	<1.00	--	0.0657	2.720<0.679	<1.43<1.43	--	
03/22/00		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	1.680<0.753	1.35<0.750	--	
06/21/00		Sheen	<0.500	<0.500	<0.500	<1.00	--	0.0545	0.345<0.250	<0.750<0.750	<1.00	
09/14/00		--	--	--	--	--	--	--	--	--	--	
12/22/00		ND	<0.500	<0.500	<0.500	<1.00	--	0.0766	1.170<0.353	<0.750<0.750	--	
03/15/01		ND	<0.500	<0.500	<0.500	<1.00	--	0.248	4.85<3.27	6.28<3.25	--	
06/22/01		Sheen	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.448<0.250	<0.750<0.750	--	
09/25/01		Sheen	<0.500	<0.500	<0.500	<1.00	--	<0.0500	2.73<1.60	2.20<1.22	--	
12/18/01		Sheen	<0.500	<2.00	<1.00	<1.50	--	<0.100	1.09<0.250 <sup>10</sup>	<0.750<0.750 <sup>10</sup>	--	
12/18/01		Sheen	<0.500	<2.00	<1.00	<1.50	--	0.107	1.05<0.250 <sup>10</sup>	<0.750<0.750 <sup>10</sup>	--	
03/27/02		Sheen	<0.500	<0.500	<0.500	<1.00	--	<0.0793	1.620<0.536	0.936<0.750	--	
06/20/02		Sheen	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.527<0.250	<0.750<0.750	--	
09/19/02		Sheen	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
12/13/02		Sheen	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.419	<0.750	--	
06/19/03		Sheen	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
09/18/03		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
12/03/03		Sheen	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
03/09/04		Sheen	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
06/03/04		Sheen	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.544	<0.750	--	
06/03/04		Sheen	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.913	0.765	--	
09/03/04		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.451	<0.750	--	
09/03/04		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	1.33	0.765	--	
12/06/04		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.381	<0.750	--	
12/06/04		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.268	<0.750	--	
03/04/05		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.747	0.898	--	
03/04/05		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.835	0.976	--	
06/03/05		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.278	<0.750	--	
06/03/05		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
09/01/05		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.416	<0.750	--	
09/01/05		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.366	<0.750	--	
12/01/05		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.359	<0.708	--	
12/01/05		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.438	<0.714	--	
03/02/06		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.236	<0.708	--	
03/02/06	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.236	<0.708	--		
06/06/06	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--		
06/06/06	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--		
09/15/06	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.708	--		
09/15/06	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.708	--		
03/07/07	Sheen	<0.5	<0.5	<0.5	<1.5	--	<0.048	1.6	0.53	--		
06/08/07												





**Appendix C  
Historical Summary of Groundwater Analytical Data  
Total Petroleum Hydrocarbons**

Former Unocal Seattle Marketing Terminal  
3001 Elliott Avenue  
Seattle, Washington

Monitoring Well <sup>1</sup>	Date Sampled	LNAPL <sup>2</sup>	BTEX (EPA Method 8020 or 8021B) (µg/L)				TPH (EPA Method 418.1) (mg/L)	NWTPH-Gx (mg/L) Gasoline C <sub>7</sub> - C <sub>12</sub>	NWTPH-D Extended <sup>3</sup> (mg/L)		Dissolved Lead (EPA 6000/7000 Series Method) (µg/L)	
			B	T	E	X			Diesel C <sub>9</sub> - C <sub>24</sub>	Heavy Oil >C <sub>24</sub>		
MW-8 (continued)	12/14/98	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.523/<0.250	<0.750/<0.750	--	
	07/01/99	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	12/16/99	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.501/<0.403	<1.21/<1.21	--	
	06/22/00	ND	<0.500	<0.500	<0.500	<1.00	--	0.0558	0.273/<0.249	<0.750/<0.737	--	
	12/21/00	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.441/<0.245	<0.750/<0.750	--	
	06/21/01	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	12/19/01	ND	<0.500	<2.00	<1.00	<1.50	--	<0.100	0.464/<0.250 <sup>10</sup>	<0.750/<0.750 <sup>10</sup>	--	
	06/19/02	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.271/<0.250	<0.750/<0.750	--	
	12/13/02	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.439	0.762	--	
	12/02/03	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	MW-10	01/31/89	--	<0.5	<0.5	<0.5	<0.5	0.36	--	--	--	<5
		04/27/89	--	<0.5	<0.5	<0.5	<0.5	2.2	--	--	--	<5
		07/25/89	--	<0.5	<0.5	<0.5	<0.5	0.45	--	--	--	<5
10/26/89		--	<0.5	<0.5	<0.5	<0.5	3.4	--	--	--	<5	
01/16/90		--	<0.5	<0.5	<0.5	<0.5	0.35	--	--	--	<5	
04/16/90		--	<0.5	<0.5	<0.5	<0.5	<1	--	--	--	<5	
07/25/90		--	<0.5	<0.5	<0.5	<0.5	6	--	--	--	<5	
10/16/90		--	<0.5	<0.5	<0.5	<0.5	<1	--	--	--	<5	
01/17/91		--	<0.5	<0.5	<0.5	<0.5	--	<1	<1	--	<5	
04/16/91		--	<0.5	<0.5	<0.5	<0.5	--	<1	<1	--	<5	
09/17/91		--	<0.5	<0.5	<0.5	<0.5	--	<1	<1	--	<2	
12/10/91		--	<0.5	<0.5	<0.5	<0.5	--	<1	<1	--	<3	
06/25/98		ND	<0.500	<0.500	<0.500	<1.00	--	0.0593	<0.250	<0.750	1.24	
12/14/98		ND	<0.500	<0.500	<0.500	<1.28	--	0.0715	0.953/<0.250	<0.750/<0.750	--	
07/01/99		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.652/<0.250	<0.750/<0.750	--	
12/16/99		ND	<0.500	<0.500	<0.500	<1.00	--	0.0776	0.706/<0.475	<1.43/<1.43	--	
06/22/00		ND	<0.500	<0.500	<0.500	<1.00	--	0.0846	<0.503 <sup>13</sup>	<1.51 <sup>13</sup>	--	
12/21/00		ND	<0.500	<0.500	<0.500	<1.10	--	0.0657	0.555/<0.250	<0.750/<0.750	--	
06/21/01		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.301/<0.250	<0.750/<0.750	--	
12/19/01		ND	<0.500	<2.00	<1.00	<1.50	--	<0.100	0.551/<0.250 <sup>10</sup>	<0.750/<0.750 <sup>10</sup>	--	
06/19/02	ND	<0.500	<0.500	<0.500	<1.43	--	0.0545	0.656/<0.250	<0.750/<0.750	--		
12/13/02	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--		
12/02/03	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--		
MW-20	01/31/89	--	<0.5	<0.5	<0.5	<0.5	1.1	--	--	--	<5	
	04/27/89	--	<0.5	<0.5	<0.5	<0.5	1.6	--	--	--	<5	
	07/25/89	--	1.0	<0.5	<0.5	<0.5	0.31	--	--	--	<5	
	10/26/89	--	0.7	<0.5	<0.5	<0.5	3.2	--	--	--	<5	
	01/16/90	--	<0.5	<0.5	<0.5	<0.5	1.4	--	--	--	<5	
	04/16/90	--	0.6	<0.5	<0.5	<0.5	<1	--	--	--	<5	
	07/25/90	--	<0.5	<0.5	<0.5	<0.5	<1	--	--	--	<5	
	10/16/90	--	<0.5	<0.5	<0.5	<0.5	<1	--	--	--	<5	
	01/17/91	--	<0.5	<0.5	<0.5	<0.5	--	<1	<1	--	<5	
	04/16/91	--	<0.5	<0.5	<0.5	<0.5	--	<1	<1	--	<2	
	09/17/91	--	<0.5	<0.5	<0.5	<0.5	--	<1	<1	--	<2	
	12/10/91	--	<0.5	<0.5	<0.5	<0.5	--	<1	<1	--	3.4	
	06/25/98	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	<1.00	
	12/15/98	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.287/<0.250	<0.750/<0.750	--	
	07/01/99	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.291/<0.250	<0.750/<0.750	--	
	12/16/99	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.452/<0.250	<0.750/<0.750	--	
	06/22/00	ND	<0.500	<0.500	<0.500	1.67	--	<0.0500	<0.250	<0.750	--	
	12/21/00	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.689/<0.250	<0.750/<0.750	--	
	06/21/01	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.277/<0.250	<0.750/<0.750	--	
	12/19/01	ND	<0.500	<2.00	<1.00	<1.50	--	<0.100	1.05/<0.250 <sup>10</sup>	<0.750/<0.750 <sup>10</sup>	--	
06/20/02	ND	6.60	<0.500	<0.500	3.30	--	<0.0500	0.627/<0.250	<0.750/<0.750	--		
12/13/02	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--		
12/02/03	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--		
MW-25	01/31/89	--	<0.5	4.7	<0.5	2.3	3.7	--	--	--	<5	
	04/27/89	--	7.2	1.2	1.6	<0.5	0.93	--	--	--	<5	
	07/25/89	--	1.4	0.8	1.2	<0.5	3.4	--	--	--	<5	
	10/26/89	--	<0.5	<0.5	<0.5	<0.5	7.8	--	--	--	<5	
	01/16/90	--	1.3	<0.5	<0.5	<0.5	4.9	--	--	--	<5	
	04/16/90	--	6.6	1.4	0.8	2.7	<1	--	--	--	<5	
	07/25/90	--	2.5	0.6	0.6	0.8	<1	--	--	--	<5	
	10/16/90	--	<0.5	<0.5	<0.5	0.8	<1	--	--	--	<5	
	01/17/91	--	1.0	0.7	<0.5	1.4	<1	--	<1	--	<5	
	04/16/91	--	0.9	<0.5	<0.5	<0.5	<1	--	<1	--	<20	
	09/17/91	--	<0.5	<0.5	<0.5	0.6	<1	--	<1	--	<20	
	12/10/91	--	<0.5	<0.5	<0.5	<0.5	<1	--	<1	--	<3.0	
	03/13/98	ND	<0.500	<0.500	<0.500	<1.00	--	0.160	<0.250	<0.750	--	
	06/24/98	ND	<0.500	1.68	<0.500	<1.00	--	0.689	<0.250	<0.750	<1.00	
	09/03/98	ND	<0.500	<0.500	<0.500	<1.00	--	0.0716	<0.250	<0.750	--	
	12/14/98	ND	<0.500	<0.500	0.795	1.31	--	0.0697	1.26/<0.250	<0.750/<0.750	--	
	03/24/99	ND	<0.600	<0.700	<1.00	<2.50	--	0.118	0.969/<0.250	<0.750/<0.750	--	
	07/01/99	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.719/<0.250	<0.750/<0.750	<20.0	
	09/29/99	ND	<0.500	3.52	<0.500	<10.0	--	0.136	1.58/<0.476	<1.43/<1.43	--	
	12/16/99	ND	<0.500	<0.500	0.632	1.81	--	0.106	1.31/<0.250	<0.750/<0.750	--	
03/22/00	ND	<0.500	1.94	<0.500	<1.00	--	0.148	1.36/<0.447	<1.34/<1.34	--		
06/22/00	ND	<0.500	<0.500	<0.500	<1.00	--	0.0876	0.674/<0.250	<0.750/<0.750	<10.0		
09/15/00	ND	<0.500	<0.607	<0.500	<1.28	--	0.716	1.26/<0.250	<0.750/<0.750	--		
12/21/00	ND	<0.500	<0.500	<0.500	1.18	--	0.0991	1.25/<0.250	<0.750/<0.750	--		
03/15/01	ND	<0.500	<0.500	<0.500	1.75	--	0.0664	1.19/<0.250	<0.750/<0.750	--		
06/21/01	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.538/<0.250	<0.750/<0.750	<1.00		
09/25/01	ND	<0.500	<0.500	<0.500	<1.00	--	0.0596	0.864/<0.250	<0.750/<0.750	--		
12/19/01	ND	<0.500	<2.00	<1.00	<1.50	--	0.175	2.22/<0.250 <sup>10</sup>	0.852/<0.750 <sup>10</sup>	--		
03/26/02	ND	<0.500	<0.500	<0.500	1.39	--	0.12	0.861/<0.250	<0.750/<0.750	--		
06/19/02	ND	<0.500	<0.500	<0.500	1.44	--	0.108	0.706/<0.250	<0.750/<0.750	<1.00		
12/13/02	ND	<0.500	<0.500	<0.500	<1.00	--	0.0578	<0.250	<0.750	--		
12/02/03	ND	<0.500	<0.500	<0.500	<1.00	--	0.110	<0.250	<0.750	--		
MW-26	01/31/89	--	<0.5	<0.5	<0.5	<0.5	0.64	--	--	--	<5	
	04/27/89	--	<0.5	<0.5	<0.5	<0.5	0.08	--	--	--	<5	
	07/25/89	--	<0.5	<0.5	<0.5	<0.5	1.4	--	--	--	<5	
	10/26/89	--	<0.5	<0.5	<0.5	<0.5	0.94	--	--	--	<5	
	01/16/90	--	<0.5	<0.5	<0.5	<0.5	1.8	--	--	--	<5	
	04/16/90	--	<0.5	<0.5	<0.5	<0.5	<1	--	--	--	<5	
	07/25/90	--	<0.5									

**Appendix C**  
**Historical Summary of Groundwater Analytical Data**  
**Total Petroleum Hydrocarbons**

Former Unocal Seattle Marketing Terminal  
 3001 Elliott Avenue  
 Seattle, Washington

Monitoring Well <sup>1</sup>	Date Sampled	LNAPL <sup>2</sup>	BTEX (EPA Method 8020 or 8021B) (µg/L)				TPH (EPA Method 418.1) (mg/L)	NWTPH-Gx (mg/L)		NWTPH-D Extended <sup>3</sup> (mg/L)		Dissolved Lead (EPA 6000/7000 Series Method) (µg/L)
			B	T	E	X		Gasoline C <sub>7</sub> - C <sub>12</sub>	Diesel C <sub>12</sub> - C <sub>24</sub>	Heavy Oil >C <sub>24</sub>		
MW-27 (continued)	04/16/90	--	<0.5	<0.5	<0.5	0.6	<1	--	--	--	<5	
	07/25/90	--	<0.5	<0.5	<0.5	<0.5	2	--	--	--	<5	
	10/16/90	--	<0.5	<0.5	<0.5	<0.5	<1	--	--	--	<5	
	01/17/91	--	0.6	<0.5	<0.5	<0.5	<1	<1	<1	--	<5	
	04/16/91	--	<0.5	<0.5	<0.5	0.9	<1	<1	<1	--	<2	
	09/19/91	--	<0.5	<0.5	<0.5	1.1	<1	<1	<1	--	4	
	12/10/91	--	<0.5	<0.5	<0.5	<0.5	<1	<1	<1	--	<3.0	
	03/13/98	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	06/24/98	ND	<0.500	2.85	<0.500	<1.00	--	0.188	<0.250	<0.750	<1.00	
	09/03/98	ND	<0.800	<0.500	<0.500	<1.00	--	0.0961	0.316	<0.750	--	
	12/14/98	ND	<4.00	<0.500	<0.500	1.33	--	0.119	0.485/<0.250	<0.750/<0.750	--	
	03/24/99	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.394/<0.250	<0.750/<0.750	--	
	07/01/99	ND	<0.500	<2.20	<0.500	<1.00	--	0.0823	0.394/<0.250	<0.750/<0.750	--	
	09/29/99	ND	<0.500	1.87	<0.500	<1.00	--	<0.0500	0.830/<0.323	<0.750/<0.750	--	
	12/16/99	ND	<0.500	<0.500	<0.500	1.29	--	0.0925	0.544 <sup>15</sup>	<0.750 <sup>15</sup>	--	
	03/22/00	ND	<0.500	0.874	<0.500	<1.00	--	<0.0500	0.468/<0.250	<0.750/<0.750	--	
	06/22/00	ND	0.692	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	09/15/00	ND	<0.605	<0.500	<0.500	<1.00	--	<0.0500	0.420/<0.250	<0.750/<0.750	--	
	12/21/00	ND	1.89	<0.500	<0.500	<1.00	--	0.0727	0.308/<0.250	<0.750/<0.750	--	
	03/15/01	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.537/<0.250	<0.750/<0.750	--	
	06/21/01	Sheen	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.259/<0.250	<0.750/<0.750	--	
	09/25/01	ND	0.571	<0.500	<0.500	<1.00	--	<0.0500	1.38/0.547	<0.750/<0.750	--	
	12/19/01	Sheen	<0.500	<2.00	<1.00	<1.50	--	<0.100	<0.250 <sup>10</sup>	<0.750 <sup>10</sup>	--	
	03/26/02	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.257/<0.250	<0.750/<0.750	--	
	06/19/02	ND	<0.500	<0.500	<0.500	1.05	--	<0.0500	<0.250	<0.750	--	
	09/19/02	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	12/13/02	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	03/21/03	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	06/19/03	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	09/18/03	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.672	<0.750	--	
	12/03/03	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	03/09/04	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	06/03/04	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	09/03/04	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	12/06/04	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	03/04/05	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	06/03/05	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	09/01/05	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	12/01/05	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.236	<0.708	--	
	03/02/06	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.236	<0.708	--	
MW-27R	03/07/07	ND	<0.5	<0.5	<0.5	<1.5	--	<0.048	<0.076	<0.094	--	
	09/26/07	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.077	<0.096	<0.47	
	11/27/07	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.080	<0.100	0.091	
MW-34	10/26/89	--	1.7	3	<0.5	2.1	0.27	--	--	--	<5	
	01/16/90	--	<0.5	<0.5	<0.5	<0.5	0.08	--	--	--	<5	
	04/16/90	--	<0.5	<0.5	<0.5	<0.5	<1	--	--	--	<5	
	07/25/90	--	<0.5	<0.5	<0.5	<0.5	<1	--	--	--	<5	
	10/16/90	--	<0.5	<0.5	<0.5	<0.5	<1	--	--	--	<5	
	01/17/91	--	<0.5	<0.5	<0.5	<0.5	--	<1	<1	--	<5	
	04/16/91	--	<0.5	<0.5	<0.5	<0.5	--	<1	<1	--	<2	
	09/17/91	--	<0.5	<0.5	<0.5	<0.5	--	<1	<1	--	3	
	12/01/91	--	<0.5	<0.5	<0.5	<0.5	--	<1	<1	--	3.0	
MW-35	10/26/89	--	33	1.1	<0.5	1.4	<0.5	--	--	--	<5	
	01/16/90	--	<0.5	<0.5	<0.5	<0.5	<0.5	--	--	--	<5	
	04/16/90	--	<0.5	<0.5	<0.5	<0.5	<1	--	--	--	<5	
	07/25/90	--	<0.5	<0.5	<0.5	<0.5	<1	--	--	--	<5	
	10/16/90	--	<0.5	<0.5	<0.5	<0.5	<1	--	--	--	<5	
	01/17/91	--	<0.5	<0.5	<0.5	<0.5	--	<1	<1	--	<5	
	04/16/91	--	<0.5	<0.5	<0.5	<0.5	--	<1	<1	--	<5	
	09/17/91	--	<0.5	<0.5	<0.5	<0.5	--	<1	<1	--	2	
	12/01/91	--	<0.5	<0.5	<0.5	<0.5	--	<1	<1	--	3.3	
MW-36	10/26/89	--	330	1.9	2.5	8.0	2	--	--	--	<5	
	01/16/90	--	95	3.1	<0.5	9.4	0.39	--	--	--	<5	
	04/16/90	--	140	7.8	<0.5	<5.0	3.2	--	--	--	<5	
	07/25/90	--	<0.5	<0.5	3.4	17	--	--	--	--	<5	
	10/16/90	--	8.0	<0.5	4.8	4.8	4	--	--	--	<5	
	01/17/91	--	1.2	5.6	12	58	6	11	20	--	<5	
	04/16/91	--	1.7	6.4	<0.5	4.9	--	<1	<1	--	<2	
	09/17/91	--	<0.5	<0.5	1.1	3.2	--	15	29	--	<2	
	12/01/91	--	<0.5	<0.5	2.5	6.5	--	<1	<1	--	<3.0	
	03/13/98	ND	<0.500	<0.500	<0.500	<1.00	--	0.609	12.5	2.69	--	
	06/25/98	ND	<0.500	<0.500	<0.500	<2.50	--	0.345	<0.250	<0.750	<1.00	
	09/03/98	ND	<0.800	<0.500	<0.700	<4.00	--	0.499	7.42	1.43	--	
	12/14/98	ND	1.24	0.699	0.707	4.12	--	0.536	1.43/<0.250	<0.750/<0.750	--	
	03/24/99	ND	1.96	<1.10	<1.40	<3.50	--	0.999	27.1/18.1	5.86/3.39	--	
	07/01/99	ND	<0.500	<0.500	<0.500	<2.00	--	0.257 <sup>7</sup>	1.28/<0.250	<0.750/<0.750	--	
	09/29/99	ND	<0.500	<0.500	<0.500	<1.00	--	0.522 <sup>7</sup>	4.63/2.01	0.849/<0.0750	--	
	12/16/99	ND	0.813	<1.50	<5.00	<2.00	--	0.344	0.887/<0.250	<0.750/<0.750	--	
	03/22/00	ND	<0.500	0.792	<0.500	<3.00	--	0.584	6.42/4.30	1.58/<0.750	--	
	06/22/00 <sup>8</sup>	ND	5.80	70.0	33.2	240	--	2.17	0.850/<0.250	<0.750/<0.750	--	
	09/15/00	Sheen	<0.500	<2.39	<0.704	<5.46	--	0.923	9.25/6.10	1.70/0.927	--	
	12/21/00	ND	0.636	<1.12	<0.500	<2.20	--	0.229	1.26/<0.250	<0.750/<0.750	--	
	03/15/01	ND	2.00	<1.04	<0.500	<12.5	--	2.19	5.46/4.03	1.40/<0.750	--	
	06/21/01	ND	<0.500	<0.500	<0.500	<1.00	--	0.207	0.643/<0.250	<0.750/<0.750	--	
	09/25/01	Sheen	1.03	<0.500	<0.500	2.54	--	0.514	8.88/6.64	1.92/<0.750	--	
	12/19/01	ND	1.49	<2.00	<1.00	<1.50	--	0.415	1.15/<0.250 <sup>10</sup>	<0.750/<0.750 <sup>10</sup>	--	
	03/26/02	ND	1.01	<0.500	<0.500	1.9	--	0.38	1.47/0.794	<0.750/<0.750	--	
	06/20/02	ND	0.618	<0.500	<0.500	<1.00	--	0.106	1.01/<0.250	<0.750/<0.750	--	
	09/19/02	Sheen	0.914	<0.500	<0.500	1.85	--	0.307	1.39 <sup>11</sup>	<0.750 <sup>7</sup>	--	
	12/13/02	Sheen	<0.500	<0.500	<0.500	1.07	--	0.186	15.5	<0.750	--	
	03/21/03	Sheen	0.846	<0.500	<0.500	2.4	--	0.398	3.25	<0.750	--	
	06/19/03 <sup>14</sup>	Sheen	0.691	0.508	0.503	2.93	--	0.623 <sup>7</sup>	6.0			

**Appendix C**  
**Historical Summary of Groundwater Analytical Data**  
**Total Petroleum Hydrocarbons**

Former Unocal Seattle Marketing Terminal  
 3001 Elliott Avenue  
 Seattle, Washington

Monitoring Well <sup>1</sup>	Date Sampled	LNAPL <sup>2</sup>	BTEX (EPA Method 8020 or 8021B) (µg/L)				TPH (EPA Method 418.1) (mg/L)	NWTPH-Gx (mg/L)		NWTPH-D Extended <sup>3</sup> (mg/L)		Dissolved Lead (EPA 6000/7000 Series Method) (µg/L)
			B	T	E	X		Gasoline C <sub>7</sub> - C <sub>12</sub>	Diesel C <sub>12</sub> - C <sub>24</sub>	Heavy Oil >C <sub>24</sub>		
MW-43 (continued)	01/17/91	--	<0.5	<0.5	<0.5	<0.5	--	<1	<1	--	<5	
	04/16/91	--	<0.5	<0.5	0.7	0.6	--	<1	<1	--	<2	
	09/17/91	--	<0.5	<0.5	<0.5	<0.5	--	3	9	--	3	
	12/10/91	--	<0.5	<0.5	<0.5	<0.5	--	<1	<1	--	<3.0	
	06/25/98	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	<1.00	
MW-52	12/15/98	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	07/01/99	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.522/<0.250	<0.750/<0.750	--	
	12/16/99	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.250/<0.250	<0.750/<0.750	--	
	06/22/00	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	12/21/00	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.257/<0.250	<0.750/<0.750	--	
	06/22/01	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	12/19/01	ND	<0.500	<2.00	<1.00	<1.50	--	<1.00	0.325/<0.250 <sup>10</sup>	<0.750/<0.750 <sup>10</sup>	--	
	06/20/02	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.269/<0.250	<0.750/<0.750	--	
	12/13/02	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	12/02/03	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	MW-67	03/13/98	ND	<0.500	0.658	1.57	3.37	--	0.237	<0.250	<0.750	--
		06/24/98	ND	<0.500	1.44	<0.500	<1.00	--	0.0597	<0.250	<0.750	<1.00
		09/03/98	ND	<1.00	<0.500	0.913	<1.00	--	0.0661	0.287	<0.750	--
		12/14/98	ND	<0.800	<2.00	2.44	4.87	--	0.432	0.813/0.328	<0.750/<0.750	--
		03/24/99	ND	4.84	<0.500	<0.500	<1.00	--	0.158	0.566/<0.250	<0.750/<0.750	--
07/01/99		ND	<4.20	<1.00	2.68	4.66	--	0.341	0.833/0.275	<0.750/<0.750	<20.0	
09/29/99		ND	0.554	1.88	0.884	1.55	--	0.239	0.544/<0.250	<0.750/<0.750	--	
12/16/99		ND	<8.20	<1.25	1.9	8.65	--	0.561	0.807/<0.250	<0.750/<0.750	--	
03/22/00		ND	<0.500	1.71	0.533	1.46	--	0.156	0.651/0.292	<0.750/<0.750	--	
06/22/00		ND	4.74	1.02	1.65	4.53	--	0.395	0.951/<0.250	<0.750/<0.750	<10.0	
09/15/00		ND	<3.00	<0.500	<0.520	<1.61	--	0.157	0.807/<0.250	<0.750/<0.750	--	
12/21/00		ND	7.35	<1.38	<2.04	5.73	--	0.043	0.646/<0.250	<0.750/<0.750	--	
03/15/01		ND	<0.500	<0.500	<0.624	<1.77	--	0.165	0.524/<0.250	<0.750/<0.750	--	
06/21/01		ND	<0.500	1.21	2.47	2.61	--	0.403	0.479/<0.250	<0.750/<0.750	<1.00	
09/25/01		ND	3.45	<0.500	1.46	2.10	--	0.230	0.585/0.295	<0.750/<0.750	--	
12/19/01		ND	13.2	<2.00	1.46	2.97	--	1.01	0.760/<0.250 <sup>10</sup>	<0.750/<0.750 <sup>10</sup>	--	
03/26/02		ND	3.01	<0.500	0.671	1.09	--	0.178	0.672/<0.250	0.839/<0.750	--	
06/19/02		ND	<0.500	<0.500	<0.500	1.21	--	<0.0500	<0.250	<0.750	<1.00	
09/19/02		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250 <sup>13</sup>	<0.750 <sup>13</sup>	--	
12/13/02		ND	<0.500	<0.500	0.751	2.99	--	<0.0500	<0.250	<0.750	--	
03/21/03		ND	<0.500	<0.500	0.751	<1.00	--	<0.0500	0.352	1.44	--	
06/19/03		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
09/18/03		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
12/03/03		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
MW-70		06/25/98	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	<1.00
	12/15/98	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.488/<0.250	<0.750/<0.750	--	
	07/01/99	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	<20.0	
	12/16/99	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.392/<0.250	<0.750/<0.750	--	
	06/22/00 <sup>9</sup>	ND	<0.500	1.31	0.610	3.83	--	0.0632	<0.250 <sup>13</sup>	<0.750 <sup>13</sup>	<1.00	
	12/21/00	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	06/21/01	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	12/19/01	ND	<0.500	<2.00	<1.00	<1.50	--	<1.00	0.372/<0.250 <sup>10</sup>	<0.750/<0.750 <sup>10</sup>	--	
	06/19/02	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	12/13/02	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	12/02/03	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	MW-70R Duplicate	12/06/04	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--
		02/16/16	ND	<0.500	<0.500	<0.500	<1.50	--	<0.0500	<0.029	<0.067	--
		06/14/16	ND	<0.500	<0.500	<0.500	<1.50	--	<0.0500	<0.028	<0.066	--
		09/22/16	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.030	<0.070	--
01/12/17		ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	0.046	<0.070	--	
01/12/17		ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	0.046	<0.070	--	
03/27/17		ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.029	<0.067	--	
06/16/17		ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.029	<0.068	--	
11/08/17		ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.047	<0.100	--	
MW-71		06/25/98	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	<1.00
	12/14/98	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	3.77/<0.250	<0.750/<0.750	--	
	07/01/99	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	<20.0	
	12/16/99	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.430 <sup>15</sup>	<0.994 <sup>15</sup>	<1.00	
	06/22/00 <sup>9</sup>	ND	<0.500	0.980	0.522	3.08	--	0.0746	<0.250	<0.750	<1.00	
	12/21/00	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	06/21/01	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	<1.00	
	12/19/01	ND	<0.500	<2.00	<1.00	<1.50	--	<1.00	0.514/<0.250 <sup>10</sup>	<0.750/<0.750 <sup>10</sup>	--	
	06/19/02	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	<1.00	
	12/13/02	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	12/02/03	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	MW-72	03/13/98	ND	<11.0	<3.00	<3.00	<11.0	--	1.30	0.369	<0.750	--
		06/24/98	ND	<1.00	<1.00	<0.500	<2.00	--	0.699	0.286	<0.750	<1.00
		09/03/98	ND	<9.38	<2.50	<2.50	<4.50	--	1.03	3.11	1.78	--
		12/14/98	Sheen	5.45	0.644	1.07	1.68	--	0.196	0.847/<0.250	<0.750/<0.750	--
03/24/98		Sheen	4.98	<0.950	<0.950	<3.30	--	0.269	1.740/0.744	1.420/<0.750	--	
07/01/99		ND	<2.80	<0.900	<0.900	<2.26	--	<0.0500	1.05/<0.250	<0.750/<0.750	<1.00	
09/29/99		Sheen	5.71	2.71	0.68	5.01	--	0.481	1.86/0.424 <sup>13</sup>	1.01/<0.750 <sup>13</sup>	--	
12/16/99		Sheen	<7.40	<1.40	<0.500	6.87	--	0.421	0.905/<0.475	<1.43/<1.43	--	
03/22/00		ND	2.88	5.40	0.846	6.42	--	0.596	1.40/0.462	<0.750/<0.750	--	
06/22/00		ND	5.98	1.11	0.599	2.38	--	0.344	1.11/<0.250	<0.750/<0.750	<1.00	
09/15/00		ND	1.47	<1.20	<0.525	<5.42	--	0.547	1.35/0.427	<0.750/<0.750	--	
12/21/00		ND	5.71	<1.00	<0.500	4.46	--	0.422	0.698/<0.250	<0.750/<0.750	--	
03/15/01		ND	1.90	<1.06	<0.791	<3.29	--	0.454	1.47/<0.250	0.752/<0.750	--	
06/21/01		ND	1.08	1.29	<0.500	2.78	--	0.274	0.591/<0.250	<0.750/<0.750	--	
09/25/01		Sheen	7.98	0.679	1.07	3.24	--	0.695	3.37/1.35	1.90/0.942	--	
12/19/01		ND	12.2	<2.00	<1.00	3.21	--	0.835	1.59/0.261 <sup>10</sup>	<0.750/<0.750 <sup>10</sup>	--	
03/26/02		Sheen	6.4	0.753	<0.500	3.88	--	0.47	1.05/<0.250	<0.750/<0.750	--	
06/19/02		ND	10.3	0.722	1.48	6.67	--	0.248	3.19/<0.250	<0.750/<0.75		

**Appendix C**  
**Historical Summary of Groundwater Analytical Data**  
**Total Petroleum Hydrocarbons**

Former Unocal Seattle Marketing Terminal  
 3001 Elliott Avenue  
 Seattle, Washington

Monitoring Well <sup>1</sup>	Date Sampled	LNAPL <sup>2</sup>	BTEX (EPA Method 8020 or 8021B) (µg/L)				TPH (EPA Method 418.1) (mg/L)	NWTPH-Gx (mg/L)		NWTPH-D Extended <sup>3</sup> (mg/L)		Dissolved Lead (EPA 6000/7000 Series Method) (µg/L)
			B	T	E	X		Gasoline C <sub>7</sub> - C <sub>12</sub>	Diesel C <sub>12</sub> - C <sub>24</sub>	Heavy Oil >C <sub>24</sub>		
MW-73 (continued)	12/18/01	ND	<0.500	<2.00	<1.00	<1.50	--	<0.100	0.893<0.250 <sup>10</sup>	<0.750<0.750 <sup>10</sup>	--	
	03/26/02	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.618<0.250	<0.750<0.750	--	
	06/20/02	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.287<0.250	<0.750<0.750	<1.00	
MW-74	03/12/98	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	06/29/98	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	1.93	
	09/03/98	ND	<0.500	<0.500	<0.500	1.02	--	<0.0500	0.29	1.07	--	
	12/15/98	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.517<0.250	<0.750<0.750	--	
	03/24/99	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.600<0.250	0.993<0.750	--	
	06/29/99	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.251<0.250	<0.750<0.750	<1.00	
	09/29/99	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.462<0.250	<0.750<0.750	--	
	12/15/99	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.659<0.250	<0.750<0.750	--	
	03/22/00	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.500<0.250	0.923<0.750	--	
	06/22/00	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.234	<0.748	<1.00	
	09/14/00	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	12/22/00	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	03/15/01	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.273<0.250	0.863<0.750	--	
	06/22/01	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.505<0.250	<0.750<0.750	--	
	09/25/01	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	12/18/01	ND	<0.500	<2.00	<1.00	<1.50	--	<0.100	1.06<0.250 <sup>10</sup>	1.11<0.750 <sup>10</sup>	--	
	03/26/02	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.430<0.250	<0.750<0.750	--	
	06/20/02	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.305<0.250	<0.750<0.750	<1.00	
	MW-75	03/12/98	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--
06/29/98		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	<1.00	
09/03/98		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
12/15/98		ND	<0.500	<0.500	<0.500	1.33	--	<0.0500	<0.250	<0.750	--	
03/24/99		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
06/29/99		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	<1.00	
09/29/99		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250<0.250	<0.750<0.750	--	
12/15/99		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
03/22/00		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
06/22/00		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.239	<0.744	<1.00	
09/14/00		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
12/22/00		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
03/15/01		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
06/22/01		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	<1.00	
09/25/01		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
12/18/01		ND	<0.500	<2.00	<1.00	<1.50	--	<0.100	<0.250 <sup>10</sup>	<0.750 <sup>10</sup>	--	
03/26/02		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
06/20/02		ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	<1.00	
MW-76		06/24/98	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	<5.00
	09/03/98	ND	0.982	0.774	0.609	<1.00	--	0.0593	0.361	<0.750	--	
	12/14/98	ND	<1.00	<0.500	1.29	<1.00	--	0.0779	0.789<0.250	<0.750<0.750	--	
	03/24/98	ND	<1.00	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	07/01/99	ND	<1.20	<0.500	1.64	1.31	--	0.0998	0.786<0.250	<0.750<0.750	<20.0	
	09/29/99	ND	<0.500	0.538	0.583	<1.00	--	0.0577	0.632<0.250	<0.750<0.750	--	
	12/16/99	ND	0.582	<0.500	0.631	<1.00	--	0.728	0.667<0.250	<0.750<0.750	--	
	03/22/00	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.640<0.250	<0.750<0.750	--	
	06/22/00	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.259<0.250	<0.750<0.750	<1.00	
	09/15/00	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.605<0.250	<0.750<0.750	--	
	12/21/00	ND	<0.600	<0.500	0.628	<1.00	--	0.784	0.606<0.250	<0.750<0.750	--	
	03/15/01	ND	0.506	1.35	<0.500	1.22	--	<0.0500	0.276<0.250	<0.750<0.750	--	
	06/21/01	ND	<0.500	<0.500	0.808	<1.00	--	<0.0500	<0.250	<0.750	--	
	09/25/01	ND	0.508	<0.500	0.774	<1.00	--	<0.0500	0.461<0.316	<0.750<0.750	--	
	12/19/01	ND	<0.500	<2.00	<1.00	<1.50	--	0.114	0.549<0.250	<0.750<0.750	--	
	03/26/02	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	0.317<0.250	<0.750<0.750	--	
	06/19/02	ND	<0.500	<0.500	<0.500	1.11	--	<0.0500	<0.250	<0.750	--	
	12/13/02	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
	12/03/03	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--	
12/06/04	ND	<0.500	<0.500	<0.500	<1.00	--	<0.0500	<0.250	<0.750	--		
MW-200	03/08/07	Sheen	2.80	0.5	3.7	4	--	0.39	0.46	<0.095	--	
	06/07/07	ND	2.4	0.6	2.1	2.5	--	0.250	0.310	<0.095	<0.037	
	09/26/07	ND	1.6	<0.5	0.9	<1.5	--	0.230	0.270	<0.100	<0.047	
	09/26/07	ND	1.7	<0.5	0.8	<1.5	--	0.230	0.310	0.120	<0.047	
	11/28/07	ND	2.0	<0.5	1.2	2.1	--	0.250	0.330	<0.100	0.064	
	02/13/08	ND	3.44	<0.500	1.19	1.79	--	0.497	<0.236	<0.472	<1.00	
	05/13/08	ND	2.70	<0.500	1.15	2.07	--	0.426	<0.240	<0.481	<1.00	
	09/03/08	ND	<0.500	0.883	1.46	<1.00	--	0.337	<0.236	<0.472	<1.00	
	12/04/08	ND	3.19	<0.500	0.975	2.01	--	0.427	<0.238	<0.476	<1.00	
	02/18/09	ND	2.54	<0.500	0.619	1.14	--	0.355	<0.250	<0.500	<1.00	
	05/13/09	ND	3.43	<0.500	1.12	1.91	--	0.513	<0.278	<0.556	<1.00	
	09/11/09	ND	<0.500	<0.500	0.52	<1.00	--	0.360	<0.248	<0.495	<2.0	
	04/14/10	ND	<0.50	<0.50	0.54	<2.0	--	0.35	0.31	<0.25	<2.0	
	09/22/10	ND	<0.50	<0.50	0.56	1.2	--	0.43	0.56	<0.25	<2.0	
	04/28/11	ND	--	--	0.59	1.5	--	0.39	--	--	<2.0	
	04/28/11	ND	--	--	--	--	--	--	0.33	--	--	
	09/22/11	ND	6.7 <sup>18</sup>	<0.50 <sup>18</sup>	0.83 <sup>18</sup>	1.9 <sup>18</sup>	--	0.27	0.39 <sup>17</sup>	<0.24	--	
	09/22/11	ND	5.0	<0.50	0.65	1.4	--	0.24	0.37 <sup>17</sup>	<0.24	--	
	04/18/12	ND	3.7	<0.50	0.73	1.4	--	0.20	0.27 <sup>17</sup>	<0.24	--	
	10/11/12	ND	<0.50	0.75 <sup>21</sup>	<0.50	<0.50	--	0.39	0.30 <sup>17,19,20</sup>	<0.24	--	
	04/25/13	ND	6.5	<0.5	1.1	2.1	--	0.35	0.120	<0.068	--	
	09/19/13	ND	2.3	<0.5	<0.5	<1.5	--	0.11	0.160	<0.068	--	
	06/24/14	ND	2.4	<0.5	<0.5	<1.5	--	0.120 J	0.083	<0.067	--	
12/16/14	ND	<6.0	<0.7	1.1	<2.4	--	0.460	0.130	<0.066	--		
06/18/15	ND	<3.0	<0.5	<0.5	<1.5	--	0.092	0.074	<0.066	--		
12/08/15	ND	<0.5	0.5	0.8	<1.5	--	0.460	0.092	<0.067	--		
06/14/16	ND	<0.5	<0.5	0.6	<1.5	--	0.290	0.150	<0.067	--		
01/13/17	ND	4.2	0.5	0.9	2.2	--	0.490	0.140	<0.067	--		
06/13/17	ND	2.0	<0.5	0.6	<1.5	--	0.340	0.080	<0.067	--		
11/08/17	ND	<4.0	<0.5	<0.5	<1.5	--	0.076	0.539	<0.110	--		
MW-201	03/08/07	Sheen	0.50	<0.5	<0.5	<1.5	--	0.076	0.5			



**Appendix C  
Historical Summary of Groundwater Analytical Data  
Total Petroleum Hydrocarbons**

Former Unocal Seattle Marketing Terminal  
3001 Elliott Avenue  
Seattle, Washington

Monitoring Well <sup>1</sup>	Date Sampled	LNAPL <sup>2</sup>	BTEX (EPA Method 8020 or 8021B) (µg/L)				TPH (EPA Method 418.1) (mg/L)	NWTPH-Gx (mg/L)		NWTPH-D Extended <sup>3</sup> (mg/L)		Dissolved Lead (EPA 6000/7000 Series Method) (µg/L)
			B	T	E	X		Gasoline C <sub>7</sub> - C <sub>12</sub>	Diesel C <sub>12</sub> - C <sub>24</sub>	Heavy Oil >C <sub>24</sub>		
MW-205 (continued)	08/03/08	ND	<0.500	<0.500	<0.500	<1.00	--	<0.050	<0.240	<0.481	<1.00	
	12/05/08	ND	<0.500	<0.500	<0.500	<1.00	--	<0.050	<0.236	<0.472	<1.00	
	02/17/09	ND	<0.500	<0.500	<0.500	<1.00	--	<0.050	<0.248	<0.495	<1.00	
	05/13/09	ND	<0.500	<0.500	<0.500	<1.00	--	<0.050	<0.245	<0.490	<1.00	
	09/11/09	ND	<0.500	<0.500	<0.500	<1.00	--	0.1	<0.248	<0.495	<2.0	
	04/14/10	ND	<0.50	<0.50	<0.50	<2.0	--	0.051	<0.12	<0.25	<2.0	
	09/22/10	ND	<0.50	<0.50	<0.50	<2.0	--	0.082	0.15	<0.25	<2.0	
	04/26/11	LNAPL	--	--	--	--	--	--	--	--	--	
	09/22/11	ND	<0.50	<0.50	<0.50	<1.0	--	0.07	<0.12	<0.25	--	
	09/22/11	ND	<0.50	<0.50	<0.50	<1.0	--	<0.050	<0.12	<0.25	--	
	04/18/12	ND	<0.50	<0.50	<0.50	<1.0	--	<0.050	0.16 <sup>17</sup>	<0.24	--	
	Duplicate	04/18/12	ND	<0.50	<0.50	<0.50	<1.0	--	<0.050	0.25 <sup>17</sup>	0.44 <sup>17</sup>	--
	MW-205-NEAR	04/18/12	ND	<0.50	<0.50	<0.50	<1.0	--	<0.050	7.4 <sup>17</sup>	4.8 <sup>17</sup>	--
	MW-205-NEAR	10/12/12	ND	<0.50	<0.50	<0.50	<0.50	--	0.027	0.23 <sup>17,19,20</sup>	0.54 <sup>17,19,20</sup>	--
	Duplicate	10/12/12	ND	<0.50	<0.50	<0.50	<0.50	--	0.035	0.34 <sup>17</sup>	0.34 <sup>17</sup>	--
MW-205-NEAR	10/12/12	ND	<0.50	<0.50	<0.50	<0.50	--	0.036	0.30 <sup>17,19,20</sup>	0.24 <sup>17</sup>	--	
Duplicate	04/26/13	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.030	<0.069	--	
Duplicate	09/19/13	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.029	<0.067	--	
Duplicate	09/19/13	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.029	<0.067	--	
Duplicate	06/24/14	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050 UJ	<0.028	<0.066	--	
Duplicate	12/16/14	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.028	<0.066	--	
Duplicate	06/18/15	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.028	<0.066	--	
Duplicate	06/18/15	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.028	<0.066	--	
Duplicate	12/09/15	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.031	<0.072	--	
Duplicate	06/13/16	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	0.05	<0.068	--	
Duplicate	01/13/17	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	0.068	<0.071	--	
Duplicate	06/13/17	ND	<0.5	<0.5	<0.5	<1.5	--	0.280	<0.029	<0.067	--	
Duplicate	11/08/17	ND	<0.5	<0.5	<0.5	<1.5	--	0.071	<0.046	<0.100	--	
MW-206	03/08/07	ND	<0.5	<0.5	<0.5	<1.5	--	<0.048	<0.075	<0.094	--	
	06/07/07	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.076	<0.095	0.078	
	09/27/07	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.076	<0.095	<0.047	
	11/27/07	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.077	<0.096	<0.24	
	02/12/08	ND	<0.500	<0.500	<0.500	<1.00	--	<0.050	<0.236	<0.472	<1.00	
	05/13/08	ND	<0.500	<0.500	<0.500	<1.00	--	<0.050	<0.250	<0.505	<1.00	
	09/04/08	ND	<0.500	<0.500	<0.500	<1.00	--	<0.050	<0.240	<0.481	<1.00	
	Duplicate	09/04/08	ND	<0.500	<0.500	<0.500	<1.00	--	<0.050	<0.240	<0.481	<1.00
	Duplicate	12/04/08	ND	<0.500	<0.500	<0.500	<1.00	--	<0.050	<0.236	<0.472	<1.00
	Duplicate	12/04/08	ND	<0.500	<0.500	<0.500	<1.00	--	<0.050	<0.236	<0.472	<1.00
	Duplicate	02/18/09	ND	<0.500	<0.500	<0.500	<1.00	--	<0.050	<0.278	<0.556	<1.00
	Duplicate	05/12/09	ND	<0.500	<0.500	<0.500	<1.00	--	<0.050	<0.278	<0.556	<1.00
	Duplicate	09/11/09	ND	<0.500	<0.500	<0.500	<1.00	--	<0.050	<0.248	<0.495	<2.0
	Duplicate	04/13/10	ND	<0.50	<0.50	<0.50	<2.0	--	<0.050	--	--	--
	Duplicate	04/14/10	ND	--	--	--	--	--	--	<0.12	<0.24	<2.0
	Duplicate	09/22/10	ND	<0.50	<0.50	<0.50	<2.0	--	<0.050	<0.12	<0.25	<2.0
	Duplicate	04/27/11	ND	<0.50	<0.50	<0.50	<1.0	--	<0.050	--	--	<2.0
	Duplicate	04/28/11	ND	--	--	--	--	--	--	<0.12	<0.24	--
	Duplicate	09/21/11	ND	<0.50	<0.50	<0.50	<1.0	--	<0.050	<0.12	<0.24	--
	Duplicate	04/18/12	ND	<0.50	<0.50	<0.50	<1.0	--	<0.050	<0.12	<0.24	--
	Duplicate	10/11/12	ND	<0.50	<0.50	<0.50	<0.50	--	<0.025	0.16 <sup>17,19,20</sup>	<0.24	--
	Duplicate	04/25/13	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.029	<0.067	--
	Duplicate	09/19/13	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.029	<0.069	--
	Duplicate	06/23/14	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050 UJ	<0.029	<0.067	--
	Duplicate	12/16/14	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.028	<0.066	--
	Duplicate	06/17/15	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.029	<0.068	--
	Duplicate	12/08/15	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.029	<0.067	--
	Duplicate	06/14/16	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.028	<0.066	--
	Duplicate	01/13/17	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.028	<0.066	--
	Duplicate	06/13/17	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.029	<0.067	--
	Duplicate	06/13/17	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.030	<0.069	--
	Duplicate	11/08/17	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.048	<0.110	--
MW-207	03/08/07	ND	<0.5	<0.5	0.9	<1.5	--	<0.048	0.12	<0.095	--	
	Duplicate	03/08/07	ND	<0.5	<0.5	1.1	<1.5	--	<0.048	0.15	<0.095	--
	Duplicate	06/07/07	ND	<0.5	<0.5	<0.5	<1.5	--	<0.05	<0.077	<0.096	0.11
	Duplicate	09/27/07	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.081	<0.10	<0.47
	Duplicate	11/27/07	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.076	<0.095	<0.047
	Duplicate	02/12/08	ND	<0.500	<0.500	<0.500	<1.00	--	<0.050	<0.248	<0.495	<1.00
	Duplicate	05/13/08	ND	<0.500	<0.500	<0.500	<1.00	--	<0.050	<0.250	<0.500	<1.00
	Duplicate	09/04/08	ND	<0.500	<0.500	<0.500	<1.00	--	<0.050	<0.238	<0.476	<1.00
	Duplicate	12/03/08	ND	<0.500	<0.500	<0.500	<1.00	--	<0.050	<0.238	<0.476	<1.00
	Duplicate	02/18/09	ND	<0.500	<0.500	<0.500	<1.00	--	<0.050	<0.248	<0.495	<1.00
	Duplicate	05/12/09	ND	<0.500	<0.500	<0.500	<1.00	--	<0.050	<0.250	<0.500	<1.00
	Duplicate	09/11/09	ND	<0.500	<0.500	<0.500	<1.00	--	<0.050	<0.248	<0.495	<2.0
	Duplicate	04/14/10	ND	<0.50	<0.50	<0.50	<2.0	--	<0.050	<0.12	<0.24	<2.0
	Duplicate	09/21/10	ND	<0.50	<0.50	<0.50	<2.0	--	<0.050	<0.12	<0.24	<2.0
	Duplicate	09/21/10	ND	<0.50	<0.50	<0.50	<2.0	--	0.092	<0.12	<0.25	<2.0
	Duplicate	04/27/11	ND	<0.50	<0.50	<0.50	<1.0	--	<0.050	--	--	<2.0
Duplicate	04/28/11	ND	--	--	--	--	--	--	<0.12	<0.24	--	
Duplicate	09/21/11	ND	<0.50	<0.50	<0.50	<1.0	--	<0.050	<0.12	<0.24	--	
Duplicate	09/21/11	ND	<0.50	<0.50	<0.50	<1.0	--	<0.050	<0.12	<0.24	--	
Duplicate	04/18/12	ND	<0.50	<0.50	<0.50	<1.0	--	<0.050	<0.12	<0.24	--	
Duplicate	10/11/12	ND	<0.50	<0.50	<0.50	<0.50	--	<0.025	0.15 <sup>17,19,20</sup>	<0.24	--	
Duplicate	04/25/13	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.029	<0.068	--	
Duplicate	09/19/13	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.029	<0.067	--	
Duplicate	06/23/14	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050 UJ	<0.028	<0.066	--	
Duplicate	12/16/14	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.028	<0.066	--	
Duplicate	06/17/15	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.028	<0.066	--	
Duplicate	12/08/15	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.028	<0.066	--	
Duplicate	06/14/16	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.029	<0.068	--	
Duplicate	01/13/17	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.029	<0.067	--	
Duplicate	06/13/17	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	0.130	1.070	--	
Duplicate	06/13/17	ND	<0.5	<0.5	<0.5	<1.5	--	0.071	0.031	<0.067	--	
Duplicate	11/08/17	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.046	<0.110	--	
Duplicate	11/08/17	ND	<0.5	<0.5	<0.5	<1.5	--	<0.050	<0.046	<0.110	--	
MW-209	02/16/16	ND	1.4	1.2	1.3	4.2	--	1.600	0.150	<0.067	--	
	06/13/16	ND	1.5	1.3	1.6	3.7	--	0.930	0.200	<0.066	--	
	09/22/16	ND	0.9	0.9	<1.1	2.9	--	0.990	0.140	<0.072	--	
	01/12/17	ND	1.3	1.3	1.4	3.6	--	1.400	0.140	<0.072	--	
	03/27/17	ND	1.5	1.4	1.5	3.3	--	0.920	0.190	<0.068	--	
	06/16/17	ND	1.1	0.8	<0.5	2.4	--	1.300	0.730	0.230	--	
MW-210	02/16/16	ND	<0.5	1.1	1.4	4.7	--	2.500	8.600	1.600	--	
	06/13/16	ND	<0.5	1.6	<0.5	5.1	--	2.100	3.200	0.510	--	
	09/22/16	ND	1.3	1.1	1.							

**Appendix C  
Historical Summary of Groundwater Analytical Data  
Total Petroleum Hydrocarbons**

Former Unocal Seattle Marketing Terminal  
3001 Elliott Avenue  
Seattle, Washington

Monitoring Well <sup>1</sup>	Date Sampled	LNAPL <sup>2</sup>	BTEX (EPA Method 8020 or 8021B) (µg/L)				TPH (EPA Method 418.1) (mg/L)	NWTPH-Gx (mg/L)		NWTPH-D Extended <sup>3</sup> (mg/L)		Dissolved Lead (EPA 6000/7000 Series Method) (µg/L)
			B	T	E	X		Gasoline C <sub>7</sub> - C <sub>12</sub>	Diesel C <sub>12</sub> - C <sub>24</sub>	Heavy Oil >C <sub>24</sub>		

<sup>1</sup>For December 2000 through June 2002, samples were first analyzed without the sulfuric acid/silica gel cleanup procedure (first or only result). If analytes were detected, the sulfuric acid/silica gel cleanup procedure was performed (second result). For September 2002 and after, samples obtained from Upper Yard wells were analyzed without the sulfuric acid/silica gel cleanup procedure, and samples obtained from Elliott Avenue and Offsite Area wells were analyzed with the sulfuric acid/silica gel cleanup procedure.

<sup>2</sup>According to the laboratory, the sample chromatogram does not resemble the gasoline standard.

<sup>3</sup>According to the laboratory, sample contains diesel-range hydrocarbons that extend into the hydrocarbon range quantified as gasoline.

<sup>4</sup>Due to an error in the identification of two sets of samples, (MW-64 and Dup 121699), the results from the sampling date of 01/04/00 were not considered reliable. The 12/26/99 results were not reported by the laboratory and a resampling took place.

<sup>5</sup>Due to an extraction anomaly during the silica gel cleanup procedure, a second analytical result is not available for this sample.

<sup>6</sup>After review of field procedures and historic analytical results, the sample appears to have been cross-contaminated in the field or in the laboratory.

<sup>7</sup>BTEX and gasoline-range hydrocarbon analyses were completed outside of the recommended holding time. Results should be qualified as estimated.

<sup>8</sup>Samples were extracted 3 or 4 days after expiration of the recommended holding time.

<sup>9</sup>Results should be considered bias low or estimated due to laboratory QA/QC exception.

<sup>10</sup>MW-30 was not sampled between July 1989 and September 1990 because of the presence of free product.

<sup>11</sup>Due to an extraction anomaly, the surrogate recoveries in the WTPH-D extended analyses were outside the established control limits and the results should be considered a low estimated value, according to the laboratory.

<sup>12</sup>The 03/23/99 data for diesel-range hydrocarbons (20.8/14.6 mg/L) for MW-84 appeared anomalous due to field sample handling or laboratory analytical error. The well was resampled on 04/01/99.

<sup>13</sup>Due to a lab error, the sample extract evaporated before testing and was not analyzed with the silica gel cleanup.

<sup>14</sup>Due to the presence of an interferent near its retention time, the normal reporting limit was not attained for this compound. The presence of or concentration cannot be determined.

<sup>15</sup>The chromatographic response resembles a typical fuel pattern.

<sup>16</sup>Sample was reanalyzed due to a surrogate failure. The surrogates were within QC limits in the reanalysis.

<sup>17</sup>Instrument related QC exceeds the control limits.

<sup>18</sup>Compound was found in the blank and sample.

<sup>19</sup>The %RDP between the primary and confirmation column/detector is 40%. The lower value has been reported.

µg/L = micrograms per liter      mg/L = milligrams per liter      ND = not detected

RAL = remedial action level

-- = not tested

Shaded concentrations are greater than corresponding Remedial Action Levels. Bolded data are for the current reporting period.

NEAR = The sample was collected from the top 12 inches of the water column within the respective monitoring well.

UU = Non-detect value was analyzed outside of hold time, but less than two times hold time, concentration is an estimated value.

J = Concentration is an estimated value and was analyzed outside of hold time, but less than two times hold time.

**Appendix C  
Historical Summary of Groundwater Analytical Data  
Carcinogenic Polycyclic Aromatic Hydrocarbons**

Former Unocal Seattle Marketing Terminal  
3001 Elliott Avenue  
Seattle, Washington

OFFSITE AREA		Carcinogenic PAHs <sup>2,3</sup> (µg/L)									Noncarcinogenic PAHs <sup>2</sup> (µg/L)								
Monitoring Well <sup>1</sup>	Sample Date	Benzo(a)anthracene	Benzo(a)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Indeno(1,2,3-cd)pyrene	Total CPAHs <sup>4</sup>	Acenaphthene	Acenaphthylene	Anthracene	Benzo(g,h,i)perylene	Fluoranthene	Fluorene	Naphthalene <sup>4</sup>	Phenanthrene	Pyrene	
RAL		0.03	0.03	0.03	0.03	0.03	0.03	0.03	NE	NE	NE	NE	NE	NE	NE	NE	NE		
MW-27	12/13/02	0.0282	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	0.2822	0.398	<0.100	<0.100	<0.100	0.149	<0.100	<0.100	<0.100		
	06/19/03	0.0639	<0.0100	<0.0100	<0.0100	<0.0100	0.0288	0.0232	0.1159	3.46	<0.100	0.226	<0.100	0.963	0.296	0.188	0.357	0.952	
	12/03/03	0.0266	<0.0100	<0.0100	<0.0100	0.0195	<0.0100	<0.0100	0.0461	--	--	--	--	--	--	<0.100	--	--	
	06/03/04	0.0357	<0.0100	<0.0100	<0.0100	0.0276	<0.0100	<0.0100	0.0633	2.66	<0.100	0.178	<0.100	0.962	0.348	0.821	0.299	0.826	
	12/06/04	0.0286	<0.0100	<0.0100	<0.0100	0.0190	<0.0100	<0.0100	0.0476	1.57	<0.100	<0.100	<0.100	0.269	<0.100	<0.100	<0.100	0.488	
	06/03/05	0.0709	0.0127	0.0157	0.0166	0.0440	<0.0100	<0.0100	0.1499	2.01	<0.100	<0.100	<0.100	0.995	<0.100	<0.100	<0.100	1.21	
	12/01/05	0.0921	0.0576	0.0649	0.0393	0.0698	<0.0100	0.0444	0.3681	--	--	--	--	--	--	--	--	--	
	03/08/07	<0.02	<0.02	<0.02	<0.009	<0.02	<0.02	<0.02	<0.129	--	--	--	--	--	--	--	--	--	
MW-27R	09/26/07	<0.0098	<0.0098	<0.0098	<0.0098	<0.0098	<0.0098	<0.0098	<0.0098	--	--	--	--	--	--	0.079 <sup>5</sup>	--	--	
	11/27/07	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	--	--	--	--	--	0.19	--	--	
MW-30	04/26/13	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	--	--	--	--	--	--	--	--	
MW-67	06/19/03	0.0769	0.0195	<0.0100	<0.0100	0.0278	0.0849	0.0730	0.2821	1.99	<0.100	0.242	<0.100	0.602	0.106	<0.100	0.229	0.549	
	12/03/03	0.0284	0.0101	<0.0100	0.0106	0.0337	<0.0100	<0.0100	0.0828	--	--	--	--	--	--	0.133	--	--	
	06/03/04	0.0362	<0.0100	<0.0100	0.0132	0.0389	<0.0100	<0.0100	0.0883	1.25	<0.100	0.152	<0.100	0.839	<0.100	<0.100	<0.100	0.763	
	12/06/04	0.0273	<0.0100	<0.0100	<0.0100	0.0258	<0.0100	<0.0100	0.0531	0.930	<0.100	<0.100	<0.100	0.342	<0.100	<0.100	<0.100	0.519	
	03/04/05	0.0293	0.01	0.01	0.01	0.0221	0.01	0.01	0.0514	0.793	<0.100	0.148	<0.100	0.518	<0.100	<0.100	<0.100	0.511	
	06/03/05	0.0323	<0.0100	<0.0100	<0.0100	0.0262	<0.0100	<0.0100	0.0585	0.714	<0.100	<0.100	<0.100	0.816	<0.100	<0.100	<0.100	0.843	
MW-70R	02/16/16	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	--	--	--	--	--	--	--	--	
Duplicate	02/16/16	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	--	--	--	--	--	--	--	--	
	06/14/16	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	--	--	--	--	--	<0.030	--	--	
	09/22/16	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	--	--	--	--	--	--	<0.033	--	--	
Duplicate	01/12/17	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	--	--	--	--	--	--	--	--	--	
	01/12/17	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	--	--	--	--	--	--	--	--	--	
	03/27/17	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	--	--	--	--	--	--	--	--	
	06/13/17	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	--	--	--	--	--	--	--	--	
	11/08/17	0.018	0.015	0.026	0.018	0.019	0.019	0.015	0.130	--	--	--	--	--	--	--	--	--	
MW-76	12/13/02	0.0247	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	0.0247	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	
	06/19/03	0.0824	0.0262	<0.0100	<0.0100	0.0258	0.0718	0.0589	0.2851	0.484	<0.100	<0.100	<0.100	0.628	<0.100	<0.100	<0.100	0.342	
	12/03/03	0.0194	<0.0100	0.0107	<0.0100	0.0172	<0.0100	<0.0100	0.0473	--	--	--	--	--	--	<0.100	--	--	
	06/03/04	<0.0100	<0.0100	0.0104	<0.0100	0.0253	<0.0100	<0.0100	0.0357	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	
	12/06/04	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	<0.100	
	06/03/05	0.0725	0.0528	0.0448	0.0452	0.0797	0.0142	0.0267	0.3359	<0.100	<0.100	<0.100	<0.100	0.482	<0.100	<0.100	<0.100	0.369	
MW-200	06/07/07	<1	<1	<1	<1	<1	<1	<1	<7	22	<1	<1	<1	<1	6	31	1	<1	
	07/06/07	0.01	<0.0095	<0.0095	<0.0095	<0.0095	<0.0095	<0.0095	0.01	20	<0.30	0.51	<0.0095	0.7	5	24	0.93	0.46	
	09/26/07	0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	0.011	--	--	--	--	--	--	24 <sup>5</sup>	--	--	
Duplicate	9/26/07 <sup>0</sup>	0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	0.011	--	--	--	--	--	--	22 <sup>5</sup>	--	--	
	11/28/07	0.012	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.012	--	--	--	--	--	--	31	--	--	
	02/13/08	0.0126	<0.00990	<0.00990	<0.00990	0.0137	<0.00990	<0.00990	0.0263	--	--	--	--	--	--	--	--	--	
	05/13/08	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	--	--	--	--	--	--	--	--	--	
Filtered	05/13/08	<0.0101	<0.0101	<0.0101	<0.0101	<0.0101	<0.0101	<0.0101	<0.0101	--	--	--	--	--	--	--	--	--	
	09/03/08	<0.00943	<0.00943	<0.00943	<0.00943	<0.00943	<0.00943	<0.00943	<0.00943	--	--	--	--	--	--	--	--	--	
Filtered	09/03/08	<0.0476	<0.0476	<0.0476	<0.0476	<0.0476	<0.0476	<0.0476	<0.0476	--	--	--	--	--	--	--	--	--	
	12/04/08	<0.00943	<0.00943	<0.00943	<0.00943	<0.00943	<0.00943	<0.00943	<0.00943	--	--	--	--	--	--	--	--	--	
Filtered	12/04/08	<0.00962	<0.00962	<0.00962	<0.00962	<0.00962	<0.00962	<0.00962	<0.00962	--	--	--	--	--	--	--	--	--	
	02/18/09	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	--	--	--	--	--	--	--	--	--	
Filtered	02/18/09	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	--	--	--	--	--	--	--	--	--	
	05/13/09	<0.0111	<0.0111	<0.0111	<0.0111	<0.0111	<0.0111	<0.0111	<0.0111	--	--	--	--	--	--	--	--	--	
Filtered	05/13/09	<0.0111	<0.0111	<0.0111	<0.0111	<0.0111	<0.0111	<0.0111	<0.0111	--	--	--	--	--	--	--	--	--	
	09/11/09	<0.0111	<0.0220	<0.0111	<0.0111	<0.0111	<0.0111	<0.0111	<0.0220	--	--	--	--	--	--	--	--	--	
Filtered	09/11/09	<0.0111	<0.0111	<0.0111	<0.0111	<0.0111	<0.0111	<0.0111	<0.0111	--	--	--	--	--	--	--	--	--	
	04/14/10	<0.0099	<0.020	<0.0099	<0.0099	<0.0099	<0.0099	<0.0099	<0.020	--	--	--	--	--	--	--	--	--	
Filtered	04/14/10	<0.0099	<0.020	<0.0099	<0.0099	<0.0099	<0.0099	<0.0099	<0.020	--	--	--	--	--	--	--	--	--	
	09/22/10	0.013	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.013	--	--	--	--	--	--	--	--	--	
Filtered	09/22/10	<0.0099	<0.020	<0.0099	<0.0099	<0.0099	<0.0099	<0.0099	<0.020	--	--	--	--	--	--	--	--	--	
	04/26/11	<0.094	<0.19	<0.094	<0.094	<0.094	<0.094	<0.094	<0.19	17	0.26	0.77	<0.094	1.3	5.5	13	4.7	0.88	
Filtered	04/26/11	<0.094	<0.19	<0.094	<0.094	<0.094	<0.094	<0.094	<0.19	13	0.22	0.24	<0.094	<0.094	3.1	11	1.5	<0.094	
Original	9/22/11 <sup>9</sup>	<0.0094	<0.019	<0.0094	<0.0094	<0.0094	<0.0094	<0.0094	<0.19	2.5	0.26	0.16	<0.0094	0.043	2.5	0.70	1.1	0.039	
Original Duplicate	9/22/11 <sup>0</sup>	0.010	<0.020																





**Appendix C**  
**Historical Summary of Groundwater Analytical Data**  
**Carcinogenic Polycyclic Aromatic Hydrocarbons**

Former Unocal Seattle Marketing Terminal  
 3001 Elliott Avenue  
 Seattle, Washington

OFFSITE AREA		Carcinogenic PAHs <sup>2,3</sup> (µg/L)								Noncarcinogenic PAHs <sup>2</sup> (µg/L)								
Monitoring Well <sup>1</sup>	Sample Date	Benzo(a)anthracene	Benzo(b)pyrene	Benzo(k)fluoranthene	Benzo(e)pyrene	Chrysene	Dibenz(a,h)anthracene	Indeno(1,2,3-cd)pyrene	Total CPAHs <sup>4</sup>	Acenaphthene	Acenaphthylene	Anthracene	Benzo(g,h,i)perylene	Fluoranthene	Fluorene	Naphthalene <sup>4</sup>	Phenanthrene	Pyrene
		0.03	0.03	0.03	0.03	0.03	0.03	0.03	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE
MW-204 (continued)	07/06/07	<0.0095	<0.0095	<0.0095	<0.0095	<0.0095	<0.0095	<0.0095	<0.0095	3.3	<0.30	0.19	<0.0095	0.06	2.7	0.45	1.1	0.061
Duplicate	07/06/07	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096	3.3	<0.30	0.18	<0.0096	0.058	2.7	0.44	1	0.064
	09/28/07	0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.010	--	--	--	--	--	0.84	--	--	
	11/27/07	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	--	--	--	--	<0.010	--	--	
	02/12/08	<0.00971	<0.00971	<0.00971	<0.00971	<0.00971	<0.00971	<0.00971	<0.00971	--	--	--	--	--	--	--	--	
	05/14/08	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	--	--	--	--	--	--	--	--	
Filtered	05/14/08	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	--	--	--	--	--	--	--	--	
	09/03/08	<0.00962	<0.00962	<0.00962	<0.00962	<0.00962	<0.00962	<0.00962	<0.00962	--	--	--	--	--	--	--	--	
Filtered	09/03/08	<0.00962	<0.00962	<0.00962	<0.00962	<0.00962	<0.00962	<0.00962	<0.00962	--	--	--	--	--	--	--	--	
	12/04/08	<0.00980	<0.00980	<0.00980	<0.00980	<0.00980	<0.00980	<0.00980	<0.00980	--	--	--	--	--	--	--	--	
Filtered	12/04/08	<0.00990	<0.00990	<0.00990	<0.00990	<0.00990	<0.00990	<0.00990	<0.00990	--	--	--	--	--	--	--	--	
	02/17/09	<0.0105	<0.0105	<0.0105	<0.0105	<0.0105	<0.0105	<0.0105	<0.0105	--	--	--	--	--	--	--	--	
Duplicate	02/17/09	<0.0105	<0.0105	<0.0105	<0.0105	<0.0105	<0.0105	<0.0105	<0.0105	--	--	--	--	--	--	--	--	
Filtered	02/17/09	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	--	--	--	--	--	--	--	--	
Duplicate	02/17/09	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	--	--	--	--	--	--	--	--	
	05/13/09	<0.0100	<0.0100	<0.0100	<0.0100	0.0193	<0.0100	<0.0100	0.0193	--	--	--	--	--	--	--	--	
Duplicate	05/13/09	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	--	--	--	--	--	--	--	--	
Filtered	05/13/09	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	--	--	--	--	--	--	--	--	
Duplicate	05/13/09	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	--	--	--	--	--	--	--	--	
	09/11/09	<0.0100	<0.0200	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0200	--	--	--	--	--	--	--	--	
Duplicate	09/11/09	<0.0100	<0.0200	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0200	--	--	--	--	--	--	--	--	
Filtered	09/11/09	<0.0110	<0.0220	<0.0110	<0.0110	<0.0110	<0.0110	<0.0110	<0.0220	--	--	--	--	--	--	--	--	
Duplicate	09/11/09	<0.0096	<0.0190	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096	<0.0190	--	--	--	--	--	--	--	--	
	04/14/10	<0.0097	<0.019	<0.0097	<0.0097	<0.0097	<0.0097	<0.0097	<0.019	--	--	--	--	--	--	--	--	
Duplicate	04/14/10	<0.0099	<0.020	<0.0099	<0.0099	0.0099	<0.0099	<0.0099	0.0099	--	--	--	--	--	--	--	--	
Filtered	04/14/10	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	--	--	--	--	--	--	--	--	
Duplicate	04/14/10	<0.0099	<0.020	<0.0099	<0.0099	<0.0099	<0.0099	<0.0099	<0.020	--	--	--	--	--	--	--	--	
	09/22/10	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	--	--	--	--	--	--	--	--	
Filtered	09/22/10	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	--	--	--	--	--	--	--	--	
	04/26/11	<0.094	<0.19	<0.094	<0.094	<0.094	<0.094	<0.094	<0.19	2.6	0.33	0.13	<0.094	<0.094	2.7	1.2	1.1	<0.094
Duplicate	04/26/11	<0.094	<0.19	<0.094	<0.094	<0.094	<0.094	<0.094	<0.19	2.5	0.30	0.14	<0.094	<0.094	2.6	1.3	1.0	<0.094
Filtered	04/26/11	<0.094	<0.19	<0.094	<0.094	<0.094	<0.094	<0.094	<0.19	2.6	0.28	<0.094	<0.094	2.0	1.1	0.43	<0.094	
Duplicate	04/26/11	<0.094	<0.19	<0.094	<0.094	<0.094	<0.094	<0.094	<0.19	2.1	0.23	0.094	<0.094	<0.094	1.7	1.1	0.53	<0.094
Original	09/22/11 <sup>9</sup>	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	1.7	0.14	0.16	<0.010	0.039	1.6	0.63	1.0	0.034
Duplicate	09/22/11	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	2.3	0.15	0.13	<0.010	0.058	2.2	0.68	0.59	0.054
Re-Analysis	09/22/11 <sup>7</sup>	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	2.4	0.19	0.13	<0.010	0.041	2.1	0.61	0.83	0.042
Filtered	09/22/11 <sup>9</sup>	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	1.8	0.14	0.067	<0.010	0.018	1.4	0.52	0.72	0.014
Duplicate Filtered	09/22/11	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	2.1	0.17	0.079	<0.010	<0.010	1.6	0.65	0.75	<0.010
Re-Analysis Filtered	09/22/11 <sup>7</sup>	<0.0098	<0.020	<0.0098	<0.0098	<0.0098	<0.0098	<0.0098	<0.020	1.6	0.13	0.073	<0.0098	0.015	1.4	0.36	0.54	0.012
NEAR	09/22/11 <sup>9</sup>	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	2.1	0.21	0.98	<0.010	1.3	4.7	9.6	4.1	0.94
NEAR Re-Analysis	09/22/11 <sup>7</sup>	<0.0096	<0.019	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096	<0.019	1.8	0.21	0.83	<0.0096	1.2	6.0	5.7	4.6	0.89
NEAR Filtered	09/22/11	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	1.7	0.14	0.076	<0.010	0.018	1.3	0.53	0.68	0.013
	04/18/12	<0.019	<0.0096	<0.019	<0.019	<0.019	<0.019	<0.019	<0.038	3.3	0.37	0.21	<0.019	0.05	3.2	0.34	1.1	0.032
Filtered	04/18/12	<0.019	<0.0096	<0.019	<0.019	<0.019	<0.019	<0.019	<0.038	2.8	0.19	0.10	<0.019	1.2	<0.019	0.28	<0.019	<0.019
Duplicate	04/18/12	<0.019	<0.0096	<0.019	<0.019	<0.019	<0.019	<0.019	<0.038	3.8	0.41	0.19	<0.019	0.047	3.6	0.37	1.2	0.037
Duplicate Filtered	04/18/12	<0.019	<0.0096	<0.019	<0.019	<0.019	<0.019	<0.019	<0.038	0.82	0.032	0.071	<0.019	<0.019	0.019	0.16	<0.019	<0.019
NEAR	04/18/12	<0.019	<0.0096	<0.019	<0.019	<0.019	<0.019	<0.019	<0.038	3.3	0.36	0.19	<0.019	0.048	3.0	0.33	1.1	0.03
NEAR Duplicate	04/18/12	<0.019	<0.0096	<0.019	<0.019	<0.019	<0.019	<0.019	<0.038	3.2	0.35	0.18	<0.019	0.045	2.9	0.31	1.2	0.037
NEAR Filtered	04/18/12	<0.019	<0.0096	<0.019	<0.019	<0.019	<0.019	<0.019	<0.038	3.2	0.30	0.085	<0.019	<0.019	1.7	0.76	0.023	<0.019
NEAR Duplicate Filtered	04/18/12	<0.019	<0.0096	<0.019	<0.019	<0.019	<0.019	<0.019	<0.038	0.91	0.053	0.084	<0.019	<0.019	0.14	0.21	<0.019	<0.019
	10/12/12	<0.095	<0.19	<0.095	<0.095	<0.095	<0.095	<0.095	<0.19	2.5	0.29	0.23	<0.095	<0.095	2.4	0.94	1.1	<0.095
Filtered	10/12/12	<0.095	<0.19	<0.095	<0.095	<0.095	<0.095	<0.095	<0.19	0.98	0.11	<0.095	<0.095	<0.095	0.34	0.57	<0.095	<0.095
Duplicate	10/12/12	<0.095	<0.19	<0.095	<0.095	<0.095	<0.095	<0.095	<0.19	2.5	0.29	0.21	<0.095	<0.095	2.2	0.89	1.0	<0.095
Duplicate Filtered	10/12/12	<0.095	<0.19	<0.095	<0.095	<0.095	<0.095	<0.095	<0.19	2.2	0.24	<0.095	<0.095	<0.095	1.7	1.0	0.17	<0.095
NEAR	10/12/12	<0.095	<0.19	<0.095	<0.095	<0.095	<0.095	<0.095	<0.19	2.0	0.23	0.21	<0.095	<0.095	1.9	0.76	1.0	<0.095
NEAR Filtered	10/12/12	<0.095	<0.19	<0.095	<0.095	<0.095	<0.											



**Appendix C**  
**Historical Summary of Groundwater Analytical Data**  
**Carcinogenic Polycyclic Aromatic Hydrocarbons**

Former Unocal Seattle Marketing Terminal  
 3001 Elliott Avenue  
 Seattle, Washington

OFFSITE AREA		Carcinogenic PAHs <sup>2,3</sup> (µg/L)									Noncarcinogenic PAHs <sup>2</sup> (µg/L)								
Monitoring Well <sup>1</sup>	Sample Date	Benzo(a)anthracene	Benzo(b)pyrene	Benzo(k)fluoranthene	Benzo(e)fluoranthene	Chrysene	Dibenz(a,h)anthracene	Indeno(1,2,3-cd)pyrene	Total CPAHs <sup>4</sup>	Acenaphthene	Acenaphthylene	Anthracene	Benzo(g,h,i)perylene	Fluoranthene	Fluorene	Naphthalene <sup>4</sup>	Phenanthrene	Pyrene	
		0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	NE	NE	NE	NE	NE	NE	NE	NE	NE	
<b>MW-206 (continued) duplicate</b>	12/04/08	<0.00962	<0.00962	<0.00962	<0.00962	<0.00962	<0.00962	<0.00962	<0.00962	NE	NE	NE	NE	NE	NE	NE	NE	NE	
Filtered	12/04/08	<0.00980	<0.00980	<0.00980	<0.00980	<0.00980	<0.00980	<0.00980	<0.00980	--	--	--	--	--	--	--	--	--	
	02/18/09	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	--	--	--	--	--	--	--	--	--	
Filtered	02/18/09	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	--	--	--	--	--	--	--	--	--	
	05/12/09	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	--	--	--	--	--	--	--	--	--	
Filtered	05/12/09	<0.0125	<0.0125	<0.0125	<0.0125	<0.0125	<0.0125	<0.0125	<0.0125	--	--	--	--	--	--	--	--	--	
	09/11/09	<0.0100	<0.0200	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0200	--	--	--	--	--	--	--	--	--	
Filtered	09/11/09	<0.0110	<0.0220	<0.0110	<0.0110	<0.0110	<0.0110	<0.0110	<0.0220	--	--	--	--	--	--	--	--	--	
	04/14/10	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	--	--	--	--	--	--	--	--	--	
Filtered	04/14/10	<0.0098	<0.020	<0.0098	<0.0098	<0.0098	<0.0098	<0.0098	<0.020	--	--	--	--	--	--	--	--	--	
	09/22/10	<0.0095	<0.019	<0.0095	<0.0095	<0.0095	<0.0095	<0.0095	<0.019	--	--	--	--	--	--	--	--	--	
Filtered	09/22/10	<0.0099	<0.020	<0.0099	<0.0099	<0.0099	<0.0099	<0.0099	<0.020	--	--	--	--	--	--	--	--	--	
	04/27/11	<0.094	<0.19	<0.094	<0.094	<0.094	<0.094	<0.094	<0.19	0.14	<0.094	<0.094	<0.094	0.21	<0.094	<0.094	<0.094	0.15	
Filtered	04/27/11	<0.094	<0.19	<0.094	<0.094	<0.094	<0.094	<0.094	<0.19	0.12	<0.094	<0.094	<0.094	<0.094	<0.094	<0.094	<0.094	<0.094	
	09/21/11	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	0.014	<0.010	<0.010	<0.010	0.063	<0.010	0.049	<0.010	0.046	
Filtered	09/21/11	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	0.047	<0.010	<0.010	<0.010	0.011	<0.010	0.054	<0.010	0.01	
	04/18/12	<0.019	<0.0096	<0.019	<0.019	<0.019	<0.019	<0.019	<0.038	0.18	<0.019	0.042	<0.019	0.31	<0.019	0.022	<0.019	0.19	
Filtered	04/18/12	<0.019	<0.0096	<0.019	<0.019	<0.019	<0.019	<0.019	<0.038	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	<0.019	
	10/11/12	0.011	<0.019	<0.0095	<0.0095	<0.0095	<0.0095	<0.0095	0.011	0.21	<0.0095	0.066	<0.0095	0.37	0.018	0.0098	0.014	0.29	
Filtered	10/11/12	<0.0095	<0.019	<0.0095	<0.0095	<0.0095	<0.0095	<0.0095	<0.019	0.018	<0.0095	<0.0095	<0.0095	<0.0095	<0.0095	0.011	<0.0095	<0.0095	
	04/25/13	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	--	--	--	--	--	--	--	--	
	09/19/13	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	--	--	--	--	--	--	--	--	
	06/23/14	<0.010	<0.010	0.014	<0.010	<0.010	<0.010	0.013	0.027	--	--	--	--	--	--	--	--	--	
	12/16/14	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	--	--	--	--	--	--	--	--	
	06/17/15	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	--	--	--	--	--	--	--	--	
	12/08/15	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	--	--	--	--	--	--	--	--	
	06/14/16	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	--	--	--	--	<0.031	--	--	--	
	01/13/17	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	--	--	--	--	--	--	--	--	--	
	06/13/17	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	--	--	--	--	--	--	--	--	
	<b>11/08/17</b>	<b>&lt;0.010</b>	<b>&lt;0.010</b>	<b>&lt;0.010</b>	<b>&lt;0.010</b>	<b>&lt;0.010</b>	<b>&lt;0.010</b>	<b>&lt;0.010</b>	<b>&lt;0.010</b>	--	--	--	--	--	--	--	--	--	
<b>MW-207</b>	06/07/07	<1	<1	<1	<1	<1	<1	<1	<1	2	<1	<1	<1	<1	<1	<1	<1	<1	
	07/06/07	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096	0.31	<1	0.01	<0.0096	0.017	0.033	0.014	0.064	<0.0096	
	09/27/07	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	--	--	--	--	--	<0.010	--	--	
	11/27/07	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	--	--	--	--	--	<0.010	--	--	
	02/12/08	<0.00990	<0.00990	<0.00990	<0.00990	<0.00990	<0.00990	<0.00990	<0.00990	--	--	--	--	--	--	--	--	--	
	05/13/08	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	--	--	--	--	--	--	--	--	--	
Filtered	05/13/08	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	--	--	--	--	--	--	--	--	--	
	09/04/08	<0.00943	<0.00943	<0.00943	<0.00943	<0.00943	<0.00943	<0.00943	<0.00943	--	--	--	--	--	--	--	--	--	
Filtered	09/04/08	<0.00952	<0.00952	<b>0.0303</b>	0.0256	<0.00952	<0.00952	<0.00952	0.0559	--	--	--	--	--	--	--	--	--	
	10/01/08	<0.00990	<0.00990	<0.00990	<0.00990	<0.00990	<0.00990	<0.00990	<0.00990	--	--	--	--	--	--	--	--	--	
Duplicate	10/01/08	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	--	--	--	--	--	--	--	--	--	
Filtered	10/01/08	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	--	--	--	--	--	--	--	--	--	
Duplicate	10/01/08	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	--	--	--	--	--	--	--	--	--	
	12/03/08	<0.00952	<0.00952	<0.00952	<0.00952	<0.00952	<0.00952	<0.00952	<0.00952	--	--	--	--	--	--	--	--	--	
Filtered	12/03/08	<0.00943	<0.00943	<0.00943	<0.00943	<0.00943	<0.00943	<0.00943	<0.00943	--	--	--	--	--	--	--	--	--	
	02/18/09	<0.00990	<0.00990	<0.00990	<0.00990	<0.00990	<0.00990	<0.00990	<0.00990	--	--	--	--	--	--	--	--	--	
Filtered	02/18/09	<0.00990	<0.00990	<0.00990	<0.00990	<0.00990	<0.00990	<0.00990	<0.00990	--	--	--	--	--	--	--	--	--	
	05/12/09	<0.00980	<0.00980	<0.00980	<0.00980	<0.00980	<0.00980	<0.00980	<0.00980	--	--	--	--	--	--	--	--	--	
Filtered	05/12/09	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	--	--	--	--	--	--	--	--	--	
	09/11/09	<0.0100	<0.0200	<0.0100	<0.0100	<0.0100	<0.0100	<0.0100	<0.0200	--	--	--	--	--	--	--	--	--	
Filtered	09/11/09	<0.0110	<0.0220	<0.0110	<0.0110	<0.0110	<0.0110	<0.0110	<0.0220	--	--	--	--	--	--	--	--	--	
	04/14/10	<0.0097	<0.019	<0.0097	<0.0097	<0.0097	<0.0097	<0.0097	<0.019	--	--	--	--	--	--	--	--	--	
Filtered	04/14/10	<0.0094	<0.019	<0.0094	<0.0094	<0.0094	<0.0094	<0.0094	<0.019	--	--	--	--	--	--	--	--	--	
	09/21/10	<0.0095	<0.019	<0.0095	<0.0095	<0.0095	<0.0095	<0.0095	<0.019	--	--	--	--	--	--	--	--	--	
Duplicate	09/21/10	<0.0096	<0.019	<0.0096	<0.0096	<0.0096	<0.0096	<0.0096	<0.019	--	--	--	--	--	--	--	--	--	
Filtered	09/21/10	<0.0094	<0.019	<0.0094	<0.0094	<0.0094	<0.0094	<0.0094	<0.019	--	--	--	--	--	--	--	--	--	
Duplicate	09/21/10	<0.010	<0.020	<0.010	<0.010	<0.010	<0.010	<0.010	<0.020	--	--	--	--	--	--	--	--	--	
	04/27/11	<0.094	<0.19	<0.094	<0.094	<0.094	<0.094	<0.094	<0.19	3.2	<0.094	0.10	<0.094	0.44	1.1	0.17	0.32	0.31	
Filtered	04/27/11	<0.094	<0.19																

**Appendix C  
Historical Summary of Groundwater Analytical Data  
Carcinogenic Polycyclic Aromatic Hydrocarbons**

Former Unocal Seattle Marketing Terminal  
3001 Elliott Avenue  
Seattle, Washington

OFFSITE AREA		Carcinogenic PAHs <sup>2,3</sup> (µg/L)								Noncarcinogenic PAHs <sup>2</sup> (µg/L)									
Monitoring Well <sup>1</sup>	Sample Date	Benzo(a)anthracene	Benzo(e)pyrene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Chrysene	Dibenzo(a,h)anthracene	Indeno(1,2,3-cd)pyrene	Total cPAHs <sup>4</sup>	Acenaphthene	Acenaphthylene	Anthracene	Benzo(g,h,i)perylene	Fluoranthene	Fluorene	Naphthalene <sup>5</sup>	Phenanthrene	Pyrene	
RAL		0.03	0.03	0.03	0.03	0.03	0.03	0.03	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	
MW-207 (continued)	12/16/14	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	--	--	--	--	--	--	--	--	
	06/17/15	0.030	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.030	--	--	--	--	--	--	--	--	--	
	12/08/15	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	--	--	--	--	--	--	--	--	
	06/14/16	1.0	0.98	1.0	0.84	0.85	0.95	0.93	6.55	--	--	--	--	--	3.49	--	--	--	
	01/13/17	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	--	--	--	--	--	--	--	--	
	Duplicate	01/13/17	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	--	--	--	--	--	--	--	--
	06/13/17	0.020	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	--	--	--	--	--	--	--	--	
	11/08/17	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	--	--	--	--	--	--	--	--	
	Duplicate	11/08/17	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	--	--	--	--	--	--	--	--
	MW-209	02/16/16	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	--	--	--	--	--	--	0.21	--	--
06/13/16	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	--	--	--	--	--	<0.030	--	--		
09/22/16	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	--	--	--	--	--	--	--	--		
01/12/17	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	--	--	--	--	--	--	--	--	--		
03/27/17	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	--	--	--	--	--	--	--	--		
06/13/17	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	--	--	--	--	--	--	--	--		
MW-210	02/16/16	0.100	0.042	0.050	0.016	0.170	0.012	0.021	0.411	--	--	--	--	--	--	--	--	--	
	06/13/16	0.110	0.056	0.073	0.027	0.210	0.015	0.024	0.515	--	--	--	--	--	--	<0.031	0.515	--	
	09/22/16	0.016	0.014	0.016	<0.012	0.029	<0.012	<0.012	0.019	--	--	--	--	--	--	<0.037	--	--	
	01/12/17	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	--	--	--	--	--	--	--	--	
	03/27/17	0.016	<0.010	0.011	<0.010	0.020	<0.010	<0.010	0.009	--	--	--	--	--	--	--	--	--	
	Duplicate	03/27/17	<0.010	<0.010	<0.010	<0.010	0.012	<0.010	<0.010	0.008	--	--	--	--	--	--	--	--	--
	06/16/17	0.075	0.042	0.044	0.020	0.13	0.017	0.034	0.06	--	--	--	--	--	--	--	--	--	
MW-211	02/16/16	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	--	--	--	--	--	<0.031	--	--	
	06/13/16	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	--	--	--	--	<0.033	--	--	--	
	09/22/16	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	<0.011	--	--	--	--	--	--	--	--	--	
	01/12/17	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	--	--	--	--	--	--	--	--	
	03/27/17	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	--	--	--	--	--	--	--	--	
	06/16/17	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	--	--	--	--	--	--	--	--	--	

**Notes:**

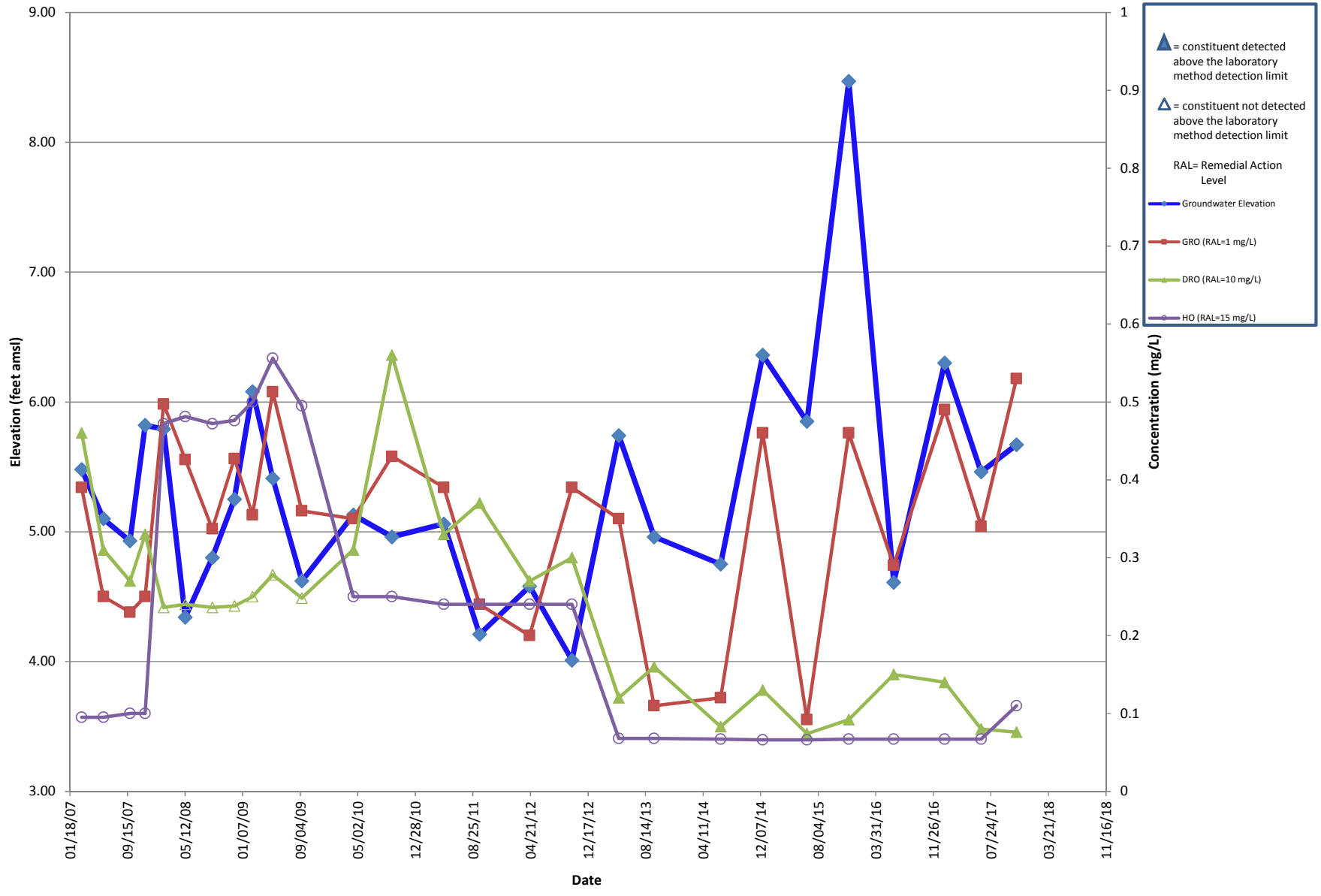
- <sup>1</sup>Monitoring well locations are shown on Figure 2.
  - <sup>2</sup>Analyses by EPA Method 8310 or 8270 (SIM).
  - <sup>3</sup>WAC 173-340-200 (MTCA).
  - <sup>4</sup>Numeric sum of detected concentrations. Where no compounds were detected, this figure is equal to the highest reporting limit for an individual compound.
  - <sup>5</sup>Naphthalene detected in the method blank, these data are from the initial extraction of the sample.
  - <sup>6</sup>Sample was extracted past the holding time.
  - <sup>7</sup>Sample was re-prepared outside of preparation holding time. Results have been flagged as "H" in the laboratory report.
  - <sup>8</sup>There was insufficient sample to perform a re-extraction or re-analysis, therefore, the data have been reported.
  - <sup>9</sup>LCS or LCSD exceeds the control limits/RPD of the LCS exceeds the control limits.
  - <sup>0</sup>Duplicate of the preceding sample.
- RAL = Remedial Action Level per Amendments No. 4 and No. 5 to Order on Consent; applicable for Offsite Area only.  
 There is no cPAH RAL for groundwater in the Upper Yard, Lower Yard or Elliott Avenue.  
 µg/L = micrograms per liter  
 NE = not established  
 "--" not sampled  
 cPAHs = carcinogenic polycyclic aromatic hydrocarbons.  
 PAHs = polynuclear aromatic hydrocarbons.  
 LNAPL = light nonaqueous phase liquid  
 Laboratory analyses by TestAmerica of Tacoma, Washington and Lancaster Laboratories of Lancaster, Pennsylvania.  
 Bolded data are for the current reporting period.  
 Shading indicates concentration greater than the RAL.  
 NEAR = The sample was collected from the top of the water column within the respective monitoring well.  
 DL, RA, RE, IN = Indicates a Dilution, Reanalysis, Re-extraction, or additional Initial metals/anion analysis of the sample.

# APPENDIX D

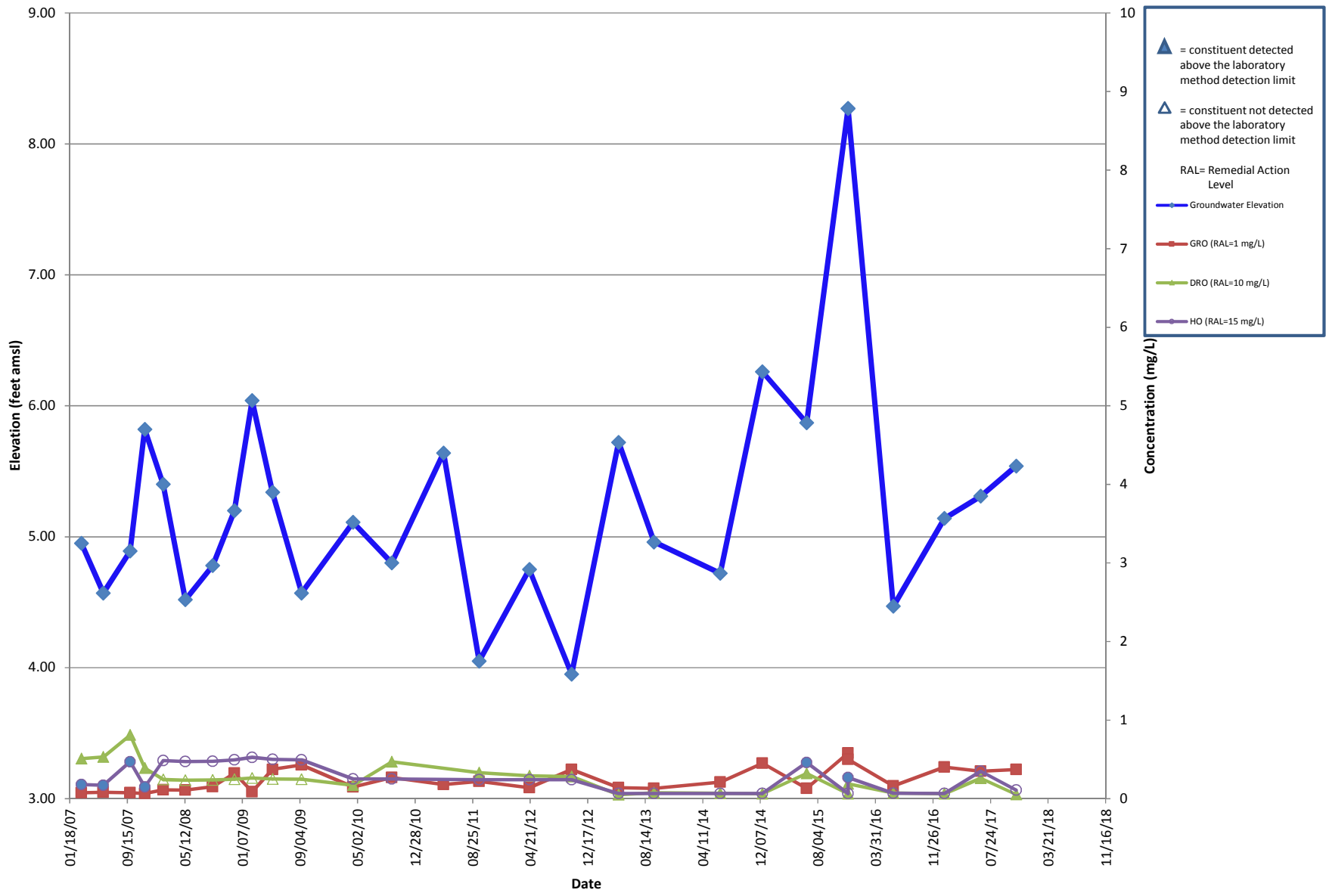
## Historical Trends Graph



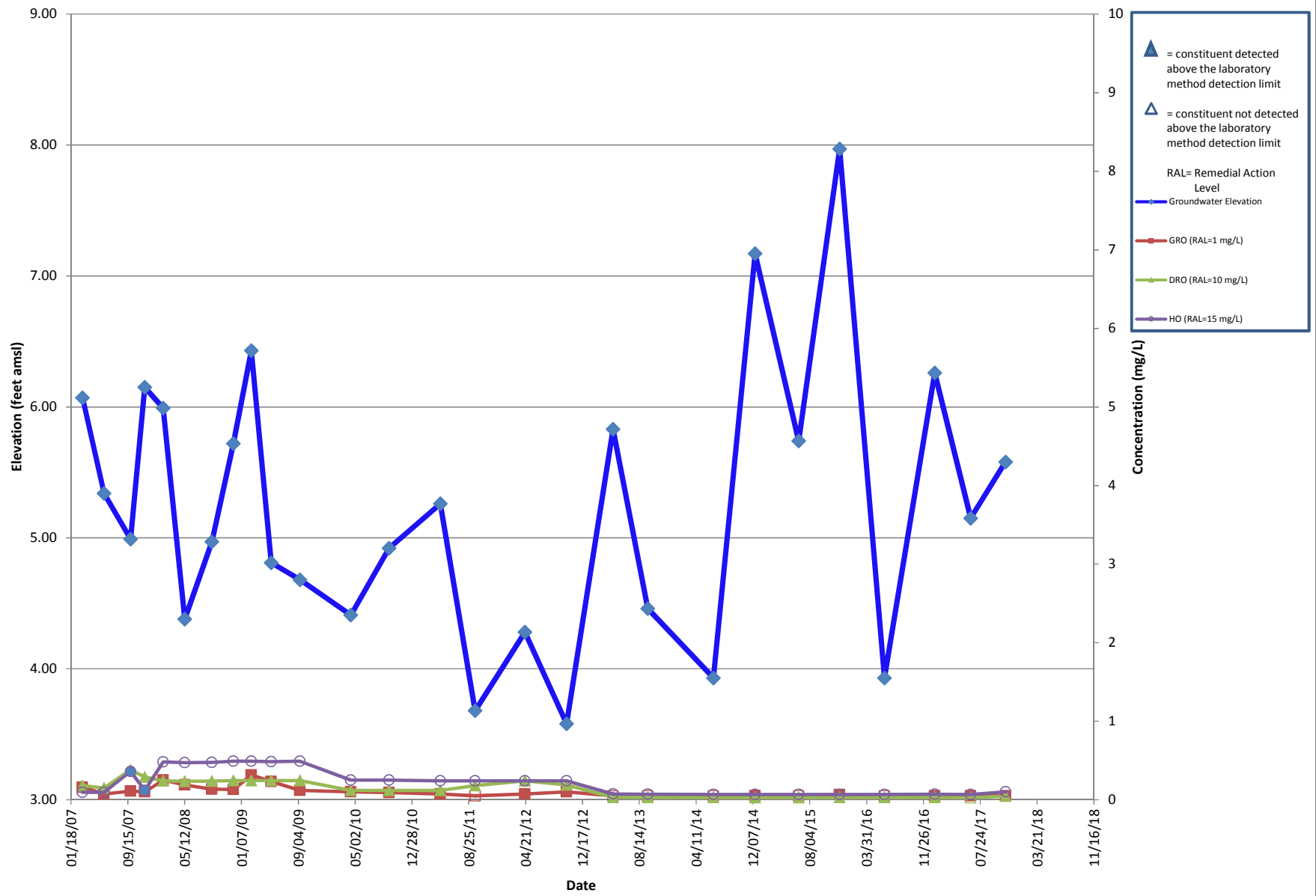
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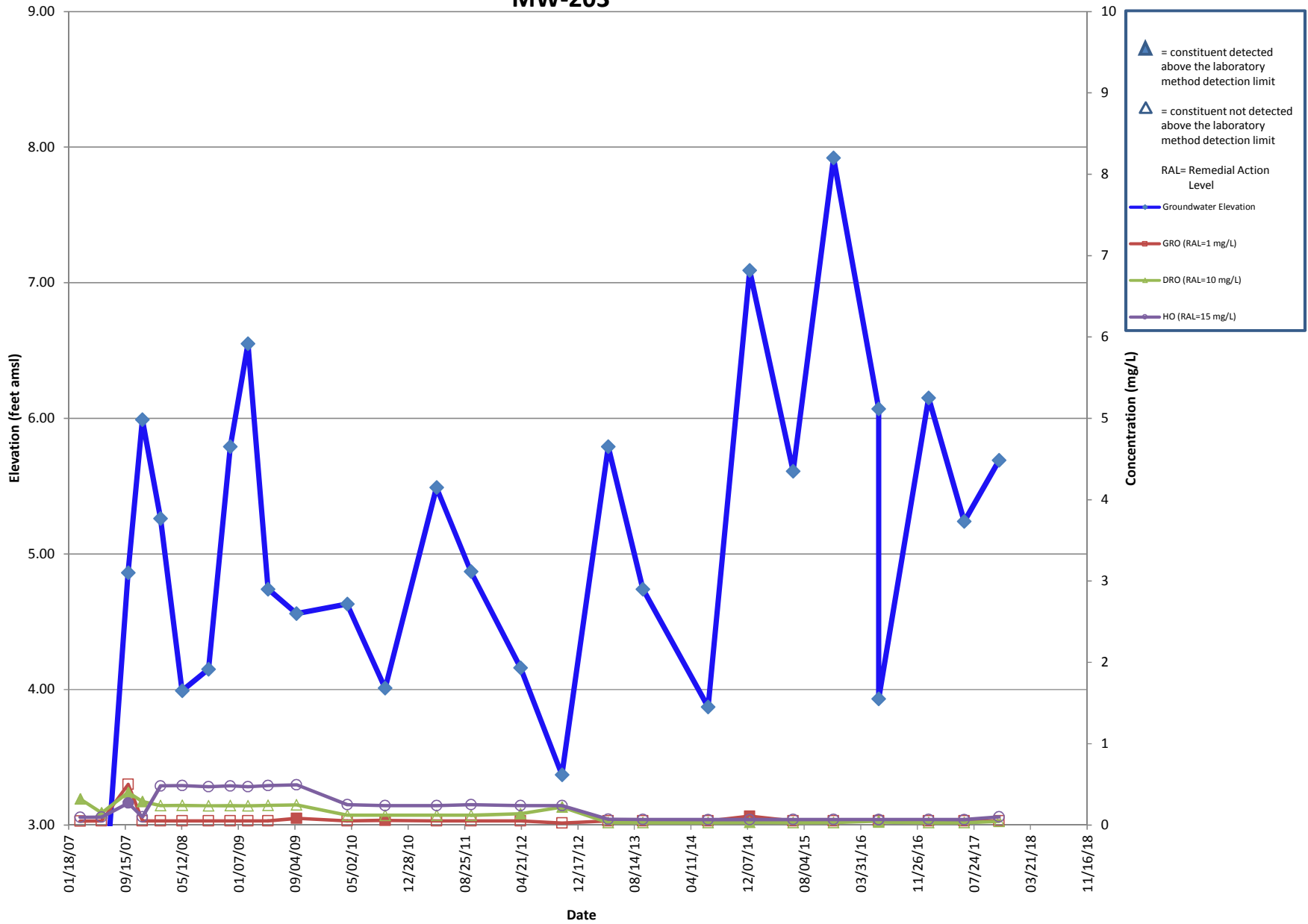
# MW-201



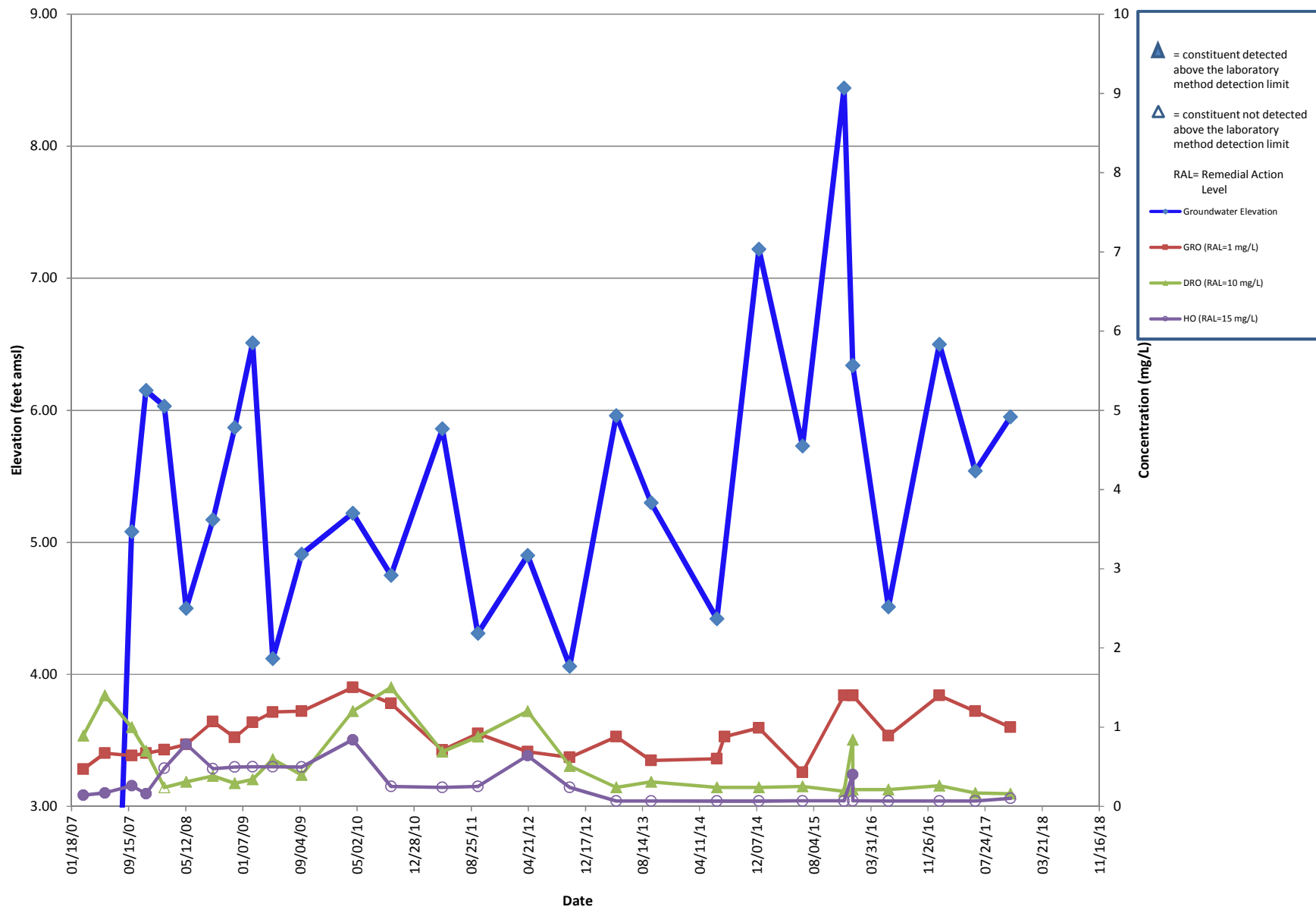
# MW-202



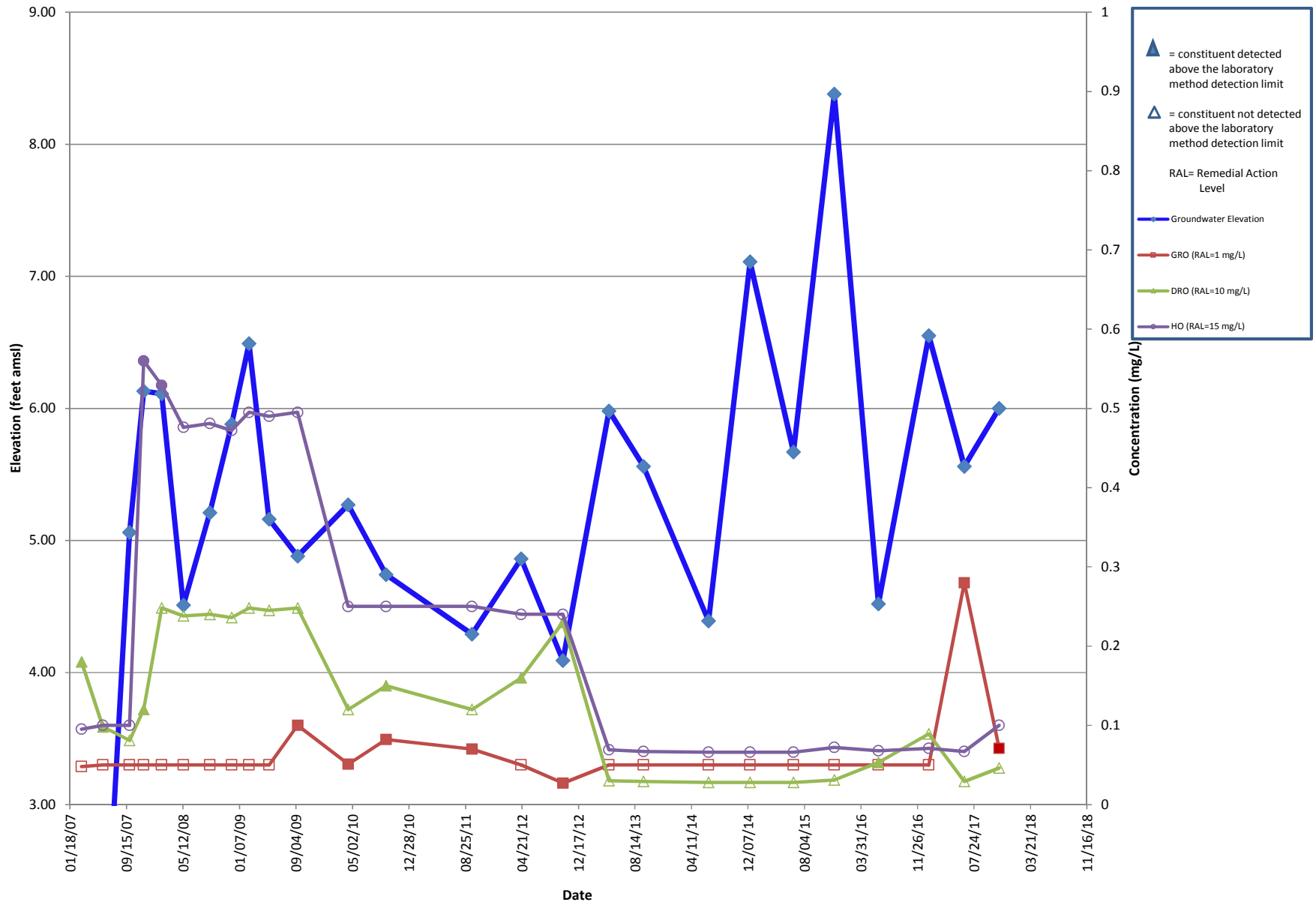
# MW-203



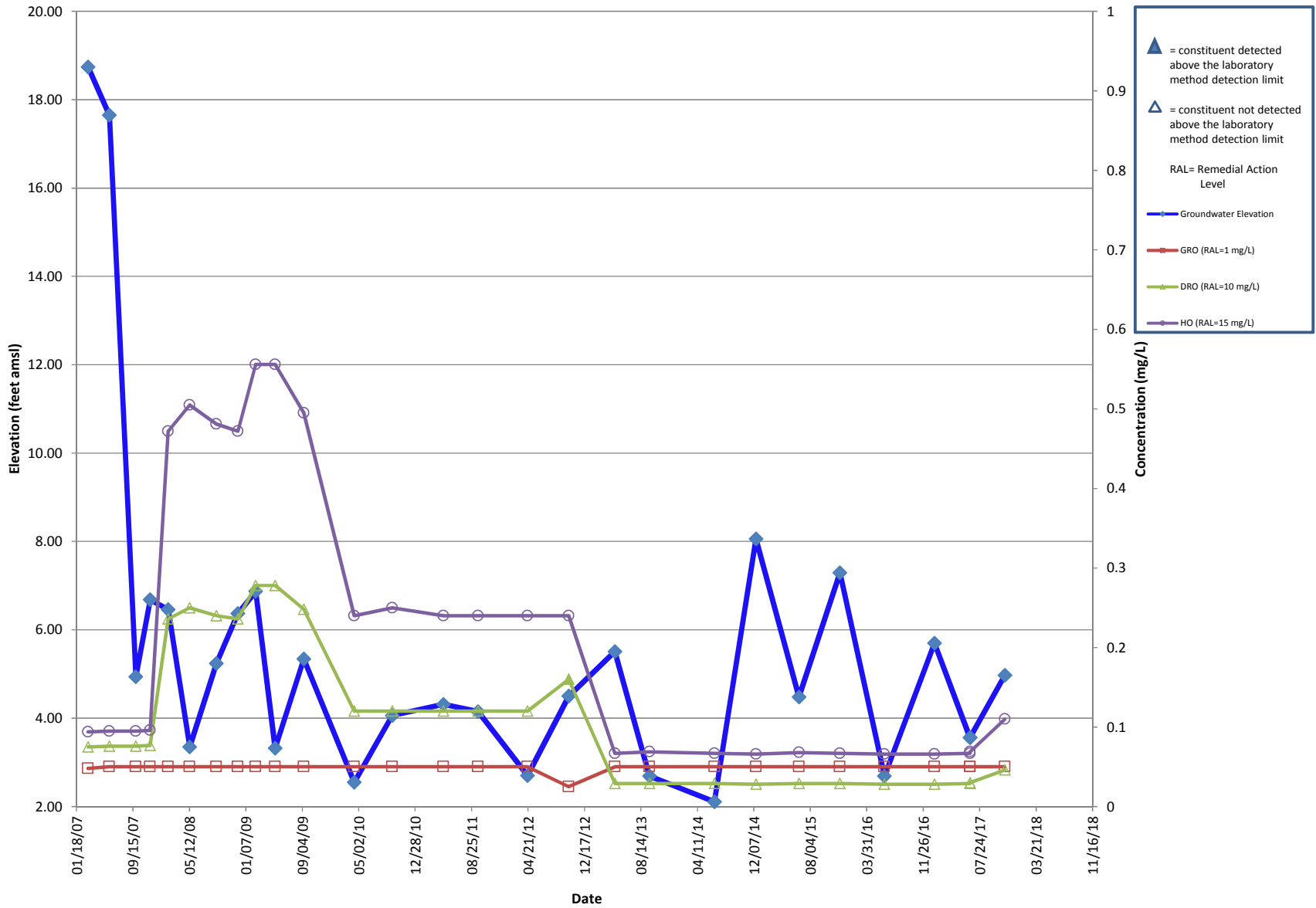
# MW-204



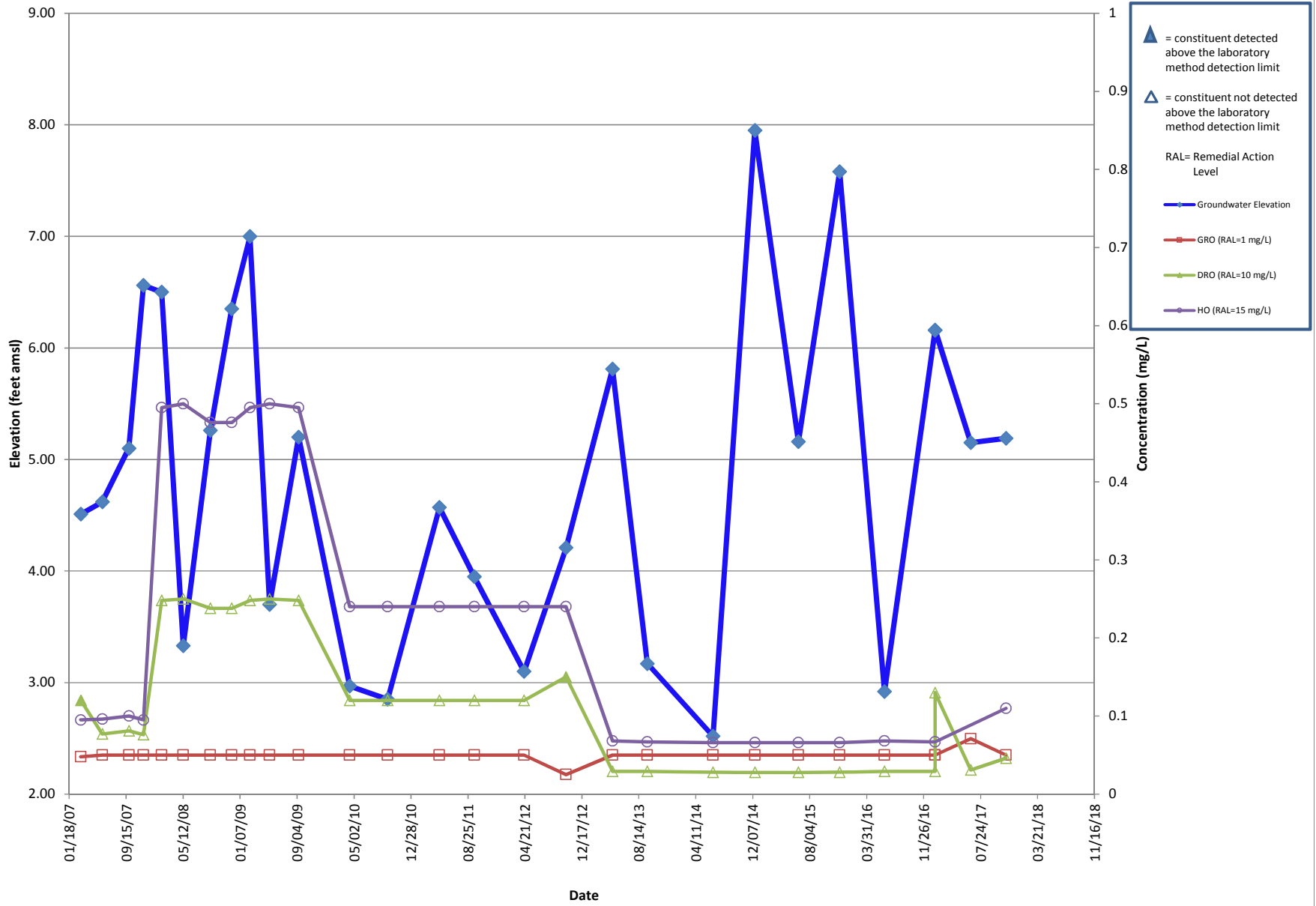
# MW-205



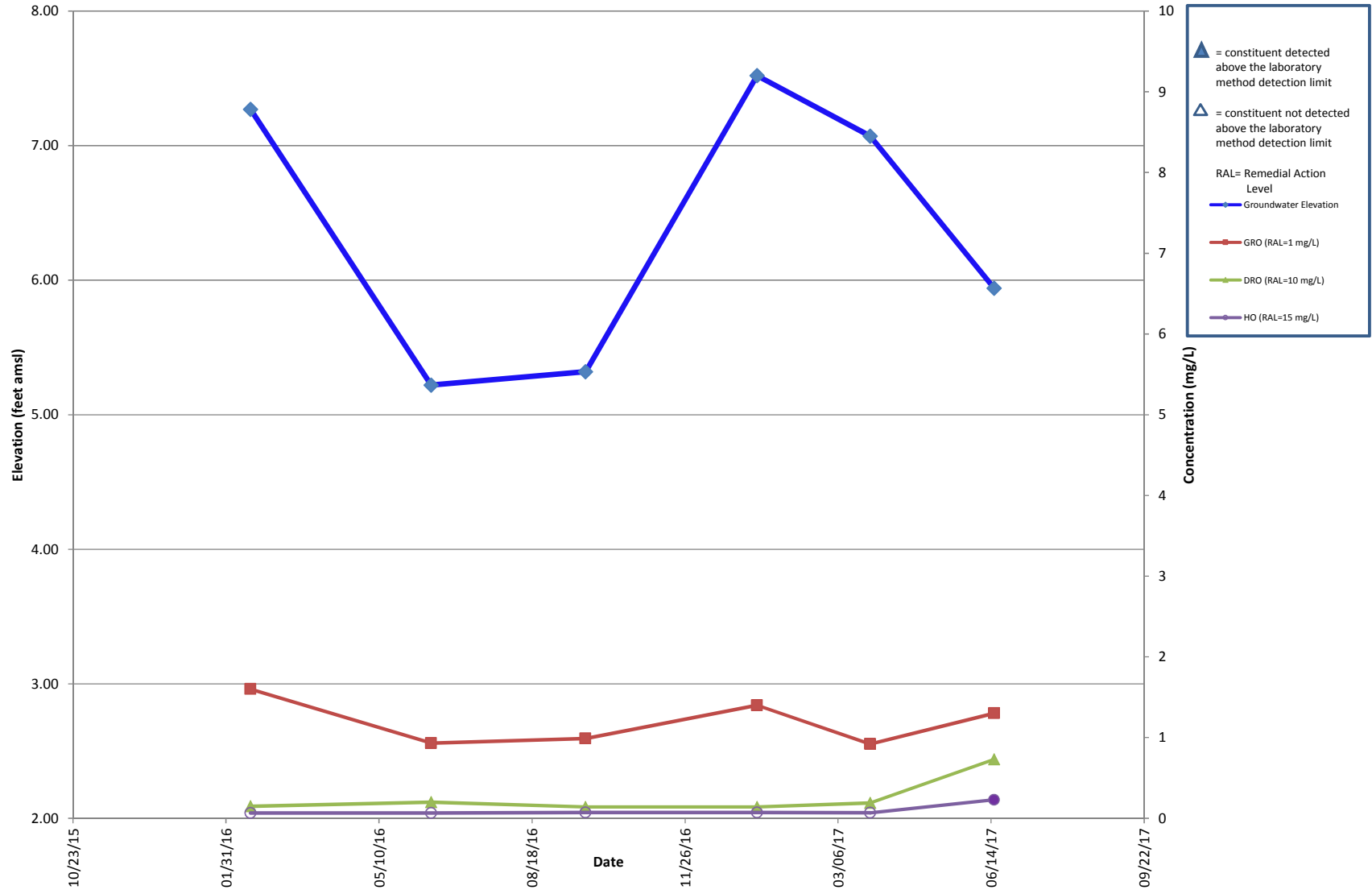
# MW-206



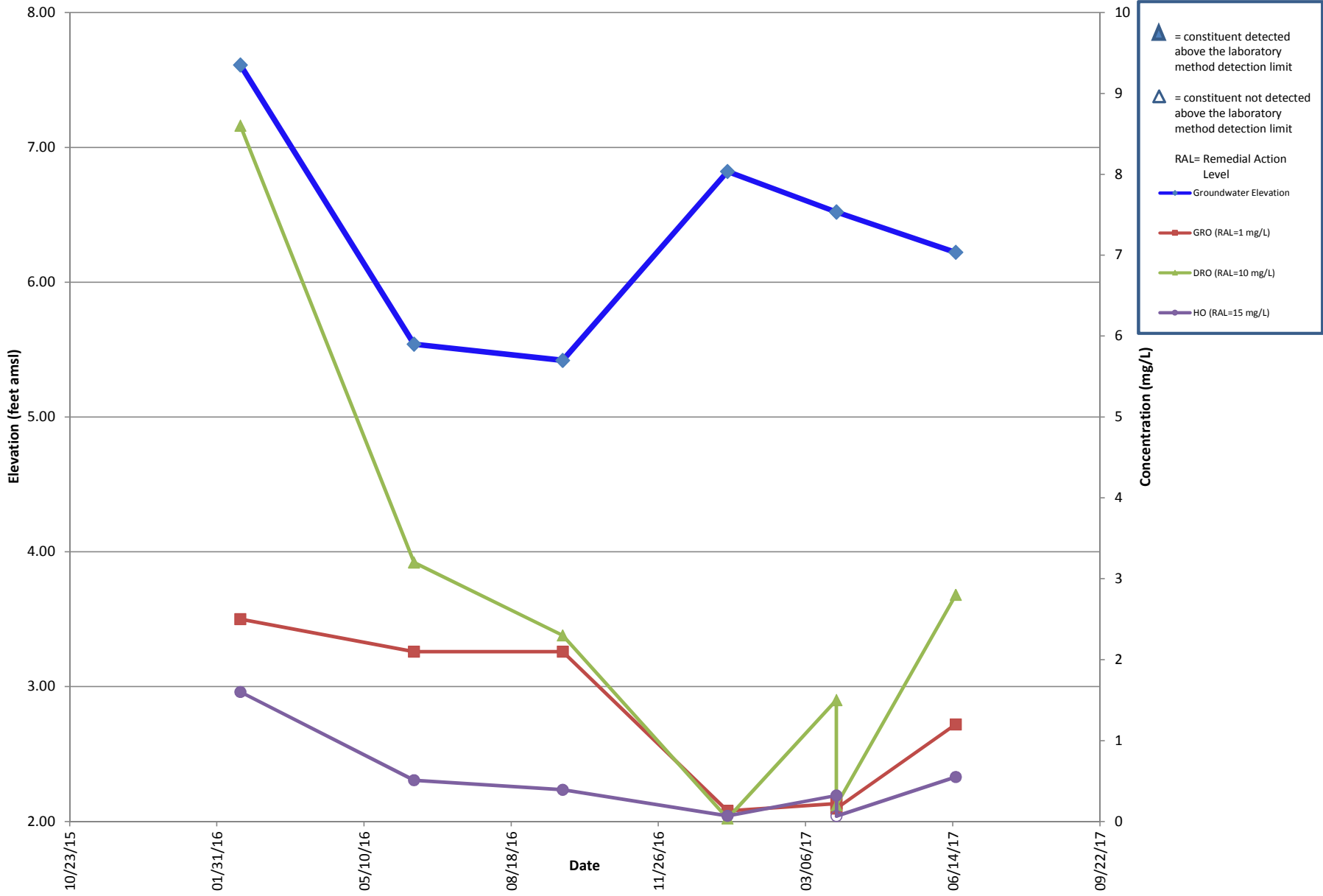
# MW-207



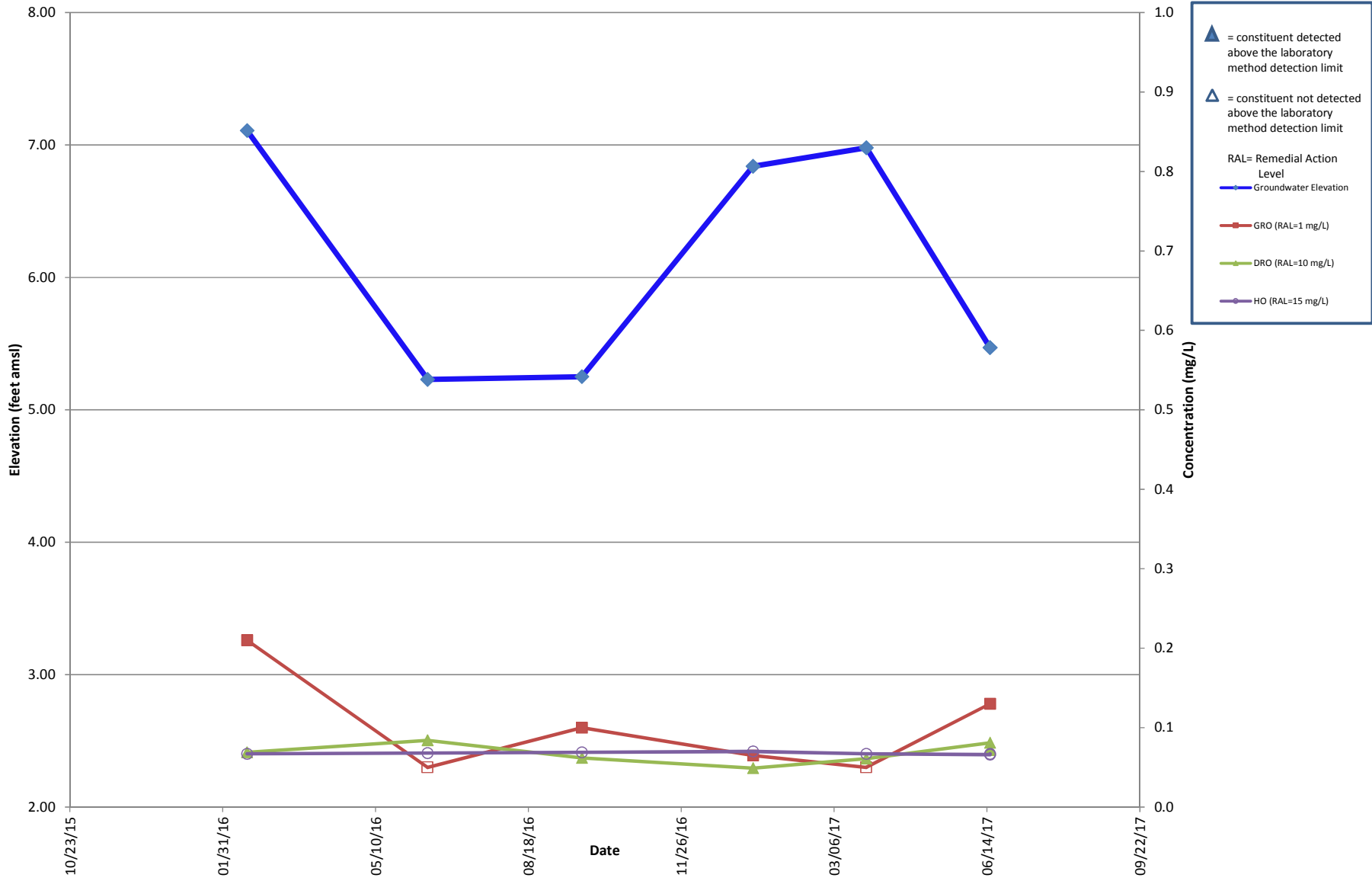
# MW-209



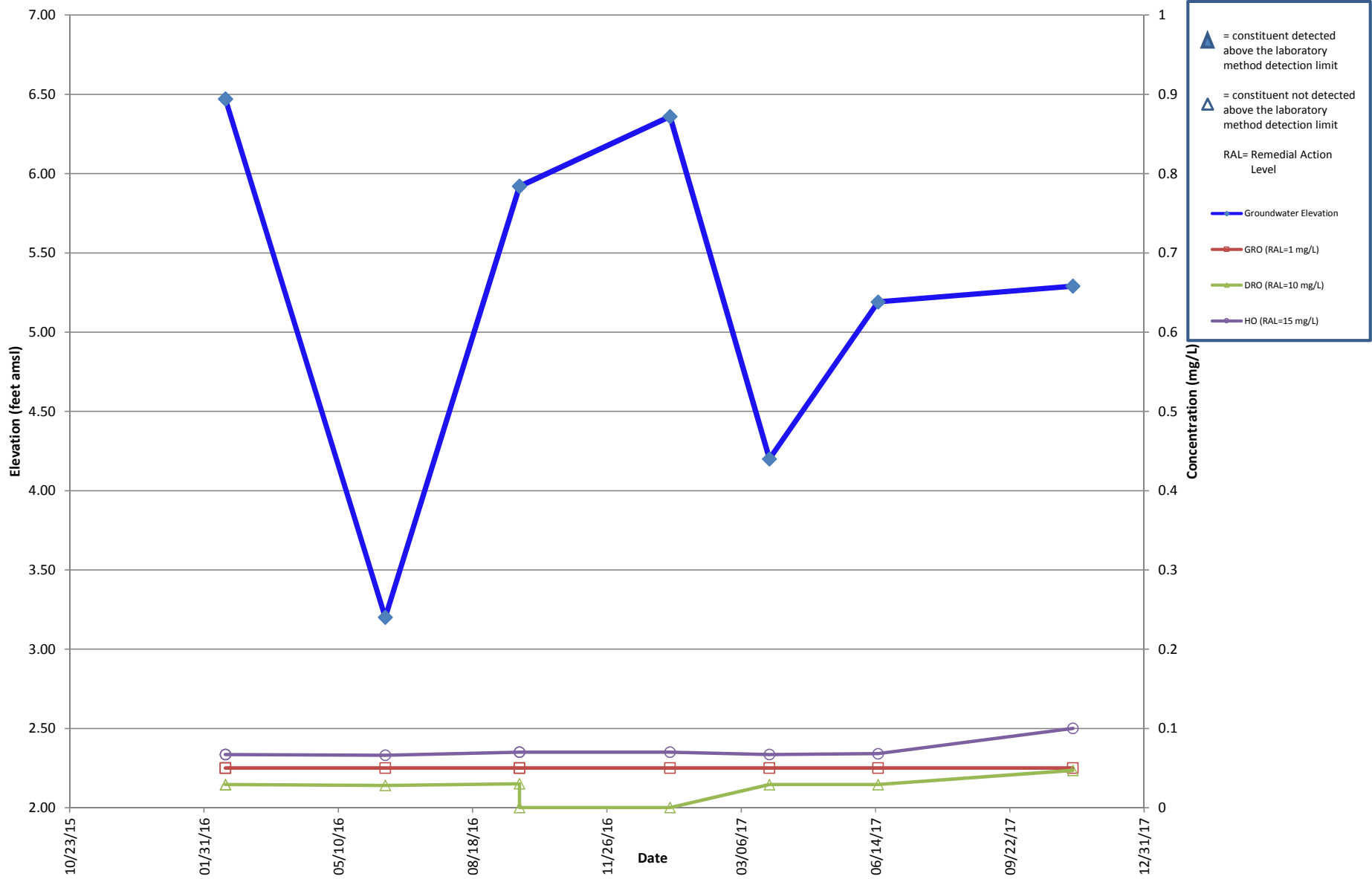
# MW-210



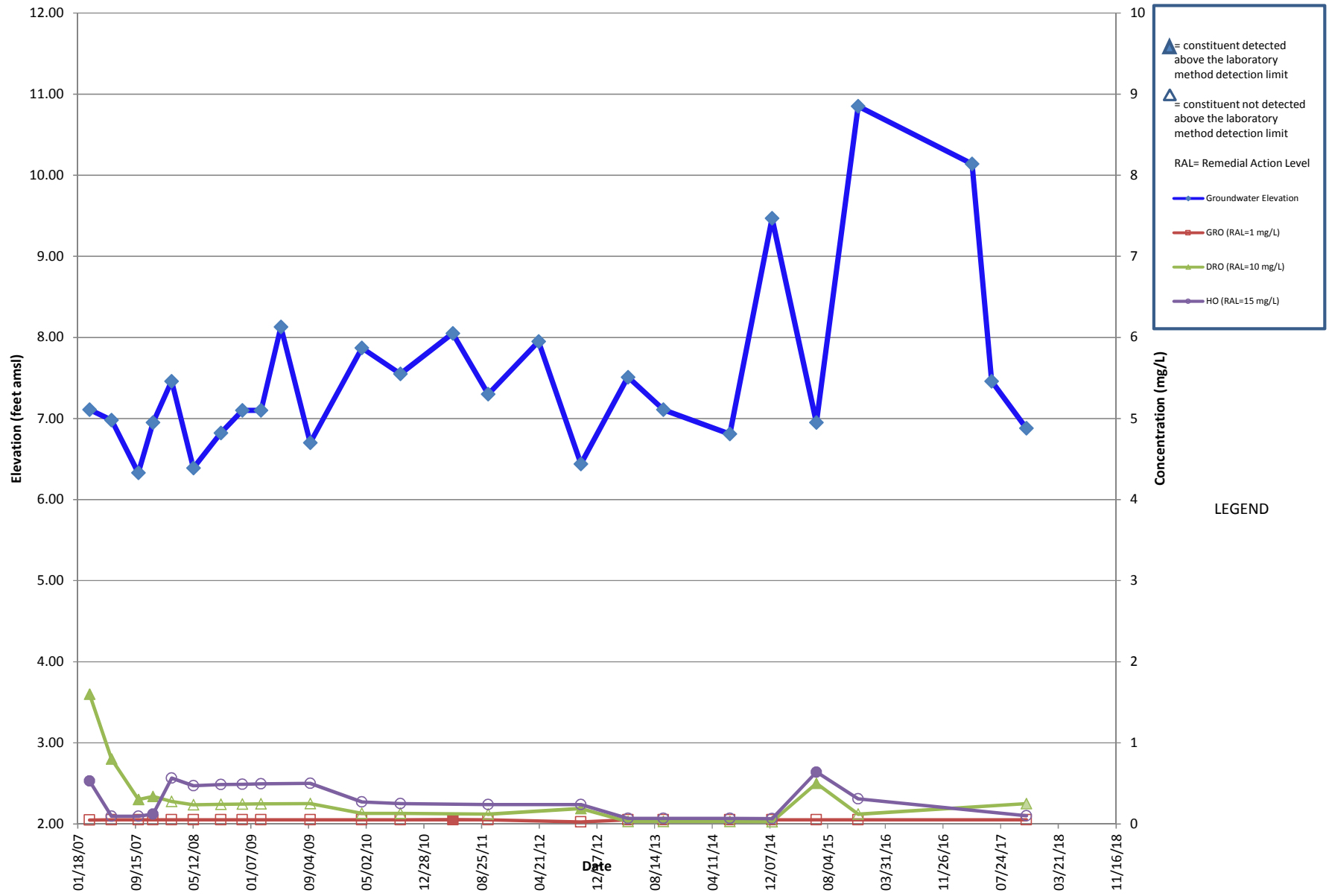
# MW-211



# MW-70R



# MW-30



LEGEND

# APPENDIX E

## Laboratory Report and Chain of Custody Forms





## ANALYSIS REPORT

Prepared by:

Eurofins Lancaster Laboratories Environmental  
2425 New Holland Pike  
Lancaster, PA 17601

Prepared for:

Chevron Environmental Mgmt Co  
BR1 X5139C  
6101 Bollinger Canyon Road  
San Ramon CA 94583

Report Date: December 04, 2017 08:58

### Project: Seattle Terminal

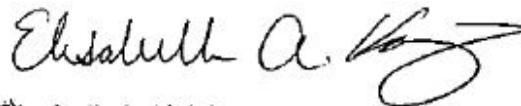
Account #: 11964  
Group Number: 1874268  
PO Number: 0015247975  
Release Number: JOLITZ  
State of Sample Origin: WA

Regulatory agencies do not accredit laboratories for all methods, analytes, and matrices. Our current scopes of accreditation can be viewed at <http://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/resources/certifications/>. To request copies of prior scopes of accreditation, contact your project manager.

Electronic Copy To ARCADIS U.S., Inc.  
Electronic Copy To Arcadis

Attn: Sam Miles  
Attn: Rebecca Andresen

Respectfully Submitted,



Elisabeth A. Knisley  
Project Manager

(717) 556-7262



## SAMPLE INFORMATION

<u>Client Sample Description</u>	<u>Sample Collection Date/Time</u>	<u>ELLE#</u>
MW-30-W-171108 Grab Groundwater	11/08/2017 12:45	9312915
MW-70R-W-171108 Grab Groundwater	11/08/2017 13:35	9312916
MW-200-W-171108 Grab Groundwater	11/08/2017 11:45	9312917
MW-201-W-171108 Grab Groundwater	11/08/2017 10:20	9312918
MW-202-W-171108 Grab Groundwater	11/08/2017 15:15	9312919
MW-203-W-171108 Grab Groundwater	11/08/2017 10:00	9312920
MW-204-W-171108 Grab Groundwater	11/08/2017 09:00	9312921
MW-205-W-171108 Grab Groundwater	11/08/2017 08:45	9312922
MW-206-W-171108 Grab Groundwater	11/08/2017 14:50	9312923
MW-207-W-171108 Grab Groundwater	11/08/2017 14:05	9312924
DUP-1-WD-171108 Grab Groundwater	11/08/2017	9312925
Trip Blank-T-171108 NA Water	11/08/2017	9312926

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

**Sample Description:** MW-30-W-171108 Grab Groundwater  
Seattle Terminal  
3001 Elliott Ave - Seattle, WA

**Chevron Environmental Mgmt Co**  
**ELLE Sample #:** WW 9312915  
**ELLE Group #:** 1874268  
**Matrix:** Groundwater

**Project Name:** Seattle Terminal

**Submittal Date/Time:** 11/10/2017 09:40  
**Collection Date/Time:** 11/08/2017 12:45

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit	Dilution Factor
<b>GC Volatiles</b>					
	<b>ECY 97-602 NWTPH-Gx</b>		<b>ug/l</b>	<b>ug/l</b>	
08274	NWTPH-Gx water C7-C12	n.a.	N.D.	50	1
<b>GC Volatiles</b>					
	<b>SW-846 8021B</b>		<b>ug/l</b>	<b>ug/l</b>	
02102	Benzene	71-43-2	N.D.	0.5	1
02102	Ethylbenzene	100-41-4	N.D.	0.5	1
02102	Toluene	108-88-3	N.D.	0.5	1
02102	Total Xylenes	1330-20-7	N.D.	1.5	1
<b>GC Petroleum Hydrocarbons w/Si</b>					
	<b>ECY 97-602 NWTPH-Dx modified</b>		<b>ug/l</b>	<b>ug/l</b>	
12917	DX DRO C12-C24 w/ SiGel	n.a.	250	46	1
12917	DX HRO C24-C40 w/ SiGel	n.a.	N.D.	100	1

### Sample Comments

State of Washington Lab Certification No. C457

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
08274	NWTPH-Gx water C7-C12	ECY 97-602 NWTPH-Gx	1	17318C94A	11/16/2017 20:56	Brett W Kenyon	1
02102	Method 8021 Water Master	SW-846 8021B	1	17318C94A	11/16/2017 20:56	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	1	17318C94A	11/16/2017 20:56	Brett W Kenyon	1
12917	NWTPH-Dx water w/Si Gel	ECY 97-602 NWTPH-Dx modified	1	173170062A	11/16/2017 00:01	Amy Lehr	1
12924	Mini-Ext. DRO DX, Column SiGel	ECY 97-602 NWTPH-Dx 06/97	1	173170062A	11/14/2017 08:00	Osvaldo R Sanchez	1

**Sample Description:** MW-70R-W-171108 Grab Groundwater  
Seattle Terminal  
3001 Elliott Ave - Seattle, WA

**Chevron Environmental Mgmt Co**  
**ELLE Sample #:** WW 9312916  
**ELLE Group #:** 1874268  
**Matrix:** Groundwater

**Project Name:** Seattle Terminal

**Submission Date/Time:** 11/10/2017 09:40  
**Collection Date/Time:** 11/08/2017 13:35

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit	Dilution Factor
<b>GC/MS Semivolatiles</b>		<b>SW-846 8270C SIM</b>	<b>ug/l</b>	<b>ug/l</b>	
14243	Benzo(a)anthracene	56-55-3	0.018	0.010	1
14243	Benzo(a)pyrene	50-32-8	0.015	0.010	1
14243	Benzo(b)fluoranthene	205-99-2	0.026	0.010	1
14243	Benzo(k)fluoranthene	207-08-9	0.018	0.010	1
14243	Chrysene	218-01-9	0.019	0.010	1
14243	Dibenz(a,h)anthracene	53-70-3	0.019	0.010	1
14243	Indeno(1,2,3-cd)pyrene	193-39-5	0.015	0.010	1
<b>GC Volatiles</b>		<b>ECY 97-602 NWTPH-Gx</b>	<b>ug/l</b>	<b>ug/l</b>	
08274	NWTPH-Gx water C7-C12	n.a.	N.D.	50	1
<b>GC Volatiles</b>		<b>SW-846 8021B</b>	<b>ug/l</b>	<b>ug/l</b>	
02102	Benzene	71-43-2	N.D.	0.5	1
02102	Ethylbenzene	100-41-4	N.D.	0.5	1
02102	Toluene	108-88-3	N.D.	0.5	1
02102	Total Xylenes	1330-20-7	N.D.	1.5	1
<b>GC Petroleum Hydrocarbons w/Si</b>		<b>ECY 97-602 NWTPH-Dx modified</b>	<b>ug/l</b>	<b>ug/l</b>	
12917	DX DRO C12-C24 w/ SiGel	n.a.	N.D.	47	1
12917	DX HRO C24-C40 w/ SiGel	n.a.	N.D.	100	1

### Sample Comments

State of Washington Lab Certification No. C457  
Carcinogenic PAHs have been reported for this sample

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14243	SIM SVOAs 8270C MINI	SW-846 8270C SIM	1	17317WAN026	11/28/2017 13:22	Catherine E Bachman	1
10466	BNA Water Extraction SIM	SW-846 3510C	1	17317WAN026	11/14/2017 08:00	Kayla A Yuditsky	1
08274	NWTPH-Gx water C7-C12	ECY 97-602 NWTPH-Gx	1	17321A53A	11/17/2017 12:36	Brett W Kenyon	1
02102	Method 8021 Water Master	SW-846 8021B	1	17318C94A	11/16/2017 22:12	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	1	17318C94A	11/16/2017 22:12	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	2	17321A53A	11/17/2017 12:36	Brett W Kenyon	1
12917	NWTPH-Dx water w/Si Gel	ECY 97-602 NWTPH-Dx modified	1	173170062A	11/16/2017 00:25	Amy Lehr	1
12924	Mini-Ext. DRO DX, Column SiGel	ECY 97-602 NWTPH-Dx 06/97	1	173170062A	11/14/2017 08:00	Oswaldo R Sanchez	1

**Sample Description:** MW-200-W-171108 Grab Groundwater  
Seattle Terminal  
3001 Elliott Ave - Seattle, WA

**Chevron Environmental Mgmt Co**  
**ELLE Sample #:** WW 9312917  
**ELLE Group #:** 1874268  
**Matrix:** Groundwater

**Project Name:** Seattle Terminal

**Submission Date/Time:** 11/10/2017 09:40  
**Collection Date/Time:** 11/08/2017 11:45

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit	Dilution Factor
<b>GC/MS Semivolatiles</b>		<b>SW-846 8270C SIM</b>	<b>ug/l</b>	<b>ug/l</b>	
14243	Benzo(a)anthracene	56-55-3	0.064	0.010	1
14243	Benzo(a)pyrene	50-32-8	0.037	0.010	1
14243	Benzo(b)fluoranthene	205-99-2	0.11	0.010	1
14243	Benzo(k)fluoranthene	207-08-9	0.096	0.010	1
14243	Chrysene	218-01-9	0.072	0.010	1
14243	Dibenz(a,h)anthracene	53-70-3	0.081	0.010	1
14243	Indeno(1,2,3-cd)pyrene	193-39-5	0.088	0.010	1
<b>GC Volatiles</b>		<b>ECY 97-602 NWTPH-Gx</b>	<b>ug/l</b>	<b>ug/l</b>	
08274	NWTPH-Gx water C7-C12	n.a.	530	50	1
<b>GC Volatiles</b>		<b>SW-846 8021B</b>	<b>ug/l</b>	<b>ug/l</b>	
02102	Benzene	71-43-2	N.D.	4.0	1
02102	Ethylbenzene	100-41-4	0.6	0.5	1
02102	Toluene	108-88-3	N.D.	0.5	1
02102	Total Xylenes	1330-20-7	N.D.	1.5	1
Reporting limits were raised due to interference from the sample matrix.					
<b>GC Petroleum Hydrocarbons w/Si</b>		<b>ECY 97-602 NWTPH-Dx modified</b>	<b>ug/l</b>	<b>ug/l</b>	
12917	DX DRO C12-C24 w/ SiGel	n.a.	76	47	1
12917	DX HRO C24-C40 w/ SiGel	n.a.	N.D.	110	1

### Sample Comments

State of Washington Lab Certification No. C457  
Carcinogenic PAHs have been reported for this sample

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14243	SIM SVOAs 8270C MINI	SW-846 8270C SIM	1	17317WAN026	11/28/2017 13:51	Catherine E Bachman	1
10466	BNA Water Extraction SIM	SW-846 3510C	1	17317WAN026	11/14/2017 08:00	Kayla A Yuditsky	1
08274	NWTPH-Gx water C7-C12	ECY 97-602 NWTPH-Gx	1	17321A53A	11/17/2017 13:04	Brett W Kenyon	1
02102	Method 8021 Water Master	SW-846 8021B	1	17318C94A	11/16/2017 22:38	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	1	17318C94A	11/16/2017 22:38	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	2	17321A53A	11/17/2017 13:04	Brett W Kenyon	1
12917	NWTPH-Dx water w/Si Gel	ECY 97-602 NWTPH-Dx modified	1	173170062A	11/16/2017 00:48	Amy Lehr	1
12924	Mini-Ext. DRO DX, Column SiGel	ECY 97-602 NWTPH-Dx 06/97	1	173170062A	11/14/2017 08:00	Oswaldo R Sanchez	1

**Sample Description:** MW-201-W-171108 Grab Groundwater  
Seattle Terminal  
3001 Elliott Ave - Seattle, WA

**Chevron Environmental Mgmt Co**  
**ELLE Sample #:** WW 9312918  
**ELLE Group #:** 1874268  
**Matrix:** Groundwater

**Project Name:** Seattle Terminal

**Submission Date/Time:** 11/10/2017 09:40  
**Collection Date/Time:** 11/08/2017 10:20

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit	Dilution Factor
<b>GC/MS Semivolatiles</b>		<b>SW-846 8270C SIM</b>	<b>ug/l</b>	<b>ug/l</b>	
14243	Benzo(a)anthracene	56-55-3	0.018	0.010	1
14243	Benzo(a)pyrene	50-32-8	N.D.	0.010	1
14243	Benzo(b)fluoranthene	205-99-2	N.D.	0.010	1
14243	Benzo(k)fluoranthene	207-08-9	N.D.	0.010	1
14243	Chrysene	218-01-9	0.019	0.010	1
14243	Dibenz(a,h)anthracene	53-70-3	N.D.	0.010	1
14243	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.	0.010	1

<b>GC Volatiles</b>		<b>ECY 97-602 NWTPH-Gx</b>	<b>ug/l</b>	<b>ug/l</b>	
08274	NWTPH-Gx water C7-C12	n.a.	370	50	1

<b>GC Volatiles</b>		<b>SW-846 8021B</b>	<b>ug/l</b>	<b>ug/l</b>	
02102	Benzene	71-43-2	N.D.	3.0	1
02102	Ethylbenzene	100-41-4	0.5	0.5	1
02102	Toluene	108-88-3	N.D.	0.5	1
02102	Total Xylenes	1330-20-7	N.D.	1.5	1

Reporting limits were raised due to interference from the sample matrix.

<b>GC Petroleum Hydrocarbons w/Si</b>		<b>ECY 97-602 NWTPH-Dx modified</b>	<b>ug/l</b>	<b>ug/l</b>	
12917	DX DRO C12-C24 w/ SiGel	n.a.	53	48	1
12917	DX HRO C24-C40 w/ SiGel	n.a.	N.D.	110	1

The recovery for a target analyte(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary. The client was contacted and the data reported.

## Sample Comments

State of Washington Lab Certification No. C457  
Carcinogenic PAHs have been reported for this sample

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

## Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14243	SIM SVOAs 8270C MINI	SW-846 8270C SIM	1	17317WAN026	11/28/2017 14:19	Catherine E Bachman	1
10466	BNA Water Extraction SIM	SW-846 3510C	1	17317WAN026	11/14/2017 08:00	Kayla A Yuditsky	1
08274	NWTPH-Gx water C7-C12	ECY 97-602 NWTPH-Gx	1	17321A53A	11/17/2017 13:32	Brett W Kenyon	1
02102	Method 8021 Water Master	SW-846 8021B	1	17318C94A	11/16/2017 23:04	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	1	17318C94A	11/16/2017 23:04	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	2	17321A53A	11/17/2017 13:32	Brett W Kenyon	1
12917	NWTPH-Dx water w/Si Gel	ECY 97-602 NWTPH-Dx modified	1	173190030A	11/28/2017 13:06	Amy Lehr	1

**Sample Description:** MW-201-W-171108 Grab Groundwater  
Seattle Terminal  
3001 Elliott Ave - Seattle, WA

Chevron Environmental Mgmt Co  
ELLE Sample #: WW 9312918  
ELLE Group #: 1874268  
Matrix: Groundwater

**Project Name:** Seattle Terminal

Submittal Date/Time: 11/10/2017 09:40  
Collection Date/Time: 11/08/2017 10:20

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
12924	Mini-Ext. DRO DX, Column SiGel	ECY 97-602 NWTPH-Dx 06/97	1	173190030A	11/16/2017 12:30	Kayla A Yuditsky	1

**Sample Description:** MW-202-W-171108 Grab Groundwater  
Seattle Terminal  
3001 Elliott Ave - Seattle, WA

**Chevron Environmental Mgmt Co**  
**ELLE Sample #:** WW 9312919  
**ELLE Group #:** 1874268  
**Matrix:** Groundwater

**Project Name:** Seattle Terminal

**Submission Date/Time:** 11/10/2017 09:40  
**Collection Date/Time:** 11/08/2017 15:15

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit	Dilution Factor
<b>GC/MS Semivolatiles</b>		<b>SW-846 8270C SIM</b>	<b>ug/l</b>	<b>ug/l</b>	
14243	Benzo(a)anthracene	56-55-3	N.D.	0.010	1
14243	Benzo(a)pyrene	50-32-8	N.D.	0.010	1
14243	Benzo(b)fluoranthene	205-99-2	N.D.	0.010	1
14243	Benzo(k)fluoranthene	207-08-9	N.D.	0.010	1
14243	Chrysene	218-01-9	N.D.	0.010	1
14243	Dibenz(a,h)anthracene	53-70-3	0.021	0.010	1
14243	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.	0.010	1

<b>GC Volatiles</b>		<b>ECY 97-602 NWTPH-Gx</b>	<b>ug/l</b>	<b>ug/l</b>	
08274	NWTPH-Gx water C7-C12	n.a.	N.D.	50	1

<b>GC Volatiles</b>		<b>SW-846 8021B</b>	<b>ug/l</b>	<b>ug/l</b>	
02102	Benzene	71-43-2	N.D.	0.5	1
02102	Ethylbenzene	100-41-4	N.D.	0.5	1
02102	Toluene	108-88-3	N.D.	0.5	1
02102	Total Xylenes	1330-20-7	N.D.	1.5	1

<b>GC Petroleum Hydrocarbons w/Si</b>		<b>ECY 97-602 NWTPH-Dx modified</b>	<b>ug/l</b>	<b>ug/l</b>	
12917	DX DRO C12-C24 w/ SiGel	n.a.	N.D.	46	1
12917	DX HRO C24-C40 w/ SiGel	n.a.	N.D.	100	1

The recovery for a target analyte(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary. The client was contacted and the data reported.

## Sample Comments

State of Washington Lab Certification No. C457  
Carcinogenic PAHs have been reported for this sample

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

## Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14243	SIM SVOAs 8270C MINI	SW-846 8270C SIM	1	17317WAN026	11/28/2017 14:48	Catherine E Bachman	1
10466	BNA Water Extraction SIM	SW-846 3510C	1	17317WAN026	11/14/2017 08:00	Kayla A Yuditsky	1
08274	NWTPH-Gx water C7-C12	ECY 97-602 NWTPH-Gx	1	17321A53A	11/17/2017 14:00	Brett W Kenyon	1
02102	Method 8021 Water Master	SW-846 8021B	1	17318C94A	11/16/2017 23:30	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	1	17318C94A	11/16/2017 23:30	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	2	17321A53A	11/17/2017 14:00	Brett W Kenyon	1
12917	NWTPH-Dx water w/Si Gel	ECY 97-602 NWTPH-Dx modified	1	173190030A	11/28/2017 13:29	Amy Lehr	1
12924	Mini-Ext. DRO DX, Column SiGel	ECY 97-602 NWTPH-Dx 06/97	1	173190030A	11/16/2017 12:30	Kayla A Yuditsky	1

**Sample Description:** MW-203-W-171108 Grab Groundwater  
Seattle Terminal  
3001 Elliott Ave - Seattle, WA

**Chevron Environmental Mgmt Co**  
**ELLE Sample #:** WW 9312920  
**ELLE Group #:** 1874268  
**Matrix:** Groundwater

**Project Name:** Seattle Terminal

**Submittal Date/Time:** 11/10/2017 09:40  
**Collection Date/Time:** 11/08/2017 10:00

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit	Dilution Factor
<b>GC/MS Semivolatiles</b>		<b>SW-846 8270C SIM</b>	<b>ug/l</b>	<b>ug/l</b>	
14243	Benzo(a)anthracene	56-55-3	N.D.	0.010	1
14243	Benzo(a)pyrene	50-32-8	N.D.	0.010	1
14243	Benzo(b)fluoranthene	205-99-2	N.D.	0.010	1
14243	Benzo(k)fluoranthene	207-08-9	N.D.	0.010	1
14243	Chrysene	218-01-9	N.D.	0.010	1
14243	Dibenz(a,h)anthracene	53-70-3	N.D.	0.010	1
14243	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.	0.010	1

<b>GC Volatiles</b>		<b>ECY 97-602 NWTPH-Gx</b>	<b>ug/l</b>	<b>ug/l</b>	
08274	NWTPH-Gx water C7-C12	n.a.	N.D.	50	1

<b>GC Volatiles</b>		<b>SW-846 8021B</b>	<b>ug/l</b>	<b>ug/l</b>	
02102	Benzene	71-43-2	N.D.	0.5	1
02102	Ethylbenzene	100-41-4	N.D.	0.5	1
02102	Toluene	108-88-3	N.D.	0.5	1
02102	Total Xylenes	1330-20-7	N.D.	1.5	1

<b>GC Petroleum Hydrocarbons w/Si</b>		<b>ECY 97-602 NWTPH-Dx modified</b>	<b>ug/l</b>	<b>ug/l</b>	
12917	DX DRO C12-C24 w/ SiGel	n.a.	N.D.	46	1
12917	DX HRO C24-C40 w/ SiGel	n.a.	N.D.	100	1

The recovery for a target analyte(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary. The client was contacted and the data reported.

## Sample Comments

State of Washington Lab Certification No. C457  
Carcinogenic PAHs have been reported for this sample

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

## Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14243	SIM SVOAs 8270C MINI	SW-846 8270C SIM	1	17317WAN026	11/28/2017 15:16	Catherine E Bachman	1
10466	BNA Water Extraction SIM	SW-846 3510C	1	17317WAN026	11/14/2017 08:00	Kayla A Yuditsky	1
08274	NWTPH-Gx water C7-C12	ECY 97-602 NWTPH-Gx	1	17321A53A	11/17/2017 14:28	Brett W Kenyon	1
02102	Method 8021 Water Master	SW-846 8021B	1	17318C94A	11/16/2017 23:55	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	1	17318C94A	11/16/2017 23:55	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	2	17321A53A	11/17/2017 14:28	Brett W Kenyon	1
12917	NWTPH-Dx water w/Si Gel	ECY 97-602 NWTPH-Dx modified	1	173190030A	11/28/2017 13:53	Amy Lehr	1
12924	Mini-Ext. DRO DX, Column SiGel	ECY 97-602 NWTPH-Dx 06/97	1	173190030A	11/16/2017 12:30	Kayla A Yuditsky	1

**Sample Description:** MW-204-W-171108 Grab Groundwater  
Seattle Terminal  
3001 Elliott Ave - Seattle, WA

**Chevron Environmental Mgmt Co**  
**ELLE Sample #:** WW 9312921  
**ELLE Group #:** 1874268  
**Matrix:** Groundwater

**Project Name:** Seattle Terminal

**Submission Date/Time:** 11/10/2017 09:40  
**Collection Date/Time:** 11/08/2017 09:00

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit	Dilution Factor
<b>GC/MS Semivolatiles</b>		<b>SW-846 8270C SIM</b>	<b>ug/l</b>	<b>ug/l</b>	
14243	Benzo(a)anthracene	56-55-3	N.D.	0.011	1
14243	Benzo(a)pyrene	50-32-8	N.D.	0.011	1
14243	Benzo(b)fluoranthene	205-99-2	N.D.	0.011	1
14243	Benzo(k)fluoranthene	207-08-9	N.D.	0.011	1
14243	Chrysene	218-01-9	N.D.	0.011	1
14243	Dibenz(a,h)anthracene	53-70-3	N.D.	0.011	1
14243	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.	0.011	1

<b>GC Volatiles</b>		<b>ECY 97-602 NWTPH-Gx</b>	<b>ug/l</b>	<b>ug/l</b>	
08274	NWTPH-Gx water C7-C12	n.a.	1,000	50	1

<b>GC Volatiles</b>		<b>SW-846 8021B</b>	<b>ug/l</b>	<b>ug/l</b>	
02102	Benzene	71-43-2	N.D.	0.9	1
02102	Ethylbenzene	100-41-4	1.2	0.5	1
02102	Toluene	108-88-3	1.2	0.5	1
02102	Total Xylenes	1330-20-7	2.3	1.5	1

Reporting limits were raised due to interference from the sample matrix.

<b>GC Petroleum Hydrocarbons w/Si</b>		<b>ECY 97-602 NWTPH-Dx modified</b>	<b>ug/l</b>	<b>ug/l</b>	
12917	DX DRO C12-C24 w/ SiGel	n.a.	160	46	1
12917	DX HRO C24-C40 w/ SiGel	n.a.	N.D.	100	1

The recovery for a target analyte(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary. The client was contacted and the data reported.

## Sample Comments

State of Washington Lab Certification No. C457  
Carcinogenic PAHs have been reported for this sample

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

## Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14243	SIM SVOAs 8270C MINI	SW-846 8270C SIM	1	17317WAN026	11/28/2017 15:44	Catherine E Bachman	1
10466	BNA Water Extraction SIM	SW-846 3510C	1	17317WAN026	11/14/2017 08:00	Kayla A Yuditsky	1
08274	NWTPH-Gx water C7-C12	ECY 97-602 NWTPH-Gx	1	17321A53A	11/17/2017 14:55	Brett W Kenyon	1
02102	Method 8021 Water Master	SW-846 8021B	1	17318C94A	11/17/2017 00:21	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	1	17318C94A	11/17/2017 00:21	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	2	17321A53A	11/17/2017 14:55	Brett W Kenyon	1
12917	NWTPH-Dx water w/Si Gel	ECY 97-602 NWTPH-Dx modified	1	173190030A	11/28/2017 14:16	Amy Lehr	1

**Sample Description:** MW-204-W-171108 Grab Groundwater  
Seattle Terminal  
3001 Elliott Ave - Seattle, WA

Chevron Environmental Mgmt Co  
ELLE Sample #: WW 9312921  
ELLE Group #: 1874268  
Matrix: Groundwater

**Project Name:** Seattle Terminal

Submittal Date/Time: 11/10/2017 09:40  
Collection Date/Time: 11/08/2017 09:00

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
12924	Mini-Ext. DRO DX, Column SiGel	ECY 97-602 NWTPH-Dx 06/97	1	173190030A	11/16/2017 12:30	Kayla A Yuditsky	1

**Sample Description:** MW-205-W-171108 Grab Groundwater  
Seattle Terminal  
3001 Elliott Ave - Seattle, WA

**Chevron Environmental Mgmt Co**  
**ELLE Sample #:** WW 9312922  
**ELLE Group #:** 1874268  
**Matrix:** Groundwater

**Project Name:** Seattle Terminal

**Submission Date/Time:** 11/10/2017 09:40  
**Collection Date/Time:** 11/08/2017 08:45

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit	Dilution Factor
<b>GC/MS Semivolatiles</b>		<b>SW-846 8270C SIM</b>	<b>ug/l</b>	<b>ug/l</b>	
14243	Benzo(a)anthracene	56-55-3	N.D.	0.010	1
14243	Benzo(a)pyrene	50-32-8	N.D.	0.010	1
14243	Benzo(b)fluoranthene	205-99-2	N.D.	0.010	1
14243	Benzo(k)fluoranthene	207-08-9	N.D.	0.010	1
14243	Chrysene	218-01-9	N.D.	0.010	1
14243	Dibenz(a,h)anthracene	53-70-3	N.D.	0.010	1
14243	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.	0.010	1

<b>GC Volatiles</b>		<b>ECY 97-602 NWTPH-Gx</b>	<b>ug/l</b>	<b>ug/l</b>	
08274	NWTPH-Gx water C7-C12	n.a.	71	50	1

<b>GC Volatiles</b>		<b>SW-846 8021B</b>	<b>ug/l</b>	<b>ug/l</b>	
02102	Benzene	71-43-2	N.D.	0.5	1
02102	Ethylbenzene	100-41-4	N.D.	0.5	1
02102	Toluene	108-88-3	N.D.	0.5	1
02102	Total Xylenes	1330-20-7	N.D.	1.5	1

<b>GC Petroleum Hydrocarbons w/Si</b>		<b>ECY 97-602 NWTPH-Dx modified</b>	<b>ug/l</b>	<b>ug/l</b>	
12917	DX DRO C12-C24 w/ SiGel	n.a.	N.D.	46	1
12917	DX HRO C24-C40 w/ SiGel	n.a.	N.D.	100	1

The recovery for a target analyte(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary. The client was contacted and the data reported.

### Sample Comments

State of Washington Lab Certification No. C457  
Carcinogenic PAHs have been reported for this sample

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14243	SIM SVOAs 8270C MINI	SW-846 8270C SIM	1	17317WAN026	11/28/2017 16:13	Catherine E Bachman	1
10466	BNA Water Extraction SIM	SW-846 3510C	1	17317WAN026	11/14/2017 08:00	Kayla A Yuditsky	1
08274	NWTPH-Gx water C7-C12	ECY 97-602 NWTPH-Gx	1	17321A53A	11/17/2017 15:23	Brett W Kenyon	1
02102	Method 8021 Water Master	SW-846 8021B	1	17318C94A	11/17/2017 00:47	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	1	17318C94A	11/17/2017 00:47	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	2	17321A53A	11/17/2017 15:23	Brett W Kenyon	1
12917	NWTPH-Dx water w/Si Gel	ECY 97-602 NWTPH-Dx modified	1	173190030A	11/28/2017 14:40	Amy Lehr	1
12924	Mini-Ext. DRO DX, Column SiGel	ECY 97-602 NWTPH-Dx 06/97	1	173190030A	11/16/2017 12:30	Kayla A Yuditsky	1

**Sample Description:** MW-206-W-171108 Grab Groundwater  
Seattle Terminal  
3001 Elliott Ave - Seattle, WA

**Chevron Environmental Mgmt Co**  
**ELLE Sample #:** WW 9312923  
**ELLE Group #:** 1874268  
**Matrix:** Groundwater

**Project Name:** Seattle Terminal

**Submission Date/Time:** 11/10/2017 09:40  
**Collection Date/Time:** 11/08/2017 14:50

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit	Dilution Factor
<b>GC/MS Semivolatiles</b>		<b>SW-846 8270C SIM</b>	<b>ug/l</b>	<b>ug/l</b>	
14243	Benzo(a)anthracene	56-55-3	N.D.	0.010	1
14243	Benzo(a)pyrene	50-32-8	N.D.	0.010	1
14243	Benzo(b)fluoranthene	205-99-2	N.D.	0.010	1
14243	Benzo(k)fluoranthene	207-08-9	N.D.	0.010	1
14243	Chrysene	218-01-9	N.D.	0.010	1
14243	Dibenz(a,h)anthracene	53-70-3	N.D.	0.010	1
14243	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.	0.010	1

<b>GC Volatiles</b>		<b>ECY 97-602 NWTPH-Gx</b>	<b>ug/l</b>	<b>ug/l</b>	
08274	NWTPH-Gx water C7-C12	n.a.	N.D.	50	1

<b>GC Volatiles</b>		<b>SW-846 8021B</b>	<b>ug/l</b>	<b>ug/l</b>	
02102	Benzene	71-43-2	N.D.	0.5	1
02102	Ethylbenzene	100-41-4	N.D.	0.5	1
02102	Toluene	108-88-3	N.D.	0.5	1
02102	Total Xylenes	1330-20-7	N.D.	1.5	1

<b>GC Petroleum Hydrocarbons w/Si</b>		<b>ECY 97-602 NWTPH-Dx modified</b>	<b>ug/l</b>	<b>ug/l</b>	
12917	DX DRO C12-C24 w/ SiGel	n.a.	N.D.	48	1
12917	DX HRO C24-C40 w/ SiGel	n.a.	N.D.	110	1

The recovery for the sample surrogate(s) is outside the QC acceptance limits as noted on the QC Summary.  
The recovery for a target analyte(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary. The client was contacted and the data reported.

## Sample Comments

State of Washington Lab Certification No. C457  
Carcinogenic PAHs have been reported for this sample

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

## Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14243	SIM SVOAs 8270C MINI	SW-846 8270C SIM	1	17317WAN026	11/28/2017 16:41	Catherine E Bachman	1
10466	BNA Water Extraction SIM	SW-846 3510C	1	17317WAN026	11/14/2017 08:00	Kayla A Yuditsky	1
08274	NWTPH-Gx water C7-C12	ECY 97-602 NWTPH-Gx	1	17321A53A	11/17/2017 15:50	Brett W Kenyon	1
02102	Method 8021 Water Master	SW-846 8021B	1	17318C94A	11/17/2017 01:12	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	1	17318C94A	11/17/2017 01:12	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	2	17321A53A	11/17/2017 15:50	Brett W Kenyon	1
12917	NWTPH-Dx water w/Si Gel	ECY 97-602 NWTPH-Dx modified	1	173190030A	11/28/2017 15:03	Amy Lehr	1

**Sample Description:** MW-206-W-171108 Grab Groundwater  
Seattle Terminal  
3001 Elliott Ave - Seattle, WA

Chevron Environmental Mgmt Co  
ELLE Sample #: WW 9312923  
ELLE Group #: 1874268  
Matrix: Groundwater

**Project Name:** Seattle Terminal

Submittal Date/Time: 11/10/2017 09:40  
Collection Date/Time: 11/08/2017 14:50

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
12924	Mini-Ext. DRO DX, Column SiGel	ECY 97-602 NWTPH-Dx 06/97	1	173190030A	11/16/2017 12:30	Kayla A Yuditsky	1

**Sample Description:** MW-207-W-171108 Grab Groundwater  
Seattle Terminal  
3001 Elliott Ave - Seattle, WA

**Chevron Environmental Mgmt Co**  
**ELLE Sample #:** WW 9312924  
**ELLE Group #:** 1874268  
**Matrix:** Groundwater

**Project Name:** Seattle Terminal

**Submission Date/Time:** 11/10/2017 09:40  
**Collection Date/Time:** 11/08/2017 14:05

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit	Dilution Factor
<b>GC/MS Semivolatiles</b>		<b>SW-846 8270C SIM</b>	<b>ug/l</b>	<b>ug/l</b>	
14243	Benzo(a)anthracene	56-55-3	N.D.	0.010	1
14243	Benzo(a)pyrene	50-32-8	N.D.	0.010	1
14243	Benzo(b)fluoranthene	205-99-2	N.D.	0.010	1
14243	Benzo(k)fluoranthene	207-08-9	N.D.	0.010	1
14243	Chrysene	218-01-9	N.D.	0.010	1
14243	Dibenz(a,h)anthracene	53-70-3	N.D.	0.010	1
14243	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.	0.010	1

<b>GC Volatiles</b>		<b>ECY 97-602 NWTPH-Gx</b>	<b>ug/l</b>	<b>ug/l</b>	
08274	NWTPH-Gx water C7-C12	n.a.	N.D.	50	1

<b>GC Volatiles</b>		<b>SW-846 8021B</b>	<b>ug/l</b>	<b>ug/l</b>	
02102	Benzene	71-43-2	N.D.	0.5	1
02102	Ethylbenzene	100-41-4	N.D.	0.5	1
02102	Toluene	108-88-3	N.D.	0.5	1
02102	Total Xylenes	1330-20-7	N.D.	1.5	1

<b>GC Petroleum Hydrocarbons w/Si</b>		<b>ECY 97-602 NWTPH-Dx modified</b>	<b>ug/l</b>	<b>ug/l</b>	
12917	DX DRO C12-C24 w/ SiGel	n.a.	N.D.	46	1
12917	DX HRO C24-C40 w/ SiGel	n.a.	N.D.	100	1

The recovery for a target analyte(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary. The client was contacted and the data reported.

## Sample Comments

State of Washington Lab Certification No. C457  
Carcinogenic PAHs have been reported for this sample

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

## Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14243	SIM SVOAs 8270C MINI	SW-846 8270C SIM	1	17317WAN026	11/28/2017 17:10	Catherine E Bachman	1
10466	BNA Water Extraction SIM	SW-846 3510C	1	17317WAN026	11/14/2017 08:00	Kayla A Yuditsky	1
08274	NWTPH-Gx water C7-C12	ECY 97-602 NWTPH-Gx	1	17321A53A	11/17/2017 16:18	Brett W Kenyon	1
02102	Method 8021 Water Master	SW-846 8021B	1	17318C94A	11/17/2017 01:38	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	1	17318C94A	11/17/2017 01:38	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	2	17321A53A	11/17/2017 16:18	Brett W Kenyon	1
12917	NWTPH-Dx water w/Si Gel	ECY 97-602 NWTPH-Dx modified	1	173190030A	11/28/2017 15:26	Amy Lehr	1
12924	Mini-Ext. DRO DX, Column SiGel	ECY 97-602 NWTPH-Dx 06/97	1	173190030A	11/16/2017 12:30	Kayla A Yuditsky	1

**Sample Description:** DUP-1-WD-171108 Grab Groundwater  
Seattle Terminal  
3001 Elliott Ave - Seattle, WA

**Chevron Environmental Mgmt Co**  
**ELLE Sample #:** WW 9312925  
**ELLE Group #:** 1874268  
**Matrix:** Groundwater

**Project Name:** Seattle Terminal

**Submittal Date/Time:** 11/10/2017 09:40  
**Collection Date/Time:** 11/08/2017

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit	Dilution Factor
<b>GC/MS Semivolatiles</b>		<b>SW-846 8270C SIM</b>	<b>ug/l</b>	<b>ug/l</b>	
14243	Benzo(a)anthracene	56-55-3	N.D.	0.010	1
14243	Benzo(a)pyrene	50-32-8	N.D.	0.010	1
14243	Benzo(b)fluoranthene	205-99-2	N.D.	0.010	1
14243	Benzo(k)fluoranthene	207-08-9	N.D.	0.010	1
14243	Chrysene	218-01-9	N.D.	0.010	1
14243	Dibenz(a,h)anthracene	53-70-3	N.D.	0.010	1
14243	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.	0.010	1

<b>GC Volatiles</b>		<b>ECY 97-602 NWTPH-Gx</b>	<b>ug/l</b>	<b>ug/l</b>	
08274	NWTPH-Gx water C7-C12	n.a.	N.D.	50	1

<b>GC Volatiles</b>		<b>SW-846 8021B</b>	<b>ug/l</b>	<b>ug/l</b>	
02102	Benzene	71-43-2	N.D.	0.5	1
02102	Ethylbenzene	100-41-4	N.D.	0.5	1
02102	Toluene	108-88-3	N.D.	0.5	1
02102	Total Xylenes	1330-20-7	N.D.	1.5	1

<b>GC Petroleum Hydrocarbons w/Si</b>		<b>ECY 97-602 NWTPH-Dx modified</b>	<b>ug/l</b>	<b>ug/l</b>	
12917	DX DRO C12-C24 w/ SiGel	n.a.	N.D.	46	1
12917	DX HRO C24-C40 w/ SiGel	n.a.	N.D.	100	1

The recovery for a target analyte(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary. The client was contacted and the data reported.

### Sample Comments

State of Washington Lab Certification No. C457  
Carcinogenic PAHs have been reported for this sample

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14243	SIM SVOAs 8270C MINI	SW-846 8270C SIM	1	17318WAN026	11/29/2017 17:06	Kira N Klaassen	1
10466	BNA Water Extraction SIM	SW-846 3510C	1	17318WAN026	11/15/2017 08:00	Oswaldo R Sanchez	1
08274	NWTPH-Gx water C7-C12	ECY 97-602 NWTPH-Gx	1	17321A53A	11/17/2017 16:46	Brett W Kenyon	1
02102	Method 8021 Water Master	SW-846 8021B	1	17318C94A	11/17/2017 02:04	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	1	17318C94A	11/17/2017 02:04	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	2	17321A53A	11/17/2017 16:46	Brett W Kenyon	1
12917	NWTPH-Dx water w/Si Gel	ECY 97-602 NWTPH-Dx modified	1	173190030A	11/28/2017 15:50	Amy Lehr	1
12924	Mini-Ext. DRO DX, Column SiGel	ECY 97-602 NWTPH-Dx 06/97	1	173190030A	11/16/2017 12:30	Kayla A Yuditsky	1

**Sample Description:** Trip Blank-T-171108 NA Water  
Seattle Terminal  
3001 Elliott Ave - Seattle, WA

**Chevron Environmental Mgmt Co**  
**ELLE Sample #:** WW 9312926  
**ELLE Group #:** 1874268  
**Matrix:** Water

**Project Name:** Seattle Terminal

**Submission Date/Time:** 11/10/2017 09:40  
**Collection Date/Time:** 11/08/2017

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit	Dilution Factor
<b>GC Volatiles</b>					
		<b>ECY 97-602 NWT PH-Gx</b>	<b>ug/l</b>	<b>ug/l</b>	
08274	NWT PH-Gx water C7-C12	n.a.	N.D.	50	1
<b>GC Volatiles</b>					
		<b>SW-846 8021B</b>	<b>ug/l</b>	<b>ug/l</b>	
02102	Benzene	71-43-2	N.D.	0.5	1
02102	Ethylbenzene	100-41-4	N.D.	0.5	1
02102	Toluene	108-88-3	N.D.	0.5	1
02102	Total Xylenes	1330-20-7	N.D.	1.5	1

### Sample Comments

State of Washington Lab Certification No. C457

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
08274	NWT PH-Gx water C7-C12	ECY 97-602 NWT PH-Gx	1	17318C94A	11/16/2017 15:22	Brett W Kenyon	1
02102	Method 8021 Water Master	SW-846 8021B	1	17318C94A	11/16/2017 15:22	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	1	17318C94A	11/16/2017 15:22	Brett W Kenyon	1

## Quality Control Summary

Client Name: Chevron Environmental Mgmt Co  
Reported: 12/04/2017 08:58

Group Number: 1874268

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

### Method Blank

Analysis Name	Result ug/l	MDL ug/l
Batch number: 17317WAN026	Sample number(s): 9312916-9312924	
Benzo(a)anthracene	N.D.	0.010
Benzo(a)pyrene	N.D.	0.010
Benzo(b)fluoranthene	N.D.	0.010
Benzo(k)fluoranthene	N.D.	0.010
Chrysene	N.D.	0.010
Dibenz(a,h)anthracene	N.D.	0.010
Indeno(1,2,3-cd)pyrene	N.D.	0.010
Batch number: 17318WAN026	Sample number(s): 9312925	
Benzo(a)anthracene	N.D.	0.010
Benzo(a)pyrene	N.D.	0.010
Benzo(b)fluoranthene	N.D.	0.010
Benzo(k)fluoranthene	N.D.	0.010
Chrysene	N.D.	0.010
Dibenz(a,h)anthracene	N.D.	0.010
Indeno(1,2,3-cd)pyrene	N.D.	0.010
Batch number: 17318C94A	Sample number(s): 9312915-9312926	
Benzene	N.D.	0.2
Ethylbenzene	N.D.	0.2
NWTPH-Gx water C7-C12	N.D.	50
Toluene	N.D.	0.2
Total Xylenes	N.D.	0.2
Batch number: 17321A53A	Sample number(s): 9312916-9312925	
NWTPH-Gx water C7-C12	N.D.	50
Batch number: 173170062A	Sample number(s): 9312915-9312917	
DX DRO C12-C24 w/ SiGel	N.D.	45
DX HRO C24-C40 w/ SiGel	N.D.	100
Batch number: 173190030A	Sample number(s): 9312918-9312925	
DX DRO C12-C24 w/ SiGel	N.D.	45
DX HRO C24-C40 w/ SiGel	N.D.	100

### LCS/LCSD

\*- Outside of specification

- (1) The result for one or both determinations was less than five times the LOQ.
- (2) The unspiked result was more than four times the spike added.

P##### is indicative of a Background or Unspiked sample that is batch matrix QC and was not performed using a sample from this submission group.

## Quality Control Summary

Client Name: Chevron Environmental Mgmt Co  
Reported: 12/04/2017 08:58

Group Number: 1874268

### LCS/LCSD

Analysis Name	LCS Spike Added ug/l	LCS Conc ug/l	LCSD Spike Added ug/l	LCSD Conc ug/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 17317WAN026	Sample number(s): 9312916-9312924								
Benzo(a)anthracene	1.00	1.06	1.00	1.02	106	102	75-119	4	30
Benzo(a)pyrene	1.00	0.984	1.00	0.969	98	97	75-115	1	30
Benzo(b)fluoranthene	1.00	1.03	1.00	1.01	103	101	75-120	2	30
Benzo(k)fluoranthene	1.00	0.995	1.00	0.993	99	99	71-118	0	30
Chrysene	1.00	0.952	1.00	0.926	95	93	73-111	3	30
Dibenz(a,h)anthracene	1.00	1.01	1.00	0.996	101	100	62-122	1	30
Indeno(1,2,3-cd)pyrene	1.00	1.04	1.00	1.03	104	103	64-117	1	30
Batch number: 17318WAN026	Sample number(s): 9312925								
Benzo(a)anthracene	1.00	0.896	1.00	0.863	90	86	75-119	4	30
Benzo(a)pyrene	1.00	0.851	1.00	0.848	85	85	75-115	0	30
Benzo(b)fluoranthene	1.00	0.880	1.00	0.903	88	90	75-120	3	30
Benzo(k)fluoranthene	1.00	0.890	1.00	0.858	89	86	71-118	4	30
Chrysene	1.00	0.853	1.00	0.829	85	83	73-111	3	30
Dibenz(a,h)anthracene	1.00	1.09	1.00	0.958	109	96	62-122	12	30
Indeno(1,2,3-cd)pyrene	1.00	0.974	1.00	0.904	97	90	64-117	7	30
	ug/l	ug/l	ug/l	ug/l					
Batch number: 17318C94A	Sample number(s): 9312915-9312926								
Benzene	20	20.1			100		80-120		
Ethylbenzene	20.1	19.32			96		80-120		
NWTPH-Gx water C7-C12	1100	1164.31			106		80-120		
Toluene	20.1	19.46			97		80-120		
Total Xylenes	60.2	59.61			99		80-120		
Batch number: 17321A53A	Sample number(s): 9312916-9312925								
NWTPH-Gx water C7-C12	1100	1034.27	1100	1100.81	94	100	80-120	6	30
	ug/l	ug/l	ug/l	ug/l					
Batch number: 173170062A	Sample number(s): 9312915-9312917								
DX DRO C12-C24 w/ SiGel	600	246.99	600	250.69	41	42	30-115	1	20
Batch number: 173190030A	Sample number(s): 9312918-9312925								
DX DRO C12-C24 w/ SiGel	600	465.86	600	132.79	78	22*	30-115	111*	20

### MS/MSD

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike

Analysis Name	Unspiked Conc ug/l	MS Spike Added ug/l	MS Conc ug/l	MSD Spike Added ug/l	MSD Conc ug/l	MS %Rec	MSD %Rec	MS/MSD Limits	RPD	RPD Max
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\*- Outside of specification

(1) The result for one or both determinations was less than five times the LOQ.

(2) The unspiked result was more than four times the spike added.

P##### is indicative of a Background or Unspiked sample that is batch matrix QC and was not performed using a sample from this submission group.

## Quality Control Summary

Client Name: Chevron Environmental Mgmt Co  
Reported: 12/04/2017 08:58

Group Number: 1874268

### MS/MSD

Unspiked (UNSPK) = the sample used in conjunction with the matrix spike

Analysis Name	Unspiked Conc ug/l	MS Spike Added ug/l	MS Conc ug/l	MSD Spike Added ug/l	MSD Conc ug/l	MS %Rec	MSD %Rec	MS/MSD Limits	RPD	RPD Max
Batch number: 17318C94A	Sample number(s): 9312915-9312926 UNSPK: P306618, P306620									
Benzene	N.D.	20	22.94	20	22.55	115	113	80-120	2	30
Ethylbenzene	N.D.	20.1	21.58	20.1	21.3	107	106	80-120	1	30
NWTPH-Gx water C7-C12	N.D.	1100	1255.11	1100	1247.54	114	113	80-120	1	30
Toluene	N.D.	20.1	22.02	20.1	21.61	110	108	80-120	2	30
Total Xylenes	N.D.	60.2	66.27	60.2	65.37	110	109	80-120	1	30

### Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report. For dual column analyses, the surrogate (at least one surrogate for multi-surrogate tests) must be within the acceptance limits on at least one of the two columns.

Analysis Name: SIM SVOAs 8270C MINI  
Batch number: 17317WAN026

	Fluoranthene-d10	Benzo(a)pyrene-d12	1-Methylnaphthalene-d10
9312916	79	52	72
9312917	90	88	74
9312918	81	76	69
9312919	82	46	74
9312920	87	57	71
9312921	90	79	79
9312922	91	77	70
9312923	89	35	73
9312924	90	41	75
Blank	86	88	76
LCS	87	92	78
LCSD	87	90	77
Limits:	44-115	25-125	33-112

Analysis Name: SIM SVOAs 8270C MINI  
Batch number: 17318WAN026

	Fluoranthene-d10	Benzo(a)pyrene-d12	1-Methylnaphthalene-d10
9312925	84	50	74
Blank	85	75	82
LCS	88	85	90
LCSD	84	84	90

\*- Outside of specification

- (1) The result for one or both determinations was less than five times the LOQ.
- (2) The unspiked result was more than four times the spike added.

P##### is indicative of a Background or Unspiked sample that is batch matrix QC and was not performed using a sample from this submission group.

## Quality Control Summary

Client Name: Chevron Environmental Mgmt Co  
Reported: 12/04/2017 08:58

Group Number: 1874268

### Surrogate Quality Control (continued)

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report. For dual column analyses, the surrogate (at least one surrogate for multi-surrogate tests) must be within the acceptance limits on at least one of the two columns.

Analysis Name: SIM SVOAs 8270C MINI  
Batch number: 17318WAN026

Limits: 44-115 25-125 33-112

Analysis Name: Method 8021 Water Master  
Batch number: 17318C94A

	Trifluorotoluene-P	Trifluorotoluene-F
9312915	84	75
9312916	83	
9312917	84	
9312918	97	
9312919	84	
9312920	83	
9312921	76	
9312922	83	
9312923	84	
9312924	85	
9312925	85	
9312926	85	87
Blank	84	75
LCS	82	85
MS	82	84
MSD	83	82

Limits: 51-120 63-135

Analysis Name: NWTPH-Gx water C7-C12  
Batch number: 17321A53A

	Trifluorotoluene-F
9312916	114
9312917	100
9312918	111
9312919	92
9312920	90
9312921	92
9312922	90
9312923	119
9312924	114
9312925	121
Blank	94
LCS	105
LCSD	107

\*- Outside of specification

- (1) The result for one or both determinations was less than five times the LOQ.
- (2) The unspiked result was more than four times the spike added.

P##### is indicative of a Background or Unspiked sample that is batch matrix QC and was not performed using a sample from this submission group.

## Quality Control Summary

Client Name: Chevron Environmental Mgmt Co  
Reported: 12/04/2017 08:58

Group Number: 1874268

### Surrogate Quality Control (continued)

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report. For dual column analyses, the surrogate (at least one surrogate for multi-surrogate tests) must be within the acceptance limits on at least one of the two columns.

Analysis Name: NWTPH-Gx water C7-C12  
Batch number: 17321A53A

Limits: 63-135

Analysis Name: NWTPH-Dx water w/Si Gel  
Batch number: 173170062A

	Orthoterphenyl	Capric Acid
9312915	64	0
9312916	68	0
9312917	80	0
Blank	69	0
LCS	71	0
LCSD	75	0

Limits: 50-150 0-1

Analysis Name: NWTPH-Dx water w/Si Gel  
Batch number: 173190030A

	Orthoterphenyl	Capric Acid
9312918	82	0
9312919	83	0
9312920	85	0
9312921	78	0
9312922	74	0
9312923	41*	0
9312924	86	0
9312925	68	0
Blank	81	0
LCS	82	0
LCSD	66	0

Limits: 50-150 0-1

\*- Outside of specification

- (1) The result for one or both determinations was less than five times the LOQ.
- (2) The unspiked result was more than four times the spike added.

P##### is indicative of a Background or Unspiked sample that is batch matrix QC and was not performed using a sample from this submission group.

# Chevron Northwest Region Analysis Request/Chain of Custody



**Lancaster Laboratories Environmental**

Acct. # 11904

For Eurofins Lancaster Laboratories Environmental use only  
 Group # 1874208 Sample # 9310915-26  
 Instructions on reverse side correspond with circled numbers.

1 Client Information			4 Matrix			5 Analyses Requested										6 Remarks			
Facility # <u>Seattle Terminal</u> WBS <u>NWENV-PM001400302</u> Site Address <u>3001 Elliott Ave, Seattle, WA 98121</u> Chevron PM <u>Kim Jolitz</u> Lead Consultant <u>Rebecca Andresen</u> Consultant/Office <u>1100 Olive Way, Suite 800, Seattle, WA 98101</u> Consultant Project Mgr. <u>Rebecca Andresen</u> Consultant Phone # <u>(509) 438-9828</u> Sampler <u>Ryan Brauchla (RB) / Eric Koueger (EK)</u>			<input type="checkbox"/> Sediment <input checked="" type="checkbox"/> Ground <input type="checkbox"/> Surface <input type="checkbox"/> Potable <input type="checkbox"/> NPDES <input type="checkbox"/> Air <input type="checkbox"/> Soil <input type="checkbox"/> Water <input type="checkbox"/> Oil			Total Number of Containers BTEX + MTBE <input checked="" type="checkbox"/> 8021 <input checked="" type="checkbox"/> 8260 <input type="checkbox"/> Naphth 8260 full scan Oxygenates NWTPH-Gx NWTPH-Dx with Silica Gel Cleanup <input checked="" type="checkbox"/> NWTPH-Dx without Silica Gel Cleanup <input type="checkbox"/> WA VPH <input type="checkbox"/> WA EPH <input type="checkbox"/> Lead Total <input type="checkbox"/> Diss. <input type="checkbox"/> Method CPAHS by <u>8270C</u>										SCR #: _____ <input type="checkbox"/> Results in Dry Weight <input type="checkbox"/> J value reporting needed <input type="checkbox"/> Must meet lowest detection limits possible for 8260 compounds <input type="checkbox"/> 8021 MTBE Confirmation <input type="checkbox"/> Confirm MTBE + Naphthalene <input type="checkbox"/> Confirm highest hit by 8260 <input type="checkbox"/> Confirm all hits by 8260 <input type="checkbox"/> Run _____ oxy's on highest hit <input type="checkbox"/> Run _____ oxy's on all hits			
2 Sample Identification		3 Collected		Grab	Composite											6			
Date	Time											9							
<u>MW-30</u>	<u>11/8/17</u>	<u>1245</u>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>		<u>5</u>	<input checked="" type="checkbox"/>											
<u>MW-70R</u>		<u>1335</u>					<u>7</u>	<input checked="" type="checkbox"/>											
<u>MW-200</u>		<u>1145</u>					<u>7</u>	<input checked="" type="checkbox"/>											
<u>MW-201</u>		<u>1020</u>					<u>7</u>	<input checked="" type="checkbox"/>											
<u>MW-202</u>		<u>1515</u>					<u>7</u>	<input checked="" type="checkbox"/>											
<u>MW-203</u>		<u>1000</u>					<u>7</u>	<input checked="" type="checkbox"/>											
<u>MW-204</u>		<u>0900</u>					<u>7</u>	<input checked="" type="checkbox"/>											
<u>MW-205</u>		<u>0845</u>					<u>7</u>	<input checked="" type="checkbox"/>											
<u>MW-206</u>		<u>1450</u>					<u>7</u>	<input checked="" type="checkbox"/>											
<u>MW-207</u>		<u>1405</u>					<u>7</u>	<input checked="" type="checkbox"/>											
<u>DUP-1</u>		<u>---</u>					<u>7</u>	<input checked="" type="checkbox"/>											
<u>Trip Blank</u>		<u>---</u>					<u>2</u>	<input checked="" type="checkbox"/>											
7 Turnaround Time Requested (TAT) (please circle)				Relinquished by <u>[Signature]</u>		Date <u>11/9/17</u>	Time <u>1100</u>	Received by <u>FEDEX</u>		Date <u>11/9/17</u>	Time <u>1100</u>	9							
<input checked="" type="checkbox"/> Standard 5 day 4 day <input type="checkbox"/> 72 hour 48 hour 24 hour				Relinquished by _____		Date _____	Time _____	Received by _____		Date _____	Time _____								
8 Data Package (circle if required)		EDD (circle if required)		Relinquished by Commercial Carrier:				Received by <u>[Signature]</u>		Date <u>11/10/17</u>	Time <u>940</u>								
<input checked="" type="checkbox"/> Type I - Full		<input type="checkbox"/> CVX-RTBU-FI_05 (default)		UPS _____ FedEx <input checked="" type="checkbox"/> Other _____				Custody Seals Intact?		<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No								
<input type="checkbox"/> Type VI (Raw Data)		Other: _____		Temperature Upon Receipt <u>15-1.9 °C</u>															



Client: Arcadis

**Delivery and Receipt Information**

Delivery Method:	<u>Fed Ex</u>	Arrival Timestamp:	<u>11/10/2017 9:40</u>
Number of Packages:	<u>2</u>	Number of Projects:	<u>1</u>
State/Province of Origin:	<u>WA</u>		

**Arrival Condition Summary**

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	Yes	Sample Date/Times match COC:	Yes
Custody Seal Intact:	Yes	VOA Vial Headspace $\geq$ 6mm:	No
Samples Chilled:	Yes	Total Trip Blank Qty:	2
Paperwork Enclosed:	Yes	Trip Blank Type:	HCI
Samples Intact:	Yes	Air Quality Samples Present:	No
Missing Samples:	No		
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

*Unpacked by Simon Nies (25112) at 14:47 on 11/10/2017*

**Samples Chilled Details**

Thermometer Types: DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) All Temperatures in °C.

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT42-02	1.5	DT	Wet	Y	Bagged	N
2	DT42-02	1.9	DT	Wet	Y	Bagged	N

# Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

<b>BMQL</b>	Below Minimum Quantitation Level	<b>mg</b>	milligram(s)
<b>C</b>	degrees Celsius	<b>mL</b>	milliliter(s)
<b>cfu</b>	colony forming units	<b>MPN</b>	Most Probable Number
<b>CP Units</b>	cobalt-chloroplatinate units	<b>N.D.</b>	non-detect
<b>F</b>	degrees Fahrenheit	<b>ng</b>	nanogram(s)
<b>g</b>	gram(s)	<b>NTU</b>	nephelometric turbidity units
<b>IU</b>	International Units	<b>pg/L</b>	picogram/liter
<b>kg</b>	kilogram(s)	<b>RL</b>	Reporting Limit
<b>L</b>	liter(s)	<b>TNTC</b>	Too Numerous To Count
<b>lb.</b>	pound(s)	<b>µg</b>	microgram(s)
<b>m3</b>	cubic meter(s)	<b>µL</b>	microliter(s)
<b>meq</b>	milliequivalents	<b>umhos/cm</b>	micromhos/cm
<b>&lt;</b>	less than		
<b>&gt;</b>	greater than		
<b>ppm</b>	parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.		
<b>ppb</b>	parts per billion		
<b>Dry weight basis</b>	Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.		

**Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.**

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

This report shall not be reproduced except in full, without the written approval of the laboratory.

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as "analyze immediately" are not performed within 15 minutes.

**WARRANTY AND LIMITS OF LIABILITY** - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL, LLC BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL AND (B) WHETHER EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Eurofins Lancaster Laboratories Environmental which includes any conditions that vary from the Standard Terms and Conditions, and Eurofins Lancaster Laboratories Environmental hereby objects to any conflicting terms contained in any acceptance or order submitted by client.

# Data Qualifiers

Qualifier	Definition
C	Result confirmed by reanalysis
D1	Indicates for dual column analyses that the result is reported from column 1
D2	Indicates for dual column analyses that the result is reported from column 2
E	Concentration exceeds the calibration range
J (or G, I, X)	Estimated value $\geq$ the Method Detection Limit (MDL or DL) and $<$ the Limit of Quantitation (LOQ or RL)
P	Concentration difference between the primary and confirmation column $>40\%$ . The lower result is reported.
U	Analyte was not detected at the value indicated
V	Concentration difference between the primary and confirmation column $>100\%$ . The reporting limit is raised due to this disparity and evident interference.
W	The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.
Z	Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods. Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.

# APPENDIX F

## Data Validation Report



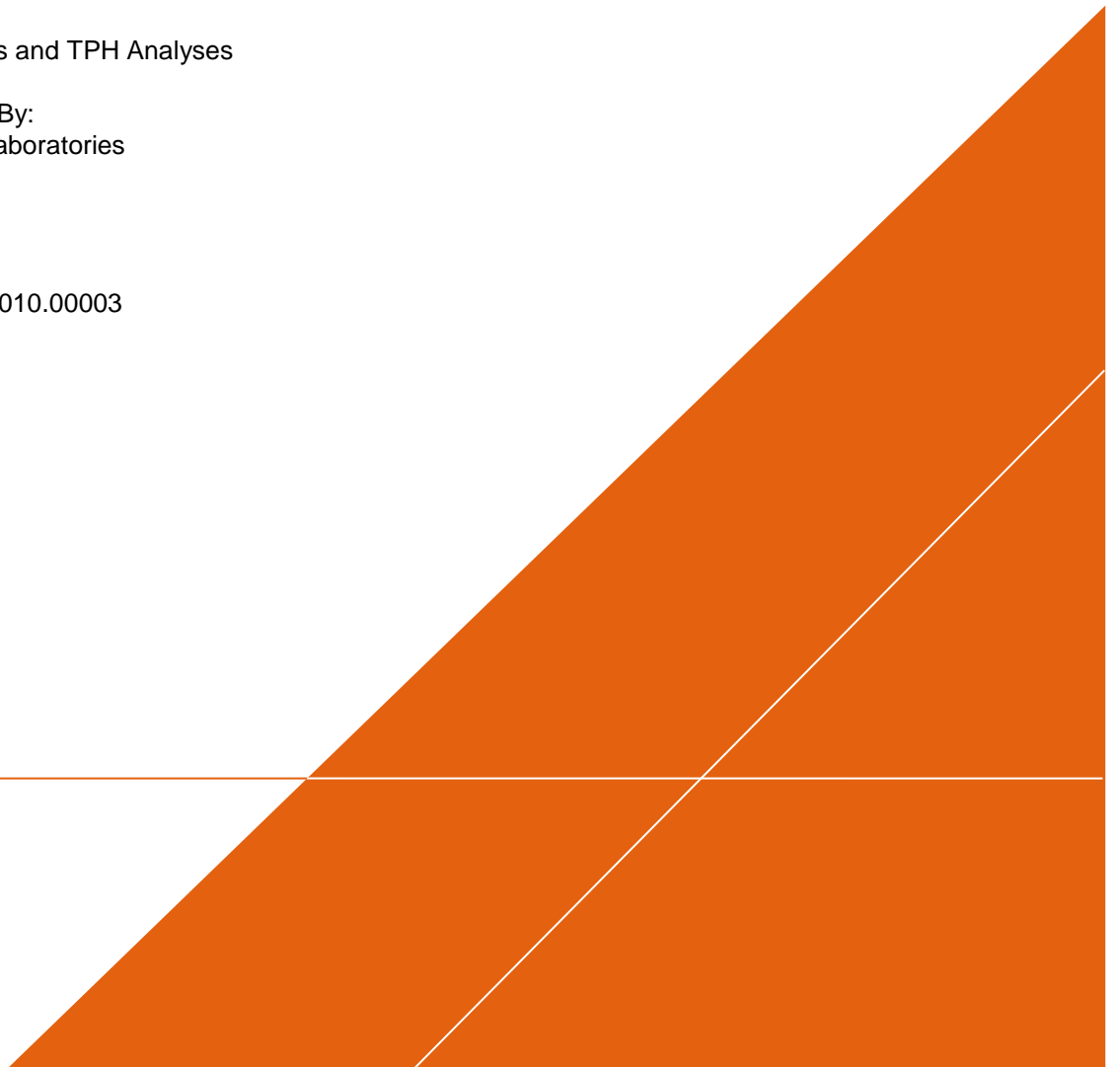
Chevron Environmental Mgmt. Company

## DATA REVIEW

### Seattle Terminal

Volatile, Semivolatiles and TPH Analyses  
SDG #: 1874268  
Analyses Performed By:  
Eurofins Lancaster Laboratories  
Lancaster, PA

Report #29198R  
Review Level: Tier II  
Project: B0045363.0010.00003



## DATA REVIEW REPORT

### SUMMARY

This data quality assessment summarizes the review of Sample Delivery Group (SDG) #s 1874268 for samples collected in association with the Chevron Seattle Terminal. The review was conducted as a Tier II evaluation and included review of data package completeness. Only analytical data associated with constituents of concern were reviewed for this validation. Field documentation was not included in this review. Included with this assessment are the validation annotated sample result sheets, and chain of custody. Analyses were performed on the following samples:

Sample ID	Lab ID	Matrix	Sample Collection Date	Parent Sample	Analysis				
					VOC	SVOC	TPH	MET	MISC
MW-30-W-1711108	9312915	Water	11/08/17		X		X		
MW-70R-W-1711108	9312916	Water	11/08/17		X	X	X		
MW-200-W-1711108	9312917	Water	11/08/17		X	X	X		
MW-201-W-1711108	9312918	Water	11/08/17		X	X	X		
MW-202-W-1711108	9312919	Water	11/08/17		X	X	X		
MW-203-W-1711108	9312920	Water	11/08/17		X	X	X		
MW-204-W-1711108	9312921	Water	11/08/17		X	X	X		
MW-205-W-1711108	9312922	Water	11/08/17		X	X	X		
MW-206-W-1711108	9312923	Water	11/08/17		X	X	X		
MW-207-W-1711108	9312924	Water	11/08/17		X	X	X		
DUP-1-WD-1711108	9312925	Water	11/08/17	MW-207-W-1711108	X	X	X		
Trip Blank-T-1711108	9312926	Water	11/08/17		X		X		

## DATA REVIEW REPORT

### ANALYTICAL DATA PACKAGE DOCUMENTATION

The table below is the evaluation of the data package completeness.

Items Reviewed	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
1. Sample receipt condition		X		X	
2. Requested analyses and sample results		X		X	
3. Master tracking list		X		X	
4. Methods of analysis		X		X	
5. Reporting limits		X		X	
6. Sample collection date		X		X	
7. Laboratory sample received date		X		X	
8. Sample preservation verification (as applicable)		X		X	
9. Sample preparation/extraction/analysis dates		X		X	
10. Fully executed Chain-of-Custody (COC) form		X		X	
11. Narrative summary of QA or sample problems provided		X		X	
12. Data Package Completeness and Compliance		X		X	

Note:

QA - Quality Assurance

## DATA REVIEW REPORT

### ORGANIC ANALYSIS INTRODUCTION

Analyses were performed according to United States Environmental Protection Agency (USEPA) SW-846 Method 8021B, 8270 (SIM) and ECY 97-602. Data were reviewed in accordance with USEPA National Functional Guidelines of October 1999.

The data review process is an evaluation of data on a technical basis rather than a determination of contract compliance. As such, the standards against which the data are being weighed may differ from those specified in the analytical method. It is assumed that the data package represents the best efforts of the laboratory and had already been subjected to adequate and sufficient quality review prior to submission.

During the review process, laboratory qualified and unqualified data are verified against the supporting documentation. Based on this evaluation, qualifier codes may be added, deleted, or modified by the data reviewer. Results are qualified with the following codes in accordance with USEPA National Functional

#### Guidelines:

- Concentration (C) Qualifiers
  - U The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
  - B The compound has been found in the sample as well as its associated blank, its presence in the sample may be suspect.
- Quantitation (Q) Qualifiers
  - E The compound was quantitated above the calibration range.
  - D Concentration is based on a diluted sample analysis.
- Validation Qualifiers
  - J The compound was positively identified; however, the associated numerical value is an estimated concentration only.
  - UJ The compound was not detected above the reported sample quantitation limit. However, the reported limit is approximate and may or may not represent the actual limit of quantitation.
  - JN The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification. The associated numerical value is an estimated concentration only.
  - UB Compound considered non-detect at the listed value due to associated blank contamination.
  - N The analysis indicates the presence of a compound for which there is presumptive evidence to make a tentative identification.
  - R The sample results are rejected.

Two facts should be noted by all data users. First, the "R" flag means that the associated value is unusable. In other words, due to significant quality control (QC) problems, the analysis is invalid and provides no information as to whether the compound is present or not. "R" values should not appear on data tables because they cannot be relied upon, even as a last resort. The second fact to keep in mind is that no compound concentration, even if it has passed all QC tests, is guaranteed to be accurate. Strict QC serves to increase confidence in data but any value potentially contains error.

## DATA REVIEW REPORT

### VOLATILE ORGANIC COMPOUND (VOC) ANALYSES

#### 1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
SW-846 8021B	Water	14 days from collection to analysis (preserved) 7 days from collection to analysis (non-preserved)	Cool to <6 °C; preserved to a pH of less than 2 s.u.
	Soil	48 hours from collection to extraction and 14 days from extraction to analysis	Cool to <6 °C.

Note:

s.u. Standard units

All samples were analyzed within the specified holding time criteria.

#### 2. Blank Contamination

Quality assurance (QA) blanks (i.e., method and rinse blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Rinse blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Compounds were not detected above the MDL in the associated blanks; therefore detected sample results were not associated with blank contamination.

#### 3. Surrogates/System Monitoring Compounds

All samples to be analyzed for organic compounds are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. VOC analysis requires that all surrogates associated with the analysis exhibit recoveries within the laboratory-established acceptance limits.

All surrogate recoveries were within control limits.

#### 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the MS/MSD analysis must exhibit a percent recovery within the laboratory-established acceptance limits. The relative percent difference (RPD) between the MS/MSD recoveries must exhibit an RPD within the laboratory-established acceptance limits.

Note: The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the compound concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater.

## DATA REVIEW REPORT

A MS/MSD was not included in the data packages.

### 5. Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) Analysis

The LCS/LCSD analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS/LCSD analysis must exhibit a percent recovery within the laboratory-established acceptance limits.

All compounds associated with the LCS/LCSD analysis exhibited recoveries within the control limits.

### 6. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 30% for water matrices and 50% for soil matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of two times the RL is applied for water matrices or three times the RL is applied for soil matrices.

Results for duplicate samples are summarized in the following table.

Sample ID/Duplicate ID	Compound	Sample Result	Duplicate Result	RPD
MW-207-W-171108/DUP-1-WD-171108	All VOCs	U	U	AC

Notes:

AC Acceptable

The calculated RPDs between the parent sample and field duplicate were acceptable.

### 7. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

# DATA REVIEW REPORT

## DATA VALIDATION CHECKLIST FOR VOCs

VOCs: SW-846 8021B	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
<b>GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS)</b>					
<b>Tier II Validation</b>					
Holding times		X		X	
Reporting limits (units)		X		X	
Blanks					
A. Method blanks		X		X	
B. Equipment blanks	X				X
C. Trip blanks		X		X	
Laboratory Control Sample (LCS)		X		X	
Laboratory Control Sample Duplicate(LCSD)		X		X	
LCS/LCSD Precision (RPD)		X		X	
Matrix Spike (MS)	X				X
Matrix Spike Duplicate(MSD)	X				X
MS/MSD Precision (RPD)	X				X
Field/Lab Duplicate (RPD)		X		X	
Surrogate Spike Recoveries		X		X	
Dilution Factor		X		X	
Moisture Content	X				X

**Notes:**

%RSD Relative standard deviation

%R Percent recovery

RPD Relative percent difference

%D Percent difference

## DATA REVIEW REPORT

### SEMIVOLATILE ORGANIC COMPOUND (SVOC) ANALYSES

#### 1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
SW-846 8270 (SIM)	Water	7 days from collection to extraction and 40 days from extraction to analysis	Cool to <6 °C
	Soil	14 days from collection to extraction and 40 days from extraction to analysis	Cool to <6 °C

All samples were analyzed within the specified holding time criteria.

#### 2. Blank Contamination

Quality assurance (QA) blanks (i.e., method and rinse blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Rinse blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Compounds were not detected above the MDL in the associated blanks; therefore detected sample results were not associated with blank contamination.

#### 3. Surrogates/System Monitoring Compounds

All samples to be analyzed for organic compounds are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. SVOC analysis requires that two of the three SVOC surrogate compounds within each fraction exhibit recoveries within the laboratory-established acceptance limits.

All surrogate recoveries were within control limits.

#### 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the MS/MSD analysis must exhibit a percent recovery within the laboratory-established acceptance limits. The relative percent difference (RPD) between the MS/MSD recoveries must exhibit an RPD within the laboratory-established acceptance limits.

Note: The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the compound concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater.

A MS/SMD was not included in the data packages.

#### 5. Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) Analysis

## DATA REVIEW REPORT

The LCS/LCSD analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS/LCSD analysis must exhibit a percent recovery within the laboratory-established acceptance limits.

All compounds associated with the LCS/LCSD analysis exhibited recoveries within the control limits.

### 6. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 30% for water matrices and 50% for soil matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate sample concentrations are less than or equal to 5 times the RL, a control limit of two times the RL is applied for water matrices or three times the RL is applied for soil matrices.

Results for duplicate samples are summarized in the following table.

Sample ID/Duplicate ID	Compound	Sample Result	Duplicate Result	RPD
MW-207-W-171108/DUP-1-WD-171108	All SVOCs	U	U	AC

Notes:

AC Acceptable

NC Not compliant

The calculated RPDs between the parent sample and field duplicate were acceptable.

### 7. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

**DATA REVIEW REPORT**

**DATA VALIDATION CHECKLIST FOR SVOCs**

SVOCs: SW-846 8270	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
<b>GAS CHROMATOGRAPHY/MASS SPECTROMETRY (GC/MS)</b>					

**Tier II Validation**

Holding times		X		X	
Reporting limits (units)		X		X	
Blanks					
D. Method blanks		X		X	
E. Equipment blanks	X				X
Laboratory Control Sample (LCS) %R		X		X	
Laboratory Control Sample Duplicate(LCSD) %R		X		X	
LCS/LCSD Precision (RPD)		X		X	
Matrix Spike (MS) %R	X				X
Matrix Spike Duplicate(MSD) %R	X				X
MS/MSD Precision (RPD)	X				X
Field/Lab Duplicate (RPD)		X		X	
Surrogate Spike Recoveries		X		X	
Dilution Factor		X		X	
Moisture Content	X				X

Notes:

- %RSD Relative standard deviation
- %R Percent recovery
- RPD Relative percent difference
- %D Percent difference

## DATA REVIEW REPORT

### DIESEL RANGE ORGANICS (DRO) – GAS RANGE ORGANICS (GRO) ANALYSES

#### 1. Holding Times

The specified holding times for the following methods are presented in the following table.

Method	Matrix	Holding Time	Preservation
DRO, ERO ECY 97-602	Soil	14 days from collection to extraction and 40 days from extraction to analysis	Cool to <6 °C
	Water	7 days from collection to extraction and 40 days from extraction to analysis	Cool to <6 °C
GRO ECY 97-602	Water	14 days from collection to analysis	Cool to <6 °C; preserved to a pH of less than 2.

All samples were analyzed within the specified holding times.

#### 2. Blank Contamination

Quality assurance (QA) blanks (i.e., method and rinse blanks) are prepared to identify any contamination which may have been introduced into the samples during sample preparation or field activity. Method blanks measure laboratory contamination. Rinse blanks measure contamination of samples during field operations.

A blank action level (BAL) of five times the concentration of a detected compound in an associated blank (common laboratory contaminant compounds are calculated at ten times) is calculated for QA blanks containing concentrations greater than the method detection limit (MDL). The BAL is compared to the associated sample results to determine the appropriate qualification of the sample results, if needed.

Compounds were not detected above the MDL in the associated blanks; therefore detected sample results were not associated with blank contamination.

#### 3. Surrogates/System Monitoring Compounds

All samples to be analyzed for organic compounds are spiked with surrogate compounds prior to sample preparation to evaluate overall laboratory performance and efficiency of the analytical technique. The analysis requires surrogate compounds exhibit recoveries within the laboratory-established acceptance limits.

Sample locations associated with surrogates exhibiting recoveries outside of the control limits presented in the following table.

Sample Locations	Surrogate	Recovery
MW-206-W-171108	Orthoterphenyl	<LL but >10%

Notes:

Lower control limit (LL)

## DATA REVIEW REPORT

The criteria used to evaluate the surrogate recoveries are presented in the following table. In the case of a surrogate deviation, the sample results associated with the deviant fraction are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
> UL	Non-detect	No Action
	Detect	J
< LL but > 10%	Non-detect	UJ
	Detect	J
< 10%	Non-detect	R
	Detect	J
Surrogates diluted below the calibration curve due to the high concentration of a target compounds	Non-detect	J <sup>1</sup>
	Detect	

Note:

<sup>1</sup>. A more concentrated analysis was not performed with surrogate compounds within the calibration range therefore no determination of extraction efficiency could be made.

#### 4. Matrix Spike/Matrix Spike Duplicate (MS/MSD) Analysis

MS/MSD data are used to assess the precision and accuracy of the analytical method. The compounds used to perform the MS/MSD analysis must exhibit a percent recovery within the laboratory-established acceptance limits. The relative percent difference (RPD) between the MS/MSD recoveries must exhibit an RPD within the laboratory-established acceptance limits.

Note: The MS/MSD recovery control limits do not apply for MS/MSD performed on sample locations where the compound concentration detected in the parent sample exceeds the MS/MSD concentration by a factor of four or greater.

A MS/MSD was not included in the data packages.

#### 5. Laboratory Control Sample/Laboratory Control Sample Duplicate (LCS/LCSD) Analysis

The LCS/LCSD analysis is used to assess the precision and accuracy of the analytical method independent of matrix interferences. The compounds associated with the LCS/LCSD analysis must exhibit a percent recovery within the laboratory-established acceptance limits.

Sample locations associated with LCS/LCSD analysis exhibiting recoveries outside of the control limits presented in the following table.

Sample Locations	Compound	LCS Recovery	LCSD Recovery
MW-201-W-171108	DxDRO C12-C24	AC	<LL but >10%
MW-202-W-171108			
MW-203-W-171108			
MW-204-W-171108			
MW-205-W-171108			
MW-206-W-171108			

## DATA REVIEW REPORT

Sample Locations	Compound	LCS Recovery	LCSD Recovery
MW-207-W-171108 DUP-1-WD-171108			

The criteria used to evaluate the LCS recoveries are presented in the following table. In the case of an LCS deviation, the sample results are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
> the upper control limit (UL)	Non-detect	No Action
	Detect	J
< the lower control limit (LL) but > 10%	Non-detect	UJ
	Detect	J
< 10%	Non-detect	R
	Detect	J

Sample locations associated with LCS/LCSD recoveries exhibiting an RPD greater than of the control limit presented in the following table.

Sample Locations	Compound
MW-201-W-171108 MW-202-W-171108 MW-203-W-171108 MW-204-W-171108 MW-205-W-171108 MW-206-W-171108 MW-207-W-171108 DUP-1-WD-171108	DxDRO C12-C24

The criteria used to evaluate the RPD between the LCS/LCSD recoveries are presented in the following table. In the case of an RPD deviation, the sample results are qualified as documented in the table below.

Control Limit	Sample Result	Qualification
> UL	Non-detect	UJ
	Detect	J

### 6. Field Duplicate Analysis

Field duplicate analysis is used to assess the overall precision of the field sampling procedures and analytical method. A control limit of 30% for water matrices and 50% for soil matrices is applied to the RPD between the parent sample and the field duplicate. In the instance when the parent and/or duplicate

## DATA REVIEW REPORT

sample concentrations are less than or equal to 5 times the RL, a control limit of two times the RL is applied for water matrices or three times the RL is applied for soil matrices.

Results for duplicate samples are summarized in the following table.

Sample ID/Duplicate ID	Compound	Sample Result	Duplicate Result	RPD
MW-207-W-171108/DUP-1-WD-171108	C7-C12	U	U	AC
	C12-C24	U	U	NC
	C24-C40	U	U	NC

Notes:

NC = Not compliant.

The calculated RPDs between the parent sample and field duplicate were acceptable.

### 7. System Performance and Overall Assessment

Overall system performance was acceptable. Other than for those deviations specifically mentioned in this review, the overall data quality is within the guidelines specified in the method.

# DATA REVIEW REPORT

## DATA VALIDATION CHECKLIST FOR DRO - GRO

DRO/GRO; ECY 97-602	Reported		Performance Acceptable		Not Required
	No	Yes	No	Yes	
GAS CHROMATOGRAPHY (GC/FID)					
<b>Tier II Validation</b>					
Holding times		X		X	
Reporting limits (units)		X		X	
Blanks					
F. Method blanks		X		X	
G. Equipment blanks	X				X
Laboratory Control Sample (LCS) %R		X		X	
Laboratory Control Sample Duplicate(LCSD) %R		X	X		
LCS/LCSD Precision (RPD)		X	X		
Matrix Spike (MS) %R	X				X
Matrix Spike Duplicate(MSD) %R	X				X
MS/MSD Precision (RPD)	X				X
Field/Lab Duplicate (RPD)		X		X	
Surrogate Spike Recoveries		X	X		
Dilution Factor		X		X	
Moisture Content	X				X

**Notes:**

%RSD – relative standard deviation

%R - percent recovery

RPD - relative percent difference

%D – difference

## DATA REVIEW REPORT

VALIDATION PERFORMED BY: Rachelle Borne

SIGNATURE:

A handwritten signature in blue ink, appearing to read "Rachelle Borne", is written over a horizontal line. The signature is cursive and somewhat stylized.

DATE: January 31, 2018

PEER REVIEW: Dennis Capria

DATE: January 31, 2018

**CHAIN OF CUSTODY  
CORRECTED SAMPLE ANALYSIS DATA  
SHEETS**



**Sample Description:** MW-30-W-171108 Grab Groundwater  
Seattle Terminal  
3001 Elliott Ave - Seattle, WA

**Chevron Environmental Mgmt Co**  
**ELLE Sample #:** WW 9312915  
**ELLE Group #:** 1874268  
**Matrix:** Groundwater

**Project Name:** Seattle Terminal

**Submittal Date/Time:** 11/10/2017 09:40  
**Collection Date/Time:** 11/08/2017 12:45

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit	Dilution Factor
<b>GC Volatiles</b>					
	<b>ECY 97-602 NWTPH-Gx</b>		<b>ug/l</b>	<b>ug/l</b>	
08274	NWTPH-Gx water C7-C12	n.a.	N.D.	50	1
<b>GC Volatiles</b>					
	<b>SW-846 8021B</b>		<b>ug/l</b>	<b>ug/l</b>	
02102	Benzene	71-43-2	N.D.	0.5	1
02102	Ethylbenzene	100-41-4	N.D.	0.5	1
02102	Toluene	108-88-3	N.D.	0.5	1
02102	Total Xylenes	1330-20-7	N.D.	1.5	1
<b>GC Petroleum Hydrocarbons w/Si</b>					
	<b>ECY 97-602 NWTPH-Dx modified</b>		<b>ug/l</b>	<b>ug/l</b>	
12917	DX DRO C12-C24 w/ SiGel	n.a.	250	46	1
12917	DX HRO C24-C40 w/ SiGel	n.a.	N.D.	100	1

### Sample Comments

State of Washington Lab Certification No. C457

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
08274	NWTPH-Gx water C7-C12	ECY 97-602 NWTPH-Gx	1	17318C94A	11/16/2017 20:56	Brett W Kenyon	1
02102	Method 8021 Water Master	SW-846 8021B	1	17318C94A	11/16/2017 20:56	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	1	17318C94A	11/16/2017 20:56	Brett W Kenyon	1
12917	NWTPH-Dx water w/Si Gel	ECY 97-602 NWTPH-Dx modified	1	173170062A	11/16/2017 00:01	Amy Lehr	1
12924	Mini-Ext. DRO DX, Column SiGel	ECY 97-602 NWTPH-Dx 06/97	1	173170062A	11/14/2017 08:00	Osvaldo R Sanchez	1

**Sample Description:** MW-70R-W-171108 Grab Groundwater  
Seattle Terminal  
3001 Elliott Ave - Seattle, WA

**Chevron Environmental Mgmt Co**  
**ELLE Sample #:** WW 9312916  
**ELLE Group #:** 1874268  
**Matrix:** Groundwater

**Project Name:** Seattle Terminal

**Submission Date/Time:** 11/10/2017 09:40  
**Collection Date/Time:** 11/08/2017 13:35

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit	Dilution Factor
<b>GC/MS Semivolatiles</b>		<b>SW-846 8270C SIM</b>	<b>ug/l</b>	<b>ug/l</b>	
14243	Benzo(a)anthracene	56-55-3	0.018	0.010	1
14243	Benzo(a)pyrene	50-32-8	0.015	0.010	1
14243	Benzo(b)fluoranthene	205-99-2	0.026	0.010	1
14243	Benzo(k)fluoranthene	207-08-9	0.018	0.010	1
14243	Chrysene	218-01-9	0.019	0.010	1
14243	Dibenz(a,h)anthracene	53-70-3	0.019	0.010	1
14243	Indeno(1,2,3-cd)pyrene	193-39-5	0.015	0.010	1
<b>GC Volatiles</b>		<b>ECY 97-602 NWTPH-Gx</b>	<b>ug/l</b>	<b>ug/l</b>	
08274	NWTPH-Gx water C7-C12	n.a.	N.D.	50	1
<b>GC Volatiles</b>		<b>SW-846 8021B</b>	<b>ug/l</b>	<b>ug/l</b>	
02102	Benzene	71-43-2	N.D.	0.5	1
02102	Ethylbenzene	100-41-4	N.D.	0.5	1
02102	Toluene	108-88-3	N.D.	0.5	1
02102	Total Xylenes	1330-20-7	N.D.	1.5	1
<b>GC Petroleum Hydrocarbons w/Si</b>		<b>ECY 97-602 NWTPH-Dx modified</b>	<b>ug/l</b>	<b>ug/l</b>	
12917	DX DRO C12-C24 w/ SiGel	n.a.	N.D.	47	1
12917	DX HRO C24-C40 w/ SiGel	n.a.	N.D.	100	1

### Sample Comments

State of Washington Lab Certification No. C457  
Carcinogenic PAHs have been reported for this sample

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14243	SIM SVOAs 8270C MINI	SW-846 8270C SIM	1	17317WAN026	11/28/2017 13:22	Catherine E Bachman	1
10466	BNA Water Extraction SIM	SW-846 3510C	1	17317WAN026	11/14/2017 08:00	Kayla A Yuditsky	1
08274	NWTPH-Gx water C7-C12	ECY 97-602 NWTPH-Gx	1	17321A53A	11/17/2017 12:36	Brett W Kenyon	1
02102	Method 8021 Water Master	SW-846 8021B	1	17318C94A	11/16/2017 22:12	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	1	17318C94A	11/16/2017 22:12	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	2	17321A53A	11/17/2017 12:36	Brett W Kenyon	1
12917	NWTPH-Dx water w/Si Gel	ECY 97-602 NWTPH-Dx modified	1	173170062A	11/16/2017 00:25	Amy Lehr	1
12924	Mini-Ext. DRO DX, Column SiGel	ECY 97-602 NWTPH-Dx 06/97	1	173170062A	11/14/2017 08:00	Oswaldo R Sanchez	1

**Sample Description:** MW-200-W-171108 Grab Groundwater  
Seattle Terminal  
3001 Elliott Ave - Seattle, WA

**Chevron Environmental Mgmt Co**  
**ELLE Sample #:** WW 9312917  
**ELLE Group #:** 1874268  
**Matrix:** Groundwater

**Project Name:** Seattle Terminal

**Submission Date/Time:** 11/10/2017 09:40  
**Collection Date/Time:** 11/08/2017 11:45

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit	Dilution Factor
<b>GC/MS Semivolatiles</b>		<b>SW-846 8270C SIM</b>	<b>ug/l</b>	<b>ug/l</b>	
14243	Benzo(a)anthracene	56-55-3	0.064	0.010	1
14243	Benzo(a)pyrene	50-32-8	0.037	0.010	1
14243	Benzo(b)fluoranthene	205-99-2	0.11	0.010	1
14243	Benzo(k)fluoranthene	207-08-9	0.096	0.010	1
14243	Chrysene	218-01-9	0.072	0.010	1
14243	Dibenz(a,h)anthracene	53-70-3	0.081	0.010	1
14243	Indeno(1,2,3-cd)pyrene	193-39-5	0.088	0.010	1
<b>GC Volatiles</b>		<b>ECY 97-602 NWTPH-Gx</b>	<b>ug/l</b>	<b>ug/l</b>	
08274	NWTPH-Gx water C7-C12	n.a.	530	50	1
<b>GC Volatiles</b>		<b>SW-846 8021B</b>	<b>ug/l</b>	<b>ug/l</b>	
02102	Benzene	71-43-2	N.D.	4.0	1
02102	Ethylbenzene	100-41-4	0.6	0.5	1
02102	Toluene	108-88-3	N.D.	0.5	1
02102	Total Xylenes	1330-20-7	N.D.	1.5	1
Reporting limits were raised due to interference from the sample matrix.					
<b>GC Petroleum Hydrocarbons w/Si</b>		<b>ECY 97-602 NWTPH-Dx modified</b>	<b>ug/l</b>	<b>ug/l</b>	
12917	DX DRO C12-C24 w/ SiGel	n.a.	76	47	1
12917	DX HRO C24-C40 w/ SiGel	n.a.	N.D.	110	1

### Sample Comments

State of Washington Lab Certification No. C457  
Carcinogenic PAHs have been reported for this sample

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14243	SIM SVOAs 8270C MINI	SW-846 8270C SIM	1	17317WAN026	11/28/2017 13:51	Catherine E Bachman	1
10466	BNA Water Extraction SIM	SW-846 3510C	1	17317WAN026	11/14/2017 08:00	Kayla A Yuditsky	1
08274	NWTPH-Gx water C7-C12	ECY 97-602 NWTPH-Gx	1	17321A53A	11/17/2017 13:04	Brett W Kenyon	1
02102	Method 8021 Water Master	SW-846 8021B	1	17318C94A	11/16/2017 22:38	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	1	17318C94A	11/16/2017 22:38	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	2	17321A53A	11/17/2017 13:04	Brett W Kenyon	1
12917	NWTPH-Dx water w/Si Gel	ECY 97-602 NWTPH-Dx modified	1	173170062A	11/16/2017 00:48	Amy Lehr	1
12924	Mini-Ext. DRO DX, Column SiGel	ECY 97-602 NWTPH-Dx 06/97	1	173170062A	11/14/2017 08:00	Osvaldo R Sanchez	1

**Sample Description:** MW-201-W-171108 Grab Groundwater  
Seattle Terminal  
3001 Elliott Ave - Seattle, WA

**Chevron Environmental Mgmt Co**  
**ELLE Sample #:** WW 9312918  
**ELLE Group #:** 1874268  
**Matrix:** Groundwater

**Project Name:** Seattle Terminal

**Submission Date/Time:** 11/10/2017 09:40  
**Collection Date/Time:** 11/08/2017 10:20

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit	Dilution Factor
<b>GC/MS Semivolatiles</b>		<b>SW-846 8270C SIM</b>	<b>ug/l</b>	<b>ug/l</b>	
14243	Benzo(a)anthracene	56-55-3	0.018	0.010	1
14243	Benzo(a)pyrene	50-32-8	N.D.	0.010	1
14243	Benzo(b)fluoranthene	205-99-2	N.D.	0.010	1
14243	Benzo(k)fluoranthene	207-08-9	N.D.	0.010	1
14243	Chrysene	218-01-9	0.019	0.010	1
14243	Dibenz(a,h)anthracene	53-70-3	N.D.	0.010	1
14243	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.	0.010	1

<b>GC Volatiles</b>		<b>ECY 97-602 NWTPH-Gx</b>	<b>ug/l</b>	<b>ug/l</b>	
08274	NWTPH-Gx water C7-C12	n.a.	370	50	1

<b>GC Volatiles</b>		<b>SW-846 8021B</b>	<b>ug/l</b>	<b>ug/l</b>	
02102	Benzene	71-43-2	N.D.	3.0	1
02102	Ethylbenzene	100-41-4	0.5	0.5	1
02102	Toluene	108-88-3	N.D.	0.5	1
02102	Total Xylenes	1330-20-7	N.D.	1.5	1

Reporting limits were raised due to interference from the sample matrix.

<b>GC Petroleum Hydrocarbons w/Si</b>		<b>ECY 97-602 NWTPH-Dx modified</b>	<b>ug/l</b>	<b>ug/l</b>	
12917	DX DRO C12-C24 w/ SiGel	n.a.	53 J	48	1
12917	DX HRO C24-C40 w/ SiGel	n.a.	N.D.	110	1

The recovery for a target analyte(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary. The client was contacted and the data reported.

## Sample Comments

State of Washington Lab Certification No. C457  
Carcinogenic PAHs have been reported for this sample

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

## Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14243	SIM SVOAs 8270C MINI	SW-846 8270C SIM	1	17317WAN026	11/28/2017 14:19	Catherine E Bachman	1
10466	BNA Water Extraction SIM	SW-846 3510C	1	17317WAN026	11/14/2017 08:00	Kayla A Yuditsky	1
08274	NWTPH-Gx water C7-C12	ECY 97-602 NWTPH-Gx	1	17321A53A	11/17/2017 13:32	Brett W Kenyon	1
02102	Method 8021 Water Master	SW-846 8021B	1	17318C94A	11/16/2017 23:04	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	1	17318C94A	11/16/2017 23:04	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	2	17321A53A	11/17/2017 13:32	Brett W Kenyon	1
12917	NWTPH-Dx water w/Si Gel	ECY 97-602 NWTPH-Dx modified	1	173190030A	11/28/2017 13:06	Amy Lehr	1

**Sample Description:** MW-201-W-171108 Grab Groundwater  
Seattle Terminal  
3001 Elliott Ave - Seattle, WA

Chevron Environmental Mgmt Co  
ELLE Sample #: WW 9312918  
ELLE Group #: 1874268  
Matrix: Groundwater

**Project Name:** Seattle Terminal

Submittal Date/Time: 11/10/2017 09:40  
Collection Date/Time: 11/08/2017 10:20

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
12924	Mini-Ext. DRO DX, Column SiGel	ECY 97-602 NWTPH-Dx 06/97	1	173190030A	11/16/2017 12:30	Kayla A Yuditsky	1

**Sample Description:** MW-202-W-171108 Grab Groundwater  
Seattle Terminal  
3001 Elliott Ave - Seattle, WA

**Chevron Environmental Mgmt Co**  
**ELLE Sample #:** WW 9312919  
**ELLE Group #:** 1874268  
**Matrix:** Groundwater

**Project Name:** Seattle Terminal

**Submission Date/Time:** 11/10/2017 09:40  
**Collection Date/Time:** 11/08/2017 15:15

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit	Dilution Factor
<b>GC/MS Semivolatiles</b>		<b>SW-846 8270C SIM</b>	<b>ug/l</b>	<b>ug/l</b>	
14243	Benzo(a)anthracene	56-55-3	N.D.	0.010	1
14243	Benzo(a)pyrene	50-32-8	N.D.	0.010	1
14243	Benzo(b)fluoranthene	205-99-2	N.D.	0.010	1
14243	Benzo(k)fluoranthene	207-08-9	N.D.	0.010	1
14243	Chrysene	218-01-9	N.D.	0.010	1
14243	Dibenz(a,h)anthracene	53-70-3	0.021	0.010	1
14243	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.	0.010	1

<b>GC Volatiles</b>		<b>ECY 97-602 NWTPH-Gx</b>	<b>ug/l</b>	<b>ug/l</b>	
08274	NWTPH-Gx water C7-C12	n.a.	N.D.	50	1

<b>GC Volatiles</b>		<b>SW-846 8021B</b>	<b>ug/l</b>	<b>ug/l</b>	
02102	Benzene	71-43-2	N.D.	0.5	1
02102	Ethylbenzene	100-41-4	N.D.	0.5	1
02102	Toluene	108-88-3	N.D.	0.5	1
02102	Total Xylenes	1330-20-7	N.D.	1.5	1

<b>GC Petroleum Hydrocarbons w/Si</b>		<b>ECY 97-602 NWTPH-Dx modified</b>	<b>ug/l</b>	<b>ug/l</b>	
12917	DX DRO C12-C24 w/ SiGel	n.a.	N.D. UJ	46	1
12917	DX HRO C24-C40 w/ SiGel	n.a.	N.D.	100	1

The recovery for a target analyte(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary. The client was contacted and the data reported.

### Sample Comments

State of Washington Lab Certification No. C457  
Carcinogenic PAHs have been reported for this sample

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14243	SIM SVOAs 8270C MINI	SW-846 8270C SIM	1	17317WAN026	11/28/2017 14:48	Catherine E Bachman	1
10466	BNA Water Extraction SIM	SW-846 3510C	1	17317WAN026	11/14/2017 08:00	Kayla A Yuditsky	1
08274	NWTPH-Gx water C7-C12	ECY 97-602 NWTPH-Gx	1	17321A53A	11/17/2017 14:00	Brett W Kenyon	1
02102	Method 8021 Water Master	SW-846 8021B	1	17318C94A	11/16/2017 23:30	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	1	17318C94A	11/16/2017 23:30	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	2	17321A53A	11/17/2017 14:00	Brett W Kenyon	1
12917	NWTPH-Dx water w/Si Gel	ECY 97-602 NWTPH-Dx modified	1	173190030A	11/28/2017 13:29	Amy Lehr	1
12924	Mini-Ext. DRO DX, Column SiGel	ECY 97-602 NWTPH-Dx 06/97	1	173190030A	11/16/2017 12:30	Kayla A Yuditsky	1

**Sample Description:** MW-203-W-171108 Grab Groundwater  
Seattle Terminal  
3001 Elliott Ave - Seattle, WA

**Chevron Environmental Mgmt Co**  
**ELLE Sample #:** WW 9312920  
**ELLE Group #:** 1874268  
**Matrix:** Groundwater

**Project Name:** Seattle Terminal

**Submission Date/Time:** 11/10/2017 09:40  
**Collection Date/Time:** 11/08/2017 10:00

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit	Dilution Factor
<b>GC/MS Semivolatiles</b>		<b>SW-846 8270C SIM</b>	<b>ug/l</b>	<b>ug/l</b>	
14243	Benzo(a)anthracene	56-55-3	N.D.	0.010	1
14243	Benzo(a)pyrene	50-32-8	N.D.	0.010	1
14243	Benzo(b)fluoranthene	205-99-2	N.D.	0.010	1
14243	Benzo(k)fluoranthene	207-08-9	N.D.	0.010	1
14243	Chrysene	218-01-9	N.D.	0.010	1
14243	Dibenz(a,h)anthracene	53-70-3	N.D.	0.010	1
14243	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.	0.010	1

<b>GC Volatiles</b>		<b>ECY 97-602 NWTPH-Gx</b>	<b>ug/l</b>	<b>ug/l</b>	
08274	NWTPH-Gx water C7-C12	n.a.	N.D.	50	1

<b>GC Volatiles</b>		<b>SW-846 8021B</b>	<b>ug/l</b>	<b>ug/l</b>	
02102	Benzene	71-43-2	N.D.	0.5	1
02102	Ethylbenzene	100-41-4	N.D.	0.5	1
02102	Toluene	108-88-3	N.D.	0.5	1
02102	Total Xylenes	1330-20-7	N.D.	1.5	1

<b>GC Petroleum Hydrocarbons w/Si</b>		<b>ECY 97-602 NWTPH-Dx modified</b>	<b>ug/l</b>	<b>ug/l</b>	
12917	DX DRO C12-C24 w/ SiGel	n.a.	N.D. UJ	46	1
12917	DX HRO C24-C40 w/ SiGel	n.a.	N.D.	100	1

The recovery for a target analyte(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary. The client was contacted and the data reported.

### Sample Comments

State of Washington Lab Certification No. C457  
Carcinogenic PAHs have been reported for this sample

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14243	SIM SVOAs 8270C MINI	SW-846 8270C SIM	1	17317WAN026	11/28/2017 15:16	Catherine E Bachman	1
10466	BNA Water Extraction SIM	SW-846 3510C	1	17317WAN026	11/14/2017 08:00	Kayla A Yuditsky	1
08274	NWTPH-Gx water C7-C12	ECY 97-602 NWTPH-Gx	1	17321A53A	11/17/2017 14:28	Brett W Kenyon	1
02102	Method 8021 Water Master	SW-846 8021B	1	17318C94A	11/16/2017 23:55	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	1	17318C94A	11/16/2017 23:55	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	2	17321A53A	11/17/2017 14:28	Brett W Kenyon	1
12917	NWTPH-Dx water w/Si Gel	ECY 97-602 NWTPH-Dx modified	1	173190030A	11/28/2017 13:53	Amy Lehr	1
12924	Mini-Ext. DRO DX, Column SiGel	ECY 97-602 NWTPH-Dx 06/97	1	173190030A	11/16/2017 12:30	Kayla A Yuditsky	1

**Sample Description:** MW-204-W-171108 Grab Groundwater  
Seattle Terminal  
3001 Elliott Ave - Seattle, WA

**Chevron Environmental Mgmt Co**  
**ELLE Sample #:** WW 9312921  
**ELLE Group #:** 1874268  
**Matrix:** Groundwater

**Project Name:** Seattle Terminal

**Submittal Date/Time:** 11/10/2017 09:40  
**Collection Date/Time:** 11/08/2017 09:00

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit	Dilution Factor
<b>GC/MS Semivolatiles</b>		<b>SW-846 8270C SIM</b>	<b>ug/l</b>	<b>ug/l</b>	
14243	Benzo(a)anthracene	56-55-3	N.D.	0.011	1
14243	Benzo(a)pyrene	50-32-8	N.D.	0.011	1
14243	Benzo(b)fluoranthene	205-99-2	N.D.	0.011	1
14243	Benzo(k)fluoranthene	207-08-9	N.D.	0.011	1
14243	Chrysene	218-01-9	N.D.	0.011	1
14243	Dibenz(a,h)anthracene	53-70-3	N.D.	0.011	1
14243	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.	0.011	1

<b>GC Volatiles</b>		<b>ECY 97-602 NWTPH-Gx</b>	<b>ug/l</b>	<b>ug/l</b>	
08274	NWTPH-Gx water C7-C12	n.a.	1,000	50	1

<b>GC Volatiles</b>		<b>SW-846 8021B</b>	<b>ug/l</b>	<b>ug/l</b>	
02102	Benzene	71-43-2	N.D.	0.9	1
02102	Ethylbenzene	100-41-4	1.2	0.5	1
02102	Toluene	108-88-3	1.2	0.5	1
02102	Total Xylenes	1330-20-7	2.3	1.5	1

Reporting limits were raised due to interference from the sample matrix.

<b>GC Petroleum Hydrocarbons w/Si</b>		<b>ECY 97-602 NWTPH-Dx modified</b>	<b>ug/l</b>	<b>ug/l</b>	
12917	DX DRO C12-C24 w/ SiGel	n.a.	160 J	46	1
12917	DX HRO C24-C40 w/ SiGel	n.a.	N.D.	100	1

The recovery for a target analyte(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary. The client was contacted and the data reported.

## Sample Comments

State of Washington Lab Certification No. C457  
Carcinogenic PAHs have been reported for this sample

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

## Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14243	SIM SVOAs 8270C MINI	SW-846 8270C SIM	1	17317WAN026	11/28/2017 15:44	Catherine E Bachman	1
10466	BNA Water Extraction SIM	SW-846 3510C	1	17317WAN026	11/14/2017 08:00	Kayla A Yuditsky	1
08274	NWTPH-Gx water C7-C12	ECY 97-602 NWTPH-Gx	1	17321A53A	11/17/2017 14:55	Brett W Kenyon	1
02102	Method 8021 Water Master	SW-846 8021B	1	17318C94A	11/17/2017 00:21	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	1	17318C94A	11/17/2017 00:21	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	2	17321A53A	11/17/2017 14:55	Brett W Kenyon	1
12917	NWTPH-Dx water w/Si Gel	ECY 97-602 NWTPH-Dx modified	1	173190030A	11/28/2017 14:16	Amy Lehr	1

**Sample Description:** MW-204-W-171108 Grab Groundwater  
Seattle Terminal  
3001 Elliott Ave - Seattle, WA

Chevron Environmental Mgmt Co  
ELLE Sample #: WW 9312921  
ELLE Group #: 1874268  
Matrix: Groundwater

**Project Name:** Seattle Terminal

Submittal Date/Time: 11/10/2017 09:40  
Collection Date/Time: 11/08/2017 09:00

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
12924	Mini-Ext. DRO DX, Column SiGel	ECY 97-602 NWTPH-Dx 06/97	1	173190030A	11/16/2017 12:30	Kayla A Yuditsky	1

**Sample Description:** MW-205-W-171108 Grab Groundwater  
Seattle Terminal  
3001 Elliott Ave - Seattle, WA

**Chevron Environmental Mgmt Co**  
**ELLE Sample #:** WW 9312922  
**ELLE Group #:** 1874268  
**Matrix:** Groundwater

**Project Name:** Seattle Terminal

**Submission Date/Time:** 11/10/2017 09:40  
**Collection Date/Time:** 11/08/2017 08:45

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit	Dilution Factor
<b>GC/MS Semivolatiles</b>		<b>SW-846 8270C SIM</b>	<b>ug/l</b>	<b>ug/l</b>	
14243	Benzo(a)anthracene	56-55-3	N.D.	0.010	1
14243	Benzo(a)pyrene	50-32-8	N.D.	0.010	1
14243	Benzo(b)fluoranthene	205-99-2	N.D.	0.010	1
14243	Benzo(k)fluoranthene	207-08-9	N.D.	0.010	1
14243	Chrysene	218-01-9	N.D.	0.010	1
14243	Dibenz(a,h)anthracene	53-70-3	N.D.	0.010	1
14243	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.	0.010	1

<b>GC Volatiles</b>		<b>ECY 97-602 NWTPH-Gx</b>	<b>ug/l</b>	<b>ug/l</b>	
08274	NWTPH-Gx water C7-C12	n.a.	71	50	1

<b>GC Volatiles</b>		<b>SW-846 8021B</b>	<b>ug/l</b>	<b>ug/l</b>	
02102	Benzene	71-43-2	N.D.	0.5	1
02102	Ethylbenzene	100-41-4	N.D.	0.5	1
02102	Toluene	108-88-3	N.D.	0.5	1
02102	Total Xylenes	1330-20-7	N.D.	1.5	1

<b>GC Petroleum Hydrocarbons w/Si</b>		<b>ECY 97-602 NWTPH-Dx modified</b>	<b>ug/l</b>	<b>ug/l</b>	
12917	DX DRO C12-C24 w/ SiGel	n.a.	N.D. UJ	46	1
12917	DX HRO C24-C40 w/ SiGel	n.a.	N.D.	100	1

The recovery for a target analyte(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary. The client was contacted and the data reported.

## Sample Comments

State of Washington Lab Certification No. C457  
Carcinogenic PAHs have been reported for this sample

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

## Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14243	SIM SVOAs 8270C MINI	SW-846 8270C SIM	1	17317WAN026	11/28/2017 16:13	Catherine E Bachman	1
10466	BNA Water Extraction SIM	SW-846 3510C	1	17317WAN026	11/14/2017 08:00	Kayla A Yuditsky	1
08274	NWTPH-Gx water C7-C12	ECY 97-602 NWTPH-Gx	1	17321A53A	11/17/2017 15:23	Brett W Kenyon	1
02102	Method 8021 Water Master	SW-846 8021B	1	17318C94A	11/17/2017 00:47	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	1	17318C94A	11/17/2017 00:47	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	2	17321A53A	11/17/2017 15:23	Brett W Kenyon	1
12917	NWTPH-Dx water w/Si Gel	ECY 97-602 NWTPH-Dx modified	1	173190030A	11/28/2017 14:40	Amy Lehr	1
12924	Mini-Ext. DRO DX, Column SiGel	ECY 97-602 NWTPH-Dx 06/97	1	173190030A	11/16/2017 12:30	Kayla A Yuditsky	1

**Sample Description:** MW-206-W-171108 Grab Groundwater  
Seattle Terminal  
3001 Elliott Ave - Seattle, WA

**Chevron Environmental Mgmt Co**  
**ELLE Sample #:** WW 9312923  
**ELLE Group #:** 1874268  
**Matrix:** Groundwater

**Project Name:** Seattle Terminal

**Submission Date/Time:** 11/10/2017 09:40  
**Collection Date/Time:** 11/08/2017 14:50

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit	Dilution Factor
<b>GC/MS Semivolatiles</b>		<b>SW-846 8270C SIM</b>	<b>ug/l</b>	<b>ug/l</b>	
14243	Benzo(a)anthracene	56-55-3	N.D.	0.010	1
14243	Benzo(a)pyrene	50-32-8	N.D.	0.010	1
14243	Benzo(b)fluoranthene	205-99-2	N.D.	0.010	1
14243	Benzo(k)fluoranthene	207-08-9	N.D.	0.010	1
14243	Chrysene	218-01-9	N.D.	0.010	1
14243	Dibenz(a,h)anthracene	53-70-3	N.D.	0.010	1
14243	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.	0.010	1
<b>GC Volatiles</b>		<b>ECY 97-602 NWTPH-Gx</b>	<b>ug/l</b>	<b>ug/l</b>	
08274	NWTPH-Gx water C7-C12	n.a.	N.D.	50	1
<b>GC Volatiles</b>		<b>SW-846 8021B</b>	<b>ug/l</b>	<b>ug/l</b>	
02102	Benzene	71-43-2	N.D.	0.5	1
02102	Ethylbenzene	100-41-4	N.D.	0.5	1
02102	Toluene	108-88-3	N.D.	0.5	1
02102	Total Xylenes	1330-20-7	N.D.	1.5	1
<b>GC Petroleum Hydrocarbons w/Si</b>		<b>ECY 97-602 NWTPH-Dx modified</b>	<b>ug/l</b>	<b>ug/l</b>	
12917	DX DRO C12-C24 w/ SiGel	n.a.	N.D. UJ	48	1
12917	DX HRO C24-C40 w/ SiGel	n.a.	N.D. UJ	110	1

The recovery for the sample surrogate(s) is outside the QC acceptance limits as noted on the QC Summary.  
The recovery for a target analyte(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary. The client was contacted and the data reported.

### Sample Comments

State of Washington Lab Certification No. C457  
Carcinogenic PAHs have been reported for this sample

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14243	SIM SVOAs 8270C MINI	SW-846 8270C SIM	1	17317WAN026	11/28/2017 16:41	Catherine E Bachman	1
10466	BNA Water Extraction SIM	SW-846 3510C	1	17317WAN026	11/14/2017 08:00	Kayla A Yuditsky	1
08274	NWTPH-Gx water C7-C12	ECY 97-602 NWTPH-Gx	1	17321A53A	11/17/2017 15:50	Brett W Kenyon	1
02102	Method 8021 Water Master	SW-846 8021B	1	17318C94A	11/17/2017 01:12	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	1	17318C94A	11/17/2017 01:12	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	2	17321A53A	11/17/2017 15:50	Brett W Kenyon	1
12917	NWTPH-Dx water w/Si Gel	ECY 97-602 NWTPH-Dx modified	1	173190030A	11/28/2017 15:03	Amy Lehr	1

**Sample Description:** MW-206-W-171108 Grab Groundwater  
Seattle Terminal  
3001 Elliott Ave - Seattle, WA

Chevron Environmental Mgmt Co  
ELLE Sample #: WW 9312923  
ELLE Group #: 1874268  
Matrix: Groundwater

**Project Name:** Seattle Terminal

Submittal Date/Time: 11/10/2017 09:40  
Collection Date/Time: 11/08/2017 14:50

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
12924	Mini-Ext. DRO DX, Column SiGel	ECY 97-602 NWTPH-Dx 06/97	1	173190030A	11/16/2017 12:30	Kayla A Yuditsky	1

**Sample Description:** MW-207-W-171108 Grab Groundwater  
Seattle Terminal  
3001 Elliott Ave - Seattle, WA

**Chevron Environmental Mgmt Co**  
**ELLE Sample #:** WW 9312924  
**ELLE Group #:** 1874268  
**Matrix:** Groundwater

**Project Name:** Seattle Terminal

**Submittal Date/Time:** 11/10/2017 09:40  
**Collection Date/Time:** 11/08/2017 14:05

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit	Dilution Factor
<b>GC/MS Semivolatiles</b>		<b>SW-846 8270C SIM</b>	<b>ug/l</b>	<b>ug/l</b>	
14243	Benzo(a)anthracene	56-55-3	N.D.	0.010	1
14243	Benzo(a)pyrene	50-32-8	N.D.	0.010	1
14243	Benzo(b)fluoranthene	205-99-2	N.D.	0.010	1
14243	Benzo(k)fluoranthene	207-08-9	N.D.	0.010	1
14243	Chrysene	218-01-9	N.D.	0.010	1
14243	Dibenz(a,h)anthracene	53-70-3	N.D.	0.010	1
14243	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.	0.010	1

<b>GC Volatiles</b>		<b>ECY 97-602 NWTPH-Gx</b>	<b>ug/l</b>	<b>ug/l</b>	
08274	NWTPH-Gx water C7-C12	n.a.	N.D.	50	1

<b>GC Volatiles</b>		<b>SW-846 8021B</b>	<b>ug/l</b>	<b>ug/l</b>	
02102	Benzene	71-43-2	N.D.	0.5	1
02102	Ethylbenzene	100-41-4	N.D.	0.5	1
02102	Toluene	108-88-3	N.D.	0.5	1
02102	Total Xylenes	1330-20-7	N.D.	1.5	1

<b>GC Petroleum Hydrocarbons w/Si</b>		<b>ECY 97-602 NWTPH-Dx modified</b>	<b>ug/l</b>	<b>ug/l</b>	
12917	DX DRO C12-C24 w/ SiGel	n.a.	N.D. UJ	46	1
12917	DX HRO C24-C40 w/ SiGel	n.a.	N.D.	100	1

The recovery for a target analyte(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary. The client was contacted and the data reported.

### Sample Comments

State of Washington Lab Certification No. C457  
Carcinogenic PAHs have been reported for this sample

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14243	SIM SVOAs 8270C MINI	SW-846 8270C SIM	1	17317WAN026	11/28/2017 17:10	Catherine E Bachman	1
10466	BNA Water Extraction SIM	SW-846 3510C	1	17317WAN026	11/14/2017 08:00	Kayla A Yuditsky	1
08274	NWTPH-Gx water C7-C12	ECY 97-602 NWTPH-Gx	1	17321A53A	11/17/2017 16:18	Brett W Kenyon	1
02102	Method 8021 Water Master	SW-846 8021B	1	17318C94A	11/17/2017 01:38	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	1	17318C94A	11/17/2017 01:38	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	2	17321A53A	11/17/2017 16:18	Brett W Kenyon	1
12917	NWTPH-Dx water w/Si Gel	ECY 97-602 NWTPH-Dx modified	1	173190030A	11/28/2017 15:26	Amy Lehr	1
12924	Mini-Ext. DRO DX, Column SiGel	ECY 97-602 NWTPH-Dx 06/97	1	173190030A	11/16/2017 12:30	Kayla A Yuditsky	1

**Sample Description:** DUP-1-WD-171108 Grab Groundwater  
Seattle Terminal  
3001 Elliott Ave - Seattle, WA

**Chevron Environmental Mgmt Co**  
**ELLE Sample #:** WW 9312925  
**ELLE Group #:** 1874268  
**Matrix:** Groundwater

**Project Name:** Seattle Terminal

**Submission Date/Time:** 11/10/2017 09:40  
**Collection Date/Time:** 11/08/2017

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit	Dilution Factor
<b>GC/MS Semivolatiles</b>		<b>SW-846 8270C SIM</b>	<b>ug/l</b>	<b>ug/l</b>	
14243	Benzo(a)anthracene	56-55-3	N.D.	0.010	1
14243	Benzo(a)pyrene	50-32-8	N.D.	0.010	1
14243	Benzo(b)fluoranthene	205-99-2	N.D.	0.010	1
14243	Benzo(k)fluoranthene	207-08-9	N.D.	0.010	1
14243	Chrysene	218-01-9	N.D.	0.010	1
14243	Dibenz(a,h)anthracene	53-70-3	N.D.	0.010	1
14243	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.	0.010	1

<b>GC Volatiles</b>		<b>ECY 97-602 NWTPH-Gx</b>	<b>ug/l</b>	<b>ug/l</b>	
08274	NWTPH-Gx water C7-C12	n.a.	N.D.	50	1

<b>GC Volatiles</b>		<b>SW-846 8021B</b>	<b>ug/l</b>	<b>ug/l</b>	
02102	Benzene	71-43-2	N.D.	0.5	1
02102	Ethylbenzene	100-41-4	N.D.	0.5	1
02102	Toluene	108-88-3	N.D.	0.5	1
02102	Total Xylenes	1330-20-7	N.D.	1.5	1

<b>GC Petroleum Hydrocarbons w/Si</b>		<b>ECY 97-602 NWTPH-Dx modified</b>	<b>ug/l</b>	<b>ug/l</b>	
12917	DX DRO C12-C24 w/ SiGel	n.a.	N.D. UJ	46	1
12917	DX HRO C24-C40 w/ SiGel	n.a.	N.D.	100	1

The recovery for a target analyte(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary. The client was contacted and the data reported.

## Sample Comments

State of Washington Lab Certification No. C457  
Carcinogenic PAHs have been reported for this sample

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

## Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14243	SIM SVOAs 8270C MINI	SW-846 8270C SIM	1	17318WAN026	11/29/2017 17:06	Kira N Klaassen	1
10466	BNA Water Extraction SIM	SW-846 3510C	1	17318WAN026	11/15/2017 08:00	Oswaldo R Sanchez	1
08274	NWTPH-Gx water C7-C12	ECY 97-602 NWTPH-Gx	1	17321A53A	11/17/2017 16:46	Brett W Kenyon	1
02102	Method 8021 Water Master	SW-846 8021B	1	17318C94A	11/17/2017 02:04	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	1	17318C94A	11/17/2017 02:04	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	2	17321A53A	11/17/2017 16:46	Brett W Kenyon	1
12917	NWTPH-Dx water w/Si Gel	ECY 97-602 NWTPH-Dx modified	1	173190030A	11/28/2017 15:50	Amy Lehr	1
12924	Mini-Ext. DRO DX, Column SiGel	ECY 97-602 NWTPH-Dx 06/97	1	173190030A	11/16/2017 12:30	Kayla A Yuditsky	1

**Sample Description:** Trip Blank-T-171108 NA Water  
Seattle Terminal  
3001 Elliott Ave - Seattle, WA

**Chevron Environmental Mgmt Co**  
**ELLE Sample #:** WW 9312926  
**ELLE Group #:** 1874268  
**Matrix:** Water

**Project Name:** Seattle Terminal

**Submission Date/Time:** 11/10/2017 09:40  
**Collection Date/Time:** 11/08/2017

CAT No.	Analysis Name	CAS Number	Result	Method Detection Limit	Dilution Factor
<b>GC Volatiles</b>		<b>ECY 97-602 NWT PH-Gx</b>	<b>ug/l</b>	<b>ug/l</b>	
08274	NWT PH-Gx water C7-C12	n.a.	N.D.	50	1
<b>GC Volatiles</b>		<b>SW-846 8021B</b>	<b>ug/l</b>	<b>ug/l</b>	
02102	Benzene	71-43-2	N.D.	0.5	1
02102	Ethylbenzene	100-41-4	N.D.	0.5	1
02102	Toluene	108-88-3	N.D.	0.5	1
02102	Total Xylenes	1330-20-7	N.D.	1.5	1

### Sample Comments

State of Washington Lab Certification No. C457

All QC is compliant unless otherwise noted. Please refer to the Quality Control Summary for overall QC performance data and associated samples.

### Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
08274	NWT PH-Gx water C7-C12	ECY 97-602 NWT PH-Gx	1	17318C94A	11/16/2017 15:22	Brett W Kenyon	1
02102	Method 8021 Water Master	SW-846 8021B	1	17318C94A	11/16/2017 15:22	Brett W Kenyon	1
01146	GC VOA Water Prep	SW-846 5030B	1	17318C94A	11/16/2017 15:22	Brett W Kenyon	1



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