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Final 2011 Site Investigation Completion Report

Former Unocal Edmonds Bulk Fuel Terminal

11720 Unoco Road

Edmonds, Washington

May 11, 2012

ARCADIS

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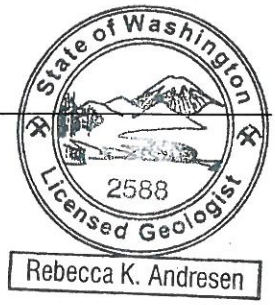

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Former Unocal Edmonds Bulk Fuel Terminal

11720 Unoco Road
Edmonds, Washington

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1. Introduction

On behalf of Chevron Environmental Management Company (Chevron), ARCADIS U.S., Inc. (ARCADIS) is pleased to submit this 2011 Site Investigation Completion (Report) for the Former Unocal Edmonds Bulk Fuel Terminal (Site), located at 11720 Unoco Road, Edmonds, Washington. The Site location is shown on **Figure 1**. This Report presents the data collected during the hydraulic evaluation activities completed pursuant to the Aquifer Testing Work Plan dated January 25, 2011 (ARCADIS, 2011a). Aquifer testing was conducted to collect the additional data needed to help assist in the selection, and eventual design of a potential remedial remedy for the Site.

Information and activities summarized in this report include:

- Field activities, summarizing the tidal study and aquifer test activities;
- Data summary of the tidal study and hydraulic conductivity testing and analysis, including hydraulic conductivity step tests, short and long duration hydraulic conductivity tests.

This report also presents a summary of the analytical results and field methods utilized during the investigation of light non-aqueous phase liquid (LNAPL) and petroleum hydrocarbon impacts in soils in the vicinity of Detention Basin No.2 (DB-2) as outlined in the Detention Basin No.2 Investigation Work Plan dated July 29, 2011 (ARCADIS, 2011b). Site layout is shown on **Figure 2**.

This report is not intended to address all assessment activities conducted at the Site under the current Agreed Order, but is a summary of the recent assessment and investigations described above. Additional Site investigation work, including additional monitoring well installation, is anticipated as part of the Feasibility Study (FS) preparation and will be described as part of revisions to the Draft FS Work Plan. A thorough discussion and evaluation of the location, concentrations, and distributions of Constituents of Concern (COCs) will be presented as part of a Conceptual Site Model (CSM) report, as an Interim Submittal prior to preparation and completion of the Draft FS. A schedule of deliverables will be included in the revised Draft FS Work Plan.

2. Background

2.1 Site Description

The Lower Yard occupies approximately 22 acres and lies east-southeast of Burlington Northern Santa Fe Railway Company (BNSF) property, south of the Edmonds Marsh (also known as the Union Oil Marsh) and a drainage ditch (Willow Creek), and north of the Upper Yard (**Figure 2**).

At its nearest point (the southwest corner of the Lower Yard), the Lower Yard boundary is approximately 160 feet from the Puget Sound shoreline. Two storm water detention basins (Detention Basin No.1 (DB-1) and DB-2) are located along the north and northeast boundaries of the Lower Yard. DB-1 borders Edmonds Marsh and Willow Creek and acts as a detention pond for overflow from DB-2 during storm events. DB-2 serves as a collection area from which Site stormwater is discharged into Willow Creek.

Currently, a stormwater system consisting of 12 storm drains collects surface water runoff and discharges directly into DB-2 via gravity flow. From DB-2, stormwater is discharged into Willow Creek under an Industrial Stormwater General Permit (SO3-002953C), and excess stormwater is stored in DB-1. When DB-1 is full, water from DB-1 is pumped to the DB-2 outfall. There are currently no permanent aboveground structures at the Site. A temporary storage shed is located along Unoco Road in the southern portion of the Lower Yard.

Previous structures in the Lower Yard included petroleum storage and transfer equipment (aboveground storage tanks and piping), two truck loading racks, several office buildings, a railcar loading/unloading station, a stormwater conveyance system including two 10,000-gallon stormwater detention tanks and two 500-gallon vapor recovery tanks, an air-blown asphalt plant, and an asphalt packaging warehouse.

2.2 Site History

Unocal operated the bulk fuel terminal from 1923 to 1991. Fuel was brought to the terminal on ships, pumped to the storage tanks in the Upper Yard, and loaded from the tanks into rail cars and trucks for delivery to customers. In addition, an asphalt plant operated at the Lower Yard from 1953 to the late 1970s.

In 2001, Unocal conducted an Interim Action in the Lower Yard, removing LNAPL and petroleum-impacted soil and groundwater from four areas of the Lower Yard. The results of the 2001 Interim Action are summarized in Lower Yard Interim Action As-built Report, Unocal Edmonds Terminal – Volume 1 (Maul Foster Alongi, Inc. [MFA] 2002). Additional Interim Actions conducted in 2003 included soil excavations in the Southwest Lower Yard and DB-1. Results of the 2003 Interim Action are summarized in the 2003 Lower Yard Interim Action As-Built Report, Detention Basin No. 1, Southwest Lower Yard, Metals Area 3, and Storm Drain Line Excavations – Volume 1 (MFA 2004). Previous excavations are shown on **Figure 2**.

In June 2007, Unocal entered into an Agreed Order with the Washington Department of Ecology (Ecology) to conduct an Interim Action in the Lower Yard (Ecology 2007). The Agreed Order (Ecology 2007) supersedes Agreed Order No. DE 92TC-N328, dated October 25, 1993. Specific objectives of the Interim Action as established in the Interim Action Report – Work Plan for 2007 Lower Yard Interim Action, Unocal Edmonds Bulk Fuel Terminal (Work Plan; SLR International Corporation [SLR] 2007a) included:

- Removal of soil with petroleum impacts in excess of the soil remediation levels which were established in the 2001 Work Plan for the Lower Yard
- Removal of LNAPL
- Extraction of groundwater that is in contact with LNAPL
- Removal of soil with arsenic concentrations in excess of the soil remediation levels which were established in the Work Plan (SLR 2007a)
- Remove the sediment in the drainage ditch (Willow Creek), at locations near the Site's two storm water outfalls, that failed 2003 toxicity tests
- Obtain the data necessary to determine if the remaining soil concentrations are sources of LNAPL on the groundwater table
- Obtain the data necessary to determine if the remaining soil concentrations will cause an exceedance of the groundwater cleanup levels (CULs) at the groundwater points of compliance (POCs)

- Obtain the data necessary to determine if the petroleum hydrocarbon concentrations in the groundwater beneath the Lower Yard will naturally attenuate to below the CULs at the groundwater POCs

The 2007 Agreed Order Interim Actions were conducted in two phases from July 2007 to April 2008 (Phase I), and July 2008 to October 2008 (Phase II). Phase I Interim Action work consisted of the removal of 108,000 tons of petroleum impacted soil for offsite disposal, and the removal of approximately 9,700 gallons of LNAPL. During Phase I construction activities, approximately 2 million gallons of groundwater were extracted, treated onsite, and discharged under a National Pollutant Discharge Elimination System (NPDES) Permit to Willow Creek. The complete results of the 2007 Phase I Interim Actions are summarized in Phase I Remedial Implementation As-Built Report, Unocal Edmonds Bulk Fuel Terminal Lower Yard (ARCADIS 2009).

Phase II Interim Action work consisted of the removal of 14,825 tons of petroleum impacted soil for offsite disposal and the removal of 131 gallons of LNAPL. During Phase II, approximately 520,000 gallons of groundwater were extracted, treated onsite, and discharged to Willow Creek under a NPDES permit. Phase II construction activities also included the removal of 2,000 tons of impacted sediments, and subsequent restoration of approximately 420 feet of Willow Creek. The complete results of the 2008 Phase II Interim Action are summarized in the FINAL – Phase II Remedial Implementation As-Built Report, Unocal Edmonds Bulk Fuel Terminal Lower Yard (ARCADIS, 2010).

In accordance with the Agreed Order (Ecology 2007), groundwater monitoring was initiated and is ongoing following completion of the interim remedial excavation activities. Groundwater sampling events were originally planned to be conducted every other month (bi-monthly) over a two year period at wells within three groundwater flow paths and the 21 POC wells. Groundwater flow paths were established within the interior of the Site and each groundwater flow path consisted of seven monitoring wells (an upgradient well, three source area wells, and three downgradient wells). The groundwater flow paths and the frequency of groundwater monitoring events were created to provide the data to utilize Ecology's Natural Attenuation Analysis Tool Package A, Modules 1, 2 and 3 (Tool Package A: Ecology 2005).

The locations of the wells inside the three groundwater flow paths were based on the presence of LNAPL on groundwater prior to remedial activities. Prior to the 2007/2008 Interim Action remedial excavations, the groundwater flow paths were believed to fit the established model of upgradient, source area, and downgradient wells. As a result

of the 2007/2008 Interim Action, remedial excavations extended beyond the mapped flow path areas, and it was determined that the resulting monitoring well arrangement was not suitable for use with Tool Package A (Ecology 2005).

As a result of the source removal and associated data collection, LNAPL no longer is observed across most of the Site and the flow paths as previously defined do not contain monitoring wells that could provide upgradient and downgradient water quality data in relation to specific source areas. Therefore the monitoring well plan outlined in the Agreed Order (Ecology 2007) was no longer applicable for a spatial evaluation of natural attenuation away from the source, as required for use with Tool Package A (Ecology 2005). As a result, revisions to the monitoring program were reviewed and approved by Ecology in December 2009. Since, the current monitoring well network is sufficient to monitor and evaluate the status of the overall dissolved-phase impacts. Therefore the stability of the Site impacted groundwater is being evaluated on a well-by-well basis, and the monitoring program needed to support this analysis was reduced accordingly.

Currently, groundwater sampling events are conducted on a quarterly basis, with POC wells sampled during first and third quarter events, and all Site wells (POC and interior wells) sampled during second and fourth quarter events. LNAPL has been present in one monitoring well (MW-510) from October 2009 until the present, with the exception of a single gauging event in June 2011. Current groundwater gauging data and analytical results are presented in **Appendix A**.

2.3 Site Geology

Five hydrostratigraphic units have been identified in the Lower Yard and are discussed in detail below:

- *2008 Fill*. The 2007-2008 Interim Action excavations were backfilled to 6 to 12 inches above the observed groundwater table in the open excavations with poorly graded coarse gravels (3/8-inch to 1-inch) with little to no fines. Backfill material above the coarse gravel to ground surface was a mixture of very fine to medium sand, trace silt, and fine to medium gravel materials.

- *1929 Fill*. This unit consists of silty sands with gravel and sandy silts with gravel. During the 2007-2008 Interim Action excavations subsurface materials encountered from ground surface to a depth of 8 to 15 feet below ground

surface (bgs) were mostly fill material placed circa 1929 or later, during the creation of the Lower Yard facility.

- *Marsh Deposits*. In many areas of the Lower Yard, beneath the 1929 Fill, there is a layer approximately 6 to 12 inches thick composed of silt and sandy silt with large amounts of organic matter such as peat, wood debris, and decomposing vegetation. This layer is encountered at depths ranging from 8 to 14 feet bgs, directly below the 1929 Fill material, and is interpreted to be representative of the former marsh horizon beneath the Lower Yard.

- *Beach Deposits*. Below the 1929 Fill and Marsh Deposits, a poorly graded sand formation of very fine to medium sand with fine gravel is present, containing organic material such as driftwood and seashells. This layer is interpreted to be representative of the former beach environment in the area prior to the creation of the Lower Yard.

- *Whidbey Formation*. This material is a poorly graded sand layer consisting of very fine to medium sand with fine gravel and is distinct from the overlying materials in the Lower Yard. It is present to the maximum explored depth of 41.8 feet bgs. This unit contains interbedded sand with silt, and interbedded silt and sandy silt are also present. The interbeds range in thickness from less than 1 inch to several feet, and appear to be laterally discontinuous. This unit is interpreted to be alluvium, and is likely part of the Whidbey Formation.

The current lithology of the Lower Yard consists primarily of 2008 Fill. The 2007 - 2008 excavations were extended to the depth of the Beach Deposits or Whidbey Formation materials. Remaining un-excavated areas are most likely 1929 Fill material, underlain by the hydrostratigraphic units described above.

3. Tidal Study Field Activities

A tidal study was conducted to better understand the effects of tidal changes in Puget Sound on groundwater within the Lower Yard, specifically to support evaluation of remediation alternatives in the upcoming FS as required by the Agreed Order (Ecology 2007). These activities will also help define possible changes to Site hydrogeology post- 2007/2008 Interim Action, and to better understand the possible interaction of groundwater and local surface water features.

The tidal study was completed from April 22 to May 9, 2011. Tidal study activities were conducted in accordance with the Aquifer Testing Work Plan (ARCADIS, 2011a). Data logging pressure transducers recording time, temperature, pressure, depth, conductivity, pH and salinity were installed in monitoring wells LM-2, MW-104, MW-122, MW-129R, MW-149R, MW-500, MW-501, MW-502, MW-515, MW-518, and MW-8R and at staff gauges TB, D-1, D-2, D-3, D-5 and D-6R, located in DB-1. A transducer was not installed in monitoring well MW-510 due to the presence of LNAPL in the well. Inadvertently, the transducer at MW-501 was not installed until May 5, 2011. Staff gauge D-4 was unable to be reached due to unstable surface conditions in the creek channel; therefore data were not collected at this location. Staff gauge D-6 was unable to be reached due to the high water level in DB-1.

A new staff gauge and transducer were installed at the west end of DB-1 on April 22, 2011. This staff gauge location is identified as D-6R. Staff gauge D-6R was surveyed at a later date for horizontal and vertical coordinates. All monitored well locations and staff gauge locations were surveyed to a common vertical datum prior to tidal study activities, with the exception of staff gauge location D-6R, which was surveyed upon completion of tidal study activities. Locations monitored during the study are presented on **Figure 3**.

During the installation of each transducer, a depth to water measurement was collected prior to transducer deployment and after each transducer was installed. The transducers were installed one foot above the bottom of each monitoring well, with the exception of well MW-122. Monitoring well MW-122 is a deep well at a total length of 40 feet bgs. The transducer at well MW-122 was installed approximately 15 feet below top of casing (btoc), or 25 feet from the bottom of the well casing, which is the total length of the transducer cable. All transducers installed at staff gauge locations were

installed as close to the creek bed as possible, at a depth sufficient to measure the extreme lows and highs of the tidal fluctuations.

Data were collected at 10 minute intervals. Periodically during the study, data were uploaded from the data logging transducers to ensure that the transducers were operating correctly and to compile the accumulated data. The transducer in monitoring well MW-122 was removed and replaced with a new transducer on May 5, 2011, due to a transducer malfunction. Data collected from MW-122 during the period from April 22 to May 5, 2011, are not included in the analysis due to the malfunction of the transducer, which was reading levels deeper than the total depth of the well. Data collected from MW-122 from May 5 to May 9, 2011 are presented.

On May 9, 2011, after 18 days of data accumulation, the transducers in the monitoring wells were removed. The Aquifer Testing Work Plan (ARCADIS 2011a) specified a 14 day monitoring period, but due to the malfunctioning transducer in well MW-122, the monitoring period was extended an additional 4 days to ensure a sufficient amount of data was collected. The data files were downloaded onto portable storage devices and data collection was stopped. Data from transducers installed at staff gauge locations were also downloaded onto portable storage devices for this time period, but were left in place to continue to record tidal data during the aquifer testing activities. Transducers installed at staff gauge locations were removed upon completion of aquifer testing activities.

A stilling well was originally planned to be installed in Puget Sound adjacent to the Site to monitor surface-water level changes in Puget Sound. Due to logistical difficulties with the installation it was not possible to install the stilling well. Instead, National Oceanic and Atmospheric Administration (NOAA) tidal data collected from the nearest available Puget Sound recording station No. 9447130 were used during the analysis of this study. This station is located on the shore of Elliot Bay in Seattle, Washington approximately 14 miles south of the Site. This gauging station represents the closest available monitoring station for the Puget Sound and the only available Puget Sound data to compare to Site data.

4. Tidal Study Results and Analysis

A tidal study was completed from April 22 to May 9, 2011. This time frame encompassed the end of a spring tide and a neap tide. The data from the tidal study were collected to evaluate the interactions and overall net gradient between the Puget Sound and groundwater at the Site, evaluate the potential for horizontal and vertical groundwater gradient reversals onsite, and measure and record salinity for improved understanding of transient salinity changes. These data will be used during remedy design and selection as part of the FS. Transducers were installed at monitoring wells and staff gauges across the Site as shown on **Figure 3**. The transducers were set to record water levels, salinity, temperature, and conductivity at 10-minute intervals. **Table 1** summarizes the minimum, maximum and average elevations and salinity concentrations and range in amplitude (if tidally influenced) at each monitoring well and surface water gauging location. Graphs depicting the tidal response, salinity concentrations and the Puget Sound elevations at each location are presented in **Appendix B**.

4.1 Magnitude of Water Level Changes

Tidal variations in water levels in the Puget Sound exert an influence on groundwater elevations at the perimeter of the Site. During the monitored period elevations of the Puget Sound ranged from an elevation of -4.84 feet above mean sea level (amsl) (minimum) to 9.28 feet amsl (maximum), as recorded at NOAA Station No. 9447130. Based on data collected during the tidal study, the Puget Sound had an average tidal amplitude of approximately 7 feet, and the amplitude varied from a minimum of 1.8 feet to a maximum of 14.1 feet.

Shallow monitoring wells with observable response to tidal influence indicated a range in amplitude from 0.07 foot to 1.15 feet. One deeper monitoring well was monitored (MW-122) and the response observed at this well indicated a range in amplitude from 0.02 to 0.33 foot (this well is completed in Whidbey Formation material). Staff gauges with an observable response to tidal influence indicated a range in amplitude from 0.02 foot to 3.73 feet.

4.2 Horizontal Hydraulic Gradients

The groundwater elevations from wells installed in 1929 Fill and 2008 Fill, except MW-501 which only had a partial data set, were used to evaluate the flow direction (gradient

angle and magnitude) during the 17 day monitoring period (Devlin, 2003). Horizontal gradients in the surficial materials measured during the tidal study period ranged in magnitude from 0.0053 to 0.0058 foot/foot (ft/ft) with direction towards the west-northwest. The horizontal groundwater gradient direction for the monitored period (17 days) is presented on **Figure 4**.

Results of the tidal study indicate that groundwater/surface water interactions occur at the northwestern Site boundary; therefore, the combined flow direction considering surface water and groundwater elevations were also evaluated. The horizontal gradient direction with the inclusion of the perimeter staff gauges (over the 17 day monitoring period, excluding MW-501) indicates a predominant flow direction to the west-northwest with a minor flow component to the northwest. This horizontal gradient direction including surface water for the monitored period is presented on **Figure 5**. No observed horizontal gradient direction reversals were observed during the monitored period.

4.3 Vertical Hydraulic Gradient

Monitoring wells MW-122 (deep well, in the Whidbey Formation) and MW-129R (shallow well, in the 1929 Fill material) are located adjacent to one another and were used to evaluate the vertical groundwater gradient component. During the monitored period, the vertical gradient component was always upward between MW-122 and MW-129R. The vertical gradient ranged from a minimum of 0.03 to 0.05 ft/ft with an average gradient of 0.04 ft/ft. The greatest gradient magnitude was observed at high tides and the lowest gradient magnitude was observed at low tides. These results indicate that a vertical gradient reversal was not observed during the monitored period.

4.4 Salinity

During the tidal study, salinity values observed at wells and staff gauges varied across the Site. At some locations salinity variations were observed to correlate with tidal stage at wells and staff gauges with observable tidal influence. The highest observed value of salinity at a monitoring well was measured at LM-2 with values ranging from 8.94 to 12.32 practical salinity units (PSU). This well had no measureable tidal influence during the monitoring period. At the other Site shallow monitoring wells salinity was significantly lower during the monitored period, ranging from 0.11 to 0.69 PSU. At the deeper well MW-122, the salinity was constant, varying from 0.38 to 0.39 PSU.

During the monitored period, the staff gauges exhibited a response to tidal fluctuations except D-6R, located in DB-1. Salinity at the tidally influenced staff gauges ranged from less than 0.1 to 30.08 PSU. Values of salinity at D-6R ranged from 1.47 to 1.80 PSU. Both elevations and salinity values observed at D-6R appeared to be influenced by precipitation events. Salinity variations due to tidal response are observed at the staff gauges (except D-6R) indicating that an exchange of water is occurring with the Puget Sound and Willow Creek.

4.5 Tidal Efficiency

The tidal efficiency at each monitoring well was estimated from transducer data. Tidal efficiency indicates the extent to which groundwater levels in a well are influenced by tidal fluctuations in a nearby surface water body, and is the ratio of groundwater level fluctuations to surface water level fluctuations. Factors that influence tidal efficiency include the distance from the well to the surface water body, the length of the well screen relative to the thickness of the water-bearing zone (i.e., fully-penetrating versus partially penetrating wells), transmissivity of the water-bearing zone in which the well is screened, and presence of heterogeneous soil types. Tidal efficiency is scaled from zero to one, with higher values indicating greater groundwater-surface water interactions.

For this study, the tidal efficiency at each monitoring well was calculated during each tidal cycle of the monitored period. The average tidal efficiency for a well was then calculated based on values from each tidal cycle. Results show that tidal efficiency varied between approximately 0.003 (LM-2 and MW-515) and 0.09 (MW-149R). The average tidal efficiency of all the wells studied was 0.03. The values are relatively low, likely due to the low permeability and heterogeneity of material at the Site. The relatively low tidal efficiency values observed at Site monitoring wells indicates that groundwater levels at the Site are not significantly influenced by tidal changes in Puget Sound.

The table below summarizes estimated tidal efficiency values for Site monitoring wells and presents minimum and maximum tidal efficiency and the relative location of each monitoring point.

Tidal Efficiency Summary

Well ID	Tidal Efficiency			Relative Location of Monitoring Point, Approximate Distance to Puget Sound (miles)	Soil Type at Monitoring Point
	Min	Max	Average		
MW-8R	0.01	0.03	0.02	Northwest boundary, 0.20	2008 Fill
MW-104	0.04	0.07	0.05	Northwest boundary, 0.23	1929 Fill
MW-122	0.02	0.03	0.02	Southeast boundary, 0.35	Whidbey Formation
LM-2	0.001	0.02	0.003	Middle of Site, northern boundary, 0.34	1929 Fill
MW-129R	0.004	0.03	0.01	Southeast boundary, 0.35	1929 Fill
MW-149R	0.08	0.11	0.09	Northwest boundary, 0.12	2008 Fill
MW-500	0.001	0.02	0.01	Southeast boundary, 0.36	1929 Fill
MW-502	0.003	0.02	0.01	Middle of Site, southern boundary, 0.28	1929 Fill
MW-515	0.001	0.01	0.003	Northwest boundary, 0.25	2008 Fill
MW-518	0.04	0.06	0.05	Northwest boundary, 0.25	2008 Fill
MW-501	0.002	0.01	0.01	Southeast boundary, 0.35	1929 Fill

4.6 Tidal Study Observations

The following observations and conclusions were made after review and analysis of the tidal study.

- Monitoring wells MW-8R, MW-104, MW-122, MW-149R, and MW-518 appeared to exhibit a response to the tidal fluctuations in the Puget Sound during the monitored period.

- Monitoring wells MW-500, MW-501, MW-502, MW-515 and LM-2 did not appear to exhibit a response to the tidal fluctuations in the Puget Sound during the monitored period.

- A vertical upward gradient was observed in the data set from MW-129R/MW-122.

- LM-2 exhibits no measurable tidal influence but was observed to have the highest salinity concentrations measured at a monitoring well during the tidal study.

- Water from the Puget Sound is mixing with water in the Willow Creek as indicated by the water level response to tidal fluctuations and varying salinity concentrations observed at the staff gauge locations. This is also occurring at the tidally influenced monitoring wells; however, the magnitude of responses to tidal fluctuations and salinity concentrations are significantly less at the wells than observed in the Willow Creek.

- Insufficient data were collected from the Southeast Lower Yard during the monitored period to determine the local groundwater and surface water connection. Further transducer studies are anticipated to be conducted in the vicinity of monitoring wells MW-135, MW-136, MW-500, and MW-501.

- At locations where a monitoring well was located in the vicinity of a staff gauge, groundwater elevations were compared to surface water elevations. During the monitored period:

    - The horizontal component of the hydraulic gradient is towards staff gauge TB (located in the tidal basin, north of MW-20R) in Willow Creek; except at extreme high tide, when it appears that the surface water elevation at staff gauge TB is greater than groundwater elevation at monitoring well MW-104 and horizontal gradient may be directed towards the interior of the Site.

    - The horizontal component of the hydraulic gradient is towards staff gauge D-5 in Willow Creek at low tide. However, during high tide, surface water elevation at staff gauge D-5 is greater than groundwater elevation at monitoring well MW- 518 and horizontal hydraulic gradient may be directed toward the Site.

    - Surface water elevations at staff gauge D-6R and groundwater elevations at monitoring well LM-2 indicate that surface water elevations in DB-1 are slightly higher than groundwater elevations at LM-2 during both high and low tides. This indicates that the hydraulic gradient is toward LM-2 from DB-1 regardless of tidal stage.

- At staff gauge locations during the monitored period:
    - At staff gauges D-1, D-2, D-3 and D-5 surface water flow is towards the Puget Sound during low tide and flow is directed towards Edmonds Marsh during high tide. During some tidal periods, the surface water elevations at these locations are greater than that of the Puget Sound during both low and “low” high tides.
    - At staff gauge D-6R (DB-1) an observable tidal influence was not observed.
    - At staff gauge TB surface water flow is towards the Puget Sound during low tide and flow is directed towards Willow Creek during high tide.

5. Hydraulic Conductivity Testing Field Activities

Hydraulic conductivity tests were performed at the Site in select monitoring wells in order to evaluate the hydraulic conductivity of saturated material at the Site. The data will later be used in preparation of a revised CSM as well as for a future evaluation of remediation alternatives in the FS.

Hydraulic conductivity testing was conducted from May 9 to May 20, 2011, and on September 29, 2011. The testing consisted of hydraulic conductivity step tests at ten wells from May 9 to 13, 2011, followed by short duration hydraulic conductivity tests at seven wells conducted from May 16 to 19, 2011, and then a long duration hydraulic conductivity test conducted at one well over a 24 hour period (May 19 to 20, 2011). Tested wells included LM-2, MW-104, MW-129R, MW-149R, MW-500, MW-518 and MW-8R (**Figure 3**). Step tests were completed prior to short duration tests.

The step tests were conducted to determine if and at what rate the wells could be pumped at a constant rate while maintaining a steady-state drawdown, and to establish target pumping rates for the short duration tests. The step tests were conducted using a submersible pump with a control box or a peristaltic pump with down-hole tubing to pump the well. Rising head slug tests were conducted on September 29, 2011, on monitoring wells where short duration hydraulic conductivity tests could not be adequately completed due to their low yields (LM-2, MW-129R and MW-500).

All tested wells are constructed of 2-inch diameter, Schedule 40 polyvinyl chloride (PVC). The slotted screen size in the wells is 0.01-inches with the exception of wells LM-2 and MW-104 which have 0.02-inch slotted screen sizes. Borehole diameters for the tested wells are 8-inches with the exception of MW-104 which was constructed in a 10-inch diameter boring. All wells were constructed with a sand filter pack extending from the bottom of the boring to at least 1-foot above the top of the screen. Well construction information for the tested wells is summarized in **Table 2**.

Hydraulic conductivity step tests were scheduled to begin at a rate of approximately 0.25 gallons per minute (gpm), increasing to a rate of 0.5 gpm after 15 minutes of pumping, 1.0 gpm after 30 minutes of pumping, and 1.5 gpm after 45 minutes of pumping. However, the target rates were not achievable at every well and deviations are discussed below. At each pumping rate, water level measurements were collected every 30 seconds for the first five minutes of pumping, every two minutes for the next five minutes of pumping, and every five minutes for the next 10 minutes of pumping.

The step tests were typically terminated after 60 minutes of pumping. Hydraulic conductivity step test data are summarized in **Table 3**. Graphs presenting the step test data are included in **Appendix C**.

After step tests were completed at each well and a target pumping rate was determined, short duration hydraulic conductivity tests were conducted in seven wells. Short duration tests were conducted at a constant pumping rate in order to estimate hydraulic conductivity within the1929 Fill and 2008 Fill materials at the Site. Tested wells included LM-2, MW-104, MW-129R, MW-149R, MW-500, MW-518 and MW-8R. Wells LM-2, MW-104, MW-129R and MW-500 are screened in 1929 Fill material, and wells MW-149R, MW-518 and MW-8R are screened in 2008 Fill material. The data collected from the short duration tests would also be used to determine which well to use for the long duration test.

In general, short duration tests were conducted using a submersible down-hole pump in order to reach the target extraction rate as quickly as possible and with as few rate adjustments as possible. This is done in order to analyze drawdrown at the specified rate without interference from drawdown during the time interval between achieving each targeted pumping rate. The target extraction rate was then maintained throughout the duration of the test. In some instances, the water level in the well would draw down to the pump intake and in those cases the extraction rate was reduced in order to extend the test.

Manual water level measurements were collected every 30 seconds for the first five minutes of the test, every two minutes for the next 10 minutes of the test, and every five minutes for the remainder of the test. In some cases, short duration tests could not be adequately completed because steady-state pumping rates could not be maintained due to low groundwater yield. In these cases, rising head slug tests were performed instead. Rising head slug test methodology is described below. Short duration test data are summarized in **Table 4**. Graphs presenting the short duration test data are included in **Appendix D**.

A long duration hydraulic conductivity test was conducted for 24 hours at monitoring well MW-8R. The objective of the long duration test was to confirm interpretations made during the short duration hydraulic conductivity test, obtain estimates of storage parameters, and evaluate responses in other wells to long-term pumping. Monitoring well MW-8R was selected to perform the long duration test because it is located along the Site boundary and is installed in a large 2007-2008 excavation area. These characteristics make MW-8R a suitable location to test the effectiveness of a potential

groundwater capture system in areas of 2008 Fill material, and represents the upper design limit for pumping versus drawdown. The long duration test was conducted using a submersible down-hole pump to pump the well over a period of 24 hours. The target extraction pumping rate was reached as quickly as possible and was maintained throughout the test. The flow rate was confirmed every hour using a flow totalizing meter and manually measuring the pump discharge rate.

Manual water level measurements were collected every 30 seconds for the first five minutes of pumping, every 2 minutes for the next six minutes of pumping, every five minutes for the next 20 minutes of pumping, every 15 minutes for the next 60 minutes of pumping, every 30 minutes for the next two hours of pumping, and every hour for the remainder of the test. Pressure transducers were in installed monitoring well MW-8R, as well as surrounding wells MW-521, MW-522 and MW-523 during the duration of the test. The long duration test data are summarized in **Table 5**. Graphs presenting the long duration test data are included in **Appendix E**.

5.1 Hydraulic Conductivity Test Deviations

This section describes the deviations that occurred during the hydraulic conductivity testing. During the step test conducted at well MW-104 on May 11, 2011, data were collected at flow rates of 0.5 and 1.0 gpm, however, a flow rate of 1.5 gpm could not be achieved due to pump failure. Sufficient data had been collected to estimate hydraulic conductivity values at this well, so no further effort was made to achieve the 1.5 gpm rate.

During the step test conducted at well MW-129R on May 12, 2011, data were collected at a flow rate of 0.25 gpm. However, the test was terminated early because the well pumped dry at the next stepped flow rate of 0.5 gpm. A submersible pump was used during this test.

On May 10, 2011, a step test was conducted on well MW-500. In order to achieve and maintain a lower pumping rate, a peristaltic pump (which is capable of maintaining a pump rate below 1 gpm) was used to perform this test. Step test data were collected at rates of 0.1 and 0.19 gpm, the maximum flow rate of the pump, but stabilized drawdown was not achieved and the test was terminated. The step test at MW-500 was replicated on May 12, 2011, using a 2-inch submersible pump. Data were collected at a flow rate of 0.25 gpm before the well went dry at a flow rate of 0.5 gpm.

Step testing conducted at well LM-2 on May 11, 2011, was terminated after the well went dry approximately 30 minutes after one step was completed at a flow rate of approximately 0.25 gpm. These data were not included in the analysis because a stabilized drawdown could not be achieved. On May 13, 2011, the step test was repeated with three lower steps at flow rates of 0.1, 0.15 and 0.18 gpm. Stabilized drawdown between pumping rates of 0.18 and 0.25 gpm was not reached at well LM-2. A peristaltic pump was used during this test.

During the step testing conducted at well MW-8R on May 12, 2011, data were collected at flow rates of 0.25 and 0.5 gpm. However, the tubing ruptured on the submersible pump when the flow rate was increased to 1.5 gpm and the test was terminated. Step testing was repeated at well MW-8R on May 18, 2011, and data were collected at flow rates of 2, 4 and 5 gpm.

During the short duration test at MW-500, the well was pumped with a submersible pump and the well went dry after pumping at 0.30 gpm. The test was restarted at a lower rate (0.25 gpm) with a peristaltic pump to determine if steady-state drawdown could be achieved, but the well was also pumped dry at the lower rate. A lower pumping rate could not be established at a steady-state drawdown, so short duration testing was abandoned for rising head slug tests.

During the short duration test at LM-2, the well was pumped with a submersible pump at rates of 0.30 and 0.20 gpm to determine if steady-state drawdown could be achieved. The well was purged dry at both rates.

5.2 Rising Head Slug Testing Methods

Rising head slug tests were conducted on September 29, 2011, on those monitoring wells where short duration hydraulic conductivity tests could not be adequately completed due to their low yields (LM-2, MW-129R and MW-500). Slug tests were conducted by inserting an Aqua Troll 200® datalogging transducer into the monitoring well, to a depth of approximately 0.5 foot above the bottom of the well and allowing water levels to equilibrate. A six foot long, 2-inch diameter PVC bailer was then inserted into the well as far into the water table as possible without disturbing the transducer.

Manual depth to water measurements were collected prior to deploying the transducer and bailer, and again after the transducer and bailer were inserted into the well. The bailer was then removed from the well as rapidly as possible, removing as much of the

water column as possible. The transducer was then left in the well to record water level data during well recharge. Dataloggers were left in the wells for a minimum of two hours, or until the depth to water level in the well had recharged to within 90 percent of the static water level.

6. Hydraulic Conductivity Test Results and Analysis

As noted in Section 5, a series of hydraulic conductivity tests were conducted between May 12 and September 29, 2011 in order to estimate hydraulic conductivity. Short duration hydraulic conductivity (approximately 60 minutes) pumping tests were conducted in wells LM-2, MW-104, MW-129R, MW-149R, MW-500, MW-518 and MW-8R between May 12 and May 17, 2011. A long duration hydraulic conductivity test was conducted at well MW-8R from May 19 to May 20, 2011. And, three falling head slug tests were conducted using wells LM-2, MW-500 and MW-129R on September 29, 2011.

The estimated minimum, maximum, and arithmetic mean for the hydraulic conductivity values (in feet per day [ft/day]) for each tested well are summarized in the table below.

Summary of Hydraulic Conductivity Results

Tested Well	Minimum Estimated Hydraulic Conductivity (ft/day)	Maximum Estimated Hydraulic Conductivity (ft/day)	Arithmetic Mean Hydraulic Conductivity (ft/day)
LM-2	0.3	0.4	0.4
MW-104	7.5	15	11
MW-129R	0.2	0.5	0.3
MW-149R	5.9	5.9	5.9
MW-500	0.05	0.1	0.1
MW-518	10	17	13
MW-8R	186	345	259

Well construction information for the tested wells and the observation wells are summarized in **Table 2**. Available boring logs for each of the wells are included as **Appendix F**. The well development history was unknown at the time of this analysis.

The analyses and results for the short duration tests, long duration test, and slug tests are presented below.

6.1 Short Duration Hydraulic Conductivity Test Analysis

For wells LM-2, MW-104, MW-129R, MW-149R, and MW-518 the single rate 60 minute test data were used for the analyses. However, for wells LM-2 and MW-500 the single rate data were not suitable for analyses; therefore, the initial step from the step tests was used.

Using the water level head data and the pumping rates, transmissivity (*T*) values were estimated for the near well portions of the aquifer using two analytical methods: Walton method and Theis solution. The Walton method used a spreadsheet-based model of the specific capacity test reduction technique described in the *Selected Analytical Methods for Well and Aquifer Evaluation* (Walton 1962). The AQTESOLV computer software was used to solve for *T* using the Theis (1935) solution. The results from these solutions and analysis are summarized in Table G-1 of **Appendix G**.

Following the analyses, hydraulic conductivity (*K*) was estimated by dividing the transmissivity (*T*) by the saturated thickness of the well for each of the tested wells (using consistent units). Due to short stress period and low stress rate, the saturated interval of the well was used in lieu of the entire saturated aquifer thickness.

6.2 MW-8R Long Duration Hydraulic Conductivity Test Analysis

The water level data and the pumping rate information collected during the long duration (24 hour) hydraulic conductivity test conducted on monitoring well MW-8R was used to estimate *T* and *K* for the fill material in the gravelly sand (Phase I excavation backfill) in the vicinity of MW-8R. Drawdown in MW-8R was approximately 0.6 foot after 24 hours of pumping at 5 gpm and was slightly influenced/complicated by tidal influence. The tidal efficiency at MW-8R is approximately 2 percent, as noted on the table on page 12, and had negligible influence on the test results. Observation well data were also collected from wells MW-521, MW-522, and MW-523; however, the displacement in these wells was insufficient to analyze.

Three solutions were used to estimate *T* and *K*: the Walton method (Walton 1962), the Theis method and the Theis Agarwal method using AQTESOLV. Hydraulic conductivity was estimated to range from 186 to 345 ft/day with an arithmetic mean of 259 ft/day within the area of 2008 Fill material (primarily sandy gravel). The results from these solutions are summarized in Table G-1 of **Appendix G.** Long duration test analyses are also included in **Appendix G.**

6.3 Slug Test Analysis

At well locations LM-2, MW-500 and MW-129R, the hydraulic conductivity was estimated using results from the step tests and/or short duration tests. However due to the low permeability at those locations, slug tests were completed to verify the results.

Both Bouwer and Rice (1976) and Dagan (1978) solutions were used to analyze the response data to provide a reasonable range of possible hydraulic conductivity values. The hydraulic conductivity values were derived from each well and ranged from 0.05 to 0.4 ft/day. The results from these solutions are summarized in Table G-1 of **Appendix G.** Slug test analyses are also included in **Appendix G**.

Note that that slug tests can be heavily impacted by drilling-induced disturbances (e.g., well skin and borehole damage) and insufficient well development. The impacts and effects caused by these near well disturbances are difficult to avoid when performing and analyzing slug test results.

7. Summary/Conclusions of Hydraulic Conductivity Testing and Tidal Study Results

Results of the tidal study indicate that the perimeter wells (located within approximately 62 feet of the property boundary) are tidally influenced. Wells monitored during the tidal study indicate a higher tidal efficiency for northwest boundary wells adjacent to the Puget Sound versus southeast boundary wells that are adjacent to the marsh. Analysis of the horizontal hydraulic gradient indicates an overall horizontal gradient direction to the west-northwest over the entire tidal study period. An upward vertical gradient is indicated by the results from MW-122/MW-129R. It is anticipated that further transducer studies will be conducted in the vicinity of monitoring wells MW-135, MW-136, MW-500, and MW-501 to better understand the horizontal hydraulic gradient in the southeast Lower Yard.

Results from hydraulic conductivity testing reflect the heterogeneity of the subsurface due to the 1929 Fill and 2008 Fill materials which comprise the surficial materials. The results from the hydraulic conductivity testing indicate that the hydraulic conductivity estimates vary and correspond to the material in which the well is completed. The geometric mean of the hydraulic conductivity for wells completed in the 1929 Fill (LM-2, MW-129R, MW-500) compare well and indicates that the 1929 Fill is of much lower permeability than wells completed in the 2008 Fill material. Wells completed in the 2008 Fill (including MW-8R, MW-129R and MW-518) have relatively higher hydraulic conductivity values than those completed in the 1929 Fill. One exception to this is MW-104 which is completed in the 1929 Fill but has a higher hydraulic conductivity.

Additional Site monitoring wells will be installed in the southeastern portion of the Lower Yard, in the vicinity of soil impacts located adjacent to the Washington State Department of Transportation (WSDOT) stormdrain, and downgradient of monitoring wells LM-2 and MW-510 in order to collect data necessary for development of the FS.The additional data will be evaluated with the data collected during the 2011 testing activities to develop a CSM for the Site, which will be submitted as an interim deliverable prior to the FS.

8. Soil Boring Advancement

Additional Site Investigation activities were conducted from September 22 to 25, 2011, as outlined in *Detention Basin No.2 Investigation Work Plan* (ARCADIS, 2011b). Soil borings were advanced to the north, south, east and west of DB-2 and on the east bank of Willow Creek to determine the extent of LNAPL-impacted soil. Permanent piezometers were installed in select borings to collect fluid-level data in the investigation area.

Seventeen soil borings were advanced in the vicinity of DB-2, as shown on **Figure 6**. Eight of the borings were converted into piezometers. The table below summarizes the locations of piezometer installations.

Boring ID	Piezometer ID	Boring ID	Piezometer ID	Boring ID	Piezometer ID
B-1	P-9	B-7	P-12	B-13	P-15
B-2	--	B-8	--	B-14	--
B-3	--	B-9	P-13	B-15	--
B-4	P-11	B-10	--	B-16	P-16
B-5	P-10	B-11	P-14	B-17	--
B-6	--	B-12	--		

Piezometers P-9 through P-12 and borings B-2, B-3, B-6 and B-8 were installed to the south of DB-2, between DB-2 and the 2007-2008 excavation areas A4, B6, B8 and B20. Piezometer P-16 and boring B-17 were installed to the north of DB-2 on the berm separating DB-2 and DB-1. Piezometers P-13, P-14 and P-15 were installed to the northwest of DB-2, between DB-2 and the 2008 sediment removal excavation area, with P-14 installed within 10 feet of monitoring well MW-510. Piezometer P13 was installed through the 2:1 sloped sidewall of excavation area A4/B8 (ARCADIS, 2009), where the top 5-feet of the boring was installed in 2008 Fill material, and below 5 feet the boring was installed in the Whidbey Formation material.

Borings B-10, B-12 and B-14 were installed to the northwest of DB-2 on the southeast bank of Willow Creek, within the sediment removal excavation area. Soil boring B-15 was installed to the north of DB-2 on the access road at the north end of DB-1. This road was constructed over the north end of DB-1 during Phase II excavation activities, and is constructed of 2008 Fill material.

Soil borings were advanced using a direct push drill rig. Borings B-10, B-12 and B-14 were installed on the southeast slope of Willow Creek were installed using a hand auger, due to logistical issues associated with heavy equipment mobilizing down to and operating along the creek bank. Soil borings were completed to a minimum depth of 15 feet bgs in order to reach a depth greater than that reached during the 2007-2008 excavation activities; native non-backfill material was encountered in every boring. Hand auger locations B-10, B-12 and B-14, located on the bank of Willow Creek were installed at elevations of 6.8, 7 and 7.5 feet amsl, respectively, and were advanced to 4 feet bgs with the final extent of the borings at elevations of 3.0, 3.5 and 2.8 feet amsl. Historical groundwater elevations in the nearest monitoring well (MW-510) have ranged from 5.24 to 7.65 feet amsl. Boring locations where piezometers were not installed were backfilled with hydrated bentonite chips.

8.1 Lithology

Lithology encountered during soil boring advancement ranged from gravel to silt. The soil types encountered from ground surface (generally approximately 13 feet amsl) to 6 to 12 feet bgs (approximately 7 to 1 feet amsl) were 2008 Fill and 1929 Fill. In general, the 2008 and 1929 Fill layers are underlain by the Whidbey Formation material. Marsh Deposit layers were encountered in various borings near the interface of the 2008 and 1929 Fill layers and the Whidbey Formation layers.

Marsh Deposit layers were encountered in seven of the 17 boring locations (B-1, B-5 through B-7, B-11, B-13 and B-16). Depths ranged from 4 feet to 10.75 feet bgs (approximately 5.5 to 1.5 feet amsl), with the majority of the Marsh Deposit layers encountered between 7.5 and 10 feet bgs (4.5 to 5.5 feet amsl). Boring logs are included in **Appendix H.** Cross sections of the DB-2 investigation area are included as **Figures 7 through 10**.

8.2 Light Nonaqueous Phase Liquid Presence in Soil Borings

LNAPL was observed in eight boring locations (B-6, B-7, B-8 and P-11 through P-15) during boring installation. Two types of LNAPL were encountered: residual LNAPL and LNAPL-saturated soils. Soils coated and/or stained with LNAPL, but with no liquid LNAPL present were referred to as residual LNAPL. Residual LNAPL, where present, was generally observed as streaks or blebs in the soil cores and was not observed continuously within a soil layer in any of the boring locations. Soils with LNAPL entrapped within the soil pore spaces, which became fluid when the soils were disrupted, were referred to as LNAPL-saturated soils. LNAPL-saturated soils, where

present, were generally not observed to be in continuous layers in the soil cores. The following describes where LNAPL was observed and LNAPL was not observed. LNAPL-saturated soil was encountered in boring B-4 in a 2-inch layer at a depth of 10 feet bgs (4 feet amsl) in silty sand material. Piezometer P-11 was installed in boring B-4 in order to collect fluid level data.

Residual LNAPL was found in boring B-6 from 9 to 9.5 feet bgs (4.5 to 4 feet amsl) in a highly organic peat layer of Marsh Deposit material with a high silt content that was black in color. The residual LNAPL was discontinuous and found only within the peat layer.

Discontinuous residual LNAPL was encountered in boring B-7 from 7.5 to 8 feet bgs (5.5 to 5 feet amsl) in a highly organic peat layer of Marsh Deposit material with silt. Piezometer P-12 was installed in boring B-7 in order to collect fluid level data.

Discontinuous LNAPL-saturated soils were observed in boring B-8 from 8.5 to 10 feet bgs (4.5 to 3 feet amsl) in 1929 Fill material. Discontinuous LNAPL- saturated soils were also observed from 10.5 to 12 feet bgs (2.5 to 1 feet amsl) in Marsh Deposit material in this same boring.

LNAPL-saturated soil was encountered in boring B-9 from 8.5 to 9.5 feet bgs (4.5 to 4 feet amsl) and 11 to 11.5 feet bgs (2 to 1.5 feet amsl), in Whidbey Formation material. LNAPL saturated soils were continuous at these depths. Piezometer P-13 was installed in boring B-9 in order to collect fluid level data.

Discontinuous LNAPL-saturated soils were observed in boring B-11 from 7.25 to 7.75 feet bgs (5.75 to 5.25 feet amsl) in 1929 Fill material. A 3-inch layer of LNAPL-saturated soils were encountered in boring B-11 at 10.25 feet bgs (2.75 feet bgs). Piezometer P-14 was installed in boring B-11 in order to collect fluid level data.

Discontinuous residual LNAPL was encountered in boring B-13 at a depth of 7 to 7.75 feet bgs (6 to 5.25 feet amsl) in 1929 Fill material and was black in color. This layer was encountered directly above a 3-inch layer of peat in Marsh Deposit material. Piezometer P-15 was installed in boring B-13 in order to collect fluid level data. Boring logs are included in **Appendix H.**

Generally LNAPL was observed within the seasonal high and low groundwater table “smear zone”. LNAPL was observed at residual or saturated levels (as described above), but always within the soil matrix. LNAPL was not observed independent of the

soil matrix as un-emulsified asphalt or thick layers of uninterrupted LNAPL as found in adjacent excavation areas A4/B8 (ARCADIS 2009) and DB-1 (MFA 2004).

9. Soil Sample Collection and Analysis

During soil boring installation soils were classified using the Unified Soil Classification System (USCS) by an ARCADIS geologist. Field screening of soil samples was conducted with a photoionization detector (PID), as well as visual observations of impacted soil, visual observations for the presence of LNAPL or sheen, and/or odor. Depending on field screening indications, three and eight soil samples were collected from each boring for laboratory analysis. Samples collected for laboratory analysis were placed in laboratory-provided containers and stored in an ice-chilled cooler prior to delivery to Lancaster Laboratories in Lancaster, Pennsylvania. PID readings, soil types, and other pertinent geologic data were recorded on the boring log and are presented in **Appendix H**.

Soil samples were submitted to a state certified laboratory and analyzed for the following constituents, per the Sampling and Analysis Plan (SAP; Appendix L of the Agreed Order [Ecology 2007]):

- Benzene by United States Environmental Protection Agency (USEPA) Method 8021B
- Gasoline-range organics (GRO) by Ecology Method NWTPH-Gx
- Diesel-range organics (DRO) and heavy oil-range organics (HO) by Ecology Method NWTPH-Dx (after silica gel cleanup)
    - Samples that contained detectable DRO and/or HO concentrations were also analyzed for carcinogenic polycyclic aromatic hydrocarbons (cPAHs) by USEPA Method 8270C

Additional geotechnical samples were obtained from each boring located within smear zone soils. Undisturbed soil samples were collected using an acetate liner from the direct push rig, and were then capped, taped and submitted for the following properties:

- Grain size analysis by ASTM International Method D422
- Porosity by Method SW 9100.

9.1 Analytical Results

A total of 78 samples from 17 soil borings were collected for analytical analysis of petroleum hydrocarbons. Twenty-two of these samples exceed Site Remediation Levels (RELs) for total TPH and/or CULs for total cPAHs (adjusted for toxicity). No samples exceeded Site CULs for benzene. The CULs for benzene and total cPAHs adjusted for toxicity are 18 and 0.14 milligrams per kilogram (mg/kg), respectively, and the REL for total TPH is 2,975 mg/kg. Soil CULs and RELs are summarized in **Table 6**.

Soil samples collected from soil borings B-4 through B-11, B-13, B-16 and B-17 contained petroleum hydrocarbon concentrations greater than one or more Site CUL/REL. Soils samples with concentrations exceeding CULs/RELs were collected from 4 feet bgs in borings B-8, B-11, B-16 and B-17 to 14 feet bgs in boring B-8. The soil sample collected from 0.5 to 1 foot bgs in boring B-10 along the Willow Creek bank exceeded the CUL for cPAHs and; no other sample collected along the Willow Creek bank contained concentrations exceeding CULs/RELs.

Sixteen of the 78 samples collected for laboratory analysis contained concentrations of total TPH exceeding the REL of 2,975 mg/kg. Total TPH is calculated by summing the concentrations of GRO, DRO and HO. If one or more of the TPH constituents was reported at concentrations less than laboratory detection limits (non-detect), then half of the reporting limit value for that constituent was added to the total. The detected concentrations of total TPH in soil samples collected during this investigation ranged from 220,400 mg/kg in the sample collected from boring B-6 at a depth of 9 to 9.5 feet bgs (B6-9-9.5), to 4,413 mg/kg in the sample collected from boring B-4 at a depth of 9.5 to 10 feet (B4-9.5-10). Sixty-two of the 78 soil samples did not contain total TPH in excess of the REL, and 18 of the 78 soil samples did not contain concentrations greater than the laboratory detection limits.

Thirteen of the 16 samples with concentrations of TPH in excess of the RELs were not observed to contain LNAPL. In addition, the following field screening indicators did not support the high TPH concentrations reported: no sheen was produced when wetted, no hydrocarbon-like odor was detected, and roots and other organics observed in the soil column were clear to white with no indication of petroleum uptake.

In peat samples where LNAPL was visually observed to be present either within or above the layer, the organic material was stained black, and LNAPL could be observed within the root structure. Samples with high TPH concentrations and no observable field indications, such as B-5-9-9.5 collected in boring B-5 at a depth of 9 to 9.5 feet

bgs, and at boring B-17 at a depth of 4 to 4.5 feet bgs, contained very high concentrations of organic matter (peat). This peat was encountered at many locations, some where LNAPL was present, and others where there was no indication of petroleum impacts, with widely varying analytical results. Both organic rich samples from B-5 and B-17 contained concentrations of total TPH in excess of 20,000 mg/kg. The chromatograms of these two samples do not exhibit a strong petroleum hydrocarbon signature like that of sample B-11-7.5-8, where visual observations of LNAPL were recorded. The peat signature on the chromatogram would fall within the range consistent with both diesel and heavy oil (C16 through C34) causing an interference and possible "false positive" in the TPH range. A more detailed forensic analysis including high resolution gas chromatography and mass spectrometry (GC/MS) to identify biomarkers such as sterols must be completed to further assess this potential interference. Laboratory data reports and chromatograms from these three samples are included in **Appendix I.**

As per the (SAP) (SLR 2007b), only samples that contained detectable concentrations of DRO were analyzed for cPAHs. The seven cPAH congener concentrations were adjusted for toxicity according to the method outlined in *Air Toxics Hot Spots Program Risk Assessment Guidelines, Part II Technical Support Document for Describing Available Cancer Potency Factors* (California Environmental Protection Agency 2005). If one or more of the congener concentrations was reported at concentrations less than the laboratory detection limits, then one-half of the detection limit was used in the adjustment calculations.

A total of 57 samples were analyzed for cPAHs. Thirteen samples contained adjusted concentrations exceeding the CUL for cPAHs of 0.14 mg/kg. Detected concentrations in these samples ranged from 115.81 mg/kg in the sample collected from boring B-17 at a depth of 4.5 to 5 feet bgs (B17-4.5-5), to 0.1451 mg/kg in the sample collected from boring B-16 at a depth of 4.5 to 5 feet bgs (B16-4.5-5). Four of the samples analyzed for cPAHs did not contain constituent concentrations greater than laboratory detection limits.

Soil sample analytical results from samples collected during this investigation are presented in **Table 7** and on **Figure 11**. Laboratory data reports are included as **Appendix I.**

10. Piezometer Construction

In accordance with the Detention Basin No. 2 Investigation Work Plan (ARCADIS 2011b), piezometers P-9 and P-10 were installed to the south of DB-2, P-14 was installed approximately 10 feet to the north of monitoring well MW-510 and P-16 was installed along the berm separating DB-1 and DB-2. Four additional piezometers (P-11, P-12, P-14 and P-15) were installed due to the presence of LNAPL encountered during boring installation. Additional piezometers were not installed in borings where field observations did not indicate the presence of LNAPL or obvious staining, high PID readings, or where a sheen was not produced during inspection of soil by wetting in the field.

The piezometers were constructed of 1-inch Schedule 40 PVC pipe with 0.01-inch slotted screen and pre-constructed well screen and sandpacks. The sand packs comprise 2/12 silica sand and extend from one foot above the screened interval (2 feet bgs) to the total depth of the piezometer (13 feet bgs). Each of the piezometers is completed with hydrated bentonite chips to one foot bgs, with flush-mount well monuments set in concrete at ground surface. The piezometers were surveyed by OTAK Surveying of Kirkland, Washington for horizontal location and vertical elevation of the well casing. Boring logs are included in **Appendix H.**

10.1 Piezometer Gauging

In accordance with the Detention Basin No.2 Investigation Work Plan (ARCADIS 2011b), the newly installed piezometers were gauged on a weekly basis for the first month after installation and on a monthly basis for the first quarter after installation. Oil/water interface probes (IF probe) are used for gauging events and disposable bailers are used to visually confirm detectable thicknesses of LNAPL. Piezometers P-12 and P-13 are the only newly installed piezometers observed to have signs of LNAPL, both of which are located within close proximity of monitoring well MW-510. Depth to water measurements, groundwater elevations and LNAPL detections and thicknesses are presented on the following table:

ID	Date	Time	Depth to Water (feet bgs)	Depth to LNAPL (feet bgs)	LNAPL Thickness (feet)	Groundwater Elevation (feet amsl)
P-9	08/25/11	12:51	7.57	--	--	6.29
	09/02/11	10:04	7.58	--	--	6.28
	09/09/11	07:58	7.61	--	--	6.25
	09/16/11	14:42	7.64	--	--	6.22
	09/26/11	11:03	8.62	--	--	5.24
	10/28/11	09:52	7.59	--	--	6.27
	11/18/11	08:55	7.45	--	--	6.41
P-10	08/25/11	12:49	4.98	--	--	6.09
	09/02/11	10:08	4.97	--	--	6.10
	09/09/11	08:02	5.00	--	--	6.07
	09/16/11	14:35	5.00	--	--	6.07
	09/26/11	10:59	4.96	--	--	6.11
	10/28/11	09:56	4.80	--	--	6.27
	11/18/11	09:00	4.81	--	--	6.26
P-11	08/25/11	12:45	7.49	--	--	6.14
	09/02/11	10:10	7.49	--	--	6.14
	09/09/11	08:05	7.50	--	--	6.13
	09/16/11	14:30	7.53	--	--	6.10
	09/26/11	12:15	7.50	--	--	6.13
	10/28/11	09:59	7.36	--	--	6.27
	11/18/11	09:03	7.31	--	--	6.32
P-12	08/25/11	12:42	7.26	--	--	5.77
	09/02/11	10:14	7.10	--	--	5.93
	09/09/11	08:08	7.11	--	--	5.92
	09/16/11	14:10	7.18	--	<0.01*	5.85
	09/26/11	12:37	7.16	7.15	0.01	5.88**
	10/28/11	10:03	6.91	--	--	6.12
	11/18/11	09:13	6.98	--	--	6.05
P-13	08/25/11	12:40	6.90	--	--	6.12
	09/02/11	10:17	6.84	--	--	6.18
	09/09/11	08:11	6.89	--	--	6.13
	09/16/11	14:17	6.91	--	<0.01*	6.11
	09/26/11	12:23	6.93	6.90	0.03	6.09*
	10/28/11	10:20	6.75	6.74	0.01	6.35*
	11/18/11	09:19	--[+]	6.66	--[+]	--[+]
P-14	08/25/11	12:38	6.79	--	--	5.35
	09/02/11	10:21	6.37	--	--	5.77
	09/09/11	08:14	6.50	--	--	5.64
	09/16/11	14:23	6.51	--	--	5.63
	09/26/11	12:19	6.60	--	--	5.54
	10/28/11	10:16	6.13	--	--	6.01
	11/18/11	09:16	6.24	--	--	5.90

P-15	08/25/11	12:30	7.48	--	--	5.06
	09/02/11	10:23	6.97	--	--	5.57
	09/09/11	08:17	7.22	--	--	5.32
	09/16/11	14:48	7.10	--	--	5.44
	09/26/11	10:56	7.15	--	--	5.39
	10/28/11	10:11	6.68	--	--	5.86
	11/18/11	09:09	6.83	--	--	5.71
P-16	08/25/11	12:25	3.60	--	--	5.44
	09/02/11	10:25	3.41	--	--	5.63
	09/09/11	08:19	3.42	--	--	5.62
	09/16/11	14:52	3.39	--	--	5.65
	09/26/11	11:00	3.38	--	--	5.66
	10/28/11	10:07	3.14	--	--	5.90
	11/18/11	09:07	3.22	--	--	5.82

*LNAPL was present during gauging, but not at measurable thicknesses.
**Groundwater elevation adjusted for the presence of LNAPL.
+ = LNAPL thickness could not be accurately measured due to LNAPL coating oil/water interface probe tip.
bgs = below ground surface
amsl = above mean sea level

The newly installed piezometers will continue to be monitored on a quarterly basis as part of the groundwater monitoring program. Gauging results will continue to be reported in Monthly Progress Reports (MPRs) and Annual Groundwater Monitoring Reports.

11. Light Nonaqueous Phase Liquid Baildown Testing

On August 24, 2011, LNAPL baildown testing was conducted at monitoring well MW-510. On July 29, 2011, the absorbent sock was removed from MW-510 to allow sufficient time for LNAPL recovery prior to testing. LNAPL thickness and groundwater elevation data were collected using an IF probe. The beginning of the LNAPL baildown test was initiated at the time of the daily low-low tide.

Static depth to LNAPL prior to testing was 7.06 feet btoc, and static depth to groundwater was 7.07 feet btoc, resulting in an LNAPL thickness of 0.01 foot prior to baildown testing. The thickness of LNAPL observed in MW-510 was less than the preferred thickness (greater than or equal to the borehole diameter) as described in the Standard Operating Procedure for LNAPL Baildown Testing that was included in Appendix A of the Detention Basin No. 2 Investigation Work Plan (ARCADIS 2011b); however, based on comments and requests from stakeholders the test was performed as planned. LNAPL was removed from the well using a Superbailer™ widemouth bailer in order to maximize the surface area for LNAPL recovery. Removal of the LNAPL was

instantaneous. The volume of LNAPL removed was approximately 0.0016 gallon and the volume of groundwater removed was approximately 0.0044 gallon. Depth to water and depth to LNAPL readings were collected manually using an IF probe approximately every 2 minutes from 0 to 15 minutes of testing, approximately every 5 minutes from 15 to 35 minutes of testing, every 10 minutes from 35 to 185 minutes of testing and three times from 185 to 423 minutes of testing.

LNAPL was present on the IF probe throughout the test. From 2 minutes to 25 minutes of testing the IF probe detected LNAPL, but not at a measurable thickness. LNAPL was observed on the IF probe and was dark in color with a low viscosity. At 35 minutes of testing, LNAPL was not measured by the IF probe, although a small amount of LNAPL was observed on the probe tip. LNAPL was detected by the IF probe, but not at a measurable thickness, during readings collected at 45, 55 and 65 minutes of testing. Readings from 75 minutes of testing to the end of testing (423 minutes) did not detect LNAPL with the IF probe, although a very small amount of LNAPL was observed on the IF probe tip. The LNAPL baildown test log is included in **Table 8.**

Depth to water readings collected during the LNAPL baildown test conducted at MW-510 correspond with tidal elevation data from Puget Sound. As the water level in well MW-510 dropped to approximately 7.16 feet btoc, LNAPL was no longer detected with the IF probe, although small amounts of LNAPL were observed on the probe tip. During the entire LNAPL baildown test, groundwater elevations were maintained within the screened interval of well MW-510. Therefore, the lack of measureable LNAPL was not due to a submerged screen column, but a lack of accumulated LNAPL within the water column. A chart illustrating groundwater elevation measurements and Puget Sound tidal elevations is presented on **Figure 12.**

12. Summary/Conclusion of the Detention Basin No. 2 Investigation

Based on soil analytical results and field observations, LNAPL appears to be present in soils and groundwater from approximately 5-feet to 1-foot amsl, but was found as high as 6-feet amsl. LNAPL observed during this investigation was primarily residual LNAPL, or stained and/or coated soils. LNAPL saturated soil, or where LNAPL became fluid when the soil column was disturbed, was generally found at groundwater interface, and/or within the smear zone between the seasonal high and low groundwater table.

No evidence of un-emulsified asphalt, or LNAPL free of soil matrix, was observed during this investigation, as was observed in excavation areas B8 and A4 during the 2007 Interim Action excavation work (ARCADIS, 2009a). Excavation areas B8 and A4 are generally associated with the area formerly known as the "slops pond" as shown on **Figure 13**. Based on this information, and the aerial photo depicted in Figure 13, the slops pond was removed in its entirety and the LNAPL found in the vicinity of DB-2 is more likely attributed to prior activities in DB-1 not related to the former slops pond.

No evidence of LNAPL was observed in hand auger borings conducted on the bank of Willow Creek. Soil analytical results were less than one-third the Soil REL of 2,975 mg/kg, indicating that LNAPL has not, and is not migrating into or below Willow Creek. LNAPL has been effectively delineated to the northern half of DB-2.

Highly organic soils and peat may be contributing to elevated concentrations of TPH specifically with respect to the C16 through C34 carbon ranges that correspond to both Site COCs, diesel and heavy oil. A detailed forensic analysis including GC/MS may be conducted to further understand the relationship between organic soils and petroleum related constituents in both soil and groundwater throughout the Site.

Data collected during this investigation as well as from other Site assessment work and Interim Action excavations have created a need for an updated CSM. There is a more thorough understanding of Site impacts and their distribution following completion of the 2007/8 interim remedial actions. It is therefore proposed that a revised CSM be developed and presented as a stand-alone document as part of an interim deliverable.

13. Schedule and Path Forward to Feasibility Study

On September 21, 2011, ARCADIS submitted a Draft FSWP for additional characterization and assessment work needed to prepare a Draft FS. A Final FSWP will be submitted within 60 days of receipt of comments from Ecology. A Draft Edmonds Terminal FS Schedule is included in **Appendix J**. This schedule is intended to show the critical paths and estimated time frame for submittal of the Revised FSWP and Draft FS, but is not intended to be a firm commitment for deliverables due to uncertainties in stakeholder review timelines. Some of the anticipated Interim Actions/Deliverables may include, but are not limited to additional Site characterization, updated CSM, an evaluation of the current Site RELs and CULs, and groundwater capture modeling. The Draft Edmonds Terminal FS Schedule will be updated and submitted with Monthly Progress Reports through submittal of the Draft FS.

14. References

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ARCADIS

Tables

TABLE 1
Tidal Study Results Summary
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Well ID	GWE (feet)		Depth (feet)		Salinity (PSU)			Amplitude (feet)	
	Max	Min	Max	Min	Max	Min	Avg	Max	Min
LM-2	6.68	6.50	5.34	5.16	12.32	8.94	11.07	--	--
MW-8R	6.42	5.77	4.60	3.95	0.22	0.18	0.19	0.31	0.02
MW-104	5.42	4.53	8.34	7.45	0.14	0.11	0.12	0.53	0.03
MW-122	-1.06	-1.39	8.40	8.07	0.39	0.38	0.38	0.33	0.02
MW-129R	7.28	6.76	6.99	6.47	0.69	0.63	0.67	0.37	0.03
MW-149R	6.10	4.59	5.92	4.41	0.34	0.23	0.29	1.15	0.07
MW-500	13.35	12.63	8.46	7.74	0.44	0.30	0.37	--	--
MW-501	12.98	12.60	9.74	9.36	0.17	0.15	0.17	--	--
MW-502	8.92	8.66	8.02	7.76	0.17	0.14	0.17	--	--
MW-515	7.47	7.21	7.57	7.31	0.21	0.18	0.19	--	--
MW-518	6.98	6.19	4.88	4.09	0.32	0.27	0.30	0.56	0.02
Staff Gauge ID	**GWE (feet)**		**Depth (feet)**		**Salinity (PSU)**			**Amplitude (feet)**	
	Max	**Min**	**Max**	**Min**	**Max**	**Min**	**Avg**	**Max**	**Min**
D-1	8.20	5.95	2.53	0.28	27.76	0.22	10.72	1.96	0.02
D-2	8.13	5.63	2.11	-0.39	27.56	0.10	10.68	1.84	0.04
D-3	8.11	5.59	2.37	-0.15	27.96	0.00	9.73	2.12	0.02
D-5	8.76	4.81	2.65	-1.30	27.76	0.00	11.55	3.73	0.19
D-6	6.84	5.54	2.43	2.43	1.80	1.47	1.68	--	--
TB	5.56	3.06	3.36	0.86	30.08	0.31	12.91	2.22	0.04

Notes:
GWE = Groundwater Elevations in feet above mean sea level
PSU = Practical Salinity Units

TABLE 2
Well Construction Details Summary
Unocal Edmonds Bulk Fuel Terminal Lower Yard
11720 Unoco Road
Edmonds, Washington

Well ID	Date Installed	Top of Casing (feet amsl) [a]	Well Diameter (inches)	Well Material	Pipe Schedule	Slotted Screen Size (inches)	Borehole Diameter (inches)	Top of Screen (feet bgs)	Bottom of Screen (feet bgs)	Well Depth (feet bgs)	Borehole Depth (feet bgs)	Top of Filter Pack (feet bgs)	Bottom of Filter Pack (feet bgs)	Depth to Bottom - 2008 (feet btoc) [b]
LM-2	4/18/1989	8.14	2	PVC	40	0.02	--	2.5	8	8	9.1	2	9	7.8
MW-8R	10/9/2008	13.82	2	PVC	40	0.01	8	3	13	13	13	2	13	13
MW-104	12/22/1992	14.08	2	PVC	40	0.02	10	5	15	15	16.5	7	15	18.2
MW-122	9/27/1995	15.54	2	PVC	40	0.01	--	30	40	40	41.5	27.66	41.5	42.65
MW-129R	10/14/2008	12.92	2	PVC	40	0.01	8	3	13	13	13.5	2	13.5	12.9
MW-149R	10/8/2008	12.18	2	PVC	40	0.01	8	3	13	13	13.5	2	13	13
MW-500	10/14/2008	16.64	2	PVC	40	0.01	8	3	13	13	13	2	13	12.75
MW-501	10/14/2008	15.24	2	PVC	40	0.01	8	3	13	13	13	2	13	13
MW-502	10/14/2008	13.00	2	PVC	40	0.01	8	3	13	13	13	2	13	13.1
MW-515	10/10/2008	11.60	2	PVC	40	0.01	8	3	13	13	13	2	13	12.7
MW-518	10/8/2008	14.60	2	PVC	40	0.01	8	3.5	13.5	13.5	13.5	2	13.5	13.5
MW-521	10/9/2008	12.18	2	PVC	40	0.01	8	3	13	13	13	2	13	12.7
MW-522	10/9/2008	13.82	2	PVC	40	0.01	8	3	13	13	13	2	13	12.7
MW-523	10/8/2008	13.53	2	PVC	40	0.01	8	3	13	13	13	2	13	12.7

Notes:
(a) Vertical Datum: N.A.V.D. 88
(b) Depth to bottom was gauged on October 20, 2008, following well development activities.
amsl = above mean sea level
-- = Data not available
bgs = below ground surface
btoc = below top of casing

TABLE 3
Hydraulic Conductivity Step Test Data Summary
Unocal Edmonds Bulk Fuel Terminal Lower Yard
11720 Unoco Road
Edmonds, Washington

Well ID	Date	Pump Used	Initial DTW (feet)	Flow Rate (GPM)	Maximum Drawdown (feet)	Notes
MW-104	5/11/2011	2" Submersible Pump	7.90	0.50	0.45	Test terminated due to pump failure.
				1.0	1.37	
				1.5	2.80	
MW-129R	5/12/2011	2" Submersible Pump	5.35	0.50	5.84	Well pumped dry at 0.5 GPM.
				0.25	5.65	
MW-149R	5/11/2011	2" Submersible Pump	6.63	0.50	1.07	
				1.0	1.98	
				1.5	2.96	
MW-500	5/10/2011	Peristaltic Pump	3.81	0.10	1.30	Test terminated after 109 minutes. Stabilized drawdown not achieved.
				0.19	5.55	
	5/12/2011	2" Submersible Pump	3.80	0.25	3.30	Test terminated due to well pumping dry at 0.5 GPM flow rate.
				0.50	7.61	
MW-518	5/11/2011	2" Submersible Pump	8.01	0.25	0.36	Test terminated after 60 minutes.
				1.0	1.39	
				1.5	1.90	
MW-8R	5/12/2011	2" Submersible Pump	8.03	0.25	0.11	Test terminated due to pump tubing failure.
				0.50	0.12	
				1.5	1.26	
	5/18/2011	2" Submersible Pump	7.50	2.0	0.17	
				4.0	0.46	
				5.0	0.59	
LM-2	5/11/2011	2" Submersible Pump	1.48	0.25	4.59	Well pumped dry.
	5/13/2011	Peristaltic Pump	1.47	0.10	1.80	
				0.15	2.18	
				0.18	3.43	

Notes:
DTW: Depth to water
btoc: below top of casing
GPM: Gallons per minute

TABLE 4
Short Duration Hydraulic Conductivity Test Data Summary
Unocal Edmonds Bulk Fuel Terminal Lower Yard
11720 Unoco Road
Edmonds, Washington

Well ID	Date	Pump Used	Initial DTW (feet)	Flow Rate (GPM)	Maximum Drawdown (feet)	Notes
MW-104	5/16/2011	2" Submersible Pump	7.73	3.0	5.18	Test terminated after 88 minutes.
MW-129R	5/17/2011	2" Submersible Pump	5.10	0.30	4.39	Test terminated after 60 minutes.
MW-149R	5/16/2011	2" Submersible Pump	6.45	2.0	4.24	Test terminated after 60 minutes.
MW-500	5/13/2011	2" Submersible Pump	3.79	0.30	7.32	Well pumped dry.
	5/13/2011	2" Submersible Pump	3.79	0.25	7.75	Well pumped dry.
LM-2	5/17/2011	2" Submersible Pump	1.20	0.30	5.40	Well pumped dry.
	5/17/2011	2" Submersible Pump	1.20	0.20	5.44	Well pumped dry.
MW-518	5/17/2011	2" Submersible Pump	8.71	2.5	3.28	Test terminated after 90 minutes.
MW-8R	5/16/2011	2" Submersible Pump	7.70	5	0.62	Test terminated after 60 minutes.

Notes:
DTW: Depth to water
btoc: below top of casing
GPM: Gallons per minute

TABLE 5
Long Term Hydraulic Conductivity Test Data Summary
Unocal Edmonds Bulk Fuel Terminal Lower Yard
11720 Unoco Road
Edmonds, Washington

Well ID	Date	Pump Used	Initial DTW (feet)	Flow Rate (GPM)	Maximum Drawdown (feet)	Notes
MW-8R	5/19/11 - 5/20/11	2" Submersible Pump	7.65	5.0	0.88	Test conducted for 24hrs, with no stoppages. Flow rate was confirmed every hour.
MW-521	5/19/11 - 5/20/11	NA	6.01	NA	no measurable drawdown	observation well
MW-522	5/19/11 - 5/20/11	NA	7.69	NA	no measurable drawdown	observation well
MW-523	5/19/11 - 5/20/11	NA	7.38	NA	no measurable drawdown	observation well

Notes:
DTW: Depth to water
btoc: below top of casing
GPM: Gallons per minute
NA: Not Applicable

TABLE 6
Summary of Soil Cleanup Levels and Remediation Levels
Unocal Edmonds Bulk Fuel Terminal Lower Yard
11720 Unoco Road
Edmonds, Washington

Constituent of Concern:	Soil Cleanup Level or Remediation Level (mg/kg):	Note:
TPH	2,975	1
Benzene	18	2
Total cPAHs	0.14	3
Arsenic	20	4

Notes:
mg/kg = Milligrams per kilogram.
TPH = Total petroleum hydrocarbons.
cPAHs = Carcinogenic polynuclear aromatic hydrocarbons
REL = Remediation Level.
DRO = Diesel range organics
GRO = Gasoline range organics
CUL = Cleanup Level.

1. REL based on Method B direct contact. Assumes empirical demonstration will be used to show compliance with residual saturation concentrations (2,000 mg/kg for DRO and 1,000 mg/kg for GRO).

2. REL based on Method B direct contact. Assumes empirical demonstration will be used to show that direct contact cleanup level for benzene is also protective of groundwater.

3. CUL based on Method B direct contact.
4. CUL based on natural background.

TABLE 7
Detention Basin No.2 Investigation Soil Sample Analytical Results
Unocal Edmonds Bulk Fuel Terminal Lower Yard
11720 Unoco Road
Edmonds, Washington

Sample ID	Sample Depth (feet bgs)	Date Sampled	BTEX (mg/kg)				Total cPAHs Adjusted for Toxicity (mg/kg)	Diesel Range Organics (mg/kg)	Gasoline Range Organics (mg/kg)	Heavy Oil (Lube) (mg/kg)	Total TPH (mg/kg)
			B	T	E	X					
Site Soil Remediation Level (REL)/Cleanup Level (CUL) (mg/kg)			**18**	**--**	**--**	**--**	**0.14**	**--**	**--**	**--**	**2975**
B1-4.5-5	4.5-5	08/22/11	0.0022 U	NA	NA	NA	0.00052	3.1 U X	1.1 U	14 X	16
B1-9.5-10	9.5-10	08/22/11	0.23 W	NA	NA	NA	0.0082	5.3	25 W	42	72
B1-14-14.5	14-14.5	08/22/11	0.17	NA	NA	NA	N/A	4.8 U	2.1 U	16 U	11 UU
B2-4-4.5	4-4.5	08/22/11	0.018 UW	NA	NA	NA	0.051	620	9.2 U W	720	1,345
B2-7-7.5	7-7.5	08/22/11	0.0020 U	NA	NA	NA	0.00073	30	1 U	37	68
B2-9.5-10	9.5-10	08/22/11	0.0019 U	NA	NA	NA	0.002	100	16	100	216
B2-12-12.5	12-12.5	08/22/11	0.0020 U	NA	NA	NA	0.00088	130	2	530	662
B2-14.5-15	14.5-15	08/22/11	0.0024 U	NA	NA	NA	N/A	3.4 U	1.2 U	11 U	8 UU
B3-4.5-5	4.5-5	08/22/11	0.0022 U	NA	NA	NA	N/A	3.2 U	1.1 U	11 U	8 UU
B3-7-7.5	7-7.5	08/22/11	0.0021 U	NA	NA	NA	0.00076	110 X	1.1 U	70 X	181
B3-12-12.5	12-12.5	08/22/11	0.0020 U	NA	NA	NA	0.00077	43 X	6.8	46 X	96
B3-14-14.5	14-14.5	08/22/11	0.0040	NA	NA	NA	N/A	3.3 U	1.3	11 U	8
B4-4.5-5	4.5-5	08/22/11	0.0020 U	NA	NA	NA	0.00053 UU	160	1 U	53 U	187
B4-9.5-10	9.5-10	08/22/11	0.024 W	NA	NA	NA	0.0075	2,900	13 W	1,500	**4,413**
B4-13-13.5	13-13.5	08/22/11	0.010	NA	NA	NA	0.0006	4.2	1.8	12 U	12
B4-14.5-15	14.5-15	08/22/11	0.021 U W	NA	NA	NA	N/A	3.6 U	11 U W	12 U	13 UU
B5-4.5-5	4.5-5	08/22/11	0.0022 U	NA	NA	NA	N/A	3.5 U	1.1 U	12 U	8 UU
B5-9-9.5	9-9.5	08/22/11	0.083 U W	NA	NA	NA	0.0138	16,000	42 U W	11,000	**27,021**
B5-11.5-12	11.5-12	08/22/11	0.0023 U	NA	NA	NA	N/A	3.8 U	1.2 U	13 U	9 UU
B5-13.5-14	13.5-14	08/22/11	0.0024 U	NA	NA	NA	N/A	3.7 U	1.2 U	12 U	8 UU
B6-4.5-5	4.5-5	08/22/11	0.021 U W	NA	NA	NA	0.09	470	190 W	310	970
B6-7-7.5	7-7.5	08/22/11	0.55 U	NA	NA	NA	**0.36**	16,000 Y	720	4,900 Y	**21,620**
B6-9-9.5	9-9.5	08/22/11	0.97	NA	NA	NA	**3.2 T**	170,000 Y	2,400	48,000 Y	**220,400**
B6-11-11.5	11-11.5	08/22/11	0.023 U W	NA	NA	NA	0.012	230 Z	30 W	57 Z	317
B6-13-13.5	13-13.5	08/22/11	0.0028 U	NA	NA	NA	N/A	3.5 U	1.4 U	12 U	8 UU

TABLE 7
Detention Basin No.2 Investigation Soil Sample Analytical Results
Unocal Edmonds Bulk Fuel Terminal Lower Yard
11720 Unoco Road
Edmonds, Washington

Sample ID	Sample Depth (feet bgs)	Date Sampled	BTEX (mg/kg)				Total cPAHs Adjusted for Toxicity (mg/kg)	Diesel Range Organics (mg/kg)	Gasoline Range Organics (mg/kg)	Heavy Oil (Lube) (mg/kg)	Total TPH (mg/kg)
			B	T	E	X					
Site Soil Remediation Level (REL)/Cleanup Level (CUL) (mg/kg)			18	--	--	--	0.14	--	--	--	2975
B7-4.5-5	4.5-5	08/22/11	0.083 U W	NA	NA	NA	0.071	260	230 W	210	700
B7-8-8.5	8-8.5	08/22/11	1.5 U W	NA	NA	NA	**2.8 T**	72,000	1,400 W	38,000	**111,400**
B7-9.5-10	9.5-10	08/22/11	0.030 U W	NA	NA	NA	0.037 **T**	4,200	47 W	1700	**5947**
B7-14-14.5	14-14.5	08/22/11	0.0021 U	NA	NA	NA	N/A	3.6 U	1 U	12 U	8 UU
B8-4.5-5	4.5-5	08/23/11	0.24 U T	NA	NA	NA	0.114	11,000	1,000	4,500	**16,500**
B8-7.5-8	7.5-8	08/23/11	0.0029	NA	NA	NA	0.077	6,800	260	2,300	**9,360**
B8-9.5-10	9.5-10	08/23/11	3.2	NA	NA	NA	**0.5 T**	50,000	730	25,000	**75,730**
B8-11-11.5	11-11.5	08/23/11	0.51 W	NA	NA	NA	0.09	4,900	300 W	3,000	**8,200**
B8-13.5-14	13.5-14	08/23/11	0.0073	NA	NA	NA	**0.1**	40	1.2 U	14	55
B8-14.5-15	14.5-15	08/23/11	0.0056	NA	NA	NA	N/A	3.5 U	1.2 U	12 U	8 UU
B9-4.5-5	4.5-5	08/23/11	0.0022 U	NA	NA	NA	N/A	3.2 U	1.1 U	27	29
B9-8.5-9	8.5-9	08/23/11	0.023 U W	NA	NA	NA	**0.29**	14,000	270 W	6,700	**20,970**
B9-9.5-10	9.5-10	08/23/11	0.0025 U	NA	NA	NA	0.0024	23	1.2 U	12 U	30
B9-10.5-11	10.5-11	08/23/11	0.0030 U	NA	NA	NA	0.025	640	1.5 U	280	921
B9-11-11.5	11-11.5	08/23/11	1.1 W	NA	NA	NA	**0.15 T**	11,000	950 W	4,300	**16,250**
B9-12.5-13	12.5-13	08/23/11	0.0026 U V	NA	NA	NA	0.00065	8.3	1.3 U	13 U	15
B10-0.5-1	0.5-1	08/25/11	0.030 U W	NA	NA	NA	**0.2**	360	15 U W	390	758
B10-1.5-2	1.5-2	08/25/11	0.046 U W	NA	NA	NA	0.018	12	23 U W	62	86
B10-2.5-3	2.5-3	08/25/11	0.030 U W	NA	NA	NA	0.00068 UU	4.1 U	15 U W	27	37
B10-3.5-4	3.5-4	08/25/11	0.0037 U V	NA	NA	NA	0.00072	15	1.8 U V	41	57
B11-4.5-5	4.5-5	08/23/11	0.0027 U	NA	NA	NA	**0.24**	360	1.3 U U	650	1,011
B11-7.5-8	7.5-8	08/23/11	0.25 U W	NA	NA	NA	0.012	24,000 S	240 W	11,000	**35,240**
B11-8.5-9	8.5-9	08/23/11	0.15 U W	NA	NA	NA	0.012	7.5	75 U W	15 U	53
B11-9.5-10	9.5-10	08/23/11	0.0034	NA	NA	NA	**1.6 T**	5.3	1.3 U	12 U	12
B11-10-10.5	10-10.5	08/23/11	0.1 U W	NA	NA	NA	**3.4**	25,000	150 W	12,000	**37,150**
B11-11-11.5	11-11.5	08/23/11	0.0042 U V	NA	NA	NA	0.01	310	2.1 U	150	461
B11-13.5-14	13.5-14	08/23/11	0.002 U	NA	NA	NA	N/A	3.5 U	1 U	12 U	8 UU

TABLE 7
Detention Basin No.2 Investigation Soil Sample Analytical Results
Unocal Edmonds Bulk Fuel Terminal Lower Yard
11720 Unoco Road
Edmonds, Washington

Sample ID	Sample Depth (feet bgs)	Date Sampled	BTEX (mg/kg)				Total cPAHs Adjusted for Toxicity (mg/kg)	Diesel Range Organics (mg/kg)	Gasoline Range Organics (mg/kg)	Heavy Oil (Lube) (mg/kg)	Total TPH (mg/kg)
			B	T	E	X					
Site Soil Remediation Level (REL)/Cleanup Level (CUL) (mg/kg)			18	--	--	--	0.14	--	--	--	2975
B12-0.5-1	0.5-1	08/24/11	0.033 U W	NA	NA	NA	0.0117	140	17 U W	150	299
B12-1-1.5	1-1.5	08/24/11	0.038 U W	NA	NA	NA	0.00072 UU	120	34 W	100	254
B12-2.5-3	2.5-3	08/24/11	0.051 U W	NA	NA	NA	0.079	160	25 U W	75	248
B12-3.5-4	3.5-4	08/24/11	0.0028 U	NA	NA	NA	0.00063	4.1	1.4 U	28	33
B13-4.5-5	4.5-5	08/23/11	0.025 U W	NA	NA	NA	0.0046	11	12 U W	64	81
B13-6-6.5	6-6.5	08/23/11	0.031 U W	NA	NA	NA	0.036	110	15 U W	250	368
B13-7-7.5	7-7.5	08/23/11	0.16 U W	NA	NA	NA	0.054 R	12,000	200 W	7,400 U	**15,900**
B13-9-9.5	9-9.5	08/23/11	0.018	NA	NA	NA	N/A	3.7 U	1.3 U	12 U	9 UU
B13-10-10.5	10-10.5	08/23/11	0.071 U W	NA	NA	NA	0.026	1,300	110 W	740	2,150
B13-11.5-12	11.5-12	08/23/11	0.0056	NA	NA	NA	N/A	4 U	1.4 U	13 U	9 UU
B14-0.5-1	0.5-1	08/25/11	0.11 U W	NA	NA	NA	0.029	16	57 U W	110	155
B14-1.5-2	1.5-2	08/25/11	0.023 U W	NA	NA	NA	N/A	NA	11 U W	NA	6 UU
B14-2.5-3	2.5-3	08/25/11	0.051 U W	NA	NA	NA	N/A	5 U	25 U W	17 U	24 UU
B14-3.5-4	3.5-4	08/25/11	0.058 U W	NA	NA	NA	0.0009	7.4	29 U W	76	98
B15-4.5-5	4.5-5	08/23/11	0.0025 U	NA	NA	NA	0.0005	4.5	1.3 U	17	22
B15-6.5-7	6.5-7	08/23/11	0.0026 U V	NA	NA	NA	N/A	3.6 U	1.3 U	18	20
B15-8.5-9	8.5-9	08/23/11	0.0048 U V	NA	NA	NA	0.0008	7.8	2.4 U	54	63
B15-11-11.5	11-11.5	08/23/11	0.029 U W	NA	NA	NA	N/A	4 U	15 U W	13 U	16 UU
B16-3.5-4	3.5-4	08/24/11	0.023 U W	NA	NA	NA	0.018	100	11 U W	280	386
B16-4-4.5	4-4.5	08/24/11	0.27 U W	NA	NA	NA	**0.1**	280	140 U W	940	1,290
B16-4.5-5	4.5-5	08/24/11	0.0024 U	NA	NA	NA	0.00123	4	1.2 U	12 U	11
B16-6-6.5	6-6.5	08/24/11	0.0031 U	NA	NA	NA	N/A	3.9 U	1.5 U	13 U	9 UU
B17-3.5-4	3.5-4	08/24/11	0.025 U W	NA	NA	NA	0.00109	550	12 U W	1,200	1,756
B17-4-4.5	4-4.5	08/24/11	0.0066	NA	NA	NA	0.0008 UU	14,000	2.3 U	8,200	**22,201**
B17-4.5-5	4.5-5	08/24/11	0.34 U W	NA	NA	NA	**116 R**	55	170	43	268
B17-5.5-6	5.5-6	08/24/11	0.033 U W	NA	NA	NA	N/A	4.3 U	17 U W	14 U	18 UU

TABLE 7
Detention Basin No.2 Investigation Soil Sample Analytical Results
Unocal Edmonds Bulk Fuel Terminal Lower Yard
11720 Unoco Road
Edmonds, Washington

Sample ID	Sample Depth (feet bgs)	Date Sampled	BTEX (mg/kg)				Total cPAHs Adjusted for Toxicity (mg/kg)	Diesel Range Organics (mg/kg)	Gasoline Range Organics (mg/kg)	Heavy Oil (Lube) (mg/kg)	Total TPH (mg/kg)
			B	T	E	X					
Site Soil Remediation Level (REL)/Cleanup Level (CUL) (mg/kg)			**18**	**--**	**--**	**--**	**0.14**	**--**	**--**	**--**	**2975**

Notes:
BTEX analyzed by EPA Method 8021B.
cPAHs analyzed by EPA Method 8270 SIM.
Gasoline analyzed by method NWTPH-G.
Diesel and Heavy Oil (Lube) analyzed by method NWTPH-D Extended.
Total TPH calculated by summing the concentrations of gasoline, diesel and heavy oil. If one or more TPH constituents were reported as Non-Detect, half of the reporting limit value was added to the total.

cPAHs adjusted for toxicity according to WAC 173-340-708(8) and *Air Toxics Hot Spots Program Risk Assessment Guidelines, Part II Technical Support Document for Describing Available Cancer Potency Factors* . Office of Environmental Health Hazard Assessment, California EPA, May 2005. If one or more adjusted cPAH constituents were reported as Non-Detect, half of the reporting limt was used in calculations.
Highlighted cells indicate concentration exceeds REL or CUL.
NA = Indicates analysis not conducted.
[ ] = Bracketed data indicate duplicate sample.

BTEX = Benzene, toluene, ethylbenzene, and total xylenes
EPA = Environmental Protection Agency
mg/kg = Milligrams per kilogram
cPAHs = Carcinogenic polynuclear aromatic hydrocarbons
REL = Remediation level
CUL = Cleanup level
TPH = Total petroleum hydrocarbons

Lab Qualifiers	Definition
J	Indicates an estimated value.
JZ	Detected hydrocarbons in the gasoline range appear to be due to overlap of diesel range hydrocarbons.
R	The GC/MS semivolatile internal standard peak areas were outside of the QC limits for both the initial injection and the re-injection. The values here are from the initial injection of the sample
S	Due to the nature of the sample extrac matrix, the extract could only be concentrated to a final volume of 10ml instead of the usual volume of 5ml. The reporting limits were raised accordingly
T	Reporting limits were raised due to interference from the sample matrix
U	The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
UU	The constituents making up the total are all non-detects.
V	The recovery for the sample surrogate is outside the QC acceptance limits as noted on the QC Summary. A reanalysis was not performed to confirm a matrix effect
W	Reporting limits were raised due to sample foaming
X	The LCS recovery is outside the QC limits. Results from the re-extraction are within the limits. The hold time had expired prior to the re-extraction; therefore, all results are reported from the original extraction. Similar results were obtained in both extracts.
Y	Due to dilution of the sample extract, capric acid recovery could not be determined.
Z	The caprice acid reverse surrogate recovery is 0%

TABLE 8

LNAPL Baildown Test Log

Unocal Edmonds Bulk Fuel Terminal Lower Yard

11720 Unoco Road

Edmonds, Washington

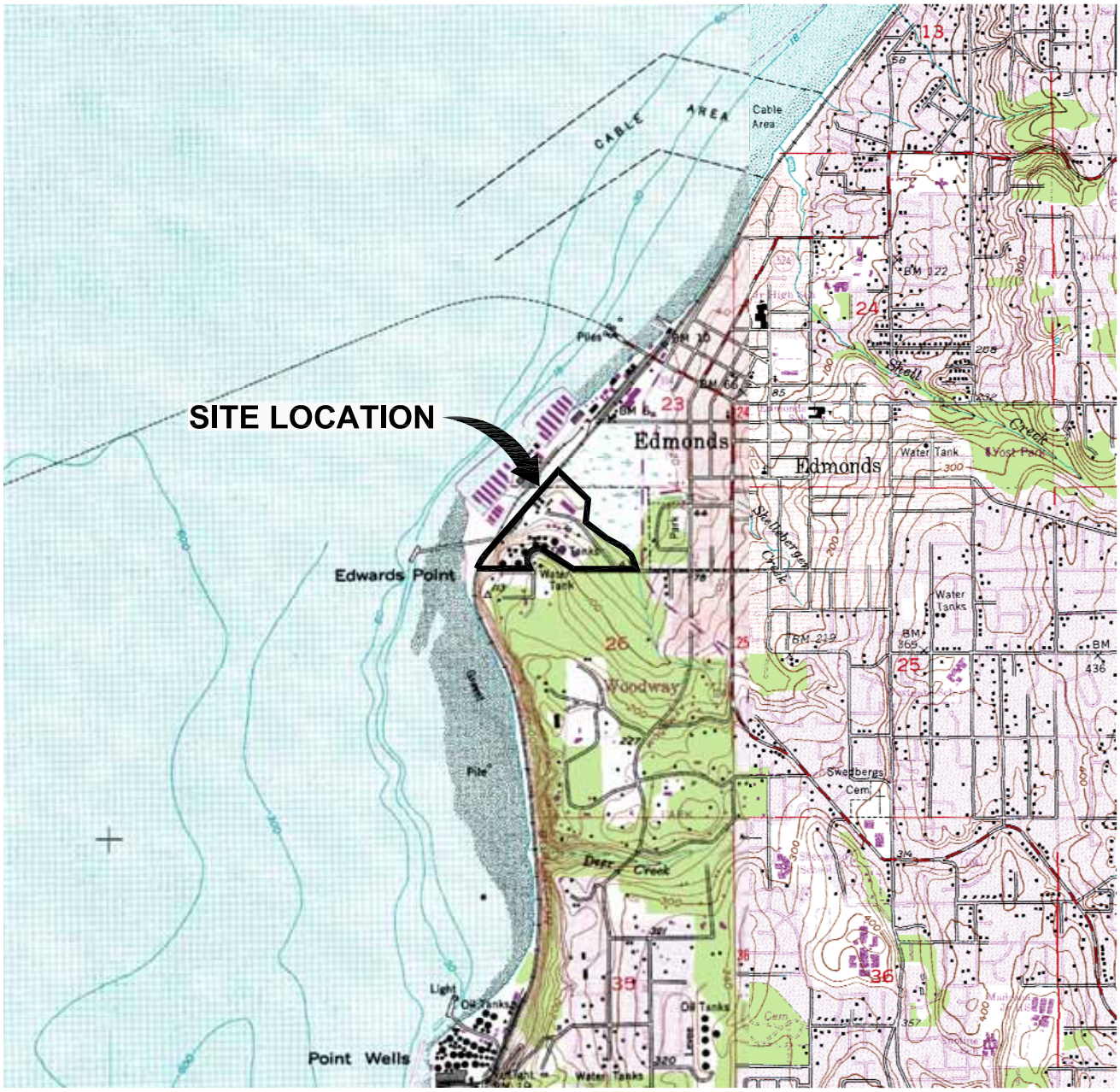
Site Name	Edmonds Terminal	**Test Well ID**	MW-510
Date and Time In	8/24/11 7:30 AM	**Date and Time Out**	8/24/11 3:00 PM
Personnel	Scott Zorn/Seamas McGuire	**Weather**	Sun
Well Construction Details			
Top of Casing Elevation (ft amsl)	12.53	**Screen Slot Size (in)**	0.01
Total Well Depth (ft)	13	**Filter Pack Type**	#2/12 silica
Depth to Top of Screen (ft)	3	**Depth to Bottom of Screen (ft)**	13
Well Casing Diameter (in)	2	**Borehole Diameter (in)**	8
Initial Test Conditions			
Static Depth to LNAPL (ft)	7.06	**Test Date**	8/24/2011
Static Depth to Water (ft)	7.07	**Start Time**	7:45 AM
LNAPL Thickness (ft)	0.01	**Initial LNAPL Volume in Well (gal)**	0.0016
LNAPL Removal Information			
LNAPL Removal Method/Equipment	Bailer	**Time LNAPL Removal Begins**	7:53 AM
Volume of LNAPL Removed (gal)	0.0016	**Time LNAPL Removal is Completed**	7:53 AM
Volume of Groundwater Removed (gal)	0.0044		

Baildown Test Data

Elapsed Time (min)	Time	Depth to LNAPL (ft)	Depth to Water (ft)	Ground Water Elevation (ft)	Tide Elevation (Ft above Mean Lower Low Water)	Observations
2	7:55 AM	7.1	7.1	5.43	0.4264	LNAPL appears to have a darker color and
3	7:56 AM	7.11	7.11	5.42	0.4264	lower viscocity
5	7:58 AM	7.1	7.1	5.43	0.4592	Much darker in color
7	8:00 AM	7.09	7.09	5.44	0.4592	
9	8:02 AM	7.09	7.09	5.44	0.492	
11	8:04 AM	7.09	7.09	5.44	0.492	
13	8:06 AM	7.1	7.1	5.43	0.5248	
15	8:08 AM	7.1	7.1	5.43	0.5248	
22	8:15 AM	7.1	7.1	5.43	0.5904	
25	8:28 AM	7.1	7.11	5.42	0.7544	
30	8:33 AM	--	7.12	5.41	0.8528	
35	8:38 AM	--	7.12	5.41	0.9184	LNAPL on probe - DTP not measured
45	8:48 AM	7.13	7.13	5.4	1.0824	
55	8:58 AM	7.13	7.13	5.4	1.2464	
65	9:08 AM	7.15	7.15	5.38	1.4432	LNAPL on probe - DTP not measured
75	9:18 AM	--	7.15	5.38	1.6728	
85	9:28 AM	--	7.16	5.37	1.9024	Very small amount of LNAPL on probe
95	9:38 AM	--	7.18	5.35	2.1648	No LNAPL on probe
105	9:48 AM	--	7.16	5.37	2.3944	Very small amount on probe
115	9:58 AM	--	7.17	5.36	2.6568	very small amount of LNAPL
125	10:08 AM	--	7.17	5.36	2.9848	Very small amount of LNAPL
135	10:18 AM	--	7.17	5.36	3.2472	Very small amount of LNAPL
145	10:28 AM	--	7.17	5.36	3.5424	Very small amount of LNAPL
155	10:38 AM	--	7.17	5.36	3.8704	Very small amount of LNAPL
165	10:48 AM	--	7.17	5.36	4.1656	Very small amount of LNAPL
175	10:58 AM	7.17	7.17	5.36	4.4936	LNAPL on probe - sheen
185	11:08 AM	--	7.16	5.37	4.7888	Small LNAPL on probe
300	1:03 PM	--	7.05	5.48	8.0688	very small amount on tip
389	2:22 PM	--	6.86	5.67	9.348	very small amount on tip
423	3:14 PM	--	6.79	5.74	9.7088	very small amount on tip

ARCADIS

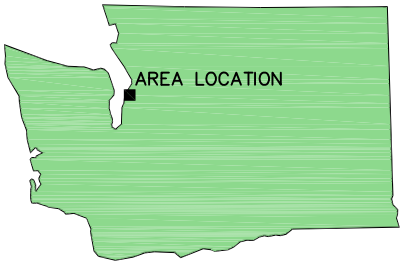
Figures



REFERENCE: USGS QUADS., 7.5 MIN. SERIES (TOPOGRAPHIC) - EDMONDS EAST, WASH. AND EDMONDS WEST, WASH.

0 0.5 1.0

Approximate Scale: 1"=0.5 Miles



WASHINGTON

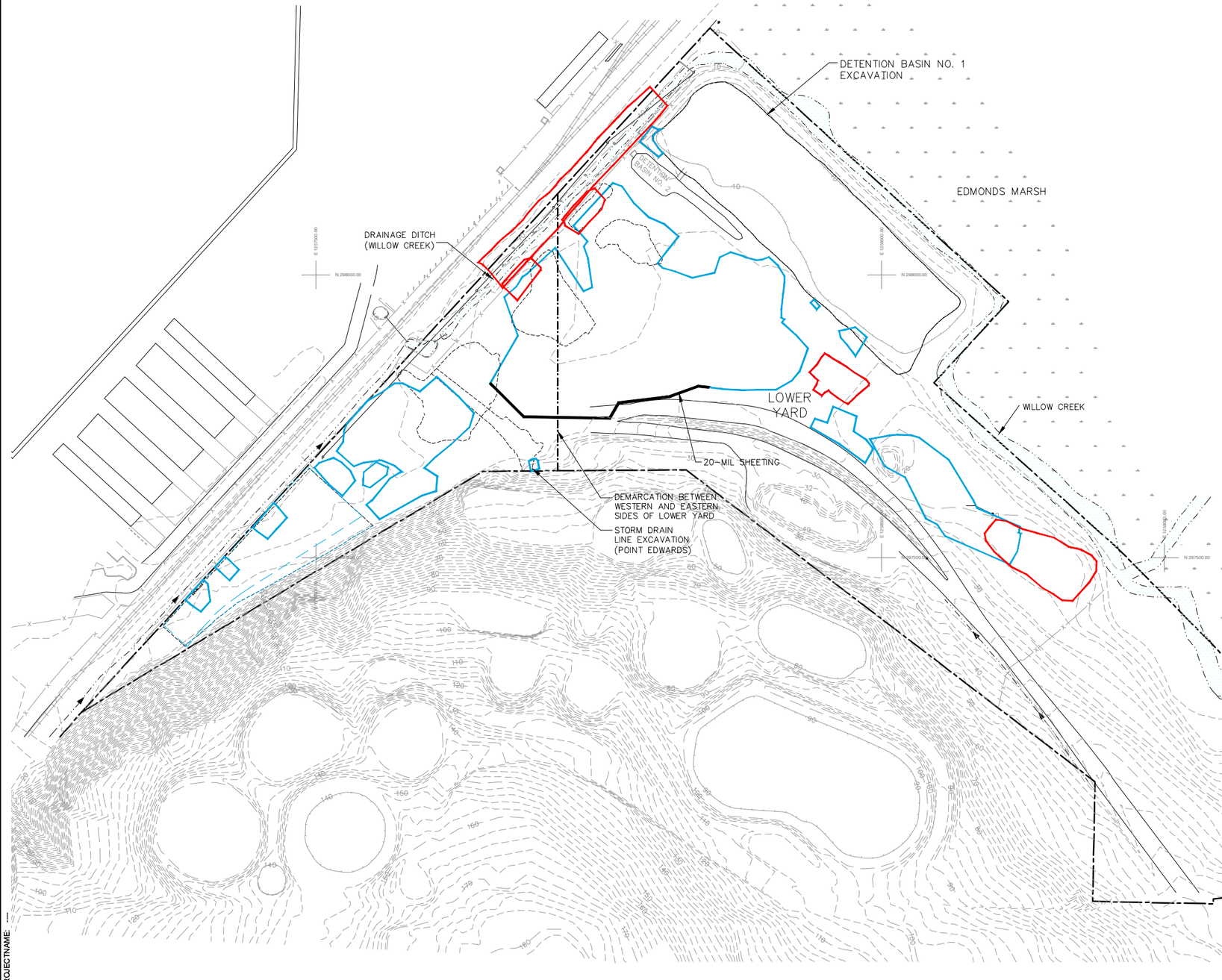
CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL EDMONDS TERMINAL
EDMONDS, WASHINGTON

2011 SITE INVESTIGATION COMPLETION REPORT

SITE LOCATION MAP

ARCADIS

FIGURE 1



LEGEND:

- 2001 AND 2003 SOIL EXCAVATIONS BELOW GROUNDWATER TABLE
- LOWER YARD PROPERTY BOUNDARY
- 2007/2008 EXCAVATION BOUNDARIES
- PHASE II EXCAVATION AREAS

NOTE:

20-MIL SHEETING INSTALLED UPON COMPLETION OF PHASE I EXCAVATION. SHEETING REACHES TO APPROXIMATELY 10 FT BGS.

0 100' 200'
GRAPHIC SCALE

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL EDMONDS TERMINAL
EDMONDS, WASHINGTON
2011 SITE INVESTIGATION COMPLETION REPORT

SITE LAYOUT MAP

ARCADIS

FIGURE 2

CITY: SYRACUSE, NY DIV/GROUP: ENVCAD DB: K. DAVIS, P. LISTER PM/TM: R. ANDRESEN TR: D. RASAR LYR: ON=*;OFF=REF; (FRZ)
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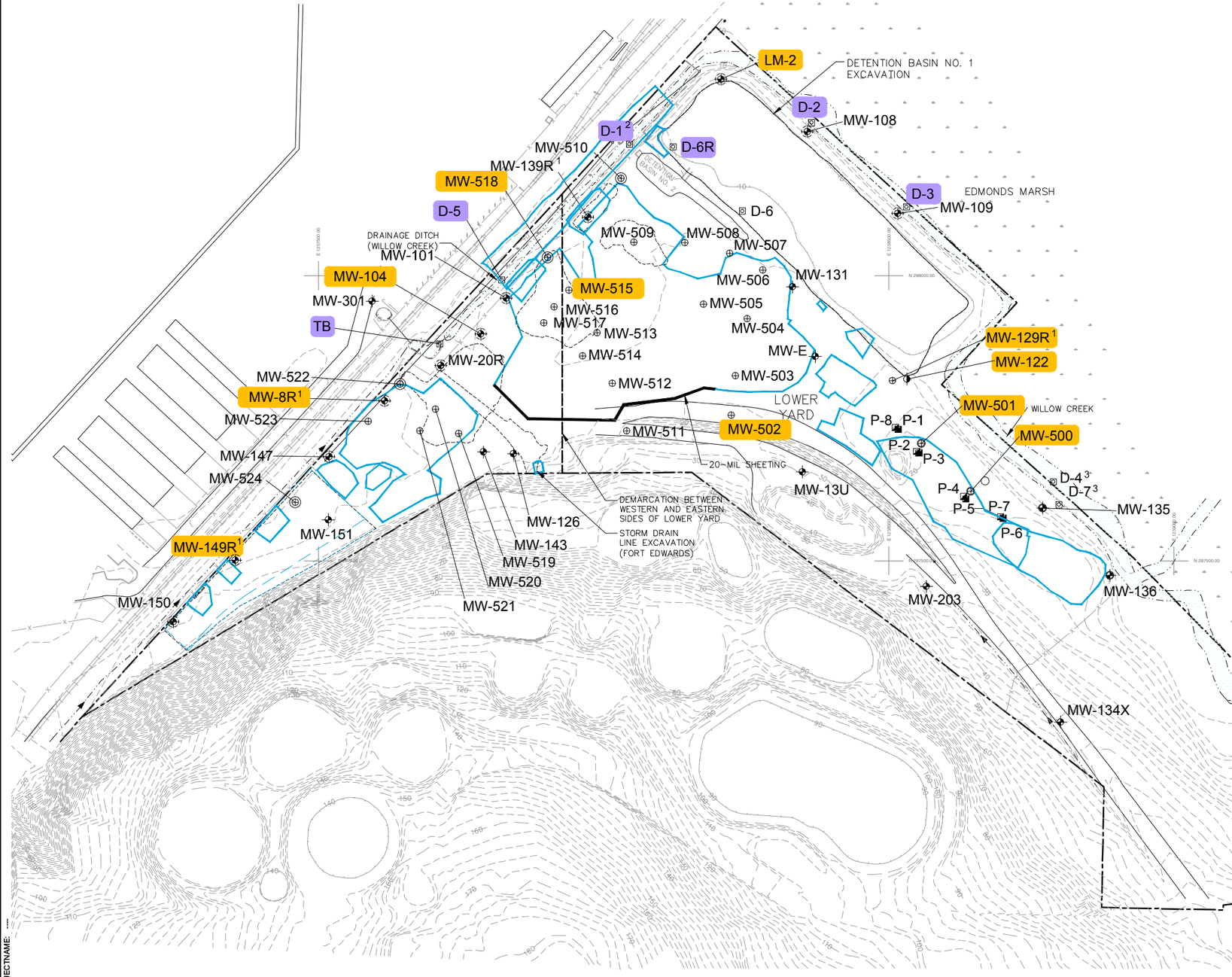
45362X02
45362X00



LEGEND:

MW-203	MONITORING WELL LOCATION AND DESIGNATION
MW-122	DEEP MONITORING WELL LOCATION AND DESIGNATION
MW-109	EXISTING SURFACE WATER COMPLIANCE MONITORING WELL LOCATION AND DESIGNATION
MW-510	SURFACE WATER COMPLIANCE MONITORING WELL LOCATION INSTALLED OCTOBER 2008
	MONITORING WELL LOCATION INSTALLED OCTOBER 2008
	PIEZOMETER
	STAFF GAUGE
	2001 AND 2003 SOIL EXCAVATIONS BELOW GROUNDWATER TABLE
	LOWER YARD PROPERTY BOUNDARY
	2007/2008 EXCAVATION BOUNDARIES
	STAFF GAUGE INCLUDED DURING HYDRAULIC EVALUATION
	MONITORING WELL INCLUDED DURING HYDRAULIC EVALUATION (MW-122 INCLUDED IN TIDAL STUDY ONLY)

NOTES:

1. MONITORING WELLS MW-129R, MW-139R, MW-8R, AND MW-149R WERE ABANDONED DURING INTERIM ACTION AND REPLACED IN OCTOBER 2008.
2. STAFF GAUGE D-1 RE-ESTABLISHED PRIOR TO JUNE 2009 SAMPLING EVENT.
3. STAFF GAUGE D-4 WAS ESTABLISHED PRIOR TO JUNE 2009 SAMPLING EVENT TO REPLACE STAFF GAUGE D-7 WHICH IS NOT WITHIN THE WILLOW CREEK CHANNEL.
4. STAFF GAUGES WERE RESURVEYED BY OTAK INCORPORATED JUNE 1, 2009. STAFF GAUGES WERE SURVEYED FROM TOP OF GAUGE AND WATER LEVELS ARE NOW MEASURED FROM TOP DOWN TO WATER.
5. 20-MIL SHEETING INSTALLED UPON COMPLETION OF PHASE I EXCAVATION. SHEETING REACHES TO APPROXIMATELY 10 FT BGS.

0 100' 200'
GRAPHIC SCALE

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL EDMONDS TERMINAL
EDMONDS, WASHINGTON
2011 SITE INVESTIGATION COMPLETION REPORT

MONITORING WELL LOCATIONS

ARCADIS

FIGURE 3

CITY: SYRACUSE, NY DIV/GROUP: ENV/CADD DB: P. LISTER, A. SCHILLING, P. LISTER PM/TM: R. ANDRESEN TR: D. RASAR LYR: ON=*;OFF=REF, (FRZ)
G:\ENVCAD\SYRACUSE\ACTIB\045362\0003\000141DWG\2011-SI-CR45362B08.dwg LAYOUT: 3 SAVED: 3/1/2012 3:29 PM ACADVER: 18.0S (LMS TECH) PAGESETUP: ---- PLOTSTYLETABLE: PLTFULL.CTB PLOTTED: 3/1/2012 3:30 PM BY: ALLEN, ROYCE
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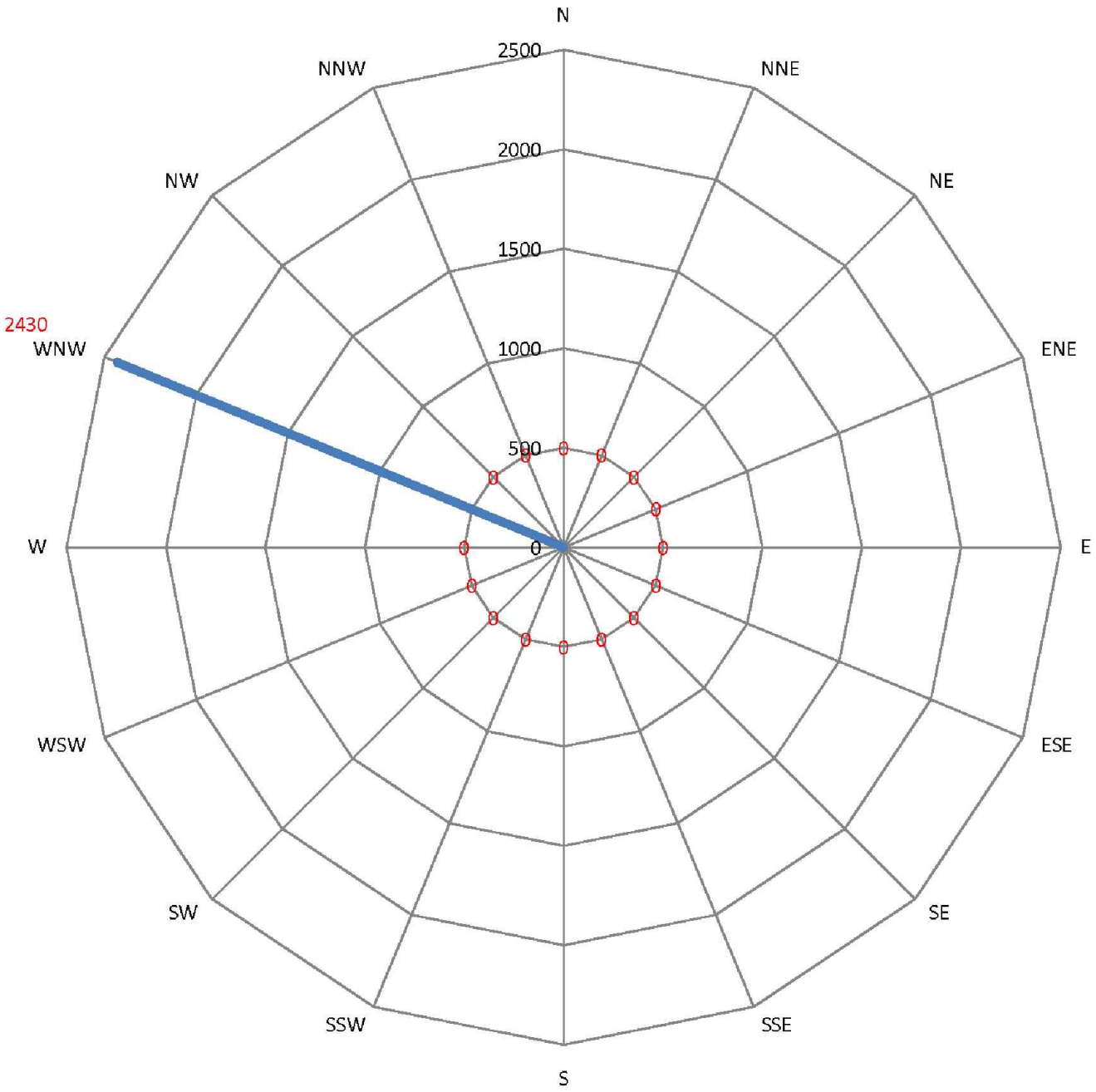
45362X02
45362X00



NOTES:

2430 - RED NUMBERS INDICATE READINGS PER CARDINAL DIRECTION

2500 - BLACK NUMBERS ARE FOR SCALE

NNW - LETTERS INDICATE CARDINAL DIRECTION

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
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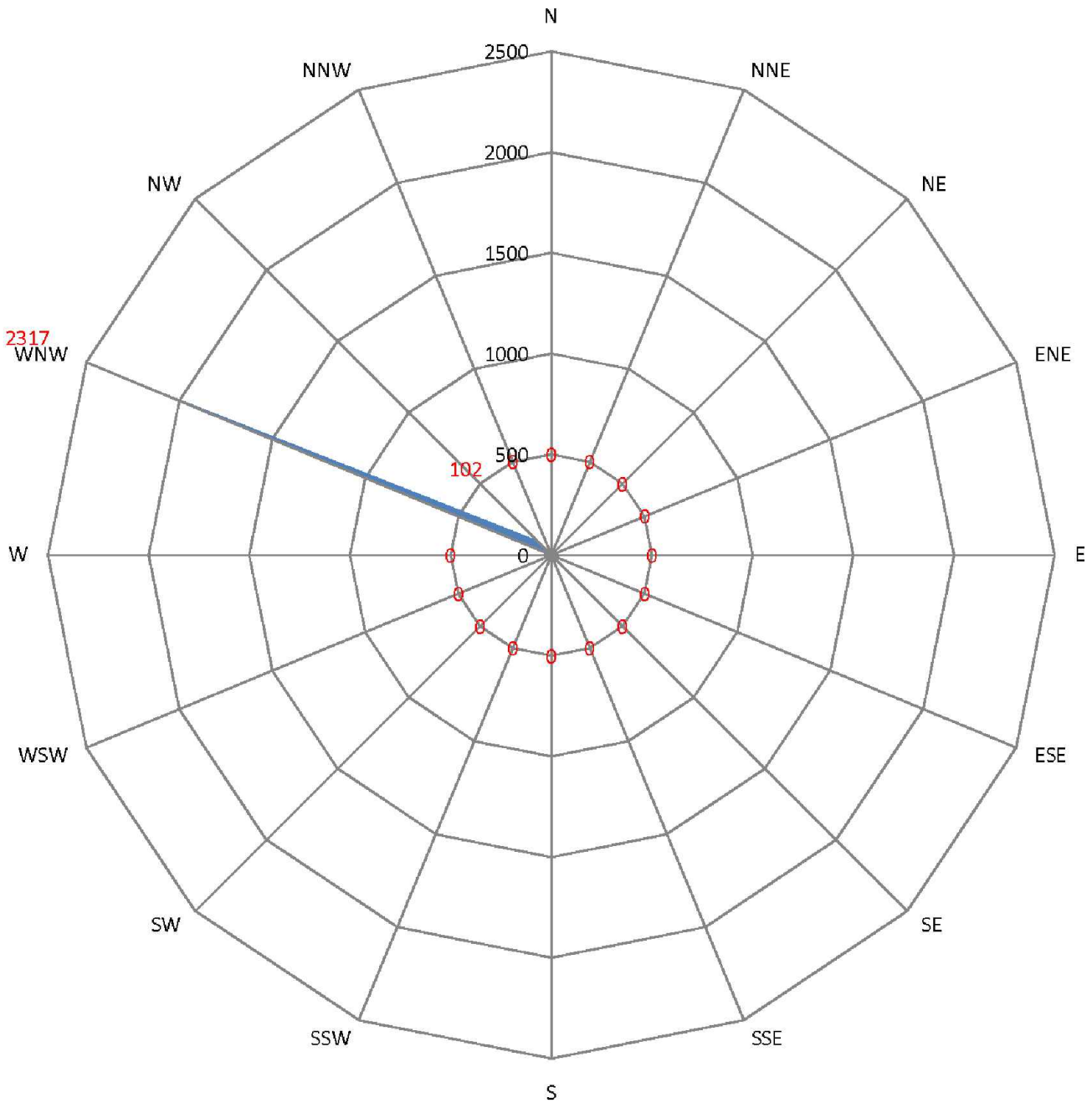
EDMONDS, WASHINGTON
2011 SITE INVESTIGATION COMPLETION REPORT

TIDAL STUDY GROUNDWATER FLOW DIRECTION

ARCADIS

FIGURE
4



NOTES:

2317 - RED NUMBERS INDICATE READINGS PER CARDINAL DIRECTION

2500 - BLACK NUMBERS ARE FOR SCALE

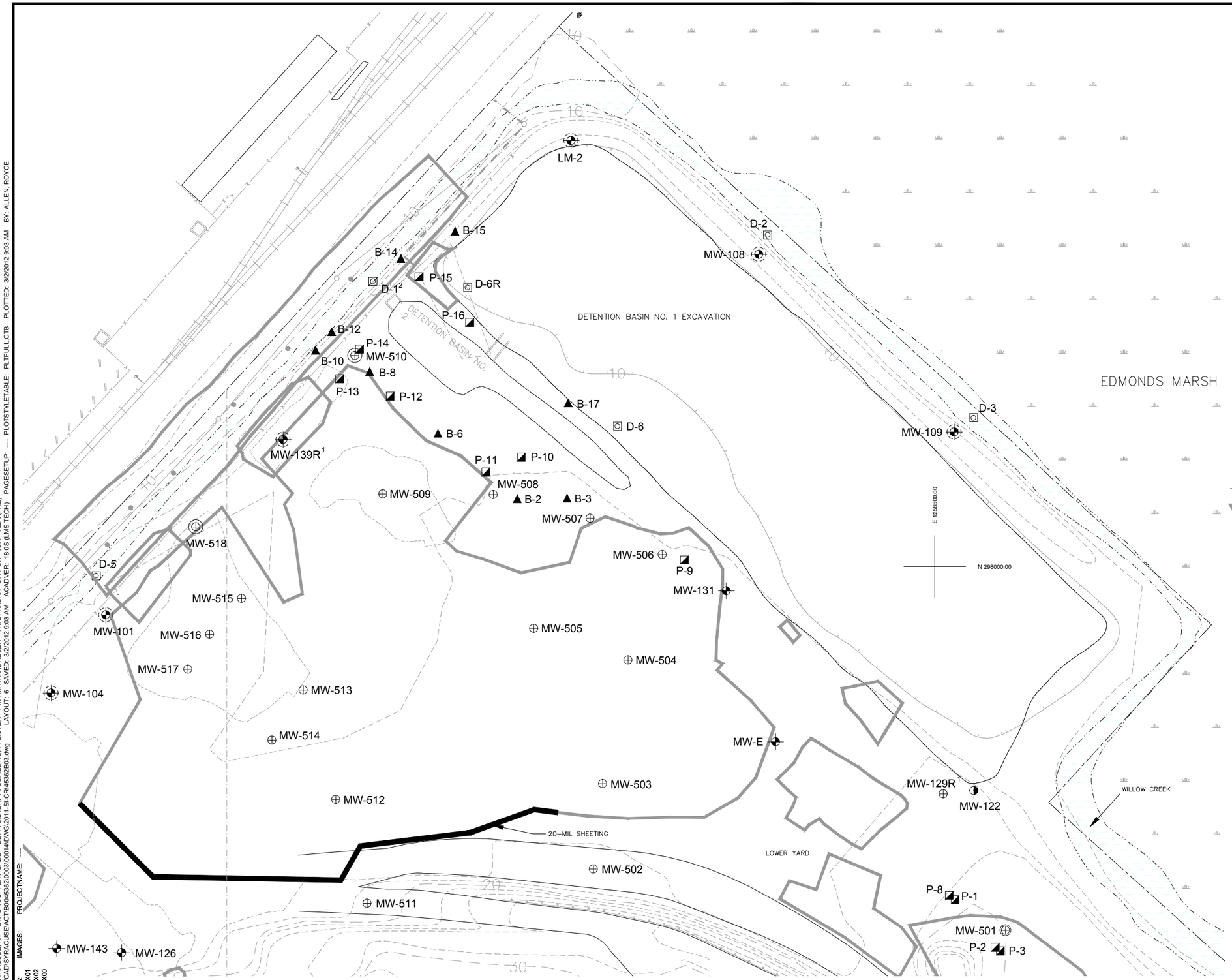
NNW - LETTERS INDICATE CARDINAL DIRECTION

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL EDMONDS TERMINAL
EDMONDS, WASHINGTON
2011 SITE INVESTIGATION COMPLETION REPORT

TIDAL STUDY GROUNDWATER AND SURFACE WATER FLOW DIRECTION

ARCADIS

FIGURE
5



LEGEND:

- MONITORING WELL LOCATION AND DESIGNATION
- DEEP MONITORING WELL LOCATION AND DESIGNATION
- EXISTING SURFACE WATER COMPLIANCE MONITORING WELL LOCATION AND DESIGNATION
- SURFACE WATER COMPLIANCE MONITORING WELL LOCATION INSTALLED OCTOBER 2008
- MONITORING WELL LOCATION INSTALLED OCTOBER 2008
- PIEZOMETER
- SOIL BORING
- STAFF GAUGE
- 2001 AND 2003 SOIL EXCAVATIONS BELOW GROUNDWATER TABLE
- LOWER YARD PROPERTY BOUNDARY
- 2007/2008 EXCAVATION BOUNDARIES

NOTES:

1. MONITORING WELLS MW-129R, MW-139R, MW-8R, AND MW-149R WERE ABANDONED DURING INTERIM ACTION AND REPLACED IN OCTOBER 2008.
2. STAFF GAUGE D-1 RE-ESTABLISHED PRIOR TO JUNE 2009 SAMPLING EVENT.
3. STAFF GAUGES WERE RESURVEYED BY OTAK INCORPORATED JUNE 1, 2009. STAFF GAUGES WERE SURVEYED FROM TOP OF GAUGE AND WATER LEVELS ARE NOW MEASURED FROM TOP DOWN TO WATER.
4. 20-MIL SHEETING INSTALLED UPON COMPLETION OF PHASE I EXCAVATION. SHEETING REACHES TO APPROXIMATELY 10 FT BGS.

0 80' 160'

GRAPHIC SCALE

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL EDMONDS TERMINAL
EDMONDS, WASHINGTON
2011 SITE INVESTIGATION COMPLETION REPORT

DB-2 INVESTIGATION SOIL BORING LOCATIONS

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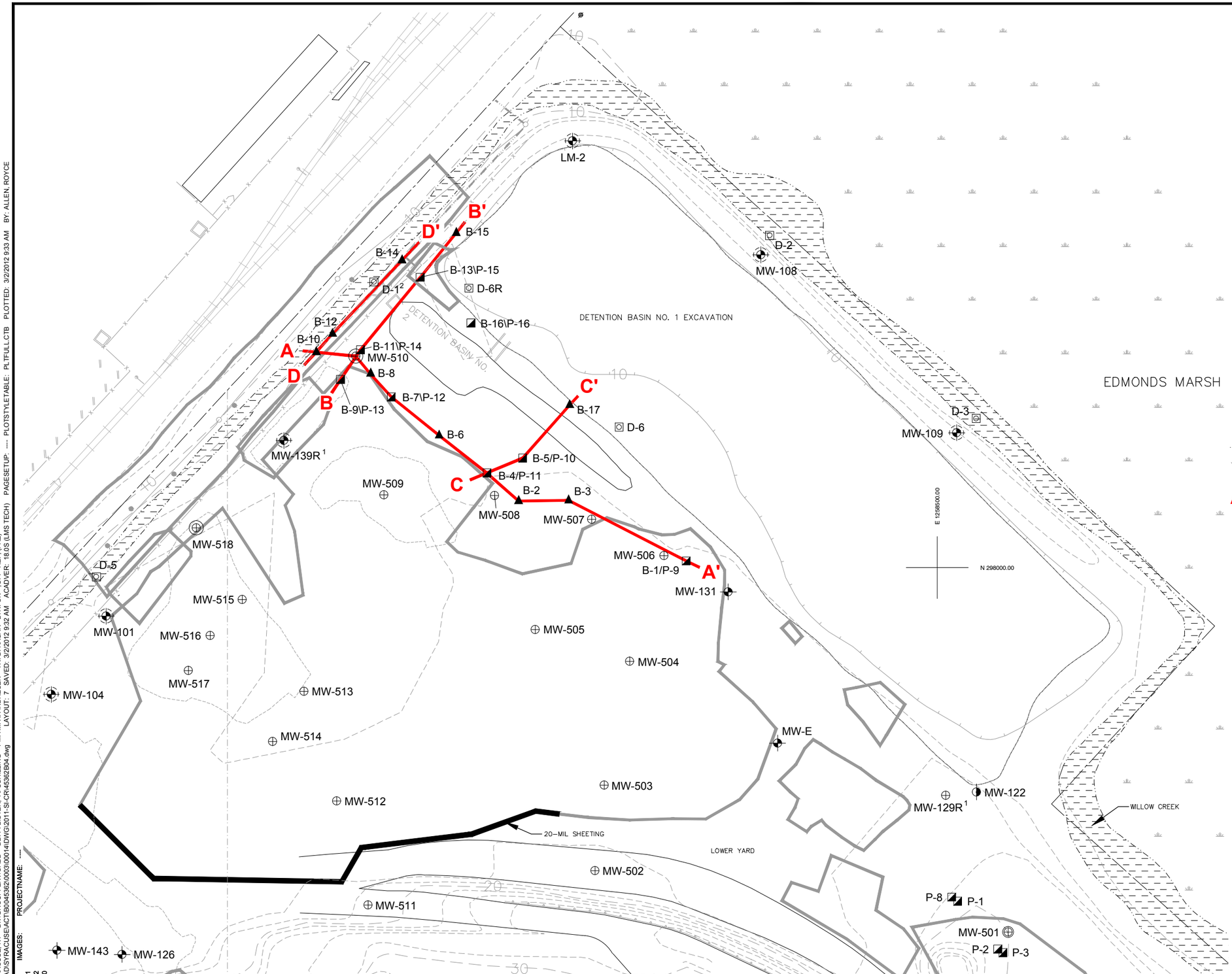
FIGURE 6



LEGEND:

- MONITORING WELL LOCATION AND DESIGNATION
- DEEP MONITORING WELL LOCATION AND DESIGNATION
- EXISTING SURFACE WATER COMPLIANCE MONITORING WELL LOCATION AND DESIGNATION
- SURFACE WATER COMPLIANCE MONITORING WELL LOCATION INSTALLED OCTOBER 2008
- MONITORING WELL LOCATION INSTALLED OCTOBER 2008
- PIEZOMETER
- SOIL BORING
- STAFF GAUGE
- 2001 AND 2003 SOIL EXCAVATIONS BELOW GROUNDWATER TABLE
- LOWER YARD PROPERTY BOUNDARY
- 2007/2008 EXCAVATION BOUNDARIES
- A—A' CROSS SECTION LOCATION

NOTES:

1. MONITORING WELLS MW–129R, MW–139R, MW–8R, AND MW–149R WERE ABANDONED DURING INTERIM ACTION AND REPLACED IN OCTOBER 2008.
2. STAFF GAUGE D–1 RE–ESTABLISHED PRIOR TO JUNE 2009 SAMPLING EVENT.
3. STAFF GAUGES WERE RESURVEYED BY OTAK INCORPORATED JUNE 1, 2009. STAFF GAUGES WERE SURVEYED FROM TOP OF GAUGE AND WATER LEVELS ARE NOW MEASURED FROM TOP DOWN TO WATER.
4. 20–MIL SHEETING INSTALLED UPON COMPLETION OF PHASE I EXCAVATION. SHEETING REACHES TO APPROXIMATELY 10 FT BGS.

0 80' 160'

GRAPHIC SCALE

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL EDMONDS TERMINAL
EDMONDS, WASHINGTON
2011 SITE INVESTIGATION COMPLETION REPORT

CROSS SECTION LOCATION MAP

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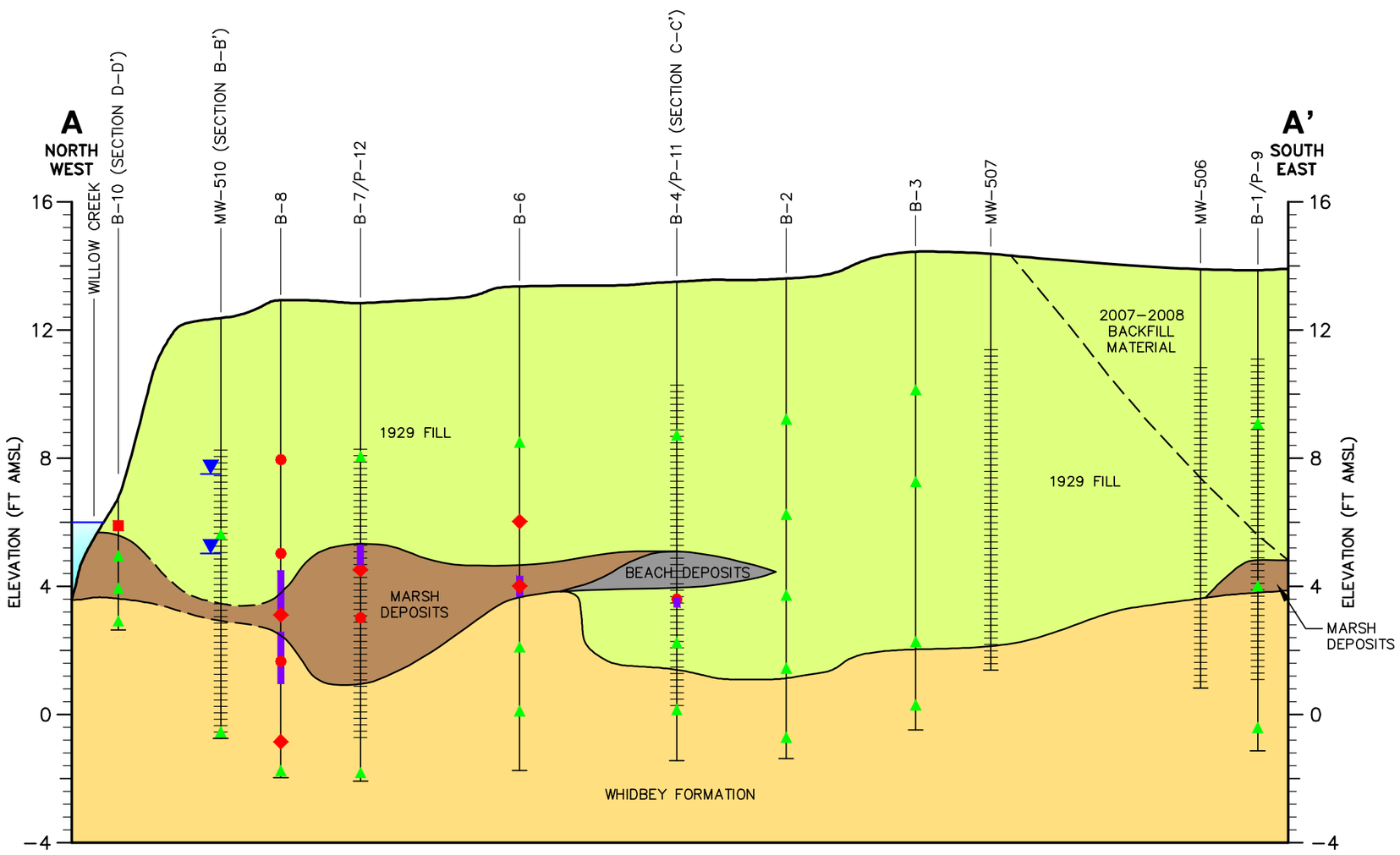
FIGURE 7



LEGEND:

- MW-510 — WELL OR BORING ID
- GROUND SURFACE
- HISTORICAL HIGH AND LOW WATER LEVEL
- LITHOLOGIC CONTACT (DASHED WHERE INFERRED)
- SCREENED INTERVAL
- BOTTOM OF BORING
- SAMPLE LOCATION EXCEEDING BOTH SITE CULs AND RELs
- SAMPLE LOCATION EXCEEDING cPAHs CUL
- SAMPLE LOCATION NOT EXCEEDING SITE CULs
- SAMPLE LOCATION EXCEEDING TOTAL TPH REL
- LNAPL PRESENT IN BORING
- 1929 FILL MATERIAL
- WHIDBEY FORMATION
- BEACH DEPOSITS
- MARSH DEPOSITS

NOTES:

1. MW-510 ANALYTICAL SAMPLES COLLECTED ON 10/08/08.
2. AMSL = ABOVE MEAN SEA LEVEL
   LNAPL = LIGHT NON-AQUEOUS PHASE LIQUID
   CULs = CLEANUP LEVELS

VERTICAL EXAGGERATION = 10x

0 4' 8'

VERTICAL SCALE

0 40' 80'

HORIZONTAL SCALE

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL EDMONDS TERMINAL
EDMONDS, WASHINGTON
2011 SITE INVESTIGATION COMPLETION REPORT

CROSS SECTION A-A'

ARCADIS

FIGURE **8**

CITY: SYRACUSE, N.Y. GROUP: ENV/CADD-141 DB: P. LISTER, R. ALLEN PM: R. ANDRESEN TM: S. ZORN TR: D. RASAR LYR: ON=*;OFF=REF: (FR2)
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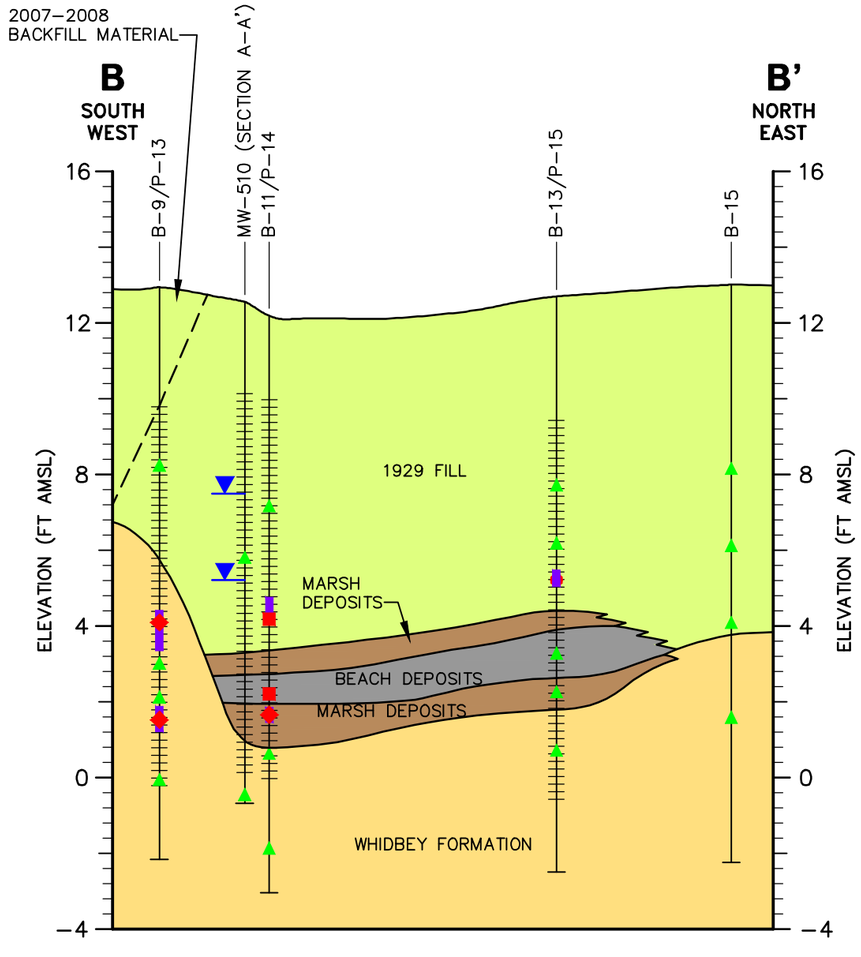
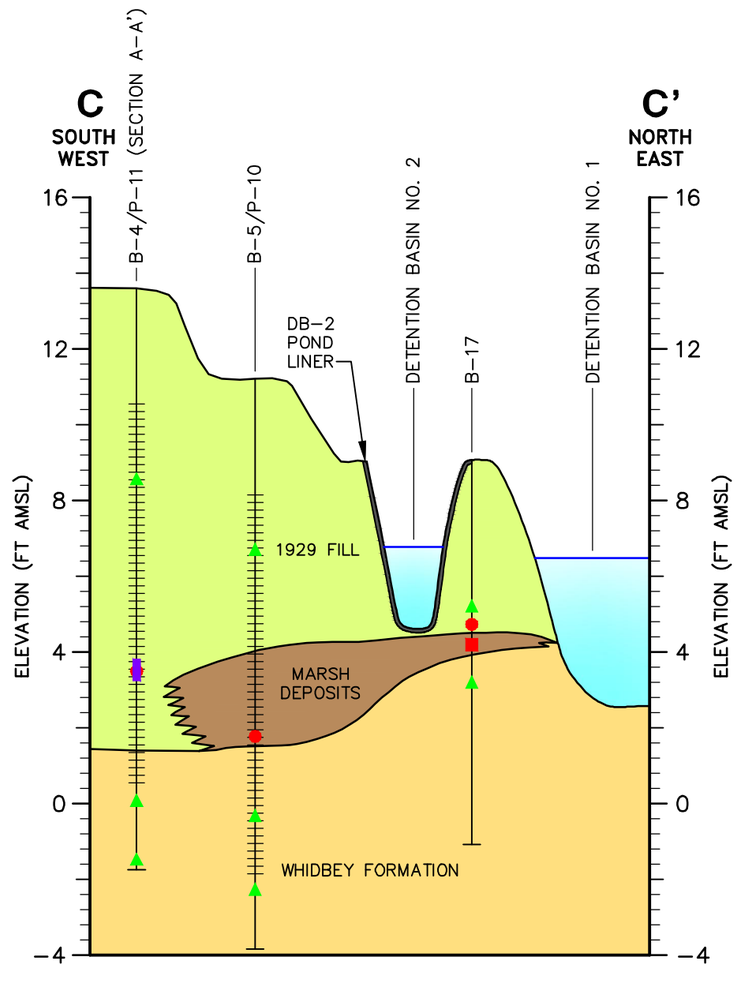
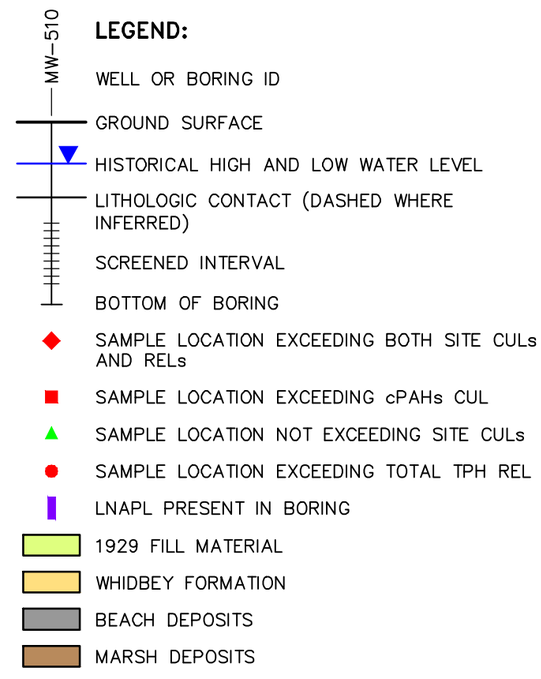
XREFS: IMAGES: PROJECTNAME: ---
45362XBL

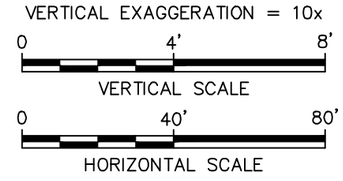






NOTES:

1. MW–510 ANALYTICAL SAMPLES COLLECTED ON 10/08/08.
2. AMSL = ABOVE MEAN SEA LEVEL
   LNAPL = LIGHT NON–AQUEOUS PHASE LIQUID
   CULs = CLEANUP LEVELS



CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL EDMONDS TERMINAL
EDMONDS, WASHINGTON
2011 SITE INVESTIGATION COMPLETION REPORT

CROSS SECTIONS B-B' & C-C'

ARCADIS

FIGURE
9

CITY: SYRACUSE, N.Y. GROUP: ENV/CADD-141 DB: P. LISTER, R. ALLEN PM: R. ANDRESEN TM: S. ZORN TR: D. RASAR LYR: ON=*;OFF=REF. (FRZ)
G:\ENV\CAD\SYRACUSE\ACT\B0045362\0003\000141DWG\2011-SI-CR45362V02.dwg LAYOUT: 9 SAVED: 2/29/2012 10:36 AM ACADVER: 18.0S (LMS TECH)
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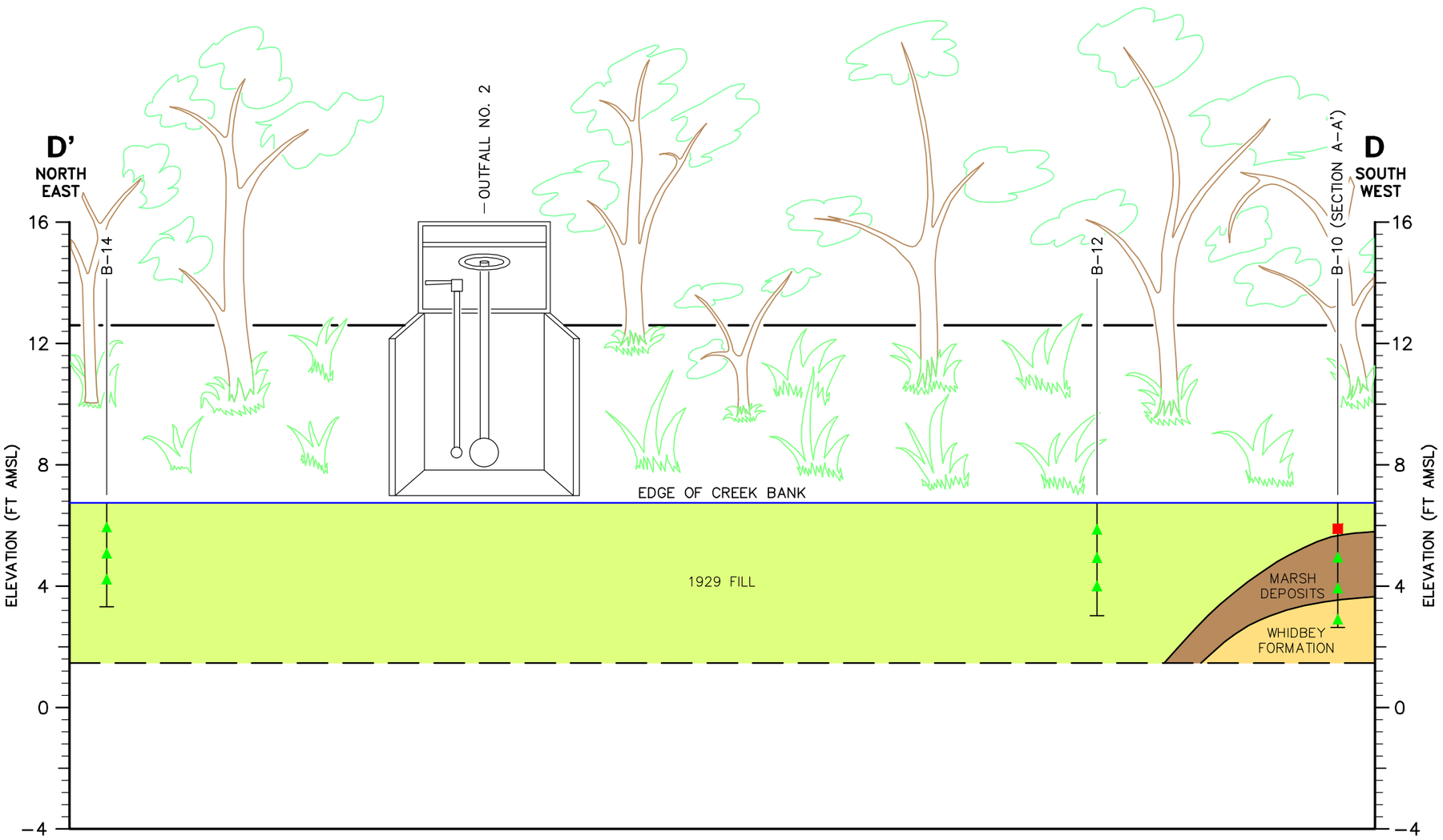
45362XBL



LEGEND:

- B-10 — WELL OR BORING ID
- GROUND SURFACE
- HISTORICAL HIGH AND LOW WATER LEVEL
- LITHOLOGIC CONTACT (DASHED WHERE INFERRED)
- SCREENED INTERVAL
- BOTTOM OF BORING
- SAMPLE LOCATION EXCEEDING BOTH SITE CULs AND RELs
- SAMPLE LOCATION EXCEEDING cPAHs CUL
- SAMPLE LOCATION NOT EXCEEDING SITE CULs
- SAMPLE LOCATION EXCEEDING TOTAL TPH REL
- LNAPL PRESENT IN BORING
- 1929 FILL MATERIAL
- MARSH DEPOSITS
- WHIDBEY FORMATION

NOTES:

1. MW-510 ANALYTICAL SAMPLES COLLECTED ON 10/08/08.

2. AMSL = ABOVE MEAN SEA LEVEL
   LNAPL = LIGHT NON-AQUEOUS PHASE LIQUID
   CULs = CLEANUP LEVELS

VERTICAL EXAGGERATION = 2.5x

0 4' 8'

VERTICAL SCALE

0 10' 20'

HORIZONTAL SCALE

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL EDMONDS TERMINAL
EDMONDS, WASHINGTON
2011 SITE INVESTIGATION COMPLETION REPORT

CROSS SECTION D-D'

ARCADIS

FIGURE
10

B-12 8/24/2011		
Sample Depth	Total cPAHs	Total TPH
0.5–1	0.0117	299
1–1.5	0.00072 UU	254
2.5–3	0.079	248
3.5–4	0.00063	33

B-14 8/25/2011		
Sample Depth	Total cPAHs	Total TPH
0.5–1	0.029	155
1.5–2	NA	6 UU
2.5–3	NA	24 UU
3.5–4	0.0009	98

B-15 8/23/2011		
Sample Depth	Total cPAHs	Total TPH
4.5–5	0.0005	22
6.5–7	NA	20
8.5–9	0.0008	63
11–11.5	NA	16 UU

B-13/P-15 8/23/2011		
Sample Depth	Total cPAHs	Total TPH
4.5–5	0.0046	81
6–6.5	0.036	368
7–7.5	0.054 R	**15,900**
9–9.5	NA	9 UU
10–10.5	0.026	2,150
11.5–12	NA	9 UU

B-10 8/25/2011		
Sample Depth	Total cPAHs	Total TPH
0.5–1	**0.2**	758
1.5–2	0.018	86
2.5–3	0.00068 UU	37
3.5–4	0.00072	57

B-16/P-16 8/24/2011		
Sample Depth	Total cPAHs	Total TPH
3.5–4	0.018	386
4–4.5	**0.1**	1,290
4.5–5	0.00123	11
6–6.5	NA	9 UU

B-11/P-14 8/23/2011		
Sample Depth	Total cPAHs	Total TPH
4.5–5	**0.24**	1,011
7.5–8	0.012	**35,240**
8.5–9	0.012	53
9.5–10	**1.6 T**	12
10–10.5	**3.4**	**37,150**
11–11.5	0.01	461
13.5–14	NA	8 UU

B-17 8/24/2011		
Sample Depth	Total cPAHs	Total TPH
3.5–4	0.00109	1,756
4–4.5	0.0008 UU	**22,201**
4.5–5	**116 R**	268
5.5–6	NA	18 UU

B-5/P-10 8/22/2011		
Sample Depth	Total cPAHs	Total TPH
4.5–5	NA	8 UU
9–9.5	0.0138	**27,021**
11.5–12	NA	9 UU
13.5–14	NA	8 UU

B-9/P-13 8/23/2011		
Sample Depth	Total cPAHs	Total TPH
4.5–5	NA	29
8.5–9	**0.29**	**20,970**
9.5–10	0.0024	30
10.5–11	0.025	921
11–11.5	**0.15 T**	**16,250**
12.5–13	0.00065	15

B-3 8/22/2011		
Sample Depth	Total cPAHs	Total TPH
4.5–5	NA	8 UU
7–7.5	0.00076	181
12–12.5	0.00077	96
14–14.5	NA	8

B-1/P-9 8/22/2011		
Sample Depth	Total cPAHs	Total TPH
4.5–5	0.00052	16
9.5–10	0.0082	72
14–14.5	NA	11 UU

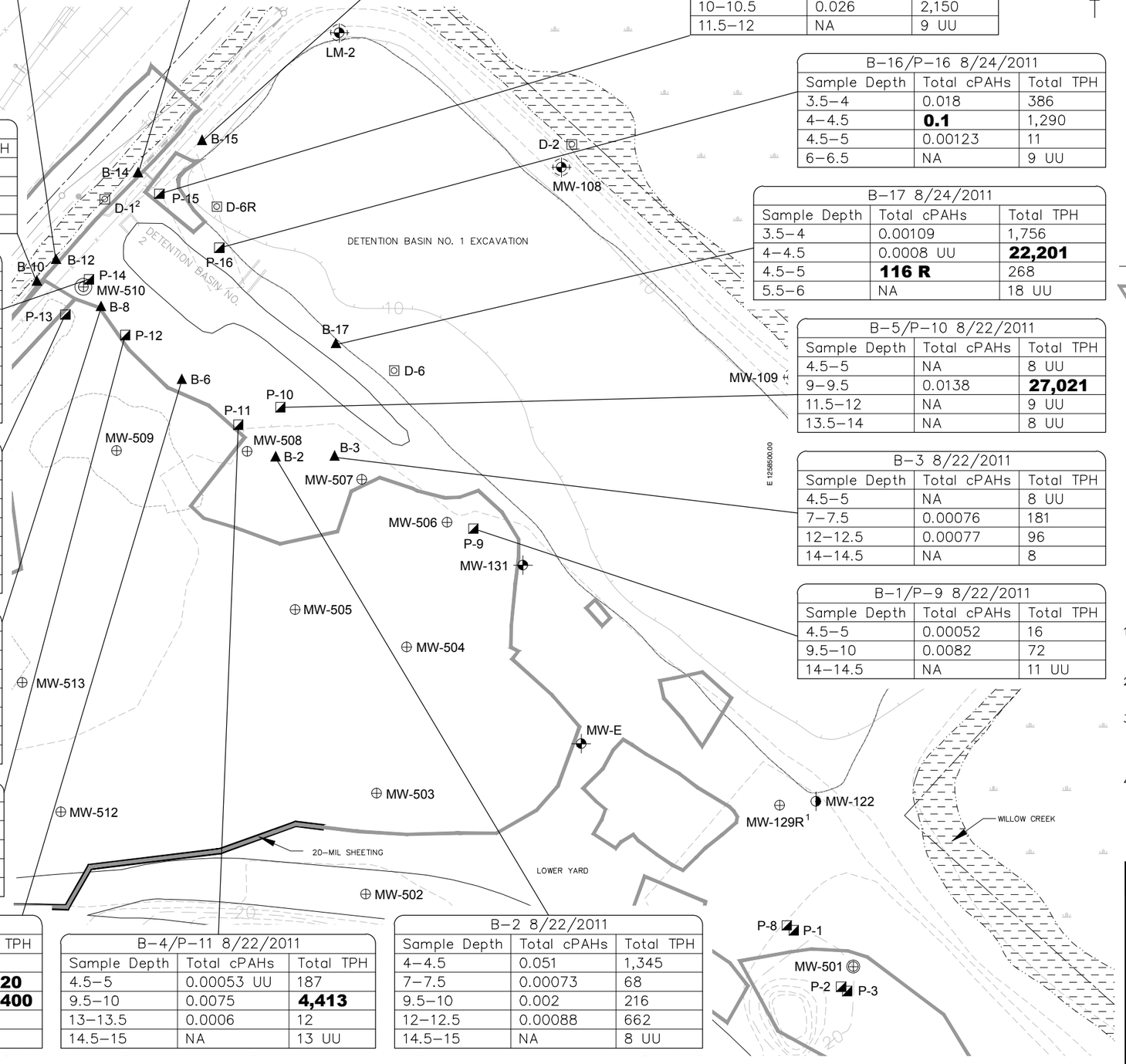
B-8 8/23/2011		
Sample Depth	Total cPAHs	Total TPH
4.5–5	0.114	**16,500**
7.5–8	0.077	**9,360**
9.5–10	**0.5 T**	**75,730**
11–11.5	0.09	**8,200**
13.5–14	**0.1**	55
14.5–15	NA	8 UU

B-7/P-12 8/22/2011		
Sample Depth	Total cPAHs	Total TPH
4.5–5	0.071	700
8–8.5	**2.8 T**	**111,400**
9.5–10	0.037 T	**5,947**
14–14.5	NA	8 UU

B-6 8/22/2011		
Sample Depth	Total cPAHs	Total TPH
4.5–5	0.09	970
7–7.5	**0.36**	**21,620**
9–9.5	**3.2 T**	**220,400**
11–11.5	0.012	317
13–13.5	NA	8 UU

B-4/P-11 8/22/2011		
Sample Depth	Total cPAHs	Total TPH
4.5–5	0.00053 UU	187
9.5–10	0.0075	**4,413**
13–13.5	0.0006	12
14.5–15	NA	13 UU

B-2 8/22/2011		
Sample Depth	Total cPAHs	Total TPH
4–4.5	0.051	1,345
7–7.5	0.00073	68
9.5–10	0.002	216
12–12.5	0.00088	662
14.5–15	NA	8 UU



LEGEND:

- MONITORING WELL LOCATION AND DESIGNATION
- DEEP MONITORING WELL LOCATION AND DESIGNATION
- EXISTING SURFACE WATER COMPLIANCE MONITORING WELL LOCATION AND DESIGNATION
- SURFACE WATER COMPLIANCE MONITORING WELL LOCATION INSTALLED OCTOBER 2008
- MONITORING WELL LOCATION INSTALLED OCTOBER 2008
- PIEZOMETER
- SOIL BORING
- STAFF GAUGE
- 2001 AND 2003 SOIL EXCAVATIONS BELOW GROUNDWATER TABLE
- LOWER YARD PROPERTY BOUNDARY
- 2007/2008 EXCAVATION BOUNDARIES

LOCATION ID SAMPLE DATE		
Sample Depth	Total cPAHs	Total TPH
Depth in feet below ground surface	Total carcinogenic polynuclear aromatic hydrocarbons (mg/kg)	Total petroleum hydrocarbons (mg/kg)

UU – THE CONSTITUENTS MAKING UP THE TOTAL ARE ALL NON–DETECTS
T – REPORTING LIMITS WERE RAISED DUE TO INTERFERENCE FROM THE SAMPLE MATRIX
R – THE GC/MS SEMIVOLATILE INTERNAL STANDARD PEAK AREAS WERE OUTSIDE OF THE QC LIMITS FOR BOTH THE INITIAL INJECTION AND THE RE–INJECTION
NA – ANALYSIS NOT CONDUCTED
mg/kg – MILLIGRAMS PER KILOGRAM
BOLD CONCENTRATIONS REPRESENT EXCEEDANCE OF SITE CLEAN–UP LEVELS

NOTES:

1. MONITORING WELLS MW–129R, MW–139R, MW–8R, AND MW–149R WERE ABANDONED DURING INTERIM ACTION AND REPLACED IN OCTOBER 2008.
2. STAFF GAUGE D–1 RE–ESTABLISHED PRIOR TO JUNE 2009 SAMPLING EVENT.
3. STAFF GAUGES WERE RESURVEYED BY OTAK INCORPORATED JUNE 1, 2009. STAFF GAUGES WERE SURVEYED FROM TOP OF GAUGE AND WATER LEVELS ARE NOW MEASURED FROM TOP DOWN TO WATER.
4. 20–MIL SHEETING INSTALLED UPON COMPLETION OF PHASE I EXCAVATION. SHEETING REACHES TO APPROXIMATELY 10 FT BGS.

0 80' 160'
GRAPHIC SCALE

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
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EDMONDS, WASHINGTON
2011 SITE INVESTIGATION COMPLETION REPORT

ANALYTICAL RESULTS IN SOIL

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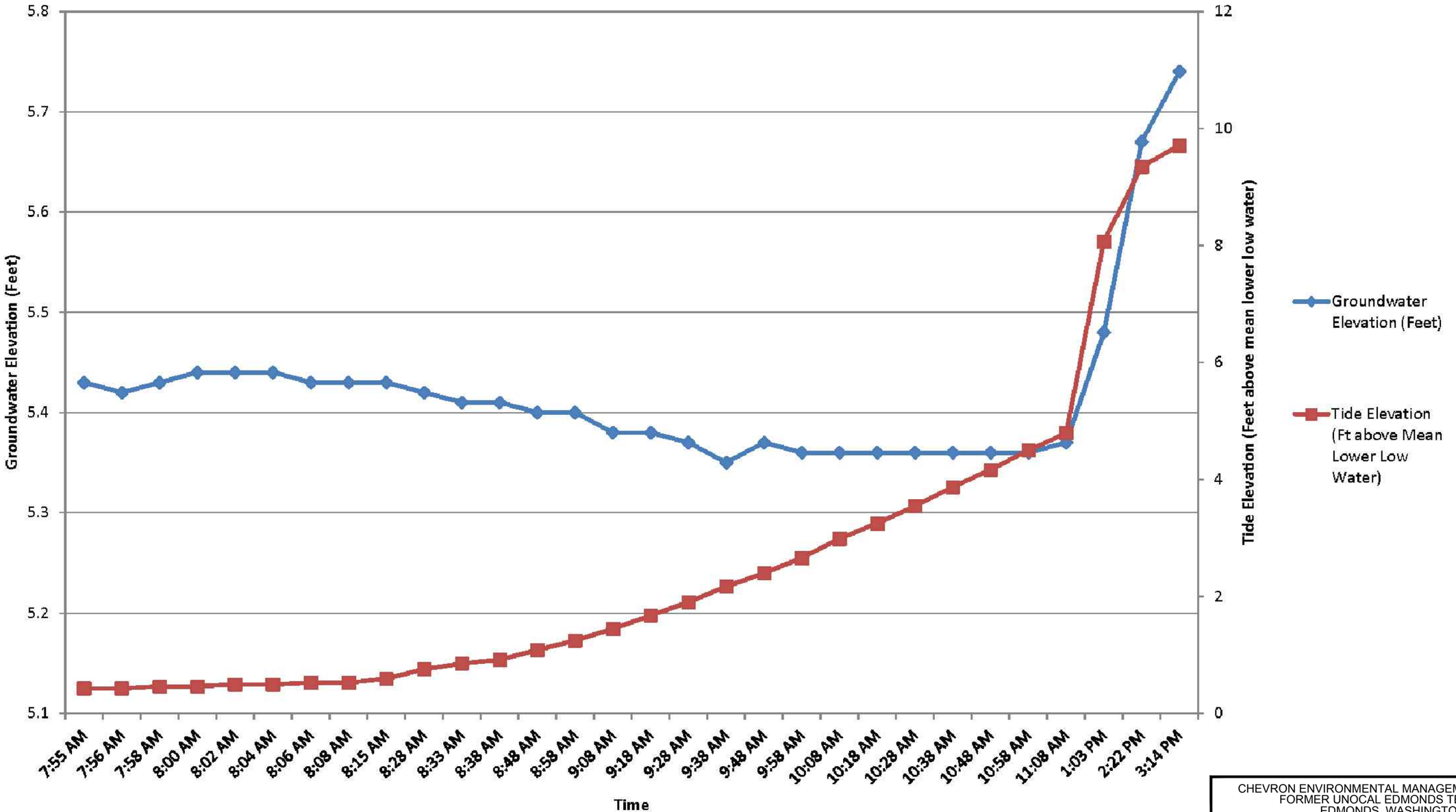
FIGURE
11

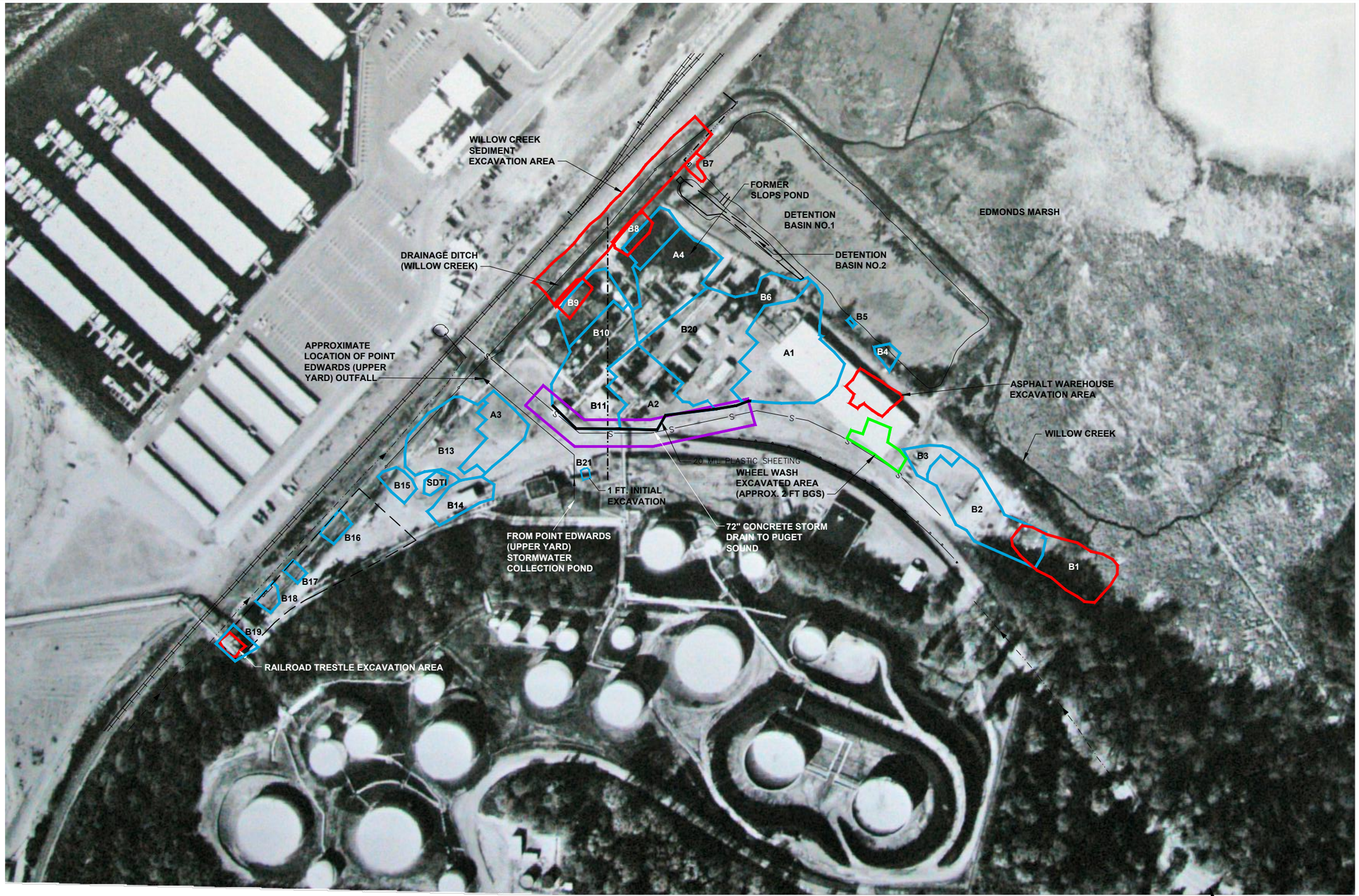


CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL EDMONDS TERMINAL
EDMONDS, WASHINGTON
2011 SITE INVESTIGATION COMPLETION REPORT

LNAPL BAILDOWN GROUNDWATER ELEVATION AND TIDAL ELEVATION

ARCADIS

FIGURE
12



LEGEND:

- DRAINAGE DITCH
- PHASE I EXCAVATION AREAS
- SHALLOW PHASE I EXCAVATION AREA
- WSDOT STORMWATER LINE AREA
- PHASE II EXCAVATION AREAS

NOTES:

1. BASE MAP SUPPLIED BY SLR INTERNATIONAL CORP., APRIL 2007, AT A SCALE OF 1"=150'.
2. AERIAL PHOTOGRAPH c. 1970 OBTAINED FROM WASHINGTON STATE DEPARTMENT OF ECOLOGY.

0 100' 200'
GRAPHIC SCALE

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL EDMONDS TERMINAL
EDMONDS, WASHINGTON
2011 SITE INVESTIGATION COMPLETION REPORT

1970 AERIAL PHOTO WITH FINAL EXCAVATION AREAS

ARCADIS

FIGURE 13

CITY: SYRACUSE, NY GROUP: ENVCAD DB: K. DAVIS, P. LISTER PIC: J VOGELEY PM: R. ANDRESEN TR: D. RASAR LYR: ON=*;OFF=*REF, (FR2)
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XREFS: IMAGES: PROJECTNAME: ----
45362X02 UE1.70AUG.□g
45362X00

ARCADIS

Appendix A

Groundwater Gauging Data and Analytical Results

Table 1

Groundwater Elevation Data
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date	Time	Top of Casing Elevation (feet)	Depth to Water (top of casing) (feet)	Depth to LNAPL (feet)	LNAPL Thickness (feet)	Groundwater Elevation (feet amsl)
LM-2	10/20/08	16:08	8.14	2.66	--	NP	5.48
	12/08/08	10:51		2.89	--	NP	5.25
	02/20/09	9:55		2.64	--	NP	5.50
	04/20/09	9:48		2.46	--	NP	5.68
	06/22/09	11:35		2.84	--	NP	5.30
	08/03/09	11:18		3.10	--	NP	5.04
	08/17/09	9:27		3.09	--	NP	5.05
	10/29/09	9:46		2.56	--	NP	5.58
	01/18/10	13:47		2.59	--	NP	5.55
	04/19/10	15:14		2.20	--	NP	5.94
	07/19/10	7:24		2.41	--	NP	5.73
	10/25/10	14:02		1.63	--	NP	6.51
	03/21/11	12:32		1.60	--	NP	6.54
	06/14/11	10:54		2.54	--	NP	5.60
	09/26/11	10:59		2.79	--	NP	5.35
MW-E	10/20/08	16:20	14.42	7.95	--	NP	6.47
	12/08/08	11:35		7.78	--	NP	6.64
	02/20/09	10:27		7.58	--	NP	6.84
	04/20/09	10:11		7.48	--	NP	6.94
	06/22/09	12:14		7.94	--	NP	6.48
	08/03/09	11:32		8.10	--	NP	6.32
	08/17/09	9:39		8.19	--	NP	6.23
	10/29/09	8:53		7.02	--	NP	7.40
	01/18/10	13:45		6.89	--	NP	7.53
	04/19/10	15:39		7.10	--	NP	7.32
	07/19/10	7:41		7.65	--	NP	6.77
	10/25/10	14:14		7.30	--	NP	7.12
	03/21/11	12:44		6.58	--	NP	7.84
	06/14/11	11:15		7.57	--	NP	6.85
	09/26/11	11:06		7.93	--	NP	6.49
MW-8R	10/20/08	15:47	13.82	8.49	--	NP	5.33
	12/08/08	10:17		8.35	--	NP	5.47
	02/20/09	9:22		8.11	--	NP	5.71
	04/20/09	9:09		8.40	--	NP	5.42
	06/22/09	11:13		7.06	--	NP	6.76
	08/03/09	10:53		8.21	--	NP	5.61
	08/17/09	8:53		8.45	--	NP	5.37
	10/29/09	8:43		7.99	--	NP	5.83
	01/18/10	13:21		6.02	--	NP	7.80
	04/19/10	14:29		7.64	--	NP	6.18
	07/19/10	6:58		8.37	--	NP	5.45
	10/25/10	13:31		7.83	--	NP	5.99
	03/21/11	12:16		6.92	--	NP	6.90
	06/14/11	9:58		8.13	--	NP	5.69
	09/26/11	10:48		8.35	--	NP	5.47
MW-101	10/20/08	15:55	14.99	8.97	--	NP	6.02
	12/08/08	10:30		8.96	--	NP	6.03
	02/20/09	9:40		8.81	--	NP	6.18
	04/20/09	9:15		8.83	--	NP	6.16
	06/22/09	11:27		8.95	--	NP	6.04
	08/03/09	11:03		9.14	--	NP	5.85
	08/17/09	9:18		9.38	--	NP	5.61
	10/29/09	9:00		8.71	--	NP	6.28
	01/18/10	13:30		7.00	--	NP	7.99
	04/19/10	14:43		8.31	--	NP	6.68
	07/19/10	7:10		9.08	--	NP	5.91
	10/25/10	13:39		8.55	--	NP	6.44
	03/21/11	12:23		7.85	--	NP	7.14
	06/14/11	10:07		8.79	--	NP	6.20
	09/26/11	10:50		9.13	--	NP	5.86

Table 1

Groundwater Elevation Data
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date	Time	Top of Casing Elevation (feet)	Depth to Water (top of casing) (feet)	Depth to LNAPL (feet)	LNAPL Thickness (feet)	Groundwater Elevation (feet amsl)
MW-104	10/20/08	15:53	14.08	8.21	--	NP	5.87
	12/08/08	10:28		8.20	--	NP	5.88
	02/20/09	9:34		8.09	--	NP	5.99
	04/20/09	9:13		8.32	--	NP	5.76
	06/22/09	11:24		8.41	8.40	0.01^	5.67
	08/03/09	11:02		8.51	--	NP	5.57
	08/17/09	9:17		8.80	--	NP	5.28
	10/29/09	8:59		8.12	--	NP	5.96
	01/18/10	13:29		6.24	--	NP	7.84
	04/19/10	14:40		7.77	--	NP	6.31
	07/19/10	7:08		8.47	--	NP	5.61
	10/25/10	13:37		7.74	--	NP	6.34
	03/21/11	12:21		7.11	--	NP	6.97
	06/14/11	10:04		8.26	--	NP	5.82
	09/26/11	10:47		8.50	--	NP	5.58
MW-108	10/20/08	16:11	12.40	6.31	--	NP	6.09
	12/08/08	10:59		7.80	--	NP	4.60
	02/20/09	9:58		6.54	--	NP	5.86
	04/20/09	9:51		6.48	--	NP	5.92
	06/22/09	11:38		6.68	--	NP	5.72
	08/03/09	11:20		6.75	--	NP	5.65
	08/17/09	9:29		6.80	--	NP	5.60
	10/29/09	9:43		7.45	--	NP	4.95
	01/18/10	13:49		6.42	--	NP	5.98
	04/19/10	15:16		6.07	--	NP	6.33
	07/19/10	7:27		6.42	--	NP	5.98
	10/25/10	13:58		5.66	--	NP	6.74
	03/21/11	12:34		5.81	--	NP	6.59
	06/14/11	10:49		6.38	--	NP	6.02
	09/26/11	9:27		6.56	--	NP	5.84
MW-109	10/20/08	16:15	13.53	6.98	--	NP	6.55
	12/08/08	11:02		7.38	--	NP	6.15
	02/20/09	10:00		7.36	--	NP	6.17
	04/20/09	9:53		7.30	--	NP	6.23
	06/22/09	11:41		7.15	--	NP	6.38
	08/03/09	11:22		7.56	--	NP	5.97
	08/17/09	9:32		7.60	--	NP	5.93
	10/29/09	9:41		7.39	--	NP	6.14
	01/18/10	13:51		6.46	--	NP	7.07
	04/19/10	15:20		6.87	--	NP	6.66
	07/19/10	7:33		7.40	--	NP	6.13
	10/25/10	13:58		6.40	--	NP	7.13
	03/21/11	12:32		6.74	--	NP	6.79
	06/14/11	10:44		6.95	--	NP	6.58
	09/26/11	9:49		7.15	--	NP	6.38
MW-122	10/20/08	16:32	15.54	8.05	--	NP	7.49
	12/08/08	11:40		7.87	--	NP	7.67
	02/20/09	10:27		7.85	--	NP	7.69
	04/20/09	10:13		7.92	--	NP	7.62
	06/22/09	11:54		8.21	--	NP	7.33
	08/03/09	10:30		8.31	--	NP	7.23
	08/17/09	9:42		8.41	--	NP	7.13
	10/29/09	9:35		7.78	--	NP	7.76
	01/18/10	14:10		7.35	--	NP	8.19
	04/19/10	15:43		7.61	--	NP	7.93
	07/19/10	7:49		8.00	--	NP	7.54
	10/25/10	14:15		7.52	--	NP	8.02
	03/21/11	12:46		7.23	--	NP	8.31
	06/14/11	11:11		7.90	--	NP	7.64
	09/26/11	11:17		8.10	--	NP	7.44

Table 1

Groundwater Elevation Data
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date	Time	Top of Casing Elevation (feet)	Depth to Water (top of casing) (feet)	Depth to LNAPL (feet)	LNAPL Thickness (feet)	Groundwater Elevation (feet amsl)
MW-126	10/20/08	17:05	12.40	4.51	--	NP	7.89
	12/08/08	10:00		4.17	--	NP	8.23
	02/20/09	9:33		4.32	--	NP	8.08
	04/20/09	8:59		4.13	--	NP	8.27
	06/22/09	11:03		4.54	--	NP	7.86
	08/03/09	10:58		4.85	--	NP	7.55
	08/17/09	8:44		4.65	--	NP	7.75
	10/29/09	9:47		4.00	--	NP	8.40
	01/18/10	13:02		3.55	--	NP	8.85
	04/19/10	14:10		3.97	--	NP	8.43
	07/19/10	6:44		4.72	--	NP	7.68
	10/25/10	13:13		4.35	--	NP	8.05
	03/21/11	12:08		3.74	--	NP	8.66
	06/14/11	11:30		4.49	--	NP	7.91
	09/26/11	10:35		4.91	--	NP	7.49
MW-129R	10/20/08	16:33	12.92	6.54	--	NP	6.38
	12/08/08	11:38		6.78	--	NP	6.14
	02/20/09	10:30		6.35	6.34	0.01	6.58**
	04/20/09	10:15		6.35	--	NP	6.57
	06/22/09	11:56		6.71	--	NP	6.21
	08/03/09	10:25		6.90	--	NP	6.02
	08/17/09	9:44		6.98	--	<0.01	5.94
	10/29/09	9:34		6.27	--	NP	6.65
	01/18/10	14:08		6.22	--	NP	6.70
	04/19/10	15:44		5.88	--	NP	7.04
	07/19/10	7:45		6.30	--	NP	6.62
	10/25/10	14:17		5.79	--	NP	7.13
	03/21/11	12:49		5.31	--	NP	7.61
	06/14/11	11:07		6.36	--	NP	6.56
	09/26/11	11:10		6.66	--	<0.01	6.26
MW-13U	10/20/08	16:46	25.60	17.52	--	NP	8.08
	12/08/08	12:03		17.32	--	NP	8.28
	02/20/09	10:52		17.29	--	NP	8.31
	04/20/09	10:35		17.10	--	NP	8.50
	06/22/09	11:40		17.40	--	NP	8.20
	08/03/09	10:39		17.53	--	NP	8.07
	08/17/09	9:55		17.63	--	NP	7.97
	10/29/09	9:32		17.26	--	NP	8.34
	01/18/10	14:02		16.21	--	NP	9.39
	04/19/10	16:06		16.52	--	NP	9.08
	07/19/10	8:10		17.21	--	NP	8.39
	10/25/10	14:48		17.25	--	NP	8.35
	03/21/11	13:03		16.33	--	NP	9.27
	06/14/11	11:30		16.88	--	NP	8.72
	09/26/11	11:15		17.34	--	NP	8.26
MW-131	10/20/08	16:17	12.53	6.37	--	NP	6.16
	12/08/08	11:31		6.10	--	NP	6.43
	02/20/09	10:58		5.91	--	NP	6.62
	04/20/09	8:42		5.75	--	NP	6.78
	06/22/09	11:46		6.27	--	NP	6.26
	08/03/09	11:31		6.45	--	NP	6.08
	08/17/09	9:32		6.46	--	NP	6.07
	10/29/09	9:30		5.70	--	NP	6.83
	01/18/10	13:46		4.81	--	NP	7.72
	04/19/10	15:32		5.49	--	NP	7.04
	07/19/10	8:36		6.11	--	NP	6.42
	10/25/10	14:12		5.83	--	NP	6.70
	03/21/11	12:42		4.83	--	NP	7.70
	06/14/11	10:53		5.95	--	NP	6.58
	09/26/11	11:04		6.40	--	NP	6.13

Table 1

Groundwater Elevation Data
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date	Time	Top of Casing Elevation (feet)	Depth to Water (top of casing) (feet)	Depth to LNAPL (feet)	LNAPL Thickness (feet)	Groundwater Elevation (feet amsl)
MW-134X	10/20/08	16:40	35.13	26.58	--	NP	8.55
	12/08/08	11:57		26.55	--	NP	8.58
	02/20/09	10:55		26.62	--	NP	8.51
	04/20/09	10:30		26.43	--	NP	8.70
	06/22/09	11:35		26.69	--	NP	8.44
	08/03/09	10:36		26.70	--	NP	8.43
	08/17/09	9:50		26.79	--	NP	8.34
	10/29/09	9:25		26.34	--	NP	8.79
	01/18/10	13:57		25.51	--	NP	9.62
	04/19/10	16:01		25.64	--	NP	9.49
	07/19/10	8:06		26.41	--	NP	8.72
	10/25/10	14:43		26.40	--	NP	8.73
	03/21/11	13:00		25.65	--	NP	9.48
	06/14/11	11:22		26.20	--	NP	8.93
	09/26/11	11:11		26.34	--	NP	8.79
MW-135	10/20/08	16:35	18.13	10.06	--	NP	8.07
	12/08/08	11:47		11.43	--	NP	6.70
	02/20/09	10:47		10.14	--	NP	7.99
	04/20/09	10:22		11.17	--	NP	6.96
	06/22/09	11:23		10.84	--	NP	7.29
	08/03/09	10:13		11.04	--	NP	7.09
	08/17/09	9:55		11.16	--	NP	6.97
	10/29/09	10:15		11.00	--	NP	7.13
	01/18/10	13:05		10.20	--	NP	7.93
	04/19/10	15:54		10.78	--	NP	7.35
	07/19/10	7:52		10.97	--	NP	7.16
	10/25/10	14:26		10.75	--	NP	7.38
	03/21/11	12:56		10.53	--	NP	7.60
	06/14/11	11:26		10.05	--	NP	8.08
	09/26/11	11:05		11.25	--	NP	6.88
MW-136	10/27/08	13:35	15.99	8.13	--	NP	7.86
	12/08/08	11:49		8.06	--	NP	7.93
	02/20/09	10:50		7.80	--	NP	8.19
	04/20/09	10:25		7.73	--	NP	8.26
	06/22/09	11:25		8.00	--	NP	7.99
	08/03/09	10:14		8.74	--	NP	7.25
	08/17/09	9:57		9.78	--	NP	6.21
	10/29/09	10:20		7.84	--	NP	8.15
	01/18/10	13:02		7.08	--	NP	8.91
	04/19/10	15:55		7.63	--	NP	8.36
	07/19/10	7:55		8.06	--	NP	7.93
	10/25/10	14:23		7.91	--	NP	8.08
	03/21/11	12:56		6.22	--	NP	9.77
	06/14/11	11:23		7.77	--	NP	8.22
	09/26/11	11:23		8.70	--	NP	7.29
MW-139R	10/20/08	15:59	13.84	7.57	--	NP	6.27
	12/08/08	10:46		7.17	--	NP	6.67
	02/20/09	9:48		6.96	--	NP	6.88
	04/20/09	9:38		6.77	--	NP	7.07
	06/22/09	11:27		7.34	--	NP	6.50
	08/03/09	11:12		7.54	--	NP	6.30
	08/17/09	9:21		7.62	--	NP	6.22
	10/29/09	9:23		6.93	--	NP	6.91
	01/18/10	13:45		5.43	--	NP	8.41
	04/19/10	14:58		6.51	--	NP	7.33
	07/19/10	7:15		7.36	--	NP	6.48
	10/25/10	13:48		7.08	--	NP	6.76
	03/21/11	12:27		5.89	--	NP	7.95
	06/14/11	10:39		7.01	--	NP	6.83
	09/26/11	10:53		7.62	--	NP	6.22

Table 1

Groundwater Elevation Data
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date	Time	Top of Casing Elevation (feet)	Depth to Water (top of casing) (feet)	Depth to LNAPL (feet)	LNAPL Thickness (feet)	Groundwater Elevation (feet amsl)
MW-143	10/22/08	12:25	11.94	4.55	--	NP	7.39
	12/16/08	10:16		4.08	--	NP	7.86
	02/20/09	10:18		4.02	--	NP	7.92
	04/20/09	9:31		3.79	--	NP	8.15
	06/22/09	11:05		4.45	--	NP	7.49
	08/03/09	10:57		4.70	--	NP	7.24
	08/17/09	8:45		4.69	--	NP	7.25
	10/29/09	9:50		4.07	--	NP	7.87
	01/18/10	13:07		2.81	--	NP	9.13
	04/19/10	14:12		3.46	--	NP	8.48
	07/19/10	6:44		4.47	--	NP	7.47
	10/25/10	13:18		3.17	--	NP	8.77
	03/21/11	12:06		3.80	--	NP	8.14
	06/14/11	11:31		4.14	--	NP	7.80
	09/26/11	10:36		2.90	--	NP	9.04
MW-147	10/20/08	15:45	11.02	5.69	--	NP	5.33
	12/08/08	10:13		5.51	--	NP	5.51
	02/20/09	9:13		5.35	--	NP	5.67
	04/20/09	9:13		5.76	--	NP	5.26
	06/22/09	11:08		5.67	--	NP	5.35
	08/03/09	10:50		5.72	--	NP	5.30
	08/17/09	8:51		5.99	--	NP	5.03
	10/29/09	8:48		5.01	--	NP	6.01
	01/18/10	13:18		2.86	--	NP	8.16
	04/19/10	14:25		5.12	--	NP	5.90
	07/19/10	6:58		5.93	--	NP	5.09
	10/25/10	13:28		4.74	--	NP	6.28
	03/21/11	12:15		4.07	--	NP	6.95
	06/14/11	9:56		5.70	--	NP	5.32
	09/26/11	10:39		8.78	--	NP	2.24
MW-149R	10/20/08	15:42	12.18	6.76	--	NP	5.42
	12/08/08	10:07		6.70	--	NP	5.48
	02/20/09	9:10		6.57	--	NP	5.61
	04/20/09	9:06		7.09	--	NP	5.09
	06/22/09	11:10		7.22	--	NP	4.96
	08/03/09	10:46		7.33	--	NP	4.85
	08/17/09	8:48		7.69	--	NP	4.49
	10/29/09	8:50		6.77	--	NP	5.41
	01/18/10	13:15		3.90	--	NP	8.28
	04/19/10	14:20		6.76	--	NP	5.42
	07/19/10	6:50		7.56	--	NP	4.62
	10/25/10	13:23		6.13	--	NP	6.05
	03/21/11	12:13		5.39	--	NP	6.79
	06/14/11	9:44		7.27	--	NP	4.91
	09/26/11	10:44		7.19	--	NP	4.99
MW-150	10/20/08	15:41	12.36	7.21	--	NP	5.15
	12/08/08	10:05		6.90	--	NP	5.46
	02/20/09	9:07		6.76	--	NP	5.60
	04/20/09	9:04		6.89	--	NP	5.47
	06/22/09	11:12		6.81	--	NP	5.55
	08/03/09	10:44		6.95	--	NP	5.41
	08/17/09	8:46		7.15	--	NP	5.21
	10/29/09	8:48		6.44	--	NP	5.92
	01/18/10	13:14		4.20	--	NP	8.16
	04/19/10	14:18		6.34	--	NP	6.02
	07/19/10	6:47		7.07	--	NP	5.29
	10/25/10	13:25		6.55	--	NP	5.81
	03/21/11	12:11		4.93	--	NP	7.43
	06/14/11	9:40		6.75	--	NP	5.61
	09/26/11	10:43		7.15	--	NP	5.21

Table 1

Groundwater Elevation Data
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date	Time	Top of Casing Elevation (feet)	Depth to Water (top of casing) (feet)	Depth to LNAPL (feet)	LNAPL Thickness (feet)	Groundwater Elevation (feet amsl)
MW-151	10/20/08	15:39	11.05	5.76	--	NP	5.29
	12/08/08	10:02		5.41	--	NP	5.64
	02/20/09	9:16		5.28	--	NP	5.77
	04/20/09	9:10		5.24	--	NP	5.81
	06/22/09	11:07		5.52	--	NP	5.53
	08/03/09	10:48		5.64	--	NP	5.41
	08/17/09	8:51		5.82	--	NP	5.23
	10/29/09	8:42		4.44	--	NP	6.61
	01/18/10	13:10		1.26	--	NP	9.79
	04/19/10	14:15		4.77	--	NP	6.28
	07/19/10	6:53		7.80	--	NP	3.25
	10/25/10	13:21		4.63	--	NP	6.42
	03/21/11	12:10		2.71	--	NP	8.34
	06/14/11	9:51		7.38	--	NP	3.67
	09/26/11	10:38		5.75	--	NP	5.30
MW-20R	10/20/08	15:51	12.17	6.53	--	NP	5.64
	12/08/08	10:27		6.50	--	NP	5.67
	02/20/09	9:27		6.37	--	NP	5.80
	04/20/09	9:11		6.80	--	NP	5.37
	06/22/09	11:21		6.83	--	NP	5.34
	08/03/09	11:00		6.90	--	NP	5.27
	08/17/09	9:15		7.18	--	NP	4.99
	10/29/09	8:58		6.55	--	NP	5.62
	01/18/10	13:27		4.60	--	NP	7.57
	04/19/10	14:38		6.30	--	NP	5.87
	07/19/10	7:06		6.94	--	NP	5.23
	10/25/10	13:34		5.96	--	NP	6.21
	03/21/11	12:19		5.73	--	NP	6.44
	06/14/11	10:02		6.76	--	NP	5.41
	09/26/11	10:47		6.83	--	NP	5.34
MW-203	10/20/08	16:43	31.15	22.83	--	NP	8.32
	12/08/08	12:00		22.69	--	NP	8.46
	02/20/09	11:00		22.71	--	NP	8.44
	04/20/09	10:33		22.55	--	NP	8.60
	06/22/09	11:38		22.81	--	NP	8.34
	08/03/09	10:38		22.90	--	NP	8.25
	08/17/09	10:22		23.02	--	NP	8.13
	10/29/09	9:30		22.11	--	NP	9.04
	01/18/10	13:59		21.67	--	NP	9.48
	04/19/10	16:04		21.86	--	NP	9.29
	07/19/10	8:05		22.57	--	NP	8.58
	10/25/10	14:45		22.62	--	NP	8.53
	03/21/11	13:00		21.76	--	NP	9.39
	06/14/11	11:27		22.26	--	NP	8.89
	09/26/11	11:13		22.63	--	NP	8.52
MW-301	10/20/08	17:30	12.15	6.73	--	NP	5.42
	12/08/08	--		--	--	--	--
	02/20/09	11:22		6.53	--	NP	5.62
	04/20/09	10:55		7.44	--	NP	4.71
	06/22/09	10:36		7.25	--	NP	4.90
	08/03/09	11:44		7.42	--	NP	4.73
	08/17/09	10:28		7.92	--	NP	4.23
	10/29/09	10:00		7.26	--	NP	4.89
	01/18/10	14:11		4.95	--	NP	7.20
	04/19/10	16:25		7.05	--	NP	5.10
	07/19/10	8:34		7.62	--	NP	4.53
	10/25/10	15:07		6.05	--	NP	6.10
	03/21/11	13:26		6.36	--	NP	5.79
	06/14/11	11:50		7.57	--	NP	4.58
	09/26/11	11:50		7.27	--	NP	4.88

Table 1

Groundwater Elevation Data
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date	Time	Top of Casing Elevation (feet)	Depth to Water (top of casing) (feet)	Depth to LNAPL (feet)	LNAPL Thickness (feet)	Groundwater Elevation (feet amsl)
MW-500	10/20/08	16:32	16.64	8.71	--	NP	7.93
	12/08/08	11:45		5.16	--	NP	11.48
	02/20/09	10:46		4.51	--	NP	12.13
	04/20/09	10:19		3.54	--	NP	13.10
	06/22/09	11:28		5.18	--	NP	11.46
	08/03/09	10:20		6.15	--	NP	10.49
	08/17/09	9:48		6.51	--	NP	10.13
	10/29/09	9:05		4.94	--	NP	11.70
	01/18/10	13:16		1.69	--	NP	14.95
	04/19/10	15:50		3.77	--	NP	12.87
	07/19/10	7:45		5.39	--	NP	11.25
	10/25/10	14:35		5.51	--	NP	11.13
	03/21/11	12:54		2.20	--	NP	14.44
	06/14/11	11:17		4.71	--	NP	11.93
	09/26/11	11:00		6.94	--	NP	9.70
MW-501	10/20/08	16:30	15.24	7.27	--	NP	7.97
	12/08/08	11:43		5.20	--	NP	10.04
	02/20/09	10:44		3.43	--	NP	11.81
	04/20/09	10:17		2.50	--	NP	12.74
	06/22/09	11:31		3.98	--	NP	11.26
	08/03/09	10:22		4.95	--	NP	10.29
	08/17/09	9:46		5.51	--	NP	9.73
	10/29/09	9:02		3.01	--	NP	12.23
	01/18/10	13:23		0.56	--	NP	14.68
	04/19/10	15:48		2.54	--	NP	12.70
	07/19/10	7:44		4.36	--	NP	10.88
	10/25/10	14:35		4.57	--	NP	10.67
	03/21/11	12:48		1.31	--	NP	13.93
	06/14/11	11:12		3.51	--	NP	11.73
	09/26/11	11:12		6.01	--	NP	9.23
MW-502	10/20/08	16:25	13.00	5.41	--	NP	7.59
	12/08/08	11:20		5.16	--	NP	7.84
	02/20/09	10:24		5.03	--	NP	7.97
	04/20/09	10:40		4.98	--	NP	8.02
	06/22/09	11:49		5.35	--	NP	7.65
	08/03/09	11:34		5.53	--	NP	7.47
	08/17/09	9:39		5.56	--	NP	7.44
	10/29/09	9:40		5.03	--	NP	7.97
	01/18/10	13:55		3.78	--	NP	9.22
	04/19/10	15:42		4.47	--	NP	8.53
	07/19/10	7:24		5.25	--	NP	7.75
	10/25/10	14:15		5.20	--	NP	7.80
	03/21/11	12:43		4.05	--	NP	8.95
	06/14/11	11:05		4.90	--	NP	8.10
	09/26/11	11:10		5.46	--	NP	7.54
MW-503	10/20/08	16:23	12.22	5.75	--	NP	6.47
	12/08/08	11:23		5.42	--	NP	6.80
	02/20/09	10:21		5.25	--	NP	6.97
	04/20/09	10:43		5.00	--	NP	7.22
	06/22/09	11:48		5.56	--	NP	6.66
	08/03/09	11:33		5.75	--	NP	6.47
	08/17/09	9:37		5.76	--	NP	6.46
	10/29/09	9:39		5.00	--	NP	7.22
	01/18/10	13:54		3.66	--	NP	8.56
	04/19/10	15:40		4.69	--	NP	7.53
	07/19/10	7:26		5.45	--	NP	6.77
	10/25/10	14:12		5.19	--	NP	7.03
	03/21/11	12:42		4.10	--	NP	8.12
	06/14/11	11:01		5.10	--	NP	7.12
	09/26/11	11:07		5.55	--	NP	6.67

Table 1

Groundwater Elevation Data
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date	Time	Top of Casing Elevation (feet)	Depth to Water (top of casing) (feet)	Depth to LNAPL (feet)	LNAPL Thickness (feet)	Groundwater Elevation (feet amsl)
MW-504	10/20/08	16:14	13.32	7.01	--	NP	6.31
	12/08/08	11:26		6.63	--	NP	6.69
	02/20/09	10:16		6.46	--	NP	6.86
	04/20/09	10:30		6.25	--	NP	7.07
	06/22/09	11:42		6.81	--	NP	6.51
	08/03/09	11:29		7.00	--	NP	6.32
	08/17/09	9:35		7.05	--	NP	6.27
	10/29/09	9:26		6.28	--	NP	7.04
	01/18/10	13:53		4.90	--	NP	8.42
	04/19/10	15:37		5.99	--	NP	7.33
	07/19/10	7:28		6.80	--	NP	6.52
	10/25/10	14:10		6.66	--	NP	6.66
	03/21/11	12:40		5.48	--	NP	7.84
	06/14/11	10:57		6.48	--	NP	6.84
	09/26/11	11:05		7.09	--	NP	6.23
MW-505	10/20/08	16:11	11.42	5.10	--	NP	6.32
	12/08/08	11:13		4.72	--	NP	6.70
	02/20/09	10:18		4.53	--	NP	6.89
	04/20/09	10:02		4.32	--	NP	7.10
	06/22/09	11:39		4.90	--	NP	6.52
	08/03/09	11:28		5.11	--	NP	6.31
	08/17/09	9:33		5.13	--	NP	6.29
	10/29/09	9:25		4.37	--	NP	7.05
	01/18/10	13:52		2.99	--	NP	8.43
	04/19/10	15:35		4.08	--	NP	7.34
	07/19/10	7:31		5.89	--	NP	5.53
	10/25/10	14:08		4.73	--	NP	6.69
	03/21/11	12:39		3.45	--	NP	7.97
	06/14/11	10:58		4.58	--	NP	6.84
	09/26/11	10:54		5.14	--	NP	6.28
MW-506	10/20/08	16:16	13.44	7.13	--	NP	6.31
	12/08/08	11:29		6.75	--	NP	6.69
	02/20/09	10:13		6.60	--	NP	6.84
	04/20/09	10:08		6.37	--	NP	7.07
	06/22/09	11:44		6.93	--	NP	6.51
	08/03/09	11:30		7.13	--	NP	6.31
	08/17/09	9:31		7.17	--	NP	6.27
	10/29/09	9:28		6.39	--	NP	7.05
	01/18/10	13:47		5.02	--	NP	8.42
	04/19/10	15:30		6.10	--	NP	7.34
	07/19/10	7:37		6.91	--	NP	6.53
	10/25/10	14:10		6.75	--	NP	6.69
	03/21/11	12:40		5.50	--	NP	7.94
	06/14/11	10:48		6.59	--	NP	6.85
	09/26/11	11:00		7.13	--	NP	6.31
MW-507	10/20/08	16:09	13.60	7.38	--	NP	6.22
	12/08/08	11:11		7.09	--	NP	6.51
	02/20/09	10:11		6.91	--	NP	6.69
	04/20/09	10:00		6.70	--	NP	6.90
	06/22/09	11:37		7.23	--	NP	6.37
	08/03/09	11:27		7.41	--	NP	6.19
	08/17/09	9:29		7.45	--	NP	6.15
	10/29/09	9:23		6.70	--	NP	6.90
	01/18/10	13:48		5.49	--	NP	8.11
	04/19/10	15:29		6.40	--	NP	7.20
	07/19/10	7:36		7.14	--	NP	6.46
	10/25/10	14:09		6.90	--	NP	6.70
	03/21/11	12:38		5.86	--	NP	7.74
	06/14/11	10:44		6.95	--	NP	6.65
	09/26/11	11:01		7.40	--	NP	6.20

Table 1

Groundwater Elevation Data
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date	Time	Top of Casing Elevation (feet)	Depth to Water (top of casing) (feet)	Depth to LNAPL (feet)	LNAPL Thickness (feet)	Groundwater Elevation (feet amsl)
MW-508	10/20/08	16:07	13.31	7.16	--	NP	6.15
	12/08/08	11:09		6.33	--	NP	6.98
	02/20/09	10:08		6.70	--	NP	6.61
	04/20/09	9:59		6.40	--	NP	6.91
	06/22/09	11:35		6.94	--	NP	6.37
	08/03/09	11:26		7.15	--	NP	6.16
	08/17/09	9:28		7.20	--	NP	6.11
	10/29/09	9:22		6.55	--	NP	6.76
	01/18/10	13:49		5.13	--	NP	8.18
	04/19/10	15:27		6.11	--	NP	7.20
	07/19/10	7:33		6.88	--	NP	6.43
	10/25/10	14:07		6.58	--	NP	6.73
	03/21/11	12:36		5.51	--	NP	7.80
	06/14/11	10:40		6.70	--	NP	6.61
	09/26/11	10:57		7.18	--	NP	6.13
MW-509	10/20/08	16:05	10.28	3.97	--	NP	6.31
	12/08/08	11:07		3.59	--	NP	6.69
	02/20/09	10:06		3.39	--	NP	6.89
	04/20/09	9:36		3.18	--	NP	7.10
	06/22/09	11:33		3.75	--	NP	6.53
	08/03/09	11:11		3.95	--	NP	6.33
	08/17/09	9:27		6.97	--	NP	3.31
	10/29/09	9:10		3.23	--	NP	7.05
	01/18/10	13:50		1.85	--	NP	8.43
	04/19/10	15:26		2.93	--	NP	7.35
	07/19/10	7:18		3.77	--	NP	6.51
	10/25/10	14:49		4.59	--	NP	5.69
	03/21/11	12:30		2.34	--	NP	7.94
	06/14/11	10:17		3.43	--	NP	6.85
	09/26/11	10:55		4.20	--	NP	6.08
MW-510	10/20/08	16:03	12.53	6.47	--	NP	6.06
	12/08/08	10:49		6.45	--	NP	6.08
	02/20/09	9:51		6.35	--	NP	6.18
	04/20/09	9:46		6.72	--	NP	5.81
	06/22/09	11:31		7.05	--	NP	5.48
	08/03/09	11:15		7.08	--	<0.01	5.45
	08/17/09	9:24		7.29	--	<0.01	5.24
	10/29/09	9:31		6.72	6.71	0.01	5.82**
	01/18/10	13:31		4.98	4.85	0.13	7.65**
	04/19/10	15:04		6.40	6.38	0.02	6.15**
	07/19/10	7:40		7.04	7.00	0.04	5.52**
	10/25/10	14:49		6.04	6.02	0.02	6.51**
	03/21/11	13:25		5.81	5.80	0.01	6.73**
	06/14/11	12:11		7.08	--	NP	5.45
	09/26/11	12:47		6.96	6.94	0.02	5.59**
MW-511	10/20/08	16:49	15.20	7.75	--	NP	7.45
	12/08/08	12:05		7.45	--	NP	7.75
	02/20/09	10:13		7.34	--	NP	7.86
	04/20/09	10:44		7.09	--	NP	8.11
	06/22/09	11:16		7.66	--	NP	7.54
	08/03/09	10:40		7.89	--	NP	7.31
	08/17/09	9:17		7.87	--	NP	7.33
	10/29/09	9:10		7.30	--	NP	7.90
	01/18/10	13:36		6.06	--	NP	9.14
	04/19/10	16:10		6.83	--	NP	8.37
	07/19/10	7:18		7.59	--	NP	7.61
	10/25/10	14:50		7.51	--	NP	7.69
	03/21/11	13:06		6.37	--	NP	8.83
	06/14/11	11:38		7.29	--	NP	7.91
	09/26/11	11:08		7.88	--	NP	7.32

Table 1

Groundwater Elevation Data
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date	Time	Top of Casing Elevation (feet)	Depth to Water (top of casing) (feet)	Depth to LNAPL (feet)	LNAPL Thickness (feet)	Groundwater Elevation (feet amsl)
MW-512	10/20/08	16:04	13.19	6.90	--	NP	6.29
	12/08/08	10:37		6.51	--	NP	6.68
	02/20/09	10:10		6.30	--	NP	6.89
	04/20/09	9:28		6.12	--	NP	7.07
	06/22/09	11:18		7.68	--	NP	5.51
	08/03/09	11:09		6.86	--	NP	6.33
	08/17/09	9:18		6.91	--	NP	6.28
	10/29/09	9:07		6.15	--	NP	7.04
	01/18/10	13:34		4.78	--	NP	8.41
	04/19/10	14:48		5.85	--	NP	7.34
	07/19/10	7:16		6.67	--	NP	6.52
	10/25/10	13:48		6.51	--	NP	6.68
	03/21/11	12:22		5.26	--	NP	7.93
	06/14/11	10:16		6.35	--	NP	6.84
	09/26/11	11:53		6.95	--	NP	6.24
MW-513	10/20/08	16:01	11.09	4.78	--	NP	6.31
	12/08/08	10:41		4.40	--	NP	6.69
	02/20/09	10:07		4.19	--	NP	6.90
	04/20/09	9:30		4.00	--	NP	7.09
	06/22/09	11:21		4.58	--	NP	6.51
	08/03/09	11:08		4.78	--	NP	6.31
	08/17/09	9:21		4.80	--	NP	6.29
	10/29/09	9:13		4.04	--	NP	7.05
	01/18/10	13:37		2.67	--	NP	8.42
	04/19/10	14:51		3.75	--	NP	7.34
	07/19/10	7:12		4.57	--	NP	6.52
	10/25/10	13:44		4.42	--	NP	6.67
	03/21/11	12:25		3.18	--	NP	7.91
	06/14/11	10:12		4.25	--	NP	6.84
	09/26/11	10:54		4.83	--	NP	6.26
MW-514	10/20/08	16:02	11.39	5.09	--	NP	6.30
	12/08/08	10:35		4.70	--	NP	6.69
	02/20/09	10:08		4.19	--	NP	7.20
	04/20/09	9:28		4.31	--	NP	7.08
	06/22/09	11:19		4.88	--	NP	6.51
	08/03/09	11:07		5.08	--	NP	6.31
	08/17/09	9:19		5.11	--	NP	6.28
	10/29/09	9:06		4.35	--	NP	7.04
	01/18/10	13:33		2.98	--	NP	8.41
	04/19/10	14:46		4.05	--	NP	7.34
	07/19/10	7:10		4.97	--	NP	6.42
	10/25/10	13:41		4.71	--	NP	6.68
	03/21/11	12:23		3.48	--	NP	7.91
	06/14/11	10:14		4.56	--	NP	6.83
	09/26/11	10:50		5.13	--	NP	6.26
MW-515	10/20/08	16:00	11.60	5.30	--	NP	6.30
	12/08/08	10:42		4.91	--	NP	6.69
	02/20/09	9:47		5.70	--	NP	5.90
	04/20/09	9:25		4.52	--	NP	7.08
	06/22/09	11:25		5.09	--	NP	6.51
	08/03/09	11:04		5.29	--	NP	6.31
	08/17/09	9:23		5.33	--	NP	6.27
	10/29/09	9:15		4.55	--	NP	7.05
	01/18/10	13:40		3.18	--	NP	8.42
	04/19/10	14:54		4.26	--	NP	7.34
	07/19/10	7:12		5.10	--	NP	6.50
	10/25/10	13:45		4.93	--	NP	6.67
	03/21/11	12:26		3.65	--	NP	7.95
	06/14/11	10:14		4.75	--	NP	6.85
	09/26/11	10:52		5.35	--	NP	6.25

Table 1

Groundwater Elevation Data
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date	Time	Top of Casing Elevation (feet)	Depth to Water (top of casing) (feet)	Depth to LNAPL (feet)	LNAPL Thickness (feet)	Groundwater Elevation (feet amsl)
MW-516	10/20/08	15:59	11.25	4.94	--	NP	6.31
	12/08/08	10:33		4.56	--	NP	6.69
	02/20/09	9:49		4.35	--	NP	6.90
	04/20/09	9:26		4.17	--	NP	7.08
	06/22/09	11:24		4.75	--	NP	6.50
	08/03/09	11:05		4.94	--	NP	6.31
	08/17/09	9:24		4.96	--	NP	6.29
	10/29/09	9:14		4.22	--	NP	7.03
	01/18/10	13:39		2.84	--	NP	8.41
	04/19/10	14:52		3.91	--	NP	7.34
	07/19/10	7:11		4.75	--	NP	6.50
	10/25/10	13:44		5.38	--	NP	5.87
	03/21/11	12:25		3.30	--	NP	7.95
	06/14/11	10:12		4.41	--	NP	6.84
	09/26/11	10:50		5.00	--	NP	6.25
MW-517	10/20/08	15:57	12.00	5.69	--	NP	6.31
	12/08/08	10:31		5.31	--	NP	6.69
	02/20/09	9:51		5.12	--	NP	6.88
	04/20/09	9:27		4.91	--	NP	7.09
	06/22/09	11:22		5.49	--	NP	6.51
	08/03/09	11:06		5.68	--	NP	6.32
	08/17/09	9:25		5.72	--	NP	6.28
	10/29/09	9:05		4.97	--	NP	7.03
	01/18/10	13:31		3.58	--	NP	8.42
	04/19/10	14:44		4.66	--	NP	7.34
	07/19/10	7:08		5.49	--	NP	6.51
	10/25/10	13:42		5.33	--	NP	6.67
	03/21/11	12:24		4.05	--	NP	7.95
	06/14/11	10:08		5.16	--	NP	6.84
	09/26/11	10:49		5.77	--	NP	6.23
MW-518	10/20/08	15:56	14.60	8.51	--	NP	6.09
	12/08/08	10:44		8.37	--	NP	6.23
	02/20/09	9:45		8.29	--	NP	6.31
	04/20/09	9:17		8.40	--	NP	6.20
	06/22/09	11:29		8.68	--	NP	5.92
	08/03/09	11:04		8.79	--	NP	5.81
	08/17/09	9:20		9.00	--	NP	5.60
	10/29/09	9:19		8.42	--	NP	6.18
	01/18/10	13:43		6.65	--	NP	7.95
	04/19/10	14:56		8.01	--	NP	6.59
	07/19/10	7:14		8.73	--	NP	5.87
	10/25/10	13:47		8.05	--	NP	6.55
	03/21/11	12:27		7.45	--	NP	7.15
	06/14/11	10:09		8.45	--	NP	6.15
	09/26/11	10:52		8.73	--	NP	5.87
MW-519	10/20/08	15:35	12.60	7.25	--	NP	5.35
	12/08/08	10:25		7.12	--	NP	5.48
	02/20/09	10:21		6.89	--	NP	5.71
	04/20/09	9:02		7.17	--	NP	5.43
	06/22/09	11:04		6.83	--	NP	5.77
	08/03/09	10:57		6.96	--	NP	5.64
	08/17/09	8:47		7.21	--	NP	5.39
	10/29/09	8:56		6.75	--	NP	5.85
	01/18/10	13:25		4.80	--	NP	7.80
	04/19/10	14:37		6.41	--	NP	6.19
	07/19/10	7:05		7.15	--	NP	5.45
	10/25/10	13:36		6.60	--	NP	6.00
	03/21/11	12:19		5.71	--	NP	6.89
	06/14/11	10:03		6.88	--	NP	5.72
	09/26/11	10:37		7.11	--	NP	5.49

Table 1

Groundwater Elevation Data
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date	Time	Top of Casing Elevation (feet)	Depth to Water (top of casing) (feet)	Depth to LNAPL (feet)	LNAPL Thickness (feet)	Groundwater Elevation (feet amsl)
MW-520	10/20/08	15:50	13.31	7.95	--	NP	5.36
	12/08/08	10:23		7.83	--	NP	5.48
	02/20/09	9:23		7.61	--	NP	5.70
	04/20/09	9:05		7.88	--	NP	5.43
	06/22/09	11:19		7.55	--	NP	5.76
	08/03/09	10:56		7.69	--	NP	5.62
	08/17/09	8:49		7.92	--	NP	5.39
	10/29/09	8:55		7.46	--	NP	5.85
	01/18/10	13:26		5.51	--	NP	7.80
	04/19/10	14:35		7.12	--	NP	6.19
	07/19/10	7:03		7.85	--	NP	5.46
	10/25/10	13:33		7.30	--	NP	6.01
	03/21/11	12:18		5.38	--	NP	7.93
	06/14/11	10:01		7.59	--	NP	5.72
	09/26/11	10:43		7.82	--	NP	5.49
MW-521	10/20/08	15:48	12.18	6.82	--	NP	5.36
	12/08/08	10:21		6.71	--	NP	5.47
	02/20/09	9:21		6.49	--	NP	5.69
	04/20/09	9:04		6.75	--	NP	5.43
	06/22/09	11:06		6.41	--	NP	5.77
	08/03/09	10:55		6.57	--	NP	5.61
	08/17/09	8:48		6.80	--	NP	5.38
	10/29/09	8:56		6.33	--	NP	5.85
	01/18/10	13:24		4.39	--	NP	7.79
	04/19/10	14:33		6.01	--	NP	6.17
	07/19/10	7:01		6.74	--	NP	5.44
	10/25/10	13:30		6.40	--	NP	5.78
	03/21/11	12:16		5.29	--	NP	6.89
	06/14/11	10:04		7.45	--	NP	4.73
	09/26/11	10:40		6.70	--	NP	5.48
MW-522	10/20/08	15:50	13.82	8.49	--	NP	5.33
	12/08/08	10:19		8.35	--	NP	5.47
	02/20/09	9:23		8.10	--	NP	5.72
	04/20/09	9:07		8.41	--	NP	5.41
	06/22/09	11:15		8.11	--	NP	5.71
	08/03/09	10:53		8.25	--	NP	5.57
	08/17/09	8:54		8.51	--	NP	5.31
	10/29/09	8:56		7.99	--	NP	5.83
	01/18/10	13:22		6.03	--	NP	7.79
	04/19/10	14:31		7.65	--	NP	6.17
	07/19/10	7:02		8.43	--	NP	5.39
	10/25/10	13:33		7.80	--	NP	6.02
	03/21/11	12:18		6.97	--	NP	6.85
	06/14/11	9:59		8.13	--	NP	5.69
	09/26/11	10:46		8.40	--	NP	5.42
MW-523	10/20/08	15:47	13.53	8.17	--	NP	5.36
	12/08/08	10:15		8.05	--	NP	5.48
	02/20/09	9:21		7.81	--	NP	5.72
	04/20/09	9:10		8.10	--	NP	5.43
	06/22/09	11:11		7.78	--	NP	5.75
	08/03/09	10:52		7.91	--	NP	5.62
	08/17/09	8:52		8.17	--	NP	5.36
	10/29/09	8:54		7.69	--	NP	5.84
	01/18/10	13:20		5.73	--	NP	7.80
	04/19/10	14:27		7.35	--	NP	6.18
	07/19/10	6:54		8.09	--	NP	5.44
	10/25/10	13:30		7.52	--	NP	6.01
	03/21/11	12:15		6.64	--	NP	6.89
	06/14/11	9:58		7.85	--	NP	5.68
	09/26/11	10:44		8.02	--	NP	5.51

Table 1

Groundwater Elevation Data
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date	Time	Top of Casing Elevation (feet)	Depth to Water (top of casing) (feet)	Depth to LNAPL (feet)	LNAPL Thickness (feet)	Groundwater Elevation (feet amsl)
MW-524	10/20/08	15:44	13.16	8.95	--	NP	4.21
	12/08/08	10:09		7.71	--	NP	5.45
	02/20/09	9:13		7.60	--	NP	5.56
	04/20/09	9:08		7.81	--	NP	5.35
	06/22/09	11:19		7.69	--	NP	5.47
	08/03/09	10:47		7.79	--	NP	5.37
	08/17/09	8:50		8.03	--	NP	5.13
	10/29/09	8:50		6.75	--	NP	6.41
	01/18/10	13:17		4.26	--	NP	8.90
	04/19/10	14:23		7.17	--	NP	5.99
	07/19/10	6:51		7.99	--	NP	5.17
	10/25/10	13:27		6.97	--	NP	6.19
	03/21/11	12:12		5.78	--	NP	7.38
	06/14/11	9:48		7.67	--	NP	5.49
	09/26/11	10:41		7.90	--	NP	5.26
Piezometers							
P-1 [S]	08/03/09	10:23	16.47	7.80	--	NP	8.67
	08/17/09	9:43		6.60	--	NP	9.87
	10/29/09	9:32		4.37	--	NP	12.10
	01/18/10	13:31		1.26	--	NP	15.21
	04/19/10	15:46		3.21	--	NP	13.26
	07/19/10	8:02		4.65	--	NP	11.82
	10/25/10	14:26		4.61	--	NP	11.86
	03/21/11	12:46		2.16	--	NP	14.31
	06/14/11	11:08		3.98	--	NP	12.49
	09/26/11	11:27		6.76	--	NP	9.71
P-2 [D]	08/03/09	10:21	15.00	7.39	--	NP	7.61
	08/17/09	9:46		7.46	--	NP	7.54
	10/29/09	8:57		6.38	--	NP	8.62
	01/18/10	13:28		6.30	--	NP	8.70
	04/19/10	15:47		6.68	--	NP	8.32
	07/19/10	7:46		7.02	--	NP	7.98
	10/25/10	14:29		6.65	--	NP	8.35
	03/21/11	12:49		6.26	--	NP	8.74
	06/14/11	11:10		7.01	--	NP	7.99
	09/26/11	11:15		7.01	--	NP	7.99
P-3 [S]	08/03/09	10:21	14.84	4.47	--	NP	10.37
	08/17/09	9:48		4.77	--	NP	10.07
	10/29/09	8:59		3.35	--	NP	11.49
	01/18/10	13:25		0.81	--	NP	14.03
	04/19/10	15:48		2.36	--	NP	12.48
	07/19/10	7:48		3.72	--	NP	11.12
	10/25/10	14:31		4.04	--	NP	10.80
	03/21/11	12:49		1.19	--	NP	13.65
	06/14/11	11:11		3.05	--	NP	11.79
	09/26/11	11:17		5.18	--	NP	9.66
P-4 [D]	08/03/09	10:19	16.38	8.64	--	NP	7.74
	08/17/09	9:49		8.75	--	NP	7.63
	10/29/09	9:08		7.64	--	NP	8.74
	01/18/10	13:21		7.56	--	NP	8.82
	04/19/10	15:49		7.92	--	NP	8.46
	07/19/10	7:50		8.28	--	NP	8.10
	10/25/10	14:34		7.93	--	NP	8.45
	03/21/11	12:52		7.51	--	NP	8.87
	06/14/11	11:14		8.23	--	NP	8.15
	09/26/11	11:20		8.41	--	NP	7.97

Table 1

Groundwater Elevation Data
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date	Time	Top of Casing Elevation (feet)	Depth to Water (top of casing) (feet)	Depth to LNAPL (feet)	LNAPL Thickness (feet)	Groundwater Elevation (feet amsl)
P-5 [S]	08/03/09	10:19	16.85	6.47	--	NP	10.38
	08/17/09	9:50		6.78	--	NP	10.07
	10/29/09	9:10		5.85	--	NP	11.00
	01/18/10	13:18		2.76	--	NP	14.09
	04/19/10	15:50		4.31	--	NP	12.54
	07/19/10	7:54		5.71	--	NP	11.14
	10/25/10	14:33		6.03	--	NP	10.82
	03/21/11	12:53		3.17	--	NP	13.68
	06/14/11	11:15		5.00	--	NP	11.85
	09/26/11	11:21		7.13	--	NP	9.72
P-6 [S]	08/03/09	10:16	17.67	9.90	--	NP	7.77
	08/17/09	9:53		6.31	--	NP	11.36
	10/29/09	9:12		4.92	--	NP	12.75
	01/18/10	13:10		3.09	--	NP	14.58
	04/19/10	15:52		4.63	--	NP	13.04
	07/19/10	7:59		5.21	--	NP	12.46
	10/25/10	14:29		4.81	--	NP	12.86
	03/21/11	12:54		3.41	--	NP	14.26
	06/14/11	11:20		5.05	--	NP	12.62
	09/26/11	11:25		6.40	--	NP	11.27
P-7 [D]	08/03/09	10:17	17.63	9.72	--	NP	7.91
	08/17/09	9:52		9.80	--	NP	7.83
	10/29/09	8:55		6.15	--	NP	11.48
	01/18/10	13:14		8.56	--	NP	9.07
	04/19/10	15:51		8.94	--	NP	8.69
	07/19/10	8:00		7.36	--	NP	10.27
	10/25/10	14:31		8.97	--	NP	8.66
	03/21/11	12:52		8.62	--	NP	9.01
	06/14/11	11:18		9.24	--	NP	8.39
	09/26/11	11:23		9.55	--	NP	8.08
P-8 [D]	08/03/09	10:24	16.07	8.52	--	NP	7.55
	08/17/09	9:41		8.92	--	NP	7.15
	10/29/09	8:53		8.03	--	NP	8.04
	01/18/10	13:33		7.47	--	NP	8.60
	04/19/10	15:45		7.80	--	NP	8.27
	07/19/10	8:03		8.12	--	NP	7.95
	10/25/10	14:24		7.80	--	NP	8.27
	03/21/11	12:45		7.49	--	NP	8.58
	06/14/11	11:05		8.16	--	NP	7.91
	09/26/11	11:20		8.34	--	NP	7.73
P-9	08/25/11	12:51	13.86	7.57	--	NP	6.29
	09/02/11	10:04		7.58	--	NP	6.28
	09/09/11	7:58		7.61	--	NP	6.25
	09/16/11	14:42		7.64	--	NP	6.22
	09/26/11	11:03		8.62	--	NP	5.24
	10/28/11	9:52		7.59	--	NP	6.27
	11/18/11	8:55		7.45	--	NP	6.41
P-10	08/25/11	12:49	11.07	4.98	--	NP	6.09
	09/02/11	10:08		4.97	--	NP	6.10
	09/09/11	8:02		5.00	--	NP	6.07
	09/16/11	14:35		5.00	--	NP	6.07
	09/26/11	10:59		4.96	--	NP	6.11
	10/28/11	9:56		4.80	--	NP	6.27
	11/18/11	9:00		4.81	--	NP	6.26

Table 1

Groundwater Elevation Data
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date	Time	Top of Casing Elevation (feet)	Depth to Water (top of casing) (feet)	Depth to LNAPL (feet)	LNAPL Thickness (feet)	Groundwater Elevation (feet amsl)
P-11	08/25/11	12:45	13.63	7.49	--	NP	6.14
	09/02/11	10:10		7.49	--	NP	6.14
	09/09/11	8:05		7.50	--	NP	6.13
	09/16/11	14:30		7.53	--	NP	6.10
	09/26/11	12:15		7.50	--	NP	6.13
	10/28/11	9:59		7.36	--	NP	6.27
	11/18/11	9:03		7.31	--	NP	6.32
P-12	08/25/11	12:42	13.03	7.26	--	NP	5.77
	09/02/11	10:14		7.10	--	NP	5.93
	09/09/11	8:08		7.11	--	NP	5.92
	09/16/11	14:10		7.18	--	<0.01	5.85
	09/26/11	12:37		7.16	7.15	0.01	5.88**
	10/28/11	10:03		6.91	--	NP	6.12
	11/18/11	9:13		6.98	--	NP	6.05
P-13	08/25/11	12:40	13.02	6.90	--	NP	6.12
	09/02/11	10:17		6.84	--	NP	6.18
	09/09/11	8:11		6.89	--	NP	6.13
	09/16/11	14:17		6.91	--	<0.01	6.11
	09/26/11	12:23		6.93	6.90	0.03	6.09**
	10/28/11	10:20		6.75	6.74	0.01	6.35**
	11/18/11	9:19		-- [+]	6.66	-- [+]	-- [+]
P-14	08/25/11	12:38	12.14	6.79	--	NP	5.35
	09/02/11	10:21		6.37	--	NP	5.77
	09/09/11	8:14		6.50	--	NP	5.64
	09/16/11	14:23		6.51	--	NP	5.63
	09/26/11	12:19		6.60	--	NP	5.54
	10/28/11	10:16		6.13	--	NP	6.01
	11/18/11	9:16		6.24	--	NP	5.90
P-15	08/25/11	12:30	12.54	7.48	--	NP	5.06
	09/02/11	10:23		6.97	--	NP	5.57
	09/09/11	8:17		7.22	--	NP	5.32
	09/16/11	14:48		7.10	--	NP	5.44
	09/26/11	10:56		7.15	--	NP	5.39
	10/28/11	10:11		6.68	--	NP	5.86
	11/18/11	9:09		6.83	--	NP	5.71
P-16	08/25/11	12:25	9.04	3.60	--	NP	5.44
	09/02/11	10:25		3.41	--	NP	5.63
	09/09/11	8:19		3.42	--	NP	5.62
	09/16/11	14:52		3.39	--	NP	5.65
	09/26/11	11:00		3.38	--	NP	5.66
	10/28/11	10:07		3.14	--	NP	5.90
	11/18/11	9:07		3.22	--	NP	5.82
Staff Gauges							
D-1[1]	06/22/09	10:43	8.84 [3]	2.58	--	NP	6.26
	06/22/09	12:31		2.81	--	NP	6.03
	08/03/09	9:34		2.85	--	NP	5.99
	08/03/09	12:02		2.82	--	NP	6.02
	08/17/09	7:48		2.79	--	NP	6.05
	08/17/09	10:59		2.87	--	NP	5.97
	10/29/09	7:48		2.68	--	NP	6.16
	10/29/09	10:08		2.54	--	NP	6.30
	01/18/10	12:34		1.48	--	NP	7.36
	01/18/10	14:39		1.83	--	NP	7.01
	04/19/10	14:09		2.62	--	NP	6.22
	04/19/10	16:13		2.78	--	NP	6.06
	07/19/10	5:35		2.50	--	NP	6.34
	07/19/10	9:08		3.86	--	NP	4.98

Table 1

Groundwater Elevation Data
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date	Time	Top of Casing Elevation (feet)	Depth to Water (top of casing) (feet)	Depth to LNAPL (feet)	LNAPL Thickness (feet)	Groundwater Elevation (feet amsl)
D-1 (continued)	10/25/10	12:18		1.30	--	NP	7.54
	10/25/10	15:33		1.85	--	NP	6.99
	03/21/11	11:17		2.50	--	NP	6.34
	03/21/11	13:56		2.80	--	NP	6.04
	06/14/11	8:54		2.40	--	NP	6.44
	06/14/11	12:49		2.92	--	NP	5.92
	09/26/11	8:56		2.43	--	NP	6.41
	09/26/11	--		2.69	--	NP	6.15
D-2	10/20/08	--	--	--	--	--	--
	12/08/08	11:05	5.60	1.24	--	NP	6.84
	02/20/09	9:55		0.60	--	NP	6.20
	04/20/09	9:49		0.17	--	NP	5.77
	06/22/09	10:50	8.67 [3]	2.30	--	NP	6.37
	06/22/09	12:35		2.44	--	NP	6.23
	08/03/09	9:40		2.43	--	NP	6.24
	08/03/09	12:05		2.45	--	NP	6.22
	08/17/09	7:53		2.50	--	NP	6.17
	08/17/09	11:03		2.50	--	NP	6.17
	10/29/09	7:52		2.35	--	NP	6.32
	10/29/09	10:14		2.25	--	NP	6.42
	01/18/10	12:38		1.38	--	NP	7.29
	01/18/10	14:43		1.76	--	NP	6.91
	04/19/10	14:14		2.32	--	NP	6.35
	04/19/10	16:16		2.44	--	NP	6.23
	07/19/10	5:46		2.26	--	NP	6.41
	07/19/10	9:13		2.45	--	NP	6.22
	10/25/10	12:23		1.00	--	NP	7.67
	10/25/10	15:40		1.60	--	NP	7.07
	03/21/11	11:21		2.27	--	NP	6.40
	03/21/11	14:06		2.45	--	NP	6.22
	06/14/11	9:23		2.64	--	NP	6.03
	06/14/11	12:54		2.45	--	NP	6.22
	09/26/11	9:25		2.30	--	NP	6.37
	09/26/11	--		2.39	--	NP	6.28

Table 1

Groundwater Elevation Data
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date	Time	Top of Casing Elevation (feet)	Depth to Water (top of casing) (feet)	Depth to LNAPL (feet)	LNAPL Thickness (feet)	Groundwater Elevation (feet amsl)
D-3	10/20/08	17:18	5.20	1.90	--	NP	7.10
	12/08/08	11:09		1.78	--	NP	6.98
	02/20/09	9:59		1.20	--	NP	6.40
	04/20/09	9:53		1.20	--	NP	6.40
	06/22/09	11:02	8.39 [3]	2.19	--	NP	6.20
	06/22/09	12:40		2.24	--	NP	6.15
	08/03/09	9:49		2.30	--	NP	6.09
	08/03/09	12:10		2.23	--	NP	6.16
	08/17/09	7:57		2.19	--	NP	6.20
	08/17/09	11:08		2.40	--	NP	5.99
	10/29/09	7:55		2.07	--	NP	6.32
	10/29/09	10:13		2.04	--	NP	6.35
	01/18/10	12:23		1.22	--	NP	7.17
	01/18/10	14:46		1.52	--	NP	6.87
	04/19/10	14:18		2.12	--	NP	6.27
	04/19/10	16:22		2.29	--	NP	6.10
	07/19/10	5:55		2.10	--	NP	6.29
	07/19/10	9:17		2.28	--	NP	6.11
	10/25/10	12:29		0.80	--	NP	7.59
	10/25/10	15:42		1.45	--	NP	6.94
	03/21/11	11:25		2.30	--	NP	6.09
	03/21/11	14:05		2.50	--	NP	5.89
	06/14/11	9:06		2.05	--	NP	6.34
	06/14/11	12:59		2.35	--	NP	6.04
	09/26/11	9:45		2.19	--	NP	6.20
	09/26/11	--		2.08	--	NP	6.31
D-4[2]	06/22/09	10:19	9.39 [3]	2.96	--	NP	6.43
	06/22/09	12:54		2.81	--	NP	6.58
	08/03/09	10:09		2.93	--	NP	6.46
	08/03/09	12:25		2.95	--	NP	6.44
	08/17/09	8:10		2.92	--	NP	6.47
	08/17/09	11:19		2.94	--	NP	6.45
	10/29/09	8:19		2.74	--	NP	6.65
	10/29/09	10:34		2.59	--	NP	6.80
	01/18/10	12:55		2.06	--	NP	7.33
	01/18/10	15:00		2.35	--	NP	7.04
	04/19/10	14:33		2.87	--	NP	6.52
	04/19/10	16:39		2.95	--	NP	6.44
	07/19/10	6:19		2.90	--	NP	6.49
	07/19/10	9:34		3.00	--	NP	6.39
	10/25/10	12:45		1.70	--	NP	7.69
	10/25/10	15:36		2.40	--	NP	6.99
	03/21/11	11:48		2.83	--	NP	6.56
	03/21/11	14:15		2.90	--	NP	6.49
	06/14/11	9:00		2.35	--	NP	7.04
	06/14/11	13:12		2.93	--	NP	6.46
	09/26/11	10:00		2.82	--	NP	6.57
	09/26/11	--		3.03	--	NP	6.36

Table 1

Groundwater Elevation Data
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date	Time	Top of Casing Elevation (feet)	Depth to Water (top of casing) (feet)	Depth to LNAPL (feet)	LNAPL Thickness (feet)	Groundwater Elevation (feet amsl)
D-5	10/20/08	17:15	5.60	1.20	--	NP	6.80
	12/08/08	11:18		1.25	--	NP	6.85
	02/20/09	9:45		0.30	--	NP	5.90*
	04/20/09	9:22		0.08	--	NP	5.68
	06/22/09	10:39	9.09 [3]	2.88	--	NP	6.21
	06/22/09	12:28		3.10	--	NP	5.99
	08/03/09	9:32		3.10	--	NP	5.99
	08/03/09	11:59		3.12	--	NP	5.97
	08/17/09	7:46		3.12	--	NP	5.97
	08/17/09	10:56		3.17	--	NP	5.92
	10/29/09	7:45		2.99	--	NP	6.10
	10/29/09	10:04		2.88	--	NP	6.21
	01/18/10	12:29		1.76	--	NP	7.33
	01/18/10	14:35		2.10	--	NP	6.99
	04/19/10	14:05		2.87	--	NP	6.22
	04/19/10	16:10		Dry	--	NP	Dry
	07/19/10	5:32		2.78	--	NP	6.31
	07/19/10	9:04		Dry	--	NP	Dry
	10/25/10	12:15		1.50	--	NP	7.59
	10/25/10	15:33		2.11	--	NP	6.98
	03/21/11	11:13		2.80	--	NP	6.29
	03/21/11	13:54		3.10	--	NP	5.99
	06/14/11	8:50		2.65	--	NP	6.44
	06/14/11	12:46		3.19	--	NP	5.90
	09/26/11	8:50		2.69	--	NP	6.40
	09/26/11	--		2.99	--	NP	6.10
D-6	10/20/08	--	--	--	--	--	--
	12/08/08	11:22	2.80	3.00	--	NP	5.80
	02/20/09	10:16		4.40	--	NP	7.20
	04/20/09	9:40		4.30	--	NP	7.10
	06/22/09	11:10	8.11 [3]	3.12	--	NP	4.99
	06/22/09	12:46		3.12	--	NP	4.99
	08/03/09	9:59		3.30	--	NP	4.81
	08/03/09	12:16		3.29	--	NP	4.82
	08/17/09	8:02		3.30	--	NP	4.81
	08/17/09	11:14		3.29	--	NP	4.82
	10/29/09	8:09		2.76	--	NP	5.35
	10/29/09	10:34		2.71	--	NP	5.40
	01/18/10	12:46		3.77	--	NP	4.34
	01/18/10	14:52		3.80	--	NP	4.31
	04/19/10	14:25		2.20	--	NP	5.91
	04/19/10	16:30		2.30	--	NP	5.81
	07/19/10	6:08		2.35	--	NP	5.76
	07/19/10	9:26		2.35	--	NP	5.76
	10/25/10	12:36		1.65	--	NP	6.46
	10/25/10	15:48		1.61	--	NP	6.50
	03/21/11	11:35		1.64	--	NP	6.47
	03/21/11	14:08		1.65	--	NP	6.46
	06/14/11	8:57		3.72	--	NP	4.39
	06/14/11	12:50		3.72	--	NP	4.39
	09/26/11	9:00		3.95	--	NP	4.16
	09/26/11	--		3.90	--	NP	4.21
D-7	10/20/08	17:23	7.60	Dry	--	NP	Dry
	12/08/08	11:31		Dry	--	NP	Dry
	02/20/09	10:48		Dry	--	NP	Dry
	04/20/09	10:23		Dry	--	NP	Dry

Table 1

Groundwater Elevation Data
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date	Time	Top of Casing Elevation (feet)	Depth to Water (top of casing) (feet)	Depth to LNAPL (feet)	LNAPL Thickness (feet)	Groundwater Elevation (feet amsl)
TB	10/20/08	17:05	4.70	2.30	--	NP	7.00
	12/08/08	11:16		2.50	--	NP	7.20
	02/20/09	9:37		1.10	--	NP	5.80
	04/20/09	9:20		1.33	--	NP	6.03
	06/22/09	10:35		1.63	--	NP	6.33
	06/22/09	12:25		1.85	--	NP	6.55
	08/03/09	9:27		1.83	--	NP	6.53
	08/03/09	11:56		1.83	--	NP	6.53
	08/17/09	7:41		1.83	--	NP	6.53
	08/17/09	10:52		1.88	--	NP	6.58
	10/29/09	7:41		1.69	--	NP	6.39
	10/29/09	10:01		1.64	--	NP	6.34
	01/18/10	12:18		0.45	--	NP	5.15
	01/18/10	14:24		0.90	--	NP	5.60
	04/19/10	14:00		1.74	--	NP	6.44
	04/19/10	16:07		1.94	--	NP	6.64
	07/19/10	5:28		1.59	--	NP	6.29
	07/19/10	9:01		1.97	--	NP	6.67
	10/25/10	12:11		4.20	--	NP	8.90
	10/25/10	15:30		0.86	--	NP	5.56
	06/14/11	8:47		1.49	--	NP	6.19
	06/14/11	12:42		1.95	--	NP	6.65
	09/26/11	8:47		1.51	--	NP	6.21
	09/26/11	--		1.74	--	NP	6.44

Notes:

amsl= Above Mean Sea Level

LNAPL = Light non-aqeous phase liquid

"--" = Not measured.

NP = Not present

[1] Staff gauge D-1 re-established prior to June 2009 sampling event.

[2] Staff gauge D-4 was established prior to June 2009 sampling event to replace staff guage D-7 which is not within the Willow Creek channel.

[3] Staff guages were resurveyed by OTAK Incorporated June 1, 2009. staff guages were surveyed from top of gauge and water levels are now measured from top down to water.

* = Potentially anomalous reading that will be confirmed with subsequent gauging data.

** = Groundwater elevation adjusted for the presence of LNAPL.

+ = LNAPL thickness could not be accurately measured due to LNAPL coating oil/water interface probe tip.

^ = Measurement error. LNAPL measurement was not confirmed with a bailer at the time the measurement was collected. The measurement was re-collected on 06/23/09 and there was no indication of LNAPL or LNAPL film. A bailer was used to confirm the measurement on 06/23/09 and there were no signs of LNAPL, sheen or odor present in MW-104.

[S] = Shallow piezometer (installed between 12 and 13 feet below ground surface).

[D] = Deep piezometer (installed between 22 and 25 feet below ground surface).

Table 2

Summary of Groundwater Analytical Data
Petroleum and Polynuclear Aromatic Hydrocarbons
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date Sampled	BTEX[1] (µg/L)				Total cPAHs Adjusted for Toxicity[2] (µg/L)	Diesel[3] (µg/L)	Gasoline[4] (µg/L)	Heavy Oil[3] (µg/L)	Total TPH[5] (µg/L)
		B	T	E	X					
		CUL=51				CUL=0.018				CUL=706 (West Side) 506 (East Side)
West Side of Lower Yard										
MW-101*	10/22/08	0.50 U	0.50 U	0.50 U	1.00 U	0.00747 UU	250 U	50 U	500 U	400 UU
	12/10/08	0.50 U	0.50 U	0.50 U	1.00 U	0.00747 UU	245 U	50 U	490 U	393 UU
	02/24/09	0.5 U	NA	NA	NA	0.00755 UU	160	83	72 U	279
	04/22/09	0.5 U	NA	NA	NA	0.00755 UU	160	50 U	79 U	225
	06/25/09	0.5 U	NA	NA	NA	0.0073311 UU	36	50 U	69 U	96
	08/20/09	0.5 U	NA	NA	NA	0.012499 UU	82	50 U	74 U	144
	10/27/09	0.5 U	NA	NA	NA	0.01255 UU	310	50 U	74 U	372
	01/19/10	NA	NA	NA	NA	NA	28 U	50 U	66 U	72 UU
	04/21/10	NA	NA	NA	NA	NA	75	75	78 U	189
	07/21/10	NA	NA	NA	NA	NA	98 [100]	50 [50] U	74 [73] U	160 [162]
	10/27/10	0.5 U	NA	NA	NA	0.0119225 UU	130	120	67 U	284
	03/23/11	NA	NA	NA	NA	NA	34	50 U	67 U	93
	06/15/11	NA [NA]	NA [NA]	NA [NA]	NA [NA]	NA [NA]	70 [68]	50 [50] U	67 [70] U	129 [163]
	09/27/11	NA	NA	NA	NA	NA	14.5 U	25 U	33.5 U	73 UU
MW-104*	10/22/08	3.89	11.8	0.554	1.00 U	0.00755 UU	253 U	728	505 U	1,110
	12/10/08	3.41	0.50 U	23.5	1.15	0.0074 UU	245 U	859	490 U	1,227
	02/24/09	1.4	NA	NA	NA	0.00733105 UU	130	460	68 U	624
	04/23/09	0.5 [5.0] U	NA [NA]	NA [NA]	NA [NA]	0.00763 [0.00838] UU	180 [210]	1,700 [1,800]	70 [72] U	1,915 [2,046]
	06/24/09	2.9	NA	NA	NA	0.0073105 UU	140	740	72 U	916
	08/19/09	2.0	NA	NA	NA	0.0119225 UU	120	310	68 U	464
	10/27/09	2.0	NA	NA	NA	0.0125245 UU	130	510	73 U	677
	01/19/10	NA	NA	NA	NA	NA	270	2,800	69 U	3,105
	04/21/10	NA [NA]	NA [NA]	NA [NA]	NA [NA]	NA [NA]	100 [100]	400 [510]	83 [67] U	542 [644]
	07/20/10	NA	NA	NA	NA	NA	200	450	72 U	686
	10/27/10	1.7	NA	NA	NA	0.04719 UU	81	220	67 U	335
	03/23/11	NA	NA	NA	NA	NA	290	890	68 U	1,214
	06/15/11	NA [NA]	NA [NA]	NA [NA]	NA [NA]	NA [NA]	340 [350]	1,900 [1,900]	67 [67] U	2,274 [2,374]
	09/27/11	NA	NA	NA	NA	NA	14.5 U	25 U	33.5 U	73 UU
MW-143	10/22/08	0.50 U	0.50 U	0.50 U	1.00 U	0.00747 UU	250 U	50 U	500 U	400 UU
	12/16/08	0.50 U	0.50 U	0.50 U	1.00 U	0.0074 UU	240 U	50 U	481 U	386 UU
	02/25/09	0.5 U	NA	NA	NA	0.007399 UU	1,400	50 U	580	2,005
	04/21/09	0.5 U	NA	NA	NA	0.00747 UU	710	50 U	69 U	770
	06/24/09	0.5 U	NA	NA	NA	0.00733105 UU	940	50 U	210	1,175
	08/19/09	0.5 U	NA	NA	NA	0.0125245 UU	360	50 U	71 U	421
	10/27/09	0.5 U	NA	NA	NA	0.0125245 UU	200	50 U	66 U	258
	01/21/10	NA	NA	NA	NA	NA	620	50 U	330	975
	04/20/10	NA [NA]	NA [NA]	NA [NA]	NA [NA]	NA [NA]	1,200 [1,400]	50 [50] U	340 [450]	1,565 [1,875]
	07/20/10	NA	NA	NA	NA	NA	1,300	50 U	260	1,585
	10/27/10	0.5 U	NA	NA	NA	0.0119225 UU	110	50 U	67 U	169
	06/15/11	NA	NA	NA	NA	NA	1500	50 U	220	1,745

Table 2

Summary of Groundwater Analytical Data
Petroleum and Polynuclear Aromatic Hydrocarbons
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date Sampled	BTEX[1] (µg/L) B	T	E	X	Total cPAHs Adjusted for Toxicity[2] (µg/L)	Diesel[3] (µg/L)	Gasoline[4] (µg/L)	Heavy Oil[3] (µg/L)	Total TPH[5] (µg/L)
		CUL=51				CUL=0.018				CUL=706 (West Side) 506 (East Side)
MW-147*	10/21/08	0.50 U	0.50 U	0.50 U	1.00 U	0.00733 UU	240 U	91.2	481 U	452
	12/09/08	0.50 U	0.562	1.38	3.49	0.00755 UU	243 U	604	485 U	968
	02/23/09	0.5 [0.5] U	NA [NA]	NA [NA]	NA [NA]	0.007263 [0.0077399] UU	1,100 [1,000]	760 [790]	380 [420]	2,240 [2,210]
	04/21/09	1.7	NA	NA	NA	0.00838 UU	730	630	99	1,459
	06/23/09	0.5 U	NA	NA	NA	0.0071876 UU	750	260	290	1,300
	08/18/09	0.5 U	NA	NA	NA	0.0119735 UU	240	76	70 U	351
	10/26/09	0.5 U	NA	NA	NA	0.0119735 UU	1,700	690	330	2,720
	01/19/10	NA	NA	NA	NA	NA	360	750	66 U	1,143
	04/20/10	NA	NA	NA	NA	NA	320	730	78	1,128
	07/20/10	NA	NA	NA	NA	NA	500	70	100	670
	10/26/10	0.5 U	NA	NA	NA	0.0125245 UU	1,200	330	200	1,730
	3/22/11	NA	NA	NA	NA	NA	750	740	68 U	1,524
	6/15/11	NA	NA	NA	NA	NA	370	250	67 U	654
	9/27/2011	NA	NA	NA	NA	NA	14.5 U	25 U	33.5 U	73 UU
MW-149R*	10/21/08	0.50 U	0.50 U	0.50 U	1.00 U	0.00733 UU	245 U	50 U	490 U	393 UU
	12/09/08	0.50 U	0.50 U	0.50 U	1.00 U	0.0074 UU	243 U	50 U	485 U	389 UU
	02/23/09	0.5 U	NA	NA	NA	0.00755 UU	110	50 U	78 U	174
	04/21/09	0.5 U	NA	NA	NA	0.00755 UU	100	50 U	76 U	163
	06/23/09	0.5 U	NA	NA	NA	0.0071876 UU	190	50 U	66 U	248
	08/18/09	0.5 U	NA	NA	NA	0.0119225 UU	160	50 U	66 U	218
	10/26/09	0.5 U	NA	NA	NA	0.011948 UU	430	50 U	320	775
	01/19/10	NA	NA	NA	NA	NA	28 U	50 U	66 U	72 UU
	04/20/10	NA [NA]	NA [NA]	NA [NA]	NA [NA]	NA [NA]	29 [28] U	50 [50] U	68 [66] U	74 [72] UU
	07/20/10	NA	NA	NA	NA	NA	210	50 U	89	280
	10/26/10	0.5 U	NA	NA	NA	0.011948 UU	410	50 U	210	645
	03/22/11	NA	NA	NA	NA	NA	61	50 U	66 U	119
	06/17/11	NA	NA	NA	NA	NA	82	50 U	66 U	140
	09/27/11	NA	NA	NA	NA	NA	15 U	25 U	33.5 U	77.5 UU
MW-150*	10/21/08	0.50 U	0.50 U	0.50 U	1.00 U	0.0074 UU	240 U	50 U	481 UJ	386 UU
	12/09/08	0.50 U	0.50 U	0.50 U	1.00 U	0.00719 UU	248 U	50 U	495 U	397 UU
	02/23/09	0.5 U	NA	NA	NA	0.00712 UU	82	50 U	69 U	142
	04/21/09	0.5 U	NA	NA	NA	0.0074 UU	240	50 U	69 U	300
	06/23/09	0.5 U	NA	NA	NA	0.00755 UU	160	50 U	69 U	220
	08/18/09	0.5 U	NA	NA	NA	0.0125245 UU	110	50 U	72 U	171
	10/26/09	0.5 U	NA	NA	NA	0.011948 UU	420	50 U	270	715
	01/19/10	NA	NA	NA	NA	NA	31	50 U	69 U	91
	04/20/10	NA	NA	NA	NA	NA	48	50 U	77 U	112
	07/20/10	NA	NA	NA	NA	NA	200	50 U	68 U	259
	10/26/10	0.5 U	NA	NA	NA	0.011897 UU	59	50 U	65 U	117
	03/22/11	NA	NA	NA	NA	NA	29 U	50 U	67 U	73 UU
	06/17/11	NA	NA	NA	NA	NA	190	50 U	68 U	249
	09/27/11	NA	NA	NA	NA	NA	15 U	25 U	34 U	74 UU

Table 2

Summary of Groundwater Analytical Data
Petroleum and Polynuclear Aromatic Hydrocarbons
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date Sampled	BTEX[1] (µg/L)				Total cPAHs Adjusted for Toxicity[2] (µg/L)	Diesel[3] (µg/L)	Gasoline[4] (µg/L)	Heavy Oil[3] (µg/L)	Total TPH[5] (µg/L)
		B	T	E	X					
		CUL=51				CUL=0.018				CUL=706 (West Side) 506 (East Side)
MW-20R*	10/22/08	2.95	3.31	0.50 U	1.00 U	0.00755 UU	250 U	222	500 U	597
	12/10/08	22.2	0.50 U	2.06	1.14	0.00712 UU	248 U	325	495 U	697
	02/24/09	55	NA	NA	NA	0.00711965 UU	580	420	87	1,087
	04/22/09	47	NA	NA	NA	0.00838 UU	510	270	86	866
	06/24/09	0.5 U	NA	NA	NA	0.00733105 UU	160	50 U	69 U	220
	08/19/09	8.4	NA	NA	NA	0.0119225 UU	220	50 U	68 U	279
	10/27/09	4.9	NA	NA	NA	0.01255 UU	170	50 U	72 U	231
	01/19/10	50	0.5 U	1.1	1.5 U	NA	260	66	66 U	359
	04/21/10	0.9	NA	NA	NA	NA	350	50 U	100	475
	07/20/10	0.5 [0.5] U	NA [NA]	NA [NA]	NA [NA]	NA [NA]	130 [130]	50 [50] U	66 [66] U	188 [188]
	10/27/10	0.5 U	NA	NA	NA	0.011897 UU	47	50 U	75 U	110
	03/23/11	5.3	NA	NA	NA	NA	390	50 U	190	605
	06/15/11	3.9	NA	NA	NA	NA	320	71	72	463
	09/27/11	0.9	NA	NA	NA	NA	14.5 U	25 U	34 U	73.5 UU
MW-516	10/22/08	0.779	0.711	0.50 U	3.96	0.00712 UU	248 U	429 JZ	495 U	801 J
	12/10/08	0.50 U	0.50 U	0.50 U	1.00 U	0.00747 UU	243 U	114	485 U	478
	02/24/09	0.5 U	NA	NA	NA	0.00755 UU	30 U	50 U	70 U	75 UU
	04/22/09	0.5 U	NA	NA	NA	0.00793 UU	31 U	50 U	73 U	77 UU
	06/24/09	0.5 U	NA	NA	NA	0.0071876 UU	210	50 U	69 U	270
	08/20/09	0.5 U	NA	NA	NA	0.0125245 UU	260	50 U	75 U	323
	10/27/09	0.5 U	NA	NA	NA	0.011897 UU	140	50 U	67 U	199
	01/20/10	NA	NA	NA	NA	NA	29 U	50 U	67 U	73 UU
	04/21/10	NA	NA	NA	NA	NA	30 U	50 U	70 U	75 UU
	07/21/10	NA	NA	NA	NA	NA	150	50 U	67 U	209
	10/27/10	0.5 [0.5] U	NA [NA]	NA [NA]	NA [NA]	0.0119225 [0.0119225] UU	49 [40]	50 [50] U	67 [66] U	108 [98]
	06/16/11	NA	NA	NA	NA	NA	170	50 U	67 U	229
MW-517	10/22/08	1.24	0.50 U	0.884	1.56	0.00755 UU	248 U	275 JZ	495 U	647 J
	12/10/08	0.50 U	0.50 U	0.50 U	1.00 U	0.00726 UU	240 U	130	481 U	491
	02/24/09	0.5 U	NA	NA	NA	0.00755 UU	50	50 U	72 U	111
	04/22/09	0.5 U	NA	NA	NA	0.00815 UU	100	50 U	71 U	161
	06/24/09	0.5 U	NA	NA	NA	0.0071876 UU	460	50 U	86	571
	08/20/09	0.5 U	NA	NA	NA	0.012499 UU	230	120	69 U	385
	10/27/09	0.5 U	NA	NA	NA	0.012499 UU	160	54	73 U	251
	01/20/10	NA	NA	NA	NA	NA	40	50 U	69 U	100
	04/21/10	NA [NA]	NA [NA]	NA [NA]	NA [NA]	NA [NA]	75 [94]	50 [50] U	67 [70] U	134 [154]
	07/20/10	NA	NA	NA	NA	NA	200	50 U	66 U	258
	10/27/10	0.5 U	NA	NA	NA	0.012499 UU	77	50 U	72 U	138
	06/16/11	NA	NA	NA	NA	NA	89	50 U	67 U	148

Table 2

Summary of Groundwater Analytical Data
Petroleum and Polynuclear Aromatic Hydrocarbons
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date Sampled	BTEX[1] (µg/L) B	T	E	X	Total cPAHs Adjusted for Toxicity[2] (µg/L)	Diesel[3] (µg/L)	Gasoline[4] (µg/L)	Heavy Oil[3] (µg/L)	Total TPH[5] (µg/L)
		CUL=51				CUL=0.018				CUL=706 (West Side) 506 (East Side)
MW-518*	10/22/08	0.503	0.50 U	0.50 U	1.92	0.00755 UU	248 U	770 JZ	495 U	1,142 J
	12/10/08	0.50 U	0.50 U	0.50 U	2.12	0.0074 UU	245 U	796 JZ	490 U	1,164 J
	02/25/09	0.5 U	NA	NA	NA	0.00711965 UU	450	880	73	1,403
	04/22/09	0.5 U	NA	NA	NA	0.0074 UU	480	650	72	1,202
	06/25/09	0.5 U	NA	NA	NA	0.0071876 UU	200	440	70 U	675
	08/20/09	0.5 U	NA	NA	NA	0.0125245 UU	300	730	71 U	1,066
	10/30/09	0.5 U	NA	NA	NA	0.0125245 UU	310	660	74 U	1,007
	01/20/10	NA	NA	NA	NA	NA	230	660	67 U	924
	04/21/10	NA	NA	NA	NA	NA	240	630	75 U	908
	07/21/10	NA	NA	NA	NA	NA	310 [400]	350 [270]	73 [78] U	697 [709]
	10/28/10	0.5 U	NA	NA	NA	0.0119225 UU	290	600	67 U	924
	03/23/11	NA	NA	NA	NA	NA	390	330	68 U	754
	06/16/11	NA	NA	NA	NA	NA	200	140	67 U	374
	09/27/11	NA	NA	NA	NA	NA	66	230	34 U	330
MW-519	10/22/08	0.5 [5.0] U	0.5 [5.0] U	0.5 [5.0] U	1.00 [1.00] U	0.00755 [0.00747] UU	248 [248] U	79.9 [83.6]	495 [495] U	451 [455]
	12/09/08	0.50 U	0.50 U	0.50 U	1.00 U	0.0074 UU	250 U	64.1	500 U	439
	02/24/09	0.5 U	NA	NA	NA	0.00755 UU	83	50 U	71 U	144
	04/21/09	0.5 U	NA	NA	NA	0.00755 UU	150	50 U	74 U	212
	06/24/09	0.5 U	NA	NA	NA	0.0071876 UU	220	50 U	70 U	280
	08/18/09	0.5 [0.5] U	NA [NA]	NA [NA]	NA [NA]	0.0125245 [0.011948] UU	290 [250]	50 [50] U	75 [72] U	353 [311]
	10/27/09	0.5 U	NA	NA	NA	0.0125245 UU	58	50 U	66 U	116
	01/19/10	NA	NA	NA	NA	NA	170	50 U	67 U	229
	04/21/10	NA	NA	NA	NA	NA	82	50 U	71 U	143
	07/20/10	NA	NA	NA	NA	NA	290	50 U	67 U	334
	10/26/10	0.5 [0.5] U	NA [NA]	NA [NA]	NA [NA]	0.012499 [0.012499] UU	43 [54]	50 [50] U	73 [79] U	105 [119]
	06/15/11	NA	NA	NA	NA	NA	260	50 U	68 U	319
MW-520	10/21/08	1.45	0.50 U	0.50 U	1.00 U	0.00755 UU	250 U	356	500 U	731
	12/09/08	3.77	0.50 U	0.50 U	1.00 U	0.00763 UU	243 U	125	485 U	489
	02/23/09	1.6	NA	NA	NA	0.007928 UU	160	110	76 U	308
	04/22/09	7.6 [7.3]	NA [NA]	NA [NA]	NA [NA]	0.00747 [0.00740] UU	110 [110]	50 [50] U	66 [67] U	168 [169]
	06/24/09	0.5	NA	NA	NA	0.0072631 UU	180	50 U	69 U	240
	08/18/09	0.5 U	NA	NA	NA	0.0119735 UU	140	50 U	72 U	201
	10/27/09	0.5 U	NA	NA	NA	0.012499 UU	130	50 U	73 U	192
	01/19/10	NA	NA	NA	NA	NA	30 U	50 U	70 U	75 UU
	04/20/10	NA	NA	NA	NA	NA	52	50 U	68 U	111
	07/20/10	NA	NA	NA	NA	NA	320	50 U	67 U	379
	10/27/10	0.5 U	NA	NA	NA	0.011897 UU	110	50 U	66 U	168
	06/15/11	NA	NA	NA	NA	NA	120	50 U	67 U	179

Table 2

Summary of Groundwater Analytical Data
Petroleum and Polynuclear Aromatic Hydrocarbons
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date Sampled	BTEX[1] (µg/L)				Total cPAHs Adjusted for Toxicity[2] (µg/L)	Diesel[3] (µg/L)	Gasoline[4] (µg/L)	Heavy Oil[3] (µg/L)	Total TPH[5] (µg/L)
		B	T	E	X					
		CUL=51				CUL=0.018				CUL=706 (West Side) 506 (East Side)
MW-521	10/21/08	0.50 U	0.50 U	0.50 U	1.00 U	0.00747 UU	245 U	57.9	490 U	425
	12/09/08	0.50 U	0.50 U	0.50 U	1.00 U	0.00755 UU	250 U	98.4	500 U	473
	02/23/09	1.7	NA	NA	NA	0.008154 UU	90	50 U	78 U	154
	04/21/09	0.5 U	NA	NA	NA	0.00755 UU	31 U	50 U	73 U	77 UU
	06/23/09	0.5 U	NA	NA	NA	0.007701 UU	47	50 U	71 U	108
	08/19/09	0.5 U	NA	NA	NA	0.012499 UU	45	50 U	71 U	106
	10/26/09	0.5 [0.5] U	NA [NA]	NA [NA]	NA [NA]	0.011897 [0.011948] UU	120 [78]	50 [50] U	69 [74] U	180 [140]
	01/19/10	NA	NA	NA	NA	NA	30 U	50 U	70 U	75 UU
	04/20/10	NA	NA	NA	NA	NA	31 U	50 U	73 U	77 UU
	07/20/10	NA	NA	NA	NA	NA	70	50 U	67 U	129
	10/27/10	0.5 U	NA	NA	NA	0.0125245 UU	77	50 U	72 U	138
	06/15/11	NA	NA	NA	NA	NA	47	50 U	67 U	106
MW-522*	10/21/08	1.46	0.50 U	0.50 U	1.41	0.0356 UU	250 U	534 JZ	500 U	909 J
	12/09/08	0.782 [0.805]	0.5 [5.0] U	0.5 [5.0] U	1.00 [1.00] U	0.00747 [0.00755] UU	245 [245] U	183 [186]	490 [490] U	551 [554]
	02/23/09	0.5 U	NA	NA	NA	0.007188 UU	490	160	71 U	686
	04/21/09	0.5 U	NA	NA	NA	0.00755 UU	620	62	97	779
	06/23/09	0.5 U	NA	NA	NA	0.0071876 UU	330	100	67 U	464
	08/18/09	0.5	NA	NA	NA	0.0119225 UU	300	94	67 U	428
	10/26/09	0.5	NA	NA	NA	0.0119735 UU	650	50 U	280	955
	01/19/10	NA	NA	NA	NA	NA	39	50 U	66 U	97 UU
	04/20/10	NA	NA	NA	NA	NA	220	50 U	81 U	286
	07/20/10	NA	NA	NA	NA	NA	470	50 U	76 U	533
	10/26/10	0.5 U	NA	NA	NA	0.011897 UU	260	50 U	66 U	318
	03/22/11	NA	NA	NA	NA	NA	150	50 U	68 U	208
	06/15/11	NA	NA	NA	NA	NA	380	50 U	72 U	477
	09/27/11	NA [NA]	NA [NA]	NA [NA]	NA [NA]	NA [NA]	29 [42]	25 [25] U	33.5 [33] U	87.5 [100]
MW-523*	10/21/08	0.50 U	0.50 U	0.50 U	1.00 U	0.0074 UU	245 U	63.0	490 U	431
	12/09/08	0.50 U	0.50 U	0.50 U	1.00 U	0.00763 UU	248 U	50 U	495 U	397 UU
	02/23/09	0.5 U	NA	NA	NA	0.007399 UU	32	50 U	68 U	91
	04/21/09	0.5 U	NA	NA	NA	0.0074 UU	30 U	50 U	69 U	75 UU
	06/23/09	0.5 [0.5] U	NA	NA	NA	0.0072631 [0.00755] UU	39 [78]	50 [50] U	68 [68] U	98 [137]
	08/18/09	0.5 U	NA	NA	NA	0.0119225 UU	140	50 U	66 U	198
	10/26/09	0.5 U	NA	NA	NA	0.0119735 UU	120	50 U	66 U	178
	01/19/10	NA	NA	NA	NA	NA	32	50 U	69 U	92
	04/20/10	NA	NA	NA	NA	NA	35 U	50 U	83 U	84 UU
	07/20/10	NA	NA	NA	NA	NA	61	50 U	80 U	126
	10/26/10	0.5 U	NA	NA	NA	0.01255 UU	160	50 U	74 U	222
	03/22/11	NA	NA	NA	NA	NA	28 U	50 U	66 U	72 UU
	06/15/11	NA	NA	NA	NA	NA	73	50 U	67 U	132
	09/27/11	NA	NA	NA	NA	NA	14.5 U	25 U	33.5 U	73 UU

Table 2

Summary of Groundwater Analytical Data
Petroleum and Polynuclear Aromatic Hydrocarbons
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date Sampled	BTEX[1] (µg/L)								Total cPAHs Adjusted for Toxicity[2] (µg/L)		Diesel[3] (µg/L)		Gasoline[4] (µg/L)		Heavy Oil[3] (µg/L)		Total TPH[5] (µg/L)	
		B		T		E		X											
		CUL=51								CUL=0.018								CUL=706 (West Side) 506 (East Side)	
MW-524*	10/21/08	0.50	U	0.50	U	0.50	U	1.00	U	0.00726	UU	240	U	50	U	481	U	386	UU
	12/09/08	0.50	U	0.50	U	0.50	U	1.00	U	0.0074	UU	243	U	50	U	485	U	389	UU
	02/23/09	0.5	U	NA		NA		NA		0.007928	UU	32	U	50	U	74	U	78	UU
	04/21/09	0.5	U	NA		NA		NA		0.00747	UU	29	U	50	U	67	U	73	UU
	06/23/09	0.5	U	NA		NA		NA		0.0074745	UU	29	U	50	U	67	U	73	UU
	08/18/09	0.5	U	NA		NA		NA		0.0119225	UU	29	U	50	U	67	U	73	UU
	10/26/09	0.5	U	NA		NA		NA		0.011948	UU	270		50	U	150		445	
	01/19/10	NA		NA		NA		NA		NA		30	U	50	U	71	U	76	UU
	04/20/10	NA		NA		NA		NA		NA		28	U	50	U	66	U	72	UU
	07/20/10	NA		NA		NA		NA		NA		32	U	50	U	75	U	79	UU
	10/26/10	0.5	U	NA		NA		NA		0.011897	UU	28	U	50	U	66	U	72	UU
	03/22/11	NA		NA		NA		NA		NA		28	U	50	U	66	U	72	UU
	06/17/11	NA		NA		NA		NA		NA		36		50	U	67	U	95	
	09/27/11	NA		NA		NA		NA		NA		14.5	U	25	U	33.5	U	73	UU
MW-8R*	10/21/08	0.505		0.50	U	0.50	U	1.00	U	0.0074	UU	243	U	145	JZ	485	U	509	J
	12/09/08	0.510		0.50	U	0.50	U	1.00	U	0.0074	UU	240	U	97.1		481	U	458	
	02/23/09	0.5	U	NA		NA		NA		0.00712	UU	68		50	U	70	U	128	
	04/21/09	0.5	U	NA		NA		NA		0.0074	UU	29		50	U	67	U	88	
	06/23/09	0.5	U	NA		NA		NA		0.0072631	UU	49		50	U	67	U	108	
	08/18/09	0.5	U	NA		NA		NA		0.0119225	UU	62		50	U	66	U	120	
	10/26/09	0.5	U	NA		NA		NA		0.0119735	UU	300		50	U	66	U	358	
	01/19/10	NA [NA]		NA [NA]		NA [NA]		NA [NA]		NA [NA]		34 [32]		50 [50]	U	67 [68]	U	93 [91]	
	04/20/10	NA		NA		NA		NA		NA		28	U	50	U	66	U	72	UU
	07/20/10	NA		NA		NA		NA		NA		79		50	U	67	U	138	
	10/26/10	0.5	U	NA		NA		NA		0.01255	UU	440		50	U	77	U	504	
	03/22/11	NA		NA		NA		NA		NA		28 U [32]		50 [50]	U	66 [67]	U	72 UU [91]	
	06/15/11	NA		NA		NA		NA		NA		44		50	U	67	U	103	
	09/27/11	NA		NA		NA		NA		NA		15	U	25	U	35	U	75	UU
East Side of Lower Yard																			
LM-2*	10/23/08	0.50	U	0.50	U	0.50	U	1.00	U	0.0074	UU	243	U	50	U	485	U	389	UU
	12/11/08	0.50	U	0.50	U	0.50	U	1.00	U	0.00772		243	U	50	U	485	U	389	UU
	02/26/09	0.5	U	NA		NA		NA		0.00755	UU	1,300		50	U	510		1,835	
	04/23/09	0.5	U	NA		NA		NA		0.00719	UU	1,100		50	U	230		1,355	
	06/25/09	0.5	U	NA		NA		NA		0.0071876	UU	520		50	U	370		915	
	08/20/09	0.5	U	NA		NA		NA		0.011948	UU	290		50	U	71		386	
	10/30/09	0.5	U	NA		NA		NA		0.01255	UU	1,500		50	U	700		2,225	
	01/20/10	NA		NA		NA		NA		NA		1,100		50	U	500		1,625	
	04/21/10	NA		NA		NA		NA		NA		1,100		50	U	460		1,585	
	07/22/10	NA		NA		NA		NA		NA		1,500		50	U	550		2,075	
	10/29/10	0.5	U	NA		NA		NA		0.0119225	UU	2,500		50	U	1,400		3,925	
	03/23/11	NA		NA		NA		NA		NA		1,600		50	U	1,000		2,625	
	06/16/11	NA		NA		NA		NA		NA		1,800		50	U	520		2,345	
	09/28/11	NA		NA		NA		NA		NA		14.5	U	25	U	33.5	U	73.5	UU

Table 2

Summary of Groundwater Analytical Data
Petroleum and Polynuclear Aromatic Hydrocarbons
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date Sampled	BTEX[1] (µg/L) B		T		E		X		Total cPAHs Adjusted for Toxicity[2] (µg/L)		Diesel[3] (µg/L)		Gasoline[4] (µg/L)		Heavy Oil[3] (µg/L)		Total TPH[5] (µg/L)	
		CUL=51								CUL=0.018								CUL=706 (West Side) 506 (East Side)	
MW-108*	10/23/08	0.50	U	0.50	U	0.50	U	1.00	U	0.00733	UU	243	U	50	U	485	U	389	UU
	12/11/08	0.50	U	0.50	U	0.50	U	1.00	U	0.0074	UU	243	U	50	U	485	U	389	UU
	02/26/09	0.5	U	NA		NA		NA		0.00712	UU	31	U	50	U	71	U	77	UU
	04/23/09	2.5	U W	NA		NA		NA		0.00712	UU	39		250	UW	66	U	197	
	06/25/09	0.5	U	NA		NA		NA		0.0071876	UU	28	U	50	U	66	U	72	UU
	08/20/09	0.5	U	NA		NA		NA		0.011897	UU	36		50	U	68	U	95	
	10/30/09	0.5	U	NA		NA		NA		0.013805	UU	40		50	U	71	U	101	
	01/20/10	NA		NA		NA		NA		NA		28	U	50	U	66	U	72	UU
	04/21/10	NA		NA		NA		NA		NA		75		50	U	67	U	134	
	07/22/10	NA		NA		NA		NA		NA		76		50	U	76	U	139	
	10/29/10	0.5	U	NA		NA		NA		0.0119225	UU	29	U	50	U	67	U	73	UU
	03/23/11	NA		NA		NA		NA		NA		33		50	U	67	U	92	
	06/16/11	NA		NA		NA		NA		NA		140		50	U	68	U	199	
	09/28/11	NA		NA		NA		NA		NA		15	U	25	U	34.5	U	74.5	UU
MW-109*	10/23/08	0.50	U	0.50	U	0.50	U	1.00	U	0.0077	UU	253	U	50	U	505	U	404	UU
	12/12/08	0.50	U	0.50	U	0.50	U	1.00	U	0.00733	UU	248	U	50	U	495	U	397	UU
	02/26/09	0.5	U	NA		NA		NA		0.008381	UU	32	U	50	U	75	U	79	UU
	04/23/09	0.5	U	NA		NA		NA		0.00719	UU	29	U	50	U	67	U	73	UU
	06/25/09	0.5	U	NA		NA		NA		0.0071876	UU	29	U	50	U	67	U	73	UU
	08/20/09	0.5	U	NA		NA		NA		0.011897	UU	29	U	50	U	67	U	73	UU
	10/30/09	0.5	U	NA		NA		NA		0.011897	UU	29	U	50	U	67	U	73	UU
	01/20/10	NA		NA		NA		NA		NA		29	U	50	U	67	U	73	UU
	04/21/10	NA		NA		NA		NA		NA		55		50	U	67	U	114	
	07/22/10	NA		NA		NA		NA		NA		31	U	50	U	72	U	77	UU
	10/29/10	0.5	U	NA		NA		NA		0.011897	UU	29	U	50	U	67	U	73	UU
	03/23/11	NA		NA		NA		NA		NA		29	U	50	U	67	U	73	UU
	06/16/11	NA		NA		NA		NA		NA		96		50	U	100		221	
	09/28/11	NA		NA		NA		NA		NA		16	U	25	U	37.5	U	78.5	UU
MW-129R*	10/24/08	0.50	U	0.50	U	0.50	U	1.12		0.0074	UU	250	U	68.1		500	U	443	
	12/12/08	0.50	U	0.50	U	0.50	U	1.00	U	0.00755	UU	245	U	50	U	490	U	393	UU
	02/27/09	0.5	U	NA		NA		NA		0.007263	UU	1,900		50	U	730		2,655	
	04/27/09	0.5	U	NA		NA		NA		0.00719	UU	1,400		50	U	250		1,675	
	06/26/09	0.5	U	NA		NA		NA		0.0074745	UU	1,700		50	U	1,000		2,725	
	08/21/09	0.5	U	NA		NA		NA		0.011948	UU	3,400		50	U	1,000		4,425	
	10/28/09	0.5	U	NA		NA		NA		0.0125245	UU	1,900		50	U	240		2,165	
	01/21/10	NA		NA		NA		NA		NA		1,800		50	U	650		2,475	
	04/22/10	NA		NA		NA		NA		NA		1,600		50	U	390		2,015	
	07/22/10	NA		NA		NA		NA		NA		1,800		50	U	400		2,225	
	11/01/10	0.5	U	NA		NA		NA		0.011897	UU	1,900		50	U	700		2,625	
	03/23/11	NA		NA		NA		NA		NA		1,700 [1,700]		50 [50]	UU	550 [650]		2,275 [2,375]	
	06/17/11	NA		NA		NA		NA		NA		1,600		50	U	310		1,935	
	09/28/11	NA		NA		NA		NA		NA		2,700		25	U	230		2,955	

Table 2

Summary of Groundwater Analytical Data
Petroleum and Polynuclear Aromatic Hydrocarbons
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date Sampled	BTEX[1] (µg/L)				Total cPAHs Adjusted for Toxicity[2] (µg/L)	Diesel[3] (µg/L)	Gasoline[4] (µg/L)	Heavy Oil[3] (µg/L)	Total TPH[5] (µg/L)
		B	T	E	X					
		CUL=51				CUL=0.018				CUL=706 (West Side) 506 (East Side)
MW-135*	10/27/08	0.50 U	0.50 U	0.50 U	1.00 U	0.0074 UU	243 U	50 U	485 U	389 UU
	12/15/08	0.5 [5.0] U	0.5 [5.0] U	0.5 [5.0] U	1.00 [1.00] U	0.00712 [0.00740] UU	238 [243] U	50.0 [50.0] U	476 [485] U	382 [389] UU
	02/27/09	0.5 U	NA	NA	NA	0.07928 UU	800	50 U	870	1,695
	04/24/09	0.5 U	NA	NA	NA	0.00712 UU	310	50 U	67 U	402
	06/29/09	0.5 U	NA	NA	NA	0.007399 UU	1,600	50 U	1,000	2,625
	08/24/09	0.5 U	NA	NA	NA	0.0119735 UU	1,900	50 U	640	2,565
	10/29/09	0.5 U	NA	NA	NA	0.011897 UU	2,000	50 U	520	2,545
	01/21/10	NA	NA	NA	NA	NA	460	50 U	360	845
	04/23/10	NA	NA	NA	NA	NA	610	50 U	400	1,035
	07/22/10	NA	NA	NA	NA	NA	1,400	50 U	200	1,625
	11/01/10	0.5 U	NA	NA	NA	0.012499 UU	1,800	50 U	590	2,415
	03/24/11	NA	NA	NA	NA	NA	500	50 U	170	695
	06/17/11	NA	NA	NA	NA	NA	550	50 U	210	785
	09/28/11	NA	NA	NA	NA	NA	14.5 U	25 U	34.5 U	74.5 UU
MW-136*	10/27/08	0.50 U	0.50 U	0.50 U	1.00 U	0.00755 UU	243 U	50 U	485 U	389 UU
	12/15/08	0.50 U	0.50 U	0.50 U	1.00 U	0.00747 UU	243 U	60.6	485 U	425
	02/27/09	2.5	NA	NA	NA	0.00712 UU	2,400	120	490	3,010
	04/24/09	1.9	NA	NA	NA	0.00944 UU	1,400	52	170	1,622
	06/29/09	0.8	NA	NA	NA	0.007938 UU	2,500	50 U	1,200	3,725
	08/24/09	0.6	NA	NA	NA	0.011897 UU	1,600	50 U	560	2,185
	10/29/09	0.5 U	NA	NA	NA	0.0125245 UU	2,100	50 U	460	2,585
	01/21/10	NA	NA	NA	NA	NA	980	50 U	540	1,545
	04/23/10	NA	NA	NA	NA	NA	1,100	50 U	410	1,535
	07/22/10	NA	NA	NA	NA	NA	1,300	50 U	250	1,575
	11/01/10	0.5 U	NA	NA	NA	0.011897 UU	1,200	50 U	460	1,685
	03/24/11	NA	NA	NA	NA	NA	540	50 U	78	643
	06/17/11	NA	NA	NA	NA	NA	510	50 U	110	645
	09/28/11	NA	NA	NA	NA	NA	40	25 U	33.5 U	98.5
MW-139R*	10/22/08	0.50 U	0.50 U	0.724	1.00 U	0.00726 UU	240 U	57 JZ	481 U	418 J
	12/10/08	0.50 U	0.50 U	0.50 U	1.00 U	0.00747 UU	248 U	50 U	495 U	397 UU
	02/25/09	0.5 U	NA	NA	NA	0.0083805 UU	42	50 U	73 U	104
	04/23/09	0.5 U	NA	NA	NA	0.008 UU	31 U	50 U	72 U	77 UU
	06/25/09	0.5 U	NA	NA	NA	0.00733105 UU	63	50 U	69 U	123
	08/20/09	0.5 U	NA	NA	NA	0.0119735 UU	87	50 U	66 U	145
	10/28/09	0.5 U	NA	NA	NA	0.0119735 UU	78	50 U	70 U	138
	01/20/10	NA [NA]	NA [NA]	NA [NA]	NA [NA]	NA [NA]	31 [36]	50 [50] U	70 [70] U	91 [96]
	04/21/10	NA	NA	NA	NA	NA	34 U	50 U	78 U	81 UU
	07/21/10	NA	NA	NA	NA	NA	66	50 U	80 U	131
	10/28/10	0.5 U	NA	NA	NA	0.0119225 UU	64	50 U	66 U	122
	03/23/11	NA	NA	NA	NA	NA	29 U	50 U	67 U	73 UU
	06/16/11	NA	NA	NA	NA	NA	56	50 U	870 XX	951 XX
	09/27/11	NA	NA	NA	NA	NA	14.5 U	25 U	33.5 U	73 UU

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Petroleum and Polynuclear Aromatic Hydrocarbons
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date Sampled	BTEX[1] (µg/L) B		T		E		X		Total cPAHs Adjusted for Toxicity[2] (µg/L)		Diesel[3] (µg/L)		Gasoline[4] (µg/L)		Heavy Oil[3] (µg/L)		Total TPH[5] (µg/L)	
		CUL=51								CUL=0.018								CUL=706 (West Side) 506 (East Side)	
MW-500*	10/27/08	0.800		0.934		0.50	U	8.29		0.00712	UU	1,180		298		472	U	1,714	
	12/15/08	0.50	U	0.50	U	0.50	U	1.00	U	0.00747	UU	245	U	50	U	490	U	393	UU
	02/27/09	0.5	U	NA		NA		NA		0.007928	UU	250		50	U	320		595	
	04/24/09	0.5 [0.5]	U	NA [NA]		NA [NA]		NA [NA]		0.00712 [0.00755]	UU	44 [35]		50 [50]	U	76 [75]	U	107 [98]	
	06/29/09	0.5	U	NA		NA		NA		0.0078021		1,400		50	U	500		1,925	
	08/21/09	0.6		NA		NA		NA		0.012499	UU	2,200		110		690		3,000	
	10/29/09	0.5	U	NA		NA		NA		0.011897	UU	1,000		50	U	500		1,525	
	01/21/10	NA [NA]		NA [NA]		NA [NA]		NA [NA]		NA [NA]		36 [29]	[U]	50 [50]	U	70 [69]	[U]	131 [74]	
	04/22/10	NA		NA		NA		NA		NA		59		50	U	68	U	118	
	07/22/10	NA		NA		NA		NA		NA		490		50	U	96		611	
	11/01/10	0.5	U	NA		NA		NA		0.011897	UU	170		50	U	67	U	229	
	03/24/11	NA		NA		NA		NA		NA		32		50	U	68	U	91	
	06/17/11	NA		NA		NA		NA		NA		130		50	U	67	U	189	
	09/28/11	NA [NA]		NA [NA]		NA [NA]		NA [NA]		NA [NA]		61 [45]		60 [62]		34.5 [34]	U	154.5 [141]	
MW-501*	10/24/08	0.50	U	1.42		1.15		1.00	U	0.00838	UU	6,690	J	1,040		597	J	8,330	J
	12/15/08	0.50	U	0.50	U	0.50	U	1.00	U	0.0074	UU	243	U	50	U	485	U	389	UU
	03/02/09	0.5 [5.0]	U	NA [NA]		NA [NA]		NA [NA]		0.00755 [0.00755]	UU	630 [550]		50 [50]	U	160 [210]		815 [785]	
	04/24/09	0.5	U	NA		NA		NA		0.00719	UU	350		50	U	67		442	
	06/26/09	0.5	U	NA		NA		NA		0.007399	UU	1,700		50	U	1,100		2,825	
	08/21/09	0.5	U	NA		NA		NA		0.01255	UU	2,600		50	U	760		3,385	
	10/29/09	0.5	U	NA		NA		NA		0.0125245	UU	75		50	U	73	U	137	
	01/21/10	NA		NA		NA		NA		NA		75		50	U	67	U	134	
	04/22/10	NA		NA		NA		NA		NA		130		50	U	69	U	190	
	07/22/10	NA		NA		NA		NA		NA		470		50	U	97		592	
	11/01/10	0.5	U	NA		NA		NA		0.0125245	UU	230		50	U	68	U	289	
	03/24/11	NA		NA		NA		NA		NA		89		50	U	67	U	148	
	06/17/11	NA		NA		NA		NA		NA		340		50	U	82		447	
	09/28/11	NA		NA		NA		NA		NA		15	U	25	U	33.5	U	74	UU
MW-502	10/24/08	0.50	U	0.50	U	0.891		1.00	U	0.00755	UU	347		1,100	JZ	500	U	1,697	J
	12/12/08	0.50	U	0.50	U	0.50	U	1.00	U	0.00755	UU	321	JX	874		485	U	1,438	J
	02/25/09	0.5	U	NA		NA		NA		0.00755	UU	32	U	1,500		72	U	1,552	
	04/22/09	0.5	U	NA		NA		NA		0.0712	UU	370		1,100		66	U	1,503	
	06/26/09	0.5 [0.5]	U	NA [NA]		NA [NA]		NA [NA]		0.0071876 [0.0071876]	UU	260 [220]		170 [160]		82 [66]	[U]	512 [413]	
	08/21/09	0.5	U	NA		NA		NA		0.011897	UU	140		50	U	67	U	199	
	10/28/09	0.5	U	NA		NA		NA		0.011897	UU	370		470		66	U	873	
	01/21/10	NA		NA		NA		NA		NA		300		800		130		1,230	
	04/22/10	NA		NA		NA		NA		NA		290		520		67	U	844	
	07/21/10	NA		NA		NA		NA		NA		200		50	U	68	U	259	
	10/28/10	0.5	U	NA		NA		NA		0.0125245	UU	98		50	U	75	U	161	
	06/17/11	NA		NA		NA		NA		NA		150		50	U	67	U	209	

Table 2

Summary of Groundwater Analytical Data
Petroleum and Polynuclear Aromatic Hydrocarbons
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date Sampled	BTEX[1] (µg/L) B	T	E	X	Total cPAHs Adjusted for Toxicity[2] (µg/L)	Diesel[3] (µg/L)	Gasoline[4] (µg/L)	Heavy Oil[3] (µg/L)	Total TPH[5] (µg/L)
		CUL=51				CUL=0.018				CUL=706 (West Side) 506 (East Side)
MW-503	10/27/08	0.50 U	0.50 U	0.50 U	1.00 U	0.00712 UU	236 U	50 U	472 U	379 UU
	12/12/08	0.50 U	0.50 U	0.50 U	1.00 U	0.00726 UU	243 U	50 U	485 U	389 UU
	02/26/09	0.5 U	NA	NA	NA	0.007928 UU	77	50 U	74 U	139
	04/22/09	0.5 U	NA	NA	NA	0.00719 UU	130	50 U	68 U	189
	06/26/09	0.5 U	NA	NA	NA	0.0071876 UU	210	50 U	96	331
	08/21/09	0.5 U	NA	NA	NA	0.011897 UU	140	50 U	67 U	199
	10/28/09	0.5 U	NA	NA	NA	0.011897 UU	160	50 U	66 U	218
	01/21/10	NA	NA	NA	NA	NA	150	50 U	190	365
	04/22/10	NA	NA	NA	NA	NA	30 U	50 U	70 U	75 UU
	07/21/10	NA	NA	NA	NA	NA	220	50 U	68 U	279
	10/28/10	0.5 U	NA	NA	NA	0.01255 UU	150	50 U	79	254
	06/17/11	NA [NA]	NA [NA]	NA [NA]	NA [NA]	NA [NA]	140 [160]	50 [50] U	67 [67] U	199 [219]
MW-504	10/24/08	7.03	0.50 U	4.03	2.95	0.00838 UU	248 U	329	495 U	701
	12/12/08	0.5 [5.0] U	0.5 [5.0] U	0.5 [5.0] U	1.00 [1.00] U	0.00755 [0.00747] UU	248 [250] U	50.0 [50.0] U	495 [500] U	397 [400] UU
	02/27/09	0.5 U	NA	NA	NA	0.00728 UU	30 U	50 U	70 U	75 UU
	04/24/09	0.5 U	NA	NA	NA	0.00712 UU	46	50 U	66 U	104
	06/26/09	0.5 U	NA	NA	NA	0.0071876 UU	220	50 U	73 U	282
	08/21/09	0.5 U	NA	NA	NA	0.011897 UU	220	50 U	68 U	279
	10/28/09	0.5 U	NA	NA	NA	0.0119735 UU	95	50 U	66 U	153
	01/21/10	NA	NA	NA	NA	NA	28 U	50 U	66 U	72 UU
	04/22/10	NA	NA	NA	NA	NA	29 U	50 U	67 U	73 UU
	07/21/10	NA	NA	NA	NA	NA	110	50 U	75 U	173
	10/28/10	0.5 U	NA	NA	NA	0.011897 UU	110	50 U	66 U	168
	06/17/11	NA	NA	NA	NA	NA	60	50 U	68 U	119
MW-505	10/24/08	0.5 [5.0] U	0.50 [2.78] UJ	0.5 [5.0] U	1.01 [1.00] [U	0.00755 [0.00726] UU	253 [250] U	50.0 [50.0] U	505 [500] U	404 [400] UU
	12/15/08	0.5 [5.0] U	0.50 [0.647] U	0.5 [5.0] U	1.00 [1.00] U	0.00712 [0.00712] UU	238 [238] U	50.0 [50.0] U	476 [476] U	382 [382] UU
	02/27/09	0.5 U	NA	NA	NA	0.00755 UU	52	50 U	78 U	116
	04/22/09	0.5 U	NA	NA	NA	0.00807	59	50 U	67 U	118
	06/26/09	0.5 U	NA	NA	NA	0.00733105 UU	39	50 U	100	164
	08/21/09	0.5 U	NA	NA	NA	0.0125245 UU	98	50 U	75 U	161
	10/28/09	0.5 U	NA	NA	NA	0.011897 UU	67	50 U	69 U	127
	01/20/10	NA	NA	NA	NA	NA	30 U	50 U	71 U	76 UU
	04/22/10	NA	NA	NA	NA	NA	30 U	50 U	69 U	75 UU
	07/21/10	NA	NA	NA	NA	NA	220	50 U	67 U	279
	10/29/10	0.5 U	NA	NA	NA	0.01255 UU	130	50 U	74 U	192
	06/17/11	NA	NA	NA	NA	NA	100	50 U	67 U	159

Table 2

Summary of Groundwater Analytical Data
Petroleum and Polynuclear Aromatic Hydrocarbons
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date Sampled	BTEX[1] (µg/L) B		T		E		X		Total cPAHs Adjusted for Toxicity[2] (µg/L)		Diesel[3] (µg/L)		Gasoline[4] (µg/L)		Heavy Oil[3] (µg/L)		Total TPH[5] (µg/L)	
		CUL=51								CUL=0.018								CUL=706 (West Side) 506 (East Side)	
MW-506	10/24/08	0.50	U	0.50	U	0.50	U	1.00	U	0.0074	UU	245	U	50	U	490	U	393	UU
	12/12/08	0.50	U	0.50	U	0.50	U	1.00	U	0.00747	UU	248	U	50	U	495	U	397	UU
	02/27/09	0.5	U	NA		NA		NA		0.007399	UU	37		50	U	70	U	97	
	04/24/09	0.5	U	NA		NA		NA		0.00755	UU	31	U	50	U	72	U	77	UU
	06/26/09	0.5	U	NA		NA		NA		0.00733105	UU	38		50	U	140		203	
	08/21/09	0.5	U	NA		NA		NA		0.01255	UU	85		50	U	75	U	148	
	10/30/09	0.5	U	NA		NA		NA		0.01556	UU	50		50	U	74	U	112	
	01/21/10	NA		NA		NA		NA		NA		28	U	50	U	66	U	72	UU
	04/22/10	NA		NA		NA		NA		NA		36		50	U	75	U	99	
	07/21/10	NA		NA		NA		NA		NA		57		50	U	68	U	116	
	10/29/10	0.5 [0.5]	U	NA [NA]		NA [NA]		NA [NA]		0.011897 [0.012499]	UU	97 [72]		50 [50]	U	72 [72]	U	158 [133]	
	06/16/11	NA		NA		NA		NA		NA		50		50	U	67	U	109	
MW-507	10/24/08	0.995		0.50	U	0.50	U	1.00	U	0.00733	UU	240	U	523		481	U	884	
	12/12/08	0.605		0.50	U	0.50	U	1.00	U	0.00747	UU	245	U	194		490	U	562	
	02/27/09	0.5 [5.0]	U	NA [NA]		NA [NA]		NA [NA]		0.007331 [0.7331]	UU	610 [560]		120 [130]		310 [120]		1,040 [810]	
	04/24/09	0.5	U	NA		NA		NA		0.00747	UU	520		59		74	U	616	
	06/26/09	0.5	U	NA		NA		NA		0.0072631	UU	640		62		440		1,142	
	08/21/09	0.5 [0.5]	U	NA [NA]		NA [NA]		NA [NA]		0.0125245 [0.012499]	UU	450 [500]		54 [50]	[U]	69 [72]	U	539 [561]	
	10/28/09	0.5	U	NA		NA		NA		0.01255	UU	900		50	U	88		1,013	
	01/21/10	NA		NA		NA		NA		NA		270		50	U	88		383	
	04/22/10	NA		NA		NA		NA		NA		290		50	U	91		406	
	07/21/10	NA		NA		NA		NA		NA		330		50	U	80		435	
	10/29/10	0.5	U	NA		NA		NA		0.0119225	UU	370		50	U	220		615	
	06/17/11	NA		NA		NA		NA		NA		200		50	U	88		313	
MW-508	10/24/08	0.50	U	0.50	U	0.50	U	1.00	U	0.00755	UU	243	U	50	U	485	U	389	UU
	12/11/08	0.50	U	0.50	U	0.50	U	1.00	U	0.00763	UU	243	U	50	U	485	U	389	UU
	02/26/09	0.5	U	NA		NA		NA		0.00712	UU	85		50	U	74	U	147	
	04/23/09	0.5	U	NA		NA		NA		0.00815	UU	90		50	U	70	U	150	
	06/25/09	0.5 [0.5]	U	NA [NA]		NA [NA]		NA [NA]		0.007399 [0.007399]	UU	430 [310]		50 [50]	U	290 [310]		745 [645]	
	08/21/09	0.5	U	NA		NA		NA		0.0119735	UU	200		50	U	67	U	259	
	10/28/09	0.5 [0.5]	U	NA [NA]		NA [NA]		NA [NA]		0.011948 [0.0125245]	UU	71 [68]		50 [50]	U	67 [70]	U	130 [128]	
	01/20/10	NA [NA]		NA [NA]		NA [NA]		NA [NA]		NA [NA]		29 [28]	U	50 [50]	U	67 [66]	U	73 [72]	UU
	04/22/10	NA		NA		NA		NA		NA		31	U	50	U	72	U	77	UU
	07/21/10	NA		NA		NA		NA		NA		270		50	U	76	U	333	
	10/28/10	0.5	U	NA		NA		NA		0.011897	UU	64		50	U	66	U	122	
	06/16/11	NA		NA		NA		NA		NA		150		50	U	67	U	209	

Table 2

Summary of Groundwater Analytical Data
Petroleum and Polynuclear Aromatic Hydrocarbons
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date Sampled	BTEX[1] (µg/L) B		T		E		X		Total cPAHs Adjusted for Toxicity[2] (µg/L)		Diesel[3] (µg/L)		Gasoline[4] (µg/L)		Heavy Oil[3] (µg/L)		Total TPH[5] (µg/L)	
		CUL=51								CUL=0.018								CUL=706 (West Side) 506 (East Side)	
MW-509	10/23/08	0.50	U	0.50	U	0.50	U	1.00	U	0.00733	UU	243	U	50	U	485	U	389	UU
	12/11/08	0.50	U	0.50	U	0.50	U	1.00	U	0.0074	UU	243	U	50	U	485	U	389	UU
	02/25/09	0.5	U	NA		NA		NA		0.00755	UU	32	U	50	U	75	U	74	UU
	04/23/09	0.5	U	NA		NA		NA		0.00747	UU	31	U	50	U	71	U	76	UU
	06/25/09	0.5	U	NA		NA		NA		0.00733105	UU	29		50	U	68	U	88	
	08/21/09	0.5	U	NA		NA		NA		0.0119735	UU	46		50	U	70	U	106	
	10/28/09	0.5	U	NA		NA		NA		0.0119735	UU	48		50	U	76	U	111	
	01/20/10	NA		NA		NA		NA		NA		28	U	50	U	66	U	72	UU
	04/21/10	NA		NA		NA		NA		NA		43		50	U	68	U	102	
	07/21/10	NA		NA		NA		NA		NA		34 [34]		50 [50]	U	75 [74]	U	97 [96]	
	10/28/10	0.5	U	NA		NA		NA		0.012499	UU	40		50	U	76	U	103	
	06/16/11	NA		NA		NA		NA		NA		29	U	50	U	67	U	73	UU
MW-510*	10/23/08	6.89		0.832		0.540		4.93		0.149	UU	3,400		332	JZ	495	U	3,980	J
	12/11/08	5.44		0.50	U	0.50	U	3.98		0.0747	UU	4,920		244		485	U	5,410	
	02/26/09	9.4		NA		NA		NA		0.031786	UU	14,000		430		3900	U	16,380	
	04/27/09	14		NA		NA		NA		0.00733	UU	21,000		530		1,400		22,930	
	06/24/09	18		NA		NA		NA		0.014868		22,000		490		2,600		25,090	
	08/20/09	8.4		NA		NA		NA		0.011897	UU	16,000		430		3,300	U	18,080	
	10/28/09	Not sampled due to the presence of LNAPL																	
	01/19/10	Not sampled due to the presence of LNAPL																	
	04/20/10	Not sampled due to the presence of LNAPL																	
	07/19/10	Not sampled due to the presence of LNAPL																	
	10/25/10	Not sampled due to the presence of LNAPL																	
	03/22/11	Not sampled due to the presence of LNAPL																	
	06/20/11	NA		NA		NA		NA		NA		12,000		200		3,100		15,300	
	09/28/11	Not sampled due to the presence of LNAPL																	
MW-511	10/24/08	0.50	U	0.50	U	0.50	U	1.00	U	0.00755	UU	250	U	50	U	500	U	400	UU
	12/12/08	0.50	U	0.50	U	0.50	U	1.00	U	0.00747	UU	243	U	50	U	485	U	389	UU
	02/25/09	0.5	U	NA		NA		NA		0.00711965	UU	30	U	50	U	70	U	75	UU
	04/21/09	0.5	U	NA		NA		NA		0.00712	UU	28	U	50	U	66	U	72	UU
	06/24/09	0.5 [0.5]	U	NA		NA		NA		0.0071876 [0.0071876]	UU	28 [28]	U	50 [50]	U	66 [66]	U	72 [72]	UU
	08/19/09	0.5	U	NA		NA		NA		0.0119225	UU	32		50	U	74	U	94	
	10/28/09	0.5 [0.5]	U	NA [NA]		NA [NA]		NA [NA]		0.011897 [0.0119225]	UU	33 [28]	[U]	50 [50]	U	65 [65]	U	91 [72]	[UU]
	01/20/10	NA		NA		NA		NA		NA		28	U	50	U	66	U	72	UU
	04/22/10	NA		NA		NA		NA		NA		32	U	50	U	75	U	79	UU
	07/22/10	NA		NA		NA		NA		NA		72		50	U	67	U	131	
	10/28/10	0.5	U	NA		NA		NA		0.011897	UU	36		50	U	67	U	95	
	06/17/11	NA		NA		NA		NA		NA		100		50	U	70	U	160	

Table 2

Summary of Groundwater Analytical Data
Petroleum and Polynuclear Aromatic Hydrocarbons
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date Sampled	BTEX[1] (µg/L) B	T	E	X	Total cPAHs Adjusted for Toxicity[2] (µg/L)	Diesel[3] (µg/L)	Gasoline[4] (µg/L)	Heavy Oil[3] (µg/L)	Total TPH[5] (µg/L)
		CUL=51				CUL=0.018				CUL=706 (West Side) 506 (East Side)
MW-512	10/23/08	1.97	0.50 U	2.96	5.23	0.00763 UU	250 U	348	500 U	723
	12/11/08	2.50	0.50 U	2.17	3.58	0.0074 UU	243 U	320	485 U	684
	02/25/09	1.5	NA	NA	NA	0.00712 UU	390	280	78	748
	04/21/09	2.7 [3.7]	NA [NA]	NA [NA]	NA [NA]	0.00712 [0.00712] UU	260 [220]	240 [280]	67 [66] U	534 [533]
	06/24/09	0.8	NA	NA	NA	0.0072631 UU	180	84	78	342
	08/19/08	1.3	NA	NA	NA	0.011897 UU	220	110	66 U	363
	10/27/09	0.6	NA	NA	NA	0.011897 UU	190	92	67 U	316
	01/20/10	NA	NA	NA	NA	NA	300	200	75	575
	04/21/10	NA	NA	NA	NA	NA	420	110	140	670
	07/21/10	NA	NA	NA	NA	NA	150	82	67 U	266
	10/28/10	0.5 U	NA	NA	NA	0.011897 UU	220	93	67 U	347
	06/16/11	NA [NA]	NA [NA]	NA [NA]	NA [NA]	NA [NA]	200 [190]	74 [79]	67 [67] U	308 [303]
MW-513	10/23/08	0.702	0.50 U	0.50 U	3.81	0.00755 UU	245 U	564 JZ	490 U	932 J
	12/10/08	0.793	0.50 U	0.50 U	1.21	0.0074 UU	245 U	439	490 U	807
	02/25/09	0.5 [5.0] U	NA [NA]	NA [NA]	NA [NA]	0.00755 [0.00755] UU	330 [300]	470 [440]	72 [74] U	836 [777]
	04/22/09	0.5 U	NA	NA	NA	0.00747 UU	290	330	66 U	653
	06/24/09	0.5 U	NA	NA	NA	0.007399 UU	170	280	75 U	488
	08/20/09	0.5 U	NA	NA	NA	0.0125245 UU	290	280	75 U	608
	10/27/09	0.5 [5.0] U	NA [NA]	NA [NA]	NA [NA]	0.0125245 [0.012499] UU	320 [320]	180 [240]	68 [68] U	534 [594]
	01/20/10	NA	NA	NA	NA	NA	300	210	67 U	544
	04/21/10	NA	NA	NA	NA	NA	290	160	74 U	487
	07/21/10	NA	NA	NA	NA	NA	360	140	67 U	534
	10/28/10	0.5 [0.5] U	NA [NA]	NA [NA]	NA [NA]	0.01255 [0.01255] UU	270 [290]	150 [160]	74 [67] U	457 [484]
	06/16/11	NA	NA	NA	NA	NA	230	100	67 U	364
MW-514	10/23/08	2.98	0.640	1.54	4.69	0.00712 UU	253	1020 JZ	490 U	1,520 J
	12/10/08	3.15 [3.40]	0.836 [0.822]	1.82 [1.89]	4.98 [4.95]	0.00733 [0.00755] UU	248 [245] U	801 [831]	495 [490] U	1,170 [1,200]
	02/24/09	2.9	NA	NA	NA	0.007551 UU	710	830	75 U	1,578
	04/21/09	3.5	NA	NA	NA	0.0151 UU	370	680	69 U	1,085
	06/24/09	2.0	NA	NA	NA	0.007399 UU	280	510	70 U	825
	08/19/09	3.2 [2.7]	NA	NA	NA	0.012499 [0.01255] UU	290 [270]	520 [450]	73 [70] U	847 [755]
	10/27/09	2.2	NA	NA	NA	0.011897 UU	400	400	66 U	833
	01/20/10	NA	NA	NA	NA	NA	200	340	69 U	575
	04/21/10	NA	NA	NA	NA	NA	340	270	71 U	646
	07/21/10	NA	NA	NA	NA	NA	420	170	67 U	624
	10/27/10	1.5	NA	NA	NA	0.011948 UU	250	290	70 U	575
	06/16/11	NA	NA	NA	NA	NA	230	170	67 U	434

Table 2

Summary of Groundwater Analytical Data
Petroleum and Polynuclear Aromatic Hydrocarbons
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date Sampled	BTEX[1] (µg/L) B	T	E	X	Total cPAHs Adjusted for Toxicity[2] (µg/L)	Diesel[3] (µg/L)	Gasoline[4] (µg/L)	Heavy Oil[3] (µg/L)	Total TPH[5] (µg/L)
		CUL=51				CUL=0.018				CUL=706 (West Side) 506 (East Side)
MW-515	10/22/08	1.86 [1.92]	1.35 [1.40]	1.00 [1.07]	4.47 [4.70]	0.00740 [0.00740] UU	248 [248] U	575 [603] JZ	495 [495] U	947 [975] J
	12/10/08	0.50 U	0.50 U	0.50 U	1.00 U	0.0074 UU	243 U	100	485 U	464
	02/24/09	0.5 U	NA	NA	NA	0.00773311 UU	71	69	68 U	174
	04/22/09	0.5 U	NA	NA	NA	0.0074 UU	77	59	69 U	171
	06/24/09	0.5 U	NA	NA	NA	0.00733105 UU	170	85	76 U	293
	08/20/09	0.5 [0.5] U	NA	NA	NA	0.012499 [0.0125245] UU	200 [340]	63 [110]	75 [75] U	301 [488]
	10/27/09	0.5 U	NA	NA	NA	0.012499 UU	79	50 U	70 U	139
	01/20/10	NA	NA	NA	NA	NA	34	50 U	69 U	94
	04/21/10	NA	NA	NA	NA	NA	32	50 U	67 U	91
	07/21/10	NA	NA	NA	NA	NA	120	50 U	66 U	178
	10/27/10	0.5 U	NA	NA	NA	0.0119225 UU	52	50 U	67 U	111
	06/16/11	NA	NA	NA	NA	NA	200	50 U	67 U	259

Notes:

[1]B= benzene, T= toluene, E= ethylbenzene, X= xylenes. BTEX analyzed by EPA Method 8021B.

[2]cPAHs = Carcinogenic Polynuclear Aromatic Hydrocarbons. Analyzed by EPA Method 8270C-HVI. cPAHs adjusted for toxicity according to WAC 173-340-708(8) and *Air Toxics Hot Spots Program Risk Assessment Guidelines, Part II Technical Support Document for Describing Available Cancer Potency Factors* . Office of Environmental Health Hazard Assessment, California EPA. May 2005. If one or more adjusted cPAH constituents were reported as Non-Detect, half of the reporting limt was used in calculations.

[3]Diesel and Heavy Oil (Lube) analyzed by method NWTPH-D Extended.

[4]Gasoline analyzed by method NWTPH-G.

[5]TPH = Total petroleum hydrocarbons. Total TPH calculated by summing the concentrations of gasoline, diesel and heavy oil. For results which did not exceed method reporting limits, half of the reporting limit was added to determine Total TPH.

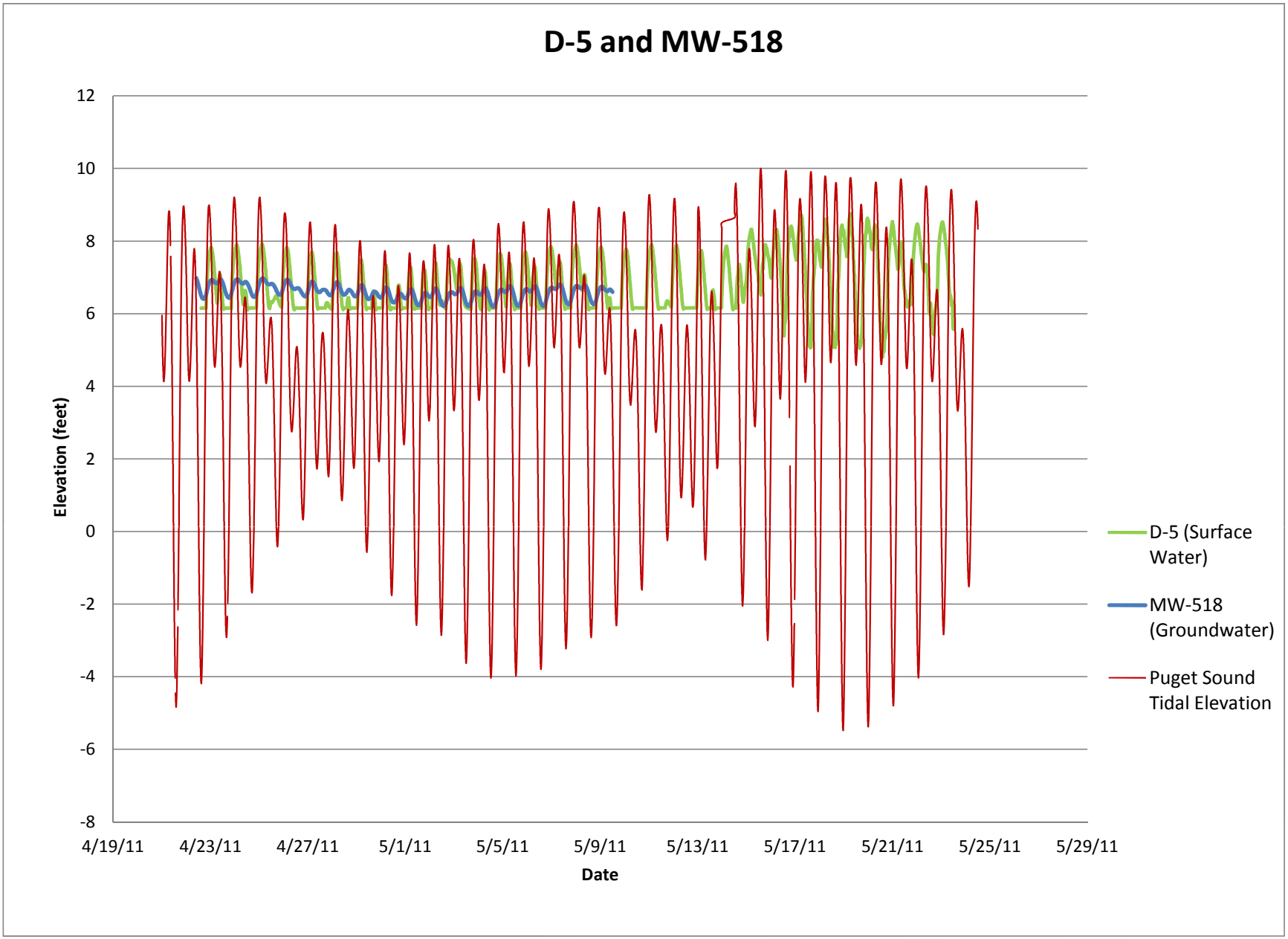
(µg/L) = micrograms per liter.
CUL = Cleanup level.
EPA = Environmental Protection Agency.
* = Denotes Point of Compliance (POC) wells.
[ ] = Bracketed data indicate duplicate samples.
Highlighted cell = Exceeds site specific CUL.
Bold values indicate the most recent sampling event.
NA = Not Analyzed.

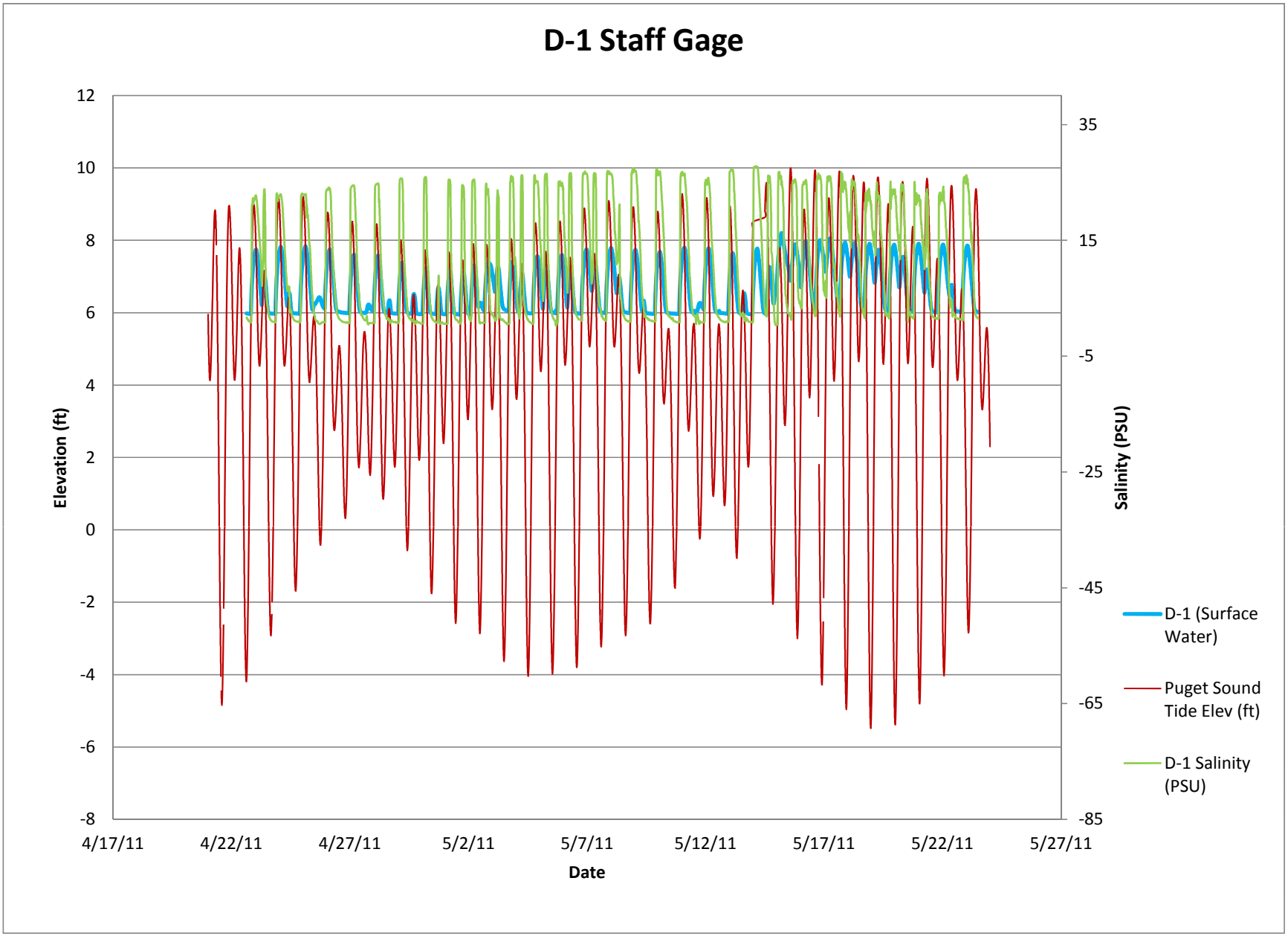
Lab Qualifiers	Definition
D	Compound quantitated using a secondary dilution.
J	Indicates an estimated value.
JX	Results in the diesel organic range are primarily due to overlap from a gasoline range product.
JZ	Detected hydrocarbons in the gasoline range appear to be due to overlap of diesel range hydrocarbons.
U	The compound was analyzed for but not detected. The associated value is the compound quantitation
UJ	The compound was analyzed for but not detected. The associated value is the estimated compound
UU	The constituents making up the total are all non-detects.
W	Due to excessive foaming of the sample, normal reporting limits were not attained.
XX	Sample was collected as part of a matrix spike/ matrix spike duplicate (MS/MSD). Anomolous detection of HO was re-analyzed. The sample extract was re-injected and confirmed the reported results. The sample was re-extracted past the method hold time. Results from the re-extraction are N.D. (<MDL) for both DRO and HO. Since the hold time had expired prior to the re-extraction, all reported data is taken from the original extraction.

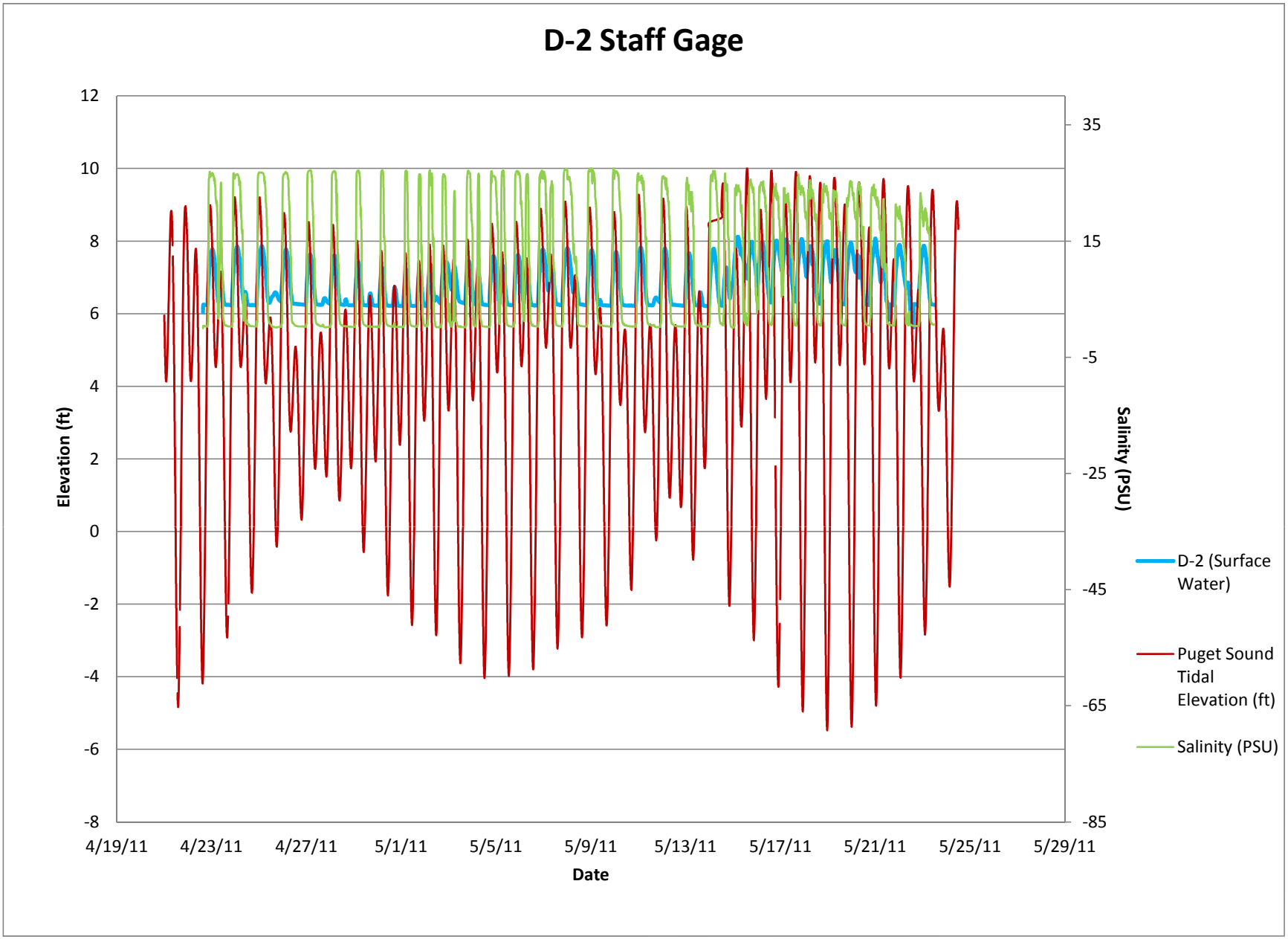
ARCADIS

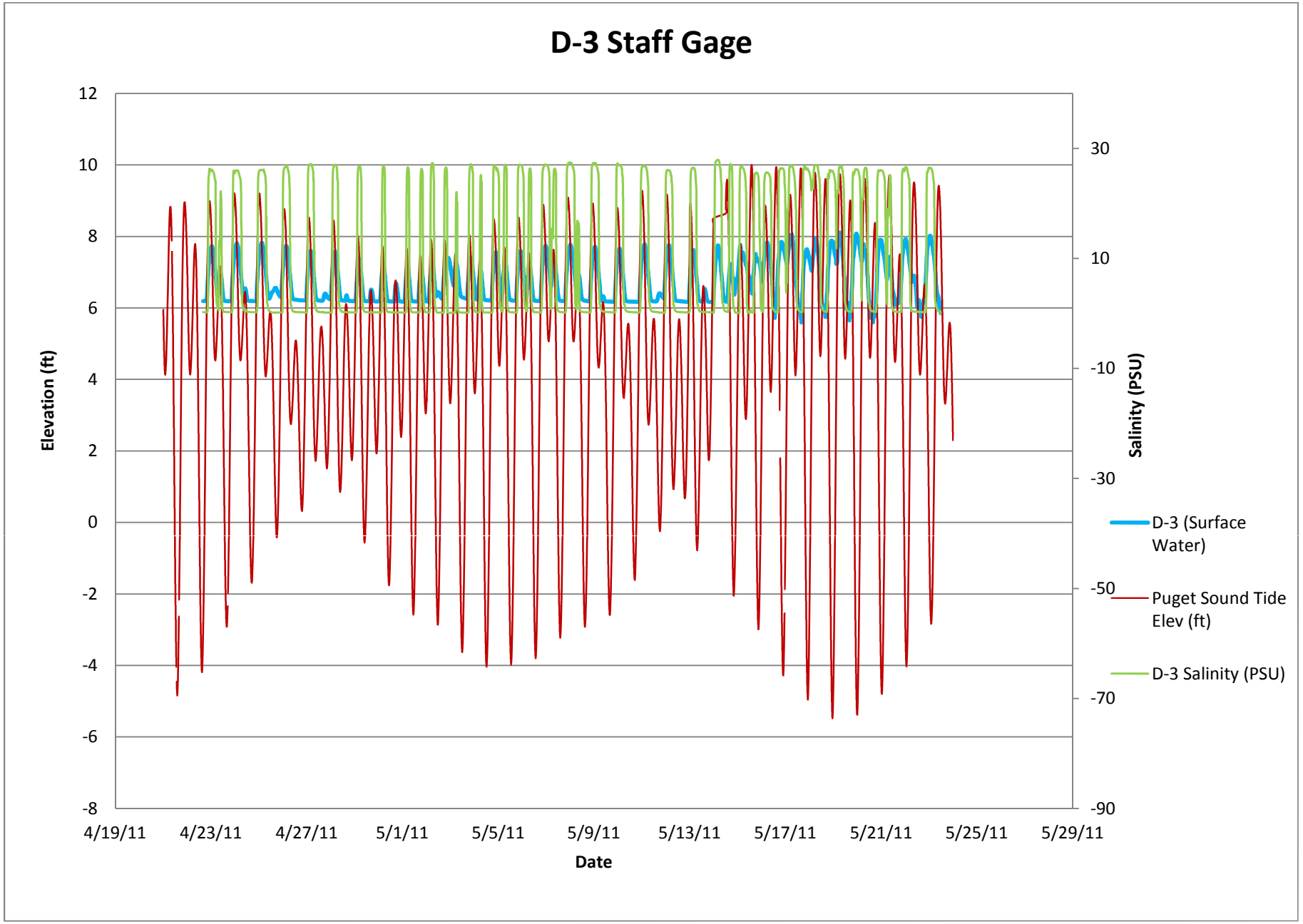
Appendix B

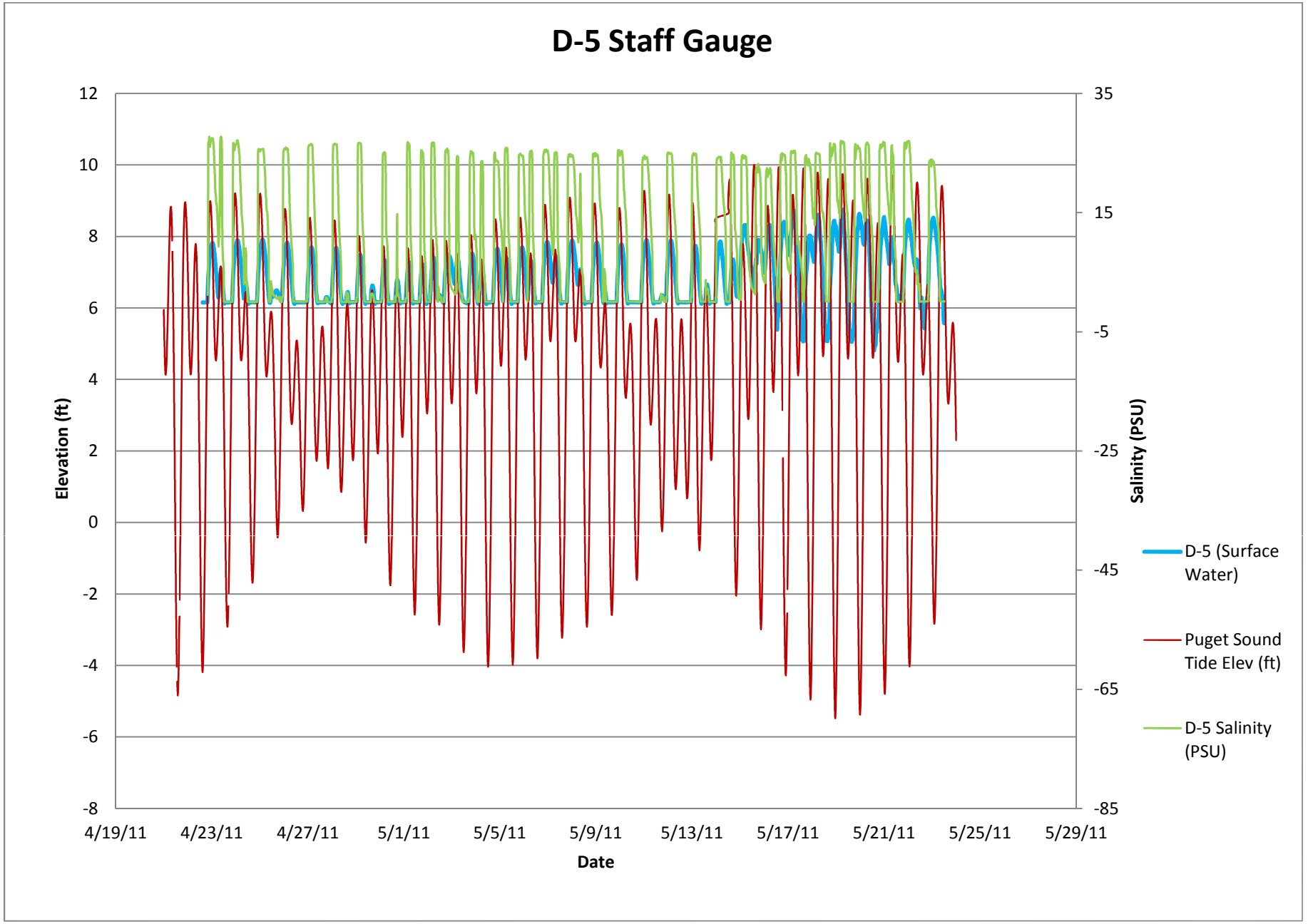
Tidal Study Analysis

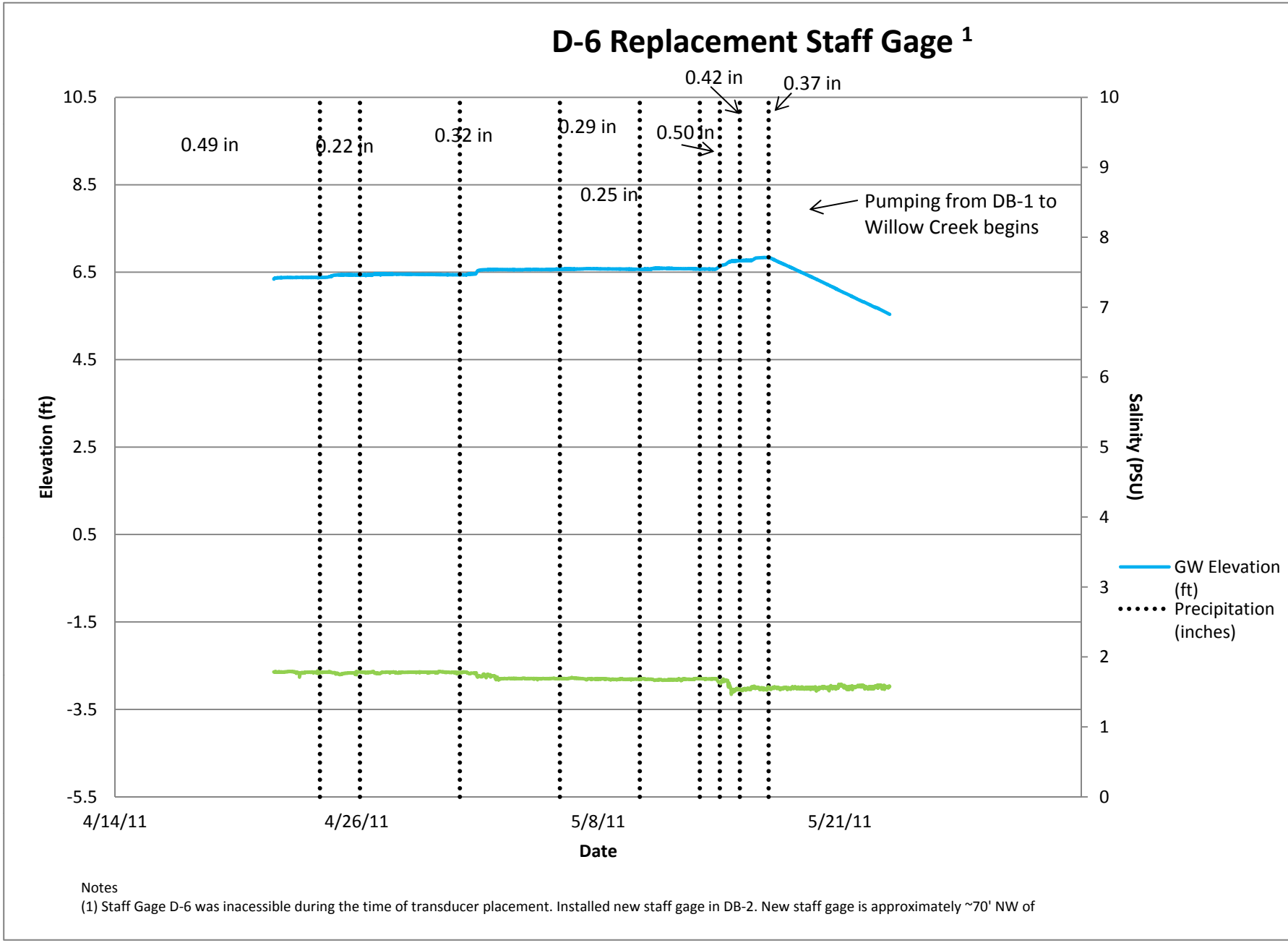

D-5 and MW-518
12
10
8
6
4
2
0
-2
-4
-6
-8
Elevation (feet)
4/19/11
4/23/11
4/27/11
5/1/11
5/5/11
5/9/11
5/13/11
5/17/11
5/21/11
5/25/11
5/29/11
Date
D-5 (Surface Water)
MW-518 (Groundwater)
Puget Sound Tidal Elevation


D-1 Staff Gage
12
10
8
6
4
2
0
-2
-4
-6
-8
Elevation (ft)
35
15
-5
-25
-45
-65
-85
Salinity (PSU)
4/17/11
4/22/11
4/27/11
5/2/11
5/7/11
5/12/11
5/17/11
5/22/11
5/27/11
Date
D-1 (Surface Water)
Puget Sound Tide Elev (ft)
D-1 Salinity (PSU)


D-2 Staff Gage
12
10
8
6
4
2
0
-2
-4
-6
-8
Elevation (ft)
35
15
-5
-25
-45
-65
-85
Salinity (PSU)
4/19/11
4/23/11
4/27/11
5/1/11
5/5/11
5/9/11
5/13/11
5/17/11
5/21/11
5/25/11
5/29/11
Date
D-2 (Surface Water)
Puget Sound Tidal Elevation (ft)
Salinity (PSU)

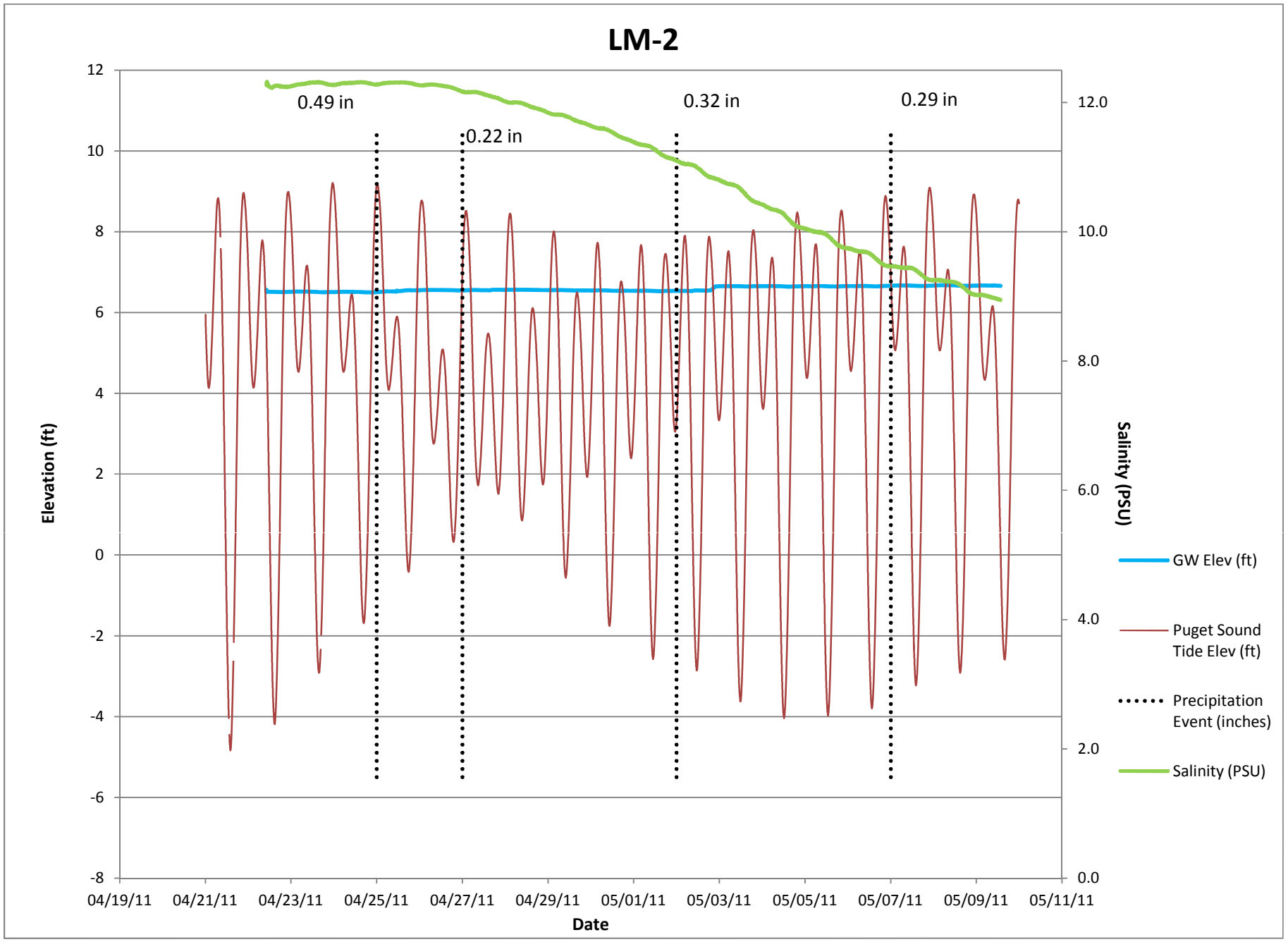

D-3 Staff Gage
Elevation (ft)
12
10
8
6
4
2
0
-2
-4
-6
-8
Salinity (PSU)
30
10
-10
-30
-50
-70
-90
4/19/11
4/23/11
4/27/11
5/1/11
5/5/11
5/9/11
5/13/11
5/17/11
5/21/11
5/25/11
5/29/11
Date
D-3 (Surface Water)
Puget Sound Tide Elev (ft)
D-3 Salinity (PSU)

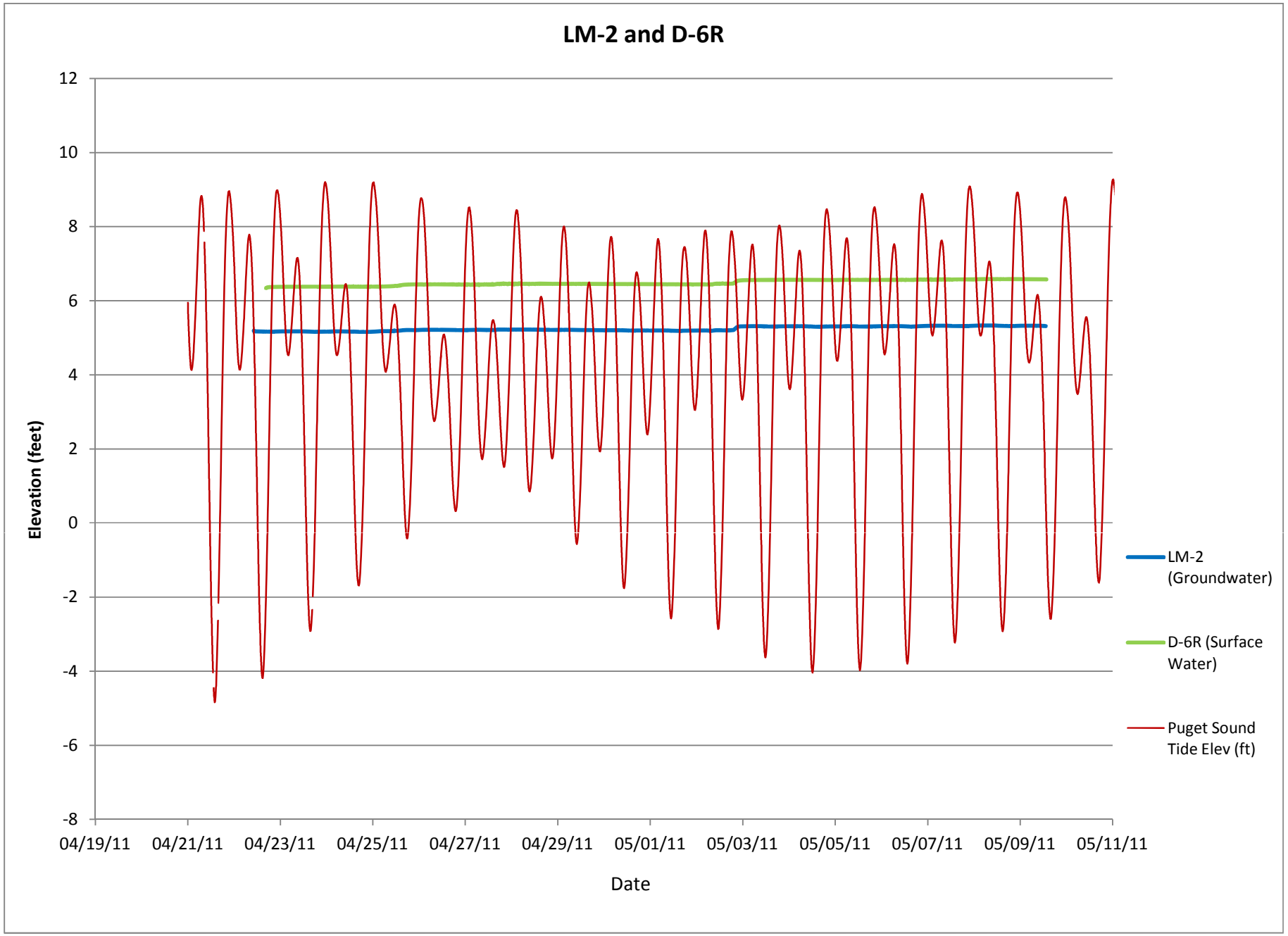

D-5 Staff Gauge
Elevation (ft)
12
10
8
6
4
2
0
-2
-4
-6
-8
Salinity (PSU)
35
15
-5
-25
-45
-65
-85
4/19/11
4/23/11
4/27/11
5/1/11
5/5/11
5/9/11
5/13/11
5/17/11
5/21/11
5/25/11
5/29/11
Date
D-5 (Surface Water)
Puget Sound Tide Elev (ft)
D-5 Salinity (PSU)

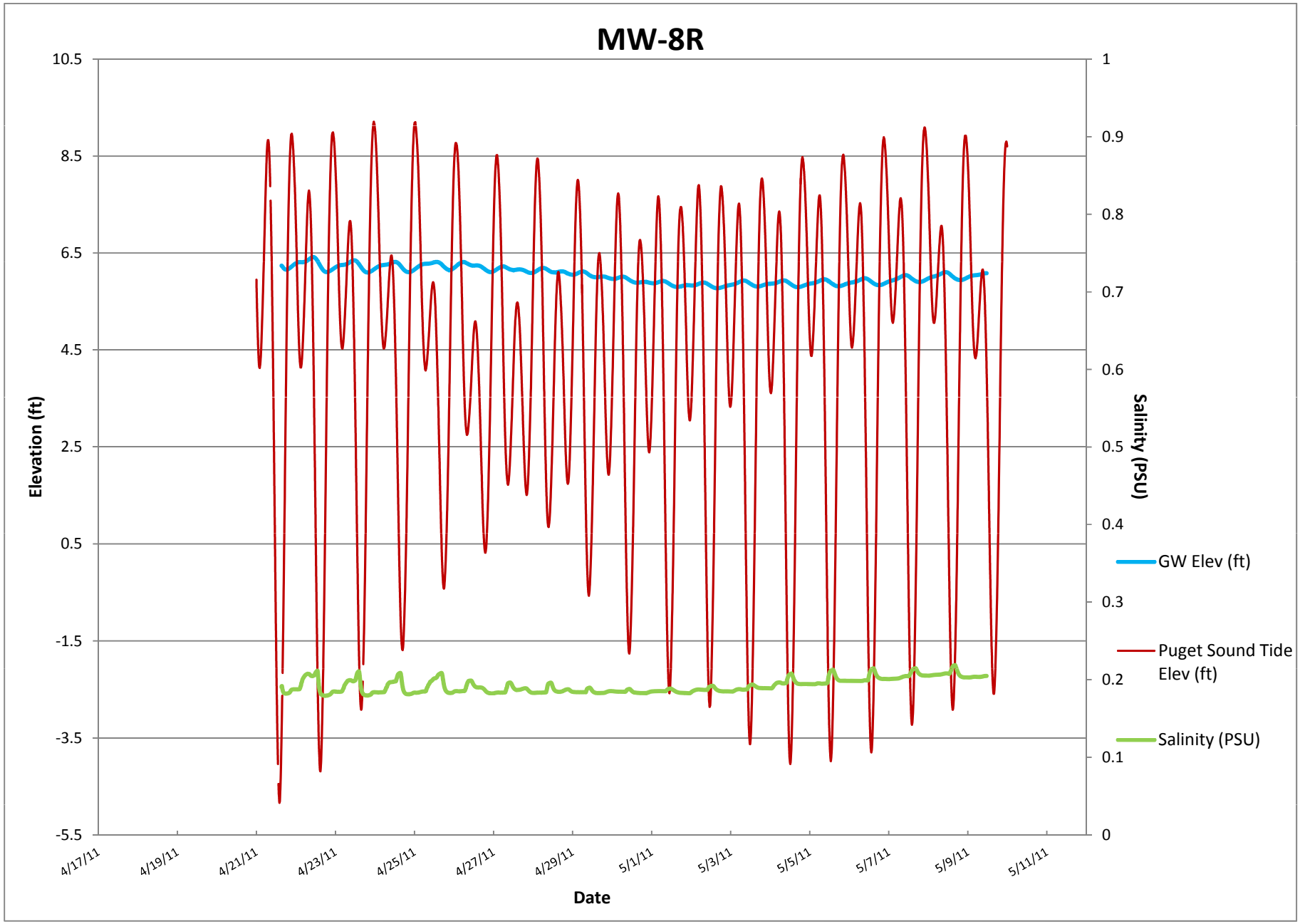


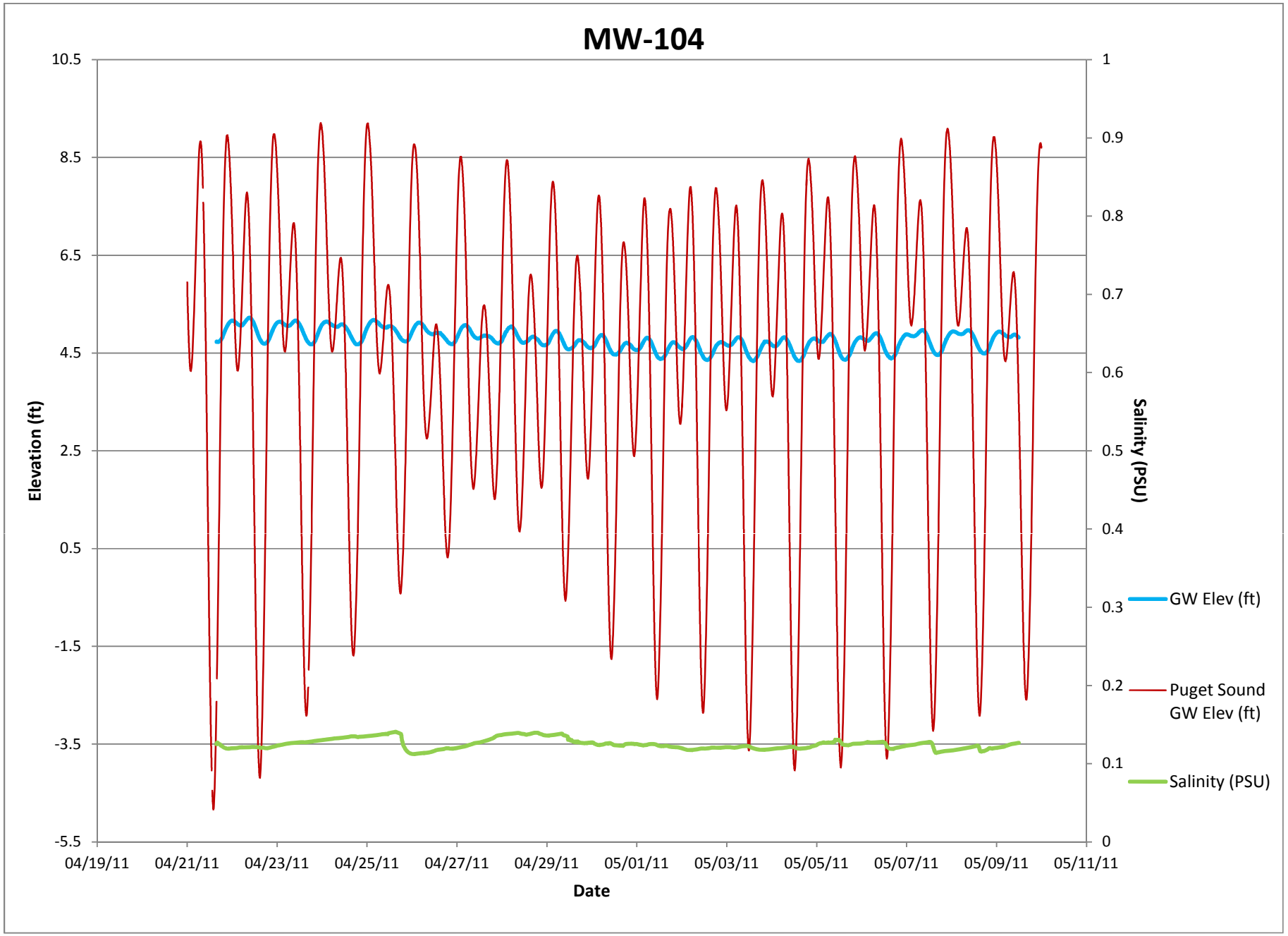
Notes

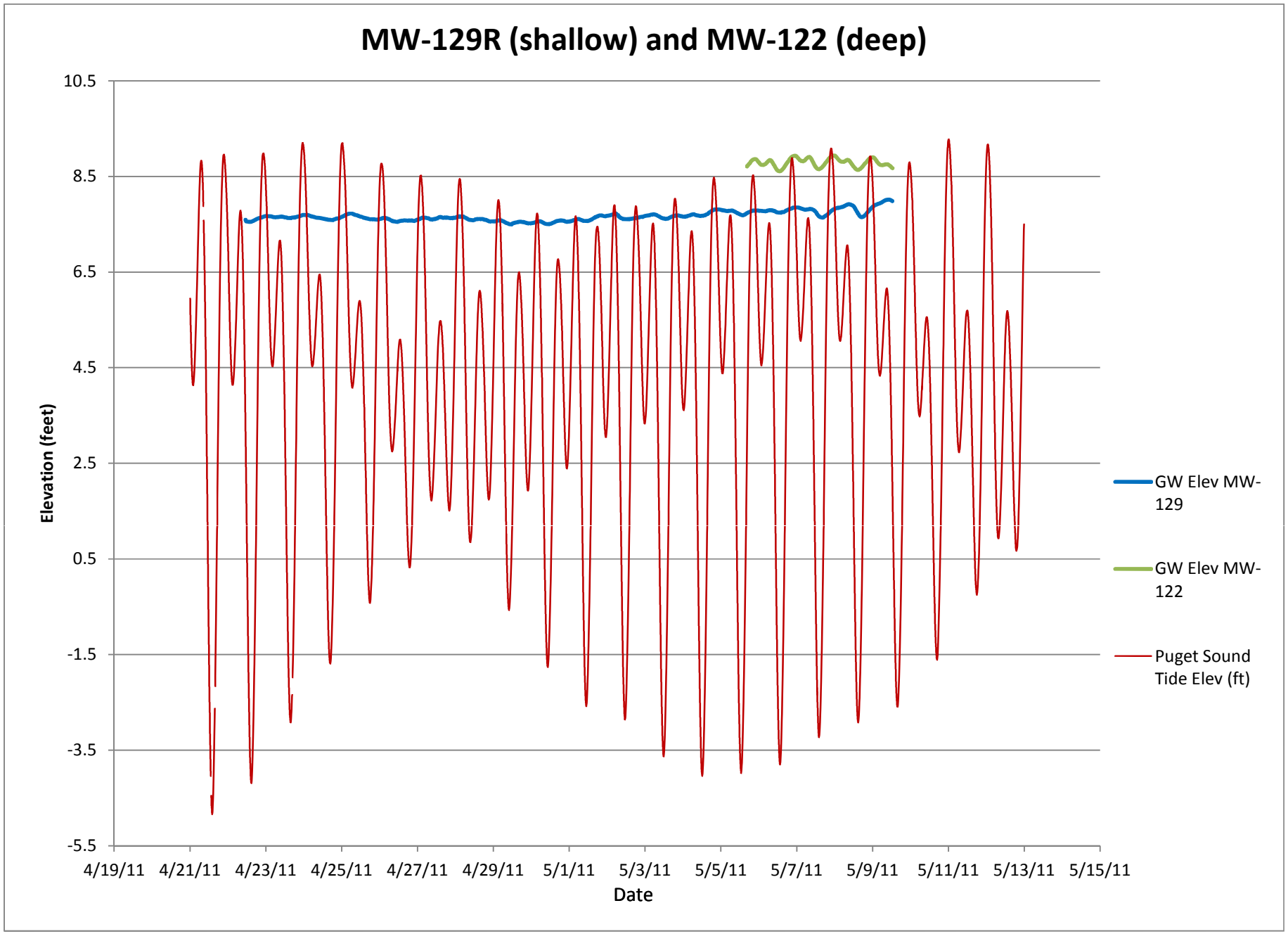
(1) Staff Gage D-6 was inacessible during the time of transducer placement. Installed new staff gage in DB-2. New staff gage is approximately ~70' NW of

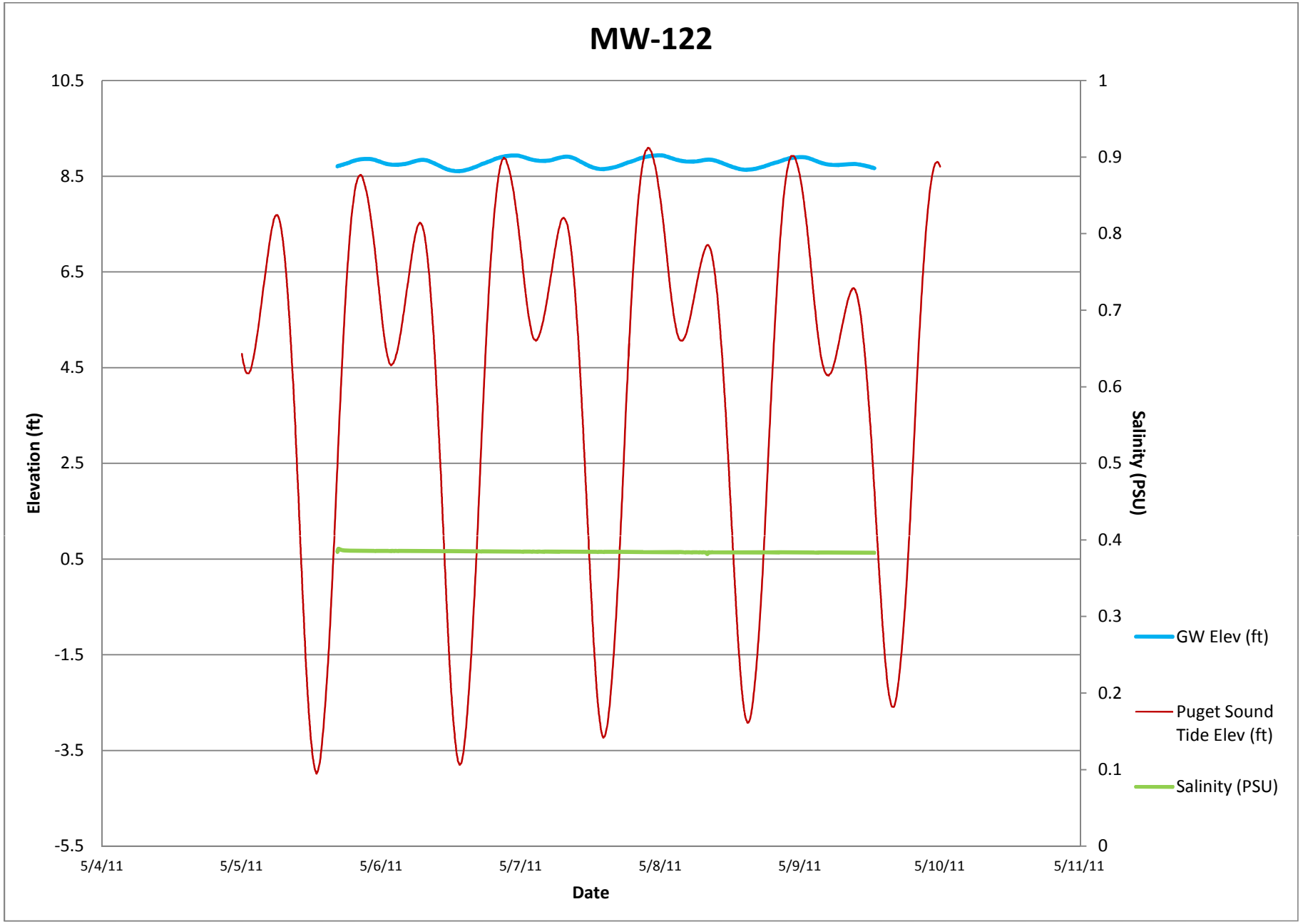

LM-2
0.49 in
0.22 in
0.32 in
0.29 in
Elevation (ft)
Salinity (PSU)
Date
12
10
8
6
4
2
0
-2
-4
-6
-8
12.0
10.0
8.0
6.0
4.0
2.0
0.0
04/19/11
04/21/11
04/23/11
04/25/11
04/27/11
04/29/11
05/01/11
05/03/11
05/05/11
05/07/11
05/09/11
05/11/11
GW Elev (ft)
Puget Sound Tide Elev (ft)
Precipitation Event (inches)
Salinity (PSU)

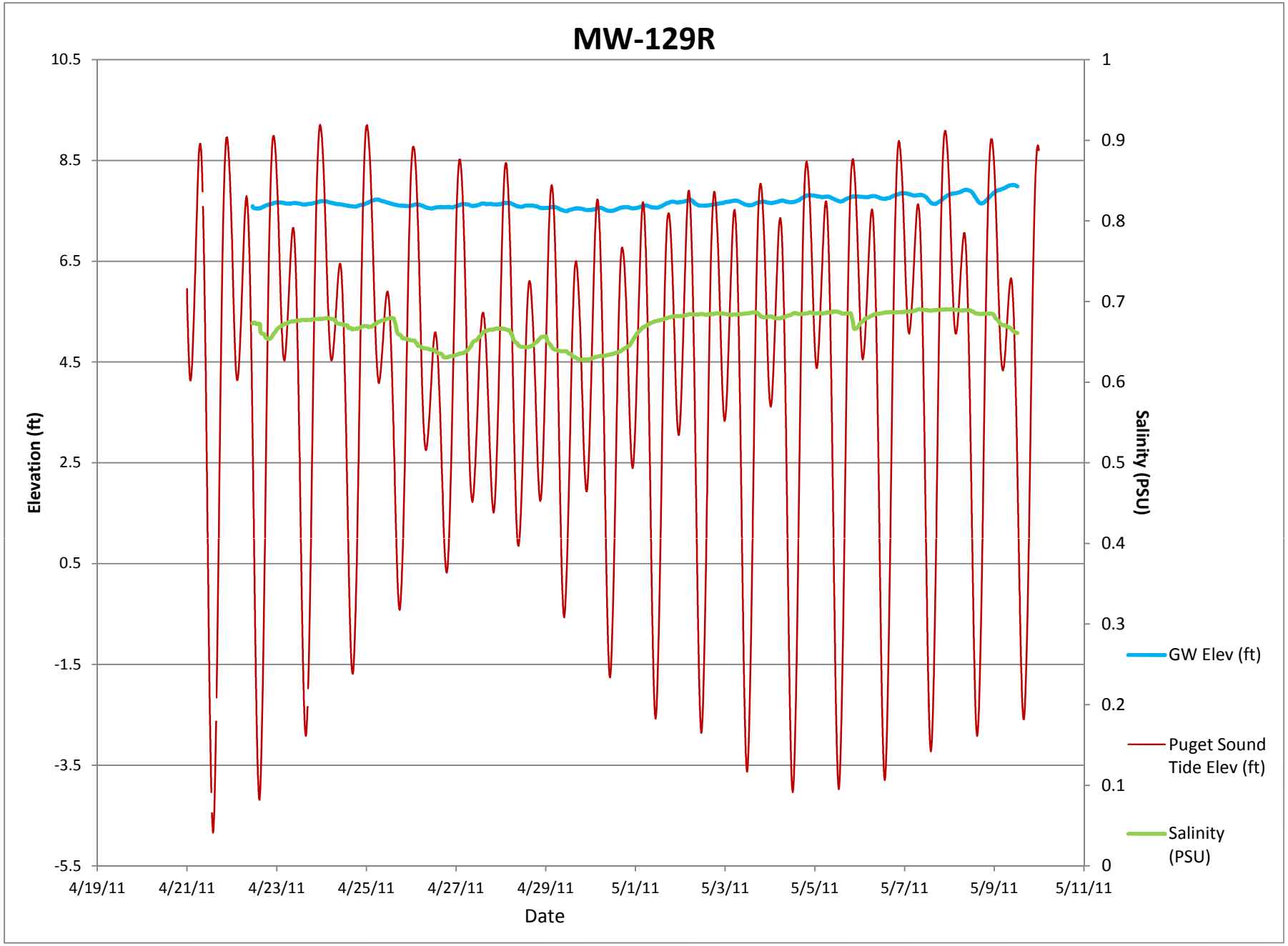

LM-2 and D-6R
12
10
8
6
4
2
0
-2
-4
-6
-8
Elevation (feet)
04/19/11
04/21/11
04/23/11
04/25/11
04/27/11
04/29/11
05/01/11
05/03/11
05/05/11
05/07/11
05/09/11
05/11/11
Date
LM-2 (Groundwater)
D-6R (Surface Water)
Puget Sound Tide Elev (ft)

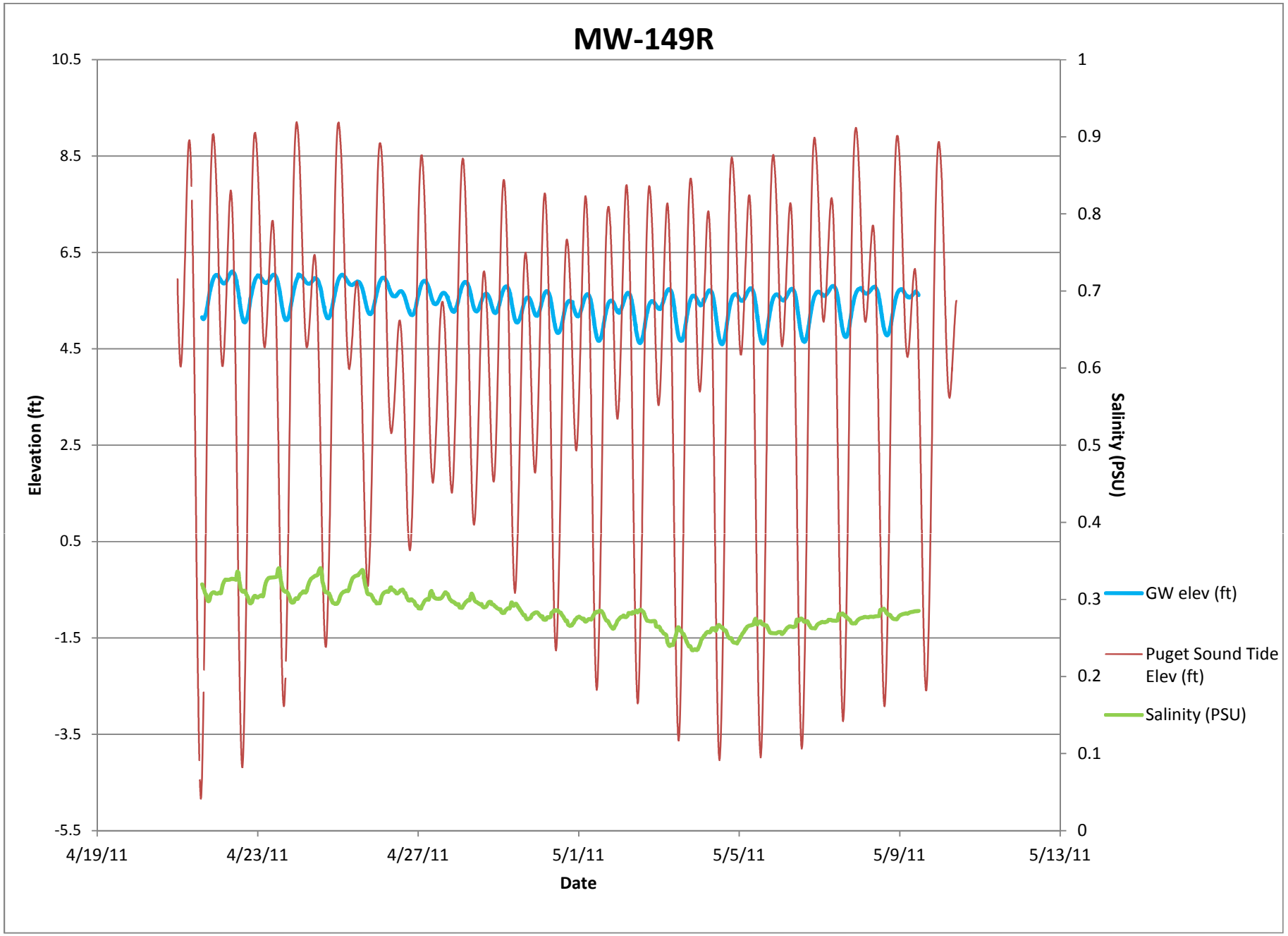

MW-8R
Elevation (ft)
10.5
8.5
6.5
4.5
2.5
0.5
-1.5
-3.5
-5.5
Salinity (PSU)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
4/17/11
4/19/11
4/21/11
4/23/11
4/25/11
4/27/11
4/29/11
5/1/11
5/3/11
5/5/11
5/7/11
5/9/11
5/11/11
Date
GW Elev (ft)
Puget Sound Tide Elev (ft)
Salinity (PSU)

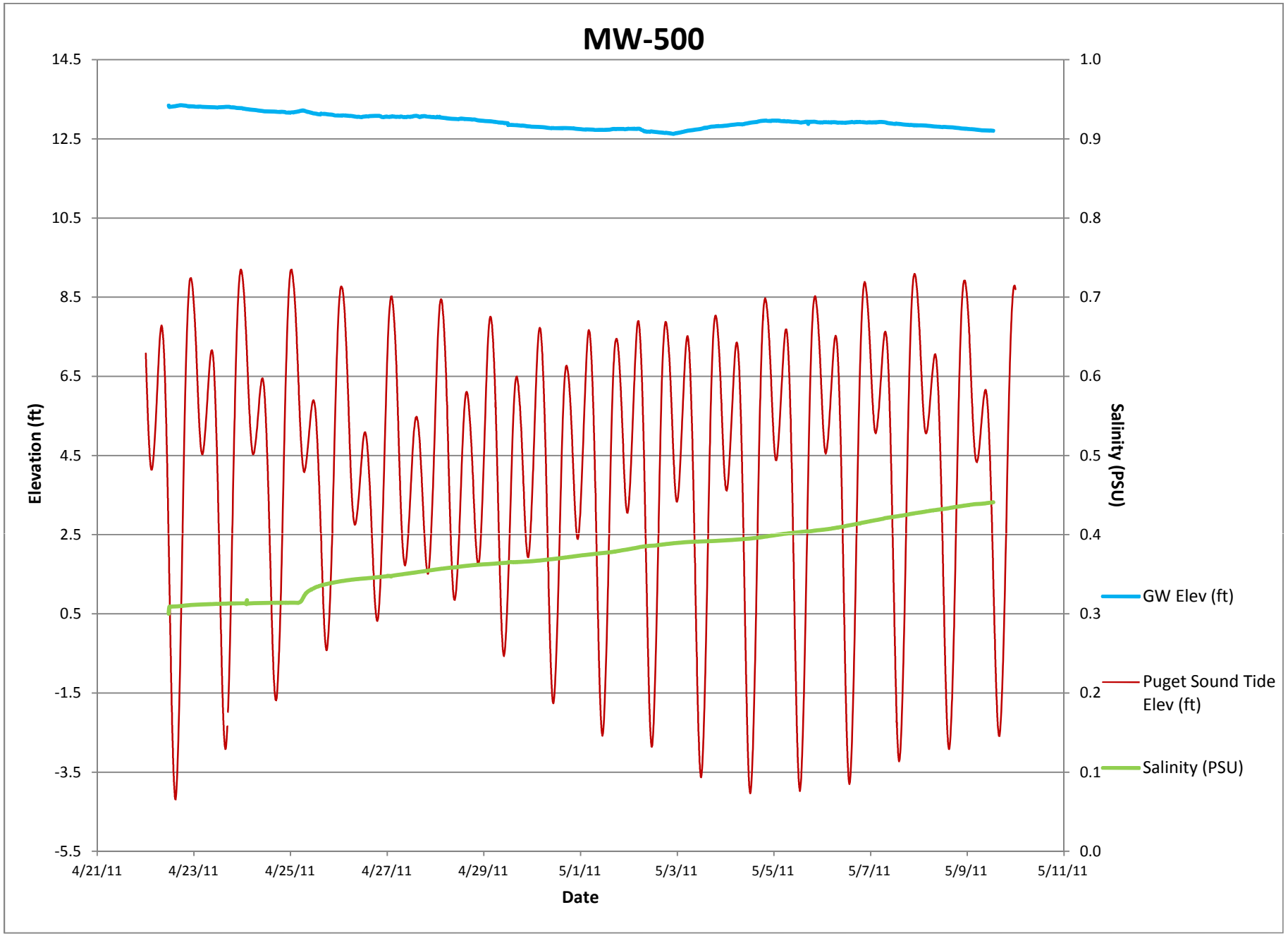

MW-104
Elevation (ft)
10.5
8.5
6.5
4.5
2.5
0.5
-1.5
-3.5
-5.5
Salinity (PSU)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
04/19/11
04/21/11
04/23/11
04/25/11
04/27/11
04/29/11
05/01/11
05/03/11
05/05/11
05/07/11
05/09/11
05/11/11
Date
GW Elev (ft)
Puget Sound GW Elev (ft)
Salinity (PSU)

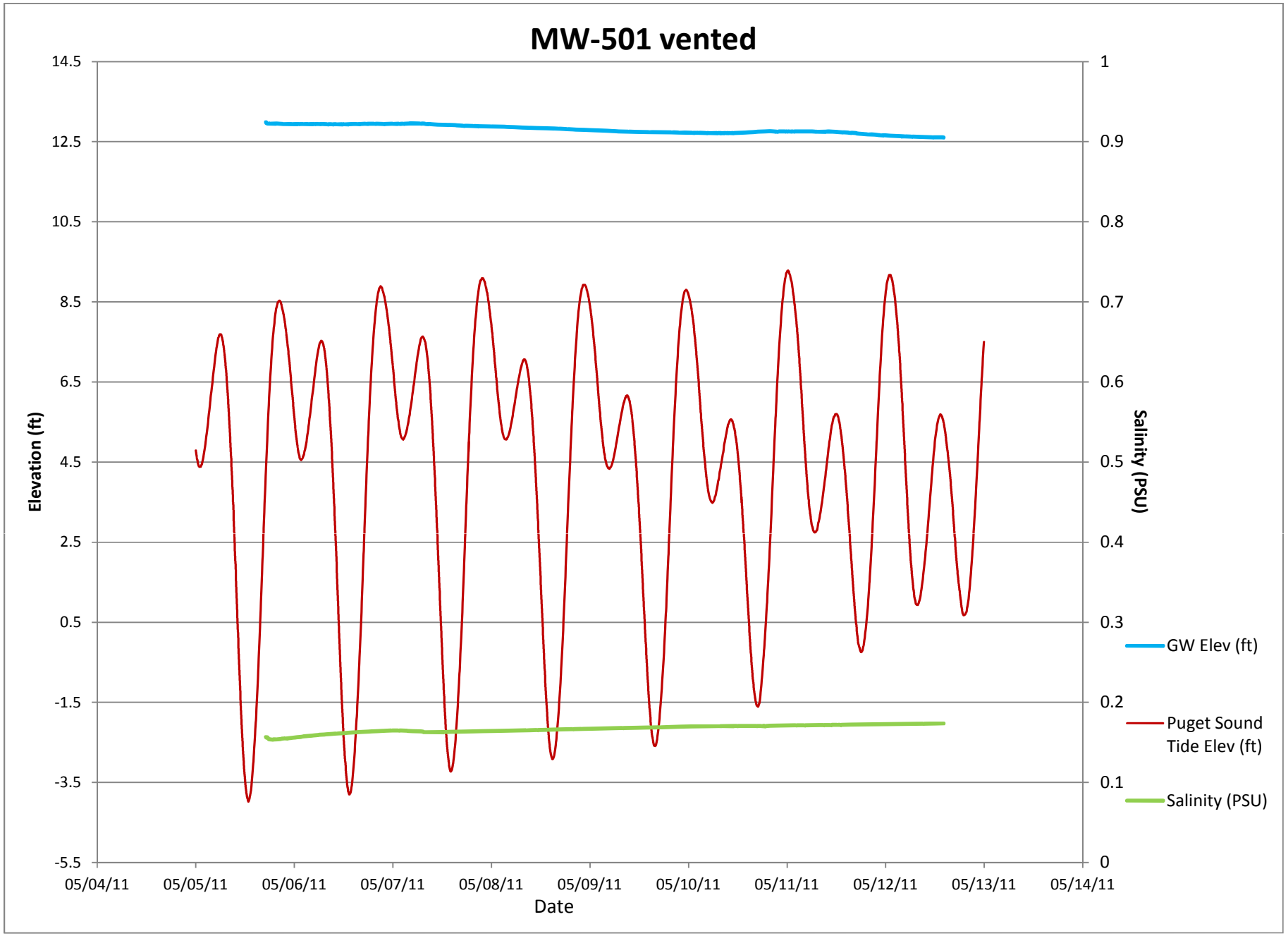

MW-129R (shallow) and MW-122 (deep)
10.5
8.5
6.5
4.5
2.5
0.5
-1.5
-3.5
-5.5
Elevation (feet)
4/19/11
4/21/11
4/23/11
4/25/11
4/27/11
4/29/11
5/1/11
5/3/11
5/5/11
5/7/11
5/9/11
5/11/11
5/13/11
5/15/11
Date
GW Elev MW-129
GW Elev MW-122
Puget Sound Tide Elev (ft)

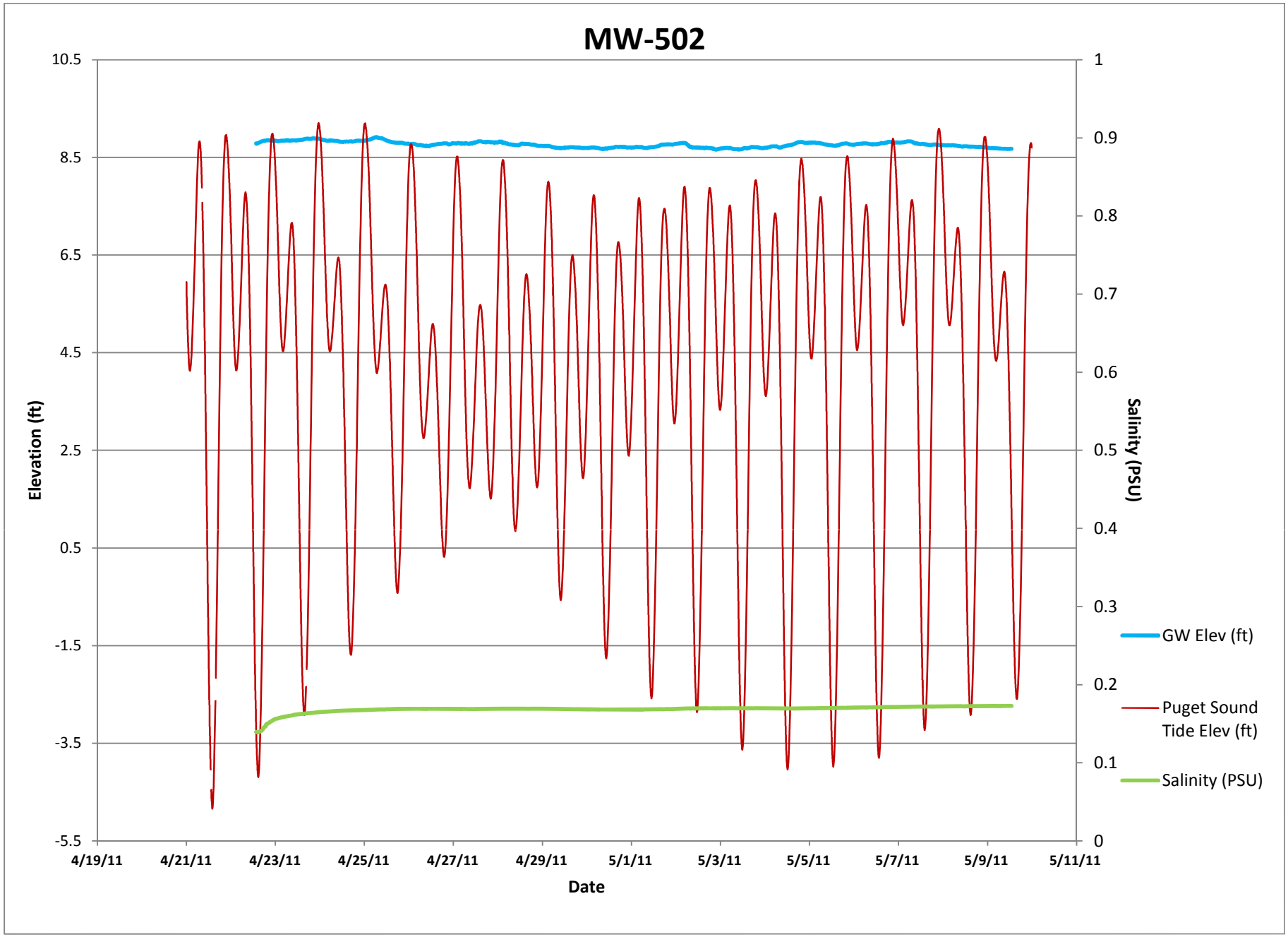

MW-122
10.5
8.5
6.5
4.5
2.5
0.5
-1.5
-3.5
-5.5
Elevation (ft)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Salinity (PSU)
5/4/11
5/5/11
5/6/11
5/7/11
5/8/11
5/9/11
5/10/11
5/11/11
Date
GW Elev (ft)
Puget Sound Tide Elev (ft)
Salinity (PSU)

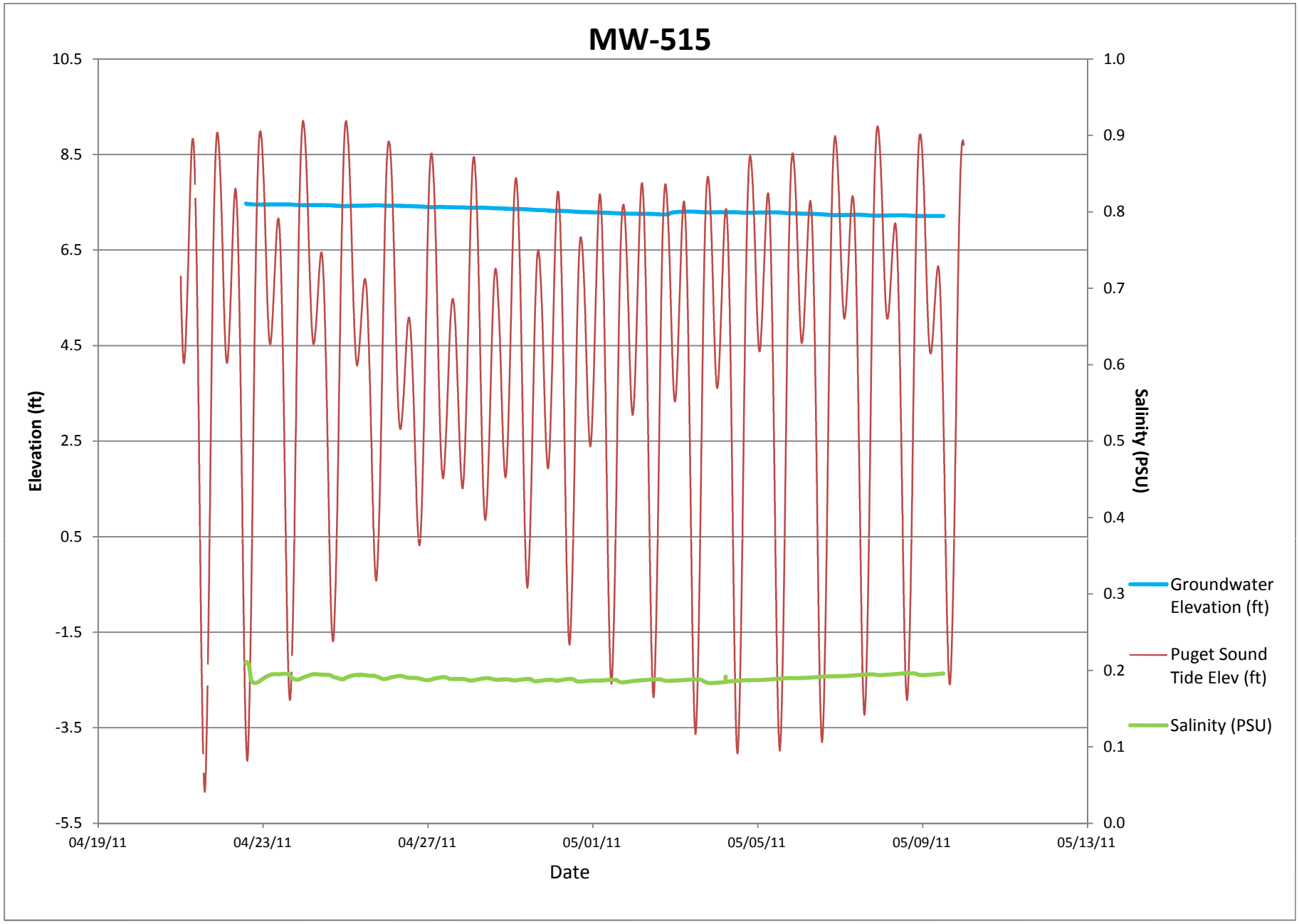

MW-129R
Elevation (ft)
10.5
8.5
6.5
4.5
2.5
0.5
-1.5
-3.5
-5.5
Salinity (PSU)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
4/19/11
4/21/11
4/23/11
4/25/11
4/27/11
4/29/11
5/1/11
5/3/11
5/5/11
5/7/11
5/9/11
5/11/11
Date
GW Elev (ft)
Puget Sound Tide Elev (ft)
Salinity (PSU)

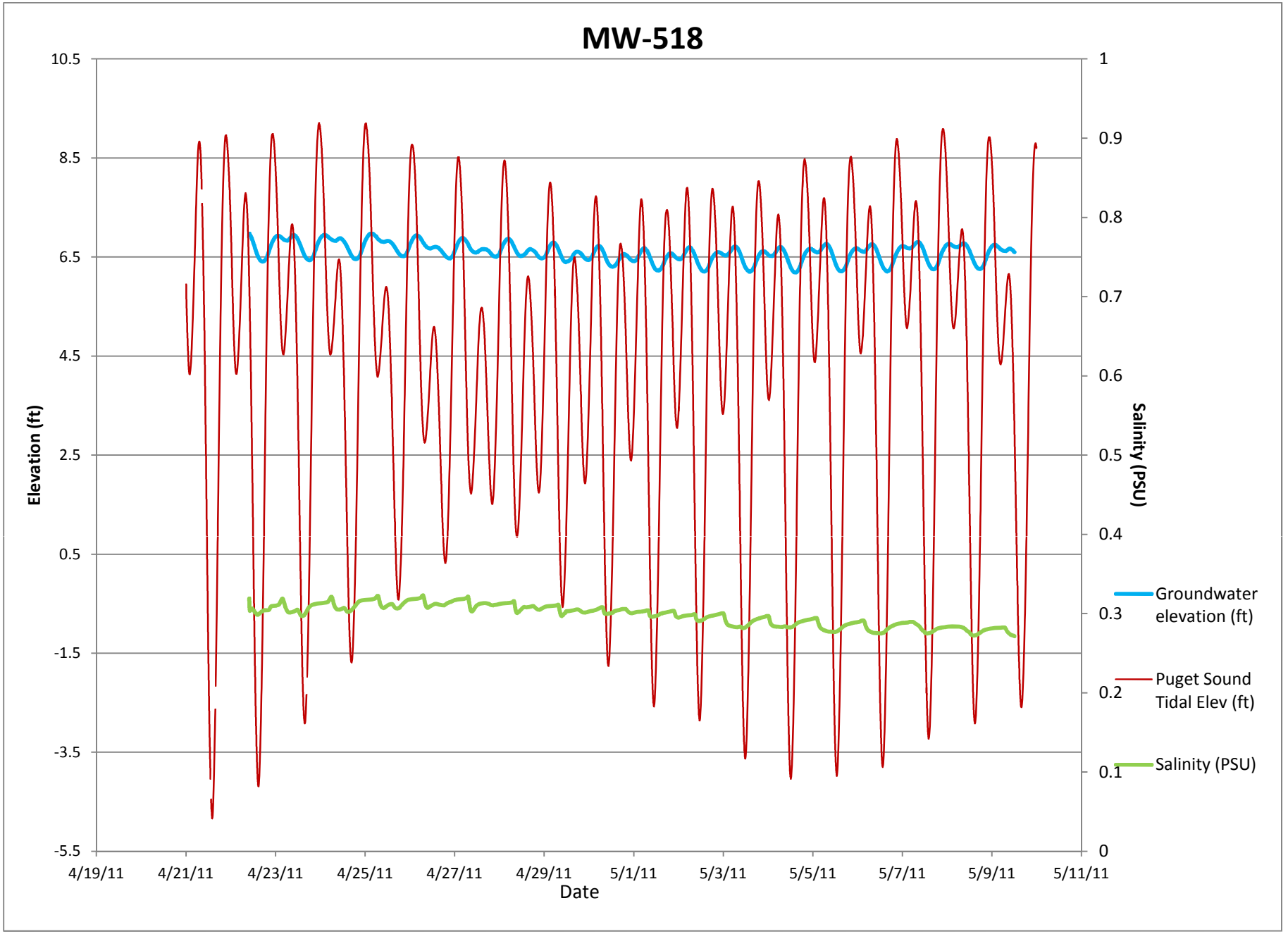

MW-149R
10.5
8.5
6.5
4.5
2.5
0.5
-1.5
-3.5
-5.5
Elevation (ft)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Salinity (PSU)
4/19/11
4/23/11
4/27/11
5/1/11
5/5/11
5/9/11
5/13/11
Date
GW elev (ft)
Puget Sound Tide Elev (ft)
Salinity (PSU)

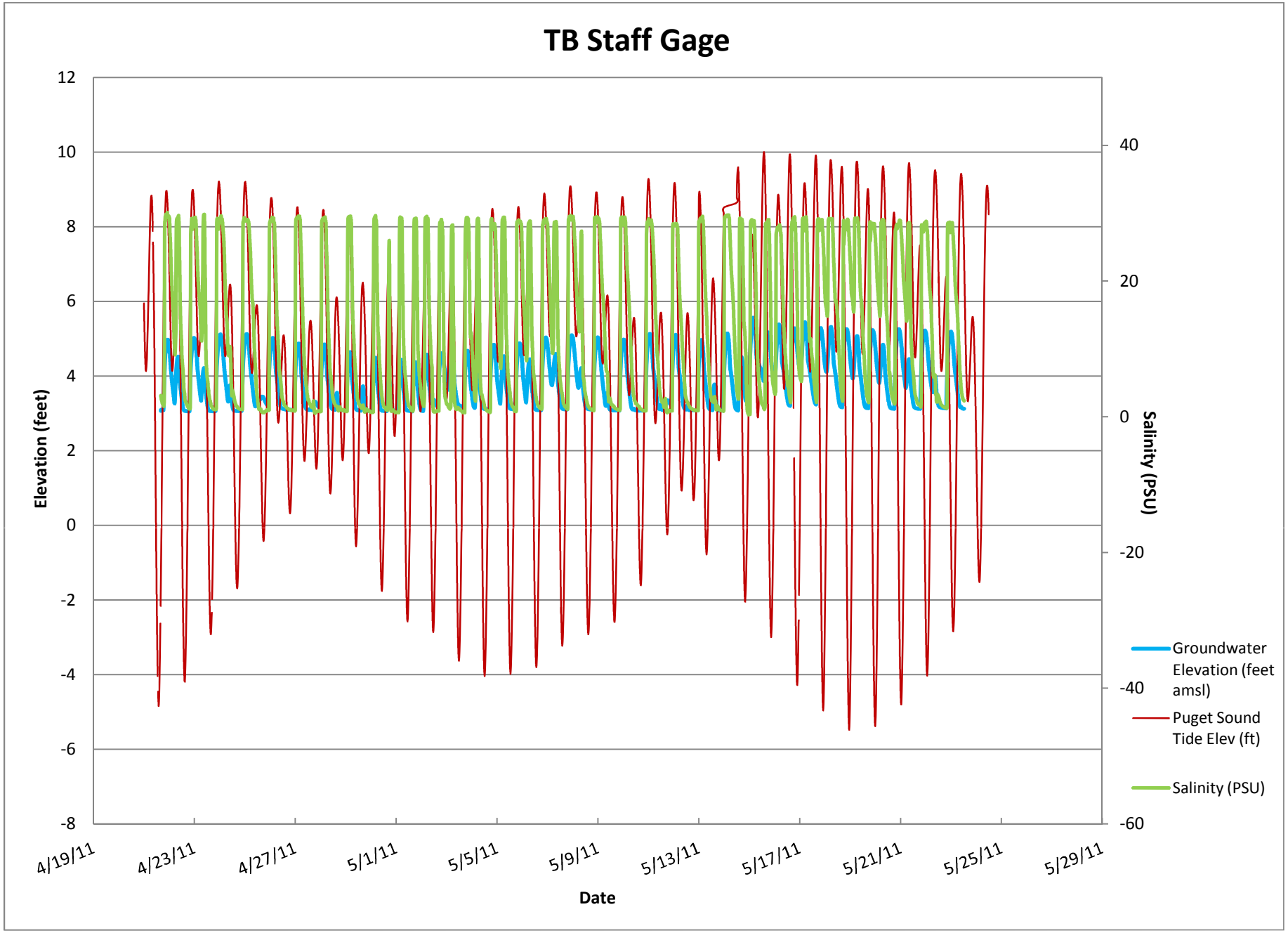

MW-500
14.5
12.5
10.5
8.5
6.5
4.5
2.5
0.5
-1.5
-3.5
-5.5
Elevation (ft)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Salinity (PSU)
4/21/11
4/23/11
4/25/11
4/27/11
4/29/11
5/1/11
5/3/11
5/5/11
5/7/11
5/9/11
5/11/11
Date
GW Elev (ft)
Puget Sound Tide Elev (ft)
Salinity (PSU)

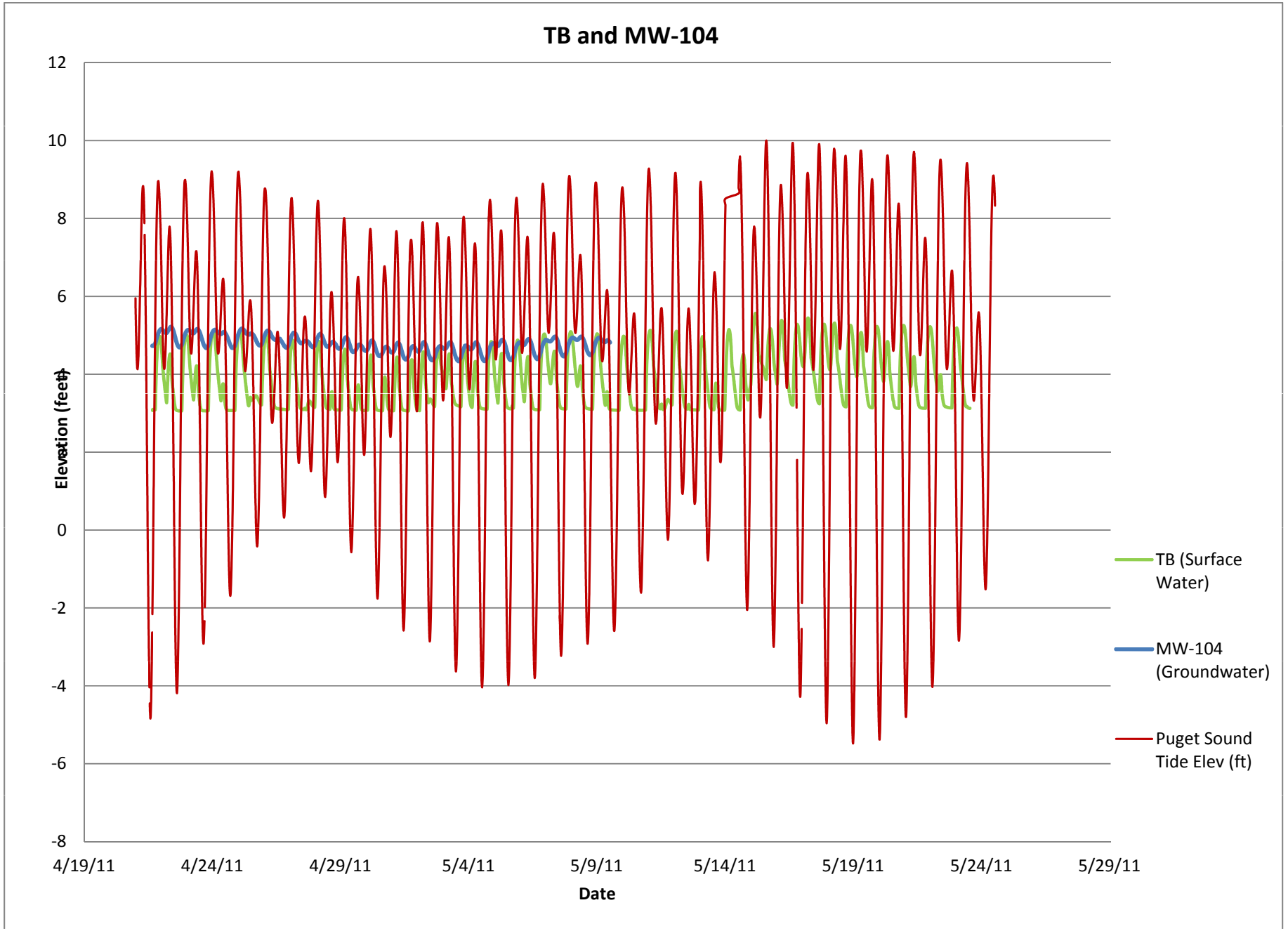

MW-501 vented
14.5
12.5
10.5
8.5
6.5
4.5
2.5
0.5
-1.5
-3.5
-5.5
Elevation (ft)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Salinity (PSU)
05/04/11
05/05/11
05/06/11
05/07/11
05/08/11
05/09/11
05/10/11
05/11/11
05/12/11
05/13/11
05/14/11
Date
GW Elev (ft)
Puget Sound Tide Elev (ft)
Salinity (PSU)


MW-502
Elevation (ft)
10.5
8.5
6.5
4.5
2.5
0.5
-1.5
-3.5
-5.5
Salinity (PSU)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
4/19/11
4/21/11
4/23/11
4/25/11
4/27/11
4/29/11
5/1/11
5/3/11
5/5/11
5/7/11
5/9/11
5/11/11
Date
GW Elev (ft)
Puget Sound Tide Elev (ft)
Salinity (PSU)


MW-515
10.5
8.5
6.5
4.5
2.5
0.5
-1.5
-3.5
-5.5
Elevation (ft)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
Salinity (PSU)
04/19/11
04/23/11
04/27/11
05/01/11
05/05/11
05/09/11
05/13/11
Date
Groundwater Elevation (ft)
Puget Sound Tide Elev (ft)
Salinity (PSU)


MW-518
10.5
8.5
6.5
4.5
2.5
0.5
-1.5
-3.5
-5.5
Elevation (ft)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Salinity (PSU)
4/19/11
4/21/11
4/23/11
4/25/11
4/27/11
4/29/11
5/1/11
5/3/11
5/5/11
5/7/11
5/9/11
5/11/11
Date
Groundwater elevation (ft)
Puget Sound Tidal Elev (ft)
Salinity (PSU)


TB Staff Gage
Elevation (feet)
Salinity (PSU)
Date
12
10
8
6
4
2
0
-2
-4
-6
-8
40
20
0
-20
-40
-60
4/19/11
4/23/11
4/27/11
5/1/11
5/5/11
5/9/11
5/13/11
5/17/11
5/21/11
5/25/11
5/29/11
Groundwater Elevation (feet amsl)
Puget Sound Tide Elev (ft)
Salinity (PSU)


TB and MW-104
12
10
8
6
4
2
0
-2
-4
-6
-8
Elevation (feet)
4/19/11
4/24/11
4/29/11
5/4/11
5/9/11
5/14/11
5/19/11
5/24/11
5/29/11
Date
TB (Surface Water)
MW-104 (Groundwater)
Puget Sound Tide Elev (ft)

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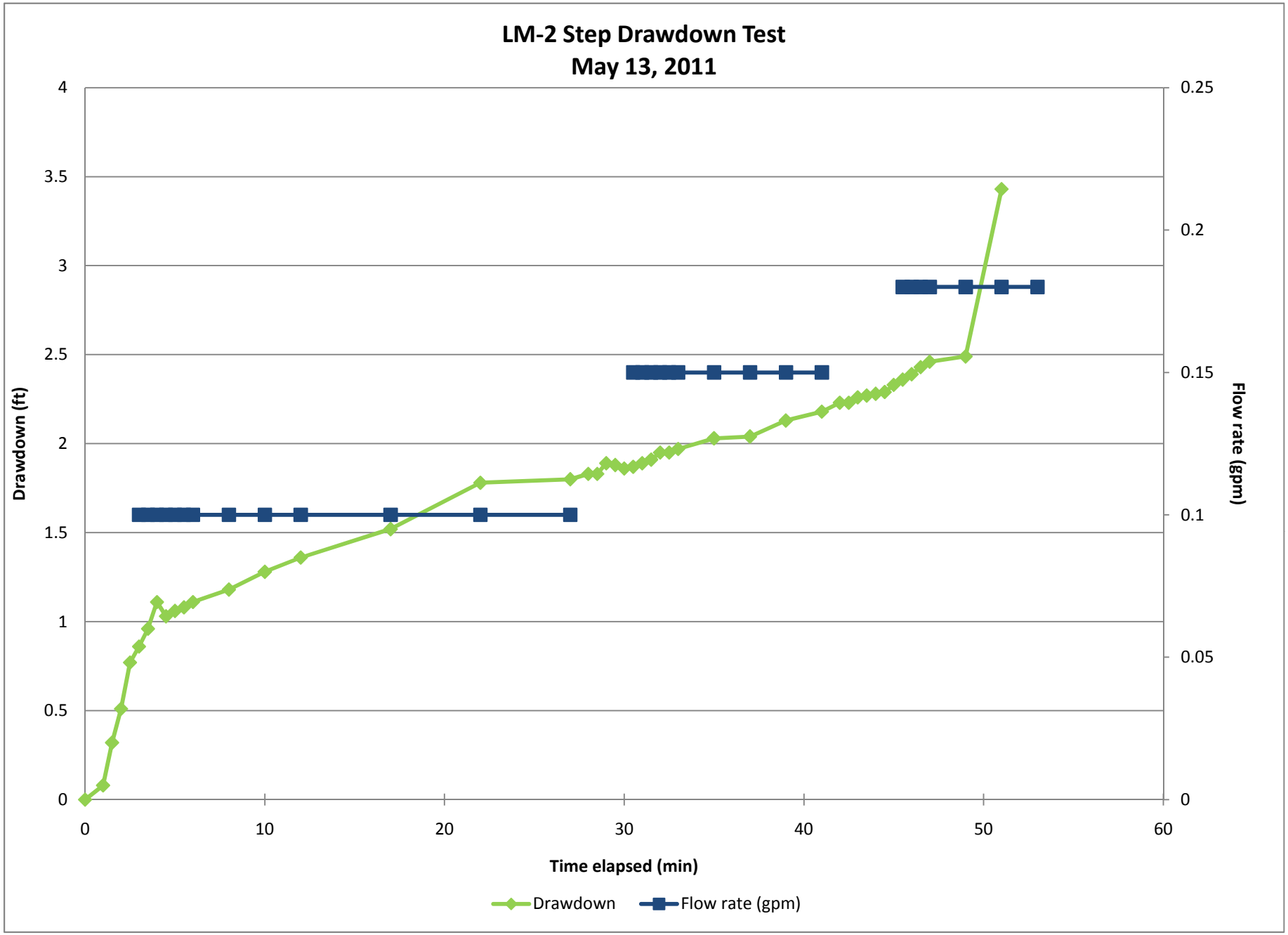
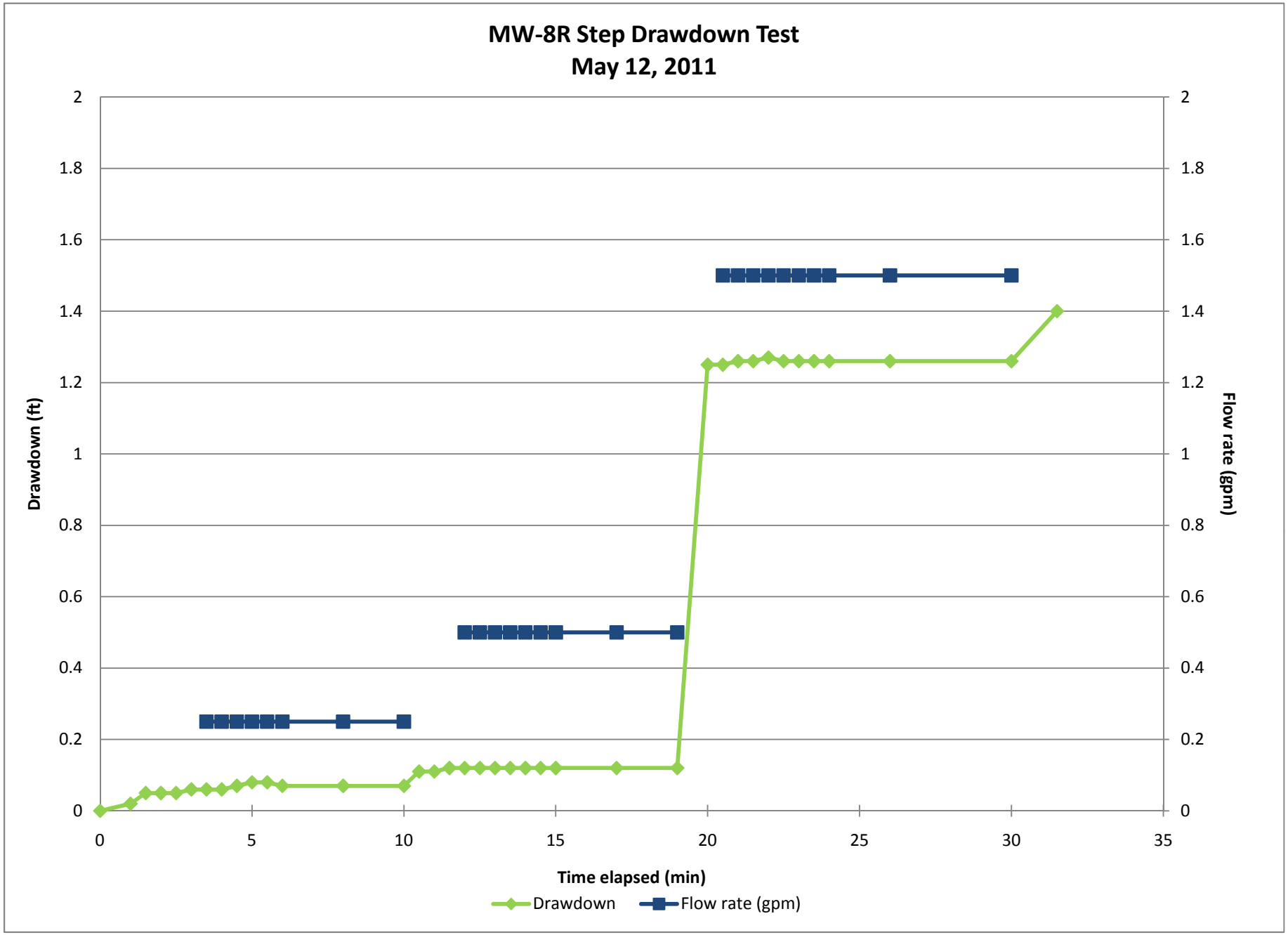
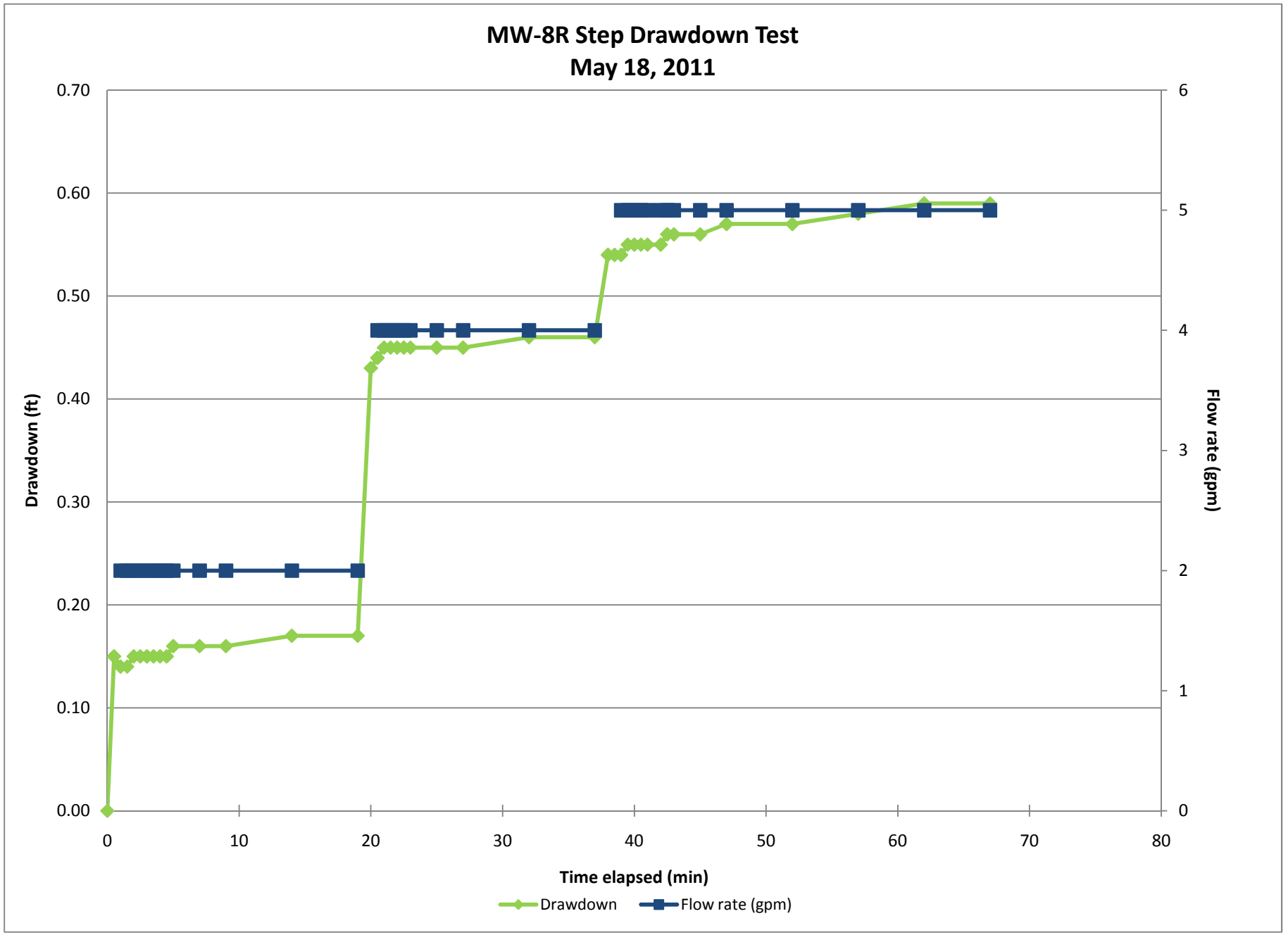
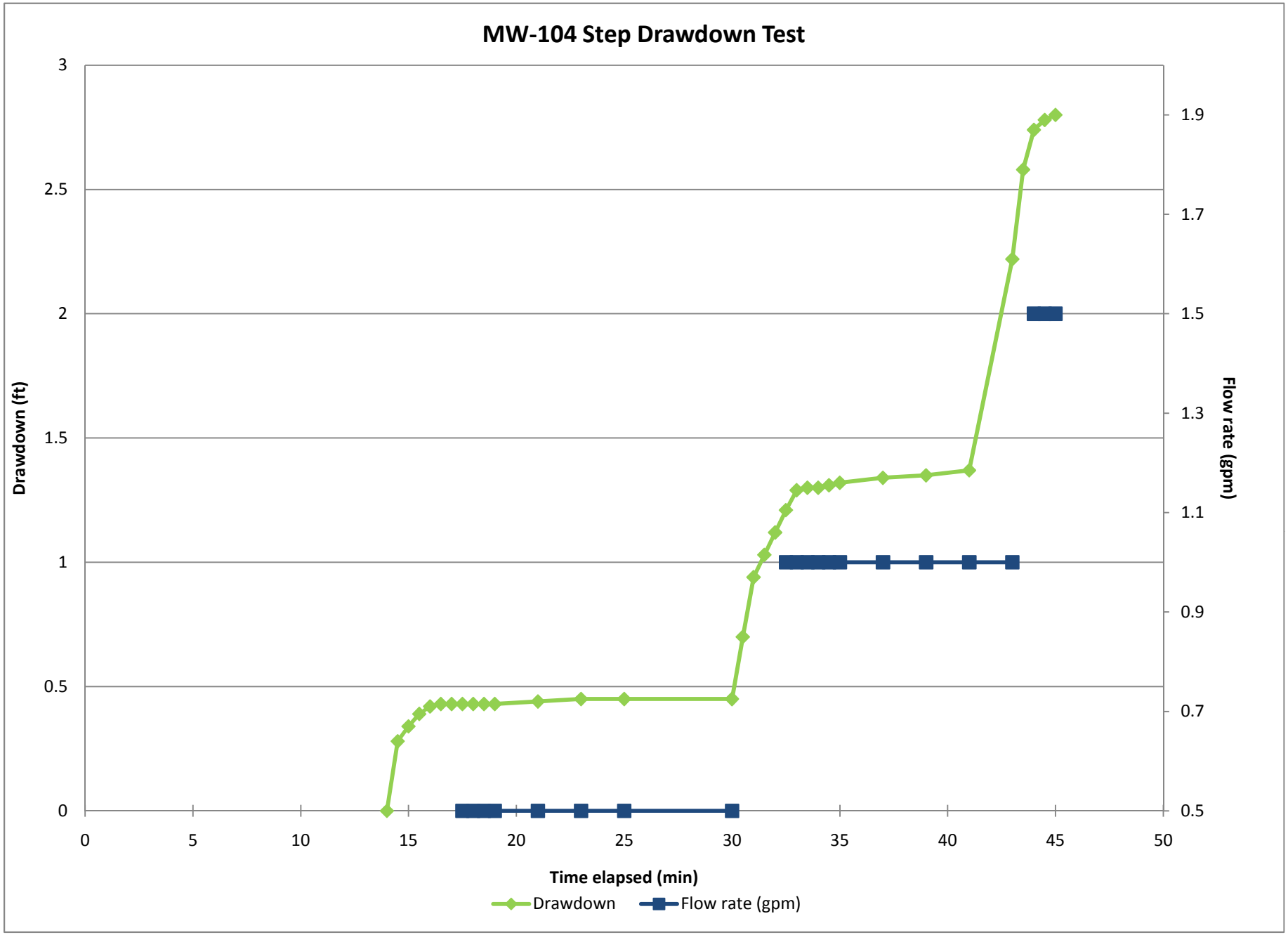
Appendix C

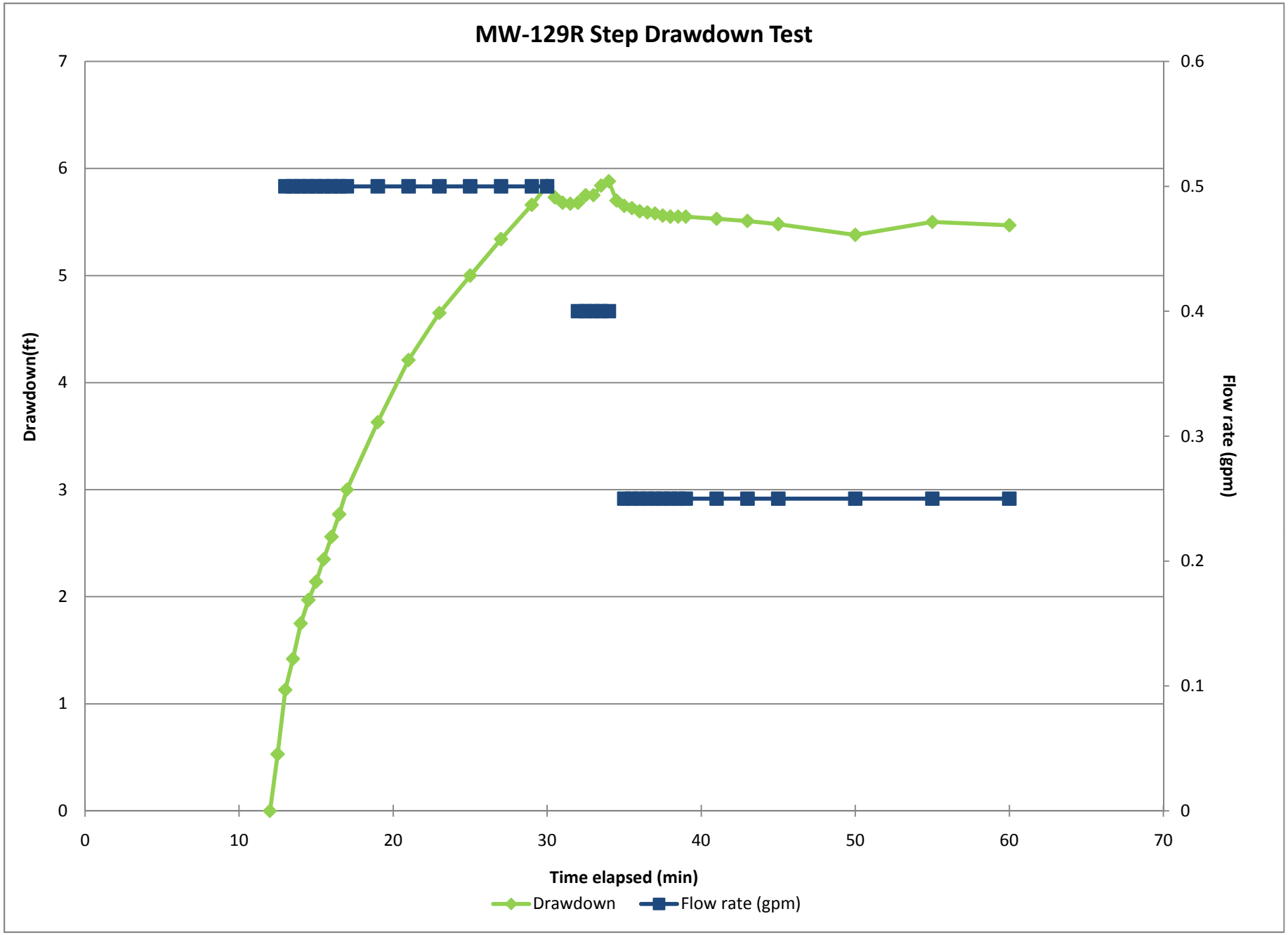
Hydraulic Conductivity Step Test Data

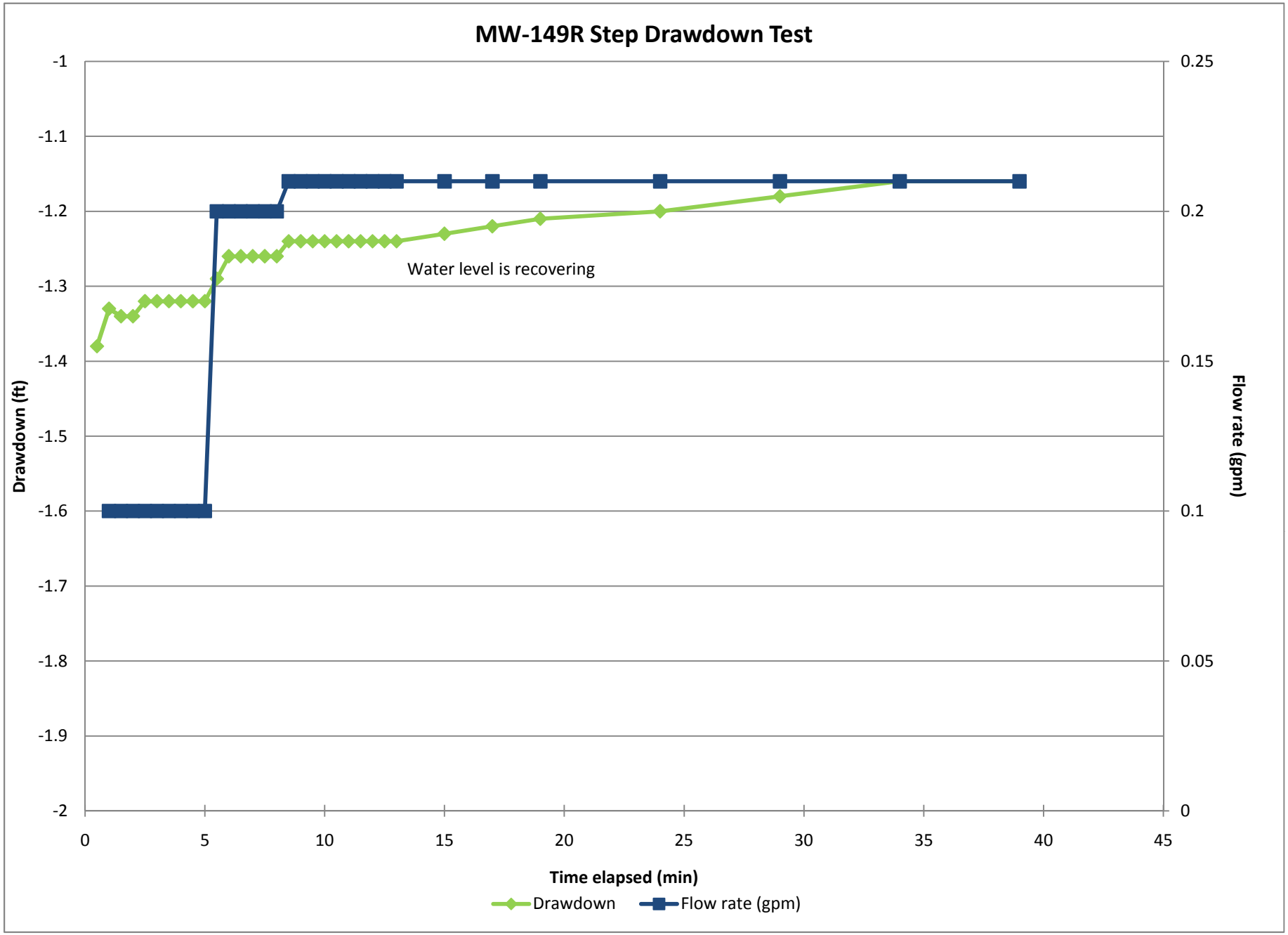

LM-2 Step Drawdown Test
May 13, 2011
Drawdown (ft)
Flow rate (gpm)
Time elapsed (min)
0
0.5
1
1.5
2
2.5
3
3.5
4
0.05
0.1
0.15
0.2
0.25
10
20
30
40
50
60
Drawdown
Flow rate (gpm)

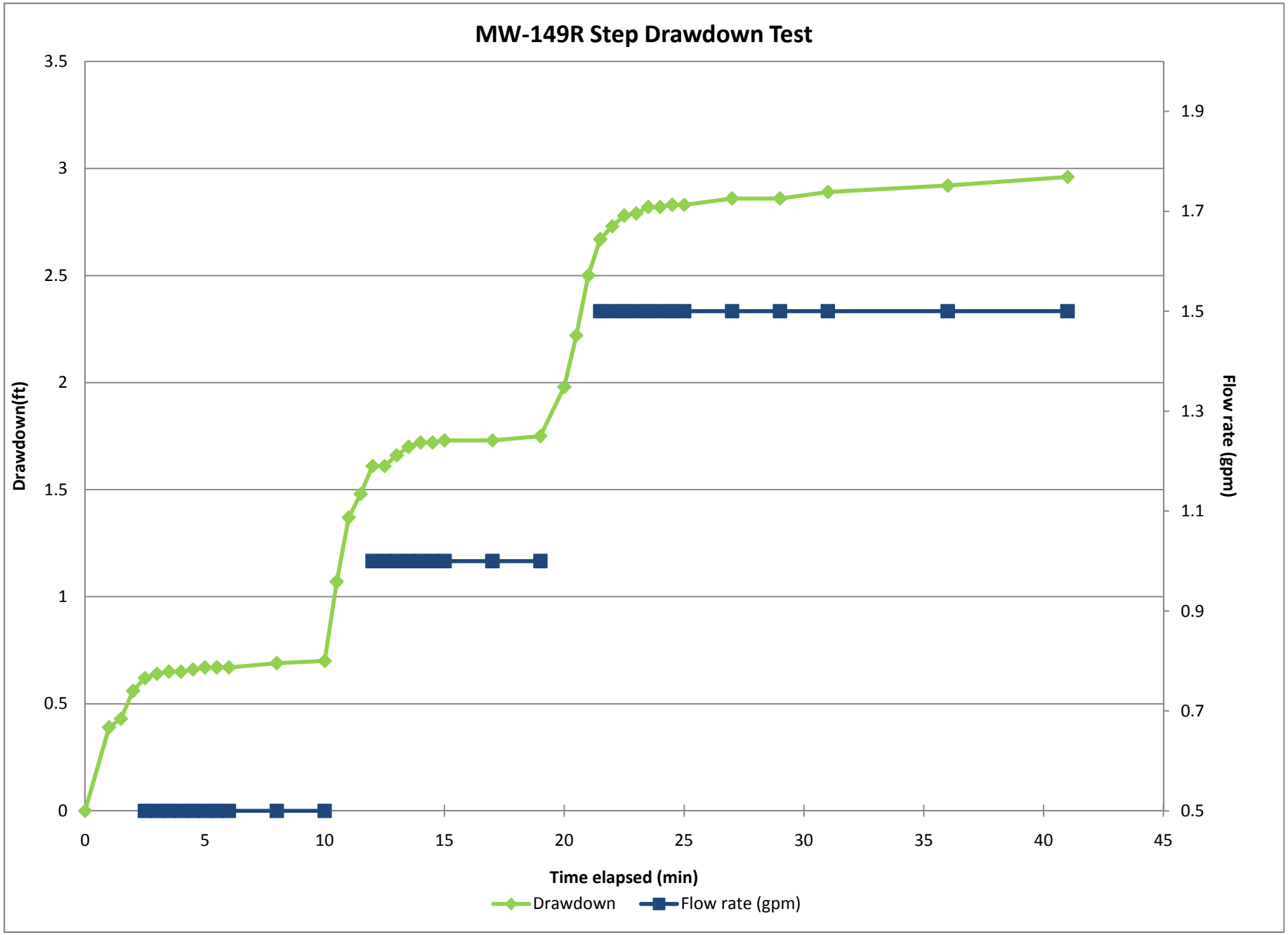

MW-8R Step Drawdown Test
May 12, 2011
Drawdown (ft)
Flow rate (gpm)
Time elapsed (min)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
0
5
10
15
20
25
30
35
Drawdown
Flow rate (gpm)

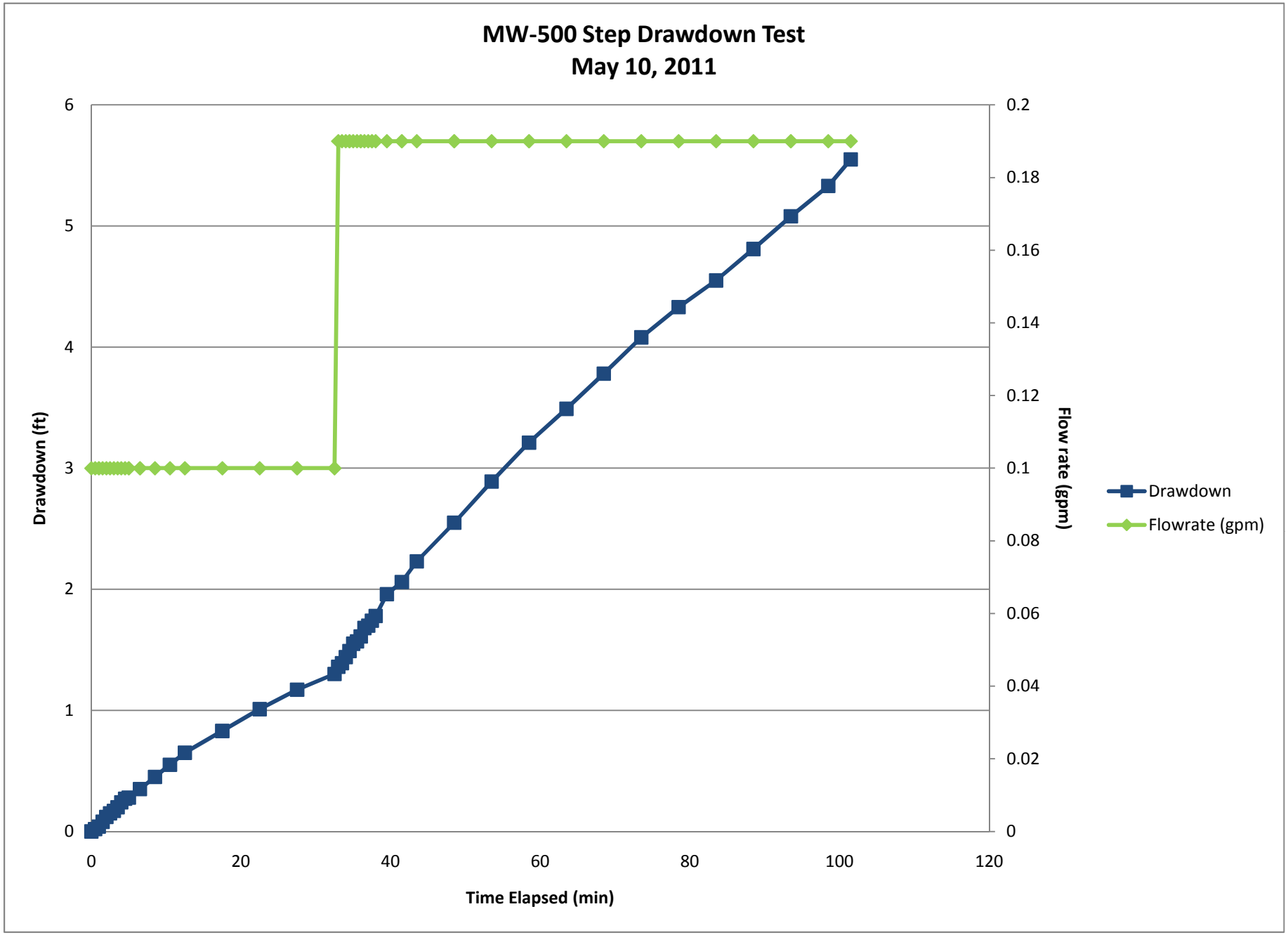

MW-8R Step Drawdown Test
May 18, 2011
Drawdown (ft)
Flow rate (gpm)
Time elapsed (min)
0.70
0.60
0.50
0.40
0.30
0.20
0.10
0.00
6
5
4
3
2
1
0
0
10
20
30
40
50
60
70
80
Drawdown
Flow rate (gpm)

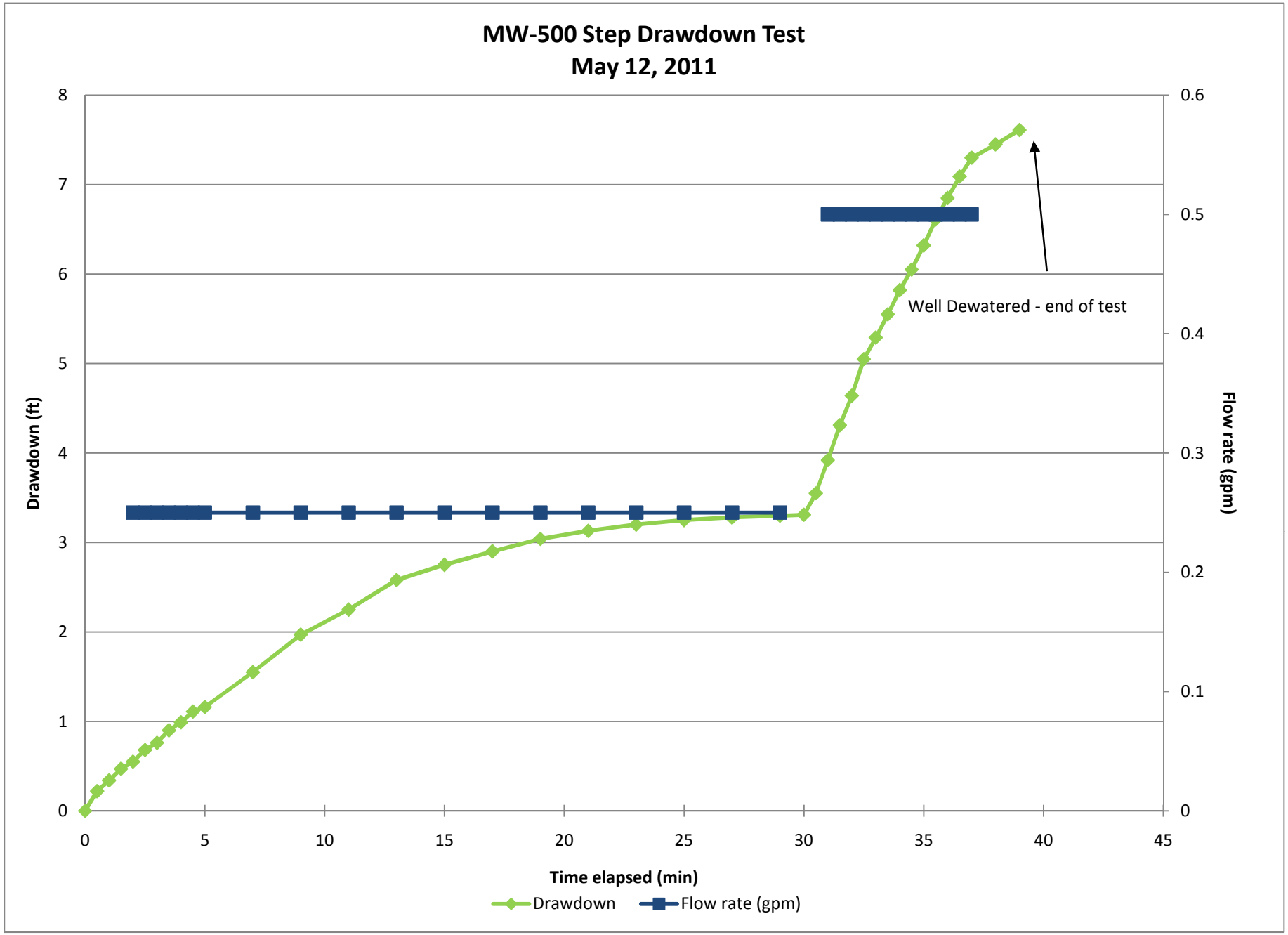

MW-104 Step Drawdown Test
Drawdown (ft)
Flow rate (gpm)
Time elapsed (min)
Drawdown
Flow rate (gpm)
3
2.5
2
1.5
1
0.5
0
1.9
1.7
1.5
1.3
1.1
0.9
0.7
0.5
0
5
10
15
20
25
30
35
40
45
50

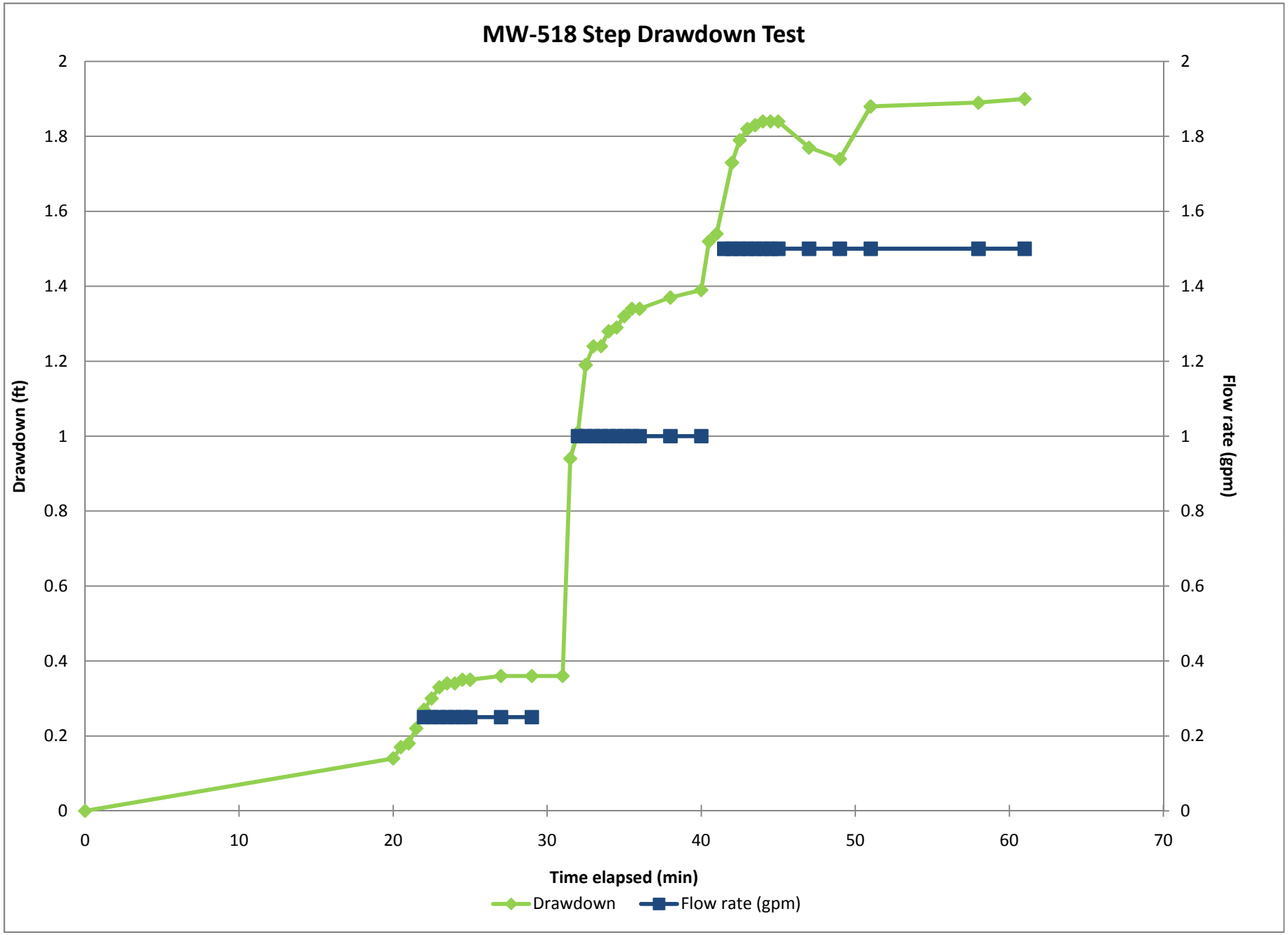

MW-129R Step Drawdown Test
Drawdown(ft)
Flow rate (gpm)
Time elapsed (min)
0
1
2
3
4
5
6
7
0
0.1
0.2
0.3
0.4
0.5
0.6
0
10
20
30
40
50
60
70
Drawdown
Flow rate (gpm)


MW-149R Step Drawdown Test
-1
-1.1
-1.2
-1.3
-1.4
-1.5
-1.6
-1.7
-1.8
-1.9
-2
Drawdown (ft)
0.25
0.2
0.15
0.1
0.05
0
Flow rate (gpm)
Water level is recovering
0
5
10
15
20
25
30
35
40
45
Time elapsed (min)
Drawdown
Flow rate (gpm)


MW-149R Step Drawdown Test
Drawdown(ft)
Flow rate (gpm)
Time elapsed (min)
Drawdown
Flow rate (gpm)
3.5
3
2.5
2
1.5
1
0.5
0
1.9
1.7
1.5
1.3
1.1
0.9
0.7
0.5
0
5
10
15
20
25
30
35
40
45


MW-500 Step Drawdown Test
May 10, 2011
Drawdown (ft)
Flow rate (gpm)
Time Elapsed (min)
0
1
2
3
4
5
6
0
0.02
0.04
0.06
0.08
0.1
0.12
0.14
0.16
0.18
0.2
0
20
40
60
80
100
120
Drawdown
Flowrate (gpm)


MW-500 Step Drawdown Test
May 12, 2011
Drawdown (ft)
Flow rate (gpm)
Time elapsed (min)
Well Dewatered - end of test
Drawdown
Flow rate (gpm)
0
1
2
3
4
5
6
7
8
0
0.1
0.2
0.3
0.4
0.5
0.6
0
5
10
15
20
25
30
35
40
45


MW-518 Step Drawdown Test
Drawdown (ft)
Flow rate (gpm)
Time elapsed (min)
0
0.2
0.4
0.6
0.8
1
1.2
1.4
1.6
1.8
2
0
10
20
30
40
50
60
70
Drawdown
Flow rate (gpm)

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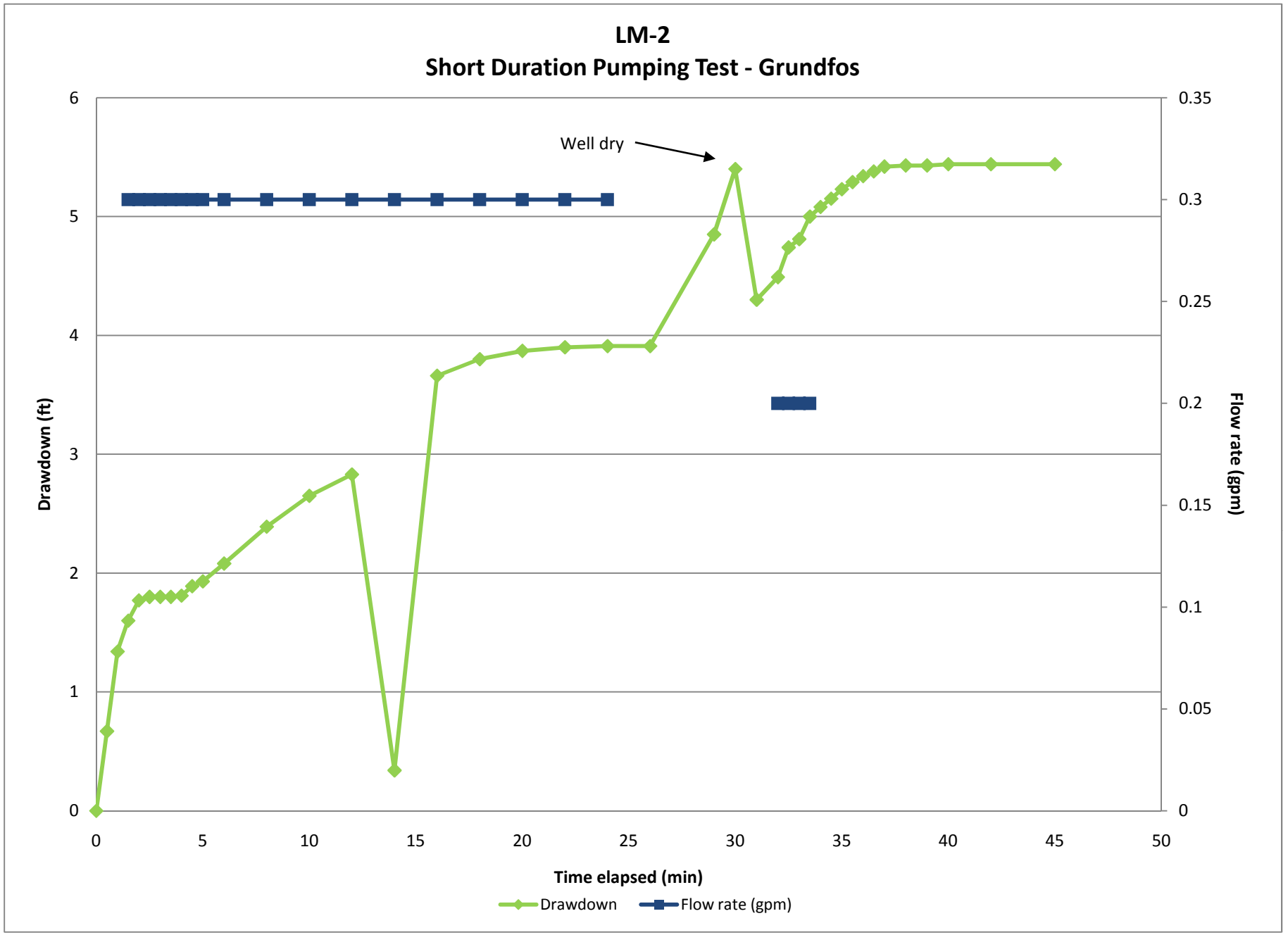
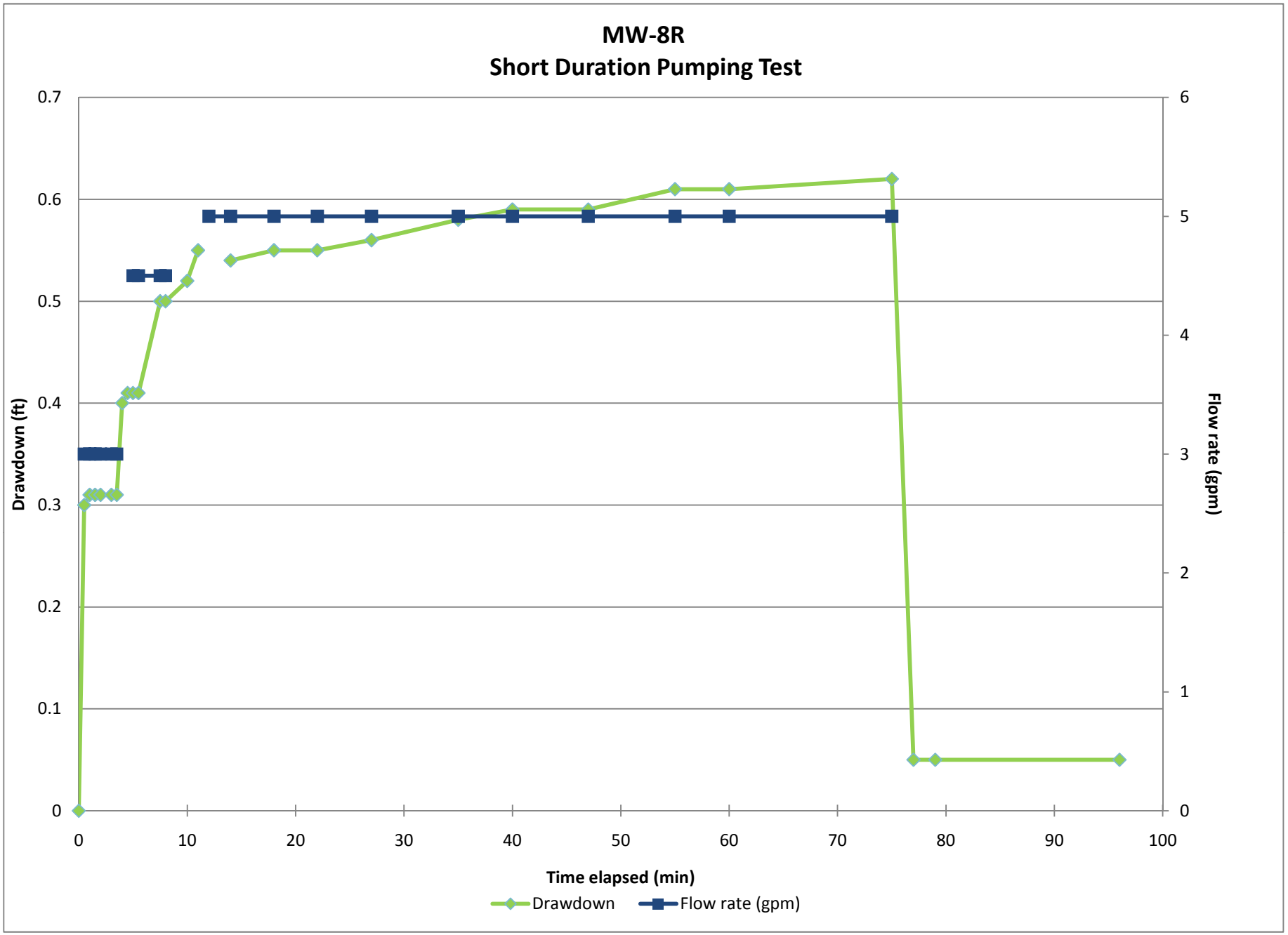
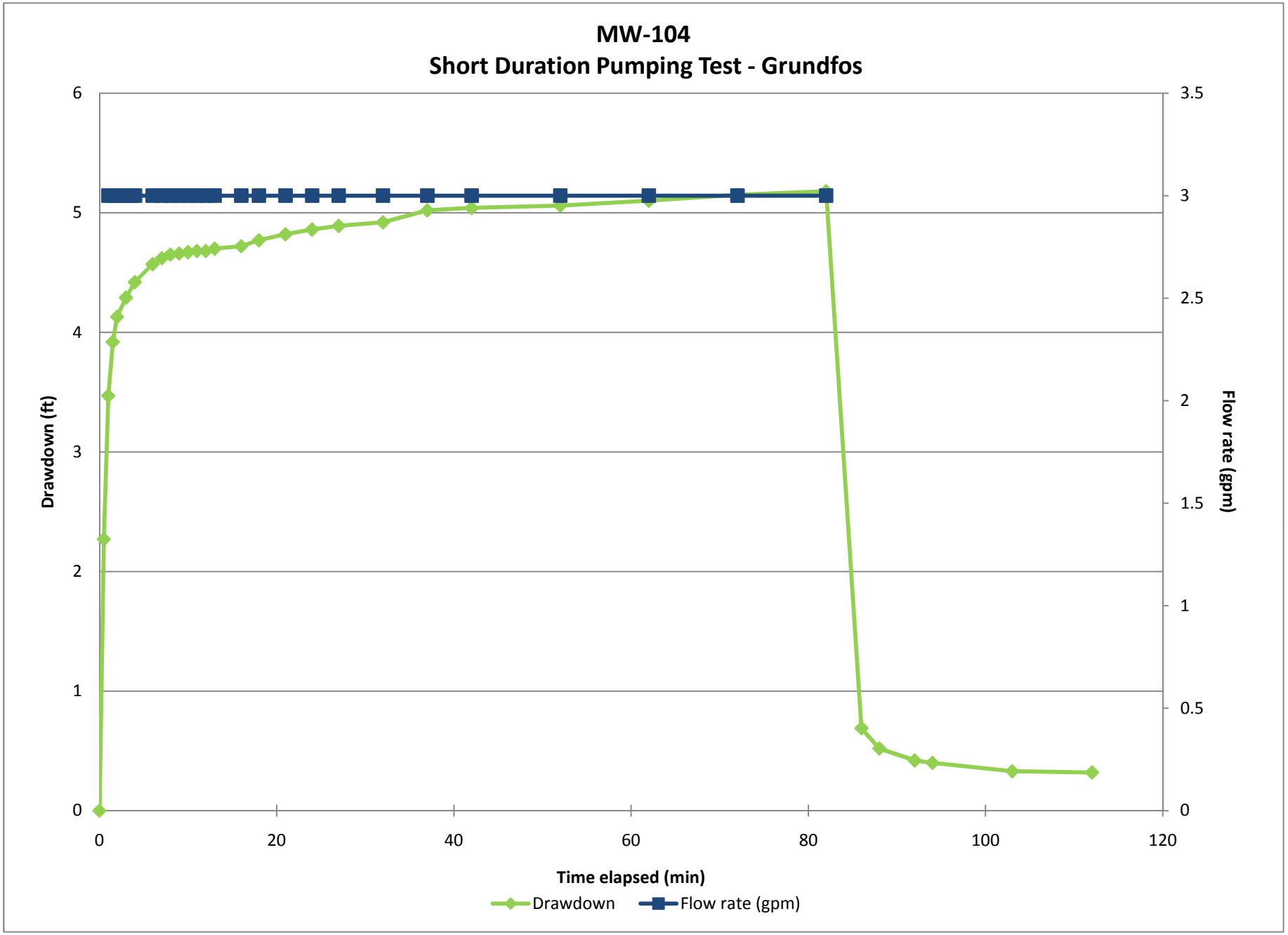
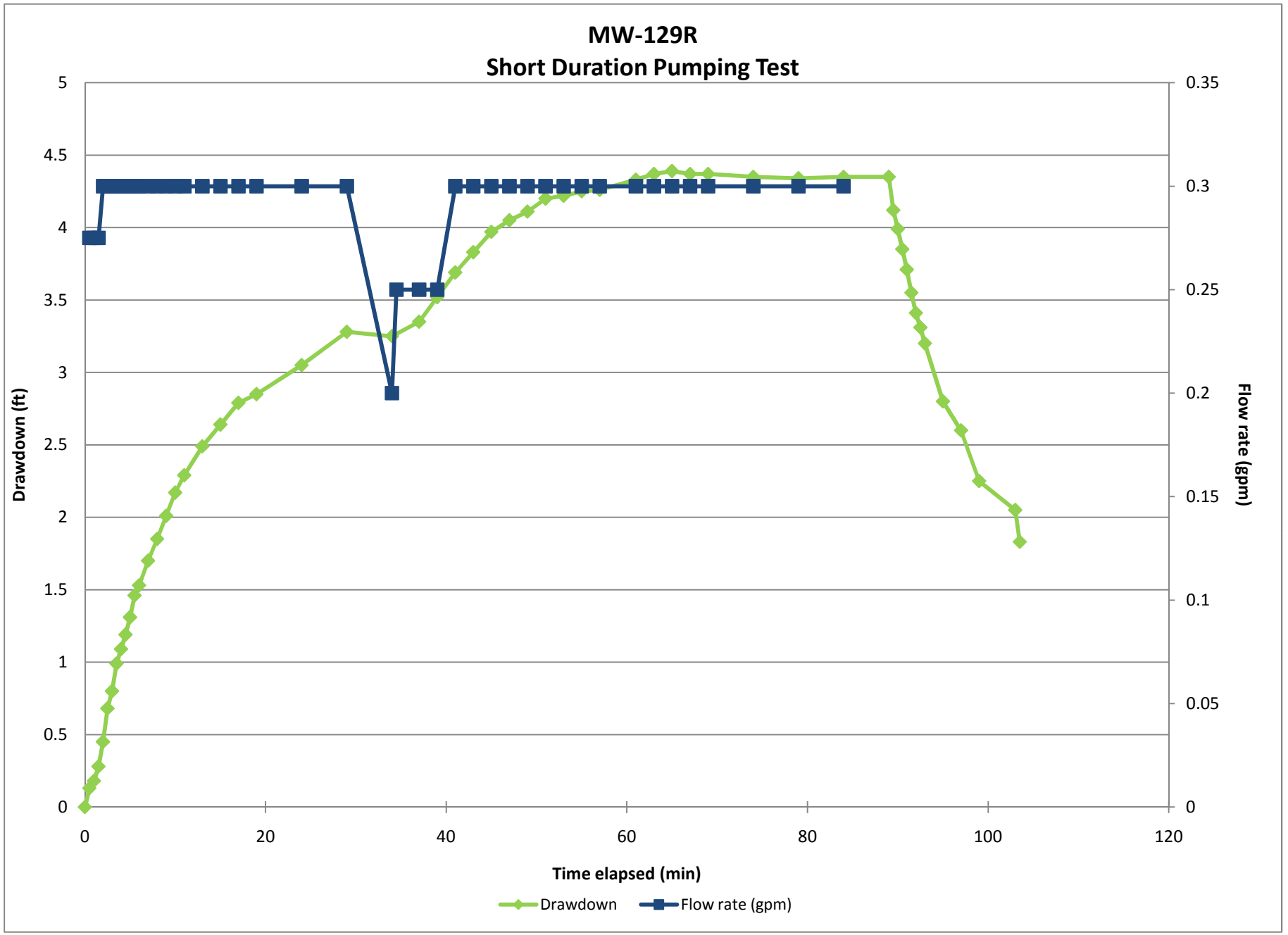
Appendix D

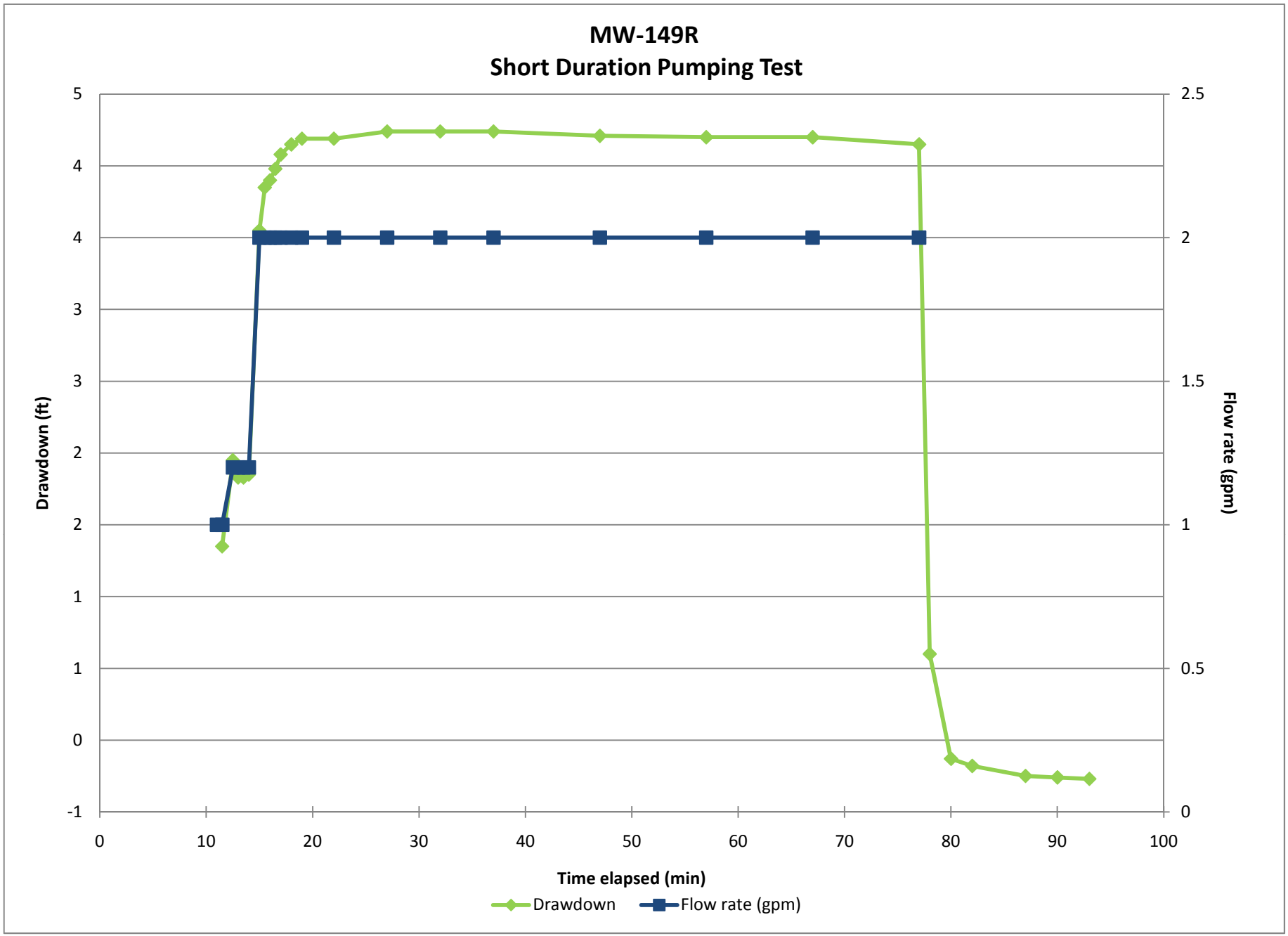
Short Duration Hydraulic Conductivity Test Data

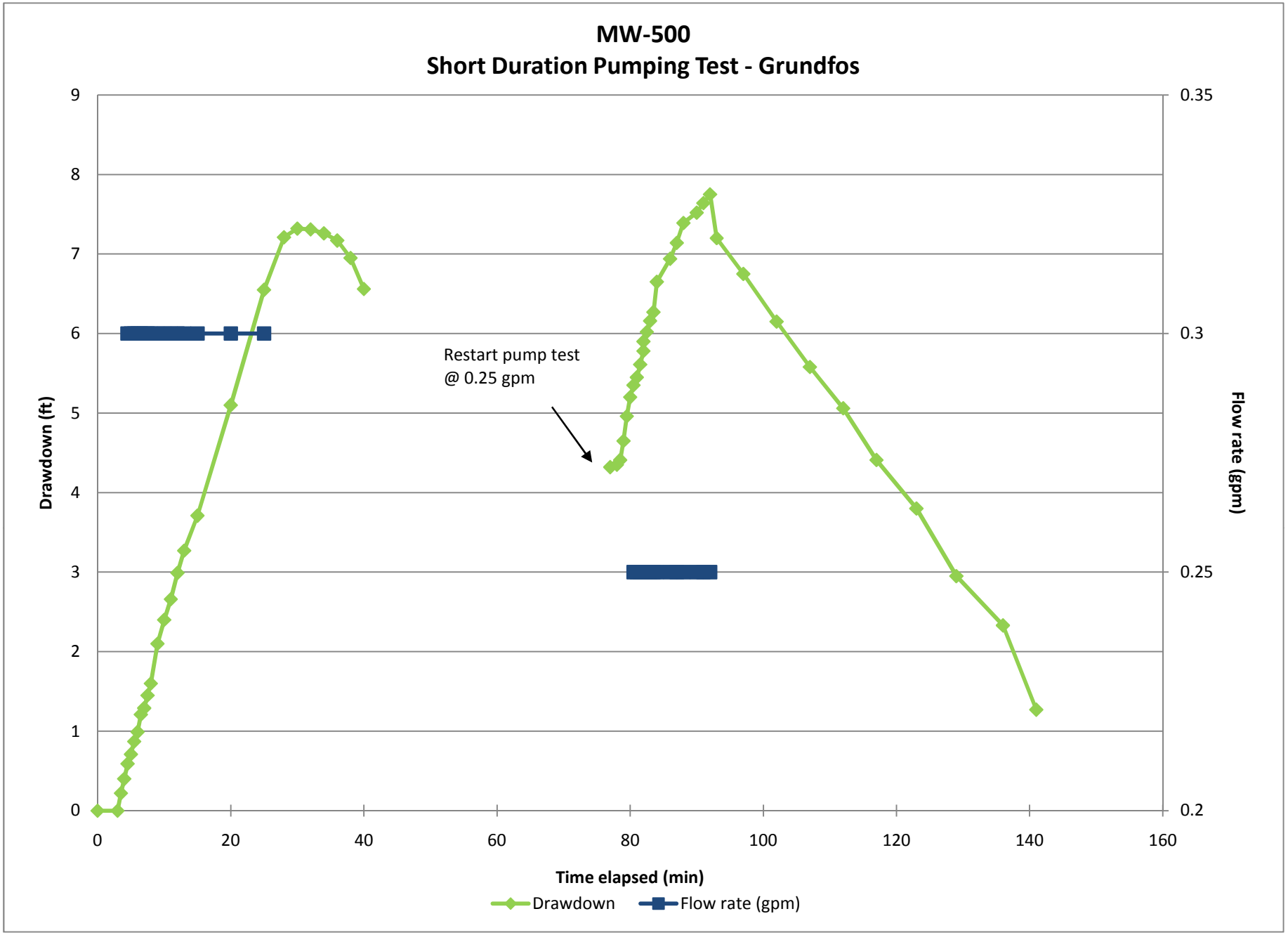

LM-2
Short Duration Pumping Test - Grundfos
Well dry
Drawdown (ft)
Flow rate (gpm)
Time elapsed (min)
Drawdown
Flow rate (gpm)
0
1
2
3
4
5
6
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0
5
10
15
20
25
30
35
40
45
50

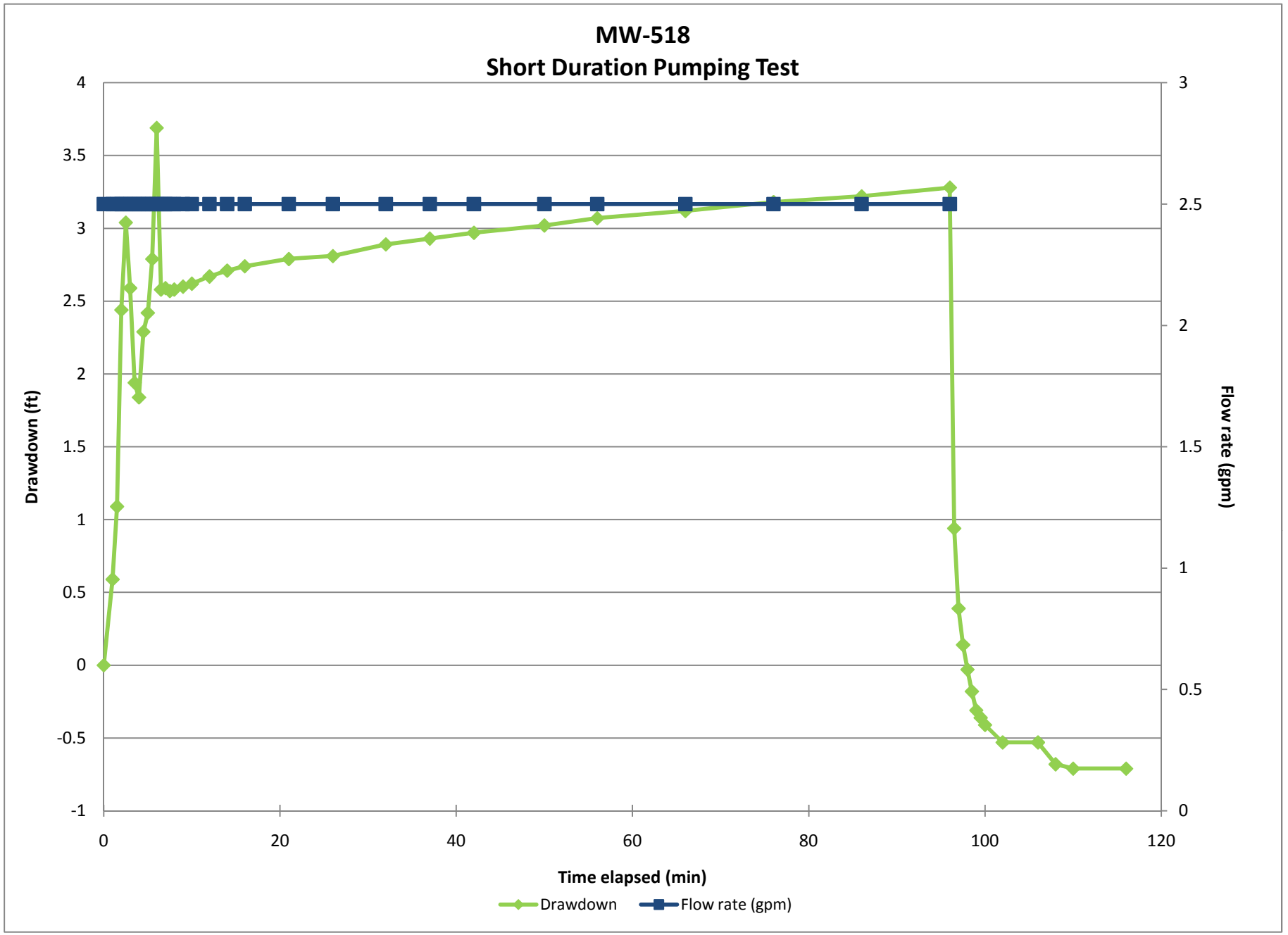

MW-8R
Short Duration Pumping Test
Drawdown (ft)
Flow rate (gpm)
Time elapsed (min)
0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0
1
2
3
4
5
6
0
10
20
30
40
50
60
70
80
90
100
Drawdown
Flow rate (gpm)


MW-104
Short Duration Pumping Test - Grundfos
Drawdown (ft)
Flow rate (gpm)
Time elapsed (min)
0
1
2
3
4
5
6
0
0.5
1
1.5
2
2.5
3
3.5
0
20
40
60
80
100
120
Drawdown
Flow rate (gpm)


MW-129R
Short Duration Pumping Test
Drawdown (ft)
Flow rate (gpm)
Time elapsed (min)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0
20
40
60
80
100
120
Drawdown
Flow rate (gpm)


MW-149R
Short Duration Pumping Test
Drawdown (ft)
Flow rate (gpm)
Time elapsed (min)
Drawdown
Flow rate (gpm)
5
4
4
3
3
2
2
1
1
0
-1
2.5
2
1.5
1
0.5
0
0
10
20
30
40
50
60
70
80
90
100


MW-500
Short Duration Pumping Test - Grundfos
Drawdown (ft)
Flow rate (gpm)
Time elapsed (min)
Restart pump test
@ 0.25 gpm
0
1
2
3
4
5
6
7
8
9
0.2
0.25
0.3
0.35
0
20
40
60
80
100
120
140
160
Drawdown
Flow rate (gpm)


MW-518
Short Duration Pumping Test
Drawdown (ft)
Flow rate (gpm)
Time elapsed (min)
Drawdown
Flow rate (gpm)
4
3.5
3
2.5
2
1.5
1
0.5
0
-0.5
-1
0
20
40
60
80
100
120

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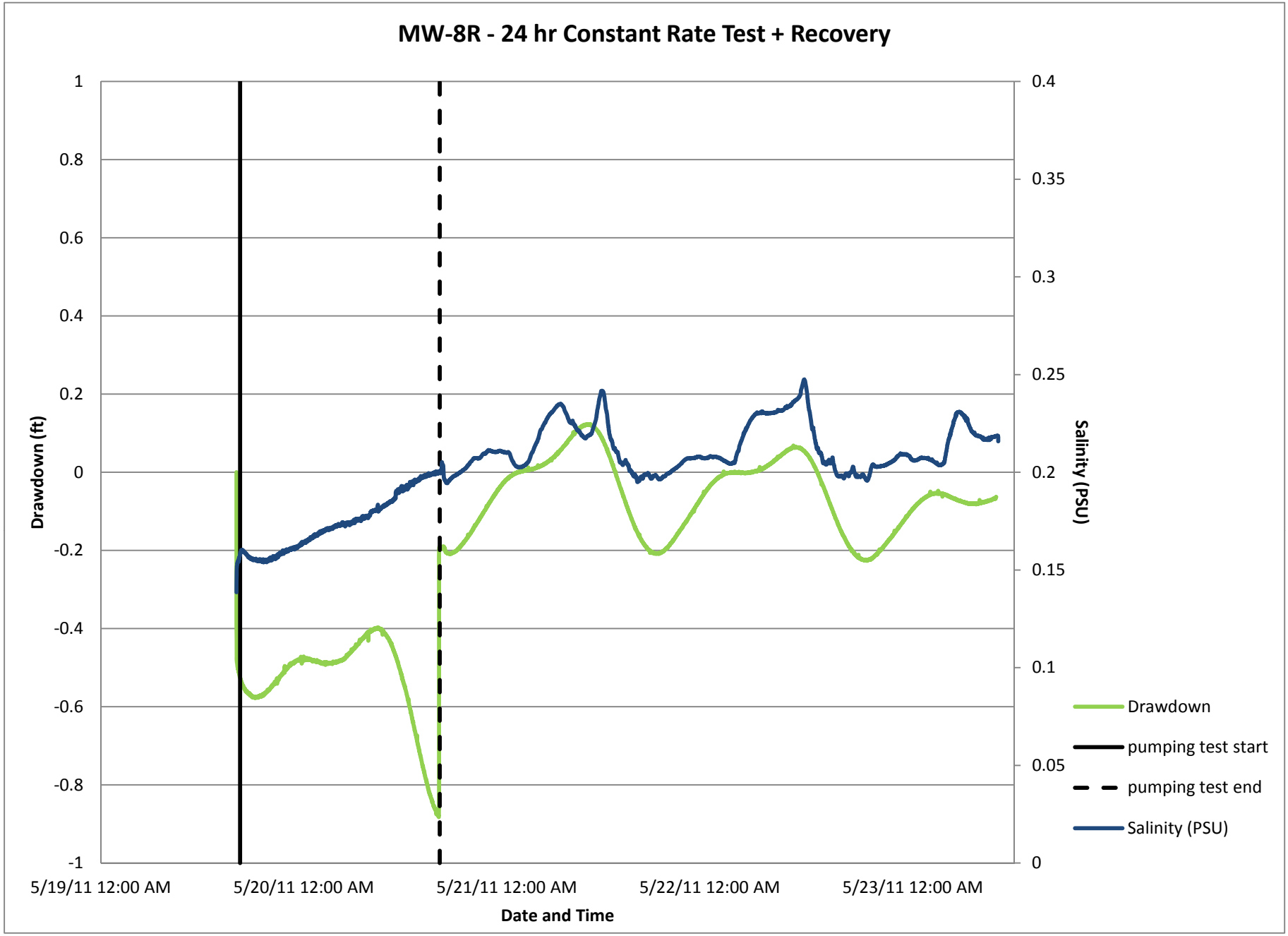
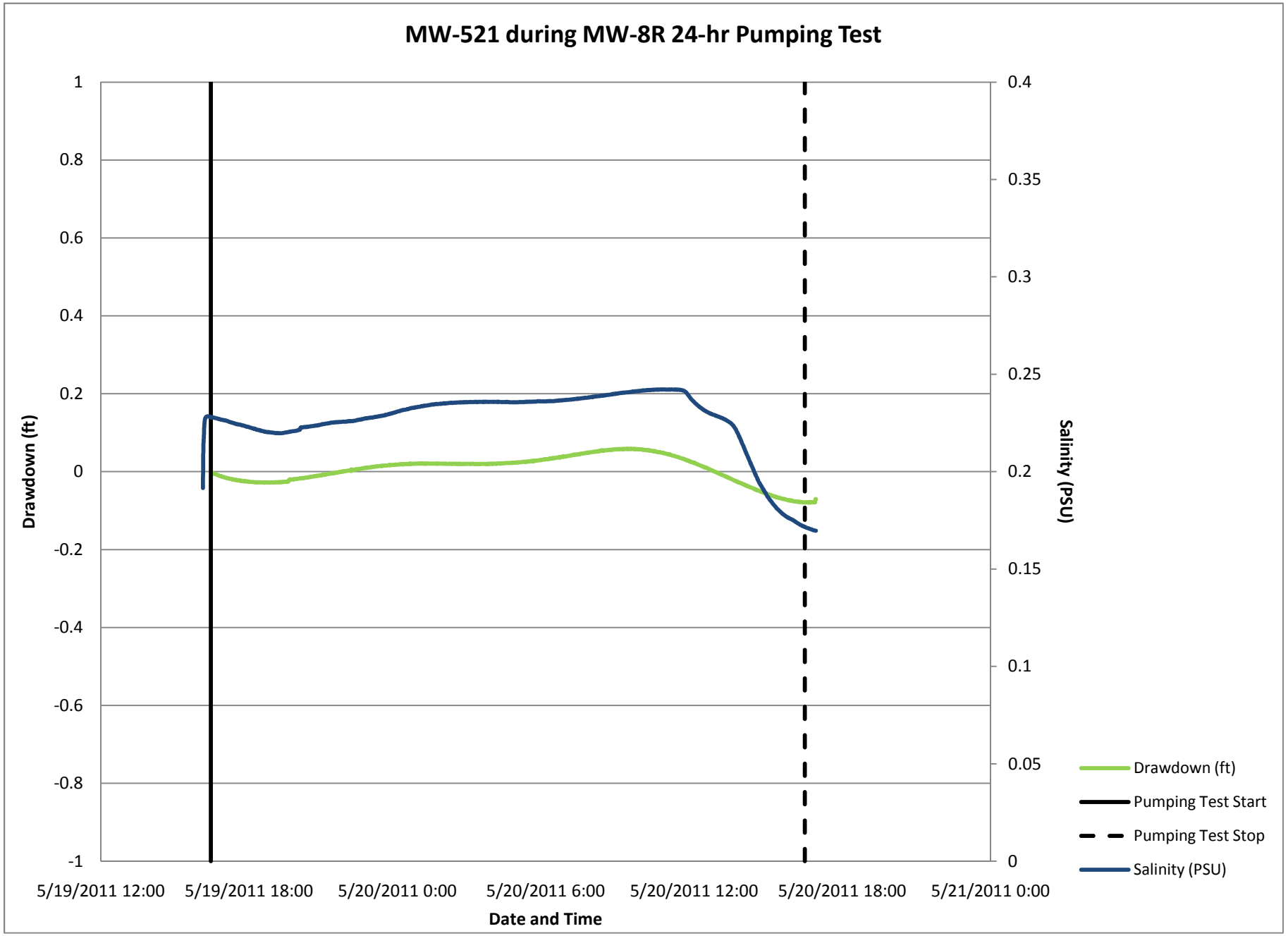
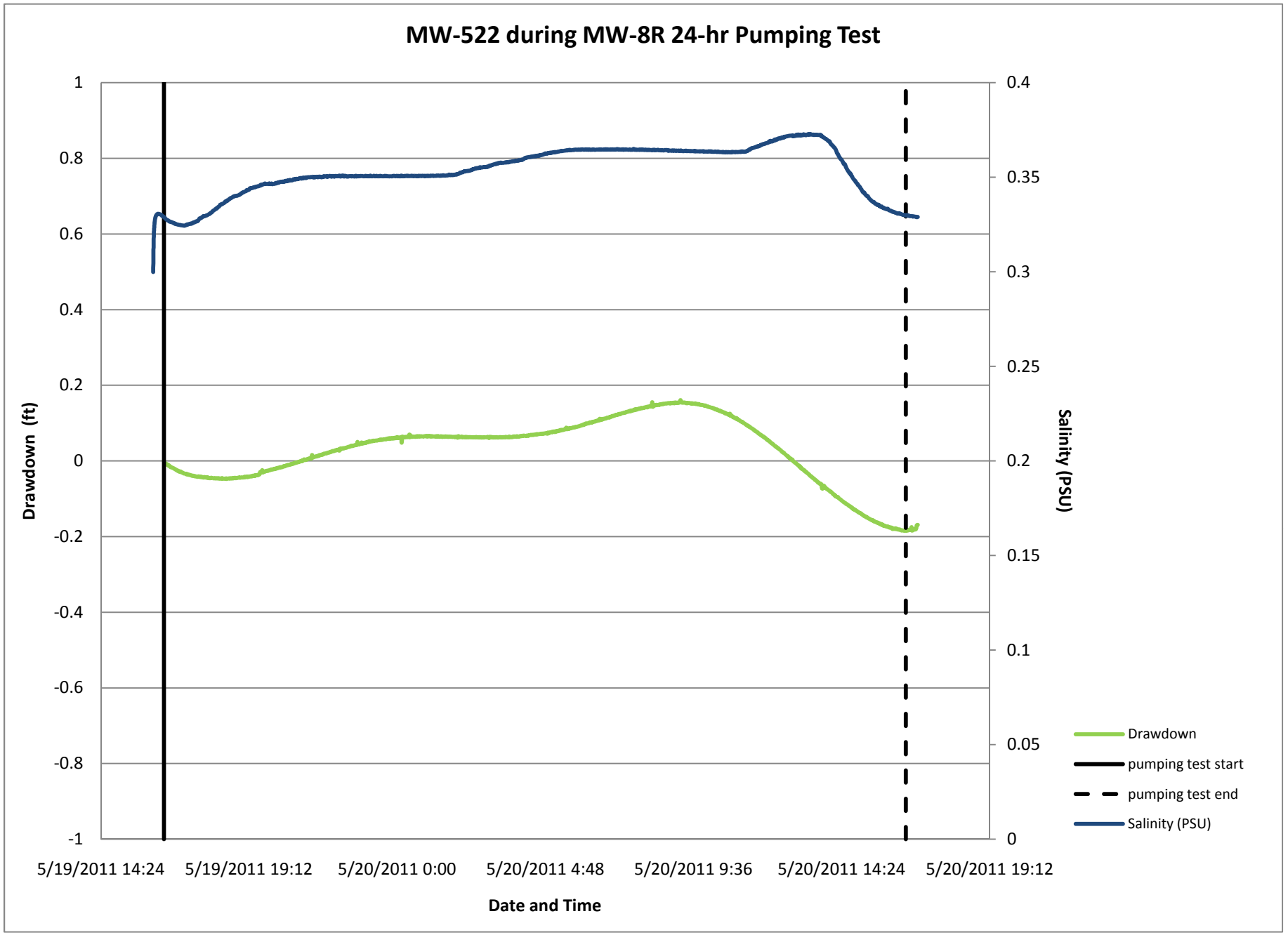
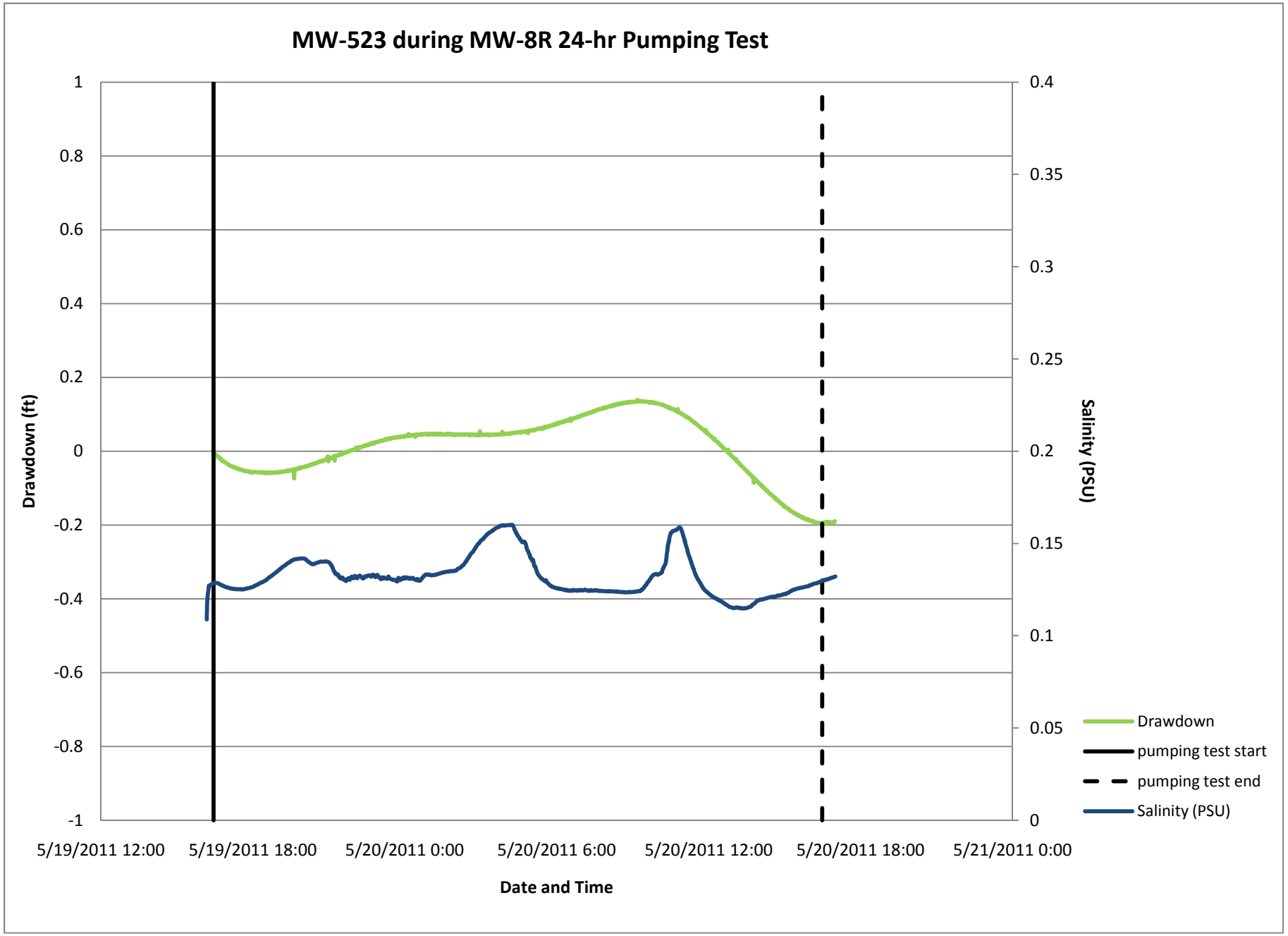
Appendix E

Long Duration Hydraulic Conductivity Test Data


MW-8R - 24 hr Constant Rate Test + Recovery
Drawdown (ft)
Salinity (PSU)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
5/19/11 12:00 AM
5/20/11 12:00 AM
5/21/11 12:00 AM
5/22/11 12:00 AM
5/23/11 12:00 AM
Date and Time
Drawdown
pumping test start
pumping test end
Salinity (PSU)


MW-521 during MW-8R 24-hr Pumping Test
Drawdown (ft)
Salinity (PSU)
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
5/19/2011 12:00
5/19/2011 18:00
5/20/2011 0:00
5/20/2011 6:00
5/20/2011 12:00
5/20/2011 18:00
5/21/2011 0:00
Date and Time
Drawdown (ft)
Pumping Test Start
Pumping Test Stop
Salinity (PSU)


MW-522 during MW-8R 24-hr Pumping Test
Drawdown (ft)
Salinity (PSU)
Date and Time
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
5/19/2011 14:24
5/19/2011 19:12
5/20/2011 0:00
5/20/2011 4:48
5/20/2011 9:36
5/20/2011 14:24
5/20/2011 19:12
Drawdown
pumping test start
pumping test end
Salinity (PSU)


MW-523 during MW-8R 24-hr Pumping Test
Drawdown (ft)
Salinity (PSU)
Date and Time
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
5/19/2011 12:00
5/19/2011 18:00
5/20/2011 0:00
5/20/2011 6:00
5/20/2011 12:00
5/20/2011 18:00
5/21/2011 0:00
Drawdown
pumping test start
pumping test end
Salinity (PSU)

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Appendix F

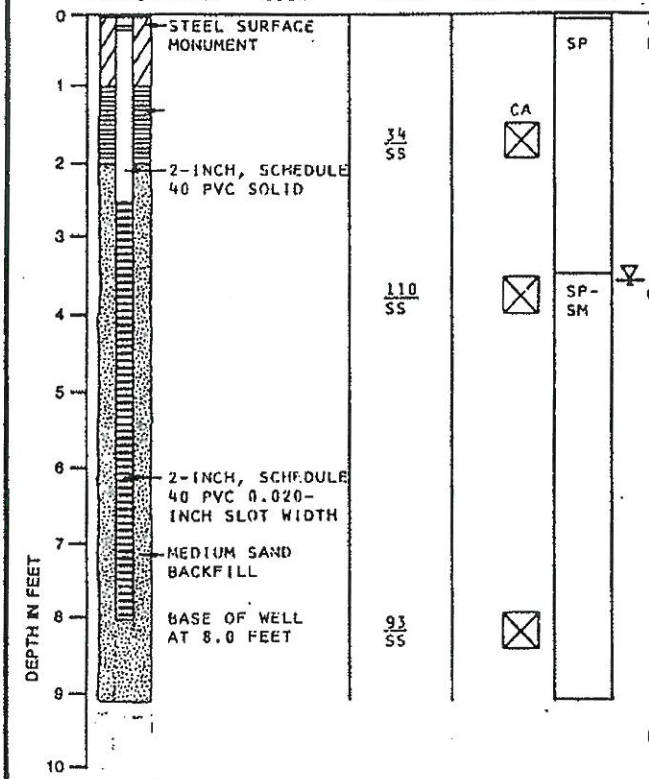
Hydraulic Conductivity Test Well Boring Logs

MONITOR WELL NO. LM-2

8.14 ft above mean sea level (Ref. NAVD 88) -DR 2/15/12

WELL SCHEMATIC
Casing Elevation: ~~13.19~~
Casing Stickup: -0.14

Vapor Conc.(ppm) / Sheen	Blow-Count	Samples	Group Symbol	DESCRIPTION Surface Elevation: 13.33 FEET
			SP	0.1 FOOT - ORGANIC DEBRIS BROWN FINE SAND WITH ROOTS AND A TRACE OF SILT (LOOSE, MOIST) (FILL)
34 / SS		CA		
			SP-SM	▽ WATER AT 3.07 FEET ON 4/19/89 GRAY FINE TO MEDIUM SAND WITH SILT AND ORGANIC MATTER (LOOSE, WET) (FILL)
110 / SS				GRADES TO MEDIUM TO COARSE SAND AT 6.0 FEET (LOOSE, WET)
93 / SS				BORING COMPLETED AT 9.1 FEET ON 4/18/89



Note: See figure A-2 for explanation of symbols

GEI 108-101 161-160-4 WSL:RK:KT 5/8/89

Geo Engineers

LOG OF MONITOR WELL

FIGURE A-4

Date Start/Finish: 10/09/08 **Drilling Company:** Cascade Drilling Inc. **Driller's Name:** Andy Flanagen **Drilling Method:** Hollow Stem Auger **Auger Size:** 8" **Rig Type:** CME-75 **Sampling Method:** 2" Split Spoon	**Northing:** 297780.40 **Easting:** 1257616.38 **Casing Elevation:** 13.82 **Borehole Depth:** 13' bgs **Surface Elevation:** **Descriptions By:** Russ Greisler	**Well/Boring ID: MW-8R** **Client:** Chevron **Location:** 11720 Unoco Rd., Edmonds, WA

DEPTH	ELEVATION	Sample Run Number		Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Analytical Sample	USCS Code	Geologic Column	Stratigraphic Description	Well/Boring Construction
0									SP		SAND (SP); brown, fine to medium, few fine subrounded gravels. (FILL)	8" Steel well box monument and j-plug
		1		1.0			0.0					Borehole backfilled with concrete to grade
												Borehole backfilled with Bentonite
												2" Blank sch. 40 PVC riser
5		2		1.0	4 11 13	24	0.0					#2/12 Silica Sand
		3		1.5	6 12 10	22	0.0		SW		Gravelly SAND (SW); brown, fine, some fine subrounded to subangular gravels. (FILL)	2" sch. 40 PVC 0.01" slotted screen
10		4		1.0							Change in color to gray, HCLO	End cap

Remarks: bgs = below ground surface
HCLO = hydrocarbon like odor

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Casing Elevation = 14.08 feet above mean sea level (Ref. NAVD 88) - DR 2/15/12

LOG OF EXPLORATORY BORING

PROJECT NAME	Unocal Bulk Terminal	BORING NO.	MW-104
LOCATION		PAGE	1 OF 2
DRILLED BY	Cascade	REFERENCE ELEV.	
DRILL METHOD	CME-75 H.S.A.	TOTAL DEPTH	16.50'
LOGGED BY	Brooks/Garson	DATE COMPLETED	12/22/92

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6-INCHES	GROUND WATER LEVELS	DEPTH IN FT.	SAMPLES	LITHOLOGIC COLUMN	WELL DETAILS	LITHOLOGIC DESCRIPTION
HA-104A	0			5				0 to 0.5 feet: GRAVEL (SP), fine to coarse, angular. 0.5 to 8.0 feet: SAND (SP), light brown, fine to medium, trace silt, trace fine, subrounded, gravel, moist. @ 5.0 feet: becomes light gray to light brown.
SB	6	15-13-14	▽					
SB-104C	0	7-11-15		10				8.0 to 10.0 feet: SAND (SW), light gray, fine to coarse, trace roots, trace fine, rounded to subrounded gravel, hydrocarbon-like odor, wet. 10.0 to 16.0 feet: SAND (SW), gray, fine to coarse, trace silt, trace wood debris, wet. @ 11.0 feet: 2-inch-thick wood.
SB-104D	0	10-11-13						
SB-104E	0	15-22-29		15				16.0 to 16.5 feet: GRAVELLY SAND (SP), gray, fine to medium, rounded to subrounded gravel, medium dense, wet. Total depth drilled = 15.0 feet. Total depth sampled = 16.5 feet. See page 2 for Well Completion Details.
				20				

REMARKS

(1) SB=samples collected using 25" ID split barrel sampler driven with 140-lb hammer. (2) HA samples collected with 3.0" ID stainless steel hand auger. (3) PID=PID readings obtained with Model 580B photoionization detector. (4) Blow counts do not represent Standard Penetration Test results. (5) Reference Elevation = top of casing elevation surveyed to a site datum.

EMCON Northwest, Inc.

0324-033.01.BULK.L44/sa:1.01/21/93

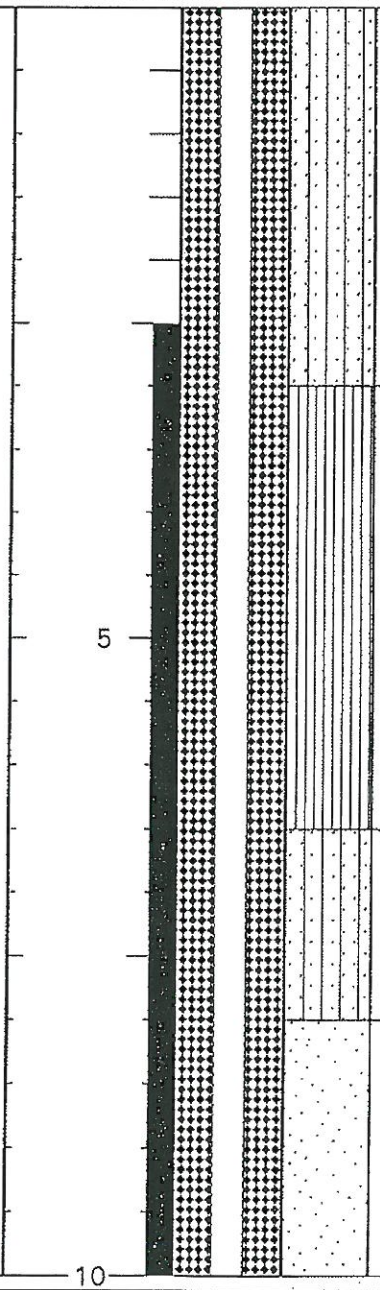
Casing Elevation = 15.54 feet above mean sea level (Ref. NAVD 88) -DR 2/15/12

LOG OF EXPLORATORY BORING

PROJECT NAME	Unocal Bulk Fuel Terminal R.I.	BORING NO.	MW-122
LOCATION	Edmonds, Washington	PAGE	1 OF 5
DRILLED BY	Holt Drilling	REFERENCE ELEV.	~~18.08'~~ 15.54
DRILL METHOD	Cable Tool	TOTAL DEPTH	41.50'
LOGGED BY	John Bertrand	DATE COMPLETED	09/27/95

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
			0 to 3.0 feet: SAND WITH SILT (SP-SM), light brown to brown, fine, few fine to coarse gravel, trace to few coarse sand, trace medium sand, loose, damp. (FILL)
SS-2.5	2.5	6-6-8	@ 2.5 feet: yellow brown, trace medium to coarse sand, trace fine to coarse gravel.
			3.0 to 6.5 feet: SILT (ML), gray, non to low plasticity, trace to few fine sand, stiff, damp, friable, very slight hydrocarbon-like odor. (ALLUVIUM)
SS-4	1.0	2-8-6	@ 4.0 feet: sandy to clayey silt, few fine sand.
SS-5.5	6.0	3-3-5	@ 5.5 feet: clayey silt, gray to olive gray, low plasticity, firm, few organics (plant fragments, etc.), moist.
			@ 6.0 feet: firm, non to low plasticity, very slight hydrocarbon-like odor.
SS-7	1.0	3-5-7	6.5 to 8.0 feet: SILTY SAND (SM), gray, fine, little silt, medium dense, moist. (ALLUVIUM)
			@ 7.0 feet: few to little silt, wet.
SS-8.5	1.0	4-6-7	8.0 to 21.5 feet: SAND (SP), gray, fine to medium, trace silt, medium dense, wet. (ALLUVIUM)
			@ 8.5 feet: fine sand, few medium sand, trace silt.

GROUND WATER LEVELS | DEPTH IN FEET | SAMPLES | WELL DETAILS | LITHOLOGIC COLUMN



REMARKS

(1) SS = collected with a 1.5-inch i.d. split spoon sampler. (2) SB = collected with a 2.5-inch i.d. split barrel sampler. (3) HA = collected with a 3.25-inch hand auger. (4) ST = collected with a Shelby tube. (5) Blow counts do not represent SPT results. (6) Sample numbers preceded by well or boring designation (e.g. MW-108-2.5, where MW-108 is well designation). (7) Reference elevation = top of PVC (MLLW). (8) PID = photoionization detector calibrated using +/- 100 ppm isobutylene gas.

EMCON

LOG OF EXPLORATORY BORING

PROJECT NAME	Unocal Bulk Fuel Terminal R.I.	BORING NO.	MW-122
LOCATION	Edmonds, Washington	PAGE	2 OF 5
DRILLED BY	Holt Drilling	REFERENCE ELEV.	18.08'
DRILL METHOD	Cable Tool	TOTAL DEPTH	41.50'
LOGGED BY	John Bertrand	DATE COMPLETED	09/27/95

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
SS-10	1.2	5-5-4	**8.0 to 21.5 feet: SAND (SP),** continued. @ 10.0 feet: loose.
SS-11.5	1.2	4-3-6	
			@ 12.5 feet: few organics (plant fibers, etc.).
SS-13	1.2	4-6-6	@ 13.0 feet: medium dense, no organics.
SS-14.5	1.2	4-4-7	@ 14.5 feet: trace to few silt, trace fine to coarse gravel, trace organics, hydrogen-sulfide-like odor.
			15
SS-16		8-12-19	@ 16.0 feet: dense, no organics.
SS-17.5		7-7-7	@ 17.5 feet: trace to few medium sand, trace silt, trace fine gravel, medium dense, trace organics.
SS-19		5-10-10	@ 19.0 feet: fine to medium sand.
			20

EMCON

REMARKS

(1) SS = collected with a 1.5-inch i.d. split spoon sampler. (2) SB = collected with a 2.5-inch i.d. split barrel sampler. (3) HA = collected with a 3.25-inch hand auger. (4) ST = collected with a Shelby tube. (5) Blow counts do not represent SPT results. (6) Sample numbers preceded by well or boring designation (e.g. MW-108-2.5, where MW-108 is well designation). (7) Reference elevation = top of PVC (MLLW). (8) PID = photoionization detector calibrated using +/- 100 ppm isobutylene gas.

LOG OF EXPLORATORY BORING

PROJECT NAME	Unocal Bulk Fuel Terminal R.I.	BORING NO.	MW-122
LOCATION	Edmonds, Washington	PAGE	3 OF 5
DRILLED BY	Holt Drilling	REFERENCE ELEV.	18.08'
DRILL METHOD	Cable Tool	TOTAL DEPTH	41.50'
LOGGED BY	John Bertrand	DATE COMPLETED	09/27/95

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6 INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
SS-20.5		12-12-13						8.0 to 21.5 feet: SAND (SP), continued.
SS-22		6-8-12						21.5 to 22.0 feet: SAND (SW), gray, fine to coarse, little fine to coarse gravel, trace to few silt, medium dense, wet. (ALLUVIUM)
SS-23.5		6-12-17						22.0 to 25.5 feet: SAND (SP), gray, fine to medium, few coarse sand, trace fine gravel, medium dense, wet. (ALLUVIUM) @ 23.5 feet: trace to few fine sand, no gravel.
SS-25		8-13-13		25				@ 24.5 feet: few fine to coarse gravel. @ 25.0 feet: trace coarse sand, trace silt.
SS-26.5		10-50/4"						25.5 to 28.5 feet: SAND (SW), gray, fine to coarse, trace fine to medium gravel, trace silt, medium dense, wet. (ALLUVIUM) @ 26.5 feet: trace to few fine to coarse gravel, very dense.
SS-28		35-12-8						@ 28.0 feet: few fine to coarse gravel, trace silt, medium dense.
SS-29.5		7-21-50		30				28.5 to 41.5 feet: SAND (SP), gray, fine to medium, trace to few coarse sand, trace to few silt, medium dense, wet. (ALLUVIUM)

REMARKS

(1) SS = collected with a 1.5-inch i.d. split spoon sampler. (2) SB = collected with a 2.5-inch i.d. split barrel sampler. (3) HA = collected with a 3.25-inch hand auger. (4) ST = collected with a Shelby tube. (5) Blow counts do not represent SPT results. (6) Sample numbers preceded by well or boring designation (e.g. MW-108-2.5, where MW-108 is well designation). (7) Reference elevation = top of PVC (MLLW). (8) PID = photoionization detector calibrated using +/- 100 ppm isobutylene gas.

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LOG OF EXPLORATORY BORING

PROJECT NAME	Unocal Bulk Fuel Terminal R.I.	BORING NO.	MW-122
LOCATION	Edmonds, Washington	PAGE	4 OF 5
DRILLED BY	Holt Drilling	REFERENCE ELEV.	18.08'
DRILL METHOD	Cable Tool	TOTAL DEPTH	41.50'
LOGGED BY	John Bertrand	DATE COMPLETED	09/27/95

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6 INCHES	LITHOLOGIC DESCRIPTION
			28.5 to 41.5 feet: SAND (SP), continued.
			@ 30.0 feet: fine sand, gray to olive gray, few silt, few medium sand, trace coarse sand, very dense.
SS-31		11-26-50/1"	@ 31.0 feet: few coarse sand, trace fine gravel, trace to few medium sand, very dense.
			@ 31.5 feet: SILTY SAND (SP-SM), olive brown, fine, few medium sand, trace to few fine to coarse gravel, trace coarse sand.
SS-32.5		5-5-5	@ 32.5 feet: sand with silt, trace fine gravel, loose.
SS-34		6-12-30	@ 34.0 feet: trace fine gravel, trace medium sand, trace silt, dense.
			35
SS-35.5		5-13-13	@ 35.5 feet: trace coarse sand.
SS-37		8-12-24	@ 37.0 feet: dense.
SS-38.5		18-50/5"	@ 38.25 feet: SAND WITH SILT (SP-SM), fine, few fine to coarse gravel, few coarse sand, trace to few medium sand, dense.
			@ 38.5 feet: fine sand, trace to few silt, trace medium sand, trace coarse sand, very dense.
			40

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REMARKS

(1) SS = collected with a 1.5-inch i.d. split spoon sampler. (2) SB = collected with a 2.5-inch i.d. split barrel sampler. (3) HA = collected with a 3.25-inch hand auger. (4) ST = collected with a Shelby tube. (5) Blow counts do not represent SPT results. (6) Sample numbers preceded by well or boring designation (e.g. MW-108-2.5, where MW-108 is well designation). (7) Reference elevation = top of PVC (MLLW). (8) PID = photoionization detector calibrated using +/- 100 ppm isobutylene gas.

LOG OF EXPLORATORY BORING

PROJECT NAME Unocal Bulk Fuel Terminal R.I.
LOCATION Edmonds, Washington
DRILLED BY Holt Drilling
DRILL METHOD Cable Tool
LOGGED BY John Bertrand

BORING NO. MW-122
PAGE 5 OF 5
REFERENCE ELEV. 18.08'
TOTAL DEPTH 41.50'
DATE COMPLETED 09/27/95

SAMPLING METHOD AND NUMBER	PID (in ppm)	BLOWS PER 6 INCHES	GROUND WATER LEVELS	DEPTH IN FEET	SAMPLES	WELL DETAILS	LITHOLOGIC COLUMN	LITHOLOGIC DESCRIPTION
SS-40		9-7-22						28.5 to 41.5 feet: SAND (SP), continued. @ 40.0 feet: no silt, dense. @ 41.0 feet: fine sand, few silt.
								Total depth drilled = 41.0 feet. Total depth sampled = 41.5 feet. WELL COMPLETION DETAILS: +2.73 to 30.0 feet: 2-inch-diameter, flush-threaded, Schedule 40 PVC blank riser pipe. 30.0 to 40.0 feet: 2-inch-diameter, flush-threaded, Schedule 40 PVC well screen with 0.010-inch machined slots and a flush-threaded end cap. +2.0 to 0 feet: Concrete. 0 to 27.66 feet: Bentonite chips hydrated with potable water. 27.66 to 41.5 feet: 20 - 40 Colorado Silica Sand.
				45				
				50				

REMARKS

(1) SS = collected with a 1.5-inch i.d. split spoon sampler. (2) SB = collected with a 2.5-inch i.d. split barrel sampler. (3) HA = collected with a 3.25-inch hand auger. (4) ST = collected with a Shelby tube. (5) Blow counts do not represent SPT results. (6) Sample numbers preceded by well or boring designation (e.g. MW-108-2.5, where MW-108 is well designation). (7) Reference elevation = top of PVC (MLLW). (8) PID = photoionization detector calibrated using +/- 100 ppm isobutylene gas.

EMCON

Date Start/Finish: 10/14/08 **Drilling Company:** Cascade Drilling Inc. **Driller's Name:** Andy Flanagen **Drilling Method:** Hollow Stem Auger **Auger Size:** 8" **Rig Type:** CME-75 **Sampling Method:** 2" Split Spoon	**Northing:** 297815.82 **Easting:** 1258506.89 **Casing Elevation:** 12.92 **Borehole Depth:** 13.5 **Surface Elevation:** **Descriptions By:** Michael Strickler	**Well/Boring ID: MW-129R** **Client:** Chevron **Location:** 11720 Unoco Rd., Edmonds, WA

DEPTH	ELEVATION	Sample Run Number		Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Analytical Sample	USCS Code	Geologic Column	Stratigraphic Description	Well/Boring Construction
0		1		1.5	5 8 18	26	0.0		SM		Silty SAND (SM); brown, very fine to fine, non-plastic fines, trace subrounded to subangular gravel, moist.	8" Steel well box monument and j-plug Borehole backfilled with concrete to grade Borehole backfilled with Bentonite
		2		1.5	7 8 10	18	6.9					
10		3		1.5	5 7 8	15	10.5					2" Blank sch. 40 PVC riser
		4		1.5	3 2 2	4	3.2		SP		SAND (SP); gray, very fine to fine, trace gravel, strong HCLO.	
5		5		1.5	3 4 5	9	4.3		SM		Silty SAND (SM); gray, very fine to ifne, trace organic debris, strong HCLO.	#2/12 Silica Sand
		6		1.5	1 1 3	4	0.0					
5		7		1.5	2 2 3	5	0.0		SP		SAND (SP); gray, very fine to fine, trace silt and organics, slight HCLO.	2" sch. 40 PVC 0.01" slotted screen
10		8		1.5	3 10 11	21	0.0					
		9		1.5	3 9 13	24	0.0					End cap Native SAND
0												

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Remarks: bgs = below ground surface
HCLO = hydrocarbon like odor

Analytical sample MW-129R-4.5 was collected from 4.5 - 5.0' bgs. Analytical sample MW-129R-7.0 was collected from 7.0-7.5' bgs.

Date Start/Finish: 10/08/08 **Drilling Company:** Cascade Drilling Inc. **Driller's Name:** Andy Flanagen **Drilling Method:** Hollow Stem Auger **Auger Size:** 8" **Rig Type:** CME-75 **Sampling Method:** 2" Split Spoon	**Northing:** 297500.80 **Easting:** 1257354.15 **Casing Elevation:** 12.18 **Borehole Depth:** 13.5 **Surface Elevation:** **Descriptions By:** Russ Greisler	**Well/Boring ID: MW-149R** **Client:** Chevron **Location:** 11720 Unoco Rd., Edmonds, WA

DEPTH	ELEVATION	Sample Run Number		Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Analytical Sample	USCS Code	Geologic Column	Stratigraphic Description	Well/Boring Construction
0									SP		SAND (SP); brown, fine to medium, few fine subrounded to subangular gravels, trace fines. (FILL)	8" Steel well box monument and j-plug
		1		1.5			0.0					Borehole backfilled with concrete to grade
	10											Borehole backfilled with Bentonite
												2" Blank sch. 40 PVC riser
5												
												#2/12 Silica Sand
	5	2		1.5	5 6 4	10	0.0		GW		GRAVEL (GW); brown, subrounded to subangular, trace sand and non plastic fines. (FILL)	
												2" sch. 40 PVC 0.01" slotted screen
10												
	0	3		1.5			0.3		GM		Silty GRAVEL with Sand (GM); dark brown, fine, subrounded to subangular, some non plastic fines, trace sand.	End cap
												Native Silty GRAVEL with Sand

Remarks: bgs = below ground surface

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Infrastructure, environment, buildings

Date Start/Finish: 10/14/08 **Drilling Company:** Cascade Drilling Inc. **Driller's Name:** Andy Flanagen **Drilling Method:** Hollow Stem Auger **Auger Size:** 8" **Rig Type:** CME-75 **Sampling Method:** 2" Split Spoon	**Northing:** 297621.69 **Easting:** 1258643.65 **Casing Elevation:** 16.64 **Borehole Depth:** 13 **Surface Elevation:** **Descriptions By:** Michael Strickler	**Well/Boring ID: MW-500** **Client:** Chevron **Location:** 11720 Unoco Rd., Edmonds, WA

DEPTH	ELEVATION	Sample Run Number		Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Analytical Sample	USCS Code	Geologic Column	Stratigraphic Description	Well/Boring Construction
0	15								SP		SAND (SP); light brown, very fine to fine, few fine subrounded to subangular gravels, moist. (FILL)	8" Steel well box monument and j-plug Borehole backfilled with concrete to grade Borehole backfilled with Bentonite 2" Blank sch. 40 PVC riser #2/12 Silica Sand 2" sch. 40 PVC 0.01" slotted screen End cap
		1		1.5	12 13 19	32	0.0					
5	10											
		2		1.5	4 3 4	7	2.0		SM		Sandy SILT (SM); gray, non plastic, very fine to fine sand, trace woody debris, slight HCLO, wet.	
10	5											
		3		1.0			12.3					

Remarks: bgs = below ground surface
HCLO = hydrocarbon like odor

ARCADIS
Infrastructure, environment, buildings

Date Start/Finish: 10/8/08 **Drilling Company:** Cascade Drilling Inc. **Driller's Name:** Andy Flanagen **Drilling Method:** Hollow Stem Auger **Auger Size:** 8" **Rig Type:** CME-75 **Sampling Method:** 2" Split Spoon	**Northing:** 298032.03 **Easting:** 1257902.08 **Casing Elevation:** 14.60 **Borehole Depth:** 13.5 **Surface Elevation:** **Descriptions By:** Aric Frohman	**Well/Boring ID: MW-518** **Client:** Chevron **Location:** 11720 Unoco Rd., Edmonds, WA

DEPTH	ELEVATION	Sample Run Number		Recovery (feet)	Blow Counts	N - Value	PID Headspace (ppm)	Analytical Sample	USCS Code	Geologic Column	Stratigraphic Description	Well/Boring Construction
0									SP		SAND (SP); brown, very fine to medium, trace fine to coarse subrounded to subangular gravel, damp. (FILL)	8" Steel well box monument and j-plug
		1		1.0	17 21 15	36	0.0					Borehole backfilled with concrete to grade
		2		1.0	16 15 16	31	0.0					Borehole backfilled with Bentonite
5	10	3		1.0	5 5 6	11	0.0				Increasing to little fine subrounded gravels	2" Blank sch. 40 PVC riser
		4		1.0	11 17 19	36	0.0					#2/12 Silica Sand
		5		1.5	11 15 15	30	0.0					
10	5	6		1.5	5 6 6	12	2.1				Change in color to gray	2" sch. 40 PVC 0.01" slotted screen
		7		1.0			0.7					
		8		1.5			0.9					End cap

Remarks: bgs = below ground surface

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Infrastructure, environment, buildings

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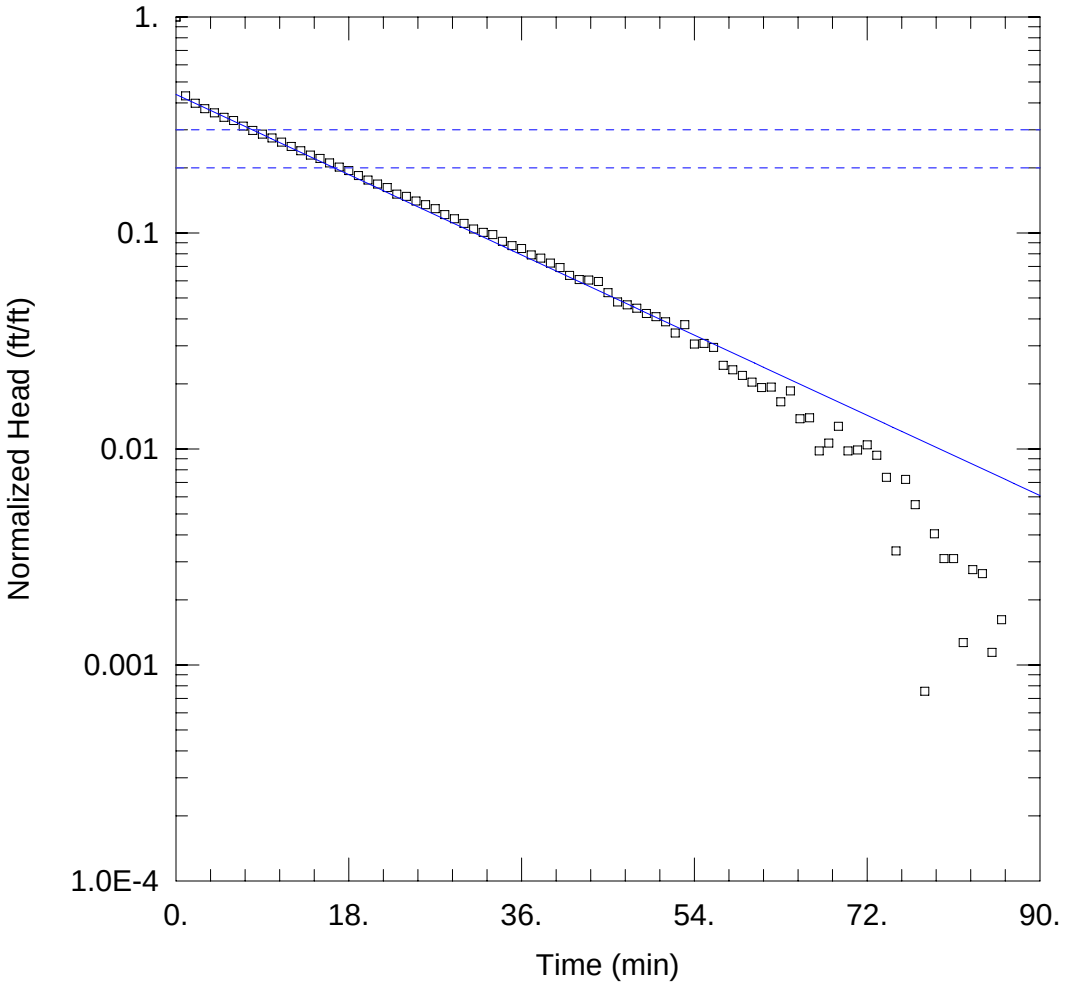
Appendix G

Hydraulic Conductivity Test Results and Analysis



LM-2 SLUG TEST

Data Set: G:\...\EdmondsTerminal LM-2_BR.aqt
Date: 11/11/11 Time: 16:45:53

PROJECT INFORMATION

Company: ARCADIS
Client: Chevron
Project: B0045362.0003
Location: Edmonds Terminal
Test Well: LM-2
Test Date: 9/29/2011

AQUIFER DATA

Saturated Thickness: 5.24 ft Anisotropy Ratio (Kz/Kr): 1.

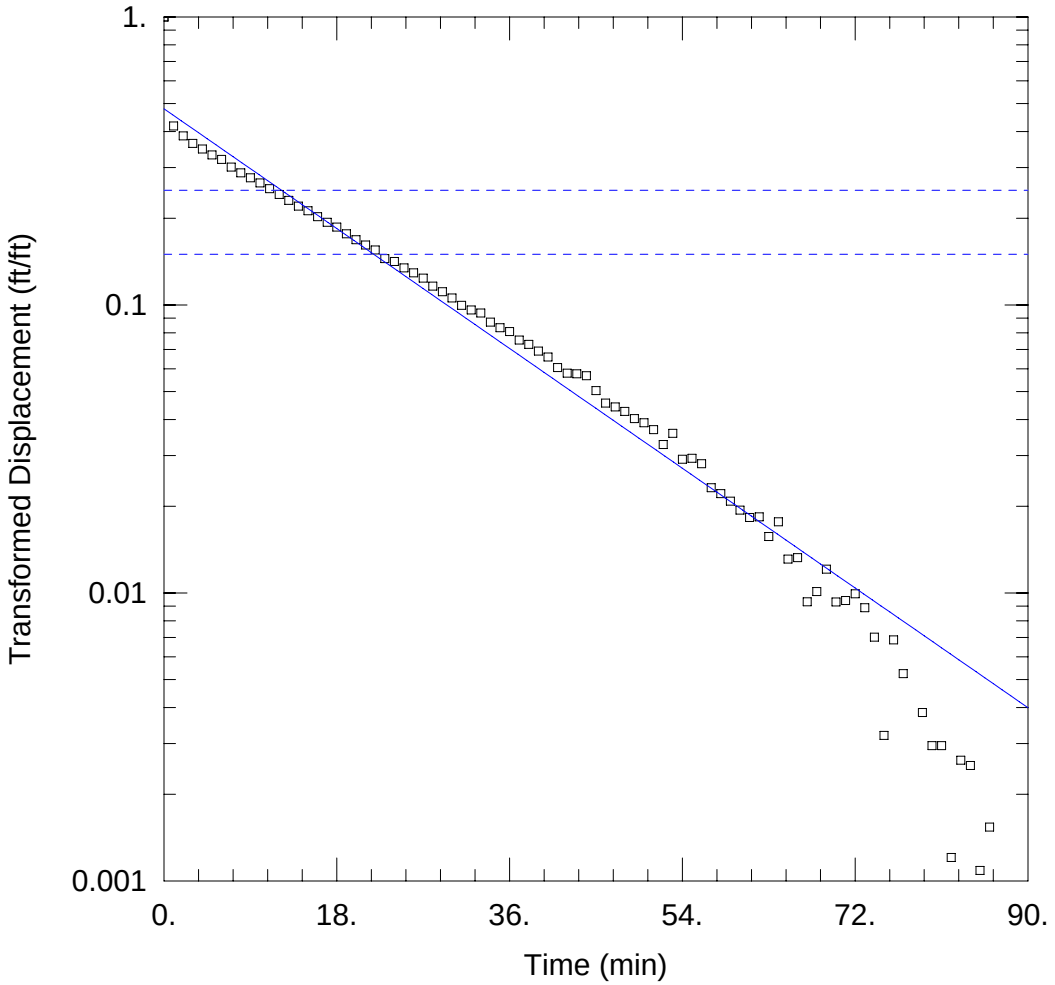
WELL DATA (LM-2)

Initial Displacement: 0.5482 ft
Total Well Penetration Depth: 5.5 ft
Casing Radius: 0.083 ft
Static Water Column Height: 5.24 ft
Screen Length: 5.5 ft
Well Radius: 0.33 ft
Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined Solution Method: Bouwer-Rice

K = 0.3 ft/day y0 = 0.24 ft



LM-2 SLUG TEST

Data Set: G:\...\EdmondsTerminal LM-2_D.aqt
Date: 11/11/11 Time: 16:57:29

PROJECT INFORMATION

Company: ARCADIS
Client: Chevron
Project: B0045362.0003
Location: Edmonds Terminal
Test Well: LM-2
Test Date: 9/29/2011

AQUIFER DATA

Saturated Thickness: 5.24 ft Anisotropy Ratio (Kz/Kr): 1.

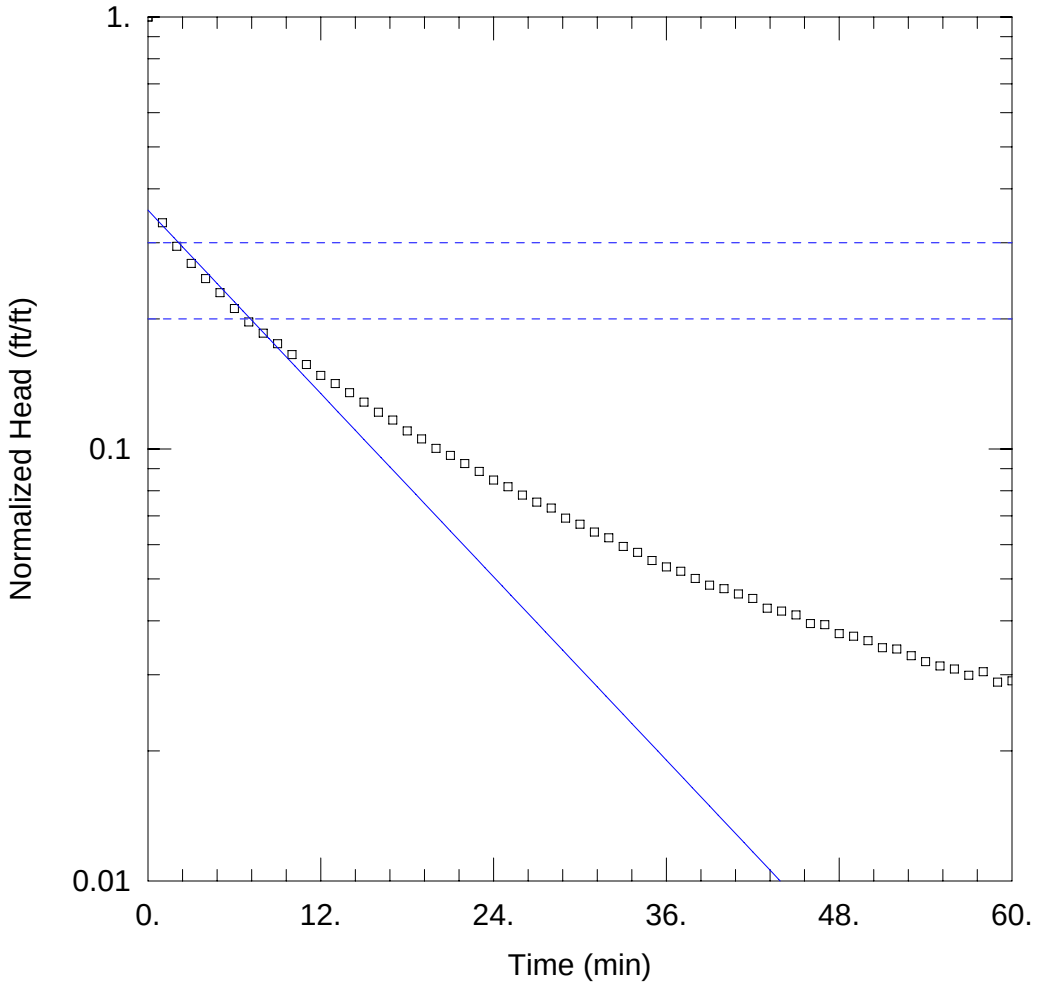
WELL DATA (LM-2)

Initial Displacement: 0.5482 ft
Total Well Penetration Depth: 5.5 ft
Casing Radius: 0.083 ft
Static Water Column Height: 5.24 ft
Screen Length: 5.5 ft
Well Radius: 0.33 ft
Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined Solution Method: Dagan

K = 0.4 ft/day y0 = 0.27 ft



MW-129R SLUG TEST

Data Set: G:\...\EdmondsTerminal MW-129R_BR.aqt
Date: 11/11/11 Time: 16:56:06

PROJECT INFORMATION

Company: ARCADIS
Client: Chevron
Project: B0045362.0003
Location: Edmonds Terminal
Test Well: MW-129R
Test Date: 9/29/2011

AQUIFER DATA

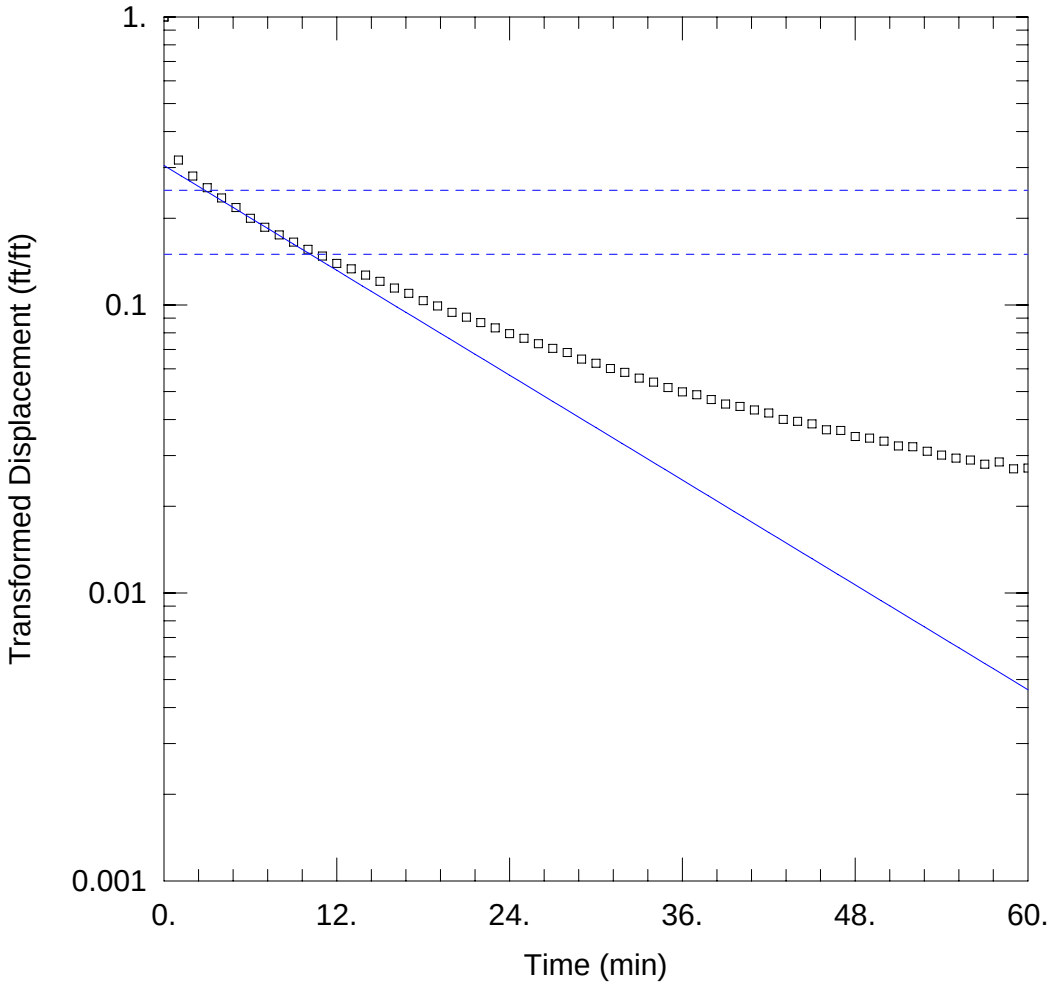
Saturated Thickness: 7.3 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-129R)

Initial Displacement: 1.345 ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.083 ft
Static Water Column Height: 7.3 ft
Screen Length: 10. ft
Well Radius: 0.33 ft
Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.2 ft/day
y0 = 0.48 ft



MW-129R SLUG TEST

Data Set: G:\...\EdmondsTerminal MW-129R_D.aqt
Date: 11/11/11 Time: 16:46:59

PROJECT INFORMATION

Company: ARCADIS
Client: Chevron
Project: B0045362.0003
Location: Edmonds Terminal
Test Well: MW-129R
Test Date: 9/29/2011

AQUIFER DATA

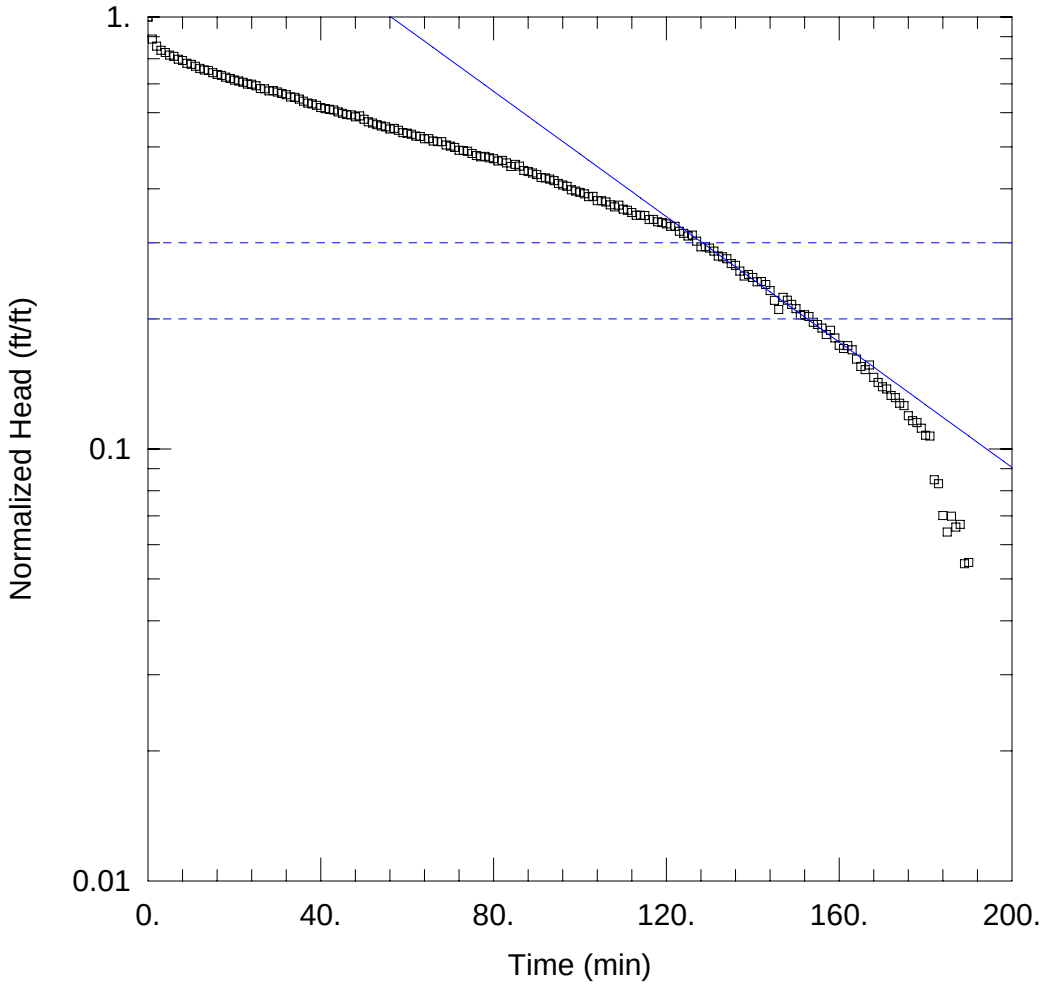
Saturated Thickness: 7.3 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-129R)

Initial Displacement: 1.345 ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.083 ft
Static Water Column Height: 7.3 ft
Screen Length: 10. ft
Well Radius: 0.33 ft
Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined
Solution Method: Dagan
K = 0.2 ft/day
y0 = 0.43 ft



MW-500 SLUG TEST

Data Set: G:\...\EdmondsTerminal MW-500_BR.aqt
Date: 11/11/11 Time: 16:48:50

PROJECT INFORMATION

Company: ARCADIS
Client: Chevron
Project: B0045362.0003
Location: Edmonds Terminal
Test Well: MW-500
Test Date: 9/29/2011

AQUIFER DATA

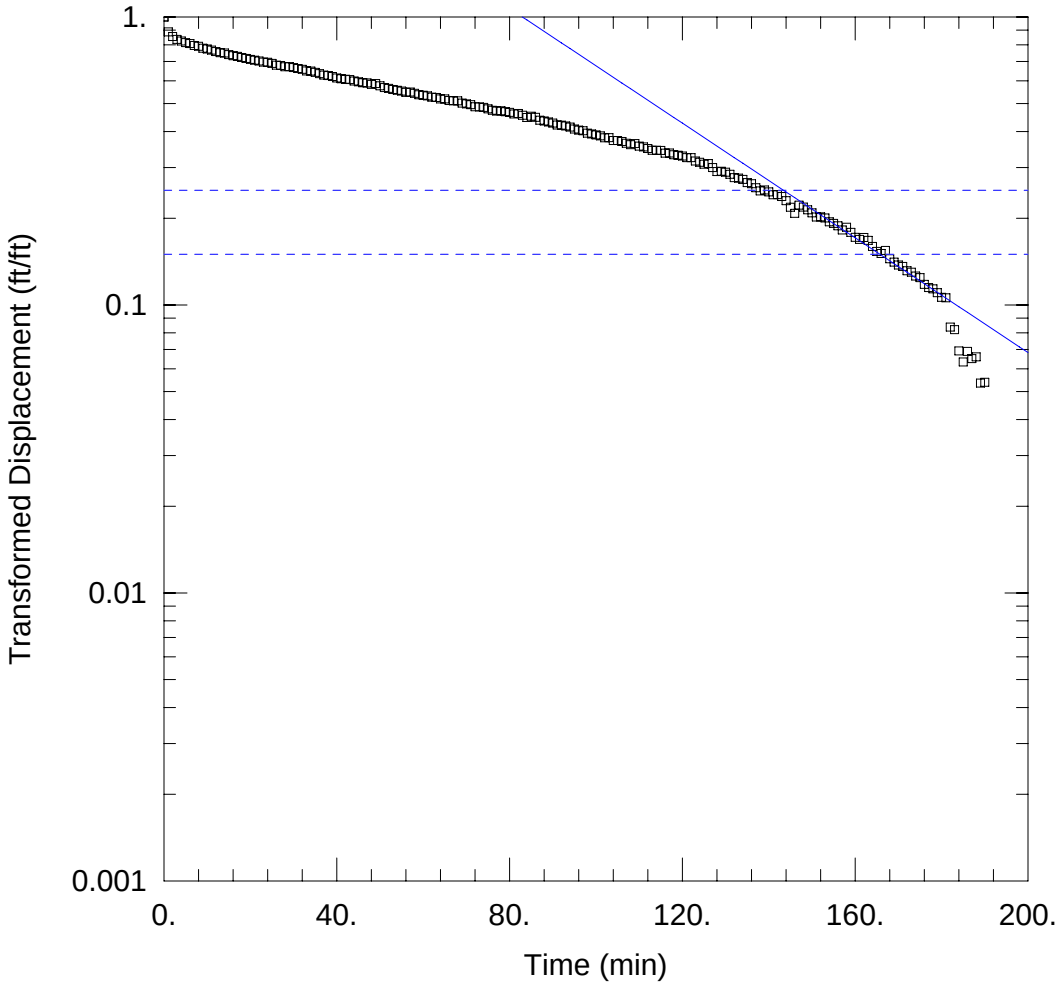
Saturated Thickness: 3.62 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-500)

Initial Displacement: 0.2735 ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.083 ft
Static Water Column Height: 3.62 ft
Screen Length: 10. ft
Well Radius: 0.33 ft
Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice
K = 0.05 ft/day
y0 = 0.7 ft



MW-500 SLUG TEST

Data Set: G:\...\EdmondsTerminal MW-500_D.aqt
Date: 11/11/11 Time: 16:49:25

PROJECT INFORMATION

Company: ARCADIS
Client: Chevron
Project: B0045362.0003
Location: Edmonds Terminal
Test Well: MW-500
Test Date: 9/29/2011

AQUIFER DATA

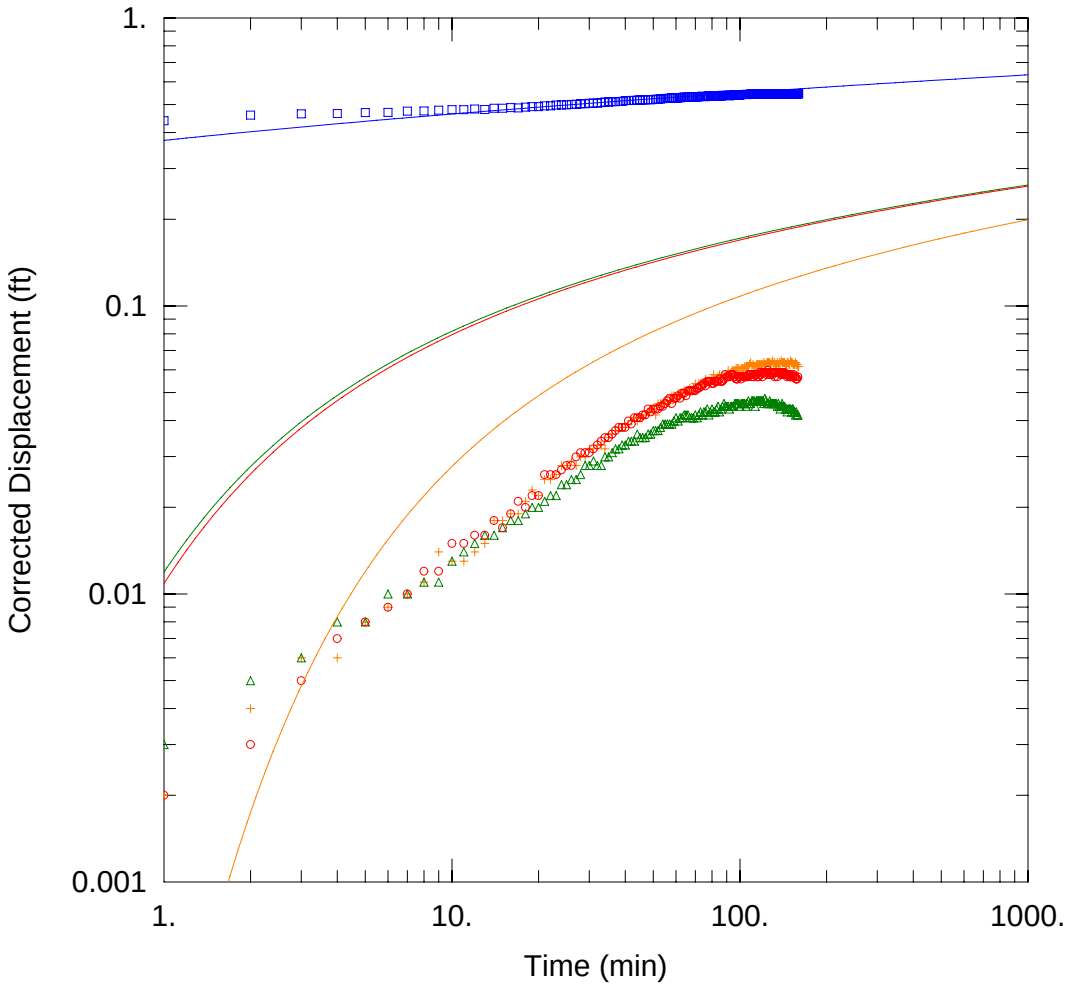
Saturated Thickness: 3.62 ft
Anisotropy Ratio (Kz/Kr): 1.

WELL DATA (MW-500)

Initial Displacement: 0.2735 ft
Total Well Penetration Depth: 10. ft
Casing Radius: 0.083 ft
Static Water Column Height: 3.62 ft
Screen Length: 10. ft
Well Radius: 0.33 ft
Gravel Pack Porosity: 0.

SOLUTION

Aquifer Model: Unconfined
Solution Method: Dagan
K = 0.08 ft/day
y0 = 1.7 ft



WELL TEST ANALYSIS

Data Set: G:\...\MW-8R-24hr.aqt
Date: 10/25/11 Time: 14:34:06

PROJECT INFORMATION

Company: ARCADIS
Client: Chevron
Project: B0045362.0003
Location: Edmonds, WA
Test Date: 5/10/2011

WELL DATA

Pumping Wells

Well Name	X (ft)	Y (ft)
MW-8R	0.08	0.08

Observation Wells

Well Name	X (ft)	Y (ft)
MW-8R	0.08	0.08
MW-521	80	-60
MW-522	20	40
MW-523	-13	-44

SOLUTION

Aquifer Model: Unconfined
Solution Method: Theis

T = 1850. ft^2/day
S = 0.002154
Kz/Kr = 0.1
b = 5.5 ft

Table G-1.
Summary of Aquifer Tests and Hydraulic Conductivity Estimates (May and September 2011)
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Well ID	Sandpack Top (ft bgs)	Top of Screen (ft bgs)	Bottom of Screen /Sandpack (ft bgs)	Well Casing Diameter (in)	Well Borehole Diameter (in)	Pumping Test Period (min)	Water Removed During Test (gal)	Initial Water-level (ft bmp)	Final Water-level (ft bmp)	Walton Method K[1] (ft/day)	Theis K [2] (ft/day)	Theis Agarwal K[3] (ft/day)	Bouwer-Rice K[4] (ft/day)	Dagan K[5] (ft/day)	Arithmetic Mean K (ft/day)	Lithology at Screen Interval	Notes
LM-2	2	2.5	9	2	*8*	27	2.7	1.47	4.53	NA	NA	NA	0.3	0.4	0.4	Sand w/ silt	*A,C*
MW-8R	2	3	13	2	8	74.5	320	7.70	8.32	186	345	245	NA	NA	259	Gravelly Sand	*B,C,D*
MW-104	3.5	5	15	2	10	83	259	7.73	12.91	7.5	15	NA	NA	NA	11	Sand w/ trace silt	*B,C*
MW-129R	2	3	13	2	8	84	24.4	5.10	9.45	0.4	0.5	NA	0.2	0.2	0.3	Sand w/ trace gravel and silt	*B,C*
MW-149R	2	3	13.5	2	8	66	130	6.45	10.65	5.9	NA	NA	NA	NA	5.9	Sand & gravel w/ trace fines	*B,C*
MW-500	2	3	13	2	8	30	7.5	3.8	7.11	0.11	NA	NA	0.05	0.08	0.1	Silty Sand	*A,B*
MW-518	2	3	13.5	2	8	96	240	8.71	11.99	17	10	NA	NA	NA	13	Sand w/ trace gravel and silt	*B,C*

Notes:
ft bgs - feet below the ground surface
in - inches
min - minutes
gal - gallons
ft bmp - feet below measuring point
ft/day - feet per day
K - hydraulic conductivity
NA - not analyzed (not suitable for analysis)
Red - assumed/estimated value
A = used step rate pump test data (initial step only) from May 12/13, 2011
B = used the steady state pump test data from the May 16/17, 2011
C = Walton method could not be adjusted for drawdown, approximate
D = Theis solutions used the 24 hour MW-8R pump test data from 5/19-20/2011. Note, the obervation well drawdown was not sufficient for accurate analyses
E = Slug tests (falling head) were peformed on the noted wells on September 19, 2011.

Solution notes:
[1] - Walton, W.C. 1962. Selected Analytical Methods for Well and Aquifer Evaluation, Illinois State Water Survey, Bulletin 19. (approximate)
[2] - Modified Theis Equation using AQTESOLV Professional V4.
[3] - Modified Theis Aagarwal Recovery Method using AQTESOLV Professional V4.
[4] - Bouwer and Rice Method using AQTESOLV Professional V4.
[5] - Dagan Method using AQTESOLV Professional V4.
Storativity could not be estimated. Thus, some additional errors were introduced in some of the solutions.
Due to the shorter test period and low data resolution, the solutions do not account for skin effects and only partially account for wellbore storage effects.

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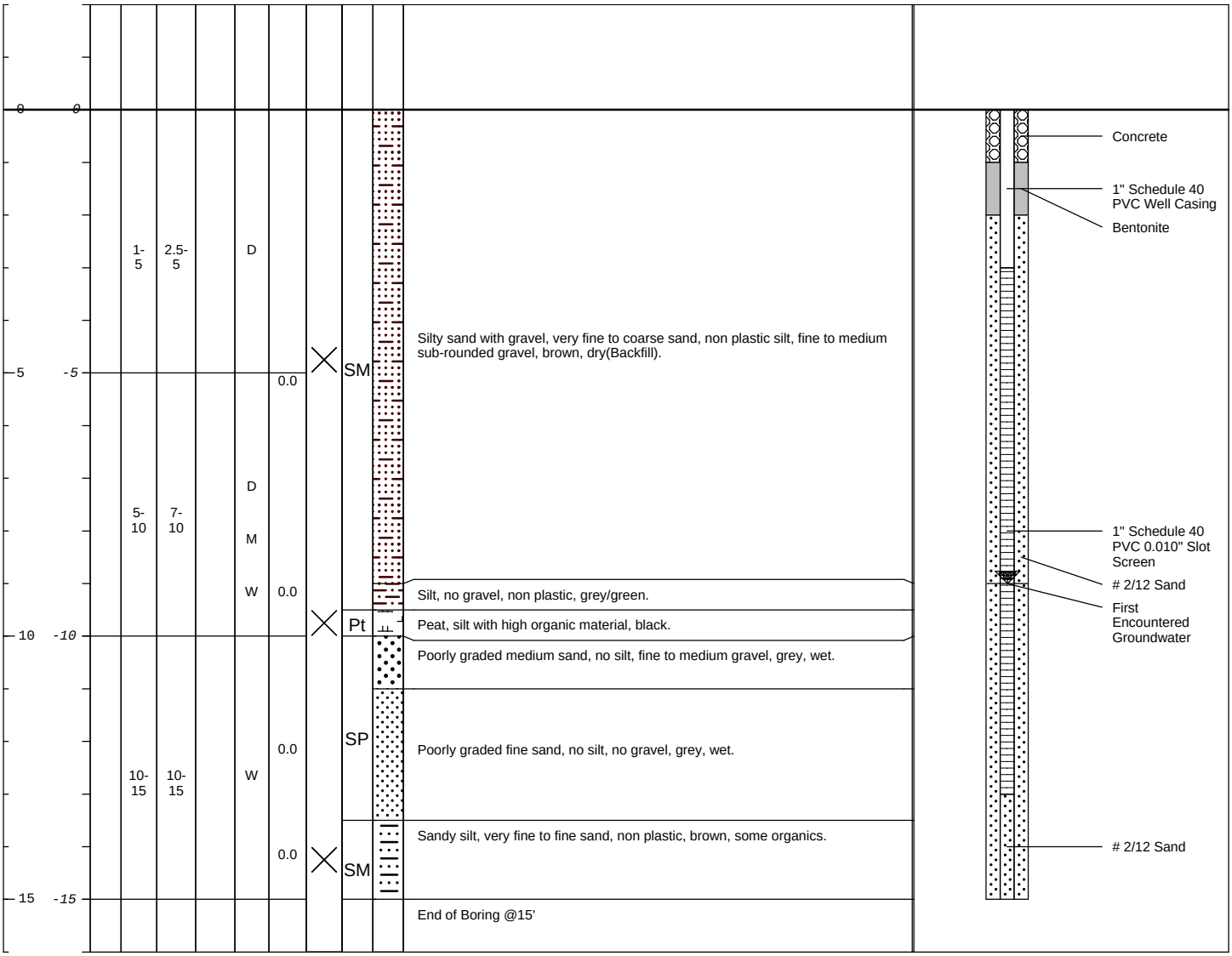
Appendix H

DB-2 Investigation Boring Logs

Date Start/Finish: 8-22-11 **Drilling Company:** Cascade Drilling Inc. **Driller's Name:** KC **Drilling Method:** Direct Push **Auger Size:** NA **Rig Type:** Geoprobe **Sampling Method:** Sleeve	**Northing:** NM **Easting:** NM **Casing Elevation:** 13.86 **Borehole Depth:** 15' **Surface Elevation:** NM **Descriptions By:** David Rasar	**Well/Boring ID:** **B-1/P-9** **Client:** Chevron **Location:** 11720 Unoco Road Edmonds, Washington



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Remarks: Note: No LNAPL , sheen, or HCLO encountered in Boring B-1. Piezometer P-9 is a 1" prepacked PVC well with 0.010 slot screen from 3-13 ft.

D = Dry
HCLO = Hydrocarbon-like Odor
M = Moist
NM = Not Measured
OD = Outer Diameter
ft. = feet
LNAPL= Light Non-Aqueous Phase Liquid
NA = Not Applicable/Avalible
NR = No Recovery
W = Wet

Date Start/Finish: 8-22-11
Drilling Company: Cascade Drilling Inc.
Driller's Name: KC
Drilling Method: Direct Push
Auger Size: NA
Rig Type: Geoprobe
Sampling Method: Sleeve

Northing: NM
Easting: NM
Casing Elevation: NA

Borehole Depth: 15'
Surface Elevation: 13.7

Descriptions By: David Rasar

Well/Boring ID: **B-2**

Client: Chevron

Location: 11720 Unoco Road
Edmonds, Washington

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	Moisture	PID Headspace (ppm)	Analytical Sample	USCS Code	Geologic Column	Stratigraphic Description	Well/Boring Construction
0	0		0-5	0-5		D	0.0				Silty sand with gravel, very fine to coarse sand, non plastic silt, fine to medium sub-rounded gravel, brown, dry(Backfill).	
							0.0					
5	-5					M			SM			
			5-10	5-10		W	0.0				Silty sand, very fine to to medium, non-plastic, trace gravel, grey, moist.	
10	-10					W	0.0				Same as above with increasing sand and grain size.	
			10-15	10-15		W	0.0		SP		Poorly graded very fine to coarse sand, with fine to medium gravel, grey, wet.	
15	-15						0.0				End of Boring @ 15'	

First Encounterecd Groundwater

Bentonite

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Remarks: Note: No LNADL , sheen, or HCLO encountered in Boring B-2.

D = Dry
HCLO = Hydrocarbon-like Odor
M = Moist
NM = Not Measured
OD = Outer Diameter
ft. = feet
LNADL= Light Non-Aqueous Phase Liquid
NA = Not Applicable/Avalible
NR = No Recovery
W = Wet

Project Number:B0045302
Data File:

Date: 11/10/2011 Created/Edited by:SWM

Date Start/Finish: 8-22-11
Drilling Company: Cascade Drilling Inc.
Driller's Name: KC
Drilling Method: Direct Push
Auger Size: NA
Rig Type: Geoprobe
Sampling Method: Sleeve

Northing: NM
Easting: NM
Casing Elevation: NA

Borehole Depth: 15'
Surface Elevation: 14.4

Descriptions By: David Rasar

Well/Boring ID: **B-3**

Client: Chevron

Location: 11720 Unoco Road
Edmonds, Washington

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	Moisture	PID Headspace (ppm)	Analytical Sample	USCS Code	Geologic Column	Stratigraphic Description	Well/Boring Construction
0	0		0-5	1-5		D					Silty sand with gravel, very fine to coarse sand, non plastic silt, fine to medium sub-rounded gravel, brown, dry(Backfill).	Bentonite; First Encountered Groundwater
5	-5		5-10	5-10		D	0.0		SM			
						M	0.0					
						W					Silty sand, very fine to to medium, non-plastic, trace fine gravel, grey, moist.	
10	-10		10-15	10-15		W	0.0				Silt with fine gravel, non-plastic, grey-green.	
							0.0		SP		Poorly graded sand, very fine to coarse sand, no silt, trace gravel, grey, wet.	
15	-15										End of Boring @ 15'	

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Remarks: Note: No LNADL , sheen, or HCLO encountered in Boring B-3.

D = Dry
HCLO = Hydrocarbon-like Odor
M = Moist
NM = Not Measured
OD = Outer Diameter
ft. = feet
LNADL= Light Non-Aqueous Phase Liquid
NA = Not Applicable/Avalible
NR = No Recovery
W = Wet

Project Number:B0045302
Data File:

Date: 11/10/2011 Created/Edited by:SWM

Date Start/Finish: 8-22-11
Drilling Company: Cascade Drilling Inc.
Driller's Name: KC
Drilling Method: Direct Push
Auger Size: NA
Rig Type: Geoprobe
Sampling Method: Sleeve

Northing: NM
Easting: NM
Casing Elevation: 13.63

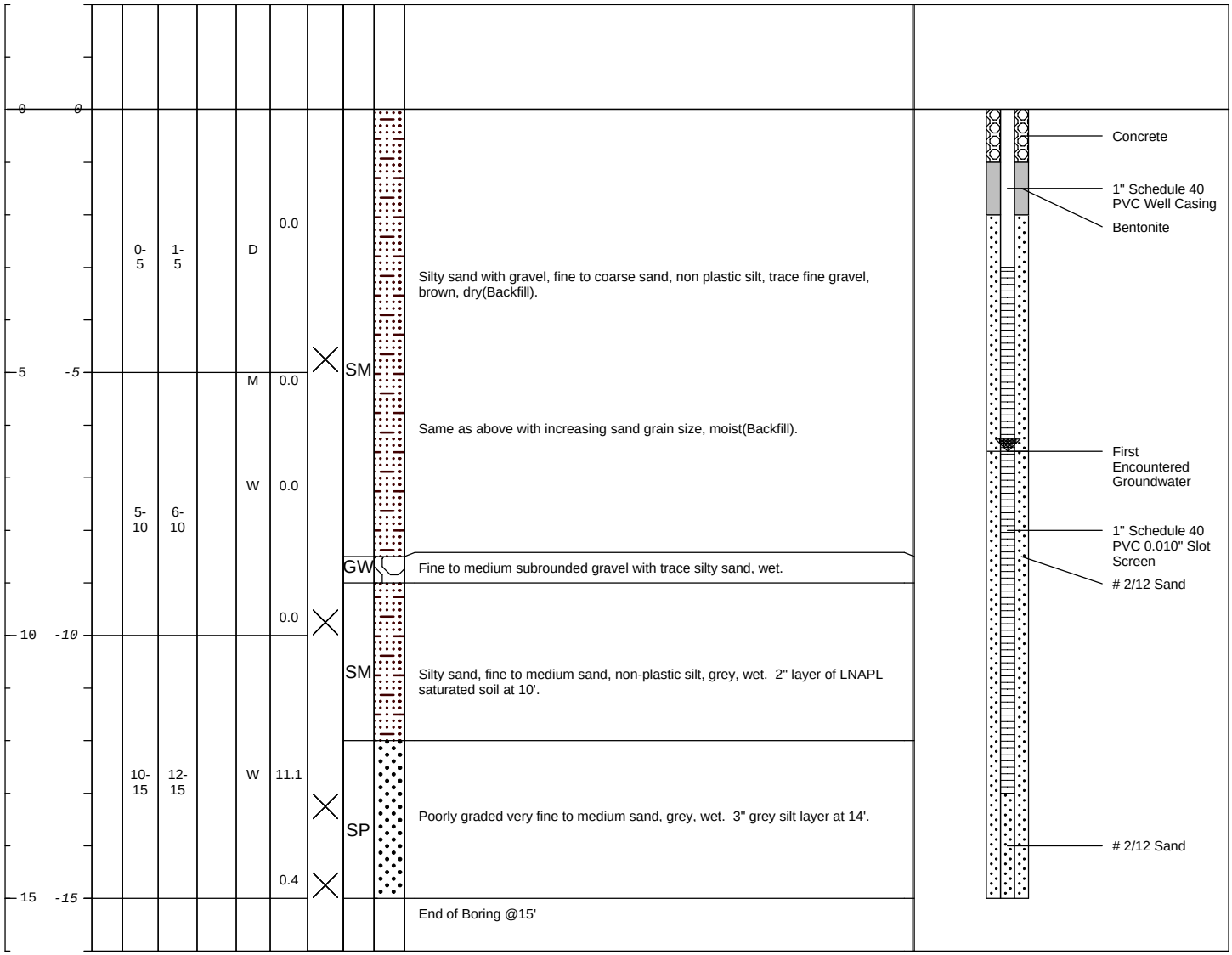
Borehole Depth: 15'
Surface Elevation: NM

Descriptions By: David Rasar

Well/Boring ID: **B-4/P-11**

Client: Chevron

Location: 11720 Unoco Road
Edmonds, Washington



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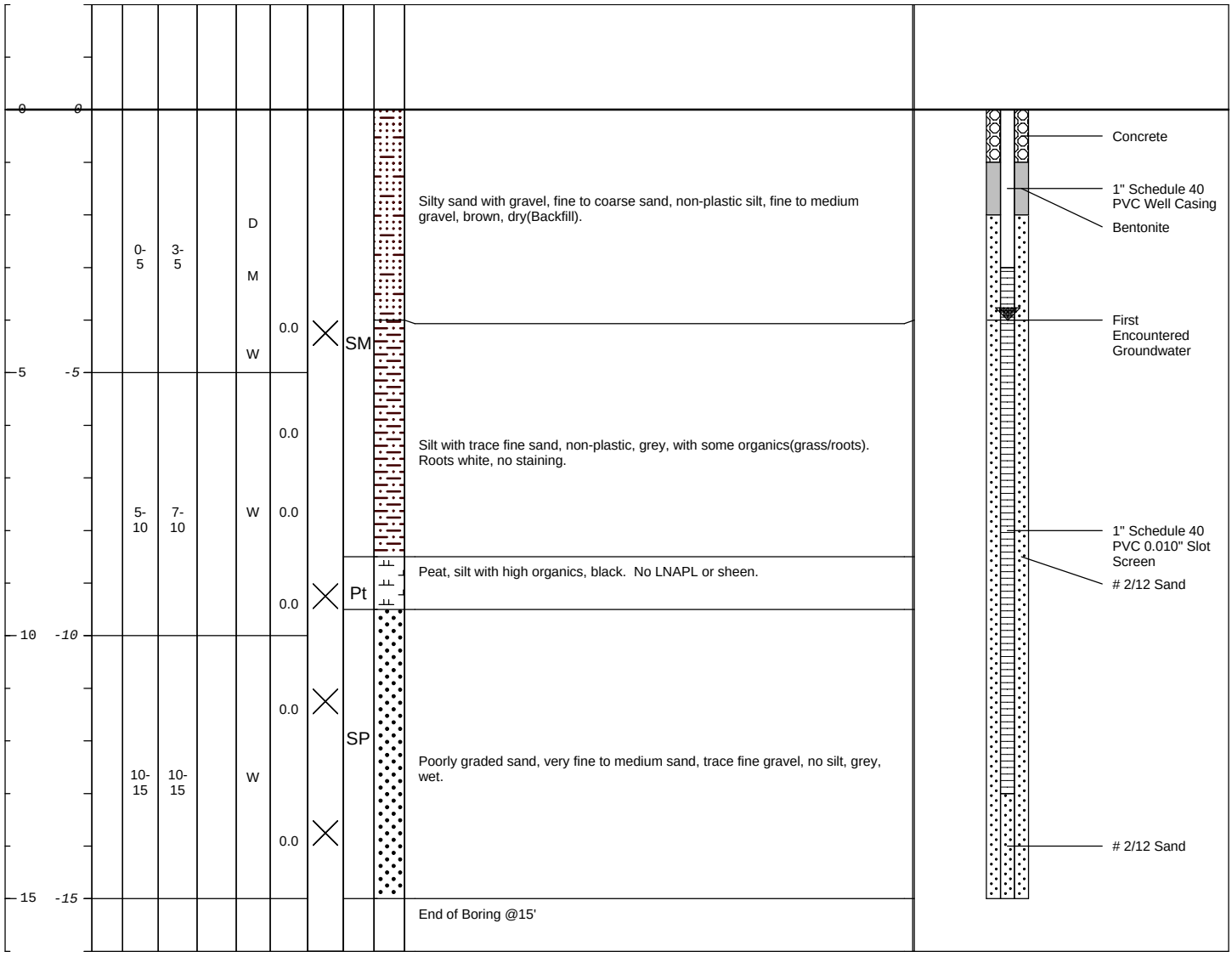
Remarks: Note: 2" layer of LNAPL saturated soil at 10'. Piezometer P-11 is a 1" prepacked PVC well with 0.010 slot screen from 3-13 ft.

D = Dry
HCLO = Hydrocarbon-like Odor
M = Moist
NM = Not Measured
OD = Outer Diameter
ft. = feet
LNADL= Light Non-Aqueous Phase Liquid
NA = Not Applicable/Avalible
NR = No Recovery
W = Wet

Project Number:B0045302
Data File:

Date: 11/10/2011 Created/Edited by:SWM

Date Start/Finish: 8-22-11 **Drilling Company:** Cascade Drilling Inc. **Driller's Name:** KC **Drilling Method:** Direct Push **Auger Size:** NA **Rig Type:** Geoprobe **Sampling Method:** Sleeve	**Northing:** NM **Easting:** NM **Casing Elevation:** 11.07 **Borehole Depth:** 15' **Surface Elevation:** NM **Descriptions By:** David Rasar	**Well/Boring ID:** **B-5/P-10** **Client:** Chevron **Location:** 11720 Unoco Road Edmonds, Washington



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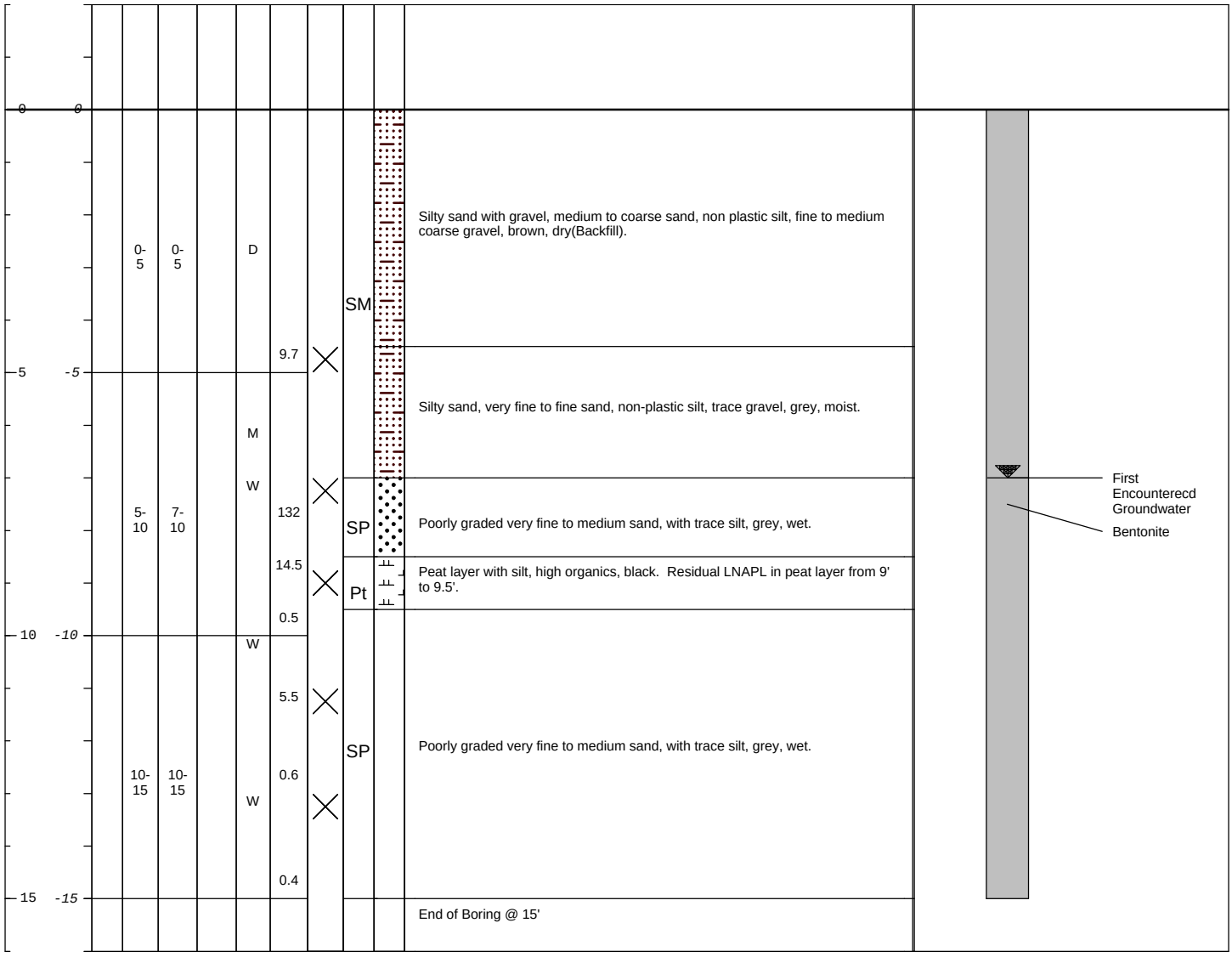
Remarks: Note: No LNAPL , sheen, or HCLO encountered in Boring B-5. Piezometer P-10 is a 1" prepacked PVC well with 0.010 slot screen from 3-13 ft.

D = Dry
HCLO = Hydrocarbon-like Odor
M = Moist
NM = Not Measured
OD = Outer Diameter
ft. = feet
LNADL= Light Non-Aqueous Phase Liquid
NA = Not Applicable/Avalible
NR = No Recovery
W = Wet

Project Number:B0045302
Data File:
Date: 11/10/2011
Created/Edited by:SWM

Date Start/Finish: 8-22-11 **Drilling Company:** Cascade Drilling Inc. **Driller's Name:** KC **Drilling Method:** Direct Push **Auger Size:** NA **Rig Type:** Geoprobe **Sampling Method:** Sleeve	**Northing:** NM **Easting:** NM **Casing Elevation:** NA **Borehole Depth:** 15' **Surface Elevation:** 13.4 **Descriptions By:** David Rasar	**Well/Boring ID:** **B-6** **Client:** Chevron **Location:** 11720 Unoco Road Edmonds, Washington



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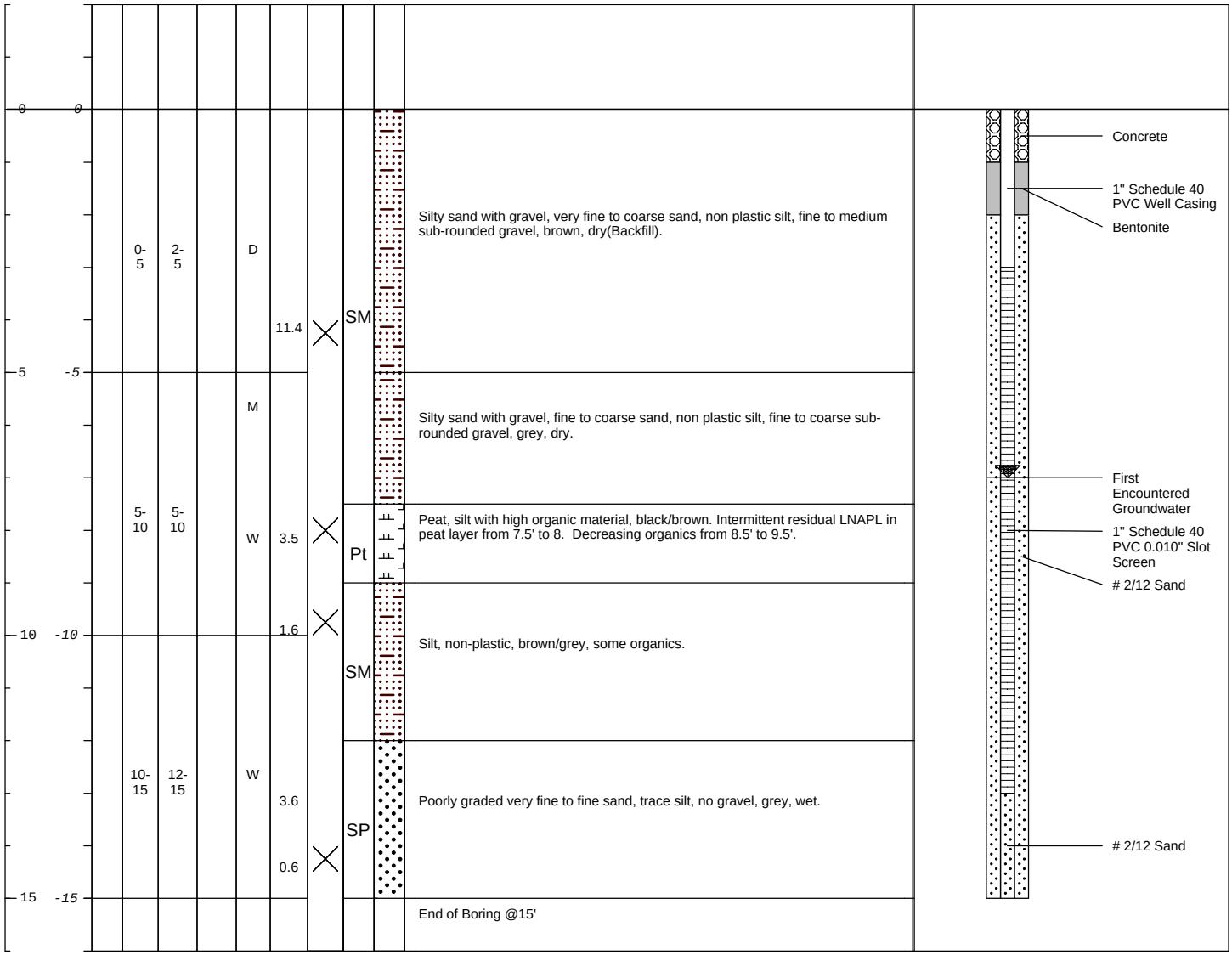
Remarks: Note: Residual LNAPL in peat layer from 9' to 9.5'.

D = Dry
HCLO = Hydrocarbon-like Odor
M = Moist
NM = Not Measured
OD = Outer Diameter
ft. = feet
LNAPL= Light Non-Aqueous Phase Liquid
NA = Not Applicable/Avalible
NR = No Recovery
W = Wet

Project Number:B0045302
Data File:
Date: 11/10/2011
Created/Edited by:SWM

Date Start/Finish: 8-22-11 **Drilling Company:** Cascade Drilling Inc. **Driller's Name:** KC **Drilling Method:** Direct Push **Auger Size:** NA **Rig Type:** Geoprobe **Sampling Method:** Sleeve	**Northing:** NM **Easting:** NM **Casing Elevation:** 13.03 **Borehole Depth:** 15' **Surface Elevation:** NM **Descriptions By:** David Rasar	**Well/Boring ID:** **B-7/P-12** **Client:** Chevron **Location:** 11720 Unoco Road Edmonds, Washington



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Remarks: Note: Intermitent redisual LNAPL in peat layer from 7.5' to 8.25'. Piezometer P-12 is a 1" prepacked PVC well with 0.010 slot screen from 3-13 ft.

D = Dry	ft. = feet
HCLO = Hydrocarbon-like Odor	LNAPL= Light Non-Aqueous Phase Liquid
M = Moist	NA = Not Applicable/Avalible
NM = Not Measured	NR = No Recovery
OD = Outer Diameter	W = Wet

Project Number:B0045302
Data File:

Date: 11/10/2011 Created/Edited by:SWM

Date Start/Finish: 8-23-11 **Drilling Company:** Cascade Driller Inc. **Driller's Name:** ELI **Drilling Method:** Direct Push **Auger Size:** NA **Rig Type:** Geoprobe **Sampling Method:** Sleeve	**Northing:** NM **Easting:** NM **Casing Elevation:** NA **Borehole Depth:** 15' **Surface Elevation:** 13.1 **Descriptions By:** David Rasar	**Well/Boring ID:** **B-8** **Client:** Chevron **Location:** 11720 Unoco Road Edmonds, Washington

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	Moisture	PID Headspace (ppm)	Analytical Sample	USCS Code	Geologic Column	Stratigraphic Description	Well/Boring Construction
0	0		0-5	2-5		D	26	X	SM		Silty sand with gravel, very fine to coarse sand, non plastic silt, fine to medium coarse gravel, brown, dry(Backfill).	
5	-5		5-10	6-10		M W	37.5 12.1 12.6	X X	SP		Sandy silt, non-plastic silt, very fine to fine sand, trace fine gravel, grey, dry. Poorly graded sand with gravel, fine to coarse sand, medium to coarse gravel, moist/wet. LNAPL saturated soils encountered from 8.5' to 10'. 2" piece of wood encountered at 9.5'. Poorly graded sand, very fine to medium sand, trace fine gravel, grey, wet. Intermittent LNAPL saturated soils encountered from 10.5' to 12'.	Bentonite First Encounterecd Groundwater
10	-10		10-15	10-15		W		X X			Poorly graded sand, very fine to medium sand, with trace fine gravel, grey, moist. No LNAPL or sheen from 12' to 15'.	
15	-15										End of Boring @ 15'	

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Remarks: Note: Intermittent LNAPL saturated soils encountered at 8.5' to 10' and 10.5' to 12'.

D = Dry
HCLO = Hydrocarbon-like Odor
M = Moist
NM = Not Measured
OD = Outer Diameter
ft. = feet
LNAPL= Light Non-Aqueous Phase Liquid
NA = Not Applicable/Avalible
NR = No Recovery
W = Wet

Project Number:B0045302
Data File:
Date: 11/10/2011
Created/Edited by:SWM

Date Start/Finish: 8-23-11 **Drilling Company:** Cascade Drilling Inc. **Driller's Name:** ELI **Drilling Method:** Direct Push **Auger Size:** NA **Rig Type:** Geoprobe **Sampling Method:** Sleeve	**Northing:** NM **Easting:** NM **Casing Elevation:** 13.02 **Borehole Depth:** 15' **Surface Elevation:** NM **Descriptions By:** David Rasar	**Well/Boring ID:** **B-9/P-13** **Client:** Chevron **Location:** 11720 Unoco Road Edmonds, Washington

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	Moisture	PID Headspace (ppm)	Analytical Sample	USCS Code	Geologic Column	Stratigraphic Description	Well/Boring Construction
0	0		0-5	1-5		D	0.0		SM		Silty sand with gravel, very fine to coarse sand, non plastic silt, fine to coarse gravel, brown, dry(Backfill).	Concrete 1" Schedule 40 PVC Well Casing Bentonite
5	-5						0.3	X			No recovery from 5' to 7.5' due to slough from 0 to 5'.	
			5-10	7.5-10		M W	11.2	X			Poorly graded sand with trace silt, very fine to fine sand, grey, moist. LNAPL saturated soils from 8.5' to 9.5'.	First Encountered Groundwater 1" Schedule 40 PVC 0.010" Slot Screen # 2/12 Sand
10	-10						0.2	X			No LNAPL from 9.5' to 11'.	
							0.6	X			Poorly graded sand with trace silt, very fine to fine sand, grey, moist. LNAPL saturated soils encountered from 11' to 11.5'. 1" medium to coarse gravel layer encountered at 11.25'.	
			10-15	10-15		W	12.0 0.3	X	SP		No LNAPL from 11.5' to 15'	# 2/12 Sand
15	-15										End of Boring @15'	

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Remarks: Note: LNAPL saturated soils from 8.5' to 9.5' and from 11' to 11.5'. Piezometer P-13 is a 1" prepacked PVC well with 0.010 slot screen from 3-13 ft.

D = Dry
HCLO = Hydrocarbon-like Odor
M = Moist
NM = Not Measured
OD = Outer Diameter
ft. = feet
LNAPL= Light Non-Aqueous Phase Liquid
NA = Not Applicable/Avalible
NR = No Recovery
W = Wet

Date Start/Finish: 8-25-11 **Drilling Company:** NA **Driller's Name:** David Rasar **Drilling Method:** Hand Auger **Auger Size:** NA **Rig Type:** NA **Sampling Method:** Hand Auger	**Northing:** NM **Easting:** NM **Casing Elevation:** NA **Borehole Depth:** 4' **Surface Elevation:** 6.8 **Descriptions By:** David Rasar	**Well/Boring ID:** **B-10** **Client:** Chevron **Location:** 11720 Unoco Road Edmonds, Washington

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	Moisture	PID Headspace (ppm)	Analytical Sample	USCS Code	Geologic Column	Stratigraphic Description	Well/Boring Construction
0	0											
			0-1	0-1		W	0.5		SM		Sandy silt, non-plastic, very fine to fine sand, some organics, grey, wet, no HCLO, no LNAPL, white roots.	
			1-2	1-2		W	1.1				Silt with organics, some very fine to fine sand, no HCLO, no LNAPL, white roots.	
			2-3	2-3		W	0.0		ML		Same as above, increasing, very fine to fine sand, no HCLO, no LNAPL.	Backfilled with cuttings.
			3-4	3.5-4		W	0.6		SP		Poor recovery, poorly graded sand, very fine to medium sand, grey, wet, no sheen, no HCLO, no LNAPL, no organics.	
5	-5										End of Boring @ 4'.	

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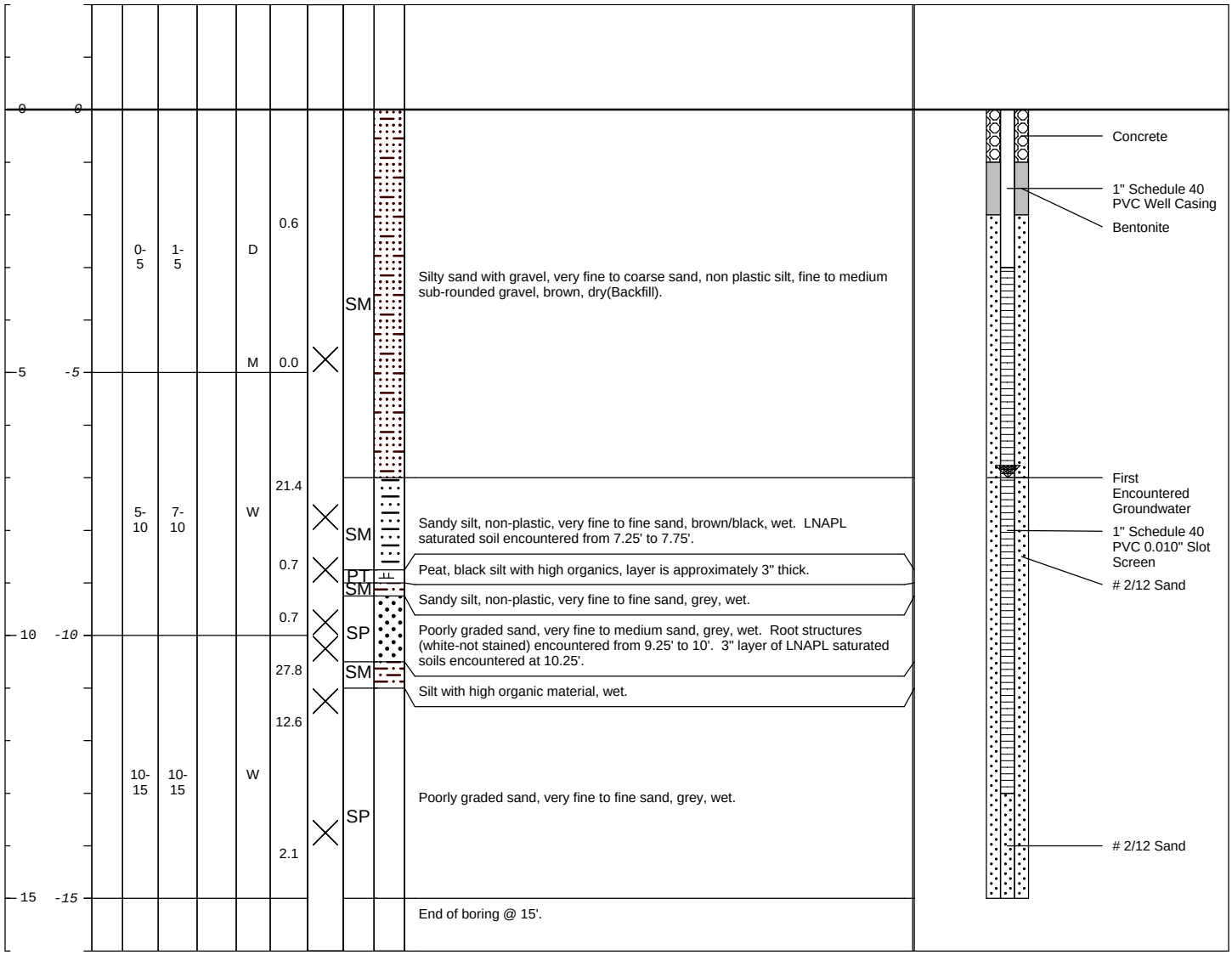
Remarks: Note: No LNAPL , sheen, or HCLO encountered in Boring B-10.

D = Dry
HCLO = Hydrocarbon-like Odor
M = Moist
NM = Not Measured
OD = Outer Diameter
ft. = feet
LNAPL= Light Non-Aqueous Phase Liquid
NA = Not Applicable/Avalible
NR = No Recovery
W = Wet

Project Number:B0045302
Data File:
Date: 11/10/2011
Created/Edited by:SWM

Date Start/Finish: 8-23-11 **Drilling Company:** Cascade Drilling Inc. **Driller's Name:** ELI **Drilling Method:** Direct Push **Auger Size:** NA **Rig Type:** Geoprobe **Sampling Method:** Sleeve	**Northing:** NM **Easting:** NM **Casing Elevation:** 12.14 **Borehole Depth:** 15' **Surface Elevation:** NM **Descriptions By:** David Rasar	**Well/Boring ID:** **B-11/P-14** **Client:** Chevron **Location:** 11720 Unoco Road Edmonds, Washington



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Remarks: Note: LNAPL found at 7.25' to 7.75' and 10.25'. Piezometer P-14 is a 1" prepacked PVC well with 0.010 slot screen from 3-13 ft.

D = Dry
HCLO = Hydrocarbon-like Odor
M = Moist
NM = Not Measured
OD = Outer Diameter
ft. = feet
LNAPL= Light Non-Aqueous Phase Liquid
NA = Not Applicable/Avalible
NR = No Recovery
W = Wet

Project Number:B0045302
Data File:
Date: 11/10/2011
Created/Edited by:SWM

Date Start/Finish: 8-24-11 **Drilling Company:** NA **Driller's Name:** David Rasar **Drilling Method:** Hand Auger **Auger Size:** NA **Rig Type:** NA **Sampling Method:** Hand Auger	**Northing:** NM **Easting:** NM **Casing Elevation:** NA **Borehole Depth:** 4' **Surface Elevation:** 7.0 **Descriptions By:** David Rasar	**Well/Boring ID:** **B-12** **Client:** Chevron **Location:** 11720 Unoco Road Edmonds, Washington

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	Moisture	PID Headspace (ppm)	Analytical Sample	USCS Code	Geologic Column	Stratigraphic Description	Well/Boring Construction
0	0											
			0-1	0-1		W					Sandy silt, non-plastic, very fine to fine sand, trace fine gravel, trace organics(roots), grey, wet, no HCLO, no LNAPL, no odor.	
			1-2	1-2		W					Sandy silt, non-plastic, very fine to fine sand, thick organics(roots) trace fine gravel, grey, wet, no HCLO, no LNAPL, no odor. Roots are very thick, white, not stained. Root structure at 1.5'.	
			2-3	2-3		W	4.1		SM		Same as above, increasing sand, trace organics(roots/white).	Backfilled with Cuttings.
			3-4	3-4		W	1.7				Same as above, no HCLO, no LNAPL, no odor.	
5	-5										End of Boring @ 4'.	

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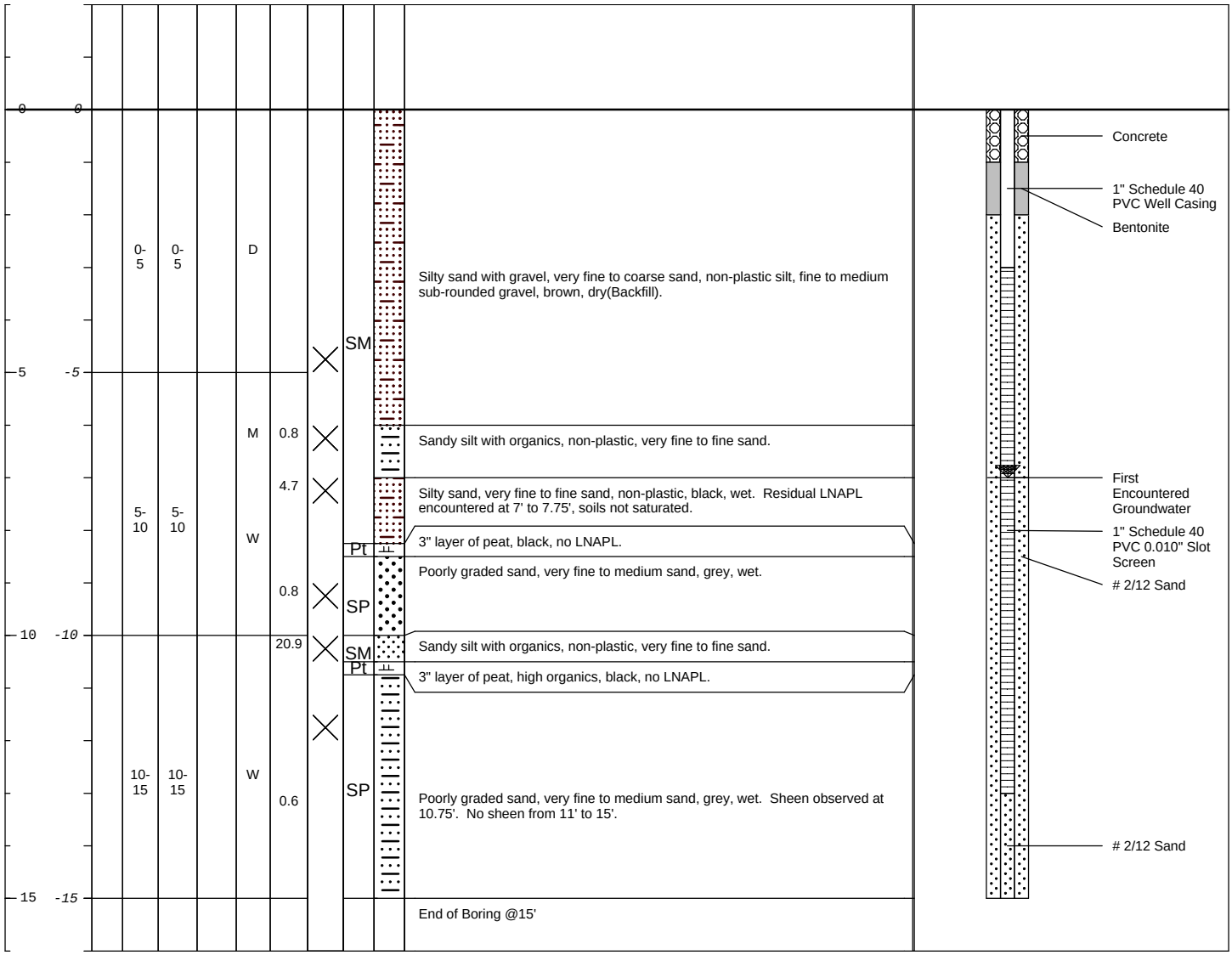
Remarks: Note: No LNAPL , sheen, or HCLO encountered in Boring B-12.

D = Dry
HCLO = Hydrocarbon-like Odor
M = Moist
NM = Not Measured
OD = Outer Diameter
ft. = feet
LNAPL= Light Non-Aqueous Phase Liquid
NA = Not Applicable/Avalible
NR = No Recovery
W = Wet

Project Number:B0045302
Data File:
Date: 11/10/2011
Created/Edited by:SWM

Date Start/Finish: 8-23-11 **Drilling Company:** Cascade Drilling Inc. **Driller's Name:** ELI **Drilling Method:** Direct Push **Auger Size:** NA **Rig Type:** Geoprobe **Sampling Method:** Sleeve	**Northing:** NM **Easting:** NM **Casing Elevation:** 13.02 **Borehole Depth:** 15' **Surface Elevation:** NM **Descriptions By:** David Rasar	**Well/Boring ID:** **B-13/P-15** **Client:** Chevron **Location:** 11720 Unoco Road Edmonds, Washington



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Remarks: Note: Residual LNAPL encountered at 7' - 7.75', sheen encountered at 10.75'.
Piezometer P-15 is a 1" prepacked PVC well with 0.010 slot screen from 3-13 ft.

D = Dry	ft. = feet
HCLO = Hydrocarbon-like Odor	LNAPL= Light Non-Aqueous Phase Liquid
M = Moist	NA = Not Applicable/Avalible
NM = Not Measured	NR = No Recovery
OD = Outer Diameter	W = Wet

Project Number:B0045302
Data File:

Date: 11/10/2011 Created/Edited by:SWM

Date Start/Finish: 8-28-11 **Drilling Company:** NA **Driller's Name:** David Rasar **Drilling Method:** Hand Auger **Auger Size:** 2" **Rig Type:** NA **Sampling Method:** Hand Auger	**Northing:** NM **Easting:** NM **Casing Elevation:** NA **Borehole Depth:** 4' **Surface Elevation:** 7.5 **Descriptions By:** David Rasar	**Well/Boring ID:** **B-14** **Client:** Chevron **Location:** 11720 Unoco Road Edmonds, Washington

DEPTH	ELEVATION	Sample Run Number	Sample/Int/Type	Recovery (feet)	Blow Counts	Moisture	PID Headspace (ppm)	Analytical Sample	USCS Code	Geologic Column	Stratigraphic Description	Well/Boring Construction
0	0											
			0-1	0-1		M	15.9				Sandy silt, non-plastic, very fine to fine sand, non-plastic, grey, moist, no HCLO, no LNAPL. Highly organic with roots and a sulfur odor from 0.5' to 1'. Roots are white, no staining.	
			1-2	1-2		W	7.1				Sandy silt, non-plastic, very fine sand, some organics(roots/bark/vegitation), grey, wet, no HCLO, no LNAPL, no sheen, sulfur odor.	
			2-3	2-3		W	11.2		SM		Sandy silt, non-plastic, very fine sand, some organics (vertical white roots), grey, wet, no HCLO, no LNAPL, no sheen, sulfur odor.	Backfilled with Cuttings.
			3-4	3-4		W	9.1				Sandy silt, non-plastic, very fine sand, some organics (vertical white roots), grey, wet, no HCLO, no LNAPL, no sheen, sulfur odor.	
5	-5										End of Boring @ 4'.	

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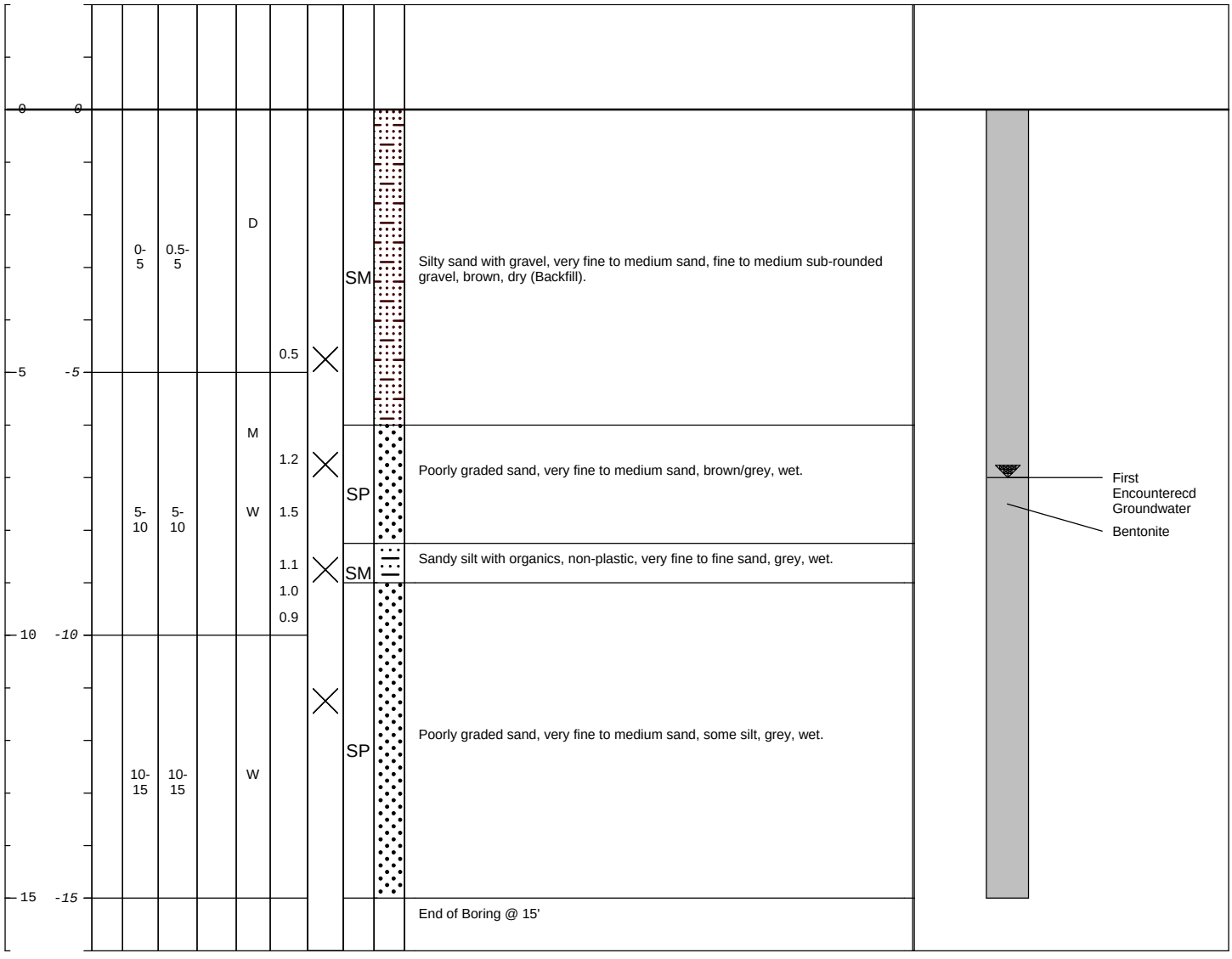
Remarks: Note: No LNAPL , sheen, or HCLO encountered in Boring B-14.

D = Dry
HCLO = Hydrocarbon-like Odor
M = Moist
NM = Not Measured
OD = Outer Diameter
ft. = feet
LNAPL= Light Non-Aqueous Phase Liquid
NA = Not Applicable/Avalible
NR = No Recovery
W = Wet

Project Number:B0045302
Data File:
Date: 11/10/2011
Created/Edited by:SWM

Date Start/Finish: 8-23-11 **Drilling Company:** Cascade Drilling Inc. **Driller's Name:** ELI **Drilling Method:** Direct Push **Auger Size:** NA **Rig Type:** Geoprobe **Sampling Method:** Sleeve	**Northing:** NM **Easting:** NM **Casing Elevation:** NA **Borehole Depth:** 15' **Surface Elevation:** 12.70 **Descriptions By:** David Rasar	**Well/Boring ID:** **B-15** **Client:** Chevron **Location:** 11720 Unoco Road Edmonds, Washington



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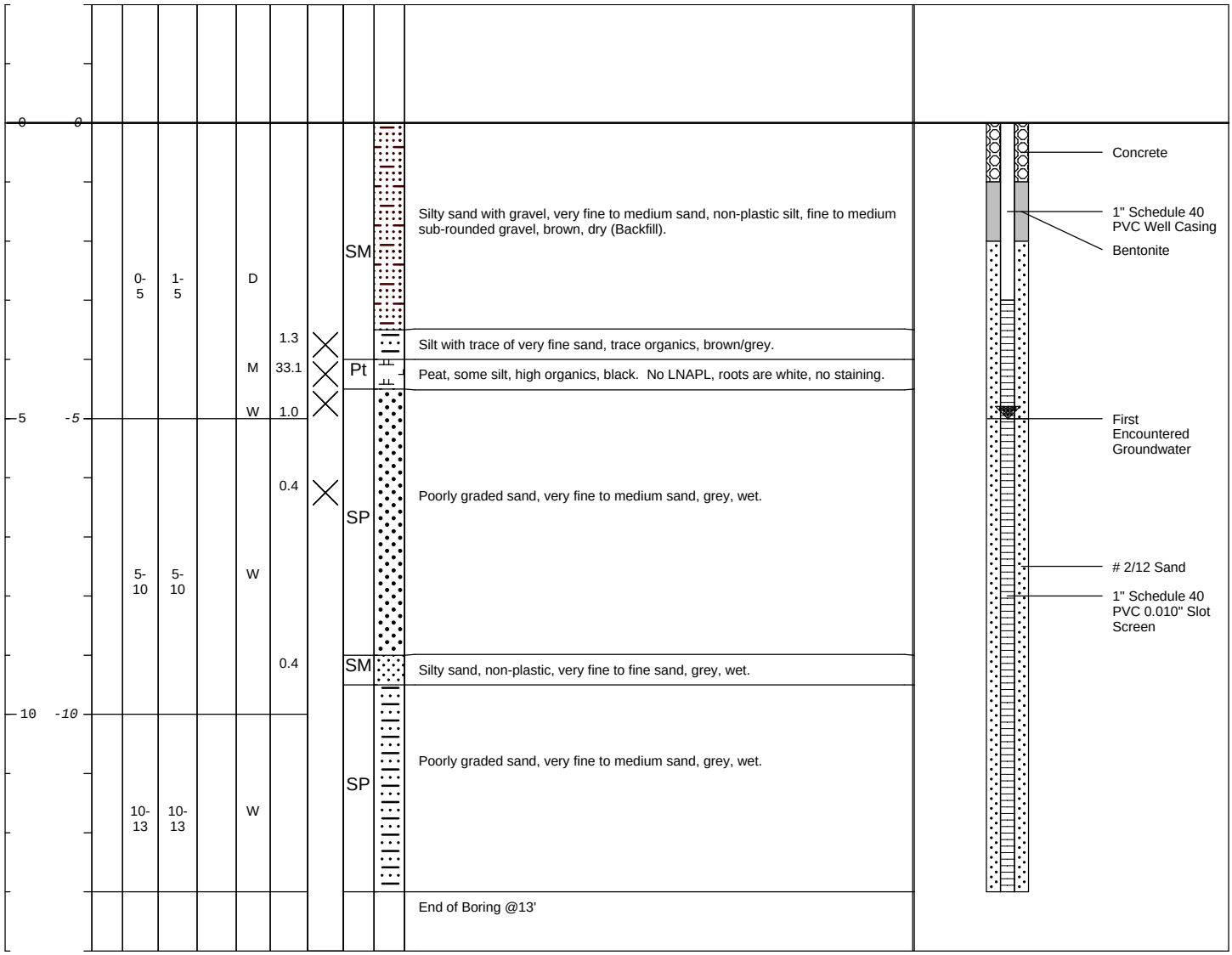
Remarks: Note: No LNAPL , sheen, or HCLO encountered in Boring B-15.

D = Dry
HCLO = Hydrocarbon-like Odor
M = Moist
NM = Not Measured
OD = Outer Diameter
ft. = feet
LNADL= Light Non-Aqueous Phase Liquid
NA = Not Applicable/Avalible
NR = No Recovery
W = Wet

Project Number:B0045302
Data File:
Date: 11/10/2011
Created/Edited by:SWM

Date Start/Finish: 8-24-11 **Drilling Company:** Cascade Drilling **Driller's Name:** ELI **Drilling Method:** Cascade Drilling Inc. **Auger Size:** NA **Rig Type:** Geoprobe **Sampling Method:** Sleeve	**Northing:** NM **Easting:** NM **Casing Elevation:** 9.04 **Borehole Depth:** 13' **Surface Elevation:** NM **Descriptions By:** David Rasar	**Well/Boring ID:** **B-16/P-16** **Client:** Chevron **Location:** 11720 Unoco Road Edmonds, Washington



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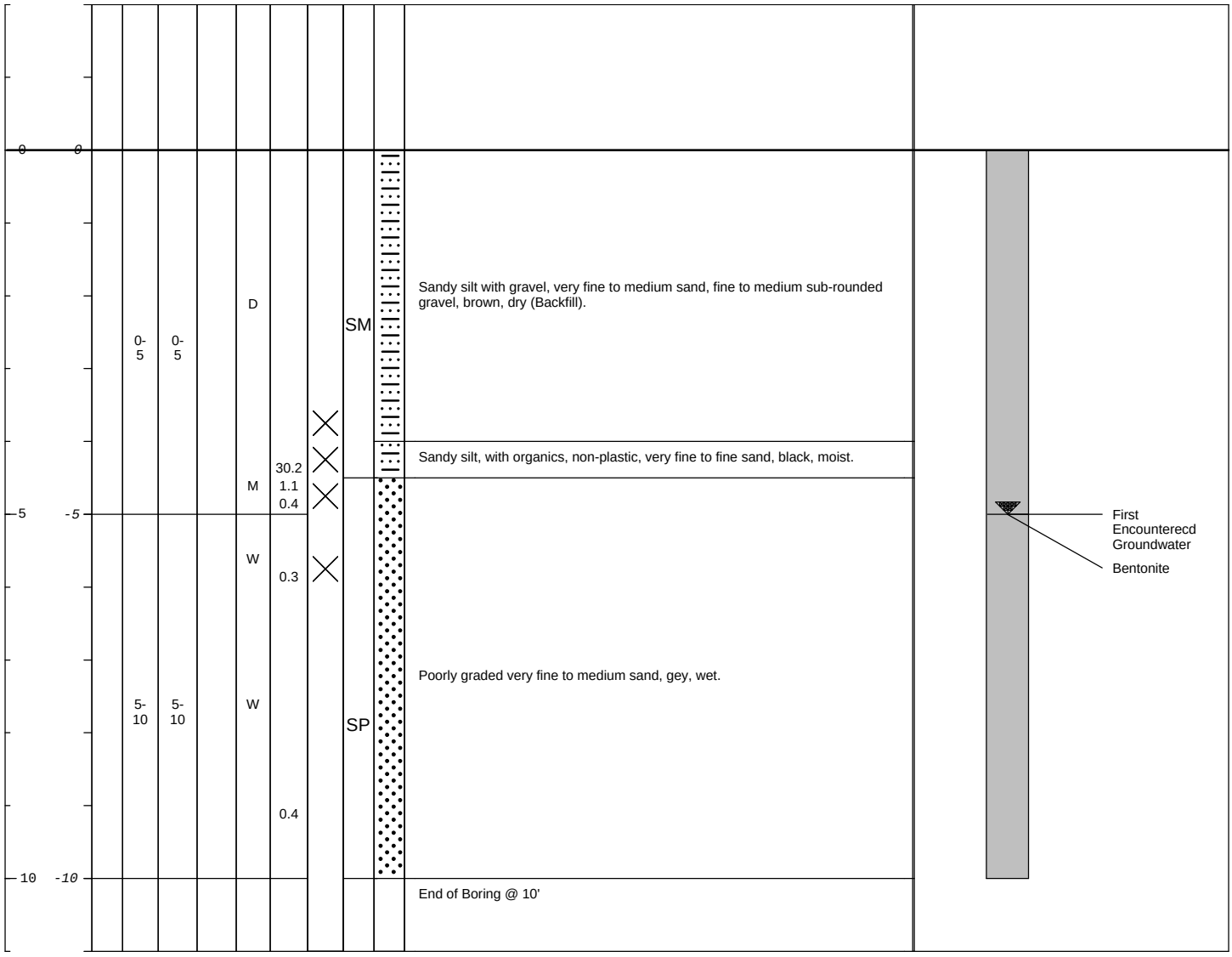
Remarks: Note: No LNAPL, sheen, or HCLO encountered in Boring B-16. Piezometer P-16 is a 1" prepacked PVC well with 0.010 slot screen from 3-13 ft.

D = Dry	ft. = feet
HCLO = Hydrocarbon-like Odor	LNAPL= Light Non-Aqueous Phase Liquid
M = Moist	NA = Not Applicable/Avalible
NM = Not Measured	NR = No Recovery
OD = Outer Diameter	W = Wet

Project Number:B0045302
Data File:

Date: 11/10/2011 Created/Edited by:SWM

Date Start/Finish: 8-24-11 **Drilling Company:** Cascade Drilling Inc. **Driller's Name:** ELI **Drilling Method:** Direct Push **Auger Size:** NA **Rig Type:** Geoprobe **Sampling Method:** Sleeve	**Northing:** NM **Easting:** NM **Casing Elevation:** NA **Borehole Depth:** 10' **Surface Elevation:** 9.2 **Descriptions By:** David Rasar	**Well/Boring ID:** **B-17** **Client:** Chevron **Location:** 11720 Unoco Road Edmonds, Washington



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Remarks: Note: No LNAPL , sheen, or HCLO encountered in Boring B-17.

D = Dry
HCLO = Hydrocarbon-like Odor
M = Moist
NM = Not Measured
OD = Outer Diameter
ft. = feet
LNADL= Light Non-Aqueous Phase Liquid
NA = Not Applicable/Avalible
NR = No Recovery
W = Wet

Project Number:B0045302
Data File:
Date: 11/10/2011
Created/Edited by:SWM

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Appendix I

DB-2 Soil Sample Analytical Data Reports and Gas Chromatograms

(Analytical Reports available on attached CD)

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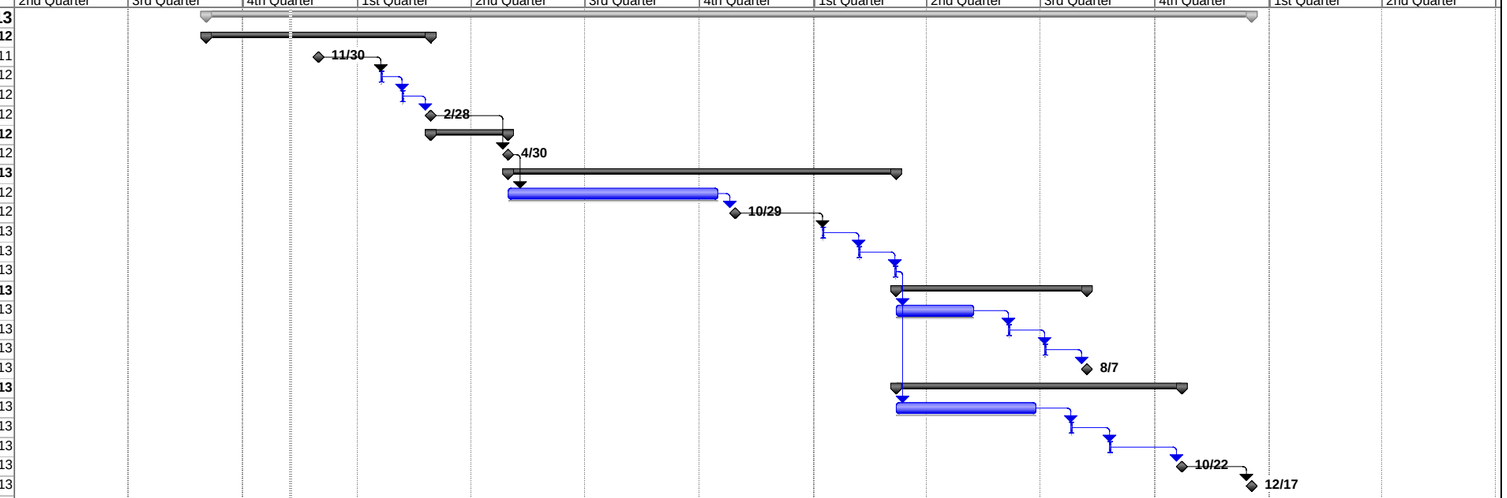
Appendix J

Draft FS Schedule

Former Edmonds Terminal
DRAFT Estimated Schedule to FS

ID	Task Name	Duration	Start	Finish
0	**DRAFT Estimated Edmonds Terminal FS Schedule***	**598 days?**	**Fri 9/2/11**	**Tue 12/17/13**
1	**Site Investigation Report**	**128 days?**	**Fri 9/2/11**	**Tue 2/28/12**
2	Submit Site Investigation Report	3.2 mons	Fri 9/2/11	Wed 11/30/11
3	DOE/Stakeholder Meeting	1 day	Fri 1/20/12	Fri 1/20/12
4	DOE/Chevron Meeting	1 day?	Mon 2/6/12	Mon 2/6/12
5	DOE - Final Comments	1 day?	Tue 2/28/12	Tue 2/28/12
6	**FS Work Plan**	**44 days**	**Wed 2/29/12**	**Mon 4/30/12**
7	Submit Final FS Work Plan	2.2 mons	Wed 2/29/12	Mon 4/30/12
8	**Interim Deliverable - Additional Site Characterization and CSM Update**	**223 days?**	**Tue 5/1/12**	**Thu 3/7/13**
9	Additional Site Characterization	6 mons?	Tue 5/1/12	Mon 10/15/12
10	Submit SC/CSM Report	2 wks?	Tue 10/16/12	Mon 10/29/12
11	DOE/Stakeholder Mtg	1 day?	Tue 1/8/13	Tue 1/8/13
12	DOE/Chevron Mtg	1 day?	Wed 2/6/13	Wed 2/6/13
13	DOE - Final Comments	1 day?	Thu 3/7/13	Thu 3/7/13
14	**Interim Deliverable - CUL/RL Determination**	**109 days?**	**Fri 3/8/13**	**Wed 8/7/13**
15	Draft Submittal to DOE	2.2 mons	Fri 3/8/13	Wed 5/8/13
16	DOE/Stakeholder Mtg	1 day	Thu 6/6/13	Thu 6/6/13
17	DOE/Chevron Mtg	1 day	Fri 7/5/13	Fri 7/5/13
18	DOE - Final Comments	1 day?	Wed 8/7/13	Wed 8/7/13
19	**Interim Deliverable - Groundwater Capture Modeling**	**163 days?**	**Fri 3/8/13**	**Tue 10/22/13**
20	Draft Submittal Groundwater Capture Model	4 mons	Fri 3/8/13	Thu 6/27/13
21	DOE/Stakeholder Mtg	1 day?	Fri 7/26/13	Fri 7/26/13
22	DOE/Chevron Mtg	1 day?	Mon 8/26/13	Mon 8/26/13
23	DOE - Final Comments	1 day?	Tue 10/22/13	Tue 10/22/13
24	Submittal of Draft FS	2 mons	Wed 10/23/13	Tue 12/17/13



* - Schedule is approximate, and is intended to show critical paths and estimated time frame for submittal of the Draft FS. This schedule is not intended as a comittment for deliverables.

Project: DRAFT Estimated Edmonds T
Date: Tue 11/8/11

Task | Progress | Summary | External Tasks | Deadline
Split | Milestone | Project Summary | External Milestone