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Final 2010 Annual Groundwater Monitoring Report

Former Unocal Edmonds Terminal

11720 Unoco Road

Edmonds, Washington

July 28, 2011

ARCADIS

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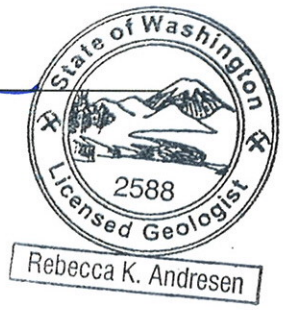

Final 2010 Annual Groundwater Monitoring Report

Former Unocal Edmonds 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) has prepared the 2010 Annual Groundwater Monitoring Report for former Unocal terminal located at 11720 Unoco Road in Edmonds, Washington (the site). The site and surrounding area are shown on **Figure 1**. In accordance with the approved modifications to the requirements of Washington State Agreed Order No. DE 4460 and the Interim Action Report – Work Plan for 2007 Lower Yard Interim Action, Unocal Edmonds Bulk Fuel Terminal (SLR 2007a) (the Work Plan), this report summarizes:

- four groundwater sampling and gauging events completed between January 2010 and October 2010,
- geochemical parameter data collected subsequent to interim action excavations,
- overall groundwater conditions,
- proposed next steps for the site and;
- proposed 2011 groundwater monitoring program.

The site layout is illustrated on **Figure 2**.

2. Site Description

The Lower Yard occupies approximately 22 acres and lies east-southeast of BNSF 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 (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 retention 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. Excess water in 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.

2.1 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 light non-aqueous phase liquid (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 (MFA 2002). Additional Interim Actions conducted in 2003 included soil excavations in the Southwest Lower Yard and Detention Basin No.1. The results of the 2003 Interim Action are summarized in 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). This Order supersedes Agreed Order No. DE 92TC-N328, dated October 25, 1993. Specific objectives of the Interim Action included:

- Removal of soil with petroleum impacts in excess of the soil remediation levels which were established in the 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 within the Southwest Lower Yard

2007 Agreed Order Interim Actions were conducted in two phases from July 2007 to April 2008 (Phase 1), 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 2009a). 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).

Groundwater monitoring was conducted to assess whether the Interim Actions achieved their objectives, as listed above. While a great deal of the petroleum contamination has been removed, ground water monitoring data indicates that additional interim cleanup actions are needed. This includes additional removal of LNAPL.

2.2 Geology

During the Phase I excavation (2007 to 2008), subsurface materials encountered from land surface to a depth of 8 to 15 feet below ground surface were silty sands with gravel and sandy silts with gravel. The removed soils were mostly fill material placed after 1929, during the creation of the lower yard facility. Below the 1929 fill material, a poorly graded sand formation of very fine to medium sand with fine gravel was encountered, which contains organic material such as beach debris (shells and driftwood), wood, and seashells, and is considered the native soil below the terminal. Beneath many of the excavated areas throughout the Lower Yard, there is a layer approximately 6 to 12 inches thick composed of sandy silt with large amounts of peat, wood debris, and decomposing vegetation. This layer was encountered at depths of 8 to 14 feet bgs, between the 1929 fill material and the native soil, and is considered to be representative of the former marsh located at the Site.

The current lithology of the Lower Yard consists primarily of backfill material that resulted from the Phase I and Phase II Interim Action work (2007 to 2008). All of the

2007-2008 excavations were extended to a depth considered to reach native soil; this material was a poorly graded sand layer consisting of very fine to medium sand with fine gravel, which contains organic material such as beach debris, wood, and seashells, and was very distinct from the overlying materials. Excavations were backfilled with poorly graded coarse gravels to 6 inches above the water table, and continued to grade with a very fine to medium sand, trace silt, and coarse gravel.

3. Groundwater Monitoring Program

In accordance with the Agreed Order No. DE92TC-N328, groundwater monitoring was conducted after the remedial excavation activities to: 1) determine if the remaining soil concentrations will be a source of LNAPL; 2) to evaluate if the remaining soil concentrations will cause an exceedance of groundwater cleanup levels (CULs) at the points of compliance (POCs); 3) to determine if the remaining petroleum hydrocarbon concentrations in groundwater will naturally attenuate below the CULs at the POCs; and 4) to calculate the restoration timeframes to meet the groundwater CULs at the POCs. Groundwater sampling events were conducted every other month (bi-monthly) over a 1-year period and on a quarterly basis for a 1-year period, and the 21 POC wells. The monitoring well network was specified in the Work Plan, referenced in the 2007 Agreed Order.

The following sampling program was developed based on the Indicator Hazardous Substances (IHSs) determined to be present at the site in the Work Plan:

- Benzene by United States Environmental Protection Agency (USEPA) Method 8021B;
- Total Petroleum Hydrocarbons as gasoline (TPH-G) by Ecology Methods NWTPH-Gx;
- Total Petroleum Hydrocarbons as diesel (TPH-D) and Total Petroleum Hydrocarbons as heavy oil-range (TPH-O) by Ecology Method NWTPH-Dx (after silica gel cleanup); and
- Total Carcinogenic Polyaromatic Hydrocarbons (cPAHs), plus naphthalene, by USEPA Method 8270C.

Along with the petroleum hydrocarbons noted above, the following natural attenuation geochemical indicator parameters were also monitored:

- sulfate by USEPA Method 300.0;

- nitrate by USEPA Method 300.0;
- alkalinity by USEPA Method 310.0;
- dissolved methane by USEPA Method RSK 175; and
- dissolved manganese by USEPA Method 200.8.

Water quality and geochemical indicator parameters, including dissolved oxygen (DO), oxidation-reduction potential (ORP), pH, conductivity, temperature, and dissolved ferrous iron measurements, were also collected at the time of purging using a water quality meter with a flow-through cell. Ferrous iron was measured using Hach® field kits.

3.1 Groundwater Cleanup Levels

Based on the Conceptual Site Model (CSM) presented in the Work Plan, groundwater beneath the site discharges to the surface water and sediments in Willow Creek. Groundwater CULs were established in the Work Plan, and are based on the protection of surface water. The CULs are based on Method A CULs for TPH and water quality criteria (WQC) for benzene and cPAHs. Since WQC have not been established for TPH, a CUL was calculated using the raw Method A groundwater CULs (800 micrograms per liter [µg/L] for GRO and 500 µg/L each for DRO and HO) and setting the combined hazard index (HI) to 1. The calculation was adjusted to account for the compositions of TPH mixtures on the eastern and western side of the Lower Yard (SLR 2007a). The demarcation between the eastern and western areas is shown on **Figure 3**. The groundwater CULs are as follows:

- Benzene: 51 µg/L
- Total cPAHs: 0.018 µg/L
- Total TPH (eastern side of site): 506 µg/L
- Total TPH (western side of site): 706 µg/L

Site specific groundwater CULs are included in **Table 1**.

3.2 Monitoring Well Network

POCs were established at the point where groundwater discharges to surface water within the monitoring well network, located along the downgradient perimeter of the

site. Seventeen POC wells were established in the Work Plan. Following implementation of the remedial excavations, subsequent discussions with Ecology and stakeholders, 21 POC wells were ultimately accepted by Ecology. The following monitoring wells are considered POC wells:

LM-2	MW-8R	MW-20R	MW-101	MW-104	MW-108
MW-109	MW-129R	MW-135	MW-136	MW-139R	MW-147
MW-149R	MW-150	MW-500	MW-501	MW-510	MW-518
MW-522	MW-523	MW-524			

The remaining 19 wells are considered interior monitoring wells, used for monitoring natural attenuation and plume migration. Based on historical groundwater flow directions, three groundwater flow paths were designated in the Work Plan to monitor the natural attenuation of the dissolved-phase concentrations in groundwater. Each flow path consists of 7 monitoring wells (an upgradient, 3 source area wells, and 3 downgradient wells). Each flow path is wider at the downgradient end to account for up to 30 percent variability in the flow direction due to tidal influence. The downgradient well in each flow path are placed at least 50 feet from Willow Creek in an attempt to minimize any surface water influence on the sample analytical results. The groundwater monitoring found that changes in site hydrogeology caused by excavation cleanup actions caused the flow path approach to no longer be suitable.

The interior monitoring wells are as follows:

MW-143	MW-502	MW-503	MW-504	MW-505	MW-506
MW-507	MW-508	MW-509	MW-511	MW-512	MW-513
MW-514	MW-515	MW-516	MW-517	MW-519	MW-520
MW-521					

Groundwater monitoring well locations are shown on **Figure 3**.

3.3 Groundwater Monitoring Program Modifications

On October 13, 2009, ARCADIS met with Ecology, the Washington State Department of Transportation (WSDOT), and the Edmonds Citizens Awareness Committee (ECAC) to discuss project progress, as well as to discuss modifying the groundwater monitoring program. As outlined in the Work Plan, groundwater flow paths were established within the interior of the site, and each 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 sampling events were

created to provide data to utilize Ecology's Data Analysis Tool Package A (Modules 1, 2 and 3) (Ecology 2003).

The locations of the wells inside the three groundwater flow paths were based on the known extent of LNAPL on groundwater prior to the creation of the Work Plan. Prior to the 2007/2008 Interim Action remedial excavations, the groundwater flow paths fit the established model of upgradient, source area, and downgradient wells. However, it was apparent during the 2007/2008 Interim Action that LNAPL was more widespread than initially thought, and following the 2007/2008 Interim Action remedial excavations, the flow paths, as defined, no longer contained monitoring wells that would provide water quality data upgradient and downgradient of the source areas. Therefore, the flow paths were no longer applicable for a spatial evaluation of natural attenuation away from the source, as required for use with Ecology's Data Analysis Tool Package A.

After analyzing groundwater data from the first year of bi-monthly sampling, a Request to Modify the Groundwater Sampling Program was submitted by ARCADIS and approved by DOE in December 2009 (ARCADIS 2009b). Because the site layout and surrounding areas did not allow for re-distribution of groundwater monitoring wells to accommodate upgradient and downgradient locations, modifications were proposed to the groundwater monitoring program. These proposed changes were not intended to address spatial discrepancies in the groundwater monitoring well network, but were intended to help reduce the quantity of non-essential groundwater analytical data. The proposed modifications addressed two major components of the groundwater monitoring program: monitoring schedule and analytical analysis of groundwater samples. These two components are discussed in greater detail below.

3.3.1 Scheduling Program Changes

The groundwater sampling schedule was changed from events conducted every other month to quarterly events. The October 2009 sampling event constituted the final bi-monthly event, with the quarterly schedule beginning in January 2010. Therefore, the 2010 sampling events occurred in January 2010, April 2010, July 2010, and October 2010. In addition LM-2 was sampled in December 2010 to confirm groundwater analytical results of the October 2010 event. The change in sampling frequency reduced the number of sampling events by two, and resulted in a total of 11 events over the 2-year period, from October 2008 to October 2010. The reduced frequency of events was considered adequate to address data needs.

3.3.2 Analytical Sampling Changes

During the seven sampling events from October 2008 to October 2009, benzene was detected at a concentration greater than applicable site CULs in only one sample from monitoring well MW-20R during a single sampling event. Therefore, benzene was discontinued from the groundwater analytical program for all site wells except well MW-20R during the first, second, and third quarter 2010 monitoring events. Benzene was analyzed in groundwater samples from all site wells during the fourth quarter 2010 sampling event.

During the seven sampling events from October 2008 to October 2009, only six samples, collected from four wells, contained concentrations of cPAHs exceeding the cPAH CUL. These did not contain detectable concentrations of cPAHs, but had elevated reporting limits which were greater than the CULs. Subsequent samples collected from the four wells with past cPAH exceedences were analyzed with reporting limits less than the cPAH CULs, and did not contain detectable concentrations of cPAHs. Therefore, cPAH analysis was discontinued from the groundwater analytical program during the first, second, and third quarter 2010 monitoring events. cPAHs were analyzed in groundwater samples from all site wells during the fourth quarter 2010 sampling event.

With the exception of purge parameters collected in the field at the time of sampling such as DO and ORP, additional laboratory submitted samples for natural attenuation parameters demonstrate little value in determining whether or not natural attenuation is occurring on a quarterly basis. Sufficient data were collected throughout the first year of monitoring to evaluate natural attenuation processes at the site. Therefore, natural attenuation parameters were discontinued from the groundwater analytical program during the first, second, and third quarter monitoring events. Natural attenuation parameters were analyzed in groundwater samples from all site wells during the fourth quarter 2010 sampling event.

Beginning with the January 2010 event, the following analytes and parameters were collected during the first, second, and third quarter 2010 sampling events:

- TPH-G by Ecology Methods NWTPH-Gx;
- TPH-D and TPH-O by Ecology Method NWTPH-Dx (after silica gel cleanup);
- Benzene by USEPA Method 8021B for MW-20R only;
- Water quality and geochemical parameters, including DO, ORP, pH, conductivity, and temperature.

During the final fourth Quarter 2010 monitoring event, the 39 site wells in the program which did not contain LNAPL were sampled for the full suite of analytes (including benzene, cPAHs, and natural attenuation parameters).

4. Groundwater Conditions 2010

The First Quarter 2010 groundwater monitoring event was conducted from January 18 to January 21. Groundwater gauging activities were conducted on January 18, and groundwater samples were collected from January 19 to January 21. The second quarter monitoring event was conducted from April 19 to April 23. Groundwater gauging activities were conducted on April 19, and groundwater samples were collected from April 20 to April 23. The third quarter sampling event was conducted from July 19 to July 22. Groundwater gauging activities were conducted on July 19, and groundwater samples were collected from July 20 to July 22. The fourth quarter groundwater monitoring event was conducted from October 25 to November 1. Groundwater gauging activities were conducted on October 25, and groundwater samples were collected from October 26 to October 29 and on November 1.

4.1 Groundwater Monitoring Procedures

During groundwater monitoring events from January to October 2010, 48 onsite wells, one offsite well (MW-301), and eight piezometers were gauged. During groundwater monitoring events, wells were gauged with a decontaminated oil/water interface probe to determine depth to groundwater and to check for the presence of LNAPL. If LNAPL or an LNAPL film was detected, a bailer was lowered into the well to visually confirm its presence. Prior to gauging, well caps were removed to allow groundwater levels to equilibrate for at least 1 hour prior to gauging. Gauging activities were initiated as close to the time of low tide as possible. Seven staff gauges in Willow Creek were measured prior to gauging the onsite wells and after gauging the site wells; two sets of data were provided for each staff gauge for each gauging event. Staff gauge D-4 was installed in June 2009 to replace staff gauge D-7 which was located outside of the Willow Creek channel and was continually dry. Surface water elevations at the staff gauge locations are not included on groundwater contour maps, as it is not practical to depict both sets of information on one map. The data collected from the staff gauge (D-6) located in DB-1 is not included on groundwater contour maps as the water level in DB-1 is manually controlled by pumping. Tide tables for each gauging event are included in **Appendix A**. Monitoring well gauging times are included in **Table 2**; the gauging times can be correlated with the tide tables to determine the tidal stage during gauging activities.

After gauging, the wells were purged via low-flow methods using peristaltic pumps with disposable polyethylene tubing. Water quality and geochemical parameters, including

DO, ORP, pH, conductivity, and temperature, were collected at the time of purging using a properly calibrated In-Situ 9500 Troll® groundwater quality meter with low-flow cells. Dissolved ferrous iron measurements were collected in the field using a Hach® ferrous iron measuring kit. Groundwater was purged until the geochemical parameters stabilized to within 10 percent of their value or until three well casing volumes were purged. Low-flow field sheets with groundwater parameters, as well as laboratory analytical results reports collected during the 2010 sampling events, are provided in **Appendices B through E**.

After stabilization parameters were reached, samples were collected into new, laboratory-supplied containers with proper preservatives and kept in iced coolers. Samples for laboratory analysis except for cPAHs were packed in iced coolers and shipped to Lancaster Laboratories in Lancaster, Pennsylvania for analysis. cPAH samples were also kept in iced coolers and/or a refrigerator and were sent to a separate laboratory to achieve the lowest possible detection levels. cPAH samples were analyzed by TestAmerica Laboratories in Tacoma, Washington.

As part of the quality assurance project plan, as described in the Sampling and Analysis Plan (SAP) of the Work Plan, quality assurance procedures were followed during each sampling event. This includes duplicate samples collected at a frequency of 10 percent of the total number of samples, which equates to four duplicate samples collected per sampling event. Duplicates were submitted blindly to the laboratory. Documentation of parent and duplicate samples was kept in the field notes and sampling sheets by ARCADIS field personnel. In addition to duplicate samples, matrix spike and matrix spike duplicate (MS/MSD) samples were collected at a frequency of 5 percent of the total number of samples, or two per sampling event. One equipment rinsate sample was collected per sampling event. Equipment blank samples were collected by rinsing decontaminated field equipment with distilled water. Duplicate samples, MS/MSD samples, and equipment rinsate samples were collected and analyzed for hydrocarbon analysis only (NWTPH-Gx, NWTPH-Dx, cPAHs by 8270 and benzene by 8021B) per the SAP.

4.2 Groundwater Flow Direction

The groundwater flow direction at the site is to the north-northwest in the central portion of the site and to the northwest in the western portion of the site, consistent with historical observations. Due to gravel backfill used during the remedial excavations, groundwater across the central and southwestern portions of the site has a very low gradient. This flattening of the groundwater gradient across areas of excavation does not appear to have an effect on the overall site groundwater gradient with the exception of the southeast Lower Yard.

The majority of the southeast Lower Yard is also composed of gravel backfill material from the remedial excavations. Groundwater flow in the southeast Lower Yard is dominated by a mounding effect. Groundwater elevations in monitoring wells MW-500 and MW-501 are generally several feet higher than nearby wells. These wells are partially installed in an excavation, but the screen interval also brackets native material. In an effort to understand the mounding, six piezometers (including the two completed deeper as part of the nested pairs) were installed in native or undisturbed material. Groundwater gauging data generally indicate that the groundwater surfaces measured in P-3 and P-5, the two shallow piezometers completed in excavation backfill, have elevations similar to those measured in wells MW-500 and MW-501, which are also partially completed in excavation backfill material. The water levels measured in P-3 and P-5 are generally several feet higher than the water levels in the deeper piezometer of each nested pair, which are installed with screens beneath the backfill material. Groundwater levels measured in piezometers with deeper well screens (P-2, P-4, P-7, and P-8) show groundwater elevations consistent with site-wide groundwater flow. The two shallow piezometers (P-1 and P-6) that were installed in older fill material, outside the footprints of the excavation, show somewhat higher groundwater elevations than their deeper counterparts. There appears to be lateral outward migration of shallow groundwater from the groundwater mound in the excavation backfill into the surrounding older fill material as the mound decays. The silty, shallow, older fill in the southeast Lower Yard (from 0 to 13 feet below ground surface) appears to have created a distinct zone in which shallow groundwater responds to recharge independently of the lower-permeability material below. The heterogeneous nature of the historical fill material found in the southeast Lower Yard has created localized pockets of lower and higher permeability which locally affect shallow groundwater elevations. Cross sections have been prepared to illustrate the groundwater mound and the slow outward degradation. The cross section locations are presented in **Figure 4**. **Figure 5** and **Figure 6** illustrate the cross-sectional profile across the width and length of the southeast Lower Yard excavation area.

4.2.1 First Quarter, January 2010

As part of first quarter monitoring activities, water levels were recorded during low tide on January 18, 2010. ARCADIS field personnel gauged 49 monitoring wells, eight piezometers, and six staff gauges in Willow Creek. Depths to water ranged from 0.56 feet below the top of casing (btoc; 14.68 feet above mean sea level [amsl]) in well MW-501 to 25.51 feet btoc (9.62 feet amsl) in well MW-134X. Groundwater elevations ranged from 5.55 feet amsl in well LM-2 to 15.21 feet amsl in piezometer P-1. Water levels in Willow Creek prior to site gauging ranged from 5.15 feet amsl at staff gauge TB to 7.36 feet amsl at staff gauge D-1. Water elevations in Willow Creek after site gauging ranged from 5.60 feet amsl at staff gauge TB to 7.04 feet amsl at staff gauge D-4. First quarter depths to water, groundwater elevations, and times of gauging are

presented in **Table 2**. First quarter 2010 groundwater elevations and contours are shown on **Figure 7.** LNAPL was present in monitoring well MW-510 during the first quarter sampling event. LNAPL was measured at a thickness of 0.13 foot from an elevation of 7.65 feet amsl to 7.78 feet amsl. This measurement was confirmed using a bailer.

4.2.2 Second Quarter, April 2010

As part of second quarter monitoring activities, water levels were recorded during low tide on April 19, 2010. ARCADIS field personnel gauged 49 monitoring wells, eight piezometers, and six staff gauges in Willow Creek. Depths to water ranged from 2.20 feet btoc (5.94 feet amsl) in well LM-2 to 25.64 feet btoc (9.49 feet amsl) in well MW-134X. Groundwater elevations ranged from 5.10 feet amsl in well MW-301 to 13.26 feet amsl in piezometer P-1. Water levels in Willow Creek prior to site gauging ranged from 6.22 feet amsl at staff gauges D-1 and D-5 to 6.52 feet amsl at staff gauge D-4. Water elevations in Willow Creek after site gauging ranged from 6.06 feet amsl at staff gauge D-1 to 6.64 feet amsl at staff gauge TB. After site gauging activities, the water level in Willow Creek was below the base of staff gauge D-5.

LNAPL was present in monitoring well MW-510 during the Second quarter sampling event. LNAPL was measured at a thickness of 0.02 foot from an elevation of 6.15 feet amsl to 6.17 feet amsl. This measurement was confirmed using a bailer. Second quarter depths to water, groundwater elevations, and times of gauging are presented in **Table 2**. Second quarter 2010 groundwater elevations and contours are shown on **Figure 8.**

4.2.3 Third Quarter, July 2010

As part of third quarter monitoring activities, water levels were recorded during low tide on July 19, 2010. ARCADIS field personnel gauged 49 monitoring wells, eight piezometers, and six staff gauges in Willow Creek. Depths to water ranged from 2.41 feet btoc (5.73 feet amsl) in well LM-2 to 26.41 feet btoc (8.72 feet amsl) in well MW-134X. Groundwater elevations ranged from 3.25 feet amsl in well MW-151 to 12.46 feet amsl in piezometer P-6. Water levels in Willow Creek prior to site gauging ranged from 6.29 feet amsl at staff gauges D-3 and TB to 6.49 feet amsl at staff gauge D-4. Water elevations in Willow Creek after site gauging ranged from 4.98 feet amsl at staff gauge D-1 to 6.67 feet amsl at staff gauge TB. After site gauging activities, the water level in Willow Creek was below the base of staff gauge D-5.

LNAPL was present in monitoring well MW-510 during the third quarter sampling event. LNAPL was measured at a thickness of 0.04 foot from an elevation of 5.52 feet amsl to 5.56 feet amsl. This measurement was confirmed using a bailer. Third quarter depths

to water, groundwater elevations, and times of gauging are presented in **Table 2**. Third quarter 2010 groundwater elevations and contours are shown on **Figure 9.**

4.2.4 Fourth Quarter, October 2010

As part of fourth quarter monitoring activities, water levels were recorded during low tide on October 25, 2010. ARCADIS field personnel gauged 49 monitoring wells, eight piezometers, and six staff gauges in Willow Creek. Depths to water ranged from 1.63 feet btoc (6.51 feet amsl) in well LM-2 to 26.40 feet btoc (8.73 feet amsl) in well MW-134X. Groundwater elevations ranged from 5.69 feet amsl in well MW-509 to 12.86 feet amsl in piezometer P-6. Water levels in Willow Creek prior to site gauging ranged from 7.54 feet amsl at staff gauge D-1 to 8.90 feet amsl at staff gauge TB. Water elevations in Willow Creek after site gauging ranged from 5.56 feet amsl at staff gauge TB to 7.07 feet amsl at staff gauge D-2.

LNAPL was present in monitoring well MW-510 during the fourth quarter sampling event. LNAPL was measured at a thickness of 0.02 foot from an elevation of 6.51 feet amsl to 6.53 feet amsl. The presence of LNAPL was confirmed using a bailer. Fourth quarter depths to water, groundwater elevations, and times of gauging are presented in **Table 2**. Fourth quarter 2010 groundwater elevations and contours are shown on **Figure 10.**

4.3 Analytical Results

Groundwater CULs for the site, as outlined in the Work Plan, are presented in **Table 1**. There are two values for total TPH CULs distinguished between the east and west side of the site, as demarcated on **Figure 2 and Figure 7 through Figure 14**. Total TPH concentrations were calculated by summing the concentrations of TPH-G, TPH-D, and TPH-O, and are collectively referred to as "TPH". If one or more of the constituents did not exceed the laboratory detection limit, half of the detection limit for each constituent was added to the detectable concentrations. To calculate Total 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). Analytical reports for monitoring events are presented in **Appendix B through Appendix E.**

4.3.1 First Quarter, January 2010

From January 19 to January 21, groundwater samples were collected from 39 site wells during the first quarter sampling event. Well MW-510 was not sampled due to the

presence of 0.13 foot of LNAPL. The presence of LNAPL is considered an exceedance of the site CULs.

Groundwater samples collected from 15 site wells contained concentrations of TPH less than laboratory detection limits. Six of these were collected from POC wells. Groundwater samples collected from 12 site wells contained concentrations of TPH exceeding applicable site CULs with concentrations ranging from 544 µg/L in the sample collected from monitoring well MW-513 to 3,105 µg/L in the sample collected from monitoring well MW-104. Seven of the 12 samples containing TPH concentrations greater than applicable CULs were collected from POC wells. Benzene was detected in the groundwater sample collected from monitoring well MW-20R at a concentration of 50 µg/L, less than the applicable site CUL of 51µg/L.

First quarter analytical results are presented in **Table 3,** and TPH data are presented on **Figure 11**. First quarter laboratory analytical reports and low-flow sampling field sheets are included as **Appendix B.**

4.3.2 Second Quarter, April 2010

From April 20 to April 23, groundwater samples were collected from 39 site wells during the second quarter sampling event. Well MW-510 was not sampled due to the presence of 0.02 foot of LNAPL. The presence of LNAPL is considered an exceedance of the site CULs.

Groundwater samples collected from 12 wells contained concentrations of TPH less than laboratory detection limits. Five of the 12 wells containing concentrations less than laboratory detection limits were collected from POC wells. Eleven groundwater samples collected from 10 site wells (including a duplicate sample) contained concentrations of TPH exceeding applicable site CULs with concentrations ranging from 646 µg/L in the sample collected from monitoring well MW-514 to 2,015 µg/L in the sample collected from monitoring well MW-129R. Six of the 11 samples were collected from POC wells. Benzene was detected in the groundwater sample collected from monitoring well MW-20R at a concentration of 0.9 µg/L, less than the applicable site CUL.

Second quarter analytical results are presented in **Table 3,** and TPH data are presented on **Figure 12**. Second quarter laboratory analytical reports and low-flow sampling field sheets are included as **Appendix C**.

4.3.3 Third Quarter, July 2010

From July 20 to July 22, groundwater samples were collected from 39 site wells during the third quarter sampling event. Well MW-510 was not sampled due to the presence of 0.04 foot of LNAPL. The presence of LNAPL is considered an exceedance of the site CULs. Groundwater samples collected from two POC wells (MW-109 and MW-524) contained concentrations of TPH less than laboratory detection limits.

Groundwater samples collected from 10 site wells contained concentrations of TPH exceeding applicable site CULs with concentrations ranging from 534 µg/L in the sample collected from monitoring well MW-513 to 2,225 µg/L in the sample collected from monitoring well MW-129R. Seven of the 10 samples with exceedances were collected from POC wells. Benzene was not detected at concentrations greater than laboratory detection limits in the groundwater sample collected from monitoring well MW-20R.

Third quarter analytical results are presented in **Table 33,** and TPH data are presented on **Figure 13**. Third quarter laboratory analytical reports and low-flow sampling field sheets are included as **Appendix D**.

4.3.4 Fourth Quarter, October 2010

From October 26 to October 29 and November 1, groundwater samples were collected from 39 site wells during the fourth quarter sampling event. Well MW-510 was not sampled due to the presence of 0.02 foot of LNAPL. The presence of LNAPL is considered an exceedance of the site CULs.

Groundwater samples collected from three POC wells (MW-108, MW-109 and MW-524) contained concentrations of TPH less than laboratory detection limits. Groundwater samples collected from eight site wells contained concentrations of TPH exceeding applicable site CULs with concentrations ranging from 575 µg/L in the sample collected from monitoring well MW-514 to 3,925 µg/L in the sample collected from monitoring well LM-2. The TPH concentration collected from LM-2 was the highest concentration reported from this well during the 2-year monitoring period, however concentrations are still less than historical high concentrations reported prior to remedial excavations in the Lower Yard. An additional sample was collected from LM-2 on December 6, 2010 to assess the persistence of the elevated concentration of TPH during the October 2010 event. The concentration of TPH during the December re-sampling event was reported at 2,405 µg/L. Although this concentration is also higher than the applicable CULs, it is more consistent with previous sampling events. Seven of the nine samples containing TPH concentrations greater than applicable CULs were collected from POC wells.

Benzene was detected in the sample collected from one POC well (MW-104) at a concentration of 1.7 µg/L and in the sample collected from one flow path well (MW-514) at a concentration of 1.5 µg/L, both of which are less than the site CUL of 51 µg/L.

One sample collected from monitoring well MW-104 contained concentrations of cPAHs exceeding the cPAH CUL. This sample did not contain detectable concentrations of cPAHs, but had an elevated reporting limit which was greater than the cPAH CUL of 0.018 µg/L. Groundwater samples collected from this well during the first year of the post-excavation groundwater program (2009) did not indicate detectable concentrations exceeding the applicable CUL.

Fourth quarter analytical results are presented in **Table 33,** and TPH data are presented on **Figure 14**. Fourth quarter laboratory analytical reports and low-flow sampling field sheets are included as **Appendix E**.

4.4 Monitoring Well MW-510

Monitoring well MW-510 has had LNAPL present since the October 2009 sampling event. LNAPL in monitoring well MW-510 is black in color, has a high viscosity, and is difficult to recover with a bailer. During each monitoring event, an oil/water interface probe is used to measure depth to LNAPL and depth to water. Bailers were used to confirm the presence of LNAPL after each groundwater measurement in monitoring well MW-510.

During 2010, LNAPL thicknesses have ranged from 0.13 foot during the first quarter monitoring event to 0.02 foot in the second quarter and fourth quarter monitoring events. The highest groundwater elevation and the thickest measurement of LNAPL (0.13 foot) of 2010 were measured in monitoring well MW-510 during the first quarter event. The lowest groundwater elevation and the second thickest measurement of LNAPL (0.04 foot) of 2010 were measured during the third quarter monitoring event. Based on the small data set, there appears to be a connection between LNAPL thickness and low groundwater elevation; however, no strong correlations could be established based on the contradictory data collected during high groundwater elevations. LNAPL versus depth to water is depicted on **Figure 15.**

LNAPL and/or sheen has never been observed in Willow Creek. The Creek between the tidal basin and the furthest upstream staff gauge (D-4) is observed for signs of LNAPL and/or sheen on a daily basis during groundwater gauging and sampling events as well as during monthly site visits. LNAPL was also not observed in Willow Creek during the 2007-2008 Interim Action Phase II excavation activities. !!!

5. Monitored Natural Attenuation Data

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) (Ecology 2005). The locations of the wells inside the three groundwater flow paths were based on the interpreted presence of LNAPL on groundwater prior to the creation of the Work Plan. Prior to the 2007/2008 Interim Action remedial excavations, the groundwater flow paths fit the established model of upgradient, source area, and downgradient wells. However, during the 2007/2008 excavations, it became apparent that LNAPL was more widespread than originally thought. As a result of the 2007/2008 Interim Action, remedial excavations extended beyond the mapped flow path areas, and the resulting monitoring well arrangement was no longer suitable for use with Ecology's Natural Attenuation Analysis Tool Package A.

As a result of the source removal, 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, and are no longer applicable for a spatial evaluation of natural attenuation away from the source, as required for use with Ecology's Natural Attenuation Analysis Tool Package A. This change in the site conceptual model rendered the previous sampling schedule and monitoring program obsolete with respect to the planned data evaluation, and resulted in proposed revisions to the monitoring program that were reviewed and approved by DOE in December 2009. The current monitoring well network is sufficient to monitor and evaluate the status of the overall dissolved-phase plume; the stability of the site plume will be evaluated on a well-by-well basis, and the monitoring program needed to support this analysis was reduced accordingly.

5.1 Groundwater Concentration Trends

Groundwater IHS concentration trends over time were evaluated at wells across the site as the primary line of evidence to determine the overall plume status (i.e., shrinking, stable, or expanding; Hun Seak Park 2005).

Groundwater IHS (TPH, cPAH, and benzene) concentrations with time were statistically evaluated using groundwater monitoring data from October 2008 through

October 2010 (**Table 3**) in order to assess the significance of any observed trends[1]. The analysis used the natural log-normalized concentration data to estimate increasing or decreasing concentration trends and, where appropriate, attenuation rates (USEPA 2002), with the results summarized in **Appendix F, Table F-1**.

Linear regression analysis was undertaken for TPH at all monitoring locations without measurable LNAPL, and for benzene at those monitoring locations where concentrations have exceeded the applicable CULs at least once since October 2008. Statistical analysis was not undertaken on cPAH concentrations, as they were consistently below laboratory detection limits at all locations, with any exceedances a reflection in changes to laboratory detection limits as compared to the CULs. Degradation rates and projected year to CUL were calculated for wells with statistically significant decreasing IHS concentration trends (**Table F-1**).

The R^2 value is a measure of how well the linear regression "fits" the data; in this case it represents the proportion of variability in the site concentration data, which can be explained using the regression model. Values of R^2 are bounded by 0 and 1, with values closer to 1 indicating a better fit of the regression to the data; conversely, R^2 values of 0 would indicate that the regression has no predictive value.

The p-value of the regression model is used to determine the statistical significance of the linear regression. Here, the null hypothesis is defined as the slope of the regression line being equal to 0 (i.e., there is no significant trend in the data) and the p-value represents the certainty with which the null hypothesis can be accepted. For the purposes of this study, a 90% confidence level has been used, which corresponds to a p-value of 0.10. For p-values greater than 0.10, the null hypothesis is accepted, and the slope of the regression line is considered not to be different than 0. For p-values less than 0.10, the null hypothesis is rejected, and the slope of the line is considered significantly different from 0 (i.e., the data demonstrate a statistically significant trend).

Statistical analysis was undertaken at 17 wells on the western side of the site (**Table 1a**). Ten of these wells have shown exceedances of the CULs since monitoring commenced in October 2008. The main findings from the statistical analysis of wells on the western side of the site are:

[1] During the review of previous versions of this report questions were raised regarding the appropriate use of non-detect values in regression analyses. Use of non-detects in future regression analyses will be carefully reviewed.

- Six locations showed statistically significant decreasing concentrations of TPH in groundwater at a 90% confidence level (MW-20R, MW-517, MW-518, MW-519; MW-520, MW-521).

- Thirteen wells did not exceed IHS CULs at any time during 2010 monitoring.

- Four wells showed TPH concentrations above the CULs on one or more occasion during 2010.

    - Well MW-518 showed concentrations above the CUL for TPH for all 2010 monitoring events, but this was combined with a statistically significant decreasing trend at a 90% confidence level. Concentrations of TPH are estimated to be below the CUL in 2.2 years.

    - Well MW-104 showed TPH above the CUL for TPH in January 2010, but was below the CUL for the remainder of the year, and no significant trends were observed in TPH at this location. The cPAH concentration was above the CUL in October 2010 due to an elevated reporting limit.

    - Wells MW-143 and MW147 showed exceedances of TPH on three occasions in 2010. Concentrations were within the historical ranges at these locations, and there were no significant increasing or decreasing trends in TPH at these wells.

Statistical analysis of 23 wells on the eastern portion of the site was undertaken, of which 15 wells have exhibited one or more exceedances of the CULs in groundwater since the Interim Action monitoring program commenced. Groundwater samples have not been collected at MW-510 since August 2009, due to the presence of LNAPL. The results are shown in **Table 1a** and summarized below:

- Statistically significant decreasing trends in TPH concentrations were observed at eight monitoring locations (MW-108; MW-109; MW-139R; MW-501; MW-502; MW-513; MW-514; MW-515)

- Eleven wells did not exceed IHS CULs at any time during monitoring in 2010.

- Eleven wells have showed TPH concentrations greater than CULs during 2010 monitoring. Of these 11 wells, four wells (MW-501, MW-502, MW-513, MW-514) have statistically significant decreasing concentrations, with measured concentrations close to, or below, CULs in October 2010.

- Well MW-510, which has not been sampled since August 2009, has historically shown a statistically significant increasing trend in TPH, which is likely linked to the presence of LNAPL at this location.

- Statistically significant increasing trends in TPH were observed at three locations (LM-2, MW-129R, and MW-135). The increasing trends at MW-129R and MW-135 are a result of TPH concentrations less than (or very close to) detection limits for the first two monitoring events in October and December 2008, which are inconsistent with subsequent analytical results. If these unusually low data points are excluded from the statistical analysis, then concentrations of TPH at MW-129R and MW-135 do not show significant increasing trends. Removing the October and December 2008 data for LM-2 still shows statistically significant increasing trends, however, the magnitude of this increase does not seem to be concerning, with linear regression analysis of the time series data at LM-2 showing a relatively flat gradient, and concentrations in December 2010 within historical ranges

Excluding the October and December 2008 data collected from monitoring wells MW-129R and MW-135, as described in the bullet point above, linear regression analysis of the 40 wells indicated stable or decreasing trends in IHS concentrations at all locations, with the exception of LM-2 and MW-510, where LNAPL is historically present and samples have not been collected since August 2009.

Overall, analysis of the groundwater data collected shows the IHS concentrations analyzed are stable or decreasing at 95% of the monitoring locations

5.2 Geochemical Indicator Parameters

In addition to the ongoing collection of hydrocarbon IHS groundwater data, geochemical indicator parameters have been monitored at the site to further characterize the groundwater environment and evaluate natural attenuation of hydrocarbon impacts. While trends in the hydrocarbon IHS constituent concentrations represent the primary line of evidence for natural attenuation in groundwater at the site, geochemical indicator parameters are monitored as a secondary line of evidence to evaluate the potential for biodegradation to occur (Hun Seak Park 2005).

Degradation of hydrocarbon constituents in groundwater can proceed via aerobic or anaerobic microbial processes. Bacteria present in soil and groundwater obtain energy for cell production and maintenance by facilitating thermodynamically advantageous reduction-oxidation (redox) reactions involving the transfer of electrons from electron donors to available electron acceptors. When sufficient dissolved oxygen is present in groundwater, aerobic biodegradation of hydrocarbons dominates. As oxygen becomes

less available, anaerobic microorganisms consume electron acceptors in the following order of preference: nitrate, manganese oxides, ferric iron hydroxides, sulfate, and carbon dioxide. Anaerobic biodegradation is thus associated with decreased concentrations of nitrate and sulfate, increased concentrations of ferrous iron and dissolved manganese, and production of methane within the plume (Wiedemeier et al. 1999).

Table 4 provides a summary of the geochemical indicator parameters collected at the site, and results are discussed below.

5.2.1 Oxidation-reduction potential and Dissolved Oxygen

The oxidation-reduction potential (ORP) can indicate whether conditions are favorable for aerobic degradation (oxidizing conditions; positive ORP) or anaerobic degradation (reducing conditions; negative ORP) and thus, what type of reactions are likely to be occurring.

The field ORP data collected at monitoring wells across the site vary, but at the majority of wells where elevated concentrations of IHS are present, negative ORP values are detected. Negative ORP indicates reducing conditions, which are favorable to anaerobic biodegradation processes. Reducing ORP values are typically found with depleted dissolved oxygen (DO) concentrations (<1 milligram per liter [mg/L]); again, evidence of conditions favorable to anaerobic degradation processes.

Well MW-511 represents a generally upgradient, un-impacted monitoring location at the site; in contrast to many of the impacted monitoring locations, ORP data collected at this location have remained positive throughout the monitoring period (25.86 millivolts [mV] to 178.32 mV). The DO concentrations at this location ranged from 0.41 mg/L to 4.34 mg/L, which is elevated compared to most other locations.

Generally, at locations were ORP is observed to fluctuate between negative (more strongly reducing) and positive (less reducing) conditions, changes in DO are also observed; with higher DO indicating somewhat more oxidizing conditions. This may be evidence of discrete tidal influences at these locations at the time of sampling; however, overall trends point to reducing, anaerobic conditions conducive to anaerobic biodegradation of COCs in site groundwater.

5.2.2 Nitrate Concentrations

Nitrate is used by denitrifying microorganisms under anaerobic conditions as an electron acceptor to oxidize organic carbon (nitrate reduction). Nitrate concentrations across the site are typically low (<0.5 mg/L) and concentrations are consistently slightly higher at the un-impacted, upgradient well MW-511 (approximately 1 mg/L). The results indicate that nitrate reduction at the site may be occurring. However, given the

low concentrations of nitrate in groundwater, nitrate reduction likely is not contributing significantly to degradation of petroleum hydrocarbons in site groundwater.

5.2.3 Dissolved manganese and Ferrous Iron

Iron and manganese reduction are anaerobic redox reactions in which metal-reducing bacteria use ferric iron and manganic manganese to facilitate oxidation of organic compounds. The reaction produces ferrous iron and dissolved manganese as byproducts.

Dissolved manganese concentrations across the site are highly variable, ranging from 0.0046 mg/L to 10.3 mg/L. Many wells with elevated hydrocarbon concentrations have corresponding elevated dissolved manganese concentrations, typically an order of magnitude higher than those with lower hydrocarbon concentrations, and typically higher than dissolved manganese concentrations in groundwater at MW-511. These results suggest that manganese reduction processes are occurring, contributing to degradation of petroleum hydrocarbons in site groundwater.

Ferrous iron concentrations show variability similar to that of dissolved manganese, with concentrations ranging from below detection to 10 mg/L. Many wells with elevated hydrocarbon concentrations have corresponding elevated ferrous iron concentrations that are typically higher than ferrous iron concentrations at MW-511. These results suggest that iron reduction processes are occurring, contributing to degradation of petroleum hydrocarbons in site groundwater.

5.2.4 Sulfate

Sulfate reduction is an anaerobic redox reaction in which sulfate-reducing bacteria use sulfate as an electron acceptor to oxidize organic carbon compounds, producing sulfides as a byproduct.

High groundwater sulfate concentrations at the site (greater than 200 mg/L and up to 2,220 mg/L) have been observed at MW-108, MW-109, LM-2, MW-507, MW-508, and MW-20R. Groundwater at these locations also has elevated electrical conductivity, ranging from 1,614 microSeimens per centimeter (µS/cm) to 30,823 µS/cm at MW-108, MW-109, LM-2, MW-507, and MW-20R, where sulfate concentrations are typically greater than 500 mg/L, and 704 µS/cm to 1,615µS/cm at MW-507 and MW-508, where sulfate concentrations between 81 mg/L and 364 mg/L are observed. These elevated sulfate concentrations are attributed to saltwater intrusion at these locations, potentially resulting in increased availability of sulfate as an electron acceptor for maintaining reducing conditions.

Sulfate concentrations across the rest of the site are generally less than 100 mg/L, with some monitoring locations where hydrocarbons are present (e.g., MW-135, MW-136,

MW-501, MW-503, MW-143, and MW-510) having sulfate concentrations less than 10 mg/L. The order of magnitude decreases in sulfate concentrations indicate that sulfate reduction likely is occurring, contributing to degradation of petroleum hydrocarbons in site groundwater. Replenishment of sulfate from the downgradient direction through saltwater intrusion may support continued sulfate-reducing conditions in site groundwater.

5.2.5 Methane

Methanogenesis is an anaerobic redox reaction in which methanogenic bacteria use carbon dioxide as an electron acceptor in the degradation of organic compounds, producing methane as a byproduct.

Methane concentrations measured at the site have ranged from less than 0.5 mg/L to as high as 21 mg/L (MW-136). The lowest concentration of methane is found at the upgradient, un-impacted well MW-511, and elevated methane concentrations (10 mg/L to 21 mg/L) are associated with areas of elevated hydrocarbons (MW-129R; MW-135; MW-136;MW-143; MW-147; MW-500; MW-501; MW-510). However, some locations where hydrocarbons are present in significant quantities, such as LM-2, have lower methane concentrations (0.015 mg/L to 0.76 mg/L) and others, such as MW-519, have elevated methane (up to 14 mg/L) but relatively low hydrocarbon impacts.

During excavation of petroleum-impacted soil at the site, a 6-inch to 12-inch layer of sandy silt containing peat, wood debris, and decomposing vegetation was observed. This high organic content layer may be contributing to elevated methane concentrations in site groundwater. Methanogenic conditions are definitely present at the site and likely are contributing to degradation of petroleum hydrocarbons in site groundwater.

5.2.6 Summary

Geochemical parameters monitored across the site indicated anaerobic, reducing groundwater conditions, which are conducive to anaerobic biodegradation of petroleum hydrocarbons. Methanogenic conditions were present on site, and there is the potential for petroleum hydrocarbon degradation to occur via this pathway. Sufficient concentrations of sulfate were present in groundwater to support sulfate reduction biodegradation reactions. Concentrations of ferrous iron and dissolved manganese support the interpretation of the presence of iron and manganese reducing conditions in site groundwater.

6. Overall Groundwater Conditions

When compared to groundwater conditions prior to Interim Action work in the Lower Yard (2001), groundwater has displayed a marked decrease in areas of LNAPL and a marked decrease in dissolved phase TPH across the site. Groundwater conditions in June 2001 are visually represented in **Figure 16**. Current groundwater conditions are visually represented in **Figure 17** for comparison. Geochemical parameters monitored across the site indicate that an environment conducive to anaerobic biodegradation of petroleum hydrocarbons is present, and is likely ongoing at the site.!!! Upgradient wells generally do not have concentrations of IHSs in excess of the groundwater CULs,. Hydrographs representing TPH compared to depth to water are presented in **Appendix G.**

During the October 2010 monitoring event, concentrations of TPH in the four POC wells listed above (which may be showing increasing trends) ranged from 2,415 µg/L in well MW-135 to measureable LNAPL in well MW-510. Monitoring well MW-510 has had detectable LNAPL present since October 2009. The thickest measurement of LNAPL was recorded at 0.13 foot during the January 2010 event. Generally, LNAPL is measured at a thickness of 0.04 foot or less. IHS concentrations in groundwater from monitoring well MW-510 prior to the presence of measureable LNAPL were increasing at a significant trend. The initial IHS concentration collected in October 2008 from monitoring well MW-510 was 3,980 µg/L. This concentration increased to 25,090 µg/L in June 2009. Monitoring wells LM-2, MW-129R, and MW-135 can be seen as having statistically significant increasing trends; however, concentrations of IHSs have not increased to initial levels detected in samples collected from monitoring well MW-510. It is unlikely that IHS concentrations in wells LM-2, MW-129R, and MW-135 indicate the presence of LNAPL in these areas, but further monitoring is warranted.

Generally, POC wells in the western portion of the site either contain concentrations of the IHSs less than the CULs or are trending toward the CULs. POC wells on the northern end and the southeast Lower Yard still contain concentrations of IHSs in excess of the CULs. Based on this information, it is anticipated that additional data will need to be collected. ARCADIS anticipates the next step will be to submit a Feasibility Study (FS).

7. Next Steps

In anticipation of preparing an FS, ARCADIS has prepared a DRAFT Aquifer Testing Work Plan, which was submitted to Ecology in December 2010 for comments. This work plan proposes the following hydraulic evaluation activities:

- **Tidal study.** A tidal study will be completed to gather information regarding short-term, transient gradients at the site and to improve understanding of the surface water-groundwater interactions at the site. This information will be used to update the CSM and inform the evaluation of the additional remedial alternatives.

- **Aquifer tests**. Aquifer tests will be performed to update and improve understanding of hydraulic conductivity of saturated material and the groundwater flow regime. Aquifer tests include short- and long-duration pumping tests and, if necessary, slug tests.

Information collected during the aquifer testing will be used to update the CSM and collect hydraulic data necessary for the completion of an FS. ARCADIS will prepare a technical memorandum summarizing the data collection and analysis. Upon completion of the hydraulic testing, additional testing may be proposed prior to preparation of an FS Work Plan and FS.

The FS Work Plan and FS will investigate various remedial strategies which may be feasible for implementation at the Terminal based on potential effectiveness, site constraints, and cost-effectiveness. The following remedial alternatives will likely be proposed for consideration in the FS:

- Excavation
- Focused enhanced bio-oxidation
- Surfactant flushing
- Groundwater containment with closely spaced wells
- Groundwater containment trench
- Interceptor trench with impermeable barrier on the downgradient extent
- Funnel and gate groundwater extraction system
- Funnel and gate with permeable sorptive walls at gates

8. Proposed Interim LNAPL Recovery

As the Aquifer Testing Work Plan, FS Work Plan, and FS are being developed and implemented, ARCADIS intends on implementing interim LNAPL recovery activities at

monitoring well MW-510. Interim recovery will include passive LNAPL recovery through the use of an absorbent sock recovery system such as SoakEase ™. A product data sheet is presented in **Appendix H**. Spent absorbent socks will be stored in a Department of Transportation approved 55-gallon drum, and properly disposed of at an Ecology approved solid waste landfill. Interim LNAPL recovery measures will be implemented immediately upon Ecology approval.

9. Proposed Monitoring Program 2011

During the aquifer testing and FS Work Plan Data collection period, ARCADIS proposes to continue the groundwater monitoring program. Beginning with the first quarter 2011 event, the following analytes and parameters are being proposed for collection during the first and third quarter 2011 events at POC wells only, and during the second quarter 2011 event at POC and interior monitoring wells:

- TPH-G by Ecology Methods NWTPH-Gx
- TPH-D and TPH-O by Ecology Method NWTPH-Dx (after silica gel cleanup)
- Benzene by USEPA Method 8021B for MW-20R only
- Water quality including DO, ORP, pH, conductivity, and temperature

During the fourth quarter 2011 monitoring event, the site wells in the program that do not contain LNAPL will be sampled for the full suite of analytes (including benzene, cPAHs, and natural attenuation parameters) as outlined in the Agreed Order, No. DE92TC-N328. ARCADIS is proposing to evaluate the monitoring program annually and propose changes to Ecology at the end of each year.

The table below illustrates the proposed groundwater monitoring schedule for 2011:

	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
POC Wells	TPH-G, TPH-D, TPH-O, Benzene (MW-20R only), water quality parameters	TPH-G, TPH-D, TPH-O, Benzene (MW-20R only), water quality parameters	TPH-G, TPH-D, TPH-O, Benzene (MW-20R only), water quality parameters	TPH-G, TPH-D, TPH-O, Benzene (all wells), cPAH, water quality parameters

Interior Monitoring Wells	No interior wells sampled	TPH-G, TPH-D, TPH-O, Benzene (MW-20R only), water quality parameters	No interior wells sampled	TPH-G, TPH-D, TPH-O, Benzene (all wells), cPAH, water quality parameters

10. Conclusions

As of the final groundwater monitoring event in the Interim Action monitoring program, IHS concentrations at the majority of POC wells are less than the established CULs. During the most recent groundwater monitoring event (October 2010), 30 of the 39 sampled wells did not contain concentrations of IHSs in excess of the CULs. Of the nine wells that did, only four wells show statistically significant increasing trends or LNAPL. Based on available data, LNAPL appears to be isolated to a localized area adjacent to DB-2. Geochemical parameters at the site indicate an environment conducive of anaerobic biodegradation of petroleum hydrocarbons, and data suggest that biodegradation is ongoing.

ARCADIS anticipates that Ecology will determine that the interim action did not constitute the final cleanup action, and that the cleanup process will continue with the issuance of an FS Work Plan and FS. A Cleanup Action Plan will be developed from the FS and implemented.

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ARCADIS

Tables

Table 1

Surface Water and Groundwater Cleanup Levels
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Indicator Hazardous Substances	Surface Water and Groundwater Cleanup Level	
	Eastern	Western
Total TPH	506	706
Benzene	51	51
Total cPAHs	0.018	0.018

Notes :
Concentrations in micrograms per liter (µg/L)

Table 2

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
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
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
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

Table 2

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
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
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
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

Table 2

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
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
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
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

Table 2

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
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
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
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

Table 2

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
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
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
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

Table 2

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
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
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
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

Table 2

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
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
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
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

Table 2

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
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
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
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

Table 2

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
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
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**
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

Table 2

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
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
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
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

Table 2

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
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
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
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

Table 2

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
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
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
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

Table 2

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
Southeast Lower Yard 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
P-2 [b]	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
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

Table 2

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-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
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
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
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
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
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
	10/25/10	12:18		1.30	--	NP	7.54
	10/25/10	15:33		1.85	--	NP	6.99

Table 2

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-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
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

Table 2

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-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
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

Table 2

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-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
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
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

Table 2

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)

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.

^ = 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 3

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)	
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	
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	
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	

Table 3

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	
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	
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	

Table 3

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-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	
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]	
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	

Table 3

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-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
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]
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

Table 3

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
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
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

Table 3

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
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	
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	
	12/06/10	0.2	U	NA		NA		NA		NA		1,800		50	U	580		2,405	

Table 3

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-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
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
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	

Table 3

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	369
	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
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
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

Table 3

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-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
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
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

Table 3

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-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
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
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

Table 3

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]	
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	
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	

Table 3

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-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	
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																	
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	

Table 3

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-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
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]
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
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

Table 3

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)

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 limit.
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.

Table 4

Summary of Groundwater Analytical Data
Natural Attenuation Parameters
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date Sampled	Temperature (°F)[1]	pH[1]	Conductivity (µS/cm)[1]	DO (mg/L)[1]	ORP (mV)[1]	Total Alkalinity (mg/L as CaCO3)[2]	Sulfate (mg/L)[3]	Nitrate (mg/L)[3]	Methane (µg/L)[4]	Manganese (mg/L)[5]	Ferrous Iron by Field Measurement (mg/L)[6]
LM-2	10/23/08	57.54	3.51	17,373.54	0.39	222.94	5.00 U	914	1 UJ	28.1	0.349	4.0
	12/11/08	53.17	3.89	13,859.08	0.17	338.86	5.00 U	942	0.200 U	46.9	0.358	5.0
	02/26/09	49.78	3.82	12,912.70	1.62	371.08	0.460 U	915	0.250 U	59	0.367	3.2
	04/23/09	51.06	4.91	11,367.56	7.37	133.42	9.7	768	0.250 U	50	0.298	6.0
	06/25/09	55.63	5.36	17,476.72	3.18	-38.23	43.4	1,280	0.640	41	0.239	6.0
	08/20/09	60.42	6.03	23,943.90	5.43	-93.49	90.6	2,220	0.250 UW	25 P	0.277	6.0
	10/30/09	56.50	4.16	5,546.90	0.91	325.52	30.2	401	0.250 U	15	0.292	7.5
	10/29/10	59.54	5.27	12,292.11	1.08	27.03	90.4	385	0.500 U	760	0.196	5.2
MW-8R	10/21/08	61.34	6.65	860.34	-0.02	-100.66	217	50.6	0.200 U	304	1.49	1.2
	12/09/08	54.32	6.83	494.30	0.40	-132.57	180	58.1	0.200 U	299	0.664	1.2
	02/23/09	47.03	6.75	426.42	0.42	-23.66	155	69.9	0.250 U	210	0.682	1.0
	04/21/09	49.17	6.81	309.61	0.54	-167.35	134	47.5	0.250 U	21	0.375	0.0
	06/23/09	61.01	6.69	404.48	0.22	17.20	0.460	45.70	0.250 U	100	0.719	2.0
	08/18/09	68.36	6.55	568.94	0.11	-5.74	208	40.6	0.250 U	240	0.945	1.0
	10/26/09	62.15	6.73	1,126.47	3.00	201.58	138	503	0.380	120	0.418	0.5
	10/26/10	60.46	6.68	1,272.61	3.23	-24.65	223	376	0.250 U	220	0.497	1.0
MW-20R	10/22/08	55.85	6.68	10,026.36	0.15	-63.43	306	283	0.200 U	771	2.97	6.0
	12/10/08	54.77	6.63	7,040.07	0.00	-88.61	263	238	0.200 U	886	1.63	4.0
	02/24/09	49.87	6.89	2,668.49	0.11	-94.36	271	77.7	0.250 U	3,300	0.404	2.0
	04/22/09	48.29	6.77	1,613.57	0.53	-71.76	250	33.6	0.250 U	2,800	293	5.5
	06/24/09	54.32	6.73	6,859.37	0.44	-54.70	234	287	0.390	160	1.24	3.5
	08/19/09	58.26	6.72	12,573.84	0.18	-122.78	229	592	0.250 U	900	2.49	6.0
	10/27/09	57.49	6.43	11,374.52	0.61	-95.09	186	520	2.80	340	1.41	2.0
	10/27/10	57.29	6.80	30,822.78	0.07	-143.50	128	1,710	1.2	51	0.839	2.6
MW-101	10/22/08	59.63	6.13	2,773.56	0.19	64.36	42.0	96.2	0.210	170	1.33	3.6
	12/10/08	55.79	5.99	1,807.60	0.41	132.69	50.0	41.0	0.450	708	3.32	2.2
	02/24/09	43.38	6.32	870.43	0.78	49.88	110	70.6	0.390	3,000	2.38	2.4
	04/22/09	49.80	6.19	452.57	3.79	24.22	83.0	83.3	0.980	300	0.977	1.0
	06/25/09	57.14	6.10	901.96	1.65	129.31	56.4	135.0	0.250 U	71	1.55	0.5
	08/20/09	64.03	6.15	1,864.72	0.66	48.55	75.8	110	0.250 UW	250 P	2.98	6.0
	10/27/09	59.81	6.11	877.98	1.56	141.54	136	37.5	1.20	1.7	0.185	0.5
	10/27/10	59.43	6.12	3,096.41	2.12	-48.48	108	107	0.250 U	200	1.33	5.0

Table 4

Summary of Groundwater Analytical Data
Natural Attenuation Parameters
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date Sampled	Temperature (°F)[1]	pH[1]	Conductivity (µS/cm)[1]	DO (mg/L)[1]	ORP (mV)[1]	Total Alkalinity (mg/L as CaCO3)[2]	Sulfate (mg/L)[3]	Nitrate (mg/L)[3]	Methane (µg/L)[4]	Manganese (mg/L)[5]	Ferrous Iron by Field Measurement (mg/L)[6]
MW-104	10/22/08	58.72	6.26	2,428.46	-0.01	-13.09	35.6	66.6	0.200 U	594	1.02	4.0
	12/10/08	55.07	6.24	982.41	0.22	30.53	53.8	23.1	0.200 U	1,160	1.13	3.0
	02/24/09	49.93	6.08	967.89	0.21	-26.14	58.8	17.0	0.250 U	2,200	1.19	3.2
	04/23/09	48.22	6.23	566.34	1.01	-121.29	59.2	60.2	0.730	1,800	0.959	4.0
	06/24/09	58.33	6.34	506.78	0.21	-62.91	63.90	39.20	0.25 U	1,200	0.714	6.0
	08/19/09	62.87	6.32	1,353.13	0.29	-61.28	75.6	45.0	0.250 U	950	0.901	6.0
	10/27/09	60.10	6.12	2,590.00	0.43	-27.46	110	92.4	0.300	3.2	1.4	4.5
	10/27/10	58.17	6.16	1,640.32	0.04	-86.19	95.1	31.2	0.250 U	1.3	1.3	2.1
MW-108	10/23/08	53.88	6.26	14,851.80	0.20	-83.53	509	373	1 UJ	2,390 D	0.208	1.4
	12/11/08	50.51	6.29	14,241.04	0.01	-184.14	557	288	0.200 U	1,410 D	0.242	1.2
	02/26/09	50.02	6.28	15,209.47	0.19	-268.28	549	456	0.250 U	3,000	0.263	3.0
	04/23/09	49.14	6.36	14,218.55	0.02	-270.38	517	315	0.250 U	2,400	0.278	3.0
	06/25/09	54.05	6.30	15,829.18	0.72	-132.71	486	507	0.520	2,100	0.284	4.5
	08/20/09	56.41	6.31	16,788.72	0.07	-158.78	525	401	0.250 UW	3,500	0.254	2.0
	10/30/09	55.36	6.31	18,050.49	0.12	-88.09	495	566	0.250 U	2,100	0.267	5.0
	10/29/10	54.88	6.31	23,517.97	0.02	-260.17	475	508	5.0 U	1,600	0.191	1.2
MW-109	10/23/08	54.91	6.22	16,332.14	1.34	-194.55	342	693	1 UJ	785	1.59	0.6
	12/11/08	51.03	6.29	12,565.11	0.80	-193.01	291	640	0.200 U	560	0.528	0.2
	02/26/09	47.82	6.38	13,623.75	3.97	-179.39	300	993	0.250 U	820	1.21	0.4
	04/23/09	47.97	6.03	8,713.56	1.84	-192.93	316	546	0.250 U	350	1.58	1.0
	06/25/09	54.17	6.21	22,124.79	0.52	-138.25	202	1,660	1.40	570	1.09	3.0
	08/20/09	55.99	6.37	23,873.46	2.33	-155.34	331	1,540	0.250 UW	320 P	1,650	1.0
	10/30/09	55.51	6.00	14,892.73	0.76	-41.77	332	1,200	0.250 U	400	1.38	1.0
	10/29/10	54.34	6.54	23,528.21	3.14	-262.04	348	824	250 U	420	1.93	0.1
MW-129R	10/24/08	54.76	6.45	839.57	-0.02	-33.84	502	23.8	0.200 U	1,930	5.74	5.8
	12/12/08	51.10	6.62	867.09	0.12	-76.86	469	91.6	0.200 U	1,600 D	10.3	5.4
	02/27/09	47.80	6.50	836.19	0.18	-70.26	505	47.1	0.250 U	6,000	8.56	5.8
	04/27/09	49.18	6.56	822.66	0.17	-116.70	485	60.4	0.250 U	10,000	8.21	10.0
	06/26/09	54.44	6.54	1,301.40	0.07	-79.11	493	64.40	0.250 U	9,100	7.81	9.0
	08/21/09	57.58	6.58	1,013.56	0.06	-286.98	597	51.3	0.250 U	5,400	7.88	9.0
	10/28/09	55.23	6.75	1,919.06	0.05	-161.96	1,150	1.7	0.250 U	15,000	5.22	8.0
	11/01/10	55.53	6.58	1,397.48	0.10	-155.22	742	75.3	0.250 U	5,500	8.92	2.8

Table 4

Summary of Groundwater Analytical Data
Natural Attenuation Parameters
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date Sampled	Temperature (°F)[1]	pH[1]	Conductivity (µS/cm)[1]	DO (mg/L)[1]	ORP (mV)[1]	Total Alkalinity (mg/L as CaCO3)[2]	Sulfate (mg/L)[3]	Nitrate (mg/L)[3]	Methane (µg/L)[4]	Manganese (mg/L)[5]	Ferrous Iron by Field Measurement (mg/L)[6]
MW-135	10/27/08	54.94	6.51	1,848.03	-0.03	-60.48	959	4.12	0.200 U	10,800 D	2.68	4.0
	12/15/08	49.73	6.59	1,954.54	-0.09	-81.98	1,070	1.43	0.200 U	7,170 D	2.69	2.2
	02/27/09	52.61	6.38	760.32	0.27	22.19	402	79.1	0.250 U	1,100	1.31	3.4
	04/24/09	50.76	6.48	649.63	0.13	-134.17	382	67.2	0.250 U	620	0.743	2.0
	06/29/09	51.44	6.47	1,319.24	1.09	-31.25	752	33.0	0.430	2,600	1.66	6.0
	08/24/09	53.02	6.56	2,049.88	0.29	-60.39	1,140	6.00	0.250 U	11,000	1.67	7.0
	10/29/09	52.90	6.54	2,162.52	0.14	-87.07	1,220	2.4	0.250 U	12,000	1.75	8.0
	11/01/10	54.37	6.46	2,818.70	0.06	-74.99	1,160	1.5 U	0.250 U	12,000	1.24	5.6
MW-136	10/27/08	53.88	6.34	2,330.80	0.06	-57.07	851	0.420	0.200 U	16,800 D	3.19	4.2
	12/15/08	46.47	6.31	1,092.68	0.17	-99.68	629	32.5	0.200 U	9,050 D	4.31	2.8
	02/27/09	47.97	6.34	990.82	0.43	-56.64	474	72.1	0.250 U	8,900	4.05	5.6
	04/24/09	49.91	6.41	925.24	0.07	-193.85	405	91.1	0.250 U	13,000	4.62	8.0
	06/29/09	51.53	6.43	975.31	0.37	-75.06	492	72.1	0.250 U	16,000	4.86	7.0
	08/24/09	54.28	6.43	1,020.67	0.14	-92.53	544	36.3	0.250 U	21,000	4.82	10.0
	10/29/09	53.78	6.35	981.76	0.25	-113.64	574	1.50 U	0.250 U	19,000	4.63	7.0
	11/01/10	54.50	6.44	1,147.64	0.05	-140.56	576	1.5 U	0.250 U	17,000	6.13	1.8
MW-139R	10/22/08	63.60	6.87	664.62	0.01	-22.31	243	64.8	0.200 U	864	2.48	1.0
	12/10/08	54.36	6.96	708.71	0.78	15.38	167	76.1	0.200	12.5	0.902	0.5
	02/25/09	43.11	7.06	334.12	3.34	136.11	105	53	0.400	5.0 U	0.115	0.4
	04/23/09	47.34	7.08	180.00	1.66	-104.66	81.4	32.3	0.250 U	10 U	0.0102	0.4
	06/25/09	62.38	7.14	365.34	0.50	-96.96	134	51.5	0.250 U	34	0.523	2.0
	08/20/09	69.85	7.10	439.97	0.22	-108.16	156	49.7	0.250 UW	77 P	0.512	1.0
	10/28/09	60.58	6.95	277.93	1.41	71.75	110	37.5	0.250 U	5.2	0.0215	0.5
	10/28/10	61.92	6.86	447.33	2.11	-69.41	185	60.4	0.250 U	52	0.189	1.0
MW-143	10/22/08	59.41	6.49	383.51	0.01	-49.00	142	34.4	0.200 U	2,210 D	1.26	5.4
	12/16/08	50.76	6.39	367.82	0.06	-73.14	194	12.9	0.200 U	7,630 D	3.82	3.2
	02/25/09	49.77	6.32	391.78	0.23	-61.12	229	1.5 U	0.250 U	18,000	4.47	4.2
	04/21/09	51.98	6.44	395.08	0.12	-167.60	220	1.80	0.250 U	17,000	4.28	5.8
	06/24/09	59.07	6.39	418.65	0.37	-130.39	210	1.5 U	0.250 U	15,000	3.67	6.0
	08/19/09	61.70	6.42	379.94	0.06	-84.88	182	9.1	0.250 U	4,100	1.86	2.0
	10/27/09	60.32	6.35	356.97	0.17	-144.82	154	14.5	0.360	4,900	0.868	6.5
	10/27/10	59.34	6.56	268.76	0.51	-174.12	68.5	55.7	0.250 U	620	0.214	3.0

Table 4

Summary of Groundwater Analytical Data
Natural Attenuation Parameters
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date Sampled	Temperature (°F)[1]	pH[1]	Conductivity (µS/cm)[1]	DO (mg/L)[1]	ORP (mV)[1]	Total Alkalinity (mg/L as CaCO3)[2]	Sulfate (mg/L)[3]	Nitrate (mg/L)[3]	Methane (µg/L)[4]	Manganese (mg/L)[5]	Ferrous Iron by Field Measurement (mg/L)[6]
MW-147	10/21/08	58.43	6.24	516.46	-0.02	-18.40	131	67.2	0.200 U	330	2.38	5.2
	12/09/08	52.49	6.42	692.37	0.18	-104.13	301	141	0.200 U	895	4.16	6.4
	02/23/09	49.80	6.42	776.76	0.12	-93.21	407	111	0.250 U	1,000	4.86	5.4
	04/21/09	50.50	6.50	629.49	0.09	634.02	334	86.9	0.250 U	1,500	4.08	6.0
	06/23/09	55.54	6.50	696.30	0.04	-108.35	393	49.60	0.250 U	340	3.92	7.0
	08/18/09	60.57	6.46	605.85	0.06	-45.34	272	74.2	0.250 U	610	3.01	7.0
	10/26/09	58.00	6.35	518.53	0.10	-41.83	205	84.6	0.250 U	890	3.26	8.0
	10/26/10	56.07	6.34	426.81	0.20	-74.33	162	83.6	0.250 U	340	2.96	5.2
MW-149R	10/21/08	58.41	6.56	521.83	0.09	-34.31	225	52.5	0.200 U	1,610 D	0.963	1.6
	12/09/08	52.55	6.22	466.01	0.17	101.87	117	165	0.200 U	224	1.06	0.6
	02/23/09	48.40	6.43	441.39	0.09	82.90	161	133	0.250 U	420	0.507	0.6
	04/21/09	48.99	6.37	329.88	1.25	589.02	115	117	0.710	60	0.216	0.2
	06/23/09	56.35	6.56	556.71	0.01	15.84	217	118	0.250 U	860	0.338	3.0
	08/18/09	62.17	6.56	643.81	0.15	-22.07	256	121	0.250 U	1,100	0.480	3.0
	10/26/09	58.37	6.21	404.24	3.57	203.93	76.4	160	1.600	7.9	0.0113	1.0
	10/26/10	57.49	6.36	501.89	0.55	50.72	150	135	0.770	28	0.140	0.5
MW-150	10/21/08	58.35	6.52	748.62	-0.05	25.37	444	68.7	0.200 U	622	1.52	1.4
	12/09/08	52.71	6.54	761.44	0.20	32.64	440	134	0.200 U	389	1.52	1.8
	02/23/09	48.38	6.56	586.85	0.14	71.82	371	101	0.250 U	180	1.24	1.0
	04/21/09	48.86	6.69	570.05	0.15	-80.49	341	86.5	0.250 U	50	1.14	1.0
	06/23/09	57.16	6.77	569.79	0.27	31.03	347	60.80	0.250 U	220	0.945	1.0
	08/18/09	62.67	6.61	708.96	0.06	-5.64	403	69.3	0.250 U	350	1.24	1.8
	10/26/09	58.83	6.64	587.23	0.96	70.66	316	73	0.380	51	0.295	1.0
	10/26/10	58.28	6.34	2,521,506.50	0.60	33.14	347	63.6	1.1	110	0.812	1.8
MW-500	10/27/08	60.04	6.44	4,499.73	0.05	-10.17	977	172	0.200 U	8,590 D	0.97	4.2
	12/15/08	48.50	6.73	641.64	0.50	76.79	362	134	0.230	1,940 D	0.511	0.0
	02/27/09	44.74	6.77	475.25	0.29	111.07	334	37.7	0.250 U	6,400	0.2	1.2
	04/24/09	50.90	6.73	339.34	0.44	-143.85	263	18.6	0.250 U	39	0.0808	0.4
	06/29/09	59.99	6.38	1,001.85	-0.08	-44.59	464	17,900	0.250 U	16,000	1,340	3.0
	08/21/09	67.41	6.38	1,341.80	0.10	-233.97	647	2.20	0.250 U	15,000	1.82	2.5
	10/29/09	59.42	6.42	734.24	0.16	-104.24	362	131	0.350	13,000	1.97	1.5
	11/01/10	58.82	6.16	735.00	0.07	-145.52	451	22.4	0.250 U	12,000	1.8	5.5

Table 4

Summary of Groundwater Analytical Data
Natural Attenuation Parameters
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date Sampled	Temperature (°F)[1]	pH[1]	Conductivity (µS/cm)[1]	DO (mg/L)[1]	ORP (mV)[1]	Total Alkalinity (mg/L as CaCO3)[2]	Sulfate (mg/L)[3]	Nitrate (mg/L)[3]	Methane (µg/L)[4]	Manganese (mg/L)[5]	Ferrous Iron by Field Measurement (mg/L)[6]
MW-501	10/24/08	60.21	6.53	3,805.79	-0.02	-27.98	1,700	59.2	0.200 U	10,500 DJ	3.49	5.0
	12/15/08	51.44	6.66	475.85	4.55	91.22	269	55.4	1.73	91.9	0.0552	0.0
	03/02/09	49.42	6.49	434.37	2.35	216.95	317	34.7	1.2	56.0	0.670	0.8
	04/24/09	51.05	6.53	374.33	1.03	-42.42	248	29.7	0.250 U	140	0.694	1.0
	06/26/09	59.01	6.40	1,025.69	0.04	37.36	NA	1.50	0.250 U	16,000	2.8	0.0
	08/21/09	67.17	6.44	1,361.38	0.19	-47.09	752	2.7	0.250 U	13,000	5.0	7.0
	10/29/09	58.23	6.43	366.98	0.24	-105.85	242	26.1	0.250 U	380	4.9	5.0
	11/01/10	59.18	6.26	844.99	0.10	-102.31	509	1.5 U	0.250 U	14	4.95	7.2
MW-502	10/24/08	59.77	6.31	558.51	0.05	-36.88	98.0	70.2	0.200 U	98.8 D	1.10	6.4
	12/12/08	53.20	6.36	482.08	0.04	-33.02	87.2	63.4	0.200 U	67.0	0.739	3.0
	02/25/09	48.02	6.37	343.38	0.11	-24.32	67.9	56.8	0.250 U	53	0.681	6.4
	04/22/09	50.96	6.36	314.18	0.03	226.34	67.7	48	0.250 U	40	0.635	7.0
	06/26/09	61.26	6.37	379.61	0.14	-57.95	95.0	52.80	0.250 U	33	0.627	6.5
	08/21/09	64.60	6.17	364.92	0.10	-38.59	107	27.6	0.250 U	20 P	0.585	6.0
	10/28/09	60.10	6.34	413.99	0.14	-65.94	153	41.4	0.250 U	45	0.568	6.0
	10/28/10	59.88	6.09	377.99	0.11	31.93	100	30.2	0.250 U	5.2	0.407	4.8
MW-503	10/27/08	58.09	6.21	359.03	0.00	-44.22	189	8.44	0.200 U	478	0.139	3.0
	12/12/08	54.35	6.36	302.27	0.07	-38.20	169	9.51	0.200 U	306	0.188	4.6
	02/26/09	50.47	6.29	280.63	0.12	-14.44	155	11.8	0.250 U	210	0.196	2.0
	04/22/09	51.85	6.36	273.33	0.02	259.93	152	12.3	0.250 U	150	0.245	7.0
	06/26/09	55.34	6.36	281.37	0.05	-56.57	156	16.3	0.250 U	190	0.225	6.5
	08/21/09	60.08	6.34	311.25	0.02	-37.47	158	11.7	0.250 U	180 P	0.238	7.0
	10/28/09	58.50	6.31	314.43	0.04	-44.90	159	12.1	0.250 U	190	0.241	10.0
	10/28/10	58.32	6.18	512.56	0.10	-23.74	145	14.9	0.250 U	0.18	0.318	5.6
MW-504	10/24/08	58.92	6.73	1,157.92	0.08	5.06	435	64.2	0.200 U	1,970 D	3.24	0.8
	12/12/08	49.76	6.98	958.10	0.24	36.78	261	188	0.710	269	1.14	0.2
	02/27/09	46.92	7.04	572.72	0.28	473.30	251	119	0.400	120	0.376	0.2
	04/24/09	49.13	7.08	566.26	0.92	-47.37	227	129	0.710	56	0.228	0.2
	06/26/09	59.97	7.08	595.29	0.14	33.80	274	106	0.250 U	170	0.419	0.0
	08/21/09	66.52	6.88	797.96	0.04	28.06	338	84.7	0.250 U	840	1.190	0.0
	10/28/09	60.48	6.81	637.65	0.41	52.25	311	86.7	0.650	380	0.676	1.5
	10/28/10	60.75	6.76	786.39	0.73	-63.57	301	47.8	0.250 U	180	0.804	0.5

Table 4

Summary of Groundwater Analytical Data
Natural Attenuation Parameters
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date Sampled	Temperature (°F)[1]	pH[1]	Conductivity (µS/cm)[1]	DO (mg/L)[1]	ORP (mV)[1]	Total Alkalinity (mg/L as CaCO3)[2]	Sulfate (mg/L)[3]	Nitrate (mg/L)[3]	Methane (µg/L)[4]	Manganese (mg/L)[5]	Ferrous Iron by Field Measurement (mg/L)[6]
MW-505	10/24/08	56.61	6.77	1,292.49	0.42	23.88	289	119	0.540	961	2.41	0.6
	12/15/08	51.14	6.89	823.56	2.25	68.13	216	144	0.630	219	1.42	0.0
	02/27/09	46.85	6.85	659.23	2.72	182.77	181	167	0.390	130	1.16	0.0
	04/22/09	49.75	7.04	586.48	1.48	-144.75	184	134	0.430	100	1.10	0.0
	06/26/09	62.11	7.01	637.54	1.42	-17.29	190	133	0.340	190	9.11	0.5
	08/21/09	64.00	6.88	719.54	0.60	-15.81	185	72.9	0.250 U	190 P	0.997	1.0
	10/28/09	57.61	6.87	620.60	1.83	26.22	187	136	0.380	230	1.10	0.5
	10/29/10	59.58	6.75	613.95	0.05	-59.16	219	58.6	250 U	1,000	1.17	1.8
MW-506	10/24/08	58.38	6.90	851.73	-0.03	-3.02	238	147	0.200 U	2,820 D	1.42	0.8
	12/12/08	49.85	6.88	863.65	0.35	52.81	186	90.7	0.210	1,770 D	1.61	0.4
	02/27/09	47.32	7.10	363.65	0.50	76.54	121	59.9	0.560	140	0.105	0.0
	04/24/09	48.74	7.12	272.22	0.56	-138.25	115	53.6	1.0	36	0.0139	0.0
	06/26/09	57.74	7.11	601.49	0.11	85.41	183	74.30	320	1,800	0.135	0.0
	08/21/09	62.46	7.06	329.13	0.07	46.69	141	28.1	0.250 U	2,200	0.434	0.5
	10/30/09	59.70	6.89	363.42	0.37	4.84	132	71.7	0.250 U	1,600	0.729	0.5
	10/29/10	58.82	6.83	518.80	0.09	-28.40	207	29.8	250 U	5,200	1.97	0.6
MW-507	10/24/08	58.31	6.54	642.48	0.01	-93.26	214	80.7	0.200 U	1,110 D	5.10	6.0
	12/12/08	52.21	6.61	795.60	0.07	-46.04	297	151	0.200 U	850	3.31	3.8
	02/27/09	48.70	6.51	909.55	0.26	37.35	290	279	0.250 U	1,600	3.97	3.2
	04/24/09	51.10	6.53	992.50	0.14	-38.69	293	364	0.250 U	1,600	3.40	3.0
	06/26/09	56.60	6.52	1,350.93	0.03	-29.33	252	282	0.250 U	1,100	4.27	7.0
	08/21/09	61.75	6.48	964.71	0.20	-46.15	279	297	0.250 U	2,300	6.04	7.0
	10/28/09	59.50	6.59	1,034.93	0.38	-20.79	350	302	0.250 U	280	3.39	2.0
	10/29/10	59.85	6.62	1,097.89	0.36	-66.97	347	243	0.250 U	59	1.67	1.5
MW-508	10/24/08	58.26	6.80	1,614.86	0.09	-18.99	430	141	0.200 U	1,630 D	0.248	0.4
	12/11/08	53.93	6.52	750.26	0.12	79.75	209	205	0.660	641	1.38	0.2
	02/26/09	48.90	6.40	786.61	0.22	-210.79	212	243	0.560	1,300	0.963	0.0
	04/23/09	49.87	6.29	882.52	0.22	-116.34	177	267	0.780	350	0.942	0.4
	06/25/09	57.68	6.54	949.43	0.18	-79.16	216	274	0.250 U	6,100	1,010	0.0
	08/21/09	61.65	6.39	1,031.70	0.21	-269.40	304	364	0.640	5,900	0.467	0.0
	10/28/09	59.81	6.13	704.28	0.49	159.01	216	224	0.750	3,500	0.767	0.0
	10/28/10	60.58	6.25	740.35	1.00	-106.68	223	176	0.250 U	6,600	0.735	2.0

Table 4

Summary of Groundwater Analytical Data
Natural Attenuation Parameters
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date Sampled	Temperature (°F)[1]	pH[1]	Conductivity (µS/cm)[1]	DO (mg/L)[1]	ORP (mV)[1]	Total Alkalinity (mg/L as CaCO3)[2]	Sulfate (mg/L)[3]	Nitrate (mg/L)[3]	Methane (µg/L)[4]	Manganese (mg/L)[5]	Ferrous Iron by Field Measurement (mg/L)[6]
MW-509	10/23/08	59.60	6.62	489.68	0.23	44.82	185	66.0	0.260	514	0.926	0.4
	12/11/08	50.47	6.83	445.56	1.34	113.25	90.0	66.2	1.92	52.5	0.450	0.4
	02/25/09	44.22	6.98	256.98	6.04	391.88	80.8	44.4	0.250 U	5.0 U	0.0127	0.2
	04/23/09	51.31	7.07	192.88	4.78	-52.52	74.8	40.6	0.250 U	10 U	0.0063	0.0
	06/25/09	64.34	6.98	321.70	0.12	-14.93	117	55.9	0.250 U	9.0	0.0996	0.5
	08/21/09	67.68	6.90	365.42	0.21	-268.87	129	38.9	0.250 U	120	0.365	0.5
	10/28/09	57.40	6.80	219.09	2.56	99.13	95.8	29.5	0.250 U	29	0.131	0.0
	10/28/10	59.45	6.71	387.07	0.40	68.41	128	43.5	0.250 U	20	0.113	0.4
MW-510	10/23/08	57.02	6.60	942.28	0.16	-1.59	512	9.78	0.200 U	7,480 D	0.221	1.2
	12/11/08	52.98	6.60	795.47	0.28	-81.60	468	12.0	0.200 U	3,990 D	0.483	1.4
	02/26/09	47.88	6.42	873.63	0.10	-55.76	468	17.0	0.250 U	9,700	2.32	1.6
	04/27/09	50.18	6.44	851.95	0.17	-181.81	437	21.2	0.250 U	11,000	2.46	7.0
	06/24/09	58.28	6.64	918.04	0.14	-123.30	475	10.1	0.250 U	14,000	1.11	6.0
	08/20/09	62.64	6.60	937.57	0.06	-301.39	446	1.5 U	0.250 UW	15,000	0.698	6.0
	10/28/09	Not sampled due to the presence of LNAPL										
	10/25/10	Not sampled due to the presence of LNAPL										
MW-511	10/24/08	55.73	6.59	248.56	0.41	25.86	122	23.1	0.350	1.63	0.289	0.2
	12/12/08	51.90	6.44	235.10	1.84	122.09	110	25.2	0.940	1.20 U	0.446	0.2
	02/25/09	48.43	6.12	350.22	3.73	140.09	77.9	23.3	1.1	5.0 U	0.169	0.0
	04/21/09	49.64	6.23	240.99	4.34	143.96	77.3	30.4	0.930	5.0 U	0.0887	0.0
	06/24/09	54.46	6.27	213.52	2.87	178.32	87.1	27.2	0.940	6.4	0.0855	NA
	08/19/09	58.96	6.30	211.69	3.17	145.06	86.1	22.3	0.940	5.4	0.0573	0.5
	10/28/09	54.96	6.20	211.44	3.68	91.82	94.4	23.2	1.4	5.0 U	0.0439	0.0
	10/28/10	55.71	6.26	263.83	3.75	26.79	88.4	24.2	830	5.0 U	0.0046	0.1
MW-512	10/23/08	60.03	6.54	396.67	-0.04	14.55	150	30.8	0.200 U	1,200 D	1.56	1.2
	12/11/08	53.48	6.58	480.74	0.01	-48.08	199	31.4	0.200 U	765	2.30	2.0
	02/25/09	47.91	6.59	441.66	0.64	-3.83	205	34.3	0.250 U	1,200	1.15	2.6
	04/21/09	51.96	7.05	460.06	0.37	-144.28	179	52.3	0.280	2,100	0.775	2.0
	06/24/09	61.82	6.65	368.86	0.38	-40.13	152	37.0	0.250 U	720	0.367	2.0
	08/19/09	66.20	6.55	346.88	0.23	-23.55	127	33.6	0.250 U	1,200	0.324	2.0
	10/27/09	59.92	6.66	369.90	2.04	-47.20	157	37.5	0.450	1,600	0.351	1.0
	10/28/10	59.67	6.72	444.53	0.88	-131.58	164	23.4	0.250 U	930	0.414	2.0

Table 4

Summary of Groundwater Analytical Data
Natural Attenuation Parameters
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date Sampled	Temperature (°F)[1]	pH[1]	Conductivity (µS/cm)[1]	DO (mg/L)[1]	ORP (mV)[1]	Total Alkalinity (mg/L as CaCO3)[2]	Sulfate (mg/L)[3]	Nitrate (mg/L)[3]	Methane (µg/L)[4]	Manganese (mg/L)[5]	Ferrous Iron by Field Measurement (mg/L)[6]
MW-513	10/23/08	58.08	6.78	405.45	-0.06	-63.03	182	19.3	0.200 U	523	2.09	2.0
	12/10/08	55.20	6.73	491.21	-0.06	-103.79	197	23.9	0.200 U	465	2.18	2.8
	02/25/09	49.12	6.76	342.53	0.10	-45.95	210	14.8	0.250 U	490	1.90	2.4
	04/22/09	50.10	6.81	342.40	0.12	-225.74	182	26.6	0.250 U	650	1.89	3.5
	06/24/09	59.64	6.82	321.78	0.09	-89.07	167	13.1	0.280	300	1.38	3.0
	08/20/09	62.58	6.73	343.96	0.11	-81.20	168	15.5	0.250 UW	320 P	1.38	2.8
	10/27/09	59.76	6.73	374.84	0.08	-96.67	178	24.3	0.250 U	550	1.80	4.0
	10/28/10	58.03	6.63	395.68	0.10	-103.39	164	11.2	0.250 U	690	1.36	3.8
MW-514	10/23/08	59.15	6.81	368.79	-0.05	-69.84	182	17.4	0.230	200	1.62	2.2
	12/10/08	55.53	6.74	410.41	0.01	-105.01	191	29.2	0.200 U	428	2.89	2.8
	02/24/09	50.68	6.74	330.80	0.15	-84.41	189	21.5	0.250 U	680	2.07	2.2
	04/21/09	51.33	6.83	345.19	0.43	-150.08	176	28.5	0.250 U	710	1.93	4.0
	06/24/09	60.09	6.89	340.42	0.21	-133.74	167	17.8	0.310	400	1.54	3.0
	08/19/09	64.22	6.77	362.34	0.10	-88.48	153	12.7	0.250 U	580	1.47	4.0
	10/27/09	60.17	6.72	342.77	0.18	-90.96	169	13.8	0.250 U	690	1.67	4.0
	10/27/10	58.93	6.62	403.73	0.07	-128.19	160	19.2	0.250 U	210	1.94	4.2
MW-515	10/22/08	62.15	6.60	451.90	0.00	23.35	174	36.2	0.200 U	395	2.46	1.1
	12/10/08	53.51	6.66	444.71	0.03	73.86	131	78.2	0.560	12.7	1.32	0.0
	02/24/09	49.14	6.63	382.79	1.00	76.95	125	61.6	0.250 U	99	0.541	0.0
	04/22/09	49.78	6.86	288.96	1.29	-156.87	112	54.1	0.250 U	45	0.569	0.0
	06/24/09	62.81	6.64	514.96	0.11	29.36	185	55.6	0.250 U	510	1.430	0.5
	08/20/09	67.66	6.65	526.87	0.29	14.84	194	33.0	0.250 UW	410	1.560	0.2
	10/27/09	60.81	6.76	319.95	1.41	40.71	137	33.0	0.250 U	270	0.970	0.5
	10/27/10	61.29	6.76	334.75	1.35	-91.25	150	30.2	0.250 U	240	0.645	1.0
MW-516	10/22/08	60.37	6.75	410.68	0.21	22.93	175	43.2	0.200 U	439	2.23	0.4
	12/10/08	53.18	6.64	391.95	0.03	54.04	149	57.6	0.330	22.0	1.58	0.0
	02/24/09	45.41	6.85	296.90	2.83	109.91	111	55.6	0.750	5.7	0.260	0.0
	04/22/09	49.82	6.86	290.47	3.59	-7.72	110	54.1	0.500	10 U	0.0591	1.0
	06/24/09	65.26	6.67	525.02	0.61	24.67	182	48.8	0.250 U	450	0.592	0.0
	08/20/09	68.95	6.68	474.28	0.83	42.34	184	25.7	0.250 UW	300 P	1.02	0.0
	10/27/09	60.04	6.69	339.91	1.48	38.92	149	34.4	0.250 U	25	0.831	0.0
	10/27/10	60.44	6.59	373.46	1.74	-27.12	142	31.4	0.250 U	26	0.386	0.1

Table 4

Summary of Groundwater Analytical Data
Natural Attenuation Parameters
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date Sampled	Temperature (°F)[1]	pH[1]	Conductivity (µS/cm)[1]	DO (mg/L)[1]	ORP (mV)[1]	Total Alkalinity (mg/L as CaCO3)[2]	Sulfate (mg/L)[3]	Nitrate (mg/L)[3]	Methane (µg/L)[4]	Manganese (mg/L)[5]	Ferrous Iron by Field Measurement (mg/L)[6]
MW-517	10/22/08	59.72	6.52	361.40	0.10	15.95	156	39.3	0.200 U	1,080 D	3.17	0.6
	12/10/08	52.71	6.51	374.55	-0.04	63.88	161	47.4	0.200 U	394	1.81	0.0
	02/24/09	46.38	6.71	355.26	1.97	101.76	127	65.8	1.2	11	0.892	0.4
	04/22/09	50.90	6.70	348.44	1.21	-81.24	128	66.7	0.250 U	43	0.584	1.0
	06/24/09	64.49	6.72	463.93	0.61	-52.18	184	50.5	0.250 U	1,700	1.14	1.0
	08/20/09	67.06	6.60	437.32	0.33	7.39	184	20.6	0.250 UW	4,400	1.36	0.5
	10/27/09	60.36	6.66	355.06	0.41	15.34	148	41.9	0.250 U	99	1.09	1.5
	10/27/10	59.99	6.68	381.89	0.56	-12.51	145	35.3	0.250 U	270	0.641	0.5
MW-518	10/22/08	61.89	6.46	2,403.10	0.10	6.25	194	93.4	0.200 U	2,380 D	1.60	3.0
	12/10/08	56.07	6.64	590.16	0.08	22.59	247	32.5	0.200 U	1,920 D	2.22	1.6
	02/25/09	47.59	6.55	482.43	0.15	-9.02	209	61.1	0.250 U	2,900	1.99	2.2
	04/22/09	48.17	6.52	519.99	0.27	-182.35	163	63.6	0.600	3,100	1.48	2.0
	06/25/09	58.02	6.48	1,501.29	0.24	6.00	117	97.6	0.500	1,500	1.67	2.0
	08/20/09	65.80	6.49	2,674.51	0.12	-247.61	176	119	0.250 UW	4,500	1.5	3.0
	10/30/09	62.35	6.50	1,278.14	0.45	-46.31	224	51.6	0.250 U	4,000	1.57	4.0
	10/28/10	60.96	6.57	1,587.58	0.04	-116.69	200	70.4	0.250 U	3,500	1.38	8.0
MW-519	10/22/08	58.05	6.55	535.69	-0.02	-34.53	217	29.8	0.200 U	6,780 D	1.31	3.6
	12/09/08	53.23	6.64	610.07	0.11	-70.36	250	30.0	0.200 U	9,760 D	1.34	3.2
	02/24/09	46.76	6.65	405.26	0.10	-41.65	186	43.1	0.460	8,800	0.847	2.7
	04/21/09	51.87	6.63	478.38	0.13	638.95	255	21.5	0.250 U	14,000	1.22	2.7
	06/24/09	60.02	6.58	618.06	0.06	-67.35	290	9.7	0.250 U	13,000	1.15	5.0
	08/18/09	66.09	6.61	691.65	0.14	-57.02	258	36.7	0.250 U	14,000	1.16	2.5
	10/27/09	59.84	6.59	364.97	0.31	-72.83	124	49.6	0.250 U	6,400	0.610	2.0
	10/26/10	59.52	6.53	469.46	0.18	-61.26	170	71.6	0.250 U	3,900	0.473	4.2
MW-520	10/21/08	59.76	6.79	944.21	0.02	-14.62	212	32.0	0.200 U	2,230 D	1.58	1.4
	12/09/08	53.17	6.81	584.24	0.12	-89.46	189	28.7	0.200 U	2,240 D	1.48	1.4
	02/23/09	47.79	6.84	477.54	0.16	-57.60	187	22.1	0.250 U	2,500	1.18	1.6
	04/22/09	48.74	6.75	397.91	0.40	-161.40	162	33.6	0.250 U	2,200	746	2.0
	06/24/09	60.08	6.67	584.31	0.04	-54.65	202	19.3	0.250 U	4,900	1.46	3.0
	08/18/09	67.93	6.60	587.53	0.06	27.15	194	5.5	0.250 U	1,600	1.09	2.0
	10/27/09	60.06	6.50	483.54	0.09	9.18	153	33.6	0.250 U	1,100	1.03	1.0
	10/27/10	60.39	6.48	731.32	0.20	-82.10	201	16	0.250 U	1,600	1.46	1.8

Table 4

Summary of Groundwater Analytical Data
Natural Attenuation Parameters
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date Sampled	Temperature (°F)[1]	pH[1]	Conductivity (µS/cm)[1]	DO (mg/L)[1]	ORP (mV)[1]	Total Alkalinity (mg/L as CaCO3)[2]	Sulfate (mg/L)[3]	Nitrate (mg/L)[3]	Methane (µg/L)[4]	Manganese (mg/L)[5]	Ferrous Iron by Field Measurement (mg/L)[6]
MW-521	10/21/08	59.50	6.57	818.08	-0.01	4.73	172	63.9	0.200 U	888	1.42	0.9
	12/09/08	53.28	6.77	555.86	0.38	-70.66	174	37.3	0.200 U	1,310	1.48	0.5
	02/23/09	46.76	6.78	408.37	0.11	-33.28	150	50.8	0.250 U	1,200	1.44	0.6
	04/21/09	52.18	6.65	282.87	0.33	643.50	105	43.5	0.250 U	66	0.587	0.2
	06/23/09	62.33	6.68	366.61	0.35	12.69	142	33.4	0.250 U	530	0.649	1.0
	08/19/09	66.65	6.54	504.12	0.14	-9.28	172	46.1	0.250 U	740	0.899	1.5
	10/26/09	60.51	6.71	701.29	0.15	-191.41	154	52.3	0.250 U	3,100	1.73	1.5
	10/27/10	59.20	6.50	541.24	0.18	-90.60	177	38.2	0.250 U	1,200	1.25	1.6
MW-522	10/21/08	62.31	6.57	756.65	0.06	-47.72	251	18.0	0.200 U	972	1.70	5.2
	12/09/08	53.30	6.71	548.80	0.14	-98.92	200	73.9	0.200 U	297	1.07	5.2
	02/23/09	48.06	6.56	503.15	0.12	-50.16	171	108	0.250 U	260	1.16	4.6
	04/21/09	49.60	6.65	393.02	0.11	699.67	154	76.6	0.250 U	74	0.880	5.2
	06/23/09	59.64	6.61	442.11	0.05	-75.88	186	51.0	0.250 U	140	0.963	3.0
	08/18/09	68.79	6.61	621.20	0.07	-68.46	244	29.5	0.250 U	580	1.26	3.0
	10/26/09	61.92	6.43	1,166.69	0.09	-25.26	206	560	0.280	400	0.947	3.0
	10/26/10	59.92	6.30	4,979,442.00	0.43	-104.90	208	628	0.250 U	180	0.758	0.8
MW-523	10/21/08	61.66	6.66	870.33	0.01	24.73	221	45.7	0.200 U	1,940 D	3.28	0.8
	12/09/08	54.24	6.71	587.13	0.31	31.67	218	53.2	0.200 U	482	3.01	0.6
	02/23/09	47.46	6.67	420.64	0.41	98.18	164	70	0.250 U	31	1.12	0.0
	04/21/09	49.53	6.76	353.07	0.35	-56.71	146	56.8	0.250 U	280	1.39	0.0
	06/23/09	62.92	6.77	437.56	2.42	141.87	164	42.4	0.250 U	5.0 U	0.59	0.0
	08/18/09	68.16	6.64	614.62	0.16	53.81	199	21.0	0.250 U	1,600	1.380	0.0
	10/26/09	62.44	6.65	720.56	0.28	62.64	248	46.5	0.250 U	420	2.95	1.0
	10/26/10	60.60	6.57	815.65	0.58	31.43	220	102	0.250 U	400	1.15	1.0
MW-524	10/21/08	60.03	6.46	965.29	-0.04	16.91	115	402	0.340	51.0	0.623	1.6
	12/09/08	52.74	6.58	421.64	2.81	154.94	70.6	172	0.620	2.10	0.0353	0.0
	02/23/09	47.66	6.62	337.04	2.35	118.32	76.5	141	0.480	6.2	0.0159	0.2
	04/21/09	48.81	6.60	309.12	4.93	68.52	73.2	119	0.250 U	12	0.0308	0.0
	06/23/09	59.55	6.59	374.54	0.55	139.04	86.0	121	0.250 U	5.0 U	0.023	0.0
	08/18/09	65.03	6.49	468.64	0.50	108.31	104	154	0.250 U	7.9	0.0537	0.0
	10/26/09	59.41	6.27	685.50	0.66	259.84	38	410	0.450	5.0 U	0.0106	1.0
	10/26/10	59.22	6.45	1,908,568.00	4.24	131.09	52.6	225	0.260	5.0 U	0.84	0.4

Table 4

Summary of Groundwater Analytical Data
Natural Attenuation Parameters
Former Unocal Terminal
11720 Unoco Road
Edmonds, Washington

Monitoring Well	Date Sampled	Temperature (°F)[1]	pH[1]	Conductivity (µS/cm)[1]	DO (mg/L)[1]	ORP (mV)[1]	Total Alkalinity (mg/L as CaCO3)[2]	Sulfate (mg/L)[3]	Nitrate (mg/L)[3]	Methane (µg/L)[4]	Manganese (mg/L)[5]	Ferrous Iron by Field Measurement (mg/L)[6]

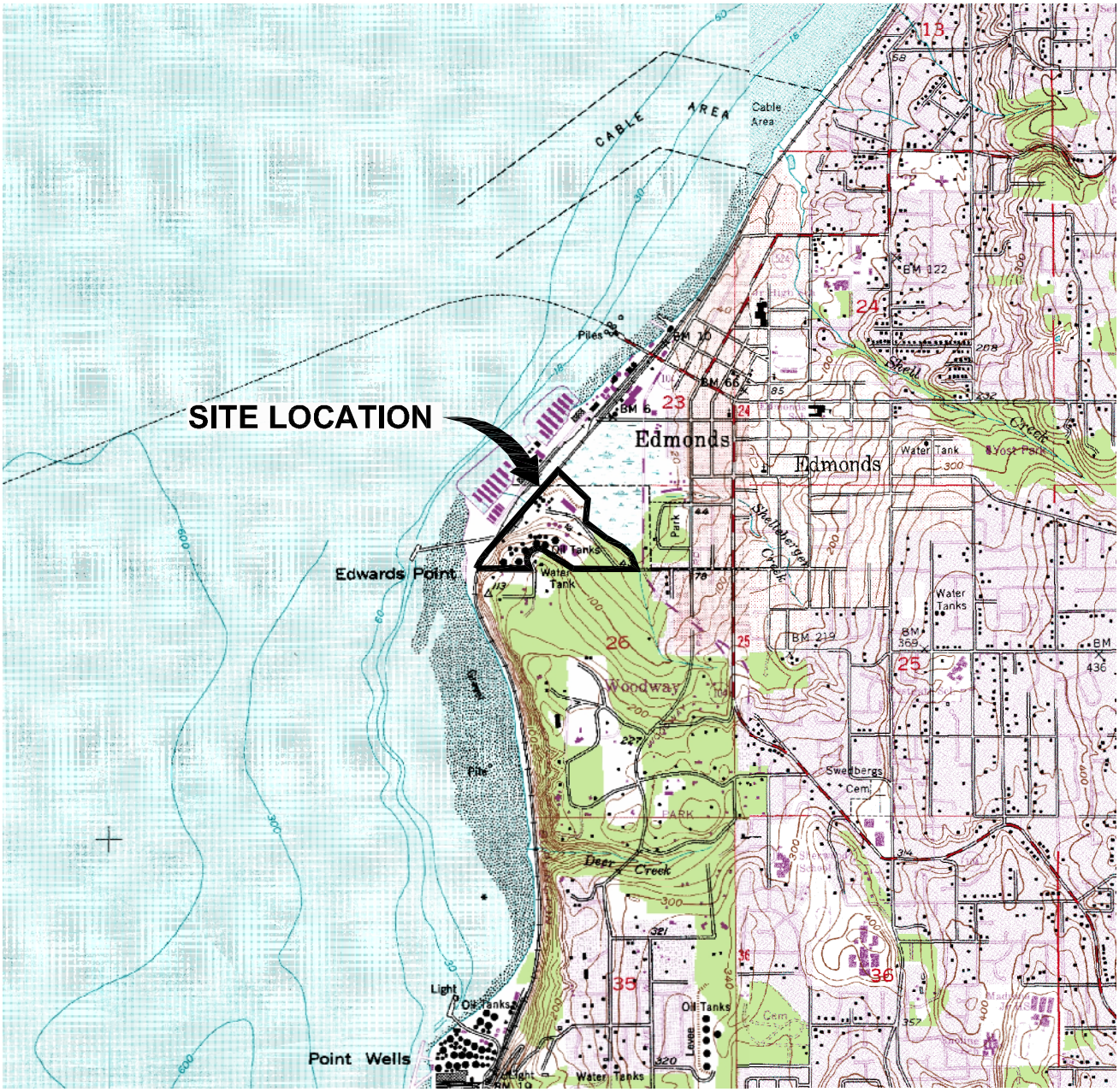
Notes:

[1]: Temperature, pH, DO, conductivity and ORP measured using an In-Situ® 9500 and flow through cell.
[2]: Total Alkalinity analyzed using EPA method 310.1
[3]: Sulfate and nitrate analyzed by EPA method 300.0.
[4]: Methane analyzed using method RSK 175.
[5]: Manganese analyzed using EPA method 6020.
[6]: Ferrous iron field measurement analyzed using a Hach field kit.
°F = Degrees Fahrenheit
µS/cm = microsiemens per centimeter
DO = Dissolved oxygen
mg/L = milligrams per liter
µg/L = micrograms per liter
ORP = Oxidation-reduction potential
mV = millivolts
$CaCO_3$ = Calcium carbonate
EPA = Environmental Protection Agency
NA = Not Analyzed

Lab Qualifiers	Definition
D	Sample required dilution due to high concentrations of target analyte.
U	The compound was analyzed for but not detected. The associated value is the compound quantitation limit.
UJ	The compound was analyzed for but not detected. The associated value is the estimated compound quantitation limit.
W	The analysis holding time was not met.
P	Due to interfering peaks on the chromatogram, the value reported for methane represents the lowest reporting limit attainable.

ARCADIS

Figures



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

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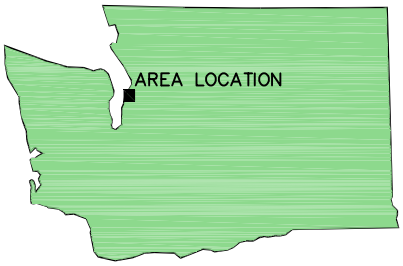
Approximate Scale: 1"=0.5 Miles



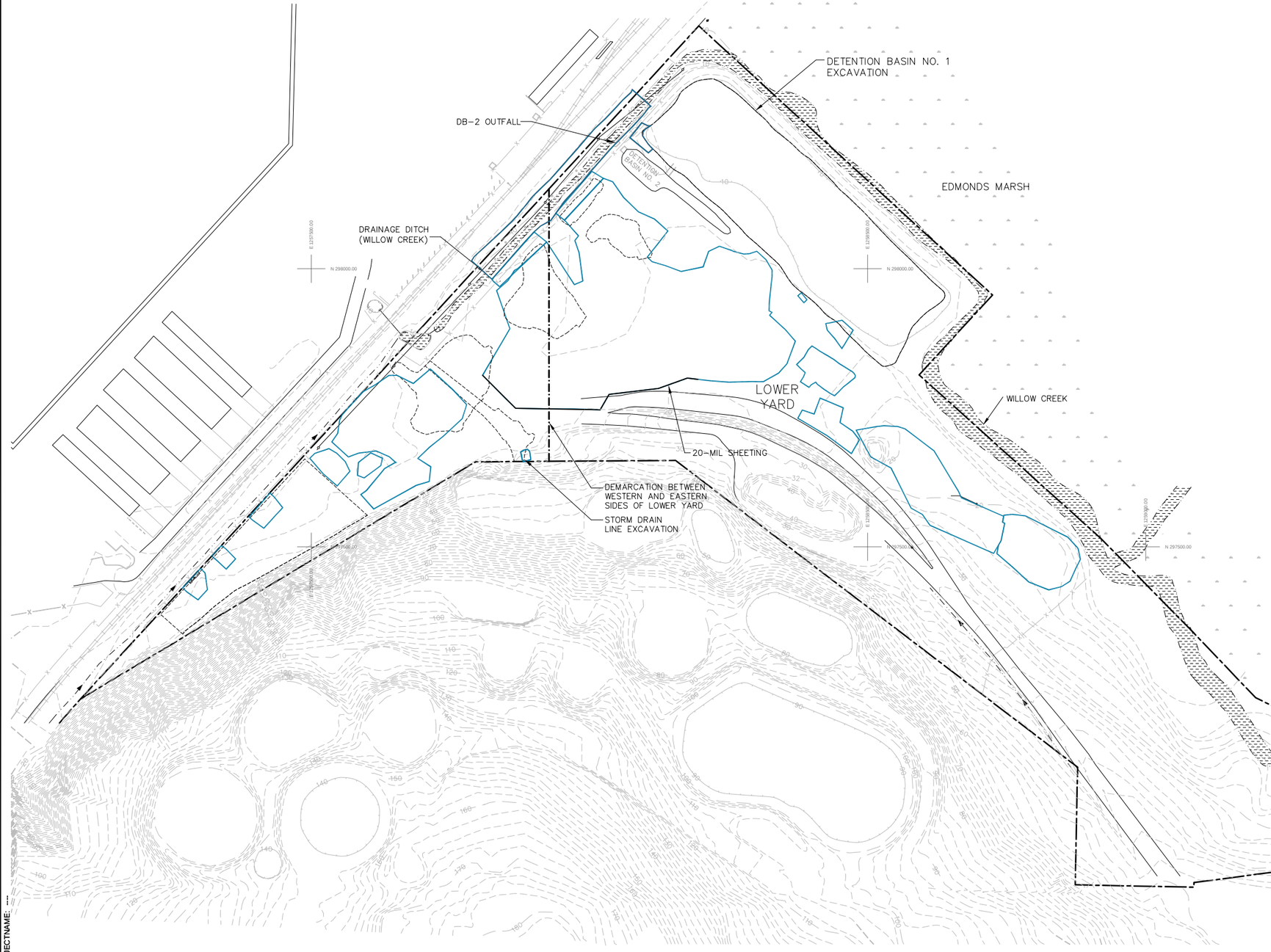
WASHINGTON

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL TERMINAL
EDMONDS, WASHINGTON

SITE LOCATION MAP

ARCADIS

FIGURE
1



LEGEND:

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

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

SITE LAYOUT MAP

ARCADIS

FIGURE
2

CITY: (TAMPA, FL) SYRACUSE, NY GROUP: ENVCAD DB: (J. RICHARDS), K. DAVIS, P. LISTER PM: R. ANDRESEN TM: S. ZORN TR: D. RASAR LYR: ON=*;OFF=*REF*
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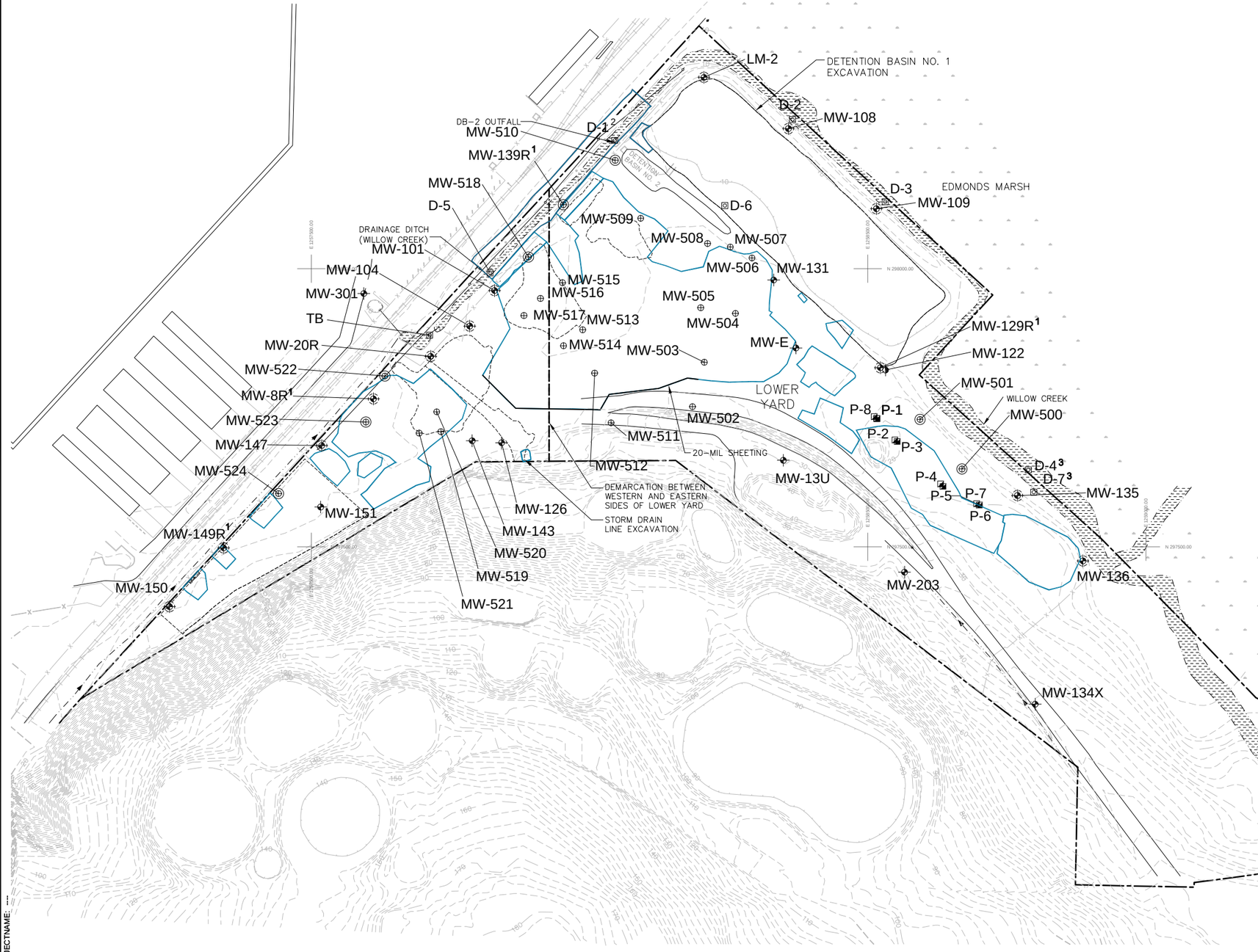

LEGEND:

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
MW-521	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

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

MONITORING WELL LOCATIONS

ARCADIS

FIGURE
3

CITY: (TAMPA, FL) SYRACUSE, NY GROUP: ENVCAD DB: (J. RICHARDS), K. DAVIS, P. LISTER PM: R. ANDRESEN TM: S. ZORN TR: D. RASAR LYR: ON=*;OFF=*REF*
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(LMS TECH)PAGESETUP: ---PLOTSTYLETABLE: PLTFULLCTB PLOTTED: 11/30/2010 8:53 AM ACADVER: 18.0S (LMS TECH)
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IMAGES:
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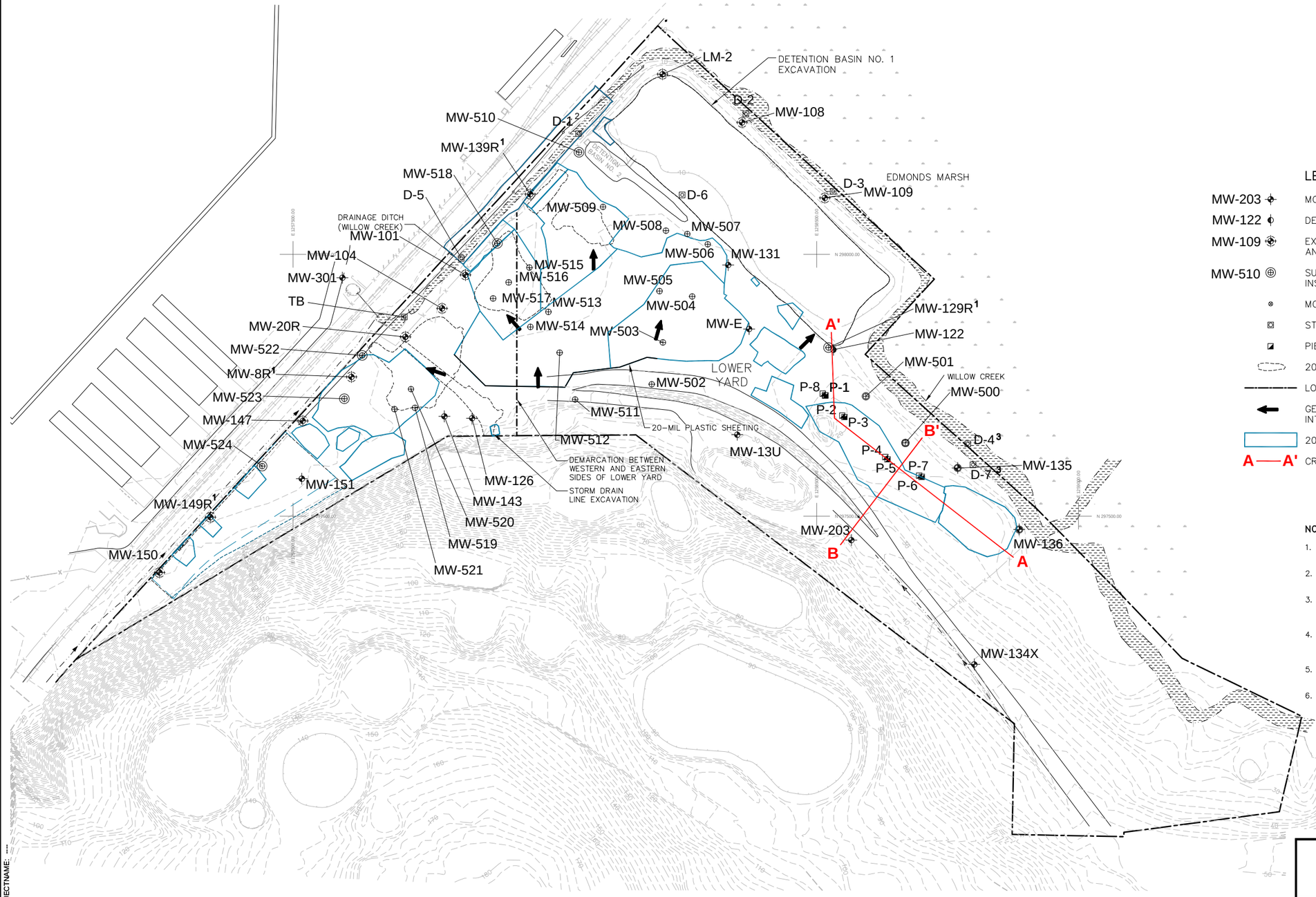
45362X02
45362X00



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
	STAFF GAUGE
	PIEZOMETER
	2001 AND 2003 SOIL EXCAVATIONS BELOW GROUNDWATER TABLE
	LOWER YARD PROPERTY BOUNDARY
	GENERAL GROUNDWATER FLOW DIRECTION AS DEFINED IN THE INTERIM ACTION REPORT
	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 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 PLASTIC SHEETING INSTALLED UPON COMPLETION OF PHASE I EXCAVATION. PLASTIC SHEETING REACHES TO APPROXIMATELY 10 FT BGS.
6. TOPOGRAPHIC RELIEF FOR GENERAL REFERENCE ONLY. RELIEF MAY NOT MATCH CURRENT SITE CONDITIONS.

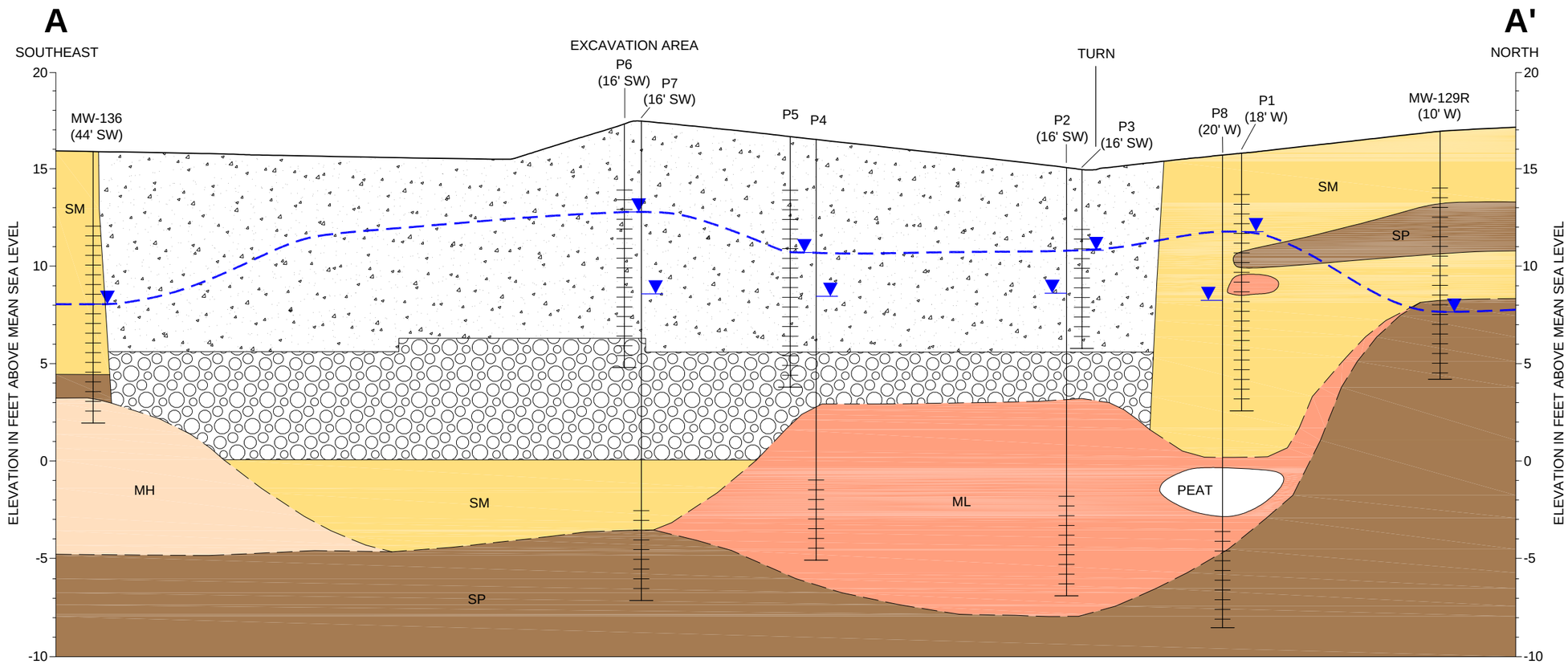
0 100' 200'
GRAPHIC SCALE

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL EDMONDS TERMINAL
EDMONDS, WASHINGTON

CROSS SECTION LOCATION MAP

ARCADIS

FIGURE
4



LEGEND:

- SM - SANDY SILT
- MH - ELASTIC SILT
- SP - SAND W/SILT & ORGANICS
- ML - SILT W/ORGANICS & WOODY DEBRIS
- 3/4" WASHED GRAVEL BACKFILL
- IMPORTED PIT RUN BACKFILL
- MW-136 BORING/WELL ID
- WATER LEVEL MEASURED IN OCTOBER 2011
- SCREENED INTERVAL
- BOTTOM OF BORING
- (44' SW) = OFF SET DISTANCE FROM CROSS SECTION PROFILE

0 50' 100'

HORIZONTAL SCALE

VERTICAL EXAGGERATION: 8x

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL EDMONDS TERMINAL
EDMONDS, WASHINGTON

GEOLOGIC CROSS SECTION A-A'

ARCADIS

FIGURE 5

CITY: SYRACUSE, NY GROUP: ENVCAD DB: K. DAVIS, P. LISTER PM: R. ANDRESEN TM: S. ZORN TR: N. OLIVIER LYR: ON=*;OFF=REF
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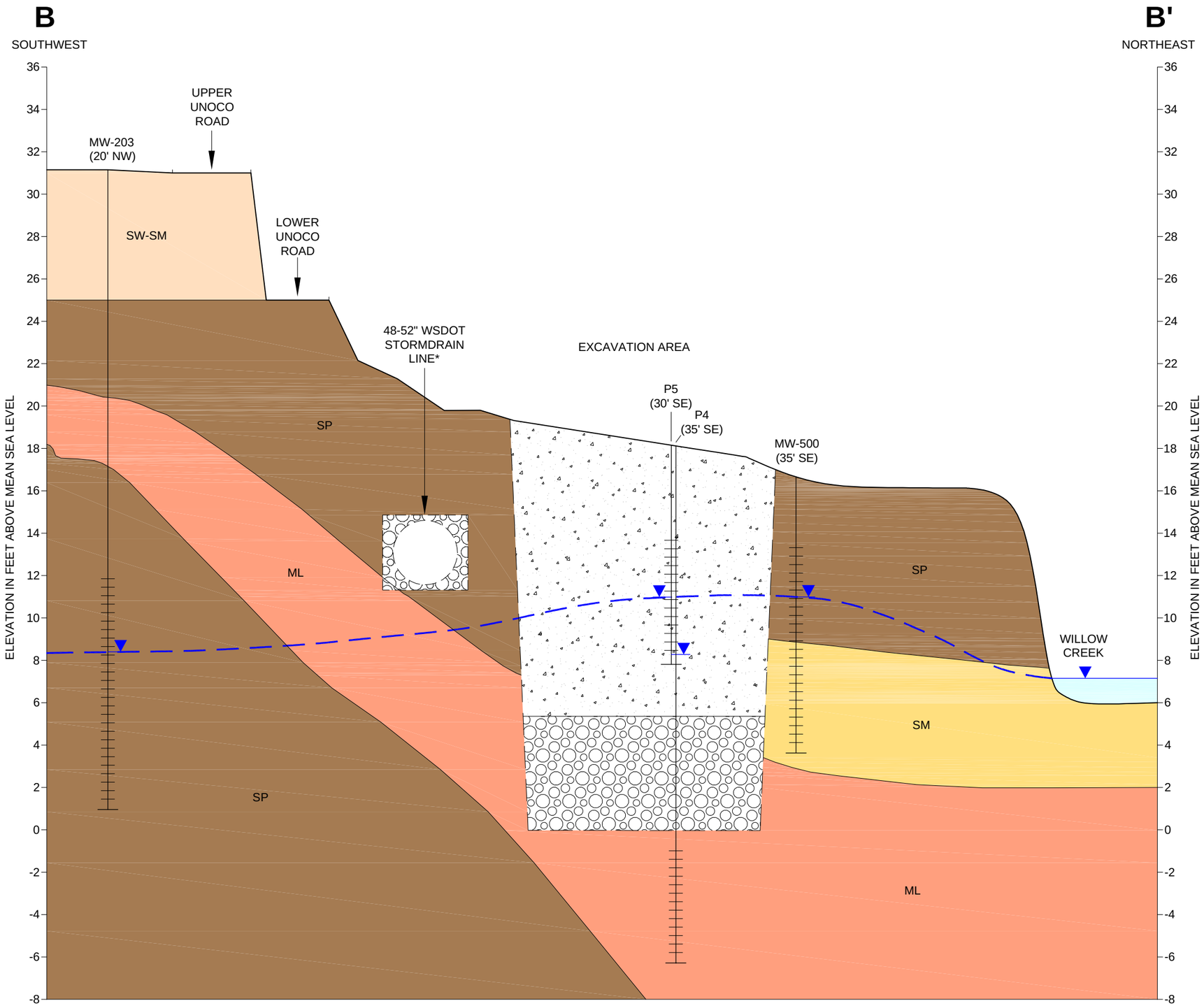


LEGEND:

- SM - SANDY SILT
- SW-SM - POORLY GRADED SAND - SILTY SAND
- SP - SAND W/SILT AND ORGANICS
- ML - SILT W/ORGANICS & WOODY DEBRIS
- 3/4" WASHED GRAVEL BACKFILL
- IMPORTED PIT RUN BACKFILL
- MW-500 BORING/WELL ID
- WATER LEVEL MEASURED IN OCTOBER 2011
- SCREENED INTERVAL
- BOTTOM OF BORING
- * WSDOT STORMDRAIN LINE LOCATION IS APPROXIMATE AND NOT DRAWN TO SCALE
- (35' SE) = OFF SET DISTANCE FROM CROSS SECTION PROFILE

0 30' 60'

HORIZONTAL SCALE

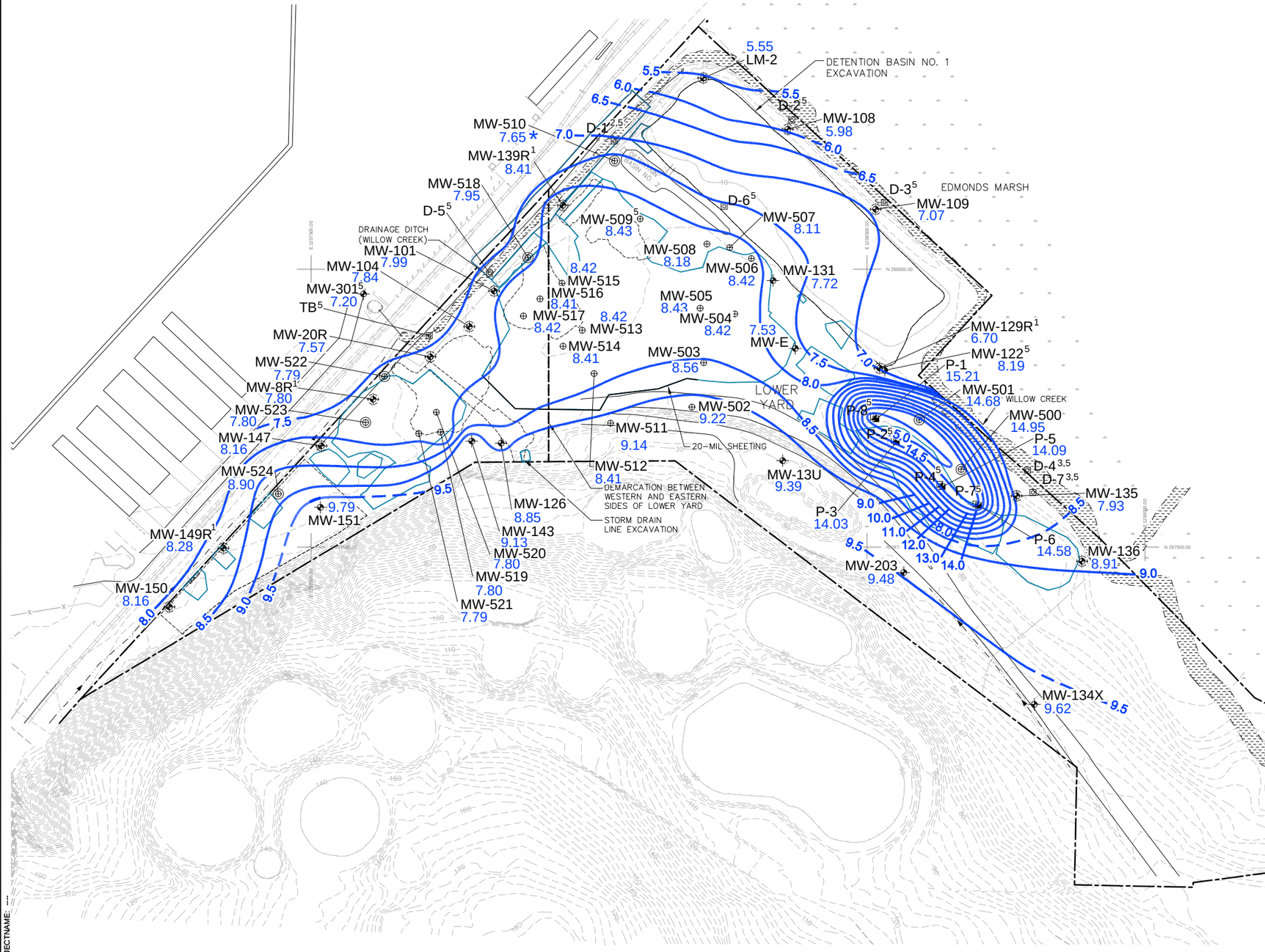
VERTICAL EXAGGERATION: 6x

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL EDMONDS TERMINAL
EDMONDS, WASHINGTON

GEOLOGIC CROSS SECTION B-B'

ARCADIS

FIGURE 6



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
	GROUNDWATER CONTOUR (0.5 FEET INTERVAL)
7.93	GROUNDWATER ELEVATION (FEET ABOVE MEAN SEA LEVEL)

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. NOT USED TO DEVELOP GROUNDWATER CONTOURS.
6. 20-MIL SHEETING INSTALLED UPON COMPLETION OF PHASE I EXCAVATION. SHEETING REACHES TO APPROXIMATELY 10 FT BGS.

* GROUNDWATER ELEVATION ADJUSTED FOR THE PRESENCE OF LIGHT NON-AQUEOUS PHASE LIQUID (LNAPL).

0 100' 200'
GRAPHIC SCALE

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL EDMONDS TERMINAL
EDMONDS, WASHINGTON

FIRST QUARTER, 2010, GROUNDWATER ELEVATIONS AND CONTOURS JANUARY 18, 2010

ARCADIS

FIGURE
7

CITY: (TAMPA, FL) SYRACUSE, NY GROUP: ENVCAD DB: (J. RICHARDS), K. DAVIS, P. LISTER PM: R. ANDRESEN TM: S. ZORN TR: D. RASAR LYR: ON=*;OFF=*REF*
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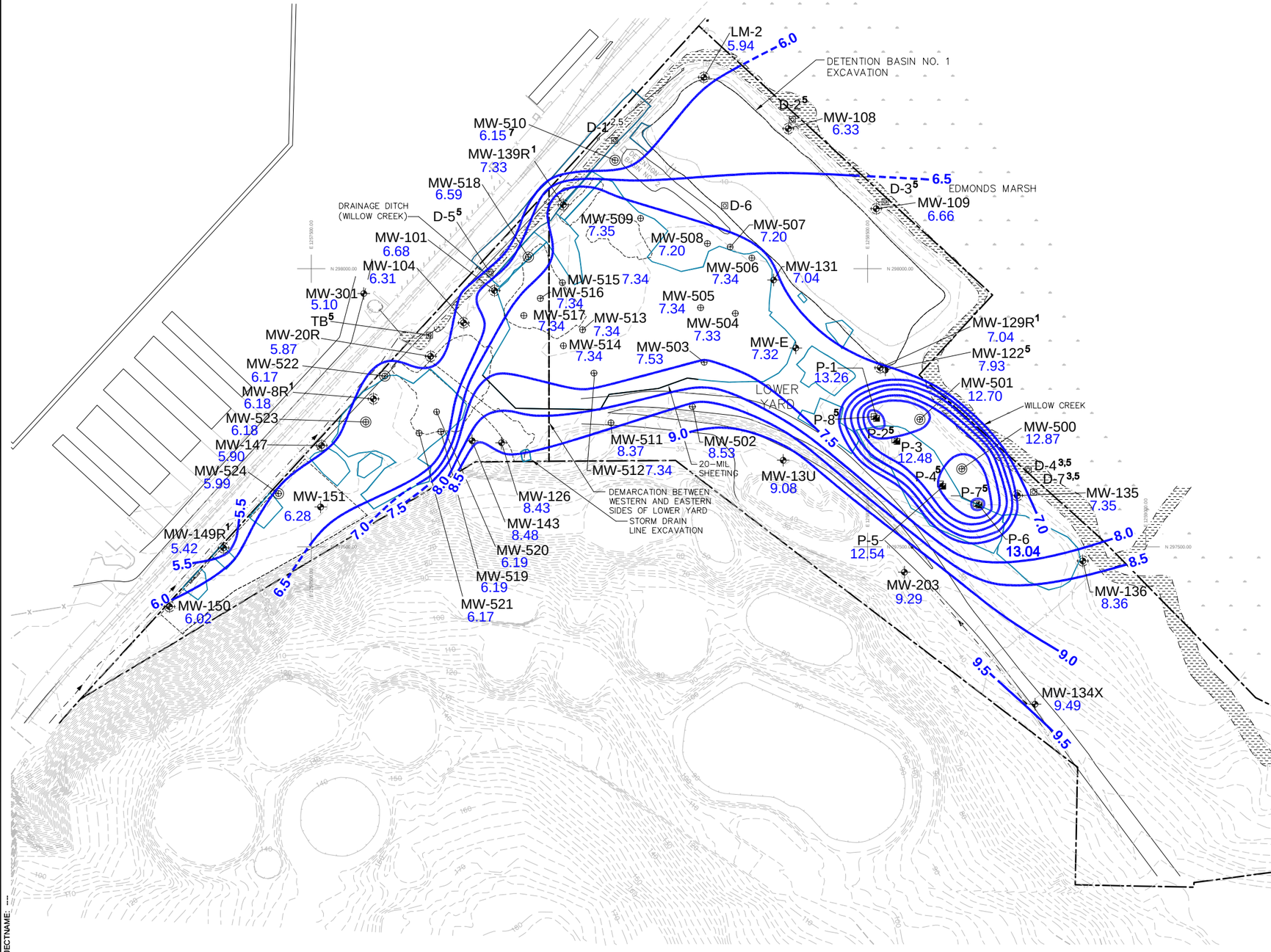

LEGEND:

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
7.04	GROUNDWATER ELEVATION
8.0	GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)

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. NOT USED TO DEVELOP GROUNDWATER CONTOURS.
6. 20-MIL SHEETING INSTALLED UPON COMPLETION OF PHASE I EXCAVATION. SHEETING REACHES TO APPROXIMATELY 10 FT BGS.
7. GROUNDWATER ELEVATION ADJUSTED FOR THE PRESENCE OF LIGHT NON-AQUEOUS PHASE LIQUID (LNAPL).

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL EDMONDS TERMINAL
EDMONDS, WASHINGTON

SECOND QUARTER, 2010 GROUNDWATER ELEVATIONS AND CONTOURS APRIL 19, 2010

ARCADIS

FIGURE
8

CITY: (TAMPA, FL) SYRACUSE, NY GROUP: ENVCAD DB: (J. RICHARDS), K. DAVIS, P. LISTER, W.JONES PM: R. ANDRESEN TM: S. ZORN TR: D. RASAR LYR: ON=*;OFF=*REF*
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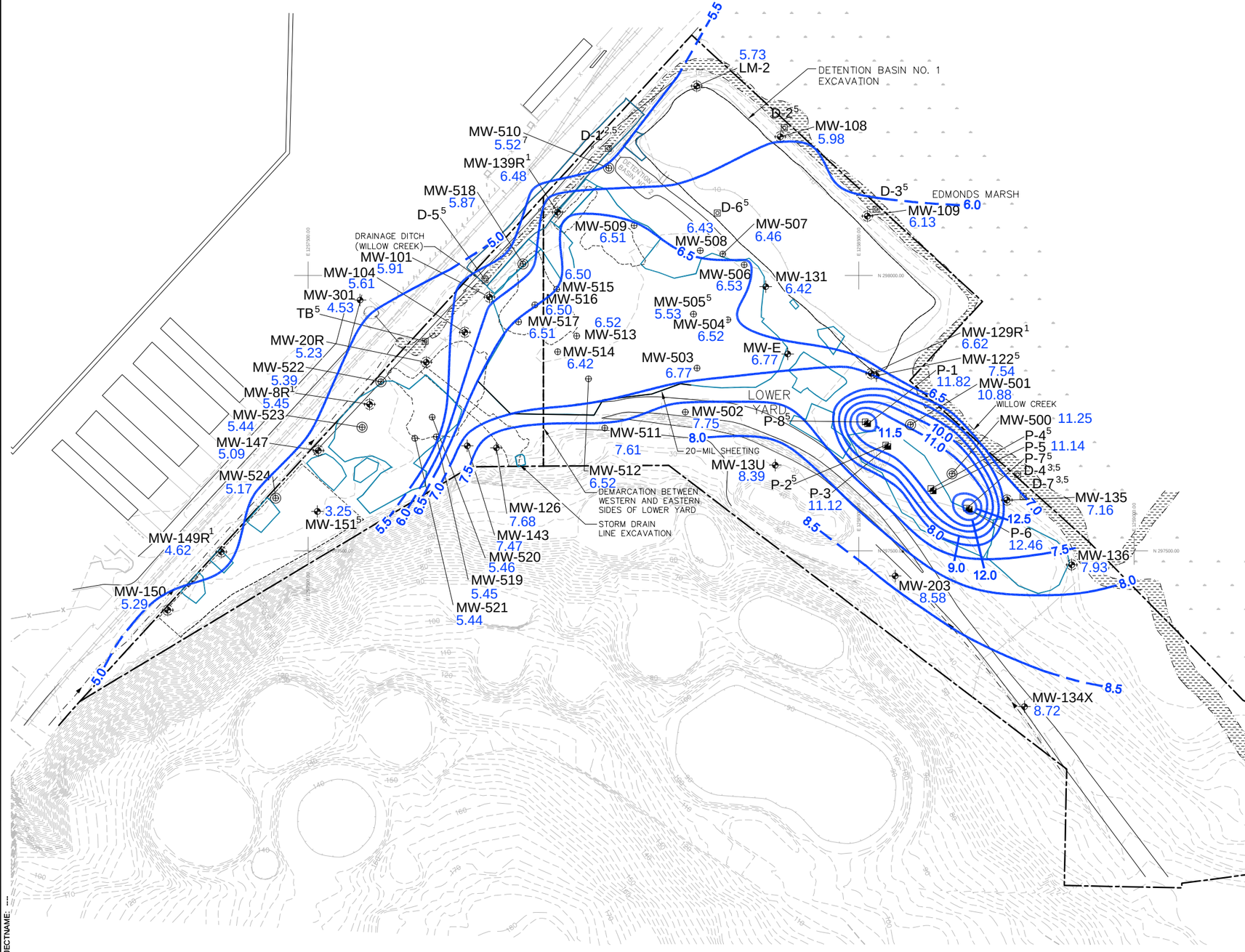

LEGEND:

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
	GROUNDWATER CONTOUR (0.5 FEET INTERVAL)
7.93	GROUNDWATER ELEVATION (FEET ABOVE MEAN SEA LEVEL)

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.
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5. NOT USED TO DEVELOP GROUNDWATER CONTOURS.
6. 20-MIL SHEETING INSTALLED UPON COMPLETION OF PHASE I EXCAVATION. SHEETING REACHES TO APPROXIMATELY 10 FT BGS.
7. GROUNDWATER ELEVATION ADJUSTED FOR THE PRESENCE OF LIGHT NON-AQUEOUS PHASE LIQUID (LNAPL).

0 100' 200'
GRAPHIC SCALE

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL EDMONDS TERMINAL
EDMONDS, WASHINGTON

THIRD QUARTER, 2010 GROUNDWATER ELEVATIONS AND CONTOURS JULY 19, 2010

ARCADIS

FIGURE
9

CITY: (TAMPA, FL) SYRACUSE, NY GROUP: ENVCAD DB: (J. RICHARDS), K. DAVIS, P. LISTER PM: R. ANDRESEN TM/TR: S. ZORN LYR: ON=*;OFF=*REF; (FRZ)
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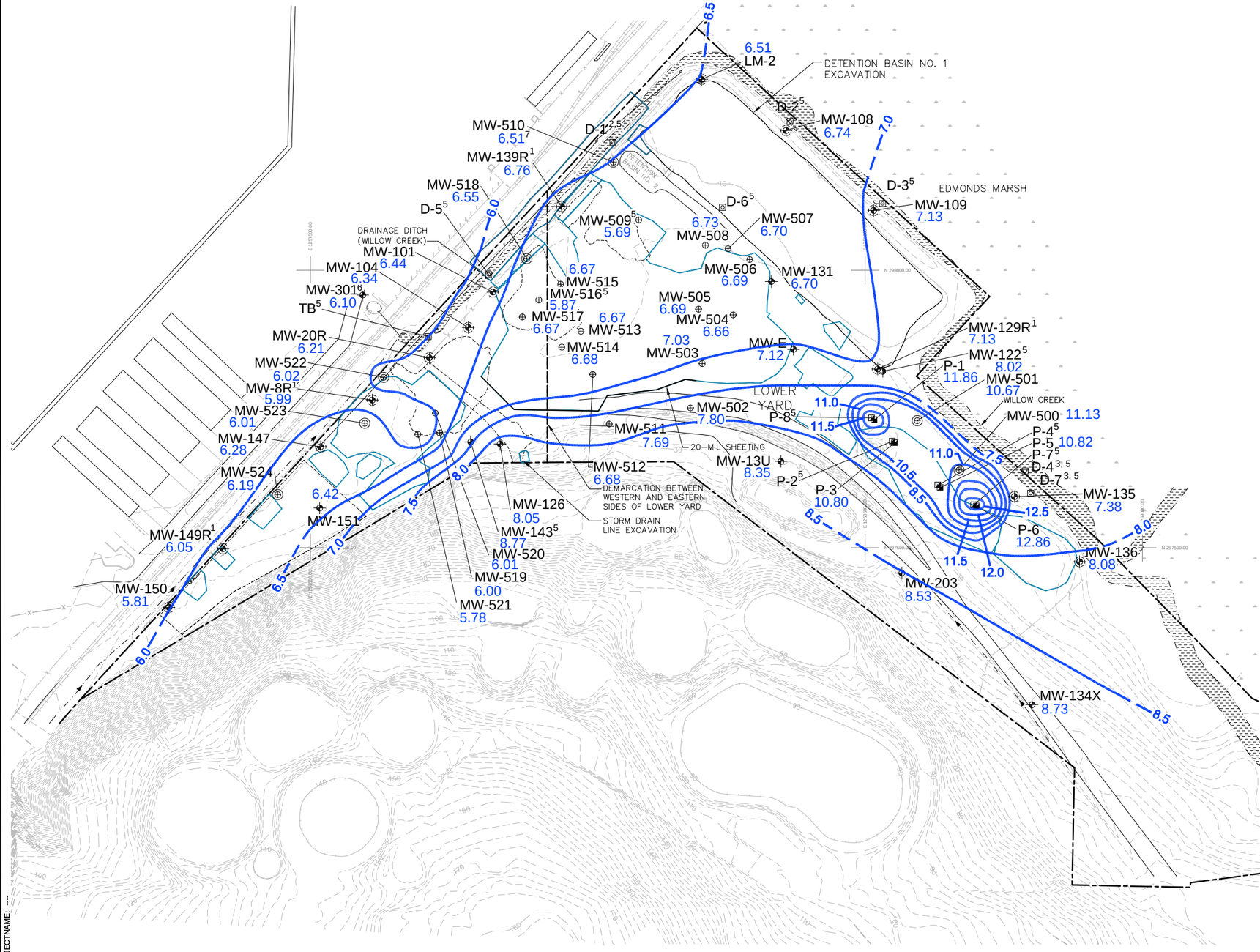

LEGEND:

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
	GROUNDWATER CONTOUR (0.5 FEET INTERVAL)
8.08	GROUNDWATER ELEVATION (FEET ABOVE MEAN SEA LEVEL)

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. NOT USED TO DEVELOP GROUNDWATER CONTOURS.
6. 20-MIL SHEETING INSTALLED UPON COMPLETION OF PHASE I EXCAVATION. SHEETING REACHES TO APPROXIMATELY 10 FT BGS.
7. GROUNDWATER ELEVATION ADJUSTED FOR THE PRESENCE OF LIGHT NON-AQUEOUS PHASE LIQUID (LNAPL).

0 100' 200'
GRAPHIC SCALE

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL EDMONDS TERMINAL
EDMONDS, WASHINGTON

FOURTH QUARTER, 2010 GROUNDWATER ELEVATIONS AND CONTOURS OCTOBER 25, 2010

ARCADIS

FIGURE
10

CITY: (TAMPA, FL) SYRACUSE, NY GROUP: ENVCAD DB: (J. RICHARDS), K. DAVIS, P. LISTER PM: R. ANDRESEN TM: S. ZORN TR: D. RASAR LYR: ON=*;OFF=*REF, (FRZ)
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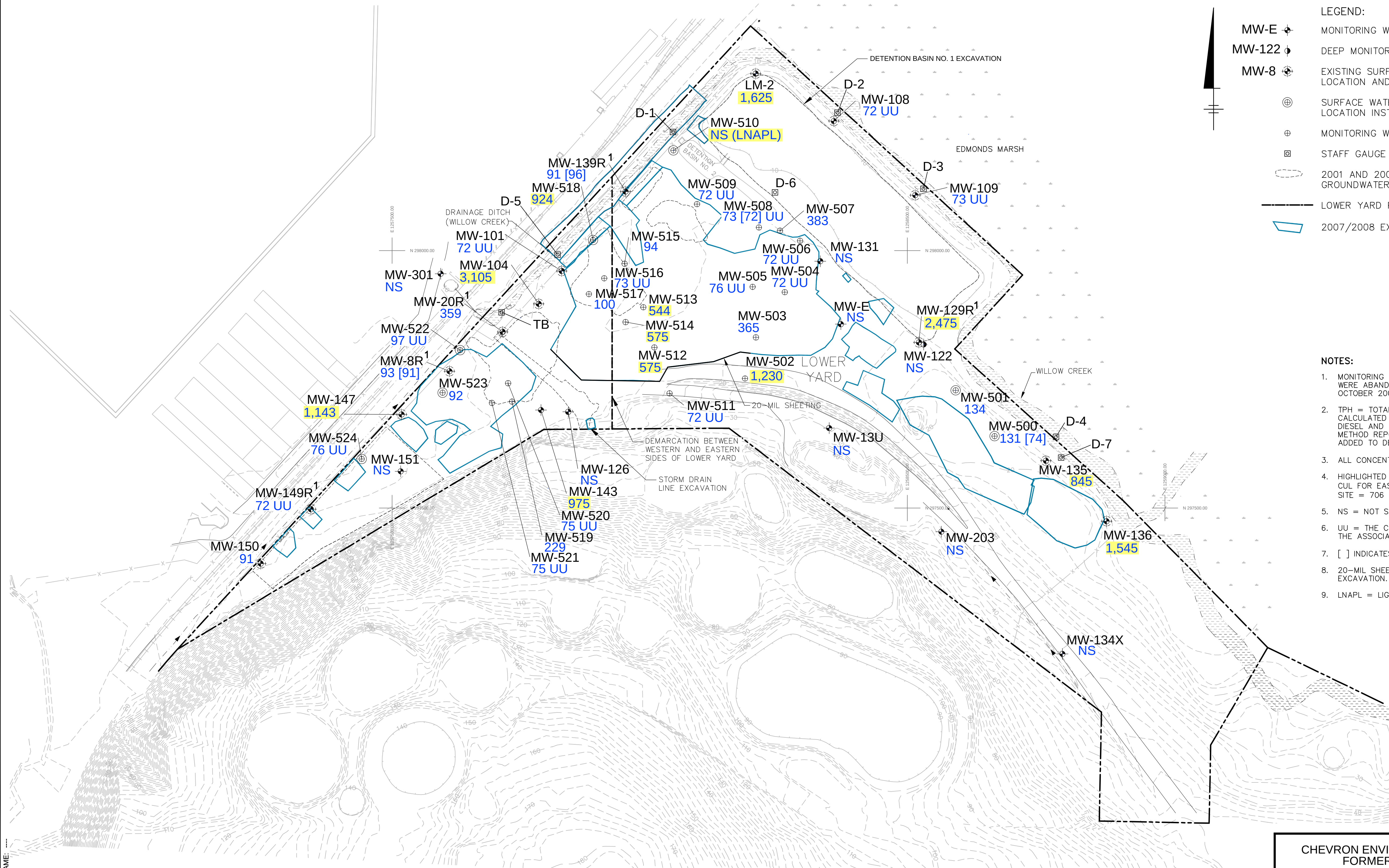


LEGEND:

- MW-E — MONITORING WELL LOCATION AND DESIGNATION
- MW-122 — DEEP MONITORING WELL LOCATION AND DESIGNATION
- MW-8 — EXISTING SURFACE WATER COMPLIANCE MONITORING WELL LOCATION AND DESIGNATION
- SURFACE WATER COMPLIANCE MONITORING WELL LOCATION INSTALLED OCTOBER 2008
- MONITORING WELL LOCATION INSTALLED OCTOBER 2008
- STAFF GAUGE
- 2001 AND 2003 SOIL EXCAVATIONS BELOW GROUNDWATER TABLE
- LOWER YARD PROPERTY BOUNDARY
- 2007/2008 EXCAVATION BOUNDARIES

NOTES:

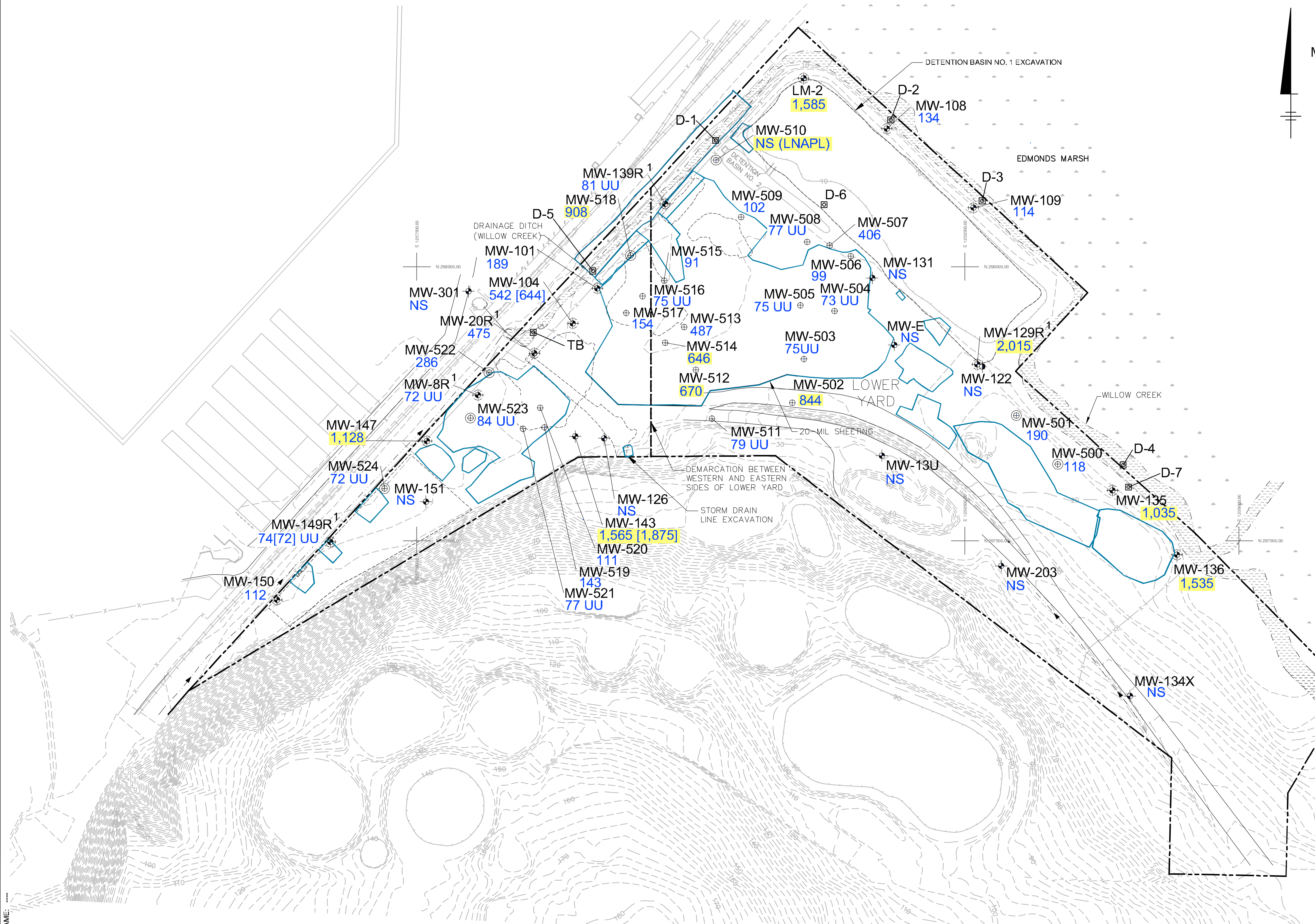
1. MONITORING WELLS MW-129R, MW-139R, MW-8R, AND MW-149R WERE ABANDONED DURING INTERIM ACTION AND REPLACED IN OCTOBER 2008.
2. TPH = TOTAL PETROLEUM HYDROCARBONS. TOTAL TPH CALCULATED BY SUMMING THE CONCENTRATIONS OF GASOLINE, DIESEL AND HEAVY OIL. FOR RESULTS WHICH DID NOT EXCEED METHOD REPORTING LIMITS, HALF OF THE REPORTING LIMIT WAS ADDED TO DETERMINE TOTAL TPH.
3. ALL CONCENTRATIONS IN MICROGRAMS PER LITER (μg/L).
4. HIGHLIGHTED CONCENTRATIONS EXCEED THE SITE SPECIFIC TPH CUL FOR EAST SIDE OF THE SITE = 506 μg/L, WEST SIDE OF SITE = 706 μg/L.
5. NS = NOT SAMPLED.
6. UU = THE COMPOUND WAS ANALYZED FOR BUT NOT DETECTED. THE ASSOCIATED VALUE IS THE COMPOUND QUANTITATION LIMIT.
7. [ ] INDICATES DUPLICATE SAMPLE.
8. 20-MIL SHEETING INSTALLED UPON COMPLETION OF PHASE I EXCAVATION. SHEETING REACHES TO APPROXIMATELY 10 FT BGS.
9. LNAPL = LIGHT NON-AQUEOUS PHASE LIQUID.

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL EDMONDS TERMINAL
EDMONDS, WASHINGTON

FIRST QUARTER, 2010
TOTAL TPH CONCENTRATIONS

ARCADIS

FIGURE
11



LEGEND:

MW-E	MONITORING WELL LOCATION AND DESIGNATION
MW-122	DEEP MONITORING WELL LOCATION AND DESIGNATION
MW-8	EXISTING SURFACE WATER COMPLIANCE MONITORING WELL LOCATION AND DESIGNATION
	SURFACE WATER COMPLIANCE MONITORING WELL LOCATION INSTALLED OCTOBER 2008
	MONITORING WELL LOCATION INSTALLED OCTOBER 2008
	STAFF GAUGE
	2001 AND 2003 SOIL EXCAVATIONS BELOW GROUNDWATER TABLE
	LOWER YARD PROPERTY BOUNDARY
	2007/2008 EXCAVATION BOUNDARIES

NOTES:

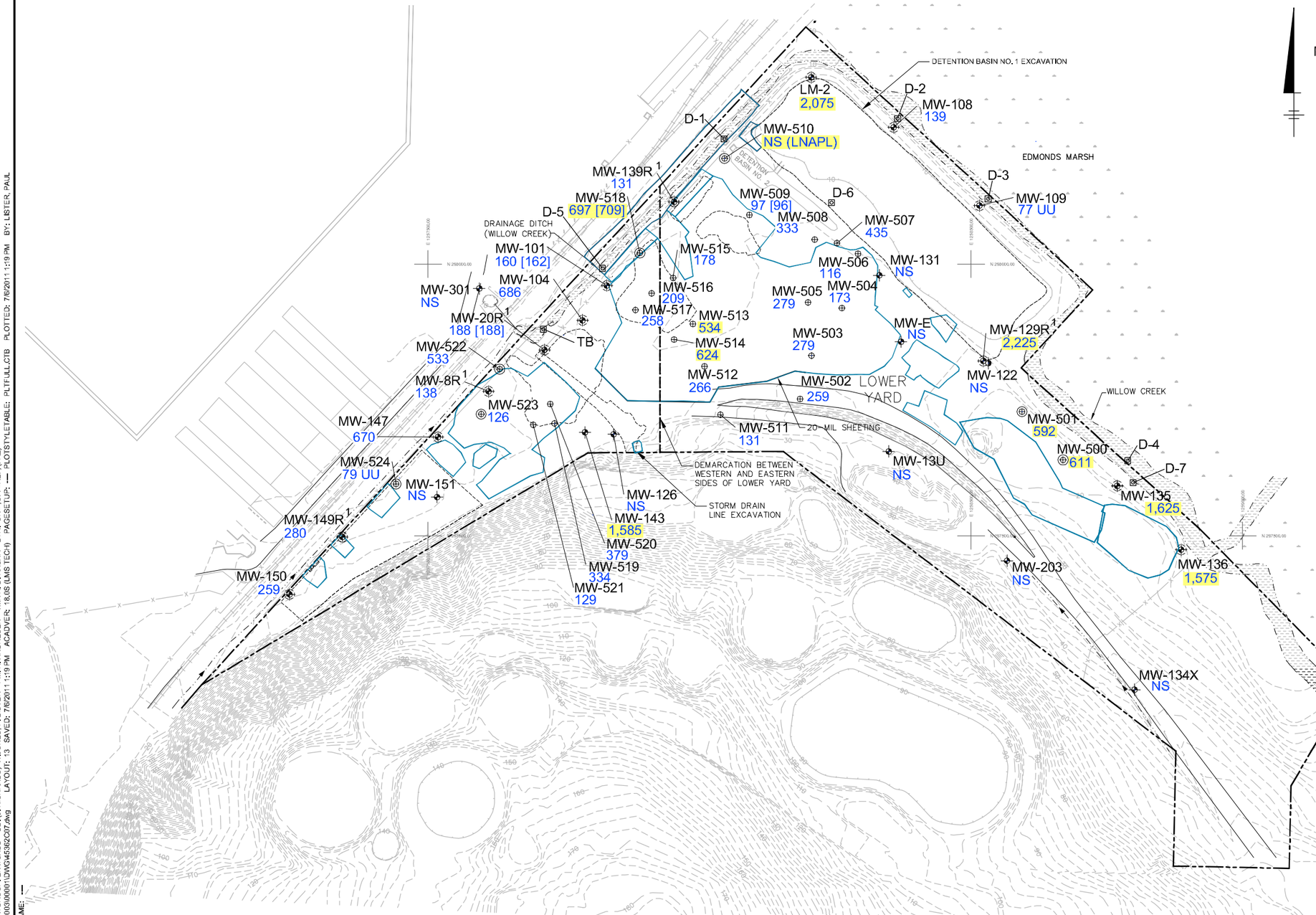
1. MONITORING WELLS MW-129R, MW-139R, MW-8R, AND MW-149R WERE ABANDONED DURING INTERIM ACTION AND REPLACED IN OCTOBER 2008.
2. TPH = TOTAL PETROLEUM HYDROCARBONS. TOTAL TPH CALCULATED BY SUMMING THE CONCENTRATIONS OF GASOLINE, DIESEL AND HEAVY OIL. FOR RESULTS WHICH DID NOT EXCEED METHOD REPORTING LIMITS, HALF OF THE REPORTING LIMIT WAS ADDED TO DETERMINE TOTAL TPH.
3. ALL CONCENTRATIONS IN MICROGRAMS PER LITER (µg/L).
4. HIGHLIGHTED CONCENTRATIONS EXCEED THE SITE SPECIFIC TPH CUL FOR EAST SIDE OF THE SITE = 506 µg/L, WEST SIDE OF SITE = 706 µg/L.
5. NS = NOT SAMPLED.
6. UU = THE COMPOUND WAS ANALYZED FOR BUT NOT DETECTED. THE ASSOCIATED VALUE IS THE COMPOUND QUANTITATION LIMIT.
7. [ ] INDICATES DUPLICATE SAMPLE.
8. 20-MIL SHEETING INSTALLED UPON COMPLETION OF PHASE I EXCAVATION. SHEETING REACHES TO APPROXIMATELY 10 FT BGS.
9. LNAPL = LIGHT NON-AQUEOUS PHASE LIQUID.

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL EDMONDS TERMINAL
EDMONDS, WASHINGTON

SECOND QUARTER, 2010
TOTAL TPH CONCENTRATIONS

ARCADIS

FIGURE
12



LEGEND:

- MW-E — MONITORING WELL LOCATION AND DESIGNATION
- MW-122 — DEEP MONITORING WELL LOCATION AND DESIGNATION
- MW-8 — EXISTING SURFACE WATER COMPLIANCE MONITORING WELL LOCATION AND DESIGNATION
- SURFACE WATER COMPLIANCE MONITORING WELL LOCATION INSTALLED OCTOBER 2008
- MONITORING WELL LOCATION INSTALLED OCTOBER 2008
- 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. 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.
3. ALL CONCENTRATIONS IN MICROGRAMS PER LITER (µg/L).
4. HIGHLIGHTED CONCENTRATIONS EXCEED THE SITE SPECIFIC TPH CUL FOR EAST SIDE OF THE SITE = 506 µg/L, WEST SIDE OF SITE = 706 µg/L.
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7. [ ] INDICATES DUPLICATE SAMPLE.
8. 20-MIL SHEETING INSTALLED UPON COMPLETION OF PHASE I EXCAVATION. SHEETING REACHES TO APPROXIMATELY 10 FT BGS.
9. LNAPL = LIGHT NON-AQUEOUS PHASE LIQUID.

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL EDMONDS TERMINAL
EDMONDS, WASHINGTON

THIRD QUARTER, 2010
TOTAL TPH CONCENTRATIONS

ARCADIS

FIGURE
13

CITY: (TAMPA, FL) SYRACUSE, NY DIV/GROUP: ENV/CADD DB: (J. RICHRADS) W. JONES, P. LISTER PM: R. ANDRESEN TM/TR: D. RASAR LYR: ON=*;OFF=*REF*;(FR2)
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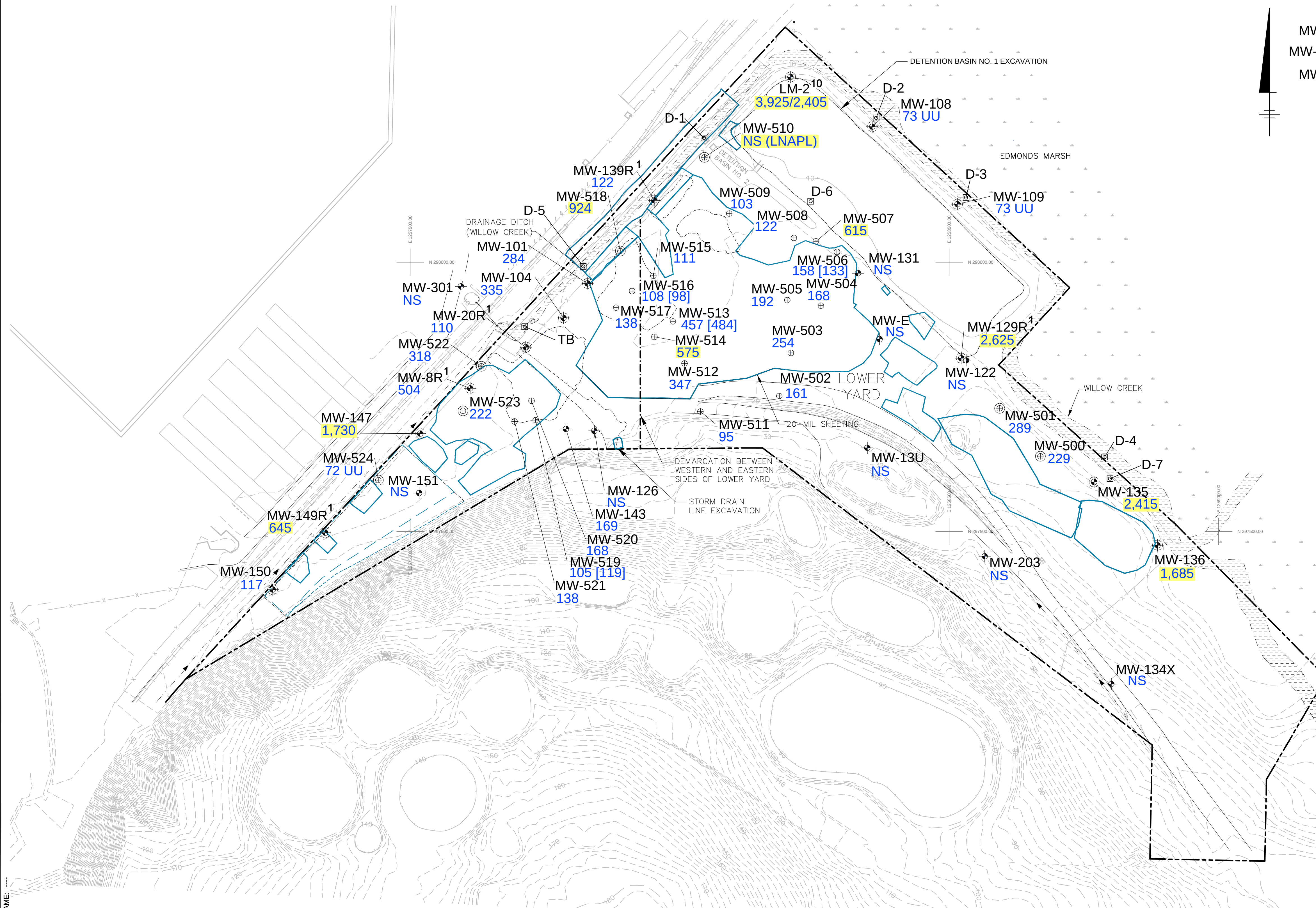

LEGEND:

- MW-E — MONITORING WELL LOCATION AND DESIGNATION
- MW-122 — DEEP MONITORING WELL LOCATION AND DESIGNATION
- MW-8 — EXISTING SURFACE WATER COMPLIANCE MONITORING WELL LOCATION AND DESIGNATION
- SURFACE WATER COMPLIANCE MONITORING WELL LOCATION INSTALLED OCTOBER 2008
- MONITORING WELL LOCATION INSTALLED OCTOBER 2008
- 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. 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.
3. ALL CONCENTRATIONS IN MICROGRAMS PER LITER (μg/L).
4. HIGHLIGHTED CONCENTRATIONS EXCEED THE SITE SPECIFIC TPH CUL FOR EAST SIDE OF THE SITE = 506 μg/L, WEST SIDE OF SITE = 706 μg/L.
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7. [ ] INDICATES DUPLICATE SAMPLE.
8. 20-MIL SHEETING INSTALLED UPON COMPLETION OF PHASE I EXCAVATION. SHEETING REACHES TO APPROXIMATELY 10 FT BGS.
9. LNAPL = LIGHT NON-AQUEOUS PHASE LIQUID.
10. 2,405 μg/L CONCENTRATION FROM SAMPLE COLLECTED ON 12/06/10.

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL EDMONDS TERMINAL
EDMONDS, WASHINGTON

FOURTH QUARTER, 2010
TOTAL TPH CONCENTRATIONS

ARCADIS

FIGURE
14

CITY: SYRACUSE, NY GROUP: ENVCAD DB: A. SCHILLING, W.JONES P. LISTER PM: R. ANDRESEN TM/TR: D. RASAR LYR: ON=*;OFF=REF, (FRZ)
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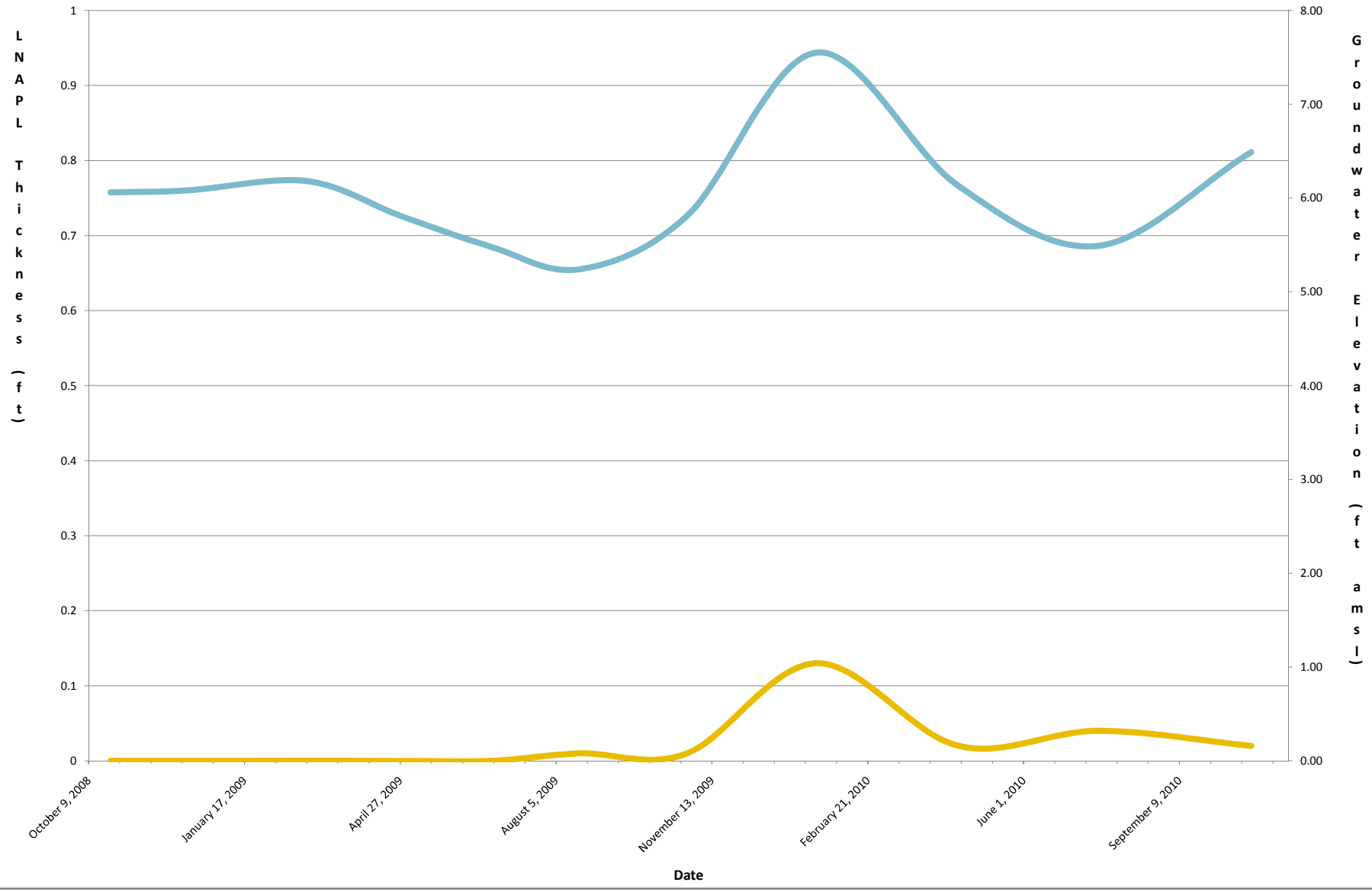
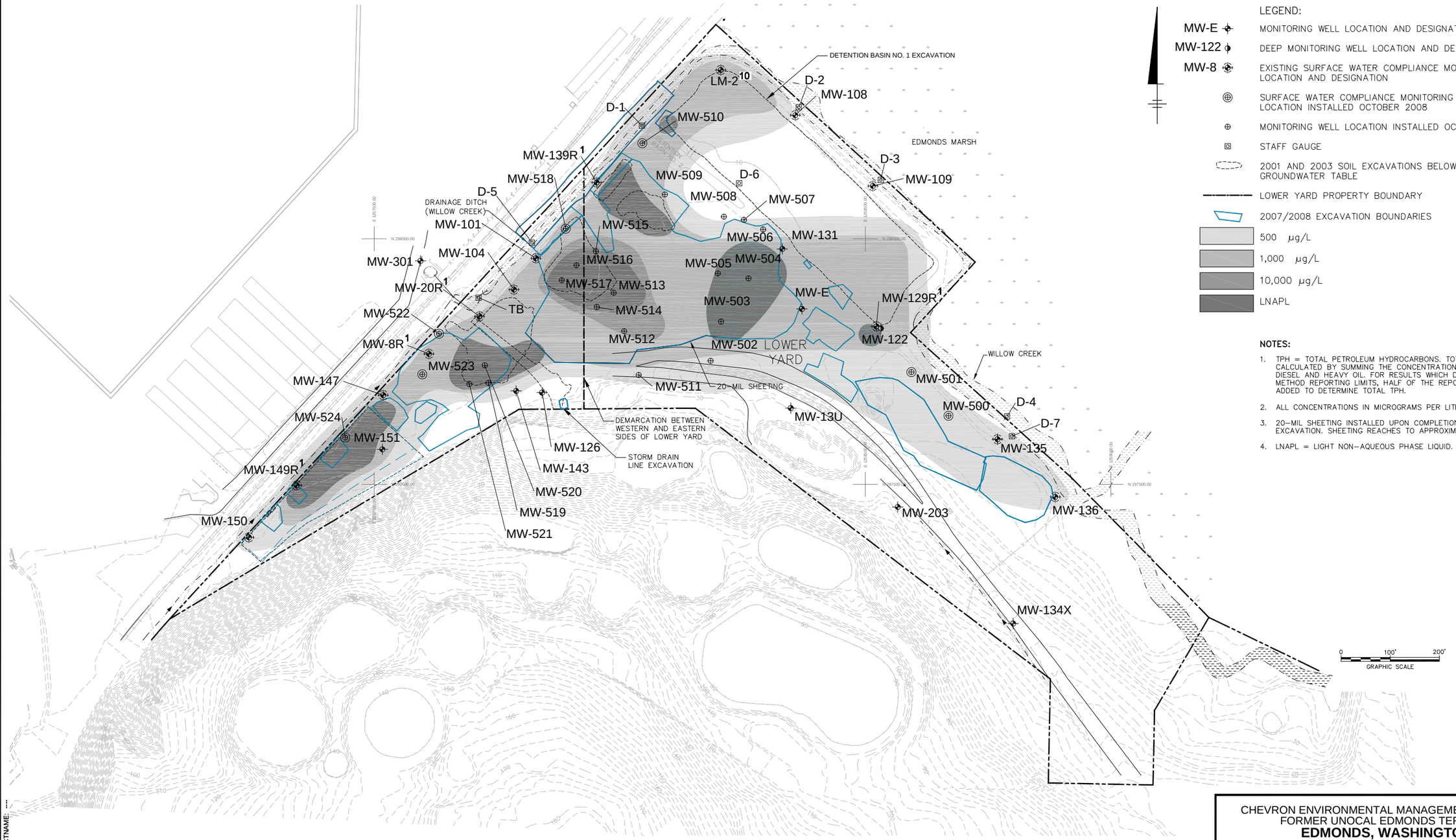
FIGURE 15

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL EDMONDS TERMINAL
EDMONDS, WASHINGTON

ARCADIS
Infrastructure, environment, buildings

LNAPL VS. GROUNDWATER ELEVATION
MONITORING WELL MW-510





LEGEND:

- MW-E — MONITORING WELL LOCATION AND DESIGNATION
- MW-122 — DEEP MONITORING WELL LOCATION AND DESIGNATION
- MW-8 — EXISTING SURFACE WATER COMPLIANCE MONITORING WELL LOCATION AND DESIGNATION
- SURFACE WATER COMPLIANCE MONITORING WELL LOCATION INSTALLED OCTOBER 2008
- MONITORING WELL LOCATION INSTALLED OCTOBER 2008
- STAFF GAUGE
- 2001 AND 2003 SOIL EXCAVATIONS BELOW GROUNDWATER TABLE
- LOWER YARD PROPERTY BOUNDARY
- 2007/2008 EXCAVATION BOUNDARIES
- 500 µg/L
- 1,000 µg/L
- 10,000 µg/L
- LNAPL

NOTES:

1. 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.
2. ALL CONCENTRATIONS IN MICROGRAMS PER LITER (µg/L).
3. 20-MIL SHEETING INSTALLED UPON COMPLETION OF PHASE I EXCAVATION. SHEETING REACHES TO APPROXIMATELY 10 FT BGS.
4. LNAPL = LIGHT NON-AQUEOUS PHASE LIQUID.

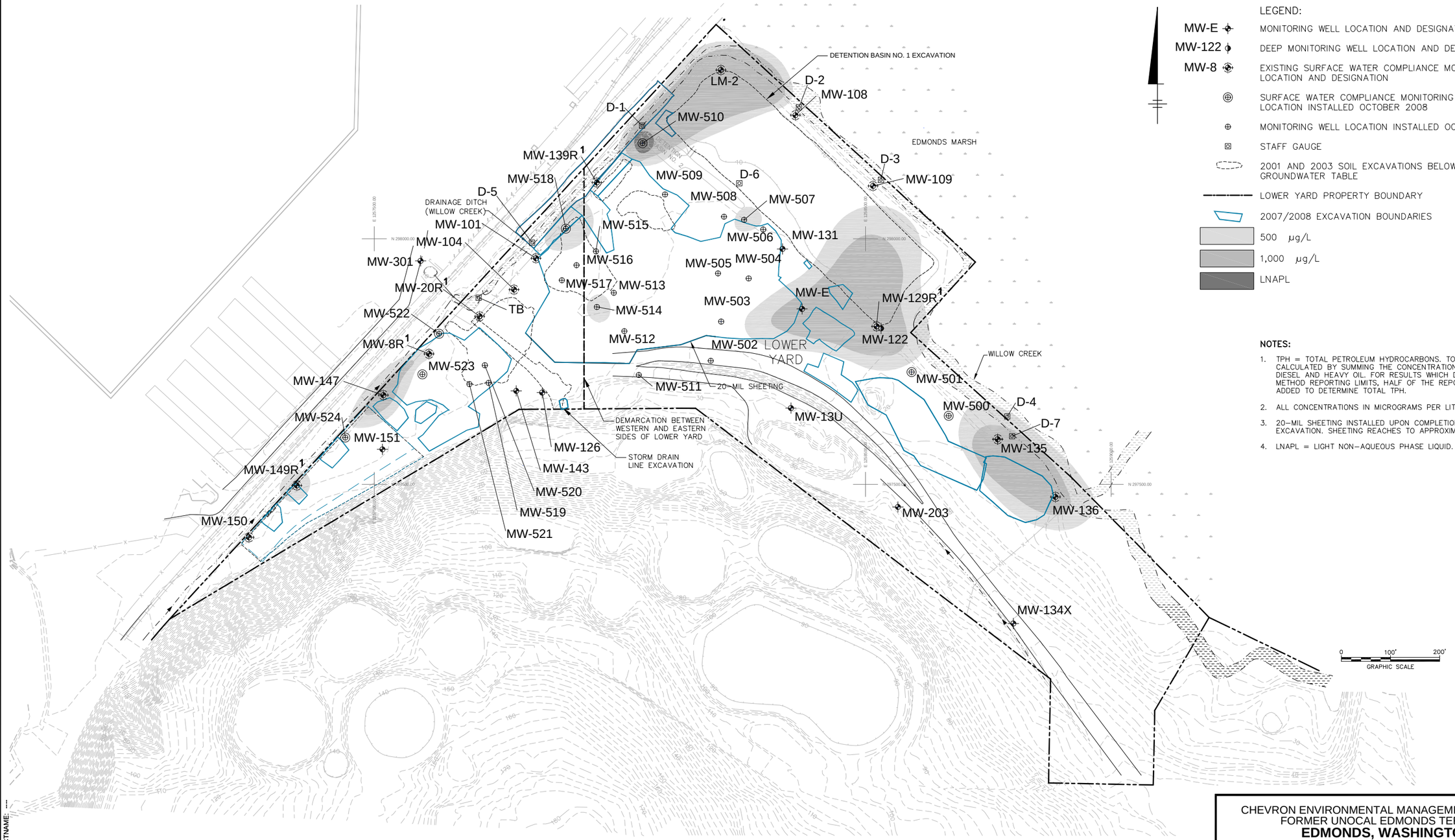
CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL EDMONDS TERMINAL
EDMONDS, WASHINGTON

TOTAL TPH ISOCONTOUR MAP (JUNE 2001)

ARCADIS

FIGURE
16

CITY: SYRACUSE, NY GROUP: ENVCAD DB: A. SCHILLING, W.JONES, P. LISTER PM: R. ANDRESEN TM/TR: D. RASAR LYR: ON=*;OFF=REF, (FR2)
G:\ENVCAD\SYRACUSE\ACT\B0045362\00300001\DWG\45362C15.dwg LAYOUT: 16SAVED: 1/25/2011 8:40 AM ACADVER: 18.0S (LMS TECH)PAGESETUP: ---PLOTSTYLETABLE: PLTFULL.CTBPLOTTED: 1/25/2011 8:41 AM BY: LISTER, PAUL
XREFS: IMAGES: PROJECTNAME: ---
45362X00
45362X01
45362X02



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- 500 µg/L
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NOTES:

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3. 20-MIL SHEETING INSTALLED UPON COMPLETION OF PHASE I EXCAVATION. SHEETING REACHES TO APPROXIMATELY 10 FT BGS.
4. LNAPL = LIGHT NON-AQUEOUS PHASE LIQUID.

CHEVRON ENVIRONMENTAL MANAGEMENT COMPANY
FORMER UNOCAL EDMONDS TERMINAL
EDMONDS, WASHINGTON

TOTAL TPH ISOCONTOUR MAP (OCTOBER 2010)

ARCADIS

FIGURE
17

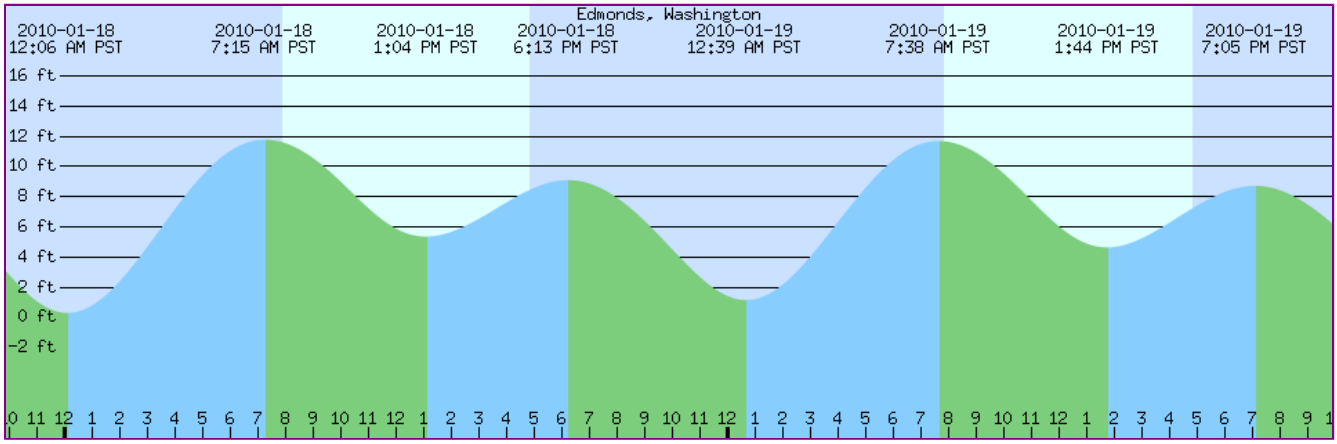
CITY: SYRACUSE, NY GROUP: ENVCAD DB: A. SCHILLING, W.JONES, P. LISTER PM: R. ANDRESEN TM/TR: D. RASAR LYR: ON=*;OFF=REF, (FRZ)
G:\ENVCAD\SYRACUSE\ACTIVE\00453620030001\DWG\453620216.dwg LAYOUT: 17SAVED: 1/25/2011 8:38 AM ACADVER: 18.0S (LMS TECH) PLTFULL.CTB PLOTTED: 1/25/2011 8:39 AM BY: LISTER, PAUL
(LMS TECH)PAGESETUP: ---PLOTSTYLETABLE:
XREFS: IMAGES: PROJECTNAME: ---
45362X00
45362X01
45362X02

ARCADIS

Appendix A

Edmonds, Washington Tide Tables

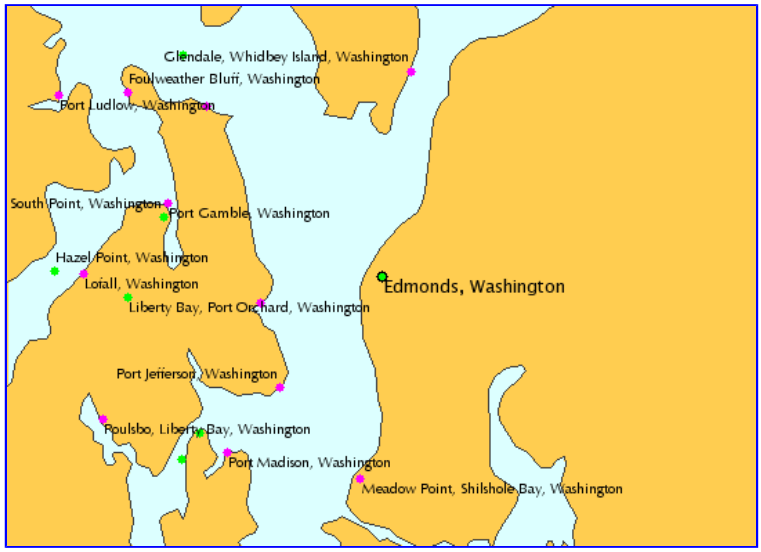
Edmonds, Washington
Requested time: 2010-01-18 12:00 AM PST



Save this tide table: subscribe (iCal) or download (WinDates or Mozilla)

Edmonds, Washington
47.8133° N, 122.3833° W

2010-01-18 12:06 AM PST	0.25 feet	Low Tide
2010-01-18 7:15 AM PST	11.72 feet	High Tide
2010-01-18 7:51 AM PST	Sunrise	
2010-01-18 1:04 PM PST	5.30 feet	Low Tide
2010-01-18 4:48 PM PST	Sunset	
2010-01-18 6:13 PM PST	9.04 feet	High Tide
2010-01-19 12:39 AM PST	1.10 feet	Low Tide
2010-01-19 7:38 AM PST	11.63 feet	High Tide
2010-01-19 7:50 AM PST	Sunrise	
2010-01-19 1:44 PM PST	4.59 feet	Low Tide
2010-01-19 4:50 PM PST	Sunset	
2010-01-19 7:05 PM PST	8.67 feet	High Tide
2010-01-20 1:14 AM PST	2.17 feet	Low Tide
2010-01-20 7:49 AM PST	Sunrise	
2010-01-20 8:03 AM PST	11.49 feet	High Tide
2010-01-20 2:26 PM PST	3.85 feet	Low Tide
2010-01-20 4:51 PM PST	Sunset	
2010-01-20 8:04 PM PST	8.28 feet	High Tide
2010-01-21 1:51 AM PST	3.42 feet	Low Tide
2010-01-21 7:48 AM PST	Sunrise	
2010-01-21 8:29 AM PST	11.29 feet	High Tide
2010-01-21 3:12 PM PST	3.11 feet	Low Tide
2010-01-21 4:53 PM PST	Sunset	
2010-01-21 9:13 PM PST	7.99 feet	High Tide
2010-01-22 2:32 AM PST	4.77 feet	Low Tide

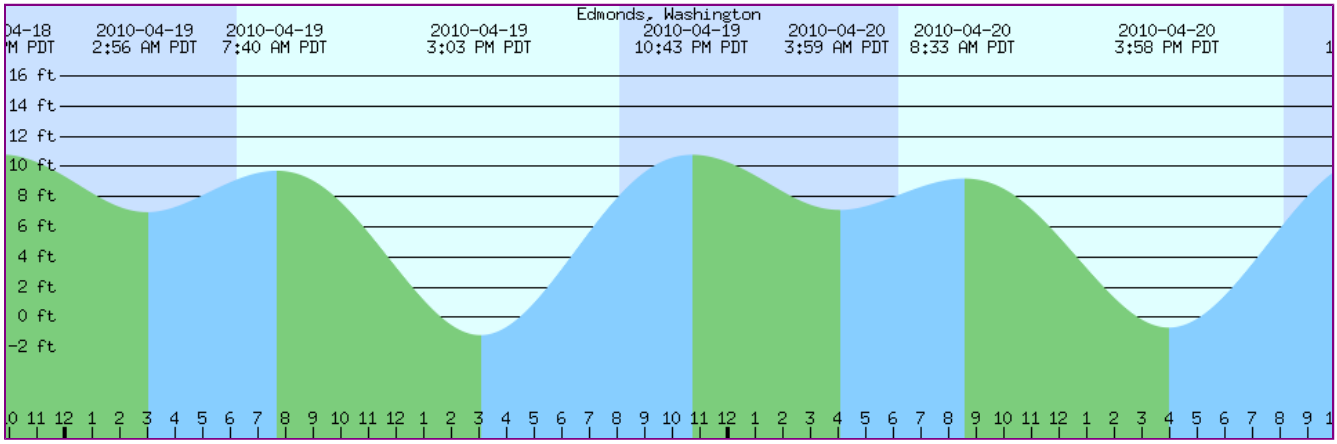


Time Control

Year: 2010 Month: 1 Day: 18 Go

Note: predictions for some locations do not cover the full span of years. If your browser returns a blank page or a "no data" error, then the predictions that you requested are not available.

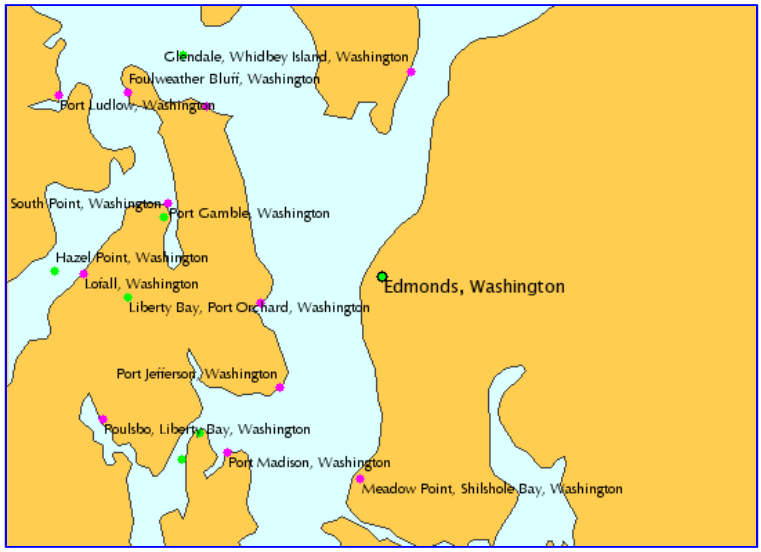
Edmonds, Washington
Requested time: 2010-04-19 12:00 AM PDT



Save this tide table: subscribe (iCal) or download (WinDates or Mozilla)

Edmonds, Washington
47.8133° N, 122.3833° W

2010-04-19 2:56 AM PDT	7.05 feet	Low Tide
2010-04-19 6:12 AM PDT	Sunrise	
2010-04-19 7:40 AM PDT	9.67 feet	High Tide
2010-04-19 3:03 PM PDT	-1.22 feet	Low Tide
2010-04-19 8:05 PM PDT	Sunset	
2010-04-19 10:43 PM PDT	10.72 feet	High Tide
2010-04-20 3:59 AM PDT	7.20 feet	Low Tide
2010-04-20 6:10 AM PDT	Sunrise	
2010-04-20 8:33 AM PDT	9.15 feet	High Tide
2010-04-20 3:58 PM PDT	-0.72 feet	Low Tide
2010-04-20 8:06 PM PDT	Sunset	
2010-04-20 11:43 PM PDT	10.77 feet	High Tide
2010-04-21 5:16 AM PDT	6.93 feet	Low Tide
2010-04-21 6:09 AM PDT	Sunrise	
2010-04-21 9:45 AM PDT	8.54 feet	High Tide
2010-04-21 11:20 AM PDT	First Quarter	
2010-04-21 4:59 PM PDT	-0.03 feet	Low Tide
2010-04-21 8:08 PM PDT	Sunset	
2010-04-22 12:40 AM PDT	10.88 feet	High Tide
2010-04-22 6:07 AM PDT	Sunrise	
2010-04-22 6:36 AM PDT	6.11 feet	Low Tide
2010-04-22 11:16 AM PDT	8.07 feet	High Tide
2010-04-22 6:05 PM PDT	0.77 feet	Low Tide
2010-04-22 8:09 PM PDT	Sunset	
2010-04-23 1:29 AM PDT	11.01 feet	High Tide

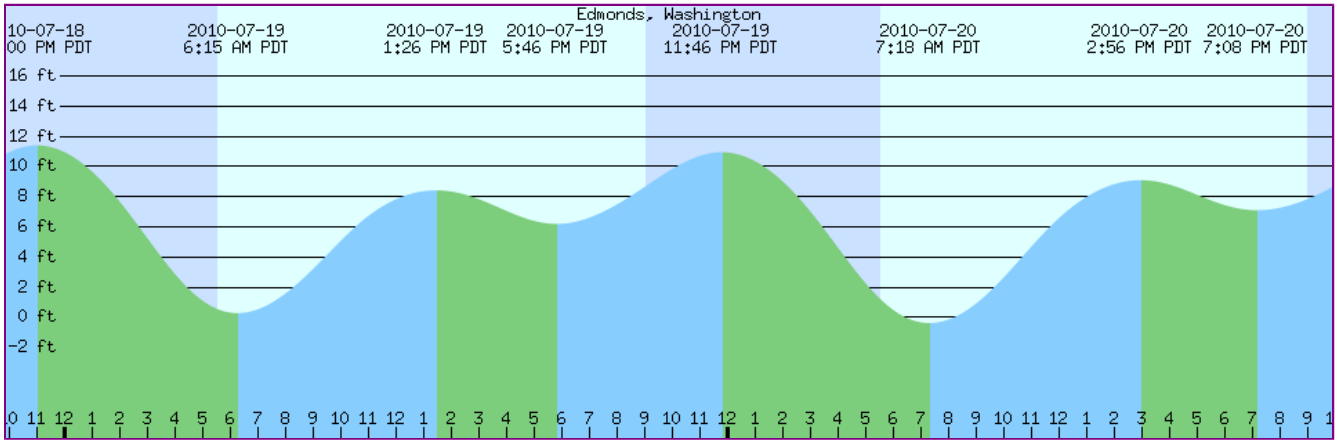


Time Control

Year: 2010 Month: 4 Day: 19 Go

Note: predictions for some locations do not cover the full span of years. If your browser returns a blank page or a "no data" error, then the predictions that you requested are not available.

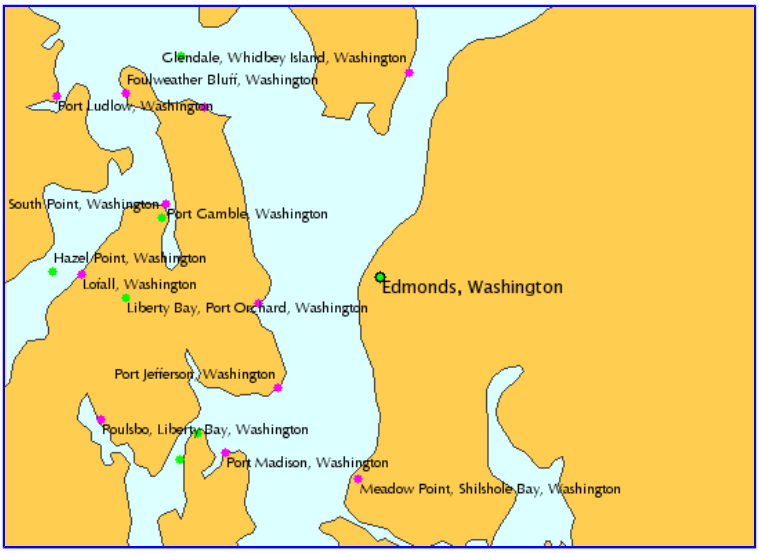
Edmonds, Washington
Requested time: 2010-07-19 12:00 AM PDT



Save this tide table: subscribe (iCal) or download (WinDates or Mozilla)

Edmonds, Washington
47.8133° N, 122.3833° W

2010-07-19	5:30 AM PDT	Sunrise	
2010-07-19	6:15 AM PDT	0.24 feet	Low Tide
2010-07-19	1:26 PM PDT	8.37 feet	High Tide
2010-07-19	5:46 PM PDT	6.24 feet	Low Tide
2010-07-19	9:00 PM PDT	Sunset	
2010-07-19	11:46 PM PDT	10.89 feet	High Tide
2010-07-20	5:31 AM PDT	Sunrise	
2010-07-20	7:18 AM PDT	-0.42 feet	Low Tide
2010-07-20	2:56 PM PDT	9.04 feet	High Tide
2010-07-20	7:08 PM PDT	7.18 feet	Low Tide
2010-07-20	8:59 PM PDT	Sunset	
2010-07-21	12:37 AM PDT	10.44 feet	High Tide
2010-07-21	5:33 AM PDT	Sunrise	
2010-07-21	8:16 AM PDT	-0.92 feet	Low Tide
2010-07-21	4:05 PM PDT	9.79 feet	High Tide
2010-07-21	8:34 PM PDT	7.56 feet	Low Tide
2010-07-21	8:58 PM PDT	Sunset	
2010-07-22	1:32 AM PDT	10.06 feet	High Tide
2010-07-22	5:34 AM PDT	Sunrise	
2010-07-22	9:09 AM PDT	-1.26 feet	Low Tide
2010-07-22	4:59 PM PDT	10.39 feet	High Tide
2010-07-22	8:57 PM PDT	Sunset	
2010-07-22	9:45 PM PDT	7.51 feet	Low Tide
2010-07-23	2:26 AM PDT	9.78 feet	High Tide



Time Control

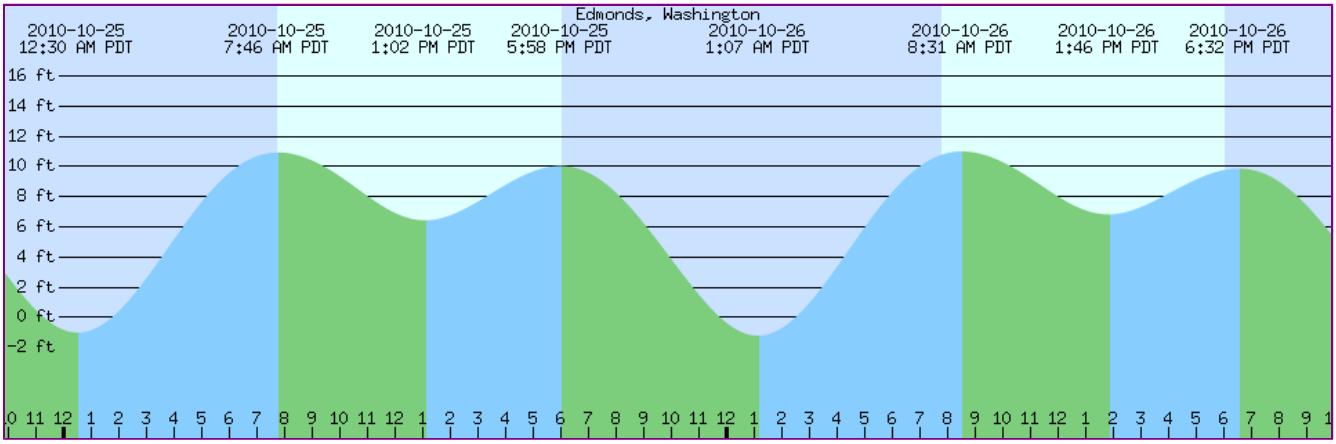
Year: 2010 Month: 7 Day: 19 Go

Note: predictions for some locations do not cover the full span of years. If your browser returns a blank page or a "no data" error, then the predictions that you requested are not available.

Mobile Geographics

Tides for iPhone

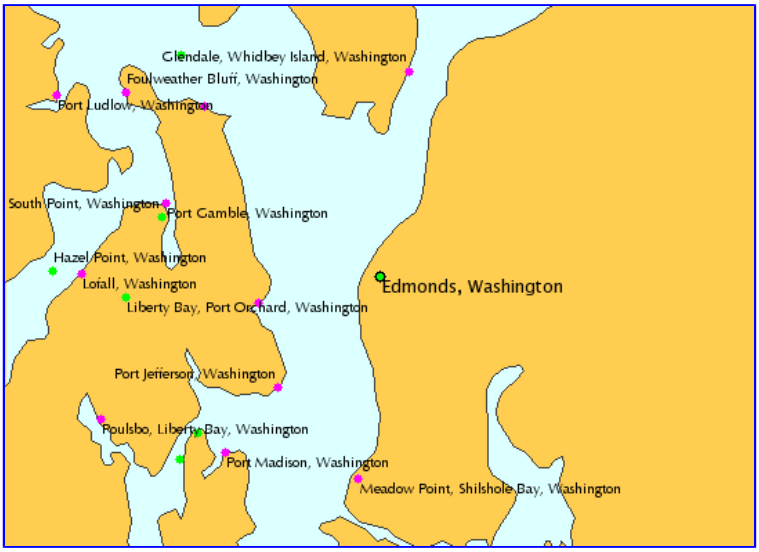
Edmonds, Washington
Requested time: 2010-10-25 12:00 AM PDT



Save this tide table: subscribe (iCal) or download (WinDates or Mozilla)

Edmonds, Washington
47.8133° N, 122.3833° W

2010-10-25 12:30 AM PDT	-1.05 feet	Low Tide
2010-10-25 7:43 AM PDT	Sunrise	
2010-10-25 7:46 AM PDT	10.88 feet	High Tide
2010-10-25 1:02 PM PDT	6.48 feet	Low Tide
2010-10-25 5:58 PM PDT	9.98 feet	High Tide
2010-10-25 6:02 PM PDT	Sunset	
2010-10-26 1:07 AM PDT	-1.26 feet	Low Tide
2010-10-26 7:45 AM PDT	Sunrise	
2010-10-26 8:31 AM PDT	10.94 feet	High Tide
2010-10-26 1:46 PM PDT	6.89 feet	Low Tide
2010-10-26 6:01 PM PDT	Sunset	
2010-10-26 6:32 PM PDT	9.81 feet	High Tide
2010-10-27 1:48 AM PDT	-1.23 feet	Low Tide
2010-10-27 7:46 AM PDT	Sunrise	
2010-10-27 9:21 AM PDT	10.95 feet	High Tide
2010-10-27 2:37 PM PDT	7.20 feet	Low Tide
2010-10-27 5:59 PM PDT	Sunset	
2010-10-27 7:11 PM PDT	9.49 feet	High Tide
2010-10-28 2:34 AM PDT	-0.95 feet	Low Tide
2010-10-28 7:48 AM PDT	Sunrise	
2010-10-28 10:15 AM PDT	10.95 feet	High Tide
2010-10-28 3:38 PM PDT	7.29 feet	Low Tide
2010-10-28 5:57 PM PDT	Sunset	
2010-10-28 8:01 PM PDT	9.00 feet	High Tide
2010-10-29 3:25 AM PDT	-0.43 feet	Low Tide



Time Control

Year: 2010 Month: 10 Day: 25 Go

Note: predictions for some locations do not cover the full span of years. If your browser returns a blank page or a "no data" error, then the predictions that you requested are not available.

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Appendix B

First Quarter, 2010, Low Flow Sampling Field Sheets and Laboratory Analytical Reports

(Analytical Reports available on attached CD)

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Appendix C

Second Quarter, 2010, Low Flow Sampling Field Sheets and Laboratory Analytical Reports

(Analytical Reports available on attached CD)

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Appendix D

Third Quarter, 2010, Low Flow Sampling Field Sheets and Laboratory Analytical Reports

(Analytical Reports available on attached CD)

ARCADIS

Appendix E

Fourth Quarter, 2010, Low Flow Sampling Field Sheets and Laboratory Analytical Reports

(Analytical Reports available on attached CD)

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Appendix F

Monitored Natural Attenuation Linear Regression Analysis

Table 1a
Summary of Statistical Analysis for Locations with CUL Exceedances

Former Unocal Edmonds Terminal
Edmonds, Washington

		Range (µg/L)			Linear Regression Analysis							
Well	Constituent	Minimum	Maximum	CUL	Start	End	Correlation Coefficient,	p-value of Correlation	Trend Direction	Significant Trend?	Attenuation Rate (days^{-}	Years to below CUL
Western Side												
MW-101	TPH	72	400	706	10/22/2008	10/27/2010	0.14	0.26	Decreasing	No	8.50E-04	Current
MW-104	TPH	335	3,105	706	10/22/2008	10/27/2010	0.16	0.22	Decreasing	No	1.08E-03	Current
MW-143	TPH	169	2,005	706	10/22/2008	11/20/2010	0.00	0.90	No Trend	No	NC	Current
MW-147	TPH	351	2,720	706	10/21/2008	10/25/2010	0.02	0.65	No Trend	No	NC	NC
MW-149R	TPH	72	775	706	10/21/2008	10/26/2010	0.00	0.89	No Trend	No	NC	Current
MW-150	TPH	91	715	706	10/21/2008	10/26/2010	0.22	0.15	Decreasing	No	1.23E-03	Current
MW-20R	TPH	110	1,087	706	10/22/2008	10/27/2010	0.59	0.01	Decreasing	Yes	2.25E-03	Current
	Benzene	1	55	51	10/22/2008	10/27/2010	0.31	0.07	Decreasing	Yes	4.49E-03	Current
MW-516	TPH	73	801	706	10/22/2008	10/25/2010	0.23	0.13	Decreasing	No	1.67E-03	Current
MW-517	TPH	100	647	706	10/22/2008	10/27/2010	0.28	0.08	Decreasing	Yes	1.48E-03	Current
MW-518	TPH	675	1,403	706	10/22/2008	10/28/2010	0.36	0.05	Decreasing	Yes	5.55E-04	2.2
MW-519	TPH	105	451	706	10/22/2008	10/27/2010	0.27	0.10	Decreasing	Yes	1.13E-03	Current
MW-520	TPH	75	731	706	10/21/2008	10/27/2010	0.32	0.07	Decreasing	Yes	1.52E-03	Current
MW-521	TPH	75	473	706	10/21/2008	10/27/2010	0.29	0.09	Decreasing	Yes	1.43E-03	Current
MW-522	TPH	97	955	706	10/21/2008	1/19/2010	0.26	0.11	Decreasing	No	1.39E-03	Current
MW-523	TPH	75	431	706	10/21/2008	10/26/2010	0.10	0.35	Decreasing	No	7.95E-04	Current
MW-524	TPH	72	445	706	10/21/2008	10/26/2010	0.25	0.12	Decreasing	No	1.63E-03	Current
MW-8R	TPH	72	509	706	10/21/2008	10/26/2010	0.02	0.64	No Trend	No	NC	Current
Eastern Side												
LM-2	TPH	386	3,925	506	10/23/2008	12/6/2010	0.56	0.01	Increasing	Yes	NC	NC
	TPH*	386	3,925	506	2/26/2009	12/6/2010	0.85	<0.001	Increasing	Yes	NC	NC
MW-108	TPH	72	389	506	10/23/2008	10/29/2010	0.31	0.08	Decreasing	Yes	1.47E-03	Current
MW-109	TPH	73	404	506	10/23/2008	10/29/2010	0.34	0.06	Decreasing	Yes	1.63E-03	Current
MW-129R	TPH	393	4,425	506	10/24/2008	11/1/2010	0.33	0.06	Increasing	Yes	NC	NC
	TPH*	1,675	4,425	506	2/27/2009	11/1/2010	0.01	0.83	Decreasing	No	NC	NC
MW-135	TPH	369	2,625	506	10/27/2008	11/1/2010	0.28	0.09	Increasing	Yes	NC	NC
	TPH*	369	2,625	506	2/27/2009	11/1/2010	0.04	0.62	Increasing	No	NC	NC
MW-136	TPH	389	3,725	506	10/27/2008	11/1/2010	0.14	0.26	Increasing	No	NC	NC
MW-139R	TPH	77	418	506	10/22/2008	10/28/2010	0.29	0.09	Decreasing	Yes	1.28E-03	Current
MW-500	TPH	107	3,000	506	10/27/2008	11/1/2010	0.12	0.31	Decreasing	No	1.72E-03	Current
MW-501	TPH	134	8,330	506	10/24/2008	11/1/2010	0.28	0.10	Decreasing	Yes	3.00E-03	Current
MW-502	TPH	161	1,700	506	10/24/2008	10/28/2010	0.49	0.02	Decreasing	Yes	2.57E-03	Current
MW-503	TPH	75	389	506	10/27/2008	10/28/2010	0.06	0.47	No Trend	No	NC	Current
MW-504	TPH	72	701	506	10/24/2008	10/28/2010	0.21	0.16	Decreasing	No	1.41E-03	Current
MW-505	TPH	75	404	506	10/24/2008	10/29/2010	0.11	0.32	Decreasing	No	7.93E-04	Current
MW-506	TPH	72	397	506	10/24/2008	10/29/2010	0.23	0.14	Decreasing	No	1.17E-03	Current
MW-507	TPH	383	1,142	506	10/24/2008	10/29/2010	0.26	0.11	Decreasing	No	8.37E-04	<1
MW-508	TPH	73	745	506	10/24/2008	10/28/2010	0.21	0.16	Decreasing	No	1.40E-03	Current
MW-509	TPH	72	389	506	10/23/2008	10/28/2010	0.26	0.11	Decreasing	No	1.29E-03	Current
MW-510	TPH	3,980	25,090	506	10/23/2008	8/20/2009	0.76	0.02	Increasing	Yes	NC	NC
MW-511	TPH	72	400	506	10/24/2008	10/28/2010	0.22	0.14	Decreasing	No	1.26E-03	Current
MW-512	TPH	266	748	506	10/23/2008	10/28/2010	0.18	0.19	Decreasing	No	6.07E-04	Current
MW-513	TPH	457	932	506	10/23/2008	10/28/2010	0.72	0.001	Decreasing	Yes	8.59E-04	Current
MW-514	TPH	575	1,578	506	10/23/2008	10/27/2010	0.82	<0.001	Decreasing	Yes	1.38E-03	<1
MW-515	TPH	91	947	506	10/22/2008	10/27/2010	0.56	0.01	Decreasing	Yes	2.23E-03	Current

Notes:
TPH = Total petroleum hydrocarbons
µg/L = Micrograms per liter
CUL = Cleanup Level
Current = Concentrations are currently below CUL
NC = Not Calculated
* excluding concentrations measured in October and December 2008

Sample Information

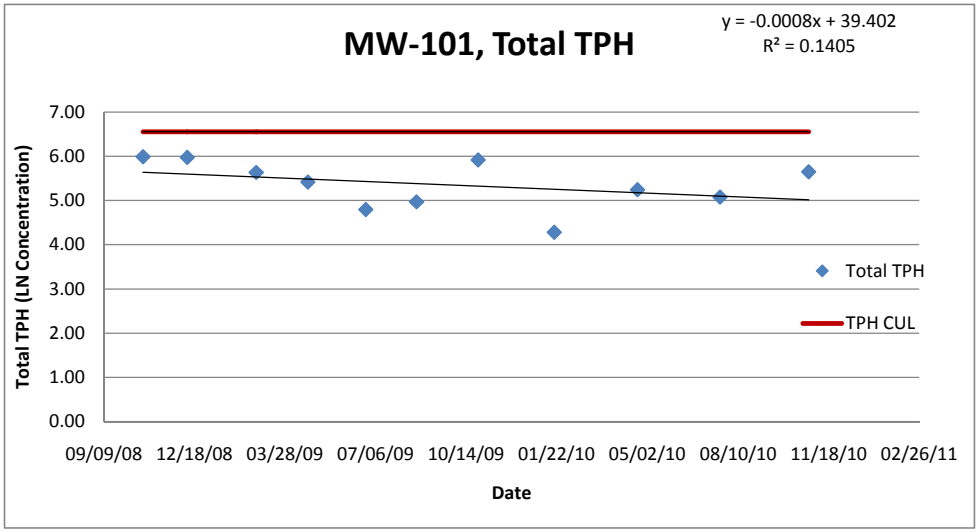
Sample Location **MW-101, West Side**

Constituent **Total TPH**

CUL **706 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/22/08	400	5.99
12/10/08	393	5.97
02/24/09	279	5.63
04/22/09	225	5.41
06/25/09	121	4.80
08/20/09	144	4.97
10/27/09	372	5.92
01/19/10	72	4.28
04/21/10	189	5.24
07/21/10	160	5.08
10/27/10	284	5.65



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	39.40233072
Slope	-8.50E-04
Date to CUL	12/1/2006

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.374829095
R Square	0.14049685
Adjusted R Square	0.044996501
Standard Error	0.534105011
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.419676769	0.41967677	1.47116582	0.256036027
Residual	9	2.56741346	0.28526816		
Total	10	2.98709023			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	39.40233072	28.06866827	1.40378341	0.19393492	-24.09340812	102.8980696
X Variable 1	-0.000849528	0.000700401	-1.21291625	0.25603603	-0.002433946	0.00073489

Results

Natural Attenuation Rates in Groundwater (K) =	8.50E-04	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	1.40E-01	2.56E-01
Chemical Half Life in Groundwater ($t_{1/2}$) =	8.16E+02	days

Abbreviations and Notes

ug/l = micrograms per liter

LN = Natural Logarithm

CUL = Cleanup Level

Sample Information

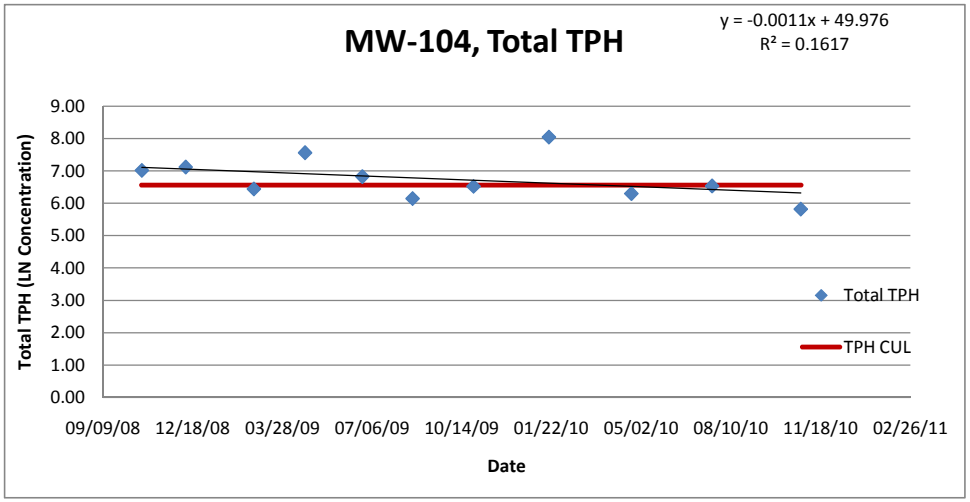
Sample Location **MW-104, West Side**

Constituent **Total TPH**

CUL **706 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/22/08	1,110	7.01
12/10/08	1,230	7.11
02/24/09	624	6.44
04/22/09	1,915	7.56
06/25/09	916	6.82
08/20/09	464	6.14
10/27/09	677	6.52
01/19/10	3105	8.04
04/21/10	542	6.30
07/20/10	686	6.53
10/27/10	335	5.81



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	49.97550167
Slope	-1.08E-03
Date to CUL	1/19/2011

Results

Natural Attenuation Rates in Groundwater (K) =	1.08E-03	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	1.62E-01	2.20E-01
Chemical Half Life in Groundwater ($t_{1/2}$) =	6.43E+02	days

Abbreviations and Notes

ug/l = micrograms per liter

LN = Natural Logarithm

CUL = Cleanup Level

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.402075502
R Square	0.161664709
Adjusted R Square	0.068516344
Standard Error	0.623991182
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.675766863	0.67576686	1.73556142	0.220252471
Residual	9	3.504284957	0.389365		
Total	10	4.18005182			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	49.97550167	32.80957372	1.52319875	0.16204174	-24.24491037	124.1959137
X Variable 1	-0.001078566	0.000818704	-1.31740708	0.22025247	-0.002930603	0.00077347

Sample Information

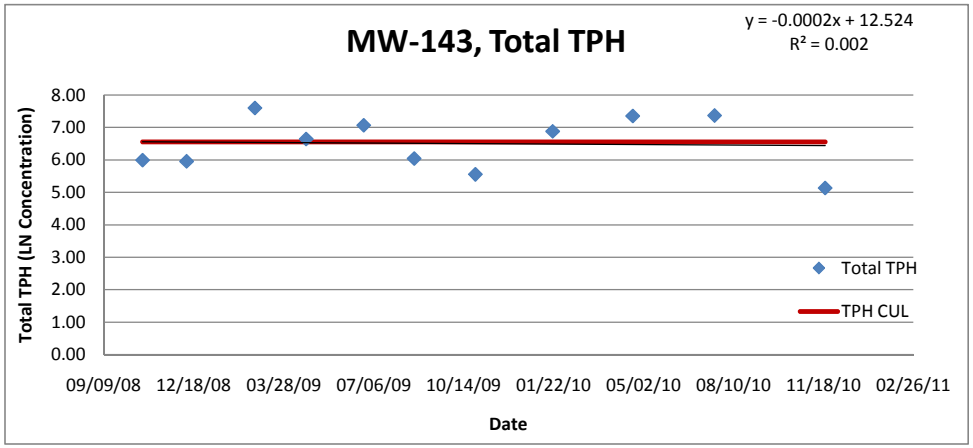
Sample Location **MW-143, West Side**

Constituent **Total TPH**

CUL **706 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/22/08	400	5.99
12/10/08	386	5.96
02/24/09	2,005	7.60
04/22/09	770	6.65
06/25/09	1,175	7.07
08/20/09	421	6.04
10/27/09	258	5.55
01/21/10	975	6.88
04/20/10	1565	7.36
07/20/10	1585	7.37
11/20/10	169	5.13



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	12.5236619
Slope	-1.50E-04
Date to CUL	11/14/2014

Results

Natural Attenuation Rates in Groundwater (K) =	1.50E-04	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	2.01E-03	8.96E-01
Chemical Half Life in Groundwater ($t_{1/2}$) =	4.62E+03	days

Abbreviations and Notes

ug/l = micrograms per liter

LN = Natural Logarithm

CUL = Cleanup Level

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.044837926
R Square	0.00201044
Adjusted R Square	-0.108877289
Standard Error	0.864001343
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.013534318	0.01353432	0.01813041	0.895852401
Residual	9	6.718484886	0.74649832		
Total	10	6.732019204			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	12.5236619	44.67098202	0.2803534	0.78554395	-88.52911984	113.5764436
X Variable 1	-0.000150083	0.00111462	-0.1346492	0.8958524	-0.002671528	0.002371363

Sample Information

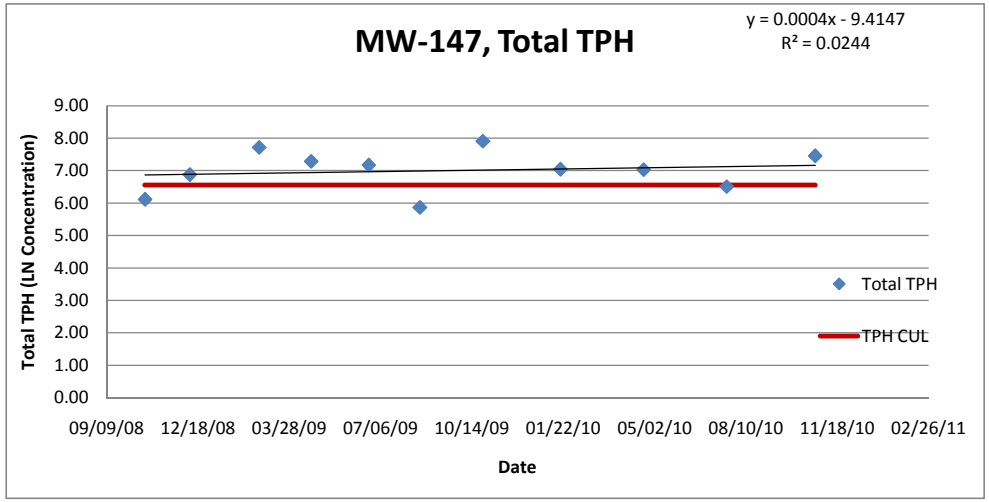
Sample Location **MW-147, West Side**

Constituent **Total TPH**

CUL **706 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/21/08	452	6.11
12/09/08	968	6.88
02/23/09	2,240	7.71
04/21/09	1,459	7.29
06/23/09	1,300	7.17
08/18/09	351	5.86
10/26/09	2,720	7.91
01/19/10	1143	7.04
04/20/10	1128	7.03
07/20/10	670	6.51
10/25/10	1730	7.46



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	-9.41470218
Slope	4.10E-04
Date to CUL	7/25/2004

Results

Natural Attenuation Rates in Groundwater (K) =	-4.10E-04	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	2.44E-02	6.47E-01
Chemical Half Life in Groundwater ($t_{1/2}$) =	NA	days

Abbreviations and Notes

ug/l = micrograms per liter

LN = Natural Logarithm

CUL = Cleanup Level

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.156148616
R Square	0.02438239
Adjusted R Square	-0.084019566
Standard Error	0.658295678
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.097472289	0.09747229	0.22492574	0.64660734
Residual	9	3.900178792	0.4333532		
Total	10	3.997651081			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-9.41470218	34.60398118	-0.27206991	0.79170682	-87.6943459	68.86494154
X Variable 1	0.000409528	0.000863504	0.47426336	0.64660734	-0.001543853	0.002362909

Sample Information

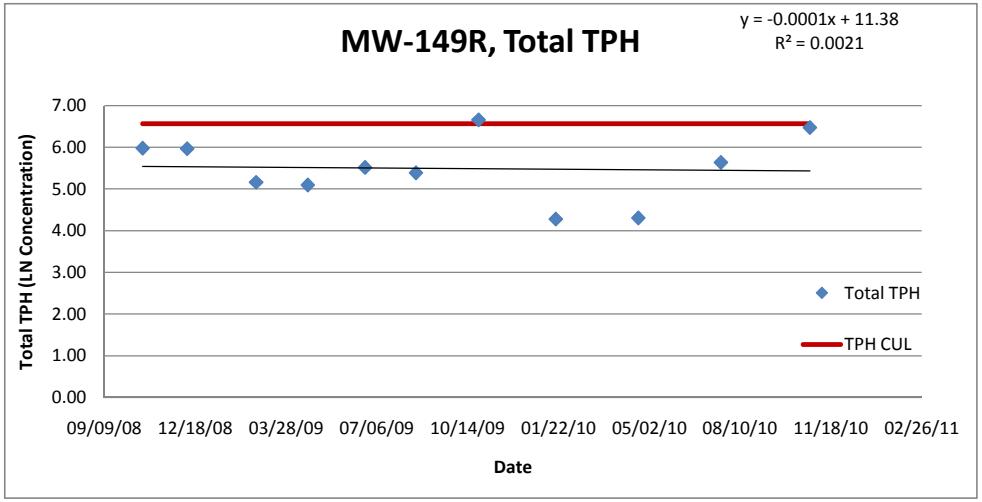
Sample Location **MW-149R, West Side**

Constituent **Total TPH**

CUL **706 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/21/08	393	5.97
12/09/08	389	5.96
02/23/09	174	5.16
04/21/09	163	5.09
06/23/09	248	5.51
08/18/09	218	5.38
10/26/09	775	6.65
01/19/10	72	4.28
04/20/10	74	4.30
07/20/10	280	5.63
10/26/10	645	6.47



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	11.37987884
Slope	-1.47E-04
Date to CUL	1/17/1996

Results

Natural Attenuation Rates in Groundwater (K) =	1.47E-04	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	2.11E-03	8.93E-01
Chemical Half Life in Groundwater ($t_{1/2}$) =	4.72E+03	days

Abbreviations and Notes

ug/l = micrograms per liter

LN = Natural Logarithm

CUL = Cleanup Level

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.04595279
R Square	0.002111659
Adjusted R Square	-0.108764823
Standard Error	0.812038538
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.012558495	0.0125585	0.01904515	0.893275438
Residual	9	5.93465928	0.65940659		
Total	10	5.947217775			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	11.37987884	42.65614727	0.26678168	0.79564927	-85.11503006	107.8747877
X Variable 1	-0.000146896	0.001064434	-0.13800416	0.89327544	-0.002554813	0.00226102

Sample Information

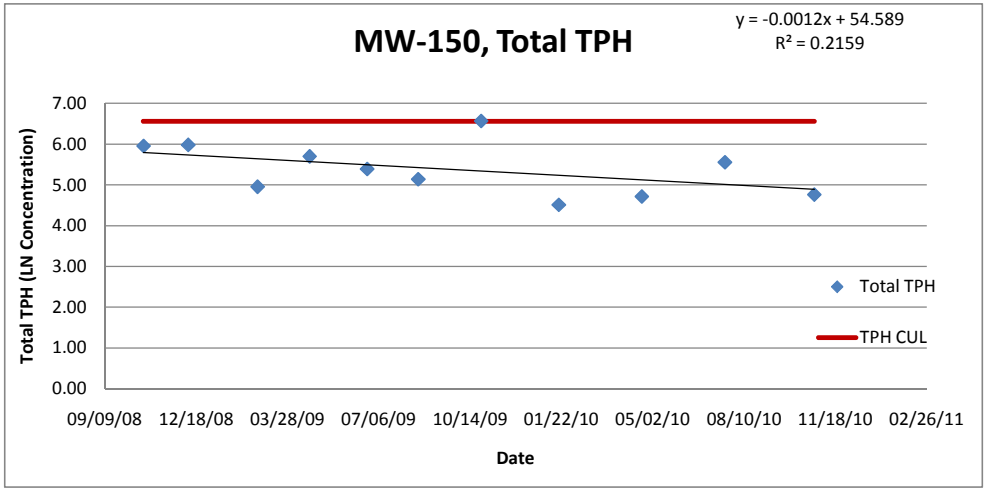
Sample Location **MW-150, West Side, POC Well**

Constituent **Total TPH**

CUL **706 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/21/08	386	5.96
12/09/08	397	5.98
02/23/09	142	4.96
04/21/09	300	5.70
06/23/09	220	5.39
08/18/09	171	5.14
10/26/09	715	6.57
01/19/10	91	4.51
04/20/10	112	4.72
07/20/10	259	5.56
10/26/10	117	4.76



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	54.58861813
Slope	-1.23E-03
Date to CUL	11/3/2007

Results

Natural Attenuation Rates in Groundwater (K) =	1.23E-03	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	2.16E-01	1.50E-01
Chemical Half Life in Groundwater ($t_{1/2}$) =	5.64E+02	days

Abbreviations and Notes

ug/l = micrograms per liter

LN = Natural Logarithm

CUL = Cleanup Level

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.464629654
R Square	0.215880715
Adjusted R Square	0.12875635
Standard Error	0.595041329
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.877341119	0.87734112	2.4778455	0.149912192
Residual	9	3.186667645	0.35407418		
Total	10	4.064008764			

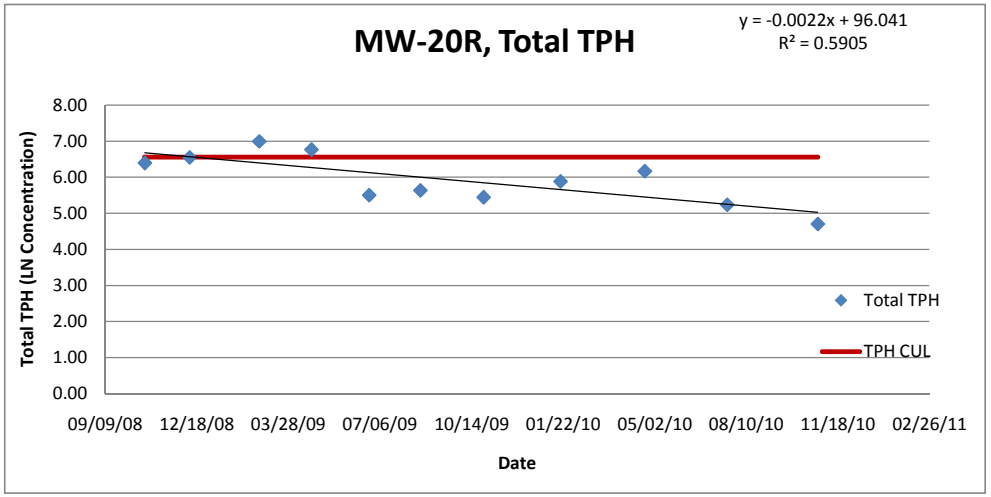
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	54.58861813	31.25734724	1.74642517	0.11468685	-16.12041369	125.2976499
X Variable 1	-0.001227796	0.00077999	-1.57411737	0.14991219	-0.002992257	0.000536664

Sample Information

Sample Location	**MW-20R, West Side**
Constituent	**Total TPH**
CUL	**706 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/22/08	597	6.39
12/10/08	697	6.55
02/24/09	1,087	6.99
04/22/09	866	6.76
06/24/09	245	5.50
08/19/09	279	5.63
10/27/09	231	5.44
01/19/10	359	5.88
04/21/10	475	6.16
07/20/10	188	5.24
10/27/10	110	4.70



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	96.04050401
Slope	-2.25E-03
Date to CUL	5/10/2009

Results

Natural Attenuation Rates in Groundwater (K) =	2.25E-03	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	5.91E-01	5.72E-03
Chemical Half Life in Groundwater ($t_{1/2}$) =	3.08E+02	days

Abbreviations and Notes

ug/l = micrograms per liter
LN = Natural Logarithm
CUL = Cleanup Level

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.768467156
R Square	0.59054177
Adjusted R Square	0.545046411
Standard Error	0.475770232
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	2.938177702	2.9381777	12.980264	0.005723124
Residual	9	2.037215826	0.22635731		
Total	10	4.975393528			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	96.04050401	25.01100061	3.8399305	0.00396695	39.46168994	152.6193181
X Variable 1	-0.002248542	0.000624107	-3.60281335	0.00572312	-0.003660371	-0.000836713

Sample Information

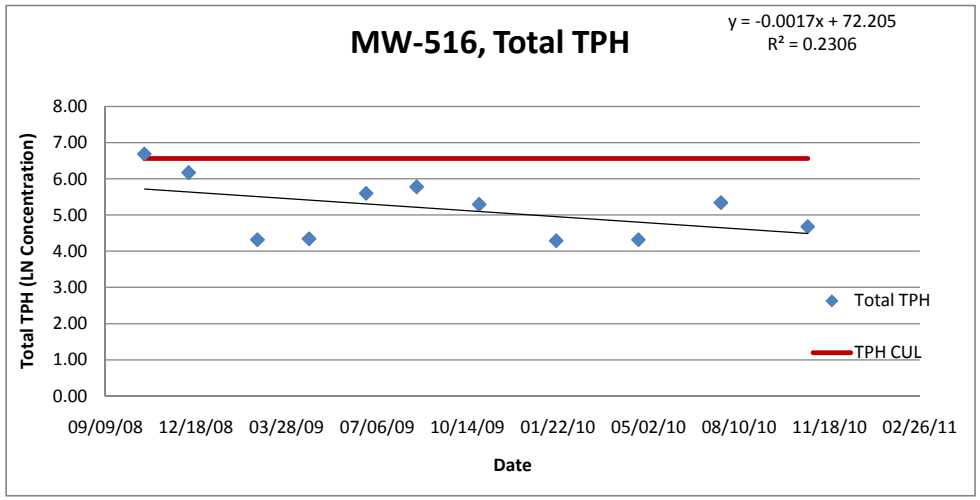
Sample Location **MW-516, West Side**

Constituent **Total TPH**

CUL **706 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/22/08	801	6.69
12/10/08	478	6.17
02/24/09	75	4.32
04/22/09	77	4.34
06/24/09	270	5.60
08/19/09	323	5.78
10/27/09	199	5.29
01/20/10	73	4.29
04/21/10	75	4.32
07/21/10	209	5.34
10/25/10	108	4.68



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	72.20544515
Slope	-1.67E-03
Date to CUL	12/23/2007

Results

Natural Attenuation Rates in Groundwater (K) =	1.67E-03	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	2.31E-01	1.35E-01
Chemical Half Life in Groundwater ($t_{1/2}$) =	4.14E+02	days

Abbreviations and Notes

ug/l = micrograms per liter

LN = Natural Logarithm

CUL = Cleanup Level

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.480252994
R Square	0.230642938
Adjusted R Square	0.14515882
Standard Error	0.775887669
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	1.62424832	1.62424832	2.6980794	0.134884443
Residual	9	5.418015074	0.60200167		
Total	10	7.042263394			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	72.20544515	40.81450795	1.76911223	0.11066135	-20.12338616	164.5342765
X Variable 1	-0.001672901	0.001018457	-1.64258315	0.13488444	-0.003976811	0.00063101

Sample Information

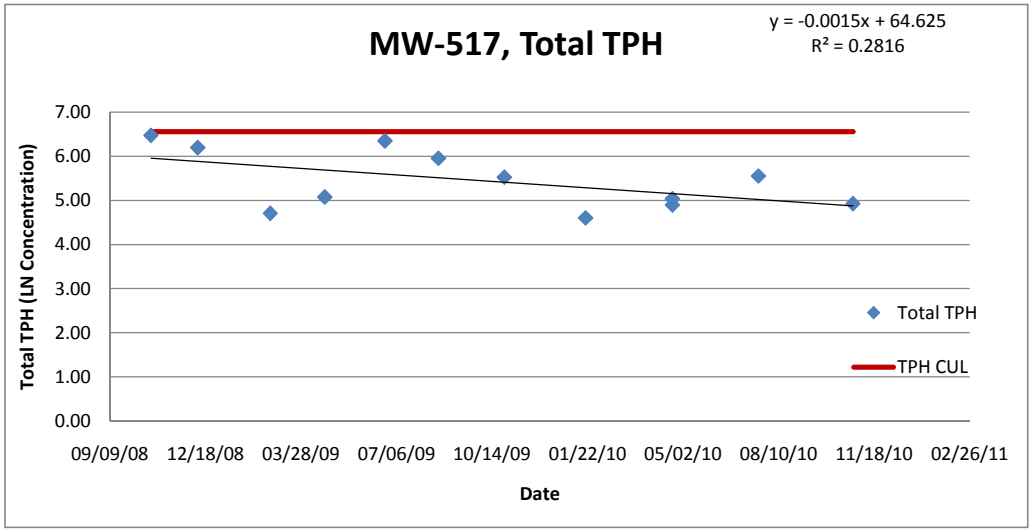
Sample Location **MW-517, West Side**

Constituent **Total TPH**

CUL **706 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/22/08	647	6.47
12/10/08	491	6.20
02/24/09	111	4.71
04/22/09	161	5.08
06/24/09	571	6.35
08/19/09	385	5.95
10/27/09	251	5.53
01/20/10	100	4.61
04/21/10	134	4.90
04/21/10	154	5.04
07/20/10	258	5.55
10/27/10	138.0000	4.93



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	64.62456182
Slope	-1.48E-03
Date to CUL	4/22/2008

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.530685996
R Square	0.281627627
Adjusted R Square	0.209790389
Standard Error	0.588763745
Observations	12

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	1.358963369	1.35896337	3.92035714	0.075874014
Residual	10	3.466427471	0.34664275		
Total	11	4.82539084			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	64.62456182	29.89087664	2.16201628	0.05591886	-1.976461454	131.2255851
X Variable 1	-0.001476165	0.000745542	-1.97998918	0.07587401	-0.003137336	0.000185006

Results

Natural Attenuation Rates in Groundwater (K) =	1.48E-03	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	2.82E-01	7.59E-02
Chemical Half Life in Groundwater ($t_{1/2}$) =	4.69E+02	days

Abbreviations and Notes

ug/l = micrograms per liter

Sample Information

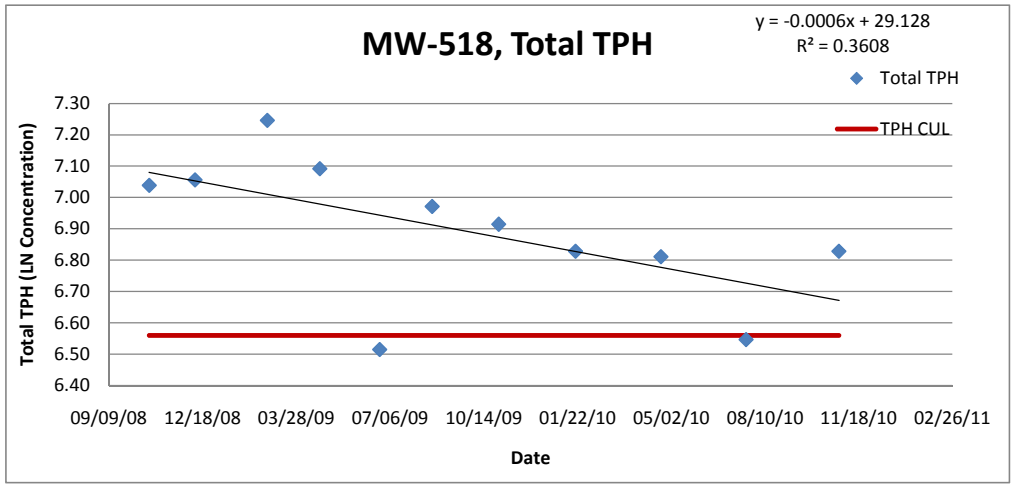
Sample Location **MW-518, West Side**

Constituent **Total TPH**

CUL **706 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/22/08	1,140	7.04
12/10/08	1,160	7.06
02/25/09	1,403	7.25
04/22/09	1,202	7.09
06/25/09	675	6.51
08/20/09	1,066	6.97
10/30/09	1,007	6.91
01/20/10	924	6.83
04/21/10	908	6.81
07/21/10	697	6.55
10/28/10	924	6.83



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	29.12766033
Slope	-5.55E-04
Date to CUL	1/6/2013

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.600682067
R Square	0.360818945
Adjusted R Square	0.289798828
Standard Error	0.187829325
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.17923992	0.17923992	5.08051745	0.050670979
Residual	9	0.317518697	0.03527986		
Total	10	0.496758617			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	29.12766033	9.863621221	2.95303922	0.01614102	6.814598981	51.44072168
X Variable 1	-0.000554766	0.000246125	-2.25400032	0.05067098	-0.001111539	2.0076E-06

Results

Natural Attenuation Rates in Groundwater (K) =	5.55E-04	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	3.61E-01	5.07E-02
Chemical Half Life in Groundwater ($t_{1/2}$) =	1.25E+03	days

Abbreviations and Notes

ug/l = micrograms per liter
LN = Natural Logarithm
CUL = Cleanup Level

Sample Information

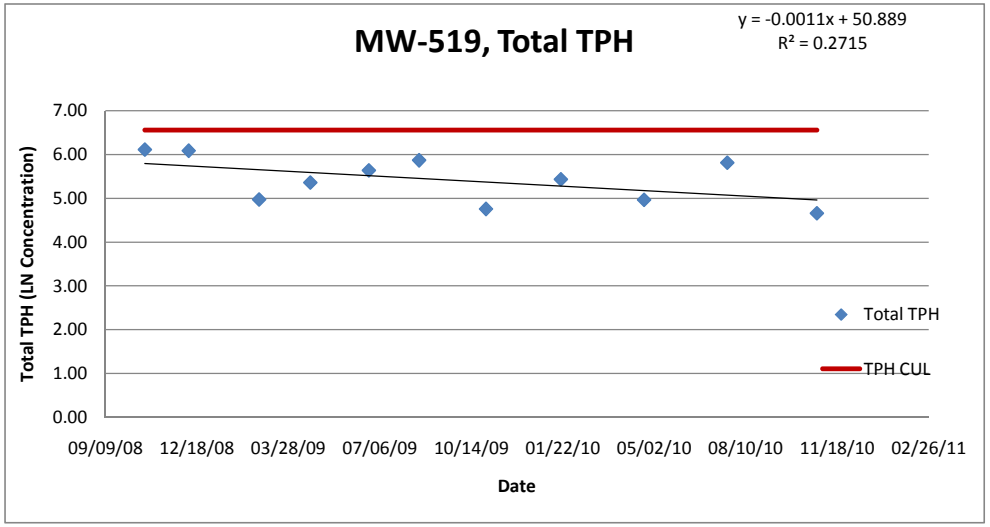
Sample Location **MW-519, West Side**

Constituent **Total TPH**

CUL **706 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/22/08	451	6.11
12/09/08	439	6.08
02/24/09	144	4.97
04/21/09	212	5.36
06/24/09	280	5.63
08/18/09	353	5.87
10/30/09	116	4.75
01/20/10	228.5	5.43
04/21/10	143	4.96
07/21/10	334	5.81
10/27/10	105	4.65



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	50.88874367
Slope	-1.13E-03
Date to CUL	10/9/2007

Results

Natural Attenuation Rates in Groundwater (K) =	1.13E-03	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	2.72E-01	1.00E-01
Chemical Half Life in Groundwater ($t_{1/2}$) =	6.11E+02	days

Abbreviations and Notes

ug/l = micrograms per liter
LN = Natural Logarithm
CUL = Cleanup Level

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.521061658
R Square	0.271505252
Adjusted R Square	0.190561391
Standard Error	0.473072807
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.750672122	0.75067212	3.35424143	0.100263064
Residual	9	2.014180923	0.22379788		
Total	10	2.764853045			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	50.88874367	24.82609799	2.04980838	0.07063565	-5.271791604	107.0492789
X Variable 1	-0.001134571	0.000619491	-1.83145883	0.10026306	-0.002535956	0.000266814

Sample Information

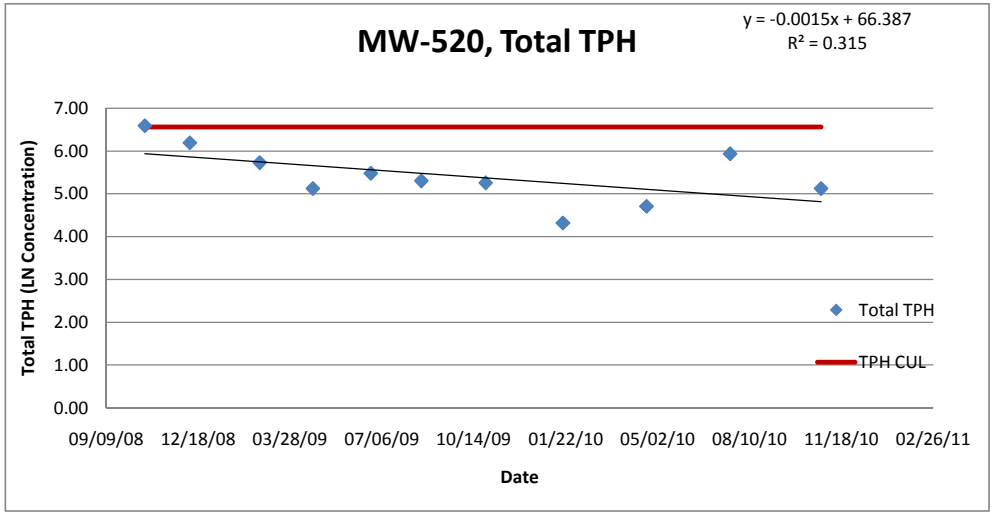
Sample Location **MW-520, West Side**

Constituent **Total TPH**

CUL **706 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/21/08	731	6.59
12/09/08	489	6.19
02/23/09	308	5.73
04/22/09	168	5.12
06/24/09	240	5.48
08/18/09	201	5.30
10/27/09	192	5.26
01/19/10	75	4.32
04/20/10	111	4.71
07/20/10	379	5.94
10/27/10	168	5.12



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	66.38714167
Slope	-1.52E-03
Date to CUL	4/14/2008

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.561282474
R Square	0.315038016
Adjusted R Square	0.238931129
Standard Error	0.570534508
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	1.347419532	1.34741953	4.13941534	0.07239952
Residual	9	2.929586619	0.32550962		
Total	10	4.277006152			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	66.38714167	29.95958728	2.21588973	0.05392454	-1.386153154	134.1604365
X Variable 1	-0.001521032	0.000747599	-2.03455532	0.07239952	-0.00321222	0.000170155

Results

Natural Attenuation Rates in Groundwater (K) =	1.52E-03	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	3.15E-01	7.24E-02
Chemical Half Life in Groundwater ($t_{1/2}$) =	4.56E+02	days

Abbreviations and Notes

ug/l = micrograms per liter

LN = Natural Logarithm

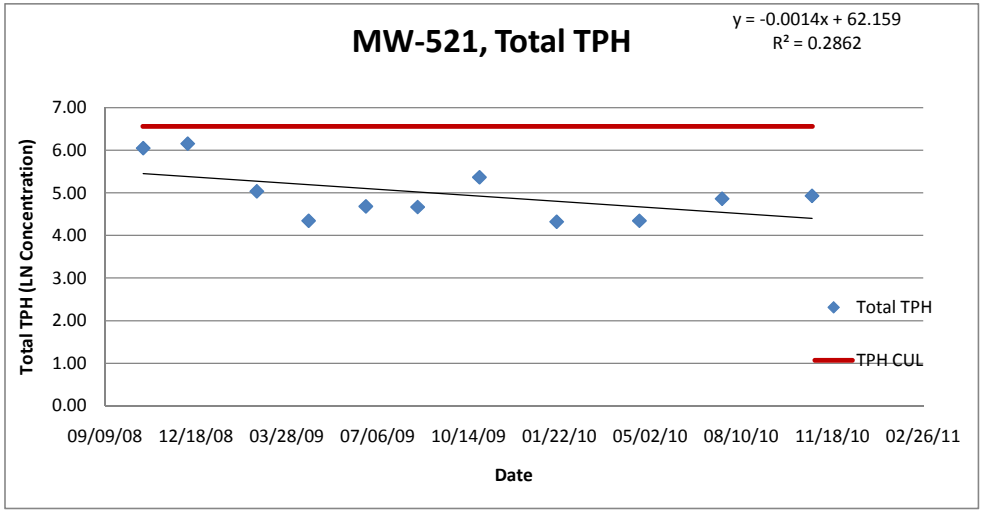
CUL = Cleanup Level

Sample Information

Sample Location	**MW-521, West Side**
Constituent	**Total TPH**
CUL	**706 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/21/08	425	6.05
12/09/08	473	6.16
02/23/09	154	5.04
04/21/09	77	4.34
06/23/09	108	4.68
08/19/09	106	4.66
10/26/09	214	5.37
01/19/10	75	4.32
04/20/10	77	4.34
07/20/10	129	4.86
10/27/10	138	4.93



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	62.15861232
Slope	-1.43E-03
Date to CUL	4/26/2007

Results

Natural Attenuation Rates in Groundwater (K) =	1.43E-03	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	2.86E-01	9.00E-02
Chemical Half Life in Groundwater ($t_{1/2}$) =	4.86E+02	days

Abbreviations and Notes

ug/l = micrograms per liter
LN = Natural Logarithm
CUL = Cleanup Level

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.534931974
R Square	0.286152217
Adjusted R Square	0.206835796
Standard Error	0.573475961
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	1.186490987	1.18649099	3.60772984	0.089974004
Residual	9	2.959872098	0.32887468		
Total	10	4.146363086			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	62.15861232	30.10531725	2.06470544	0.0689528	-5.944346597	130.2615712
X Variable 1	-0.001426906	0.000751239	-1.8994025	0.089974	-0.003126327	0.000272516

Sample Information

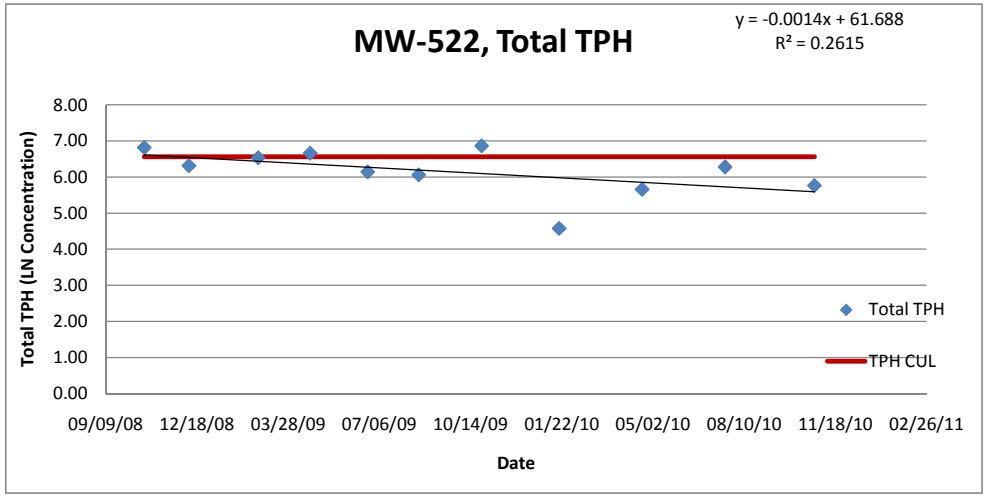
Sample Location **MW-522, West Side**

Constituent **Total TPH**

CUL **706 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/21/08	909	6.81
12/09/08	551	6.31
02/23/09	686	6.53
04/21/09	779	6.66
06/23/09	464	6.14
08/18/09	428	6.06
10/26/09	955	6.86
01/19/10	97	4.57
04/20/10	286	5.66
07/20/10	533	6.28
10/26/10	318	5.76



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	61.68829513
Slope	-1.39E-03
Date to CUL	7/23/2009

Results

Natural Attenuation Rates in Groundwater (K) =	1.39E-03	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	2.61E-01	1.08E-01
Chemical Half Life in Groundwater ($t_{1/2}$) =	5.00E+02	days

Abbreviations and Notes

ug/l = micrograms per liter

LN = Natural Logarithm

CUL = Cleanup Level

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.511334477
R Square	0.261462947
Adjusted R Square	0.179403275
Standard Error	0.59232233
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	1.117883597	1.1178836	3.18625385	0.107919113
Residual	9	3.157611685	0.35084574		
Total	10	4.275495282			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	61.68829513	31.11451905	1.98262088	0.07872671	-8.69763686	132.0742271
X Variable 1	-0.001385927	0.000776426	-1.78500808	0.10791911	-0.003142325	0.000370471

Sample Information

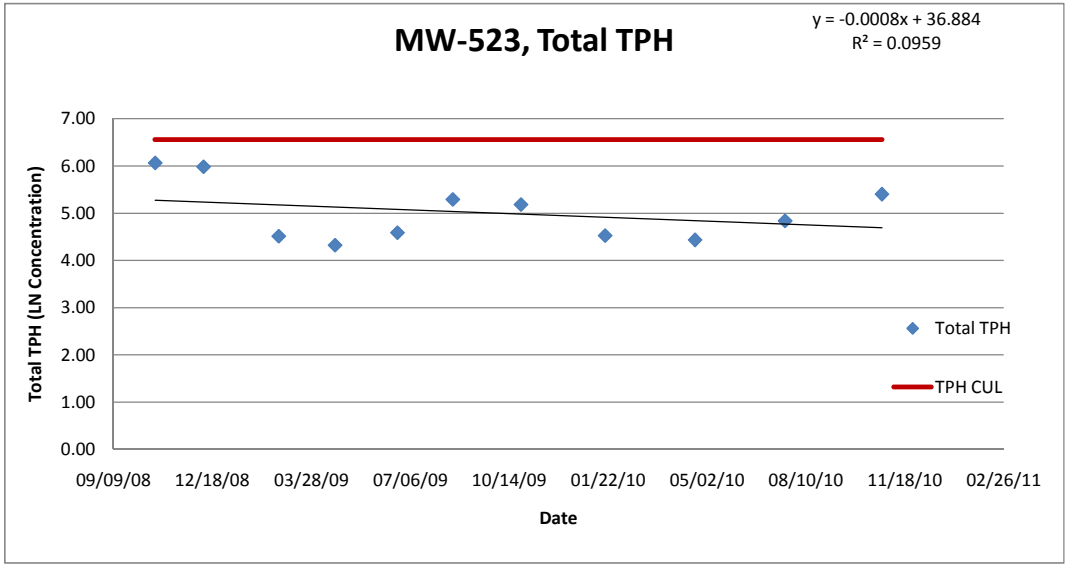
Sample Location **MW-523, West Side**

Constituent **Total TPH**

CUL **706 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/21/08	431	6.07
12/09/08	397	5.98
02/23/09	91	4.51
04/21/09	75	4.32
06/23/09	98	4.58
08/18/09	198	5.29
10/26/09	178	5.18
01/19/10	92	4.52
04/20/10	84	4.43
07/20/10	126	4.84
10/26/10	222	5.40



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	36.88427543
Slope	-7.95E-04
Date to CUL	7/12/2005

Results

Natural Attenuation Rates in Groundwater (K) =	7.95E-04	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	9.59E-02	3.54E-01
Chemical Half Life in Groundwater ($t_{1/2}$) =	8.71E+02	days

Abbreviations and Notes

ug/l = micrograms per liter

LN = Natural Logarithm

CUL = Cleanup Level

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.309706176
R Square	0.095917916
Adjusted R Square	-0.004535649
Standard Error	0.62095017
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.368169561	0.36816956	0.9548483	0.354021199
Residual	9	3.470212024	0.38557911		
Total	10	3.838381585			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	36.88427543	32.61833113	1.13078365	0.28737809	-36.90351581	110.6720667
X Variable 1	-0.000795364	0.000813952	-0.97716339	0.3540212	-0.002636651	0.001045923

Sample Information

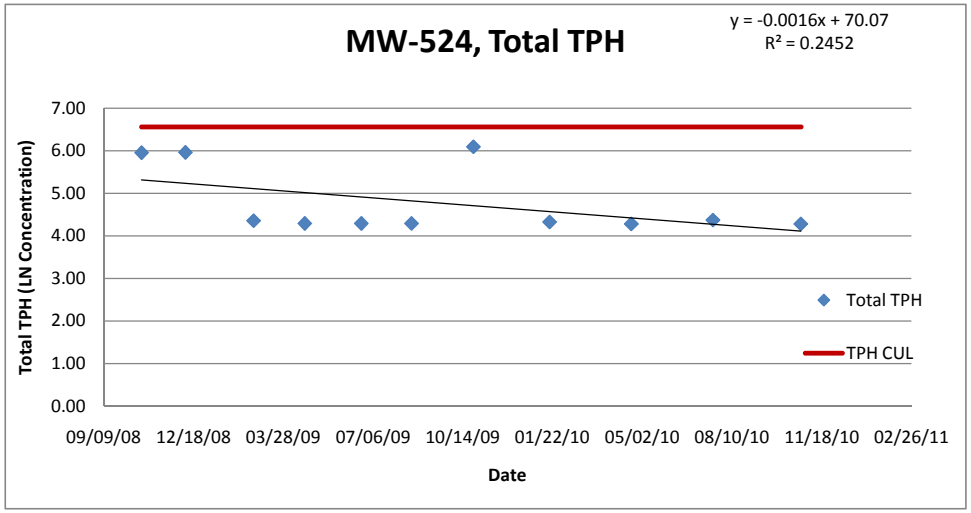
Sample Location **MW-524, West Side**

Constituent **Total TPH**

CUL **706 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/21/08	386	5.96
12/09/08	389	5.96
02/23/09	78	4.36
04/21/09	73	4.29
06/23/09	73	4.29
08/18/09	73	4.29
10/26/09	445	6.10
01/19/10	75.5	4.32
04/20/10	72	4.28
07/20/10	79	4.37
10/26/10	72	4.28



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	70.06988182
Slope	-1.63E-03
Date to CUL	4/8/2007

Results

Natural Attenuation Rates in Groundwater (K) =	1.63E-03	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	2.45E-01	1.21E-01
Chemical Half Life in Groundwater ($t_{1/2}$) =	4.25E+02	days

Abbreviations and Notes

ug/l = micrograms per liter

LN = Natural Logarithm

CUL = Cleanup Level

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.495207534
R Square	0.245230502
Adjusted R Square	0.161367224
Standard Error	0.726941791
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	1.545261301	1.5452613	2.92417025	0.12142906
Residual	9	4.755999313	0.52844437		
Total	10	6.301260614			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	70.06988182	38.18604004	1.83496068	0.0997069	-16.312942	156.4527056
X Variable 1	-0.001629457	0.000952888	-1.71002054	0.12142906	-0.003785039	0.000526124

Sample Information

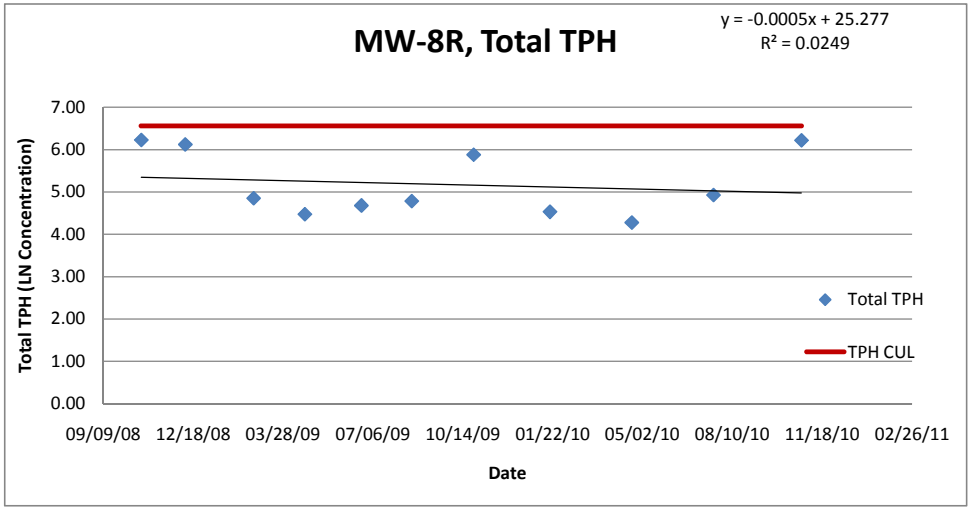
Sample Location **MW-8R, West Side**

Constituent **Total TPH**

CUL **706 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/21/08	509	6.23
12/09/08	458	6.13
02/23/09	128	4.85
04/21/09	88	4.48
06/23/09	108	4.68
08/18/09	120	4.79
10/26/09	358	5.88
01/19/10	93	4.53
04/20/10	72	4.28
07/20/10	138	4.93
10/26/10	504	6.22



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	25.27693134
Slope	-5.01E-04
Date to CUL	1/3/2004

Results

Natural Attenuation Rates in Groundwater (K) =	5.01E-04	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	2.49E-02	6.43E-01
Chemical Half Life in Groundwater ($t_{1/2}$) =	1.38E+03	days

Abbreviations and Notes

ug/l = micrograms per liter
LN = Natural Logarithm
CUL = Cleanup Level

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.157708441
R Square	0.024871952
Adjusted R Square	-0.083475608
Standard Error	0.798456589
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.146350213	0.14635021	0.22955711	0.643279243
Residual	9	5.737796325	0.63753293		
Total	10	5.884146538			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	25.27693134	41.94269149	0.60265401	0.56161459	-69.60402845	120.1578911
X Variable 1	-0.000501463	0.00104663	-0.47912118	0.64327924	-0.002869105	0.00186618

Sample Information

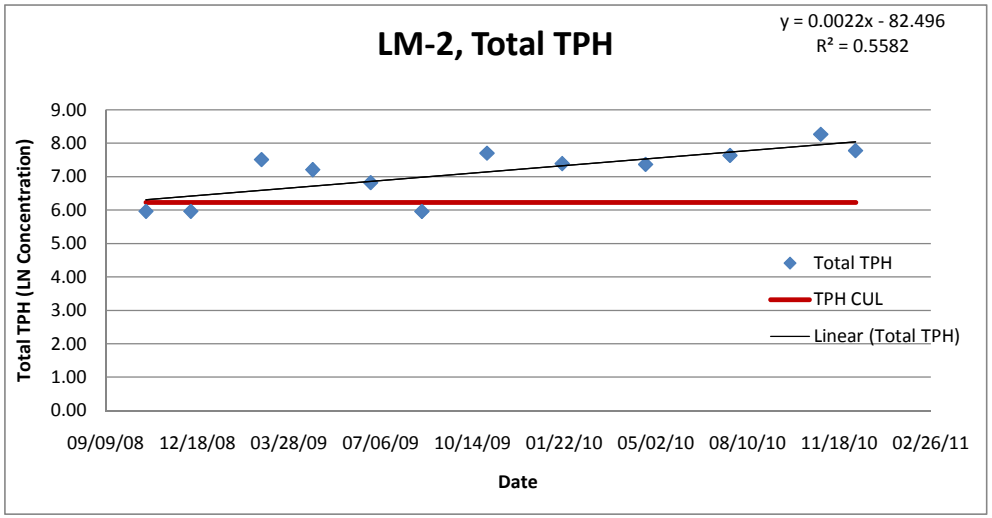
Sample Location **LM-2, East Side**

Constituent **Total TPH**

CUL **506 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/23/08	389	5.96
12/11/08	389	5.96
02/26/09	1,835	7.51
04/23/09	1,355	7.21
06/25/09	915	6.82
08/20/09	386	5.96
10/30/09	2,225	7.71
01/20/10	1625	7.39
04/21/10	1585	7.37
07/22/10	2075	7.64
10/29/10	3925	8.28
12/06/10	2405	7.79



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	-82.49567597
Slope	2.23E-03
Date to CUL	9/15/2008

Results

Natural Attenuation Rates in Groundwater (K) =	-2.23E-03	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	5.58E-01	5.23E-03
Chemical Half Life in Groundwater ($t_{1/2}$) =	NA	days

Abbreviations and Notes

ug/l = micrograms per liter
LN = Natural Logarithm
CUL = Cleanup Level

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.747141053
R Square	0.558219752
Adjusted R Square	0.514041728
Standard Error	0.548470109
Observations	12

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	3.801060947	3.80106095	12.6356883	0.005227419
Residual	10	3.008194602	0.30081946		
Total	11	6.809255549			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-82.49567597	25.21482175	-3.27171363	0.0084059	-138.6777997	-26.31355223
X Variable 1	0.002234436	0.000628592	3.55467134	0.00522742	0.000833847	0.003635025

CV 0.112608808

Sample Information

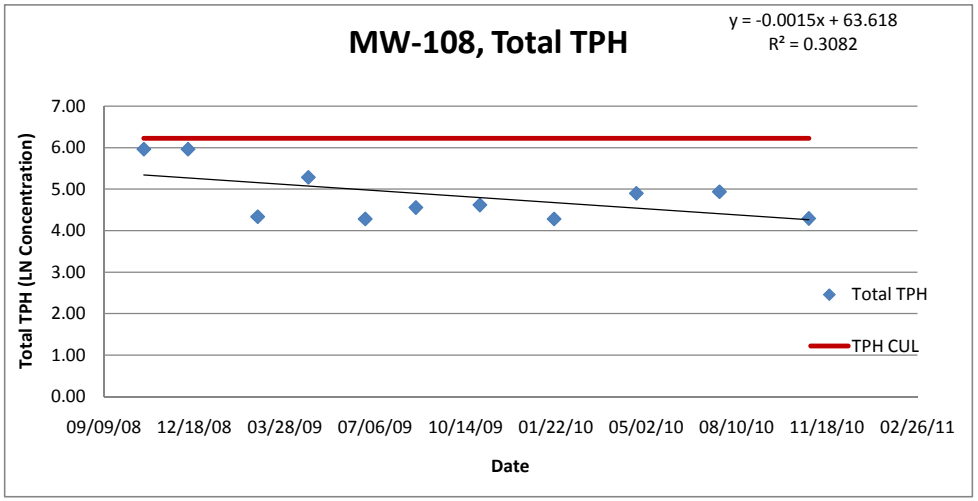
Sample Location **MW-108, East Side**

Constituent **Total TPH**

CUL **506 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/23/08	389	5.96
12/11/08	389	5.96
02/26/09	76	4.33
04/23/09	197	5.28
06/25/09	72	4.28
08/20/09	95	4.55
10/30/09	101	4.62
01/20/10	72	4.28
04/21/10	134	4.90
07/22/10	139	4.93
10/29/10	73	4.29



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	63.61822778
Slope	-1.47E-03
Date to CUL	2/26/2007

Results

Natural Attenuation Rates in Groundwater (K) =	1.47E-03	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	3.08E-01	7.63E-02
Chemical Half Life in Groundwater ($t_{1/2}$) =	4.73E+02	days

Abbreviations and Notes

ug/l = micrograms per liter

LN = Natural Logarithm

CUL = Cleanup Level

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.55511645
R Square	0.308154273
Adjusted R Square	0.231282525
Standard Error	0.558664876
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	1.251135004	1.251135	4.00868047	0.076285572
Residual	9	2.808957992	0.31210644		
Total	10	4.060092996			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	63.61822778	29.35112195	2.16748879	0.05835163	-2.778622838	130.0150784
X Variable 1	-0.001466354	0.000732383	-2.00216894	0.07628557	-0.003123119	0.000190411

Sample Information

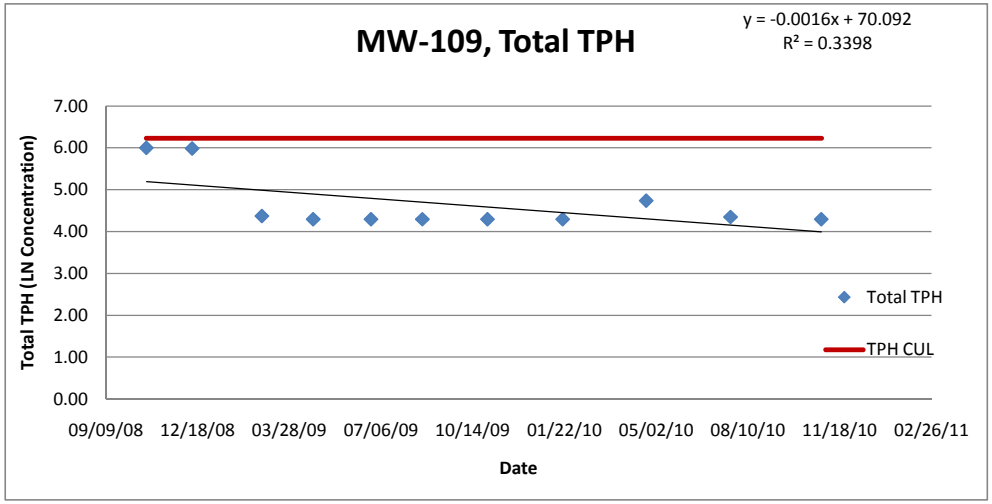
Sample Location **MW-109, East Side**

Constituent **Total TPH**

CUL **506 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/23/08	404	6.00
12/12/08	397	5.98
02/26/09	79	4.37
04/23/09	73	4.29
06/25/09	73	4.29
08/20/09	73	4.29
10/30/09	73	4.29
01/20/10	73	4.29
04/21/10	114	4.74
07/22/10	77	4.34
10/29/10	73	4.29



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	70.09150958
Slope	-1.63E-03
Date to CUL	1/29/2007

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.582937057
R Square	0.339815613
Adjusted R Square	0.266461792
Standard Error	0.578427013
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	1.54995012	1.54995012	4.63255505	0.059808766
Residual	9	3.011200286	0.33457781		
Total	10	4.561150406			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	70.09150958	30.40419662	2.30532352	0.04659173	1.312438556	138.8705806
X Variable 1	-0.001632887	0.000758658	-2.15233711	0.05980877	-0.003349091	8.33158E-05

Results

Natural Attenuation Rates in Groundwater (K) =	1.63E-03	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	3.40E-01	5.98E-02
Chemical Half Life in Groundwater ($t_{1/2}$) =	4.24E+02	days

Abbreviations and Notes

ug/l = micrograms per liter

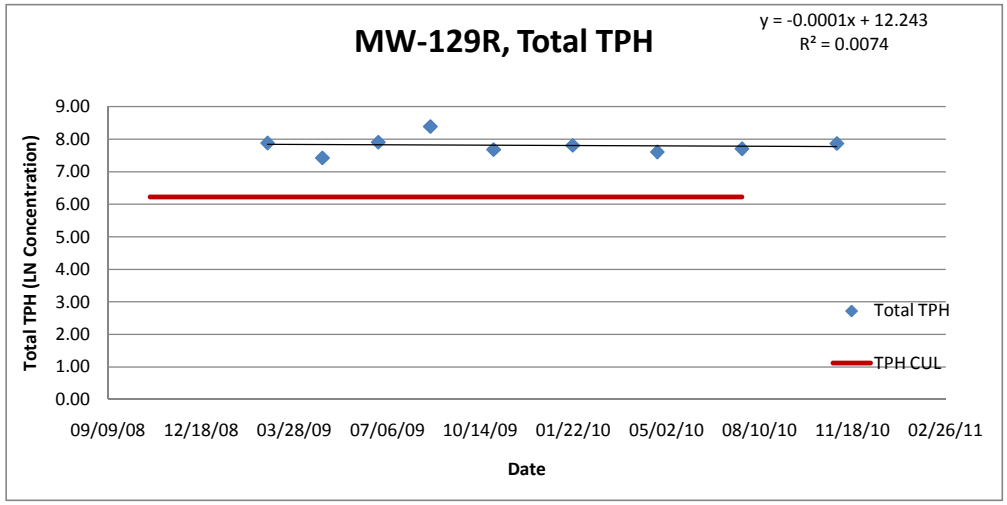
LN = Natural Logarithm

CUL = Cleanup Level

Sample Information
Sample Location **MW-129R, East Side**
Constituent **Total TPH**
CUL **506 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/24/08	443	6.09
12/12/08	393	5.97
02/27/09	2,655	7.88
04/27/09	1,675	7.42
06/26/09	2,725	7.91
08/21/09	4,425	8.40
10/28/09	2,165	7.68
01/21/10	2475.00	7.81
04/22/10	2015.00	7.61
07/22/10	2225.00	7.71
11/01/10	2625.00	7.87



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	38710.16562
Slope	1.82E+02
Date to CUL	################

Results

Natural Attenuation Rates in Groundwater (K) =	-1.82E+02	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	3.29E-01	6.49E-02
Chemical Half Life in Groundwater ($t_{1/2}$) =	NA	days

Abbreviations and Notes
ug/l = micrograms per liter
LN = Natural Logarithm
CUL = Cleanup Level

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.573911503
R Square	0.329374413
Adjusted R Square	0.254860459
Standard Error	208.2048956
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	191617.0383	191617.038	4.42030513	0.064859648
Residual	9	390143.5072	43349.2786		
Total	10	581760.5455			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	38710.16562	652.9660701	59.283579	5.5708E-13	37233.05375	40187.27749
X Variable 1	182.4985129	86.80269427	2.10245217	0.06485965	-13.86282328	378.8598491

Sample Information

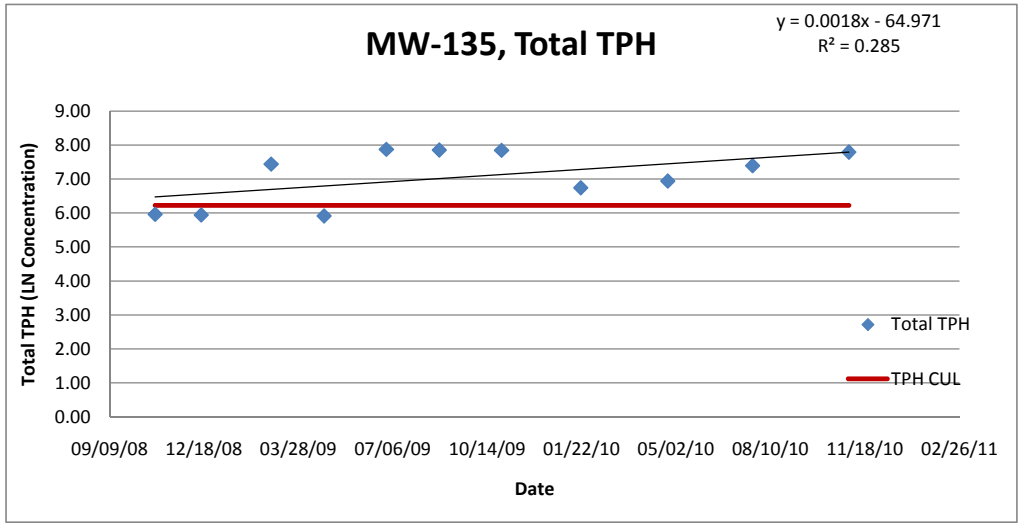
Sample Location **MW-135, East Side**

Constituent **Total TPH**

CUL **506 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/27/08	389	5.96
12/15/08	382	5.95
02/27/09	1,695	7.44
04/24/09	369	5.91
06/29/09	2,625	7.87
08/24/09	2,565	7.85
10/29/09	2,545	7.84
01/21/10	845	6.74
04/23/10	1035	6.94
07/22/10	1625	7.39
11/01/10	2415	7.79



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	-64.97113927
Slope	1.80E-03
Date to CUL	6/13/2008

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.533810713
R Square	0.284953878
Adjusted R Square	0.205504308
Standard Error	0.722020826
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	1.8697454	1.8697454	3.58660066	0.090778687
Residual	9	4.691826655	0.52131407		
Total	10	6.561572055			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-64.97113927	38.03636221	-1.70813231	0.12178849	-151.0153683	21.07308977
X Variable 1	0.001797344	0.000949051	1.89383227	0.09077869	-0.000349559	0.003944248

Results

Natural Attenuation Rates in Groundwater (K) =	-1.80E-03	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	2.85E-01	9.08E-02
Chemical Half Life in Groundwater ($t_{1/2}$) =	NA	days

Abbreviations and Notes

ug/l = micrograms per liter

LN = Natural Logarithm

CUL = Cleanup Level

Sample Information

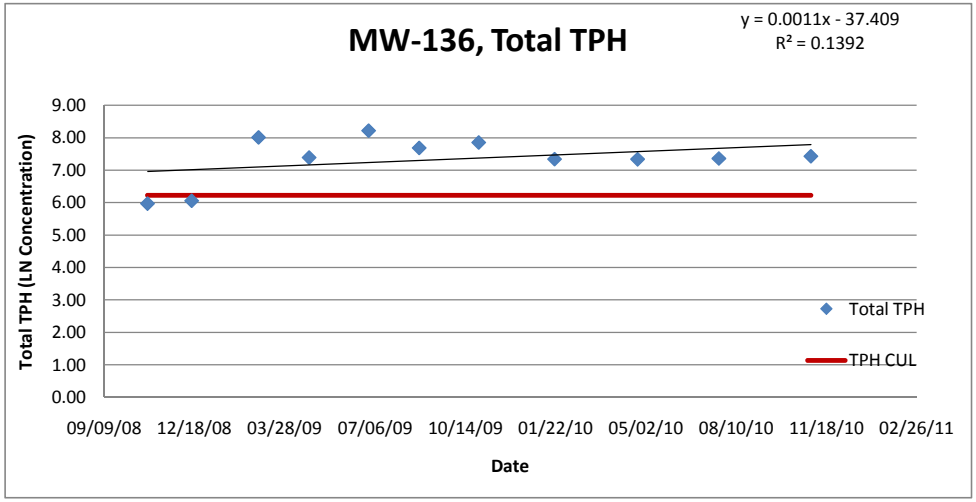
Sample Location **MW-136, East Side**

Constituent **Total TPH**

CUL **506 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/27/08	389	5.96
12/15/08	425	6.05
02/27/09	3,010	8.01
04/24/09	1,622	7.39
06/29/09	3,725	8.22
08/24/09	2,185	7.69
10/29/09	2,585	7.86
01/21/10	1545	7.34
04/23/10	1535	7.34
07/22/10	1575	7.36
11/01/10	1685	7.43



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	47.09032391
Slope	-9.83E-04
Date to CUL	10/22/2013

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.373115437
R Square	0.139215129
Adjusted R Square	0.043572366
Standard Error	0.703969405
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.72134311	0.72134311	1.4555741	0.258390787
Residual	9	4.460156309	0.49557292		
Total	10	5.181499419			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-37.4093027	37.08540573	-1.00873381	0.33945149	-121.3023187	46.48371334
X Variable 1	0.001116377	0.000925324	1.20647176	0.25839079	-0.000976851	0.003209606

Results

Natural Attenuation Rates in Groundwater (K) =	9.83E-04	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	1.39E-01	4.25E-02
Chemical Half Life in Groundwater ($t_{1/2}$) =	7.05E+02	days

Abbreviations and Notes

ug/l = micrograms per liter

LN = Natural Logarithm

CUL = Cleanup Level

Sample Information

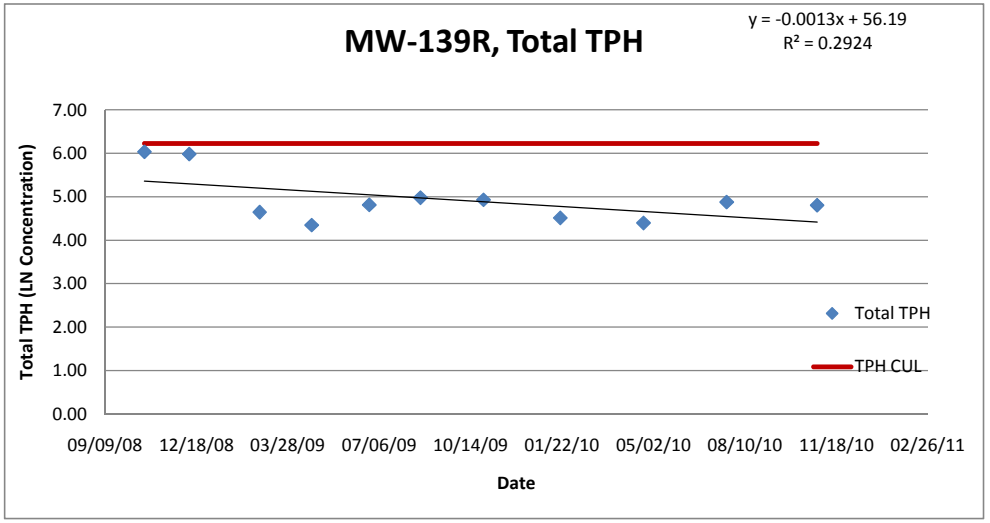
Sample Location **MW-139R, East Side**

Constituent **Total TPH**

CUL **506 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/22/08	418	6.04
12/10/08	397	5.98
02/25/09	104	4.64
04/23/09	77	4.34
06/25/09	123	4.81
08/20/09	145	4.98
10/28/09	138	4.93
01/20/10	91	4.51
04/21/10	81	4.39
07/21/10	131	4.88
10/28/10	122	4.80



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	56.18986186
Slope	-1.28E-03
Date to CUL	12/15/2006

Results

Natural Attenuation Rates in Groundwater (K) =	1.28E-03	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	2.92E-01	8.59E-02
Chemical Half Life in Groundwater ($t_{1/2}$) =	5.42E+02	days

Abbreviations and Notes

ug/l = micrograms per liter

LN = Natural Logarithm

CUL = Cleanup Level

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.540765391
R Square	0.292427208
Adjusted R Square	0.213808009
Standard Error	0.505867107
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.951835821	0.95183582	3.71953939	0.085863514
Residual	9	2.303113769	0.25590153		
Total	10	3.25494959			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	56.18986186	26.5753921	2.11435683	0.06361807	-3.927851614	116.3075753
X Variable 1	-0.001278923	0.000663132	-1.92861074	0.08586351	-0.002779032	0.000221185

Sample Information

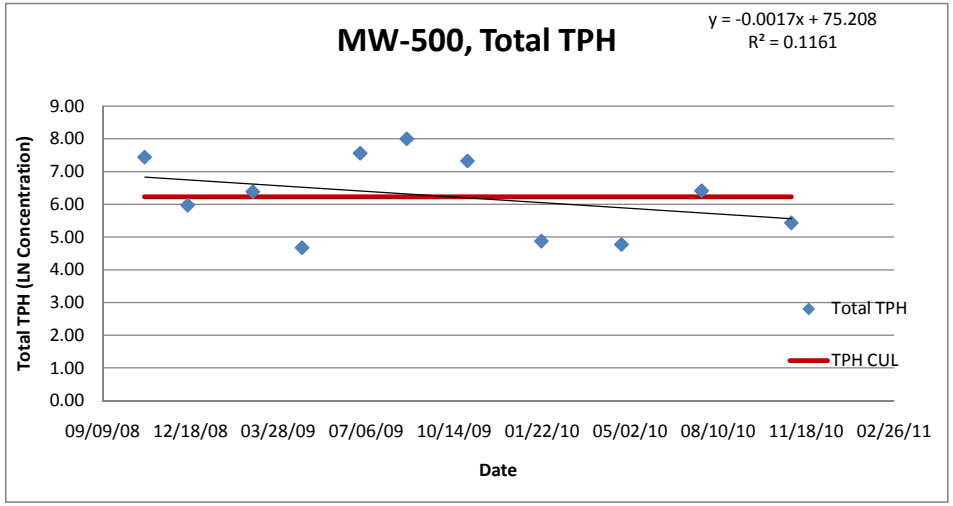
Sample Location **MW-500, East Side**

Constituent **Total TPH**

CUL **506 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/27/08	1,710	7.44
12/15/08	393	5.97
02/27/09	595	6.39
04/24/09	107	4.67
06/29/09	1,925	7.56
08/21/09	3,000	8.01
10/29/09	1,525	7.33
01/21/10	131	4.88
04/22/10	118	4.77
07/22/10	611	6.42
11/01/10	229	5.43



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	75.20829223
Slope	-1.72E-03
Date to CUL	10/11/2009

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.340671472
R Square	0.116057052
Adjusted R Square	0.017841168
Standard Error	1.203761781
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	1.712264718	1.71226472	1.18165258	0.305273752
Residual	9	13.04138183	1.44904243		
Total	10	14.75364655			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	75.20829223	63.42760405	1.1857344	0.26608762	-68.27491629	218.6915007
X Variable 1	-0.001720354	0.001582607	-1.08703844	0.30527375	-0.00530046	0.001859751

Results

Natural Attenuation Rates in Groundwater (K) =	1.72E-03	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	1.16E-01	3.05E-01
Chemical Half Life in Groundwater ($t_{1/2}$) =	4.03E+02	days

Abbreviations and Notes

ug/l = micrograms per liter

LN = Natural Logarithm

CUL = Cleanup Level

Sample Information

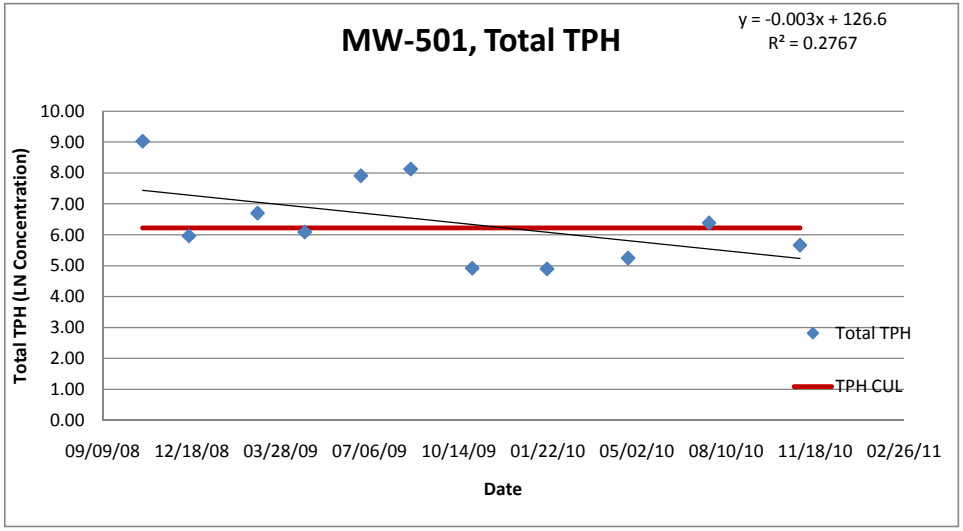
Sample Location **MW-501, East Side**

Constituent **Total TPH**

CUL **506 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/24/08	8,330	9.03
12/15/08	389	5.96
03/02/09	815	6.70
04/24/09	442	6.09
06/26/09	2,725	7.91
08/21/09	3,385	8.13
10/29/09	137	4.92
01/21/10	134	4.90
04/22/10	190	5.25
07/22/10	592	6.38
11/01/10	289	5.67



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	126.5998527
Slope	-3.00E-03
Date to CUL	12/4/2009

Results

Natural Attenuation Rates in Groundwater (K) =	3.00E-03	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	2.77E-01	9.65E-02
Chemical Half Life in Groundwater ($t_{1/2}$) =	2.31E+02	days

Abbreviations and Notes

ug/l = micrograms per liter

LN = Natural Logarithm

CUL = Cleanup Level

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.526020588
R Square	0.276697659
Adjusted R Square	0.196330732
Standard Error	1.230301583
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	5.211362567	5.21136257	3.44292945	0.096500427
Residual	9	13.62277787	1.51364199		
Total	10	18.83414044			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	126.5998527	64.7545536	1.95507259	0.08229344	-19.88512423	273.0848297
X Variable 1	-0.002998003	0.001615727	-1.85551326	0.09650043	-0.006653031	0.000657026

Sample Information

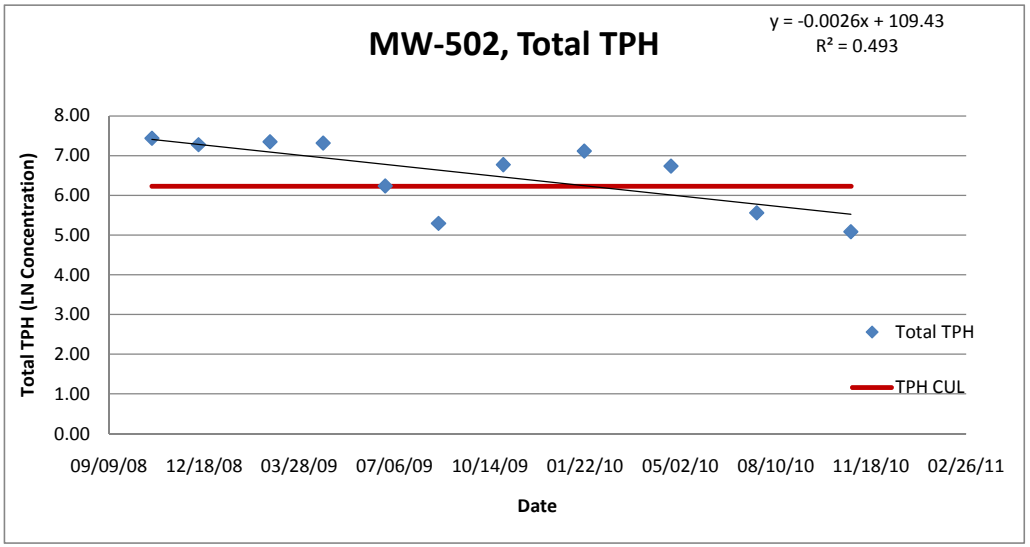
Sample Location **MW-502, East Side**

Constituent **Total TPH**

CUL **506 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/24/08	1,700	7.44
12/12/08	1,440	7.27
02/25/09	1,552	7.35
04/22/09	1,503	7.32
06/26/09	512	6.24
08/21/09	199	5.29
10/28/09	873	6.77
01/21/10	1230	7.11
04/22/10	844	6.74
07/21/10	259	5.56
10/28/10	161	5.08



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	109.4328218
Slope	-2.57E-03
Date to CUL	1/27/2010

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.702174312
R Square	0.493048764
Adjusted R Square	0.436720849
Standard Error	0.660894902
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	3.823235073	3.82323507	8.75318681	0.015996412
Residual	9	3.931038647	0.43678207		
Total	10	7.75427372			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	109.4328218	34.77135442	3.14721194	0.01179034	30.77455347	188.0910901
X Variable 1	-0.002566954	0.000867631	-2.95857851	0.01599641	-0.004529672	-0.000604237

Results

Natural Attenuation Rates in Groundwater (K) =	2.57E-03	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	4.93E-01	1.60E-02
Chemical Half Life in Groundwater ($t_{1/2}$) =	2.70E+02	days

Abbreviations and Notes

ug/l = micrograms per liter

LN = Natural Logarithm

CUL = Cleanup Level

Sample Information

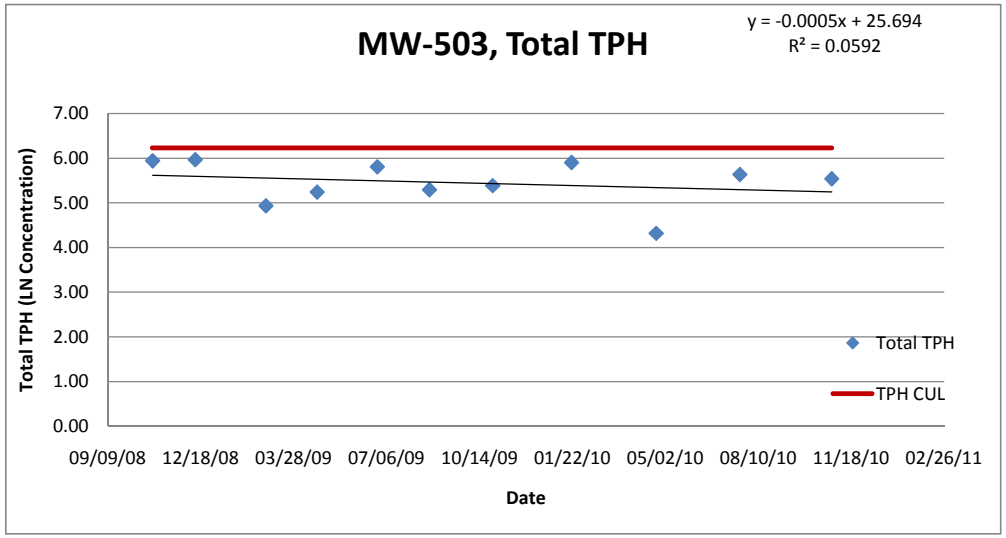
Sample Location **MW-503, East Side**

Constituent **Total TPH**

CUL **506 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/27/08	379	5.94
12/12/08	389	5.96
02/26/09	139	4.93
04/22/09	189	5.24
06/26/09	331	5.80
08/21/09	199	5.29
10/28/09	218	5.38
01/21/10	365	5.90
04/22/10	75	4.32
07/21/10	279	5.63
10/28/10	254	5.54



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	25.6944602
Slope	-5.05E-04
Date to CUL	7/4/2005

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.243408903
R Square	0.059247894
Adjusted R Square	-0.045280118
Standard Error	0.510056023
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.147460597	0.1474606	0.56681356	0.470761279
Residual	9	2.341414318	0.26015715		
Total	10	2.488874915			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	25.6944602	26.89097056	0.95550513	0.36428151	-35.13714135	86.52606175
X Variable 1	-0.000505168	0.00067099	-0.75287021	0.47076128	-0.002023053	0.001012716

Results

Natural Attenuation Rates in Groundwater (K) =	5.05E-04	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	5.92E-02	4.71E-01
Chemical Half Life in Groundwater ($t_{1/2}$) =	1.37E+03	days

Abbreviations and Notes

ug/l = micrograms per liter

LN = Natural Logarithm

CUL = Cleanup Level

Sample Information

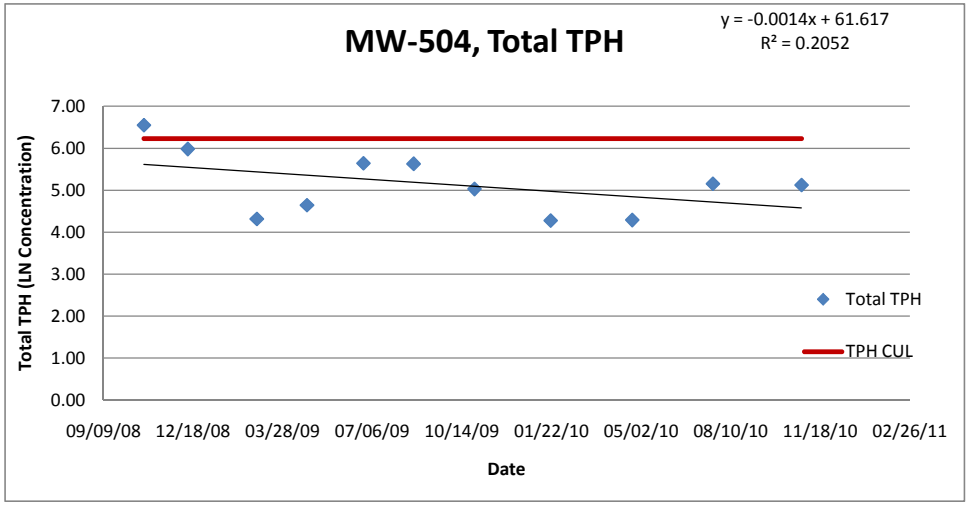
Sample Location **MW-504, East Side**

Constituent **Total TPH**

CUL **506 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/24/08	701	6.55
12/12/08	397	5.98
02/27/09	75	4.32
04/24/09	104	4.64
06/26/09	282	5.64
08/21/09	279	5.63
10/28/09	153	5.03
01/21/10	72	4.28
04/22/10	73	4.29
07/21/10	173	5.15
10/28/10	168	5.12



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	61.61707625
Slope	-1.41E-03
Date to CUL	8/17/2007

Results

Natural Attenuation Rates in Groundwater (K) =	1.41E-03	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	2.05E-01	1.62E-01
Chemical Half Life in Groundwater ($t_{1/2}$) =	4.92E+02	days

Abbreviations and Notes

ug/l = micrograms per liter

LN = Natural Logarithm

CUL = Cleanup Level

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.45293635
R Square	0.205151337
Adjusted R Square	0.116834819
Standard Error	0.703336132
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	1.149101179	1.14910118	2.32291016	0.161817322
Residual	9	4.452135432	0.49468171		
Total	10	5.601236612			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	61.61707625	37.05005212	1.66307664	0.13065864	-22.19596437	145.4301169
X Variable 1	-0.001409011	0.000924482	-1.52410963	0.16181732	-0.003500334	0.000682311

Sample Information

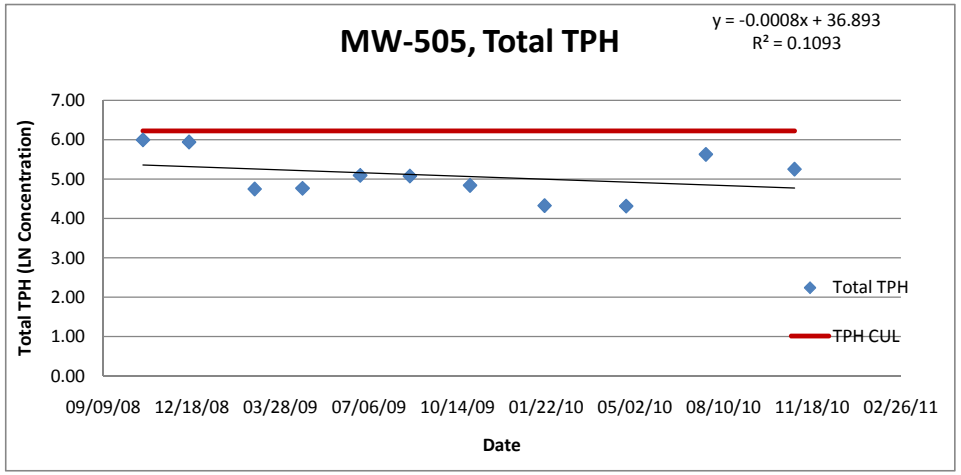
Sample Location **MW-505, East Side**

Constituent **Total TPH**

CUL **506 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/24/08	404	6.00
12/15/08	382	5.95
02/27/09	116	4.75
04/22/09	118	4.77
06/26/09	164	5.10
08/21/09	161	5.08
10/28/09	127	4.84
01/20/10	76	4.33
04/22/10	75	4.32
07/21/10	279	5.63
10/29/10	192	5.26



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	36.89273287
Slope	-7.93E-04
Date to CUL	10/23/2005

Results

Natural Attenuation Rates in Groundwater (K) =	7.93E-04	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	1.09E-01	3.21E-01
Chemical Half Life in Groundwater ($t_{1/2}$) =	8.73E+02	days

Abbreviations and Notes

ug/l = micrograms per liter

LN = Natural Logarithm

CUL = Cleanup Level

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.33054407
R Square	0.109259382
Adjusted R Square	0.010288202
Standard Error	0.574275332
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.364074545	0.36407454	1.10395149	0.320793224
Residual	9	2.968129412	0.32979216		
Total	10	3.332203956			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	36.89273287	30.2651305	1.21898476	0.25383466	-31.57174873	105.3572145
X Variable 1	-0.000793462	0.000755181	-1.05069096	0.32079322	-0.0025018	0.000914876

Sample Information

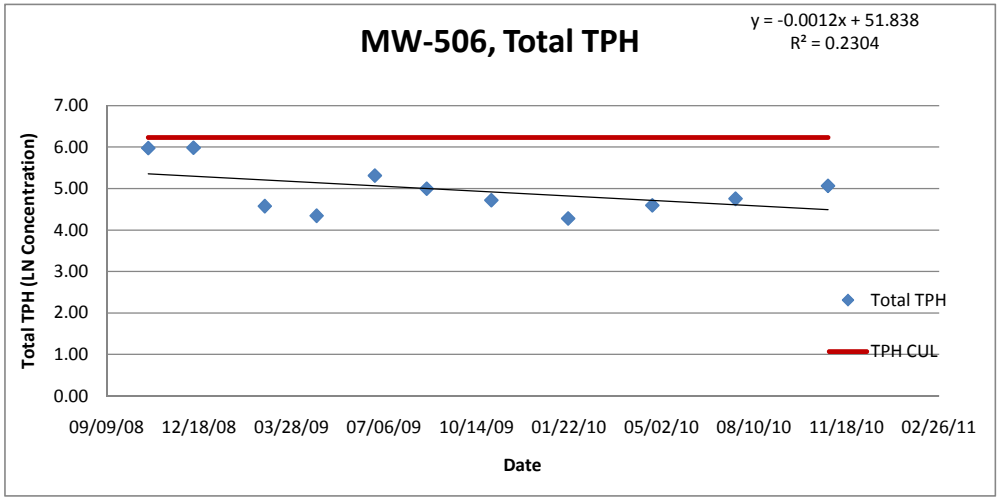
Sample Location **MW-506, East Side**

Constituent **Total TPH**

CUL **506 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/24/08	393	5.97
12/12/08	397	5.98
02/27/09	97	4.57
04/24/09	77	4.34
06/26/09	203	5.31
08/21/09	148	5.00
10/30/09	112	4.72
01/21/10	72	4.28
04/22/10	99	4.60
07/21/10	116	4.75
10/29/10	158	5.06



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	51.83784303
Slope	-1.17E-03
Date to CUL	10/5/2006

Results

Natural Attenuation Rates in Groundwater (K) =	1.17E-03	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	2.30E-01	1.35E-01
Chemical Half Life in Groundwater ($t_{1/2}$) =	5.92E+02	days

Abbreviations and Notes

ug/l = micrograms per liter

LN = Natural Logarithm

CUL = Cleanup Level

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.48003735
R Square	0.230435858
Adjusted R Square	0.144928731
Standard Error	0.542506536
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.793154322	0.79315432	2.69493159	0.13508508
Residual	9	2.648820076	0.29431334		
Total	10	3.441974397			

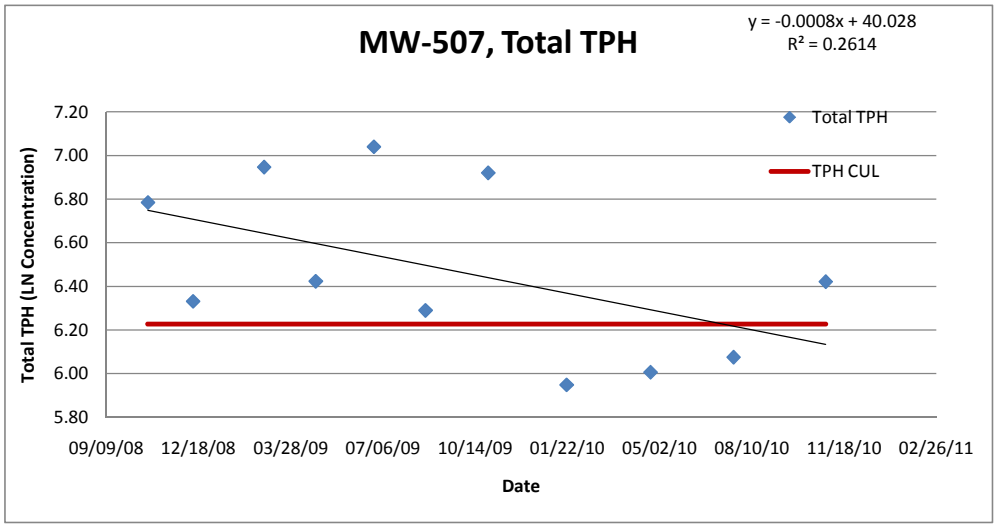
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	51.83784303	28.55439434	1.81540685	0.10284968	-12.75668451	116.4323706
X Variable 1	-0.001169643	0.000712491	-1.64162468	0.13508508	-0.00278141	0.000442124

Sample Information

Sample Location	**MW-507, East Side**
Constituent	**Total TPH**
CUL	**506 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/24/08	884	6.78
12/12/08	562	6.33
02/27/09	1,040	6.95
04/24/09	616	6.42
06/26/09	1,142	7.04
08/21/09	539	6.29
10/28/09	1,013	6.92
01/21/10	383	5.95
04/22/10	406	6.01
07/21/10	435	6.08
10/29/10	615	6.42



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	40.02804032
Slope	-8.37E-04
Date to CUL	7/9/2010

Results

Natural Attenuation Rates in Groundwater (K) =	8.37E-04	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	2.61E-01	1.08E-01
Chemical Half Life in Groundwater ($t_{1/2}$) =	8.28E+02	days

Abbreviations and Notes

ug/l = micrograms per liter
LN = Natural Logarithm
CUL = Cleanup Level

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.511308318
R Square	0.261436196
Adjusted R Square	0.179373551
Standard Error	0.357147476
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.40636414	0.40636414	3.18581245	0.107940198
Residual	9	1.147988878	0.12755432		
Total	10	1.554353018			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	40.02804032	18.80060789	2.12908224	0.06211407	-2.501889396	82.55797004
X Variable 1	-0.000837318	0.000469116	-1.78488444	0.1079402	-0.001898533	0.000223896

Sample Information

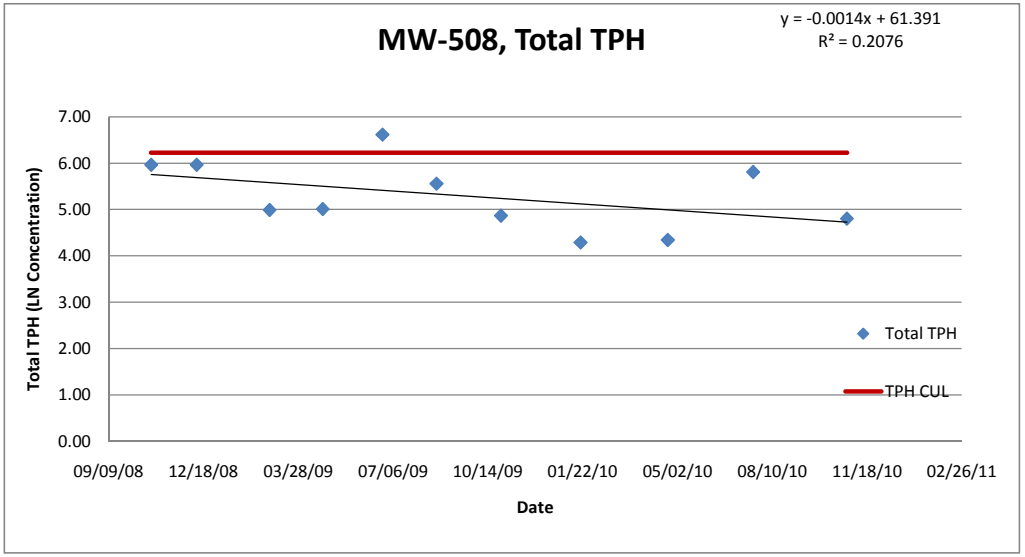
Sample Location **MW-508, East Side**

Constituent **Total TPH**

CUL **506 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/24/08	389	5.96
12/11/08	389	5.96
02/26/09	147	4.99
04/23/09	150	5.01
06/25/09	745	6.61
08/21/09	259	5.56
10/28/09	130	4.87
01/20/10	73	4.29
04/22/10	77	4.34
07/21/10	333	5.81
10/28/10	122	4.80



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	61.39115277
Slope	-1.40E-03
Date to CUL	11/21/2007

Results

Natural Attenuation Rates in Groundwater (K) =	1.40E-03	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	2.08E-01	1.59E-01
Chemical Half Life in Groundwater ($t_{1/2}$) =	4.95E+02	days

Abbreviations and Notes

ug/l = micrograms per liter
LN = Natural Logarithm
CUL = Cleanup Level

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.455608906
R Square	0.207579475
Adjusted R Square	0.11953275
Standard Error	0.694314493
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	1.136537223	1.13653722	2.35760586	0.159046398
Residual	9	4.338653532	0.48207261		
Total	10	5.475190755			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*ower 95.0%*	*pper 95.0%*
Intercept	61.39115277	36.53655093	1.68026678	0.12720716	-21.26026745	144.042573	-21.2603	144.0426
X Variable 1	-0.001399837	0.000911679	-1.53544973	0.1590464	-0.003462199	0.000662524	-0.00346	0.000663

Sample Information

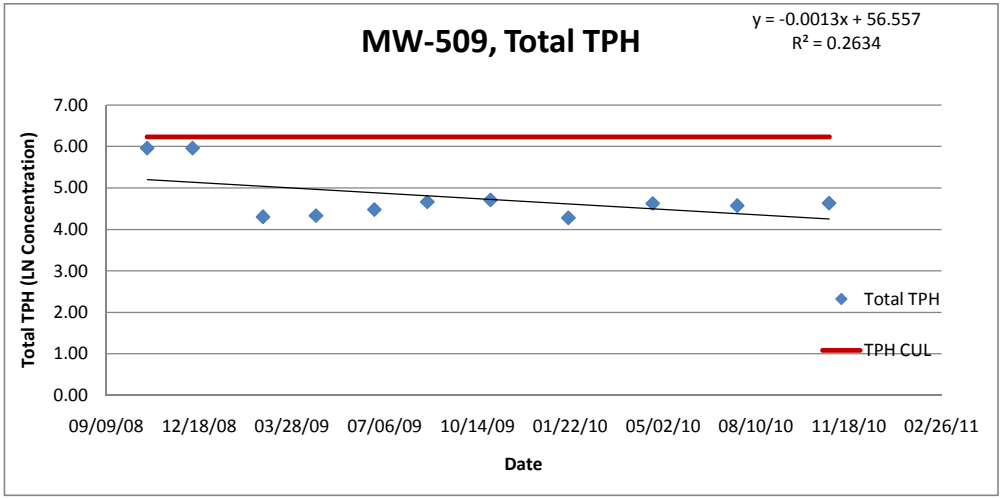
Sample Location **MW-509, East Side**

Constituent **Total TPH**

CUL **506 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/23/08	389	5.96
12/11/08	389	5.96
02/25/09	74	4.30
04/23/09	76	4.33
06/25/09	88	4.48
08/21/09	106	4.66
10/28/09	111	4.71
01/20/10	72	4.28
04/21/10	102	4.62
07/21/10	97	4.57
10/28/10	103	4.63



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	56.55708454
Slope	-1.29E-03
Date to CUL	8/22/2006

Results

Natural Attenuation Rates in Groundwater (K) =	1.29E-03	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	2.63E-01	1.06E-01
Chemical Half Life in Groundwater ($t_{1/2}$) =	5.36E+02	days

Abbreviations and Notes

ug/l = micrograms per liter

LN = Natural Logarithm

CUL = Cleanup Level

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.513219999
R Square	0.263394768
Adjusted R Square	0.181549742
Standard Error	0.548849722
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.969441821	0.96944182	3.21821351	0.106406355
Residual	9	2.711124158	0.30123602		
Total	10	3.680565979			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	56.55708454	28.86559433	1.95932514	0.08173301	-8.741426286	121.8555954
X Variable 1	-0.001292127	0.000720274	-1.79393799	0.10640635	-0.002921501	0.000337246

Sample Information

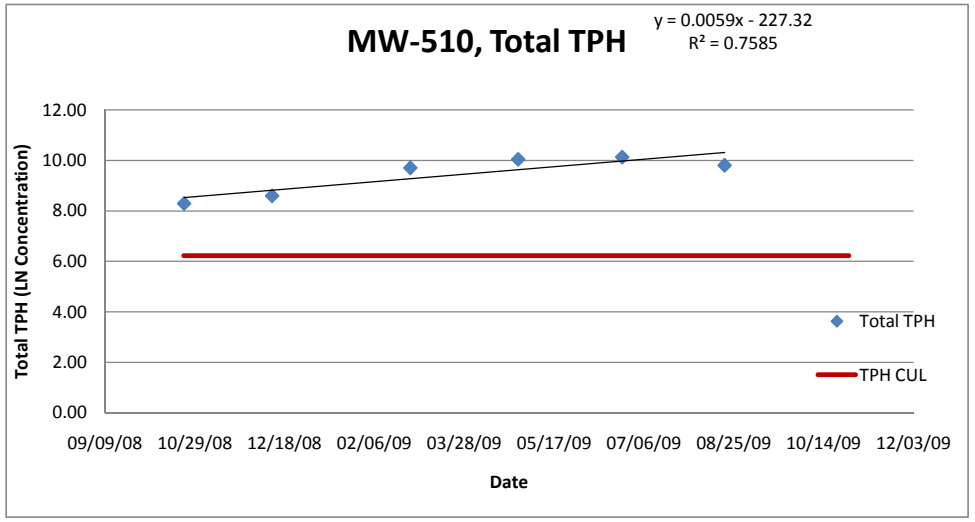
Sample Location **MW-510, East Side**

Constituent **Total TPH**

CUL **506 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/23/08	3,980	8.29
12/11/08	5,410	8.60
02/26/09	16,380	9.70
04/27/09	22,930	10.04
06/24/09	25,090	10.13
08/20/09	18,080	9.80
10/28/09	LNAPL	
01/19/10		
04/20/10		
07/19/10		
10/25/10		



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	-227.3191106
Slope	5.93E-03
Date to CUL	9/30/2007

Results

Natural Attenuation Rates in Groundwater (K) =	-5.93E-03	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	7.58E-01	2.39E-02
Chemical Half Life in Groundwater ($t_{1/2}$) =	NA	days

Abbreviations and Notes

ug/l = micrograms per liter

LN = Natural Logarithm

CUL = Cleanup Level

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.870910924
R Square	0.758485837
Adjusted R Square	0.698107296
Standard Error	0.430798339
Observations	6

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	2.331379119	2.33137912	12.5621757	0.023920415
Residual	4	0.742348834	0.18558721		
Total	5	3.073727953			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-227.3191106	66.79621895	-3.40317333	0.02719772	-412.7751457	-41.86307544
X Variable 1	0.005934229	0.001674295	3.54431597	0.02392041	0.001285642	0.010582817

Sample Information

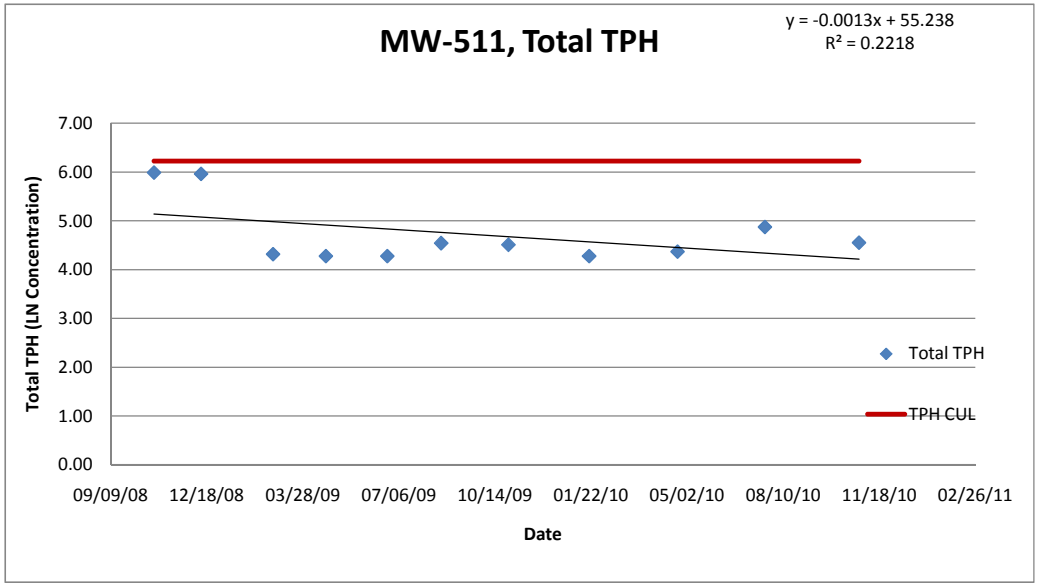
Sample Location **MW-511, East Side**

Constituent **Total TPH**

CUL **506 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/24/08	400	5.99
12/12/08	389	5.96
02/25/09	75	4.32
04/21/09	72	4.28
06/24/09	72	4.28
08/19/09	94	4.54
10/28/09	91	4.51
01/20/10	72	4.28
04/22/10	79	4.37
07/22/10	131	4.88
10/28/10	95	4.55



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	55.23814726
Slope	-1.26E-03
Date to CUL	6/14/2006

Results

Natural Attenuation Rates in Groundwater (K) =	1.26E-03	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	2.22E-01	1.44E-01
Chemical Half Life in Groundwater ($t_{1/2}$) =	5.50E+02	days

Abbreviations and Notes

ug/l = micrograms per liter

LN = Natural Logarithm

CUL = Cleanup Level

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.470978519
R Square	0.221820765
Adjusted R Square	0.135356406
Standard Error	0.600044583
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.923702478	0.92370248	2.56545895	0.143684755
Residual	9	3.24048151	0.3600535		
Total	10	4.164183989			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	55.23814726	31.53875236	1.7514373	0.11378607	-16.10746715	126.5837617
X Variable 1	-0.001260507	0.000786978	-1.60170501	0.14368475	-0.003040776	0.000519762

Sample Information

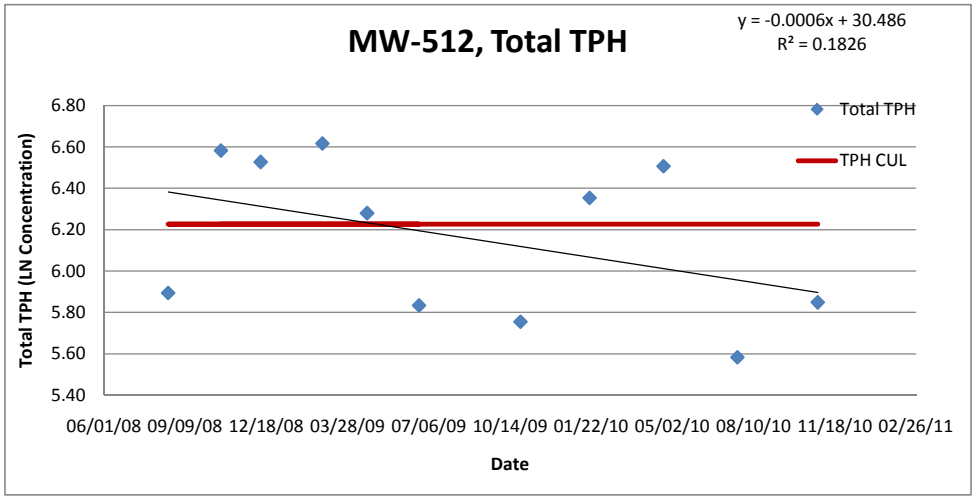
Sample Location **MW-512, East Side**

Constituent **Total TPH**

CUL **506 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/23/08	723	6.58
12/11/08	684	6.53
02/25/09	748	6.62
04/21/09	534	6.28
06/24/09	342	5.83
08/19/08	363	5.89
10/27/09	316	5.76
01/20/10	575	6.35
04/21/10	670	6.51
07/21/10	266	5.58
10/28/10	347	5.85



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	30.48630975
Slope	-6.07E-04
Date to CUL	5/3/2009

Results

Natural Attenuation Rates in Groundwater (K) =	6.07E-04	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	1.83E-01	1.90E-01
Chemical Half Life in Groundwater ($t_{1/2}$) =	1.14E+03	days

Abbreviations and Notes

ug/l = micrograms per liter

LN = Natural Logarithm

CUL = Cleanup Level

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.427278067
R Square	0.182566547
Adjusted R Square	0.091740608
Standard Error	0.364808527
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.267510766	0.26751077	2.01007056	0.189937585
Residual	9	1.197767353	0.13308526		
Total	10	1.465278119			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	30.48630975	17.15667409	1.77693588	0.10930371	-8.32478335	69.29740284
X Variable 1	-0.000607463	0.000428464	-1.41776957	0.18993759	-0.001576716	0.00036179

Sample Information

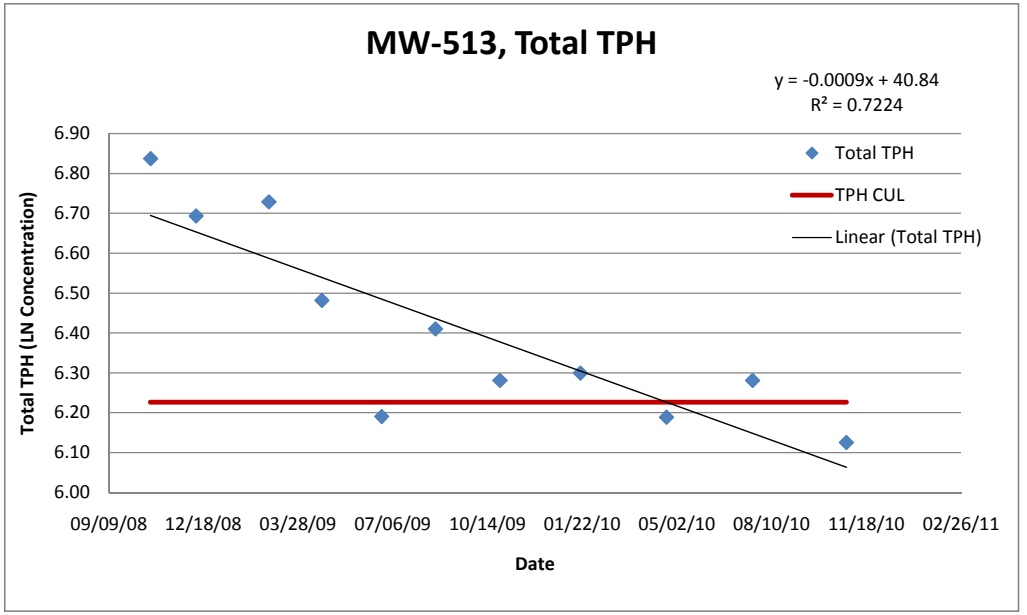
Sample Location **MW-513, East Side**

Constituent **Total TPH**

CUL **506 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/23/08	932	6.84
12/10/08	807	6.69
02/25/09	836	6.73
04/22/09	653	6.48
06/24/09	488	6.19
08/20/09	608	6.41
10/27/09	534	6.28
01/20/10	544	6.30
04/21/10	487	6.19
07/21/10	534	6.28
10/28/10	457	6.12



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	40.83984478
Slope	-8.59E-04
Date to CUL	4/20/2010

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.849955208
R Square	0.722423856
Adjusted R Square	0.691582062
Standard Error	0.135384764
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.429330787	0.42933079	23.4235357	0.000921297
Residual	9	0.164961308	0.01832903		
Total	10	0.594292094			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	40.83984478	7.113958959	5.7408041	0.00027952	24.74695159	56.93273796
X Variable 1	-0.000859132	0.000177514	-4.83978674	0.0009213	-0.001260697	-0.000457566

Results

Natural Attenuation Rates in Groundwater (K) =	8.59E-04	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	7.22E-01	9.21E-04
Chemical Half Life in Groundwater ($t_{1/2}$) =	8.07E+02	days

Abbreviations and Notes

ug/l = micrograms per liter

LN = Natural Logarithm

CUL = Cleanup Level

Sample Information

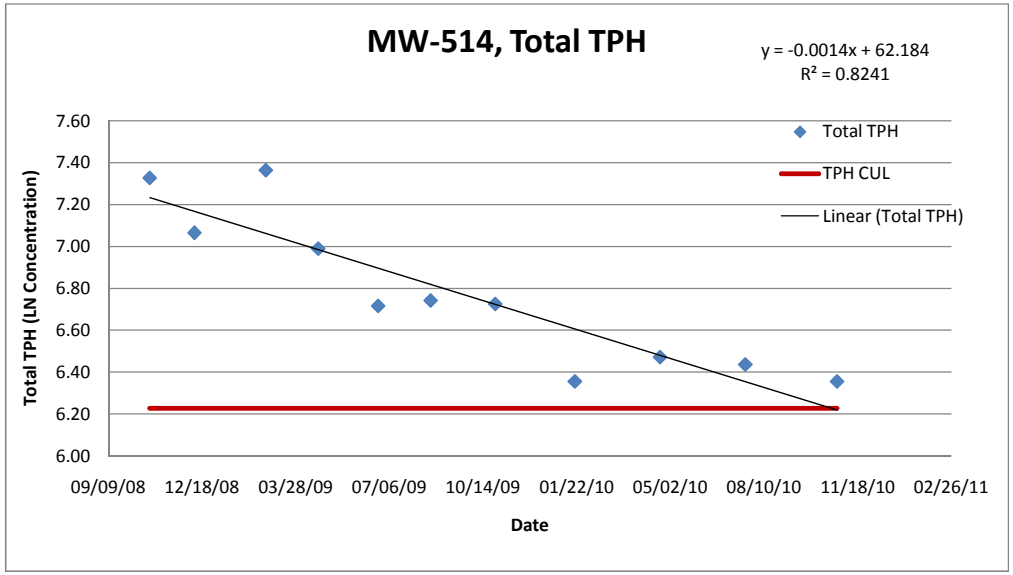
Sample Location **MW-514, East Side**

Constituent **Total TPH**

CUL **506 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/23/08	1,520	7.33
12/10/08	1,170	7.06
02/24/09	1,578	7.36
04/21/09	1,085	6.99
06/24/09	825	6.72
08/19/09	847	6.74
10/27/09	833	6.73
01/20/10	575	6.35
04/21/10	646	6.47
07/21/10	624	6.44
10/27/10	575	6.35



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	62.18443477
Slope	-1.38E-03
Date to CUL	10/21/2010

Results

Natural Attenuation Rates in Groundwater (K) =	1.38E-03	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	8.24E-01	1.12E-04
Chemical Half Life in Groundwater ($t_{1/2}$) =	5.01E+02	days

Abbreviations and Notes

ug/l = micrograms per liter

LN = Natural Logarithm

CUL = Cleanup Level

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.907804575
R Square	0.824109147
Adjusted R Square	0.804565719
Standard Error	0.162381158
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	1.111873185	1.11187318	42.1680957	0.000112271
Residual	9	0.237308764	0.02636764		
Total	10	1.349181948			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	62.18443477	8.532701664	7.28777792	4.6248E-05	42.88212262	81.48674692
X Variable 1	-0.001382626	0.000212918	-6.49369661	0.00011227	-0.001864281	-0.000900972

Sample Information

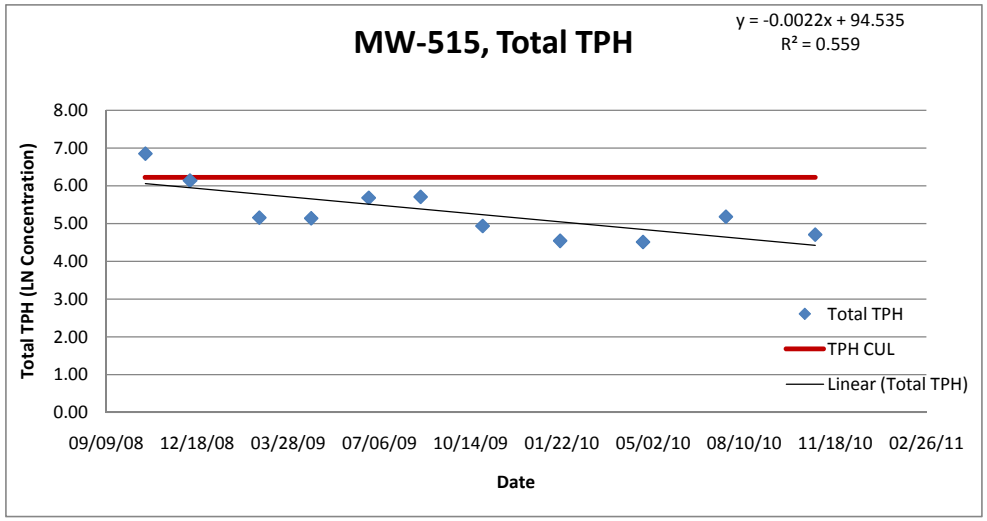
Sample Location **MW-515, East Side**

Constituent **Total TPH**

CUL **506 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/22/08	947	6.85
12/10/08	464	6.14
02/24/09	174	5.16
04/22/09	171	5.14
06/24/09	293	5.68
08/20/09	301	5.71
10/27/09	139	4.93
01/20/10	94	4.54
04/21/10	91	4.51
07/21/10	178	5.18
10/27/10	111	4.71



Date CUL Reached

CUL (ug/L)	506
LN CUL	6.2
Intercept	94.535042
Slope	-2.23E-03
Date to CUL	8/8/2008

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.747680877
R Square	0.559026693
Adjusted R Square	0.510029659
Standard Error	0.502755154
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	2.883870911	2.88387091	11.4093986	0.00815565
Residual	9	2.274864701	0.25276274		
Total	10	5.158735612			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	94.535042	26.41165765	3.57929227	0.00593732	34.78772158	154.2823624
X Variable 1	-0.002226139	0.000659054	-3.37778013	0.00815565	-0.003717022	-0.000735256

Results

Natural Attenuation Rates in Groundwater (K) =	2.23E-03	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	5.59E-01	8.16E-03
Chemical Half Life in Groundwater ($t_{1/2}$) =	3.11E+02	days

Abbreviations and Notes

ug/l = micrograms per liter

LN = Natural Logarithm

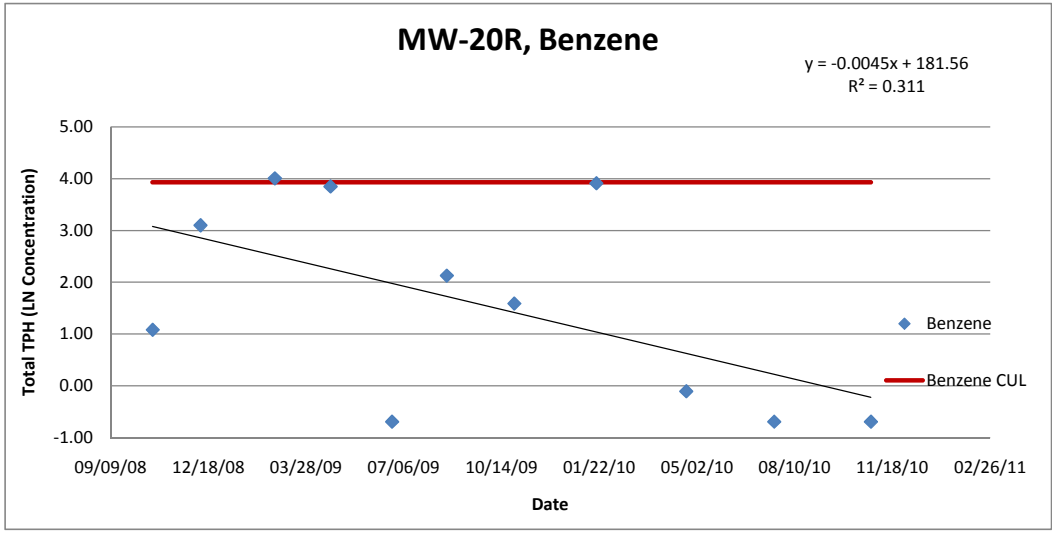
CUL = Cleanup Level

Sample Information

Sample Location	**MW-20R, West Side**
Constituent	**Benzene**
CUL	**51 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/22/08	2.95	1.08
12/10/08	22.2	3.10
02/24/09	55	4.01
04/22/09	47	3.85
06/24/09	1	-0.69
08/19/09	8.4	2.13
10/27/09	4.9	1.59
01/19/10	50	3.91
04/21/10	0.9	-0.11
07/20/10	0.5	-0.69
10/27/10	0.5	-0.69



Date CUL Reached

CUL (ug/L)	51
LN CUL	3.9
Intercept	181.560203
Slope	-4.49E-03
Date to CUL	4/14/2008

Results

Natural Attenuation Rates in Groundwater (K) =	4.49E-03	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	3.11E-01	7.46E-02
Chemical Half Life in Groundwater ($t_{1/2}$) =	1.54E+02	days

Abbreviations and Notes

ug/l = micrograms per liter
LN = Natural Logarithm
CUL = Cleanup Level

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.557691898
R Square	0.311020253
Adjusted R Square	0.234466948
Standard Error	1.698489587
Observations	11

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	11.72061772	11.7206177	4.06279326	0.074645886
Residual	9	25.96380191	2.88486688		
Total	10	37.68441963			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	181.560203	89.28873902	2.03340539	0.0725342	-20.42495713	383.5453631
X Variable 1	-0.00449094	0.00222805	-2.01563719	0.07464589	-0.009531139	0.000549259

Sample Information

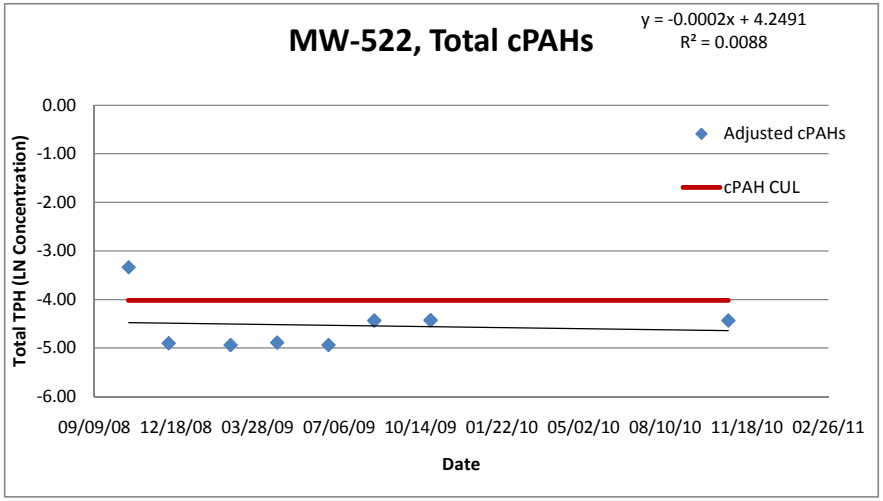
Sample Location **MW-522, West Side**

Constituent **Total cPAHs**

CUL **0.018 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/21/08	0.03560	-3.34
12/09/08	0.00747	-4.90
02/23/09	0.00719	-4.94
04/21/09	0.00755	-4.89
06/23/09	0.00719	-4.94
08/18/09	0.01192	-4.43
10/26/09	0.01197	-4.43
10/26/10	0.011897	-4.43



Date CUL Reached

CUL (ug/L)	0.018
LN CUL	-4.0
Intercept	4.249083203
Slope	-2.20E-04
Date to CUL	1/17/2003

Results

Natural Attenuation Rates in Groundwater (K) =	2.20E-04	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	8.84E-03	8.25E-01
Chemical Half Life in Groundwater ($t_{1/2}$) =	3.16E+03	days

Abbreviations and Notes

ug/l = micrograms per liter

LN = Natural Logarithm

CUL = Cleanup Level

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.094032183
R Square	0.008842051
Adjusted R Square	-0.15635094
Standard Error	0.581630043
Observations	8

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.018107358	0.01810736	0.05352558	0.824726196
Residual	6	2.029761043	0.33829351		
Total	7	2.047868401			

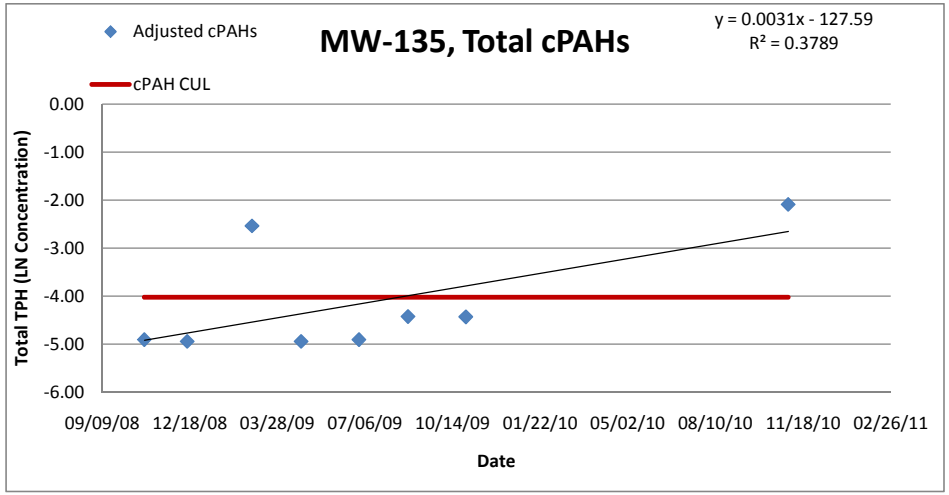
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	4.249083203	37.96572153	0.11191894	0.91453798	-88.64969057	97.14785697
X Variable 1	-0.000219626	0.000949298	-0.23135597	0.8247262	-0.002542475	0.002103223

Sample Information

Sample Location	**MW-135, East Side**
Constituent	**Total cPAHs**
CUL	**0.018 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/27/08	0.00740	-4.91
12/15/08	0.00712	-4.94
02/27/09	0.07928	-2.53
04/24/09	0.00712	-4.94
06/29/09	0.00740	-4.91
08/24/09	0.01197	-4.43
10/29/09	0.01190	-4.43
11/01/10	0.124499	-2.08



Date CUL Reached

CUL (ug/L)	0.018
LN CUL	-4.0
Intercept	-127.5908048
Slope	3.09E-03
Date to CUL	8/14/2009

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.615556055
R Square	0.378909257
Adjusted R Square	0.275394133
Standard Error	0.988633346
Observations	8

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	3.57768351	3.57768351	3.66042413	0.104240973
Residual	6	5.864375356	0.97739589		
Total	7	9.442058866			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-127.5908048	64.52224463	-1.97747003	0.09535773	-285.4710496	30.28943991
X Variable 1	0.003086256	0.001613118	1.91322349	0.10424097	-0.000860902	0.007033413

Results

Natural Attenuation Rates in Groundwater (K) =	-3.09E-03	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	3.79E-01	1.04E-01
Chemical Half Life in Groundwater ($t_{1/2}$) =	NA	days

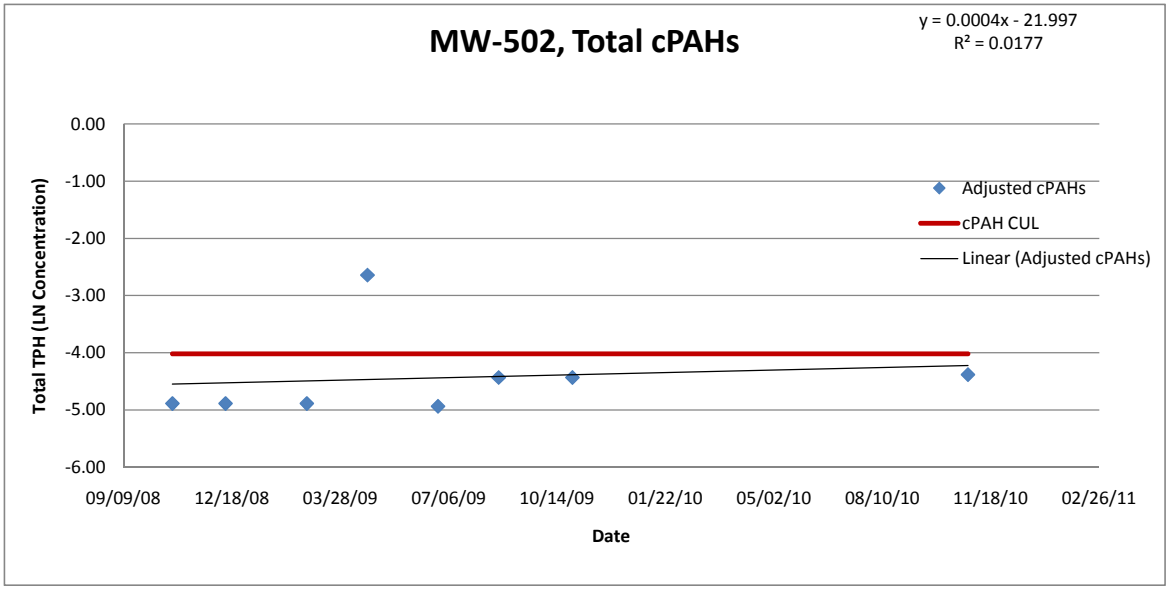
Abbreviations and Notes

ug/l = micrograms per liter
LN = Natural Logarithm
CUL = Cleanup Level

Sample Information
Sample Location **MW-502, East Side**
Constituent **Total cPAHs**
CUL **0.018 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/24/08	0.00755	-4.89
12/12/08	0.00755	-4.89
02/25/09	0.00755	-4.89
04/22/09	0.07120	-2.64
06/26/09	0.00719	-4.94
08/21/09	0.01190	-4.43
10/28/09	0.01190	-4.43
10/28/10	0.0125245	-4.38



Date CUL Reached

CUL (ug/L)	0.018
LN CUL	-4.0
Intercept	-21.99733707
Slope	4.39E-04
Date to CUL	2/7/2012

Results

Natural Attenuation Rates in Groundwater (K) =	-4.39E-04	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	1.77E-02	7.53E-01
Chemical Half Life in Groundwater ($t_{1/2}$) =	NA	days

Abbreviations and Notes
ug/l = micrograms per liter
LN = Natural Logarithm
CUL = Cleanup Level

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.133106596
R Square	0.017717366
Adjusted R Square	-0.145996407
Standard Error	0.817094458
Observations	8

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	0.07225343	0.07225343	0.1082216	0.753357337
Residual	6	4.005860119	0.66764335		
Total	7	4.078113548			

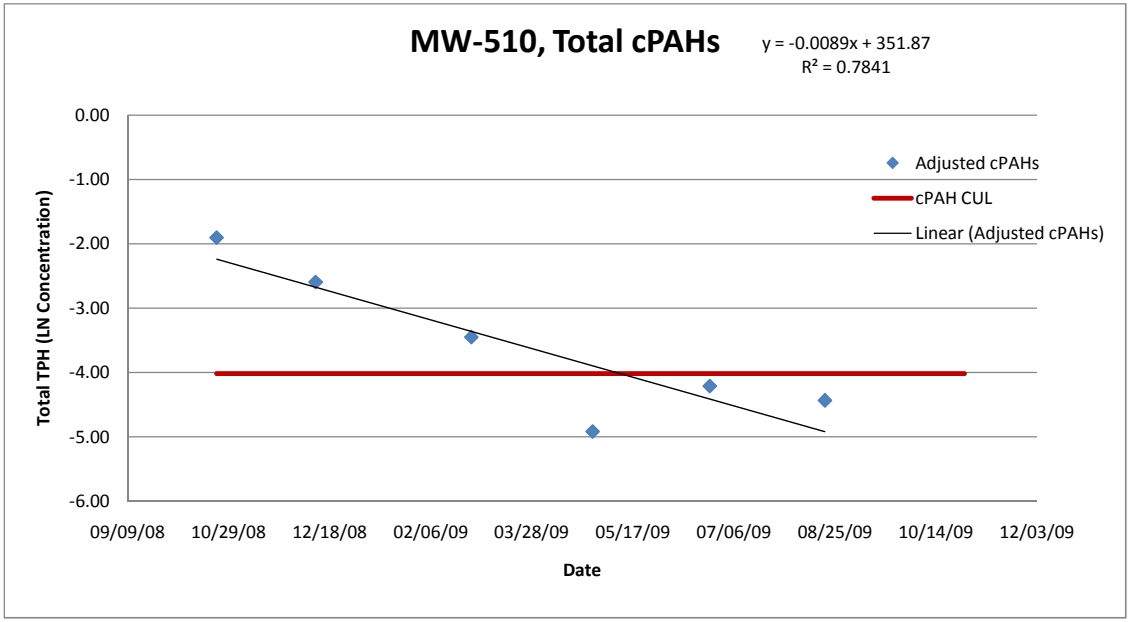
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-21.99733707	53.38680024	-0.412037	0.69462827	-152.630131	108.6354569
X Variable 1	0.000439113	0.001334809	0.32897051	0.75335734	-0.002827047	0.003705273

Sample Information

Sample Location	**MW-510, East Side**
Constituent	**Total cPAHs**
CUL	**0.018 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/23/08	0.14900	-1.90
12/11/08	0.07470	-2.59
02/26/09	0.03179	-3.45
04/27/09	0.00733	-4.92
06/24/09	0.01487	-4.21
08/20/09	0.01190	-4.43
10/28/09	LNAPL	



Date CUL Reached

CUL (ug/L)	0.018
LN CUL	-4.0
Intercept	351.8687148
Slope	-8.91E-03
Date to CUL	5/10/2009

Results

Natural Attenuation Rates in Groundwater (K) =	8.91E-03	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	7.84E-01	1.89E-02
Chemical Half Life in Groundwater ($t_{1/2}$) =	7.78E+01	days

Abbreviations and Notes

ug/l = micrograms per liter
LN = Natural Logarithm
CUL = Cleanup Level

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.885477135
R Square	0.784069756
Adjusted R Square	0.730087195
Standard Error	0.601526255
Observations	6

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	5.255455882	5.25545588	14.5245009	0.018922218
Residual	4	1.447335344	0.36183384		
Total	5	6.702791225			

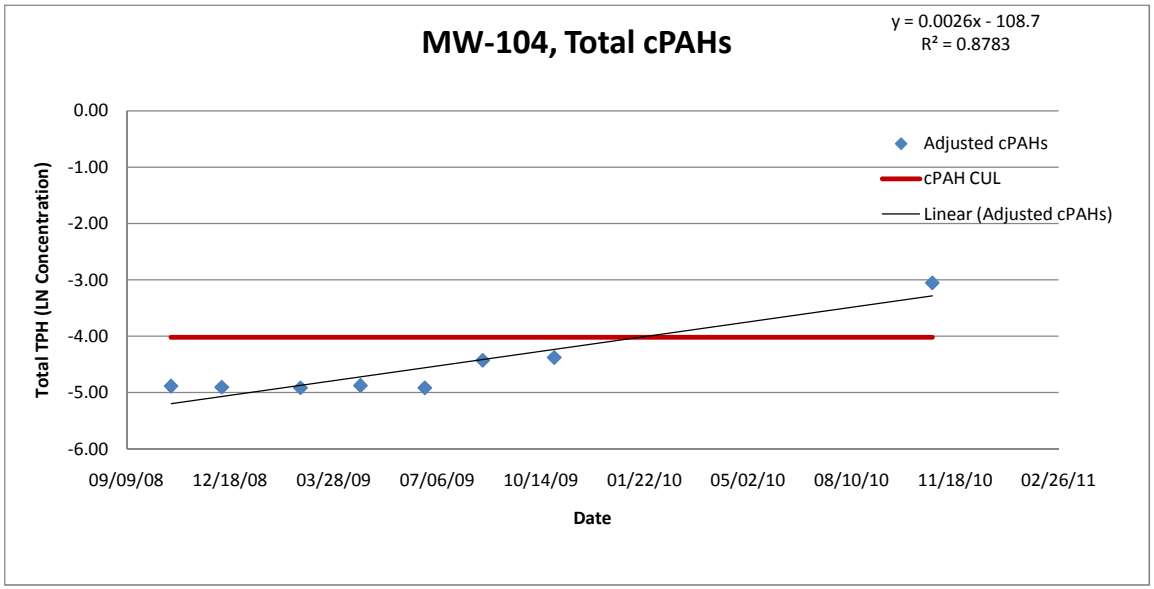
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	351.8687148	93.26795359	3.77266469	0.01955935	92.91536159	610.822068
X Variable 1	-0.0089097	0.002337828	-3.81110232	0.01892222	-0.01540055	-0.00241885

Sample Information

Sample Location	**MW-104, West Side**
Constituent	**Total cPAHs**
CUL	**0.018 (µg/L)**

Data

Sample Date	Concentration (ug/L)	LN Concentration
10/22/08	0.00755	-4.89
12/10/08	0.00740	-4.91
02/24/09	0.00733	-4.92
04/23/09	0.00763	-4.88
06/24/09	0.00731	-4.92
08/19/09	0.01192	-4.43
10/27/09	0.01252	-4.38
10/27/10	0.04719	-3.05



Date CUL Reached

CUL (ug/L)	0.018
LN CUL	-4.0
Intercept	-108.7045358
Slope	2.60E-03
Date to CUL	1/18/2010

Results

Natural Attenuation Rates in Groundwater (K) =	-2.60E-03	$days^{-1}$
Correlation Coefficient (R^2) and p-Value =	8.78E-01	5.91E-04
Chemical Half Life in Groundwater ($t_{1/2}$) =	NA	days

Abbreviations and Notes

ug/l = micrograms per liter
LN = Natural Logarithm
CUL = Cleanup Level

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.937159892
R Square	0.878268662
Adjusted R Square	0.857980106
Standard Error	0.24248135
Observations	8

ANOVA

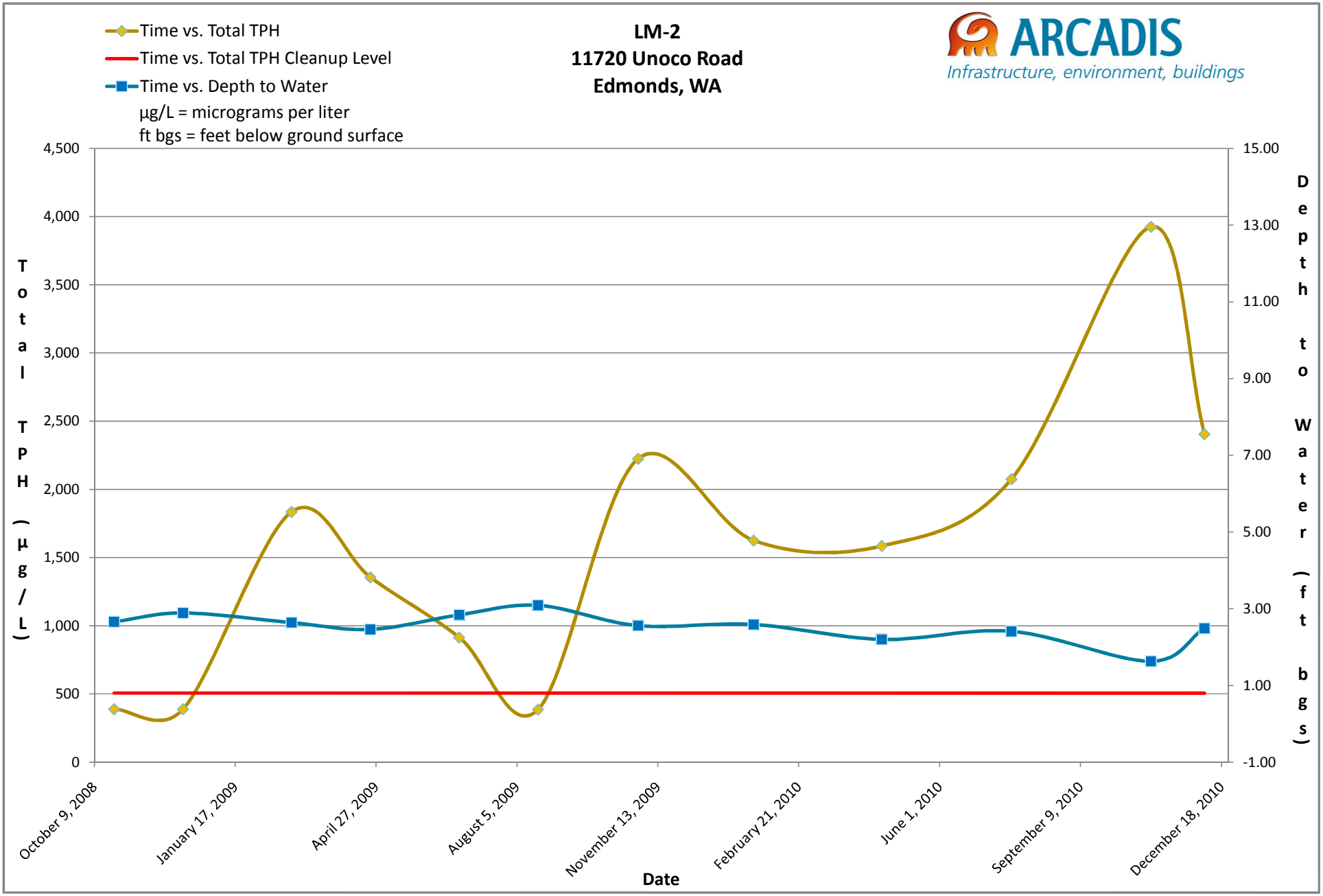
	df	*SS*	*MS*	*F*	*Significance F*
Regression	1	2.545264533	2.54526453	43.2888694	0.000591499
Residual	6	0.352783231	0.05879721		
Total	7	2.898047763			

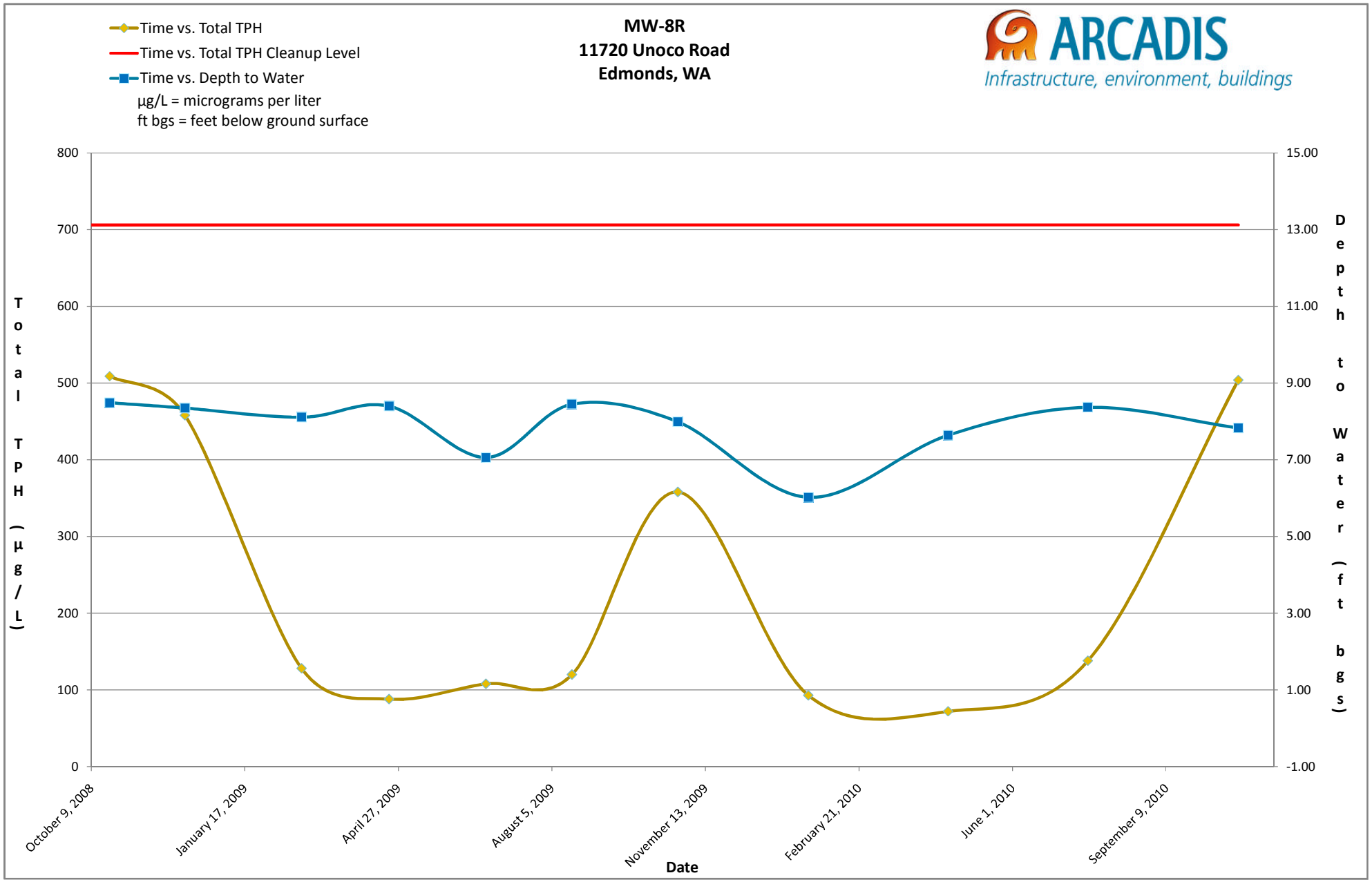
	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*
Intercept	-108.7045358	15.83122684	-6.86646316	0.00047004	-147.4421523	-69.9669193
X Variable 1	0.002604363	0.000395834	6.57942774	0.0005915	0.001635791	0.003572934

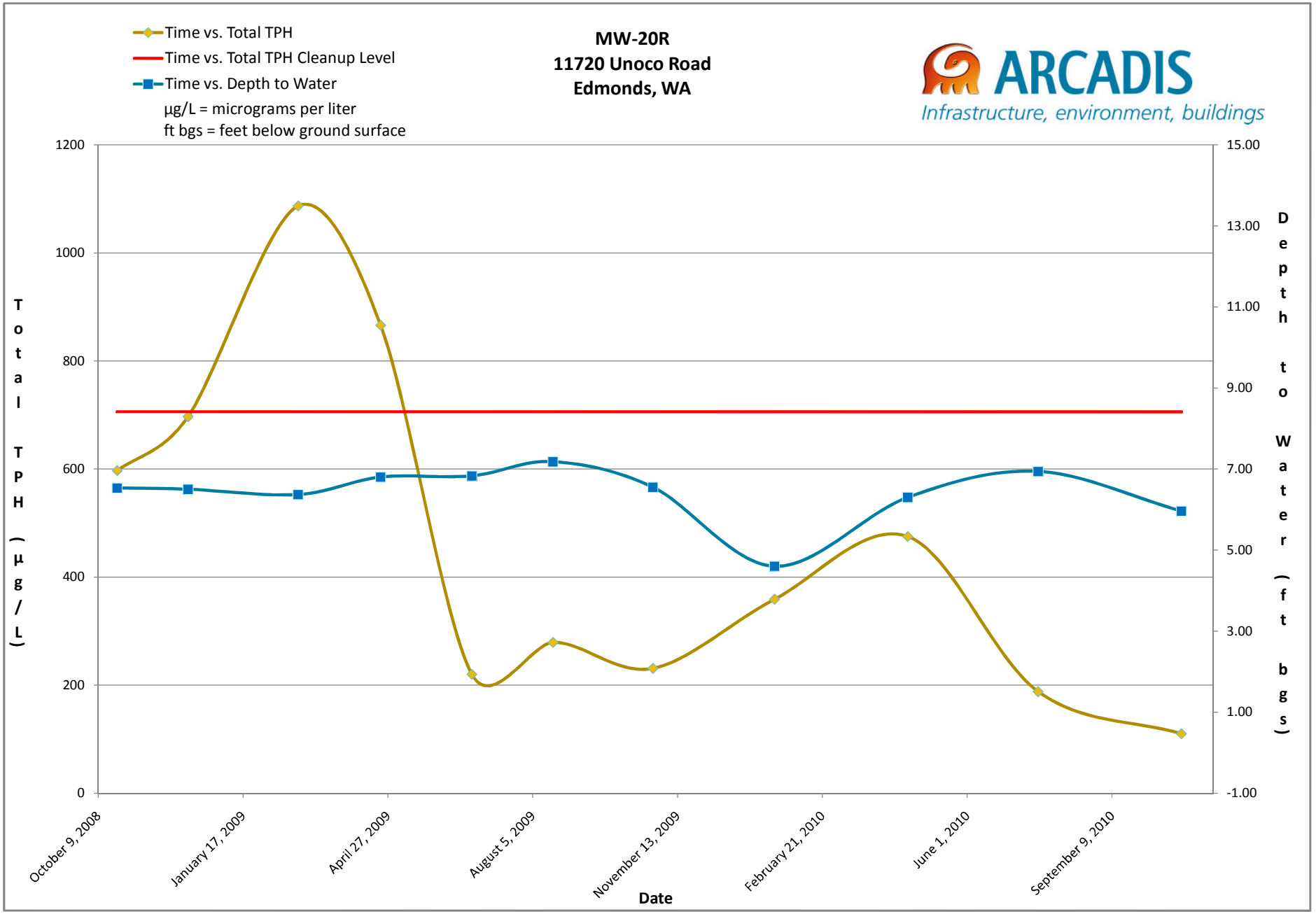
ARCADIS

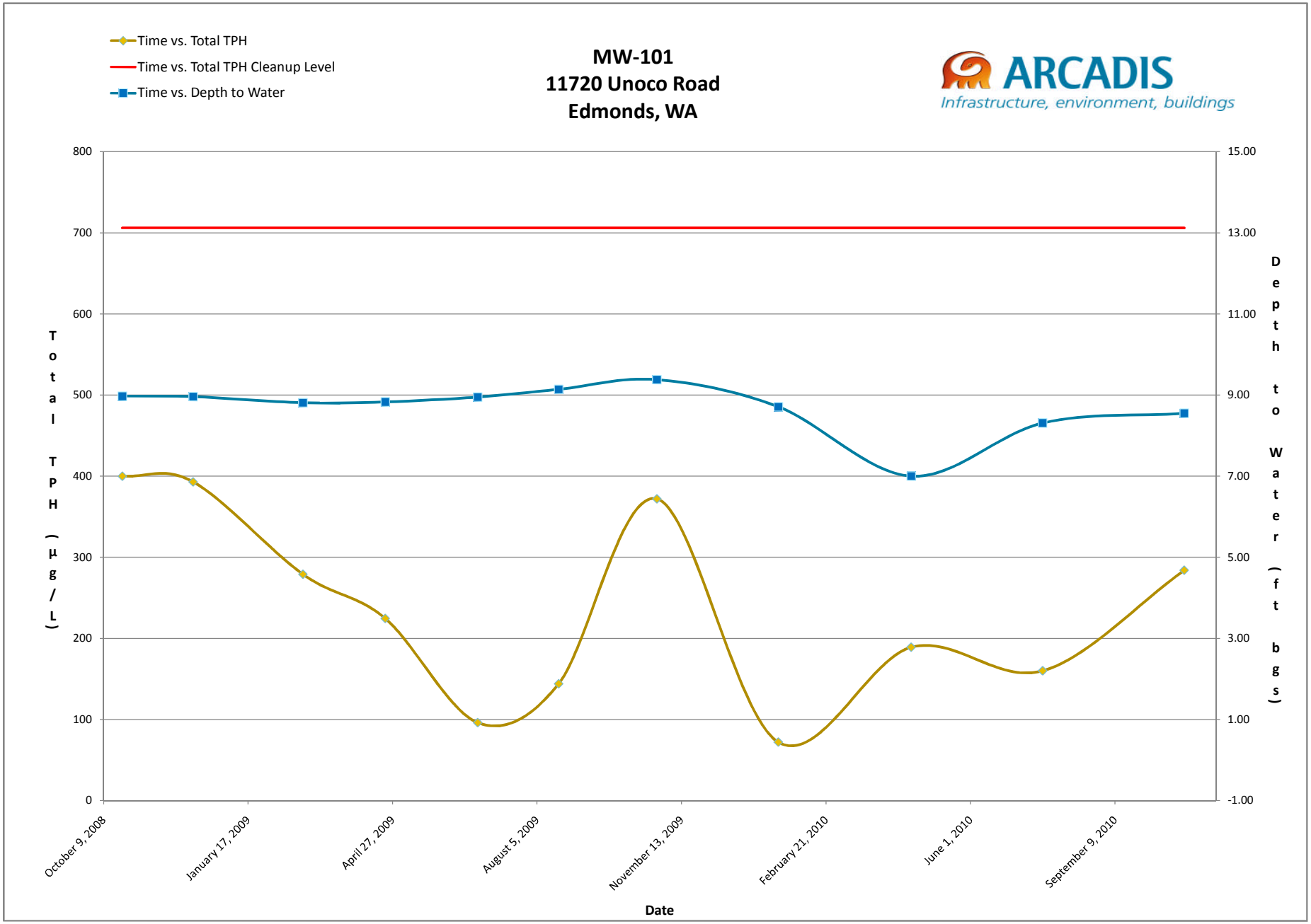
Appendix G

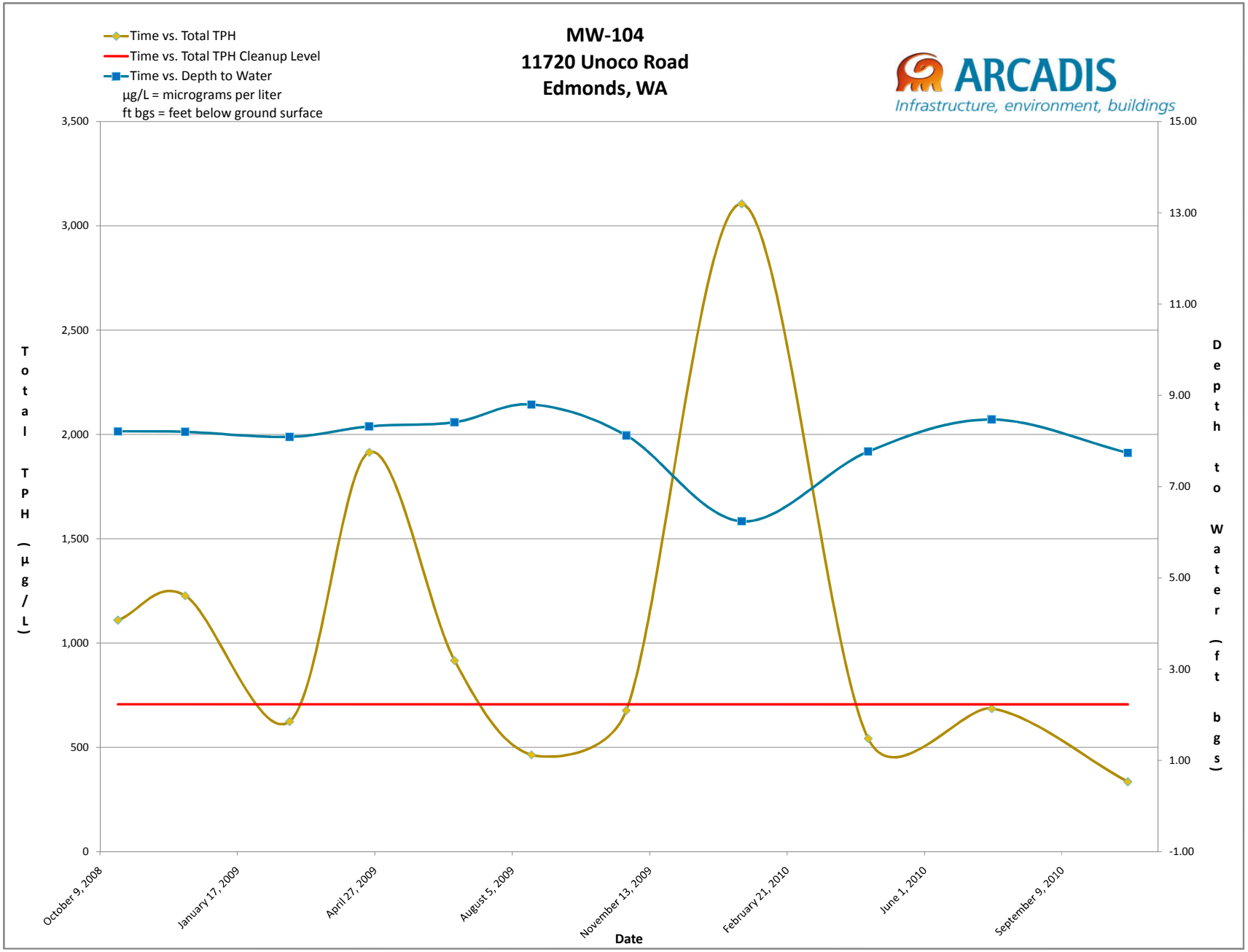
Hydrographs

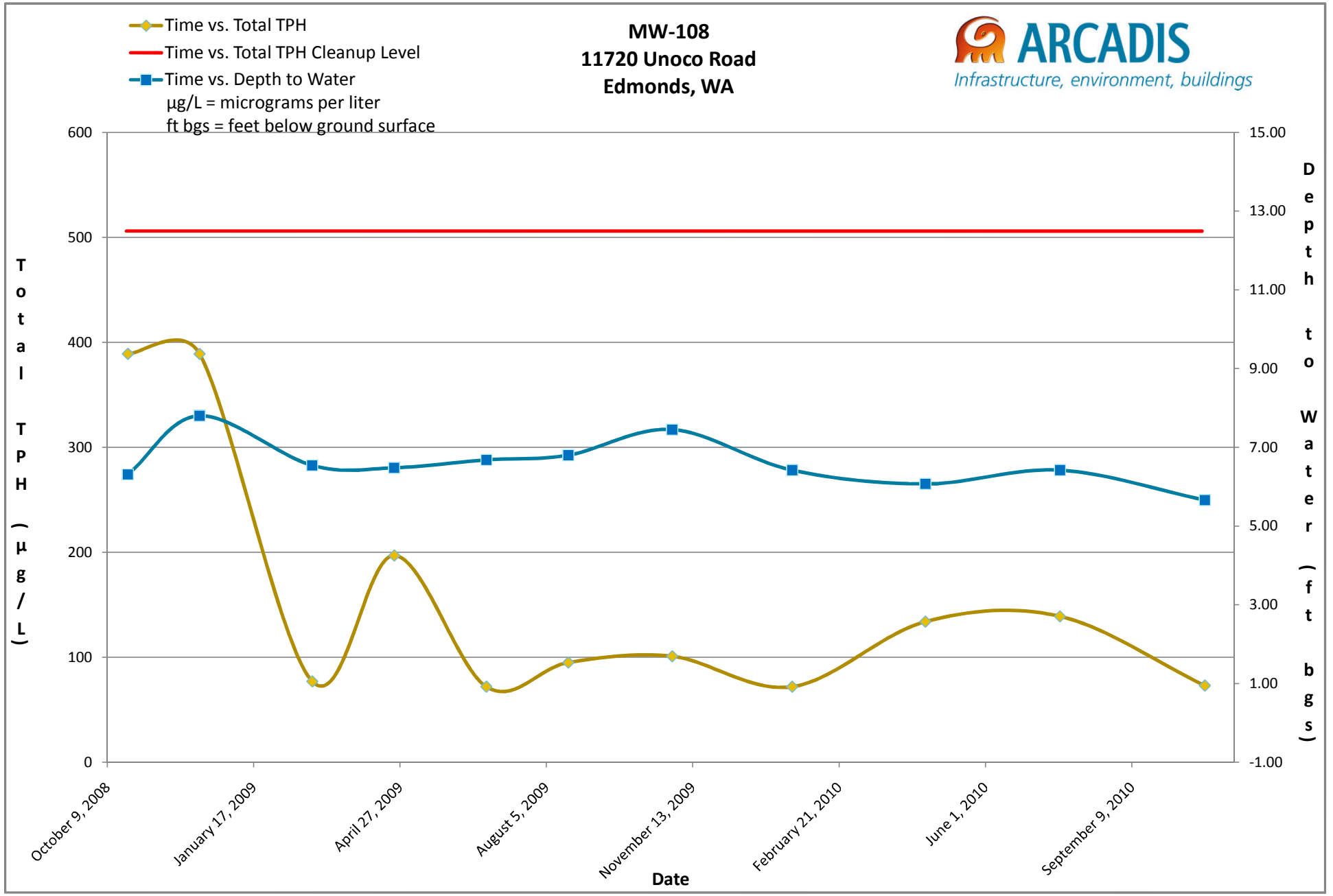

Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
µg/L = micrograms per liter
ft bgs = feet below ground surface
LM-2
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Total TPH (µg/L)
Depth to Water (ft bgs)
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
December 18, 2010
Date

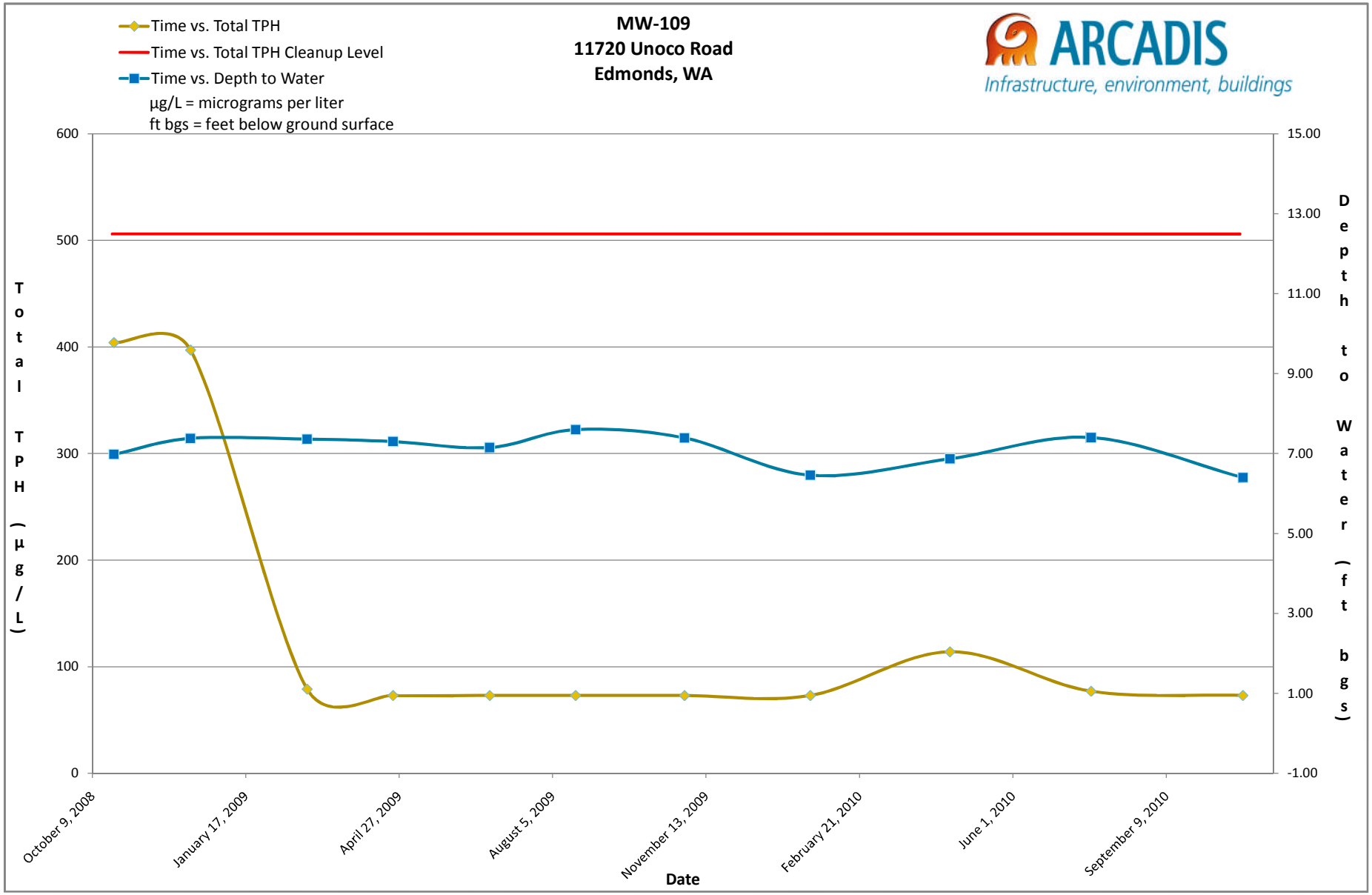

Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
µg/L = micrograms per liter
ft bgs = feet below ground surface
MW-8R
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Total TPH (µg/L)
Depth to Water (ft bgs)
800
700
600
500
400
300
200
100
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
Date

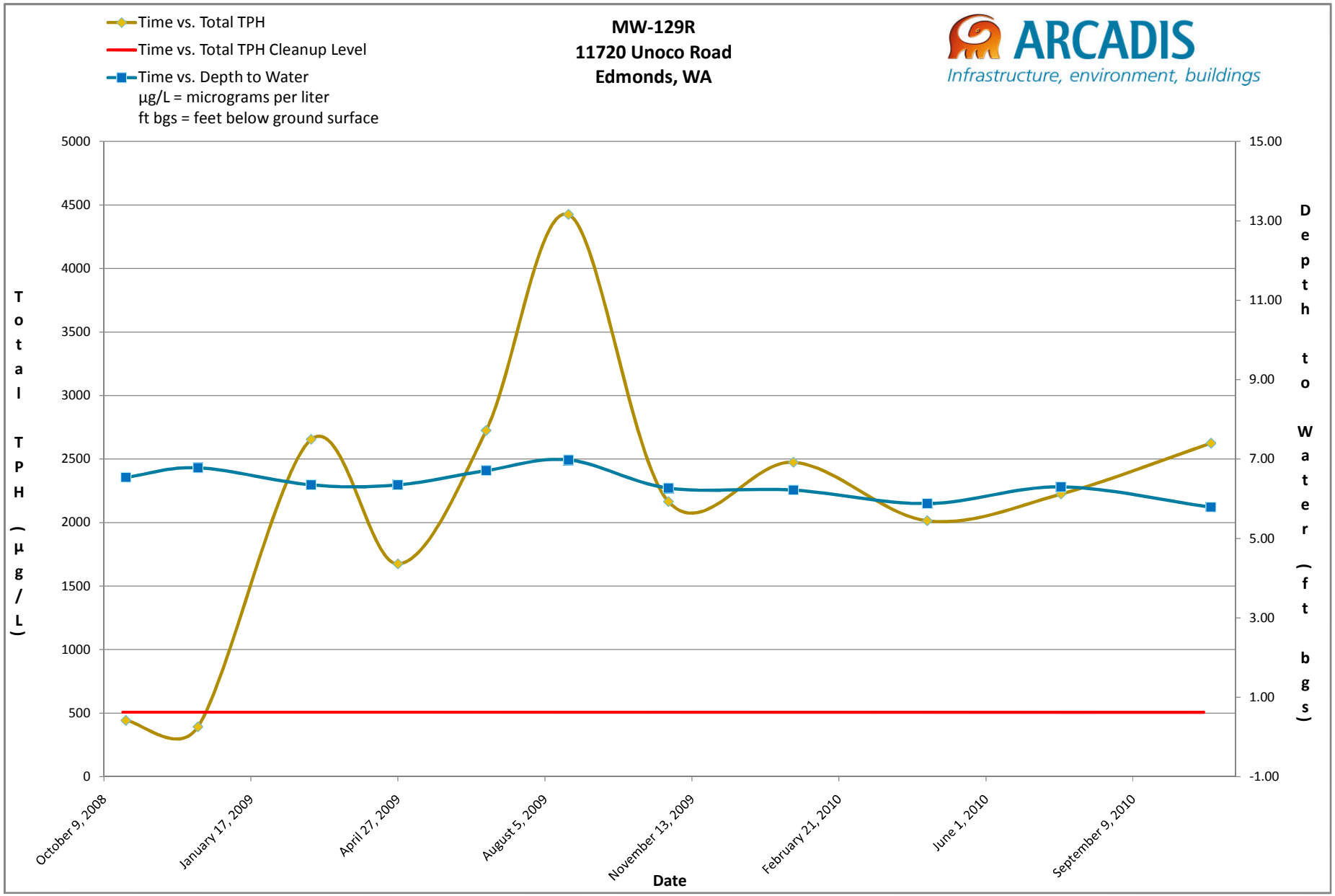

Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
µg/L = micrograms per liter
ft bgs = feet below ground surface
MW-20R
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Total TPH (µg/L)
Depth to Water (ft bgs)
1200
1000
800
600
400
200
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
Date

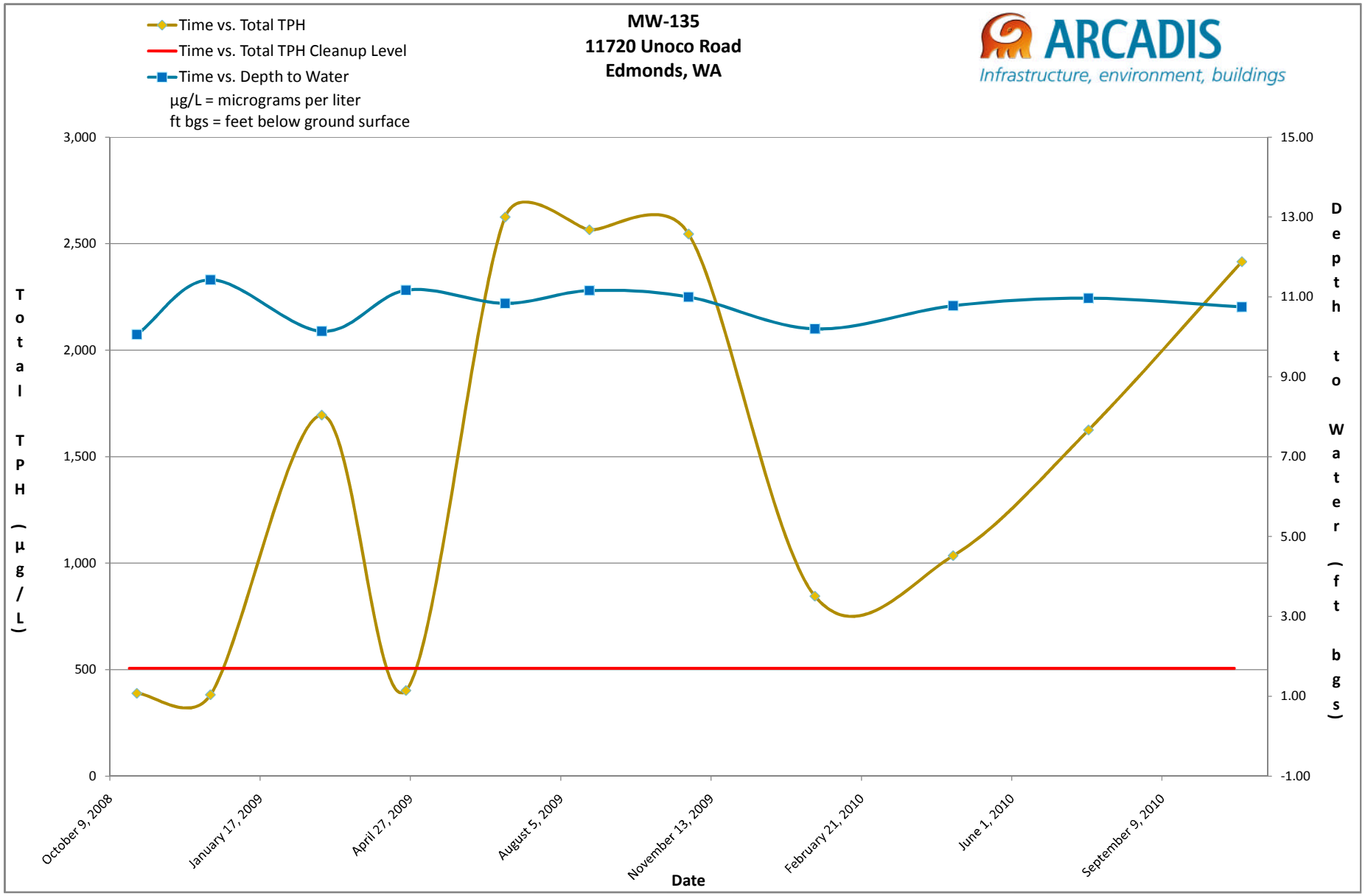

Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
MW-101
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Total TPH (µg/L)
Depth to Water (ft bgs)
800
700
600
500
400
300
200
100
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
Date

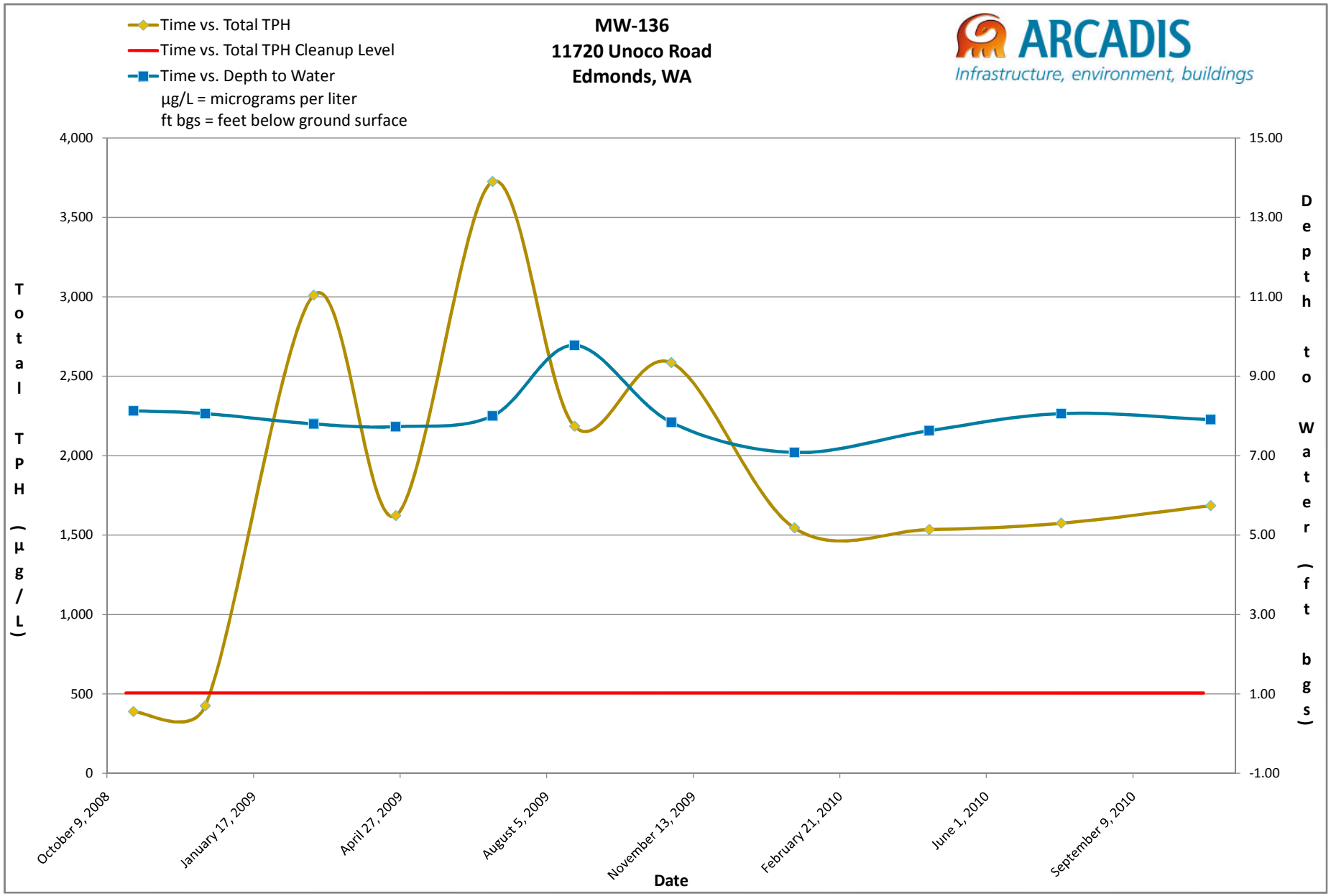

Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
µg/L = micrograms per liter
ft bgs = feet below ground surface
MW-104
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Total TPH (µg/L)
Depth to Water (ft bgs)
3,500
3,000
2,500
2,000
1,500
1,000
500
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
Date

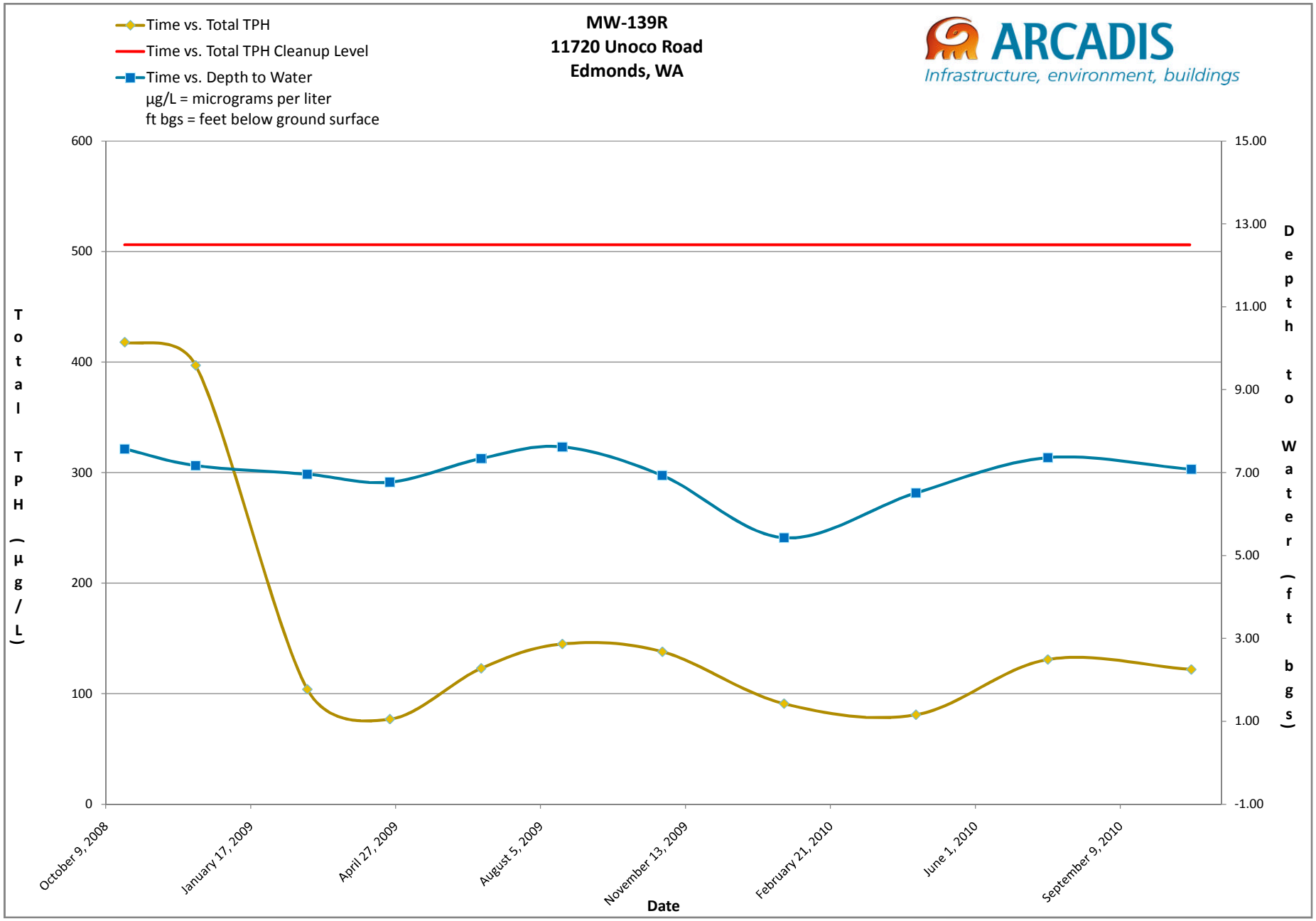

Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
µg/L = micrograms per liter
ft bgs = feet below ground surface
MW-108
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Total TPH (µg/L)
Depth to Water (ft bgs)
600
500
400
300
200
100
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
Date

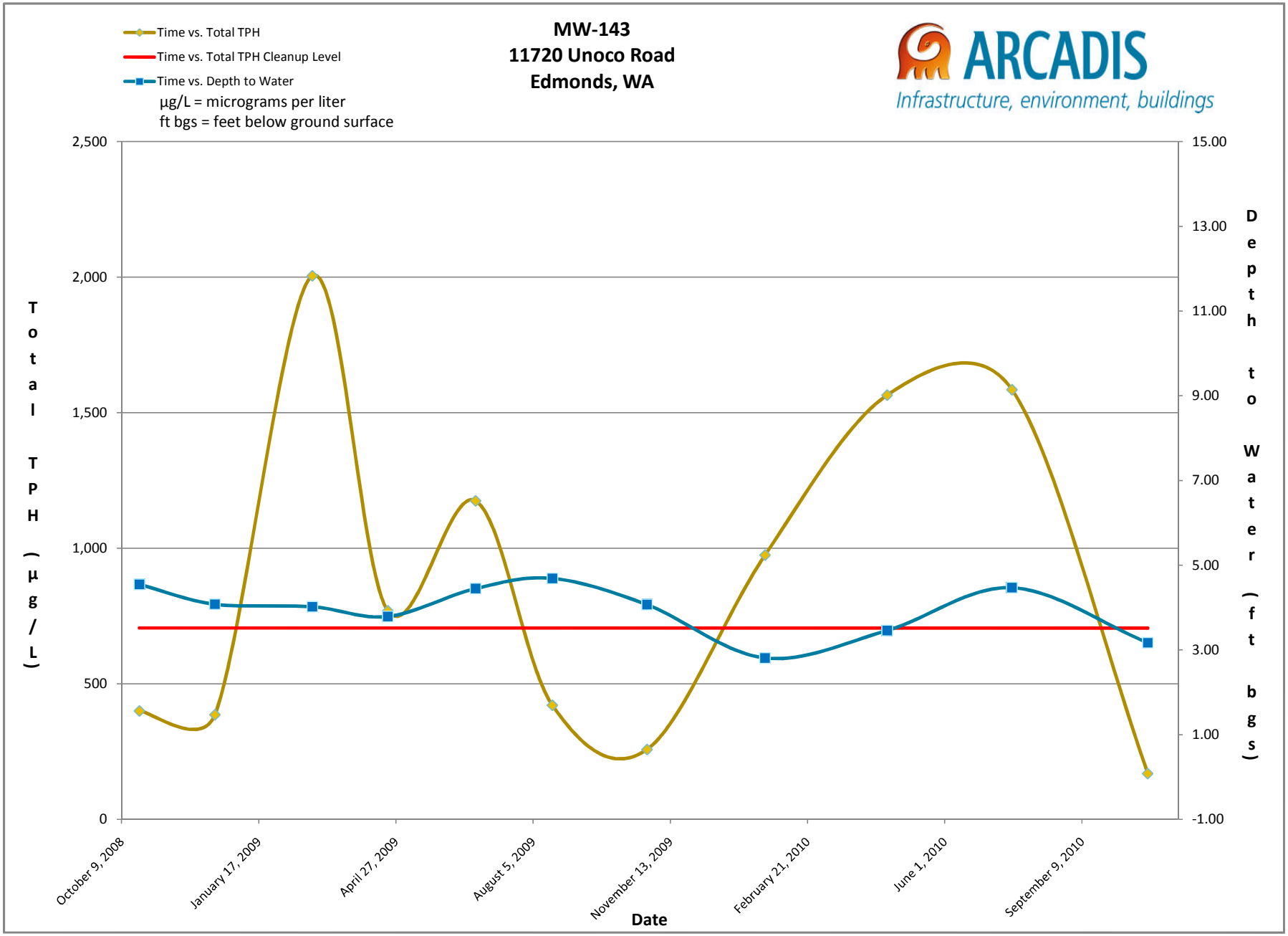

Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
µg/L = micrograms per liter
ft bgs = feet below ground surface
MW-109
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Total TPH (µg/L)
Depth to Water (ft bgs)
600
500
400
300
200
100
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
Date

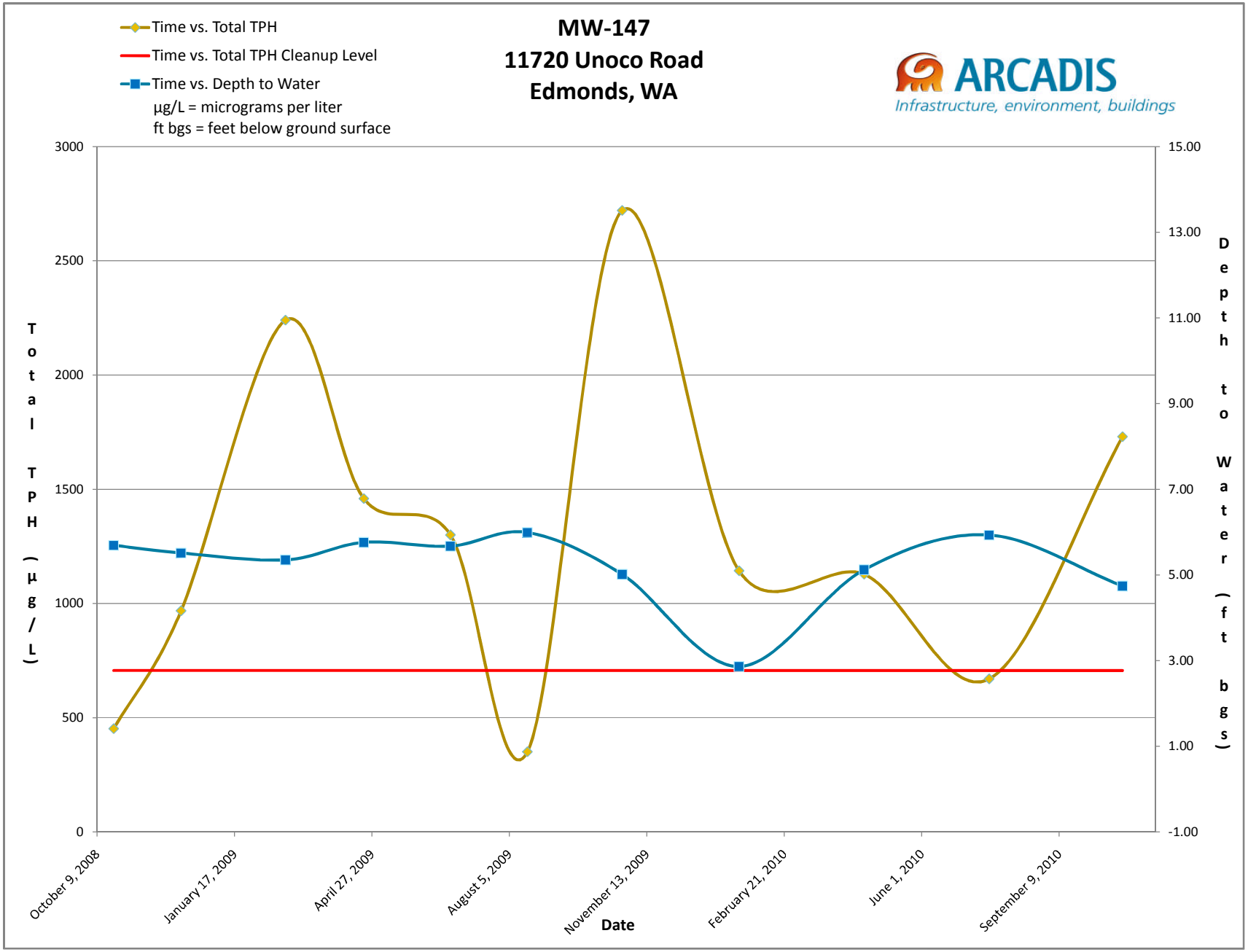

Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
µg/L = micrograms per liter
ft bgs = feet below ground surface
MW-129R
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Total TPH (µg/L)
Depth to Water (ft bgs)
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
Date


Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
µg/L = micrograms per liter
ft bgs = feet below ground surface
MW-135
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Total TPH (µg/L)
Depth to Water (ft bgs)
3,000
2,500
2,000
1,500
1,000
500
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
Date


Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
µg/L = micrograms per liter
ft bgs = feet below ground surface
MW-136
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Total TPH (µg/L)
Depth to Water (ft bgs)
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
Date

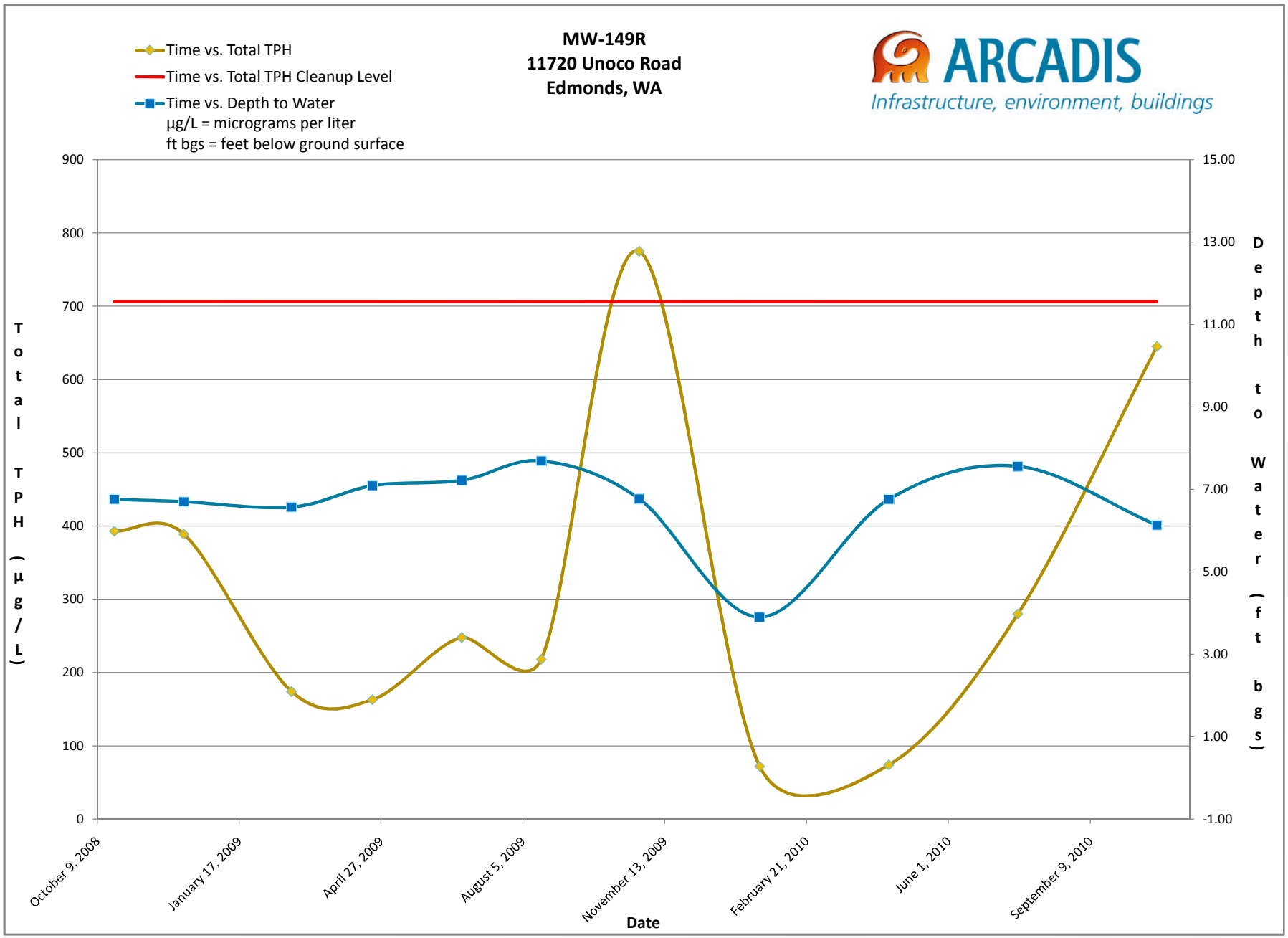

Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
µg/L = micrograms per liter
ft bgs = feet below ground surface
MW-139R
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Total TPH (µg/L)
Depth to Water (ft bgs)
600
500
400
300
200
100
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
Date

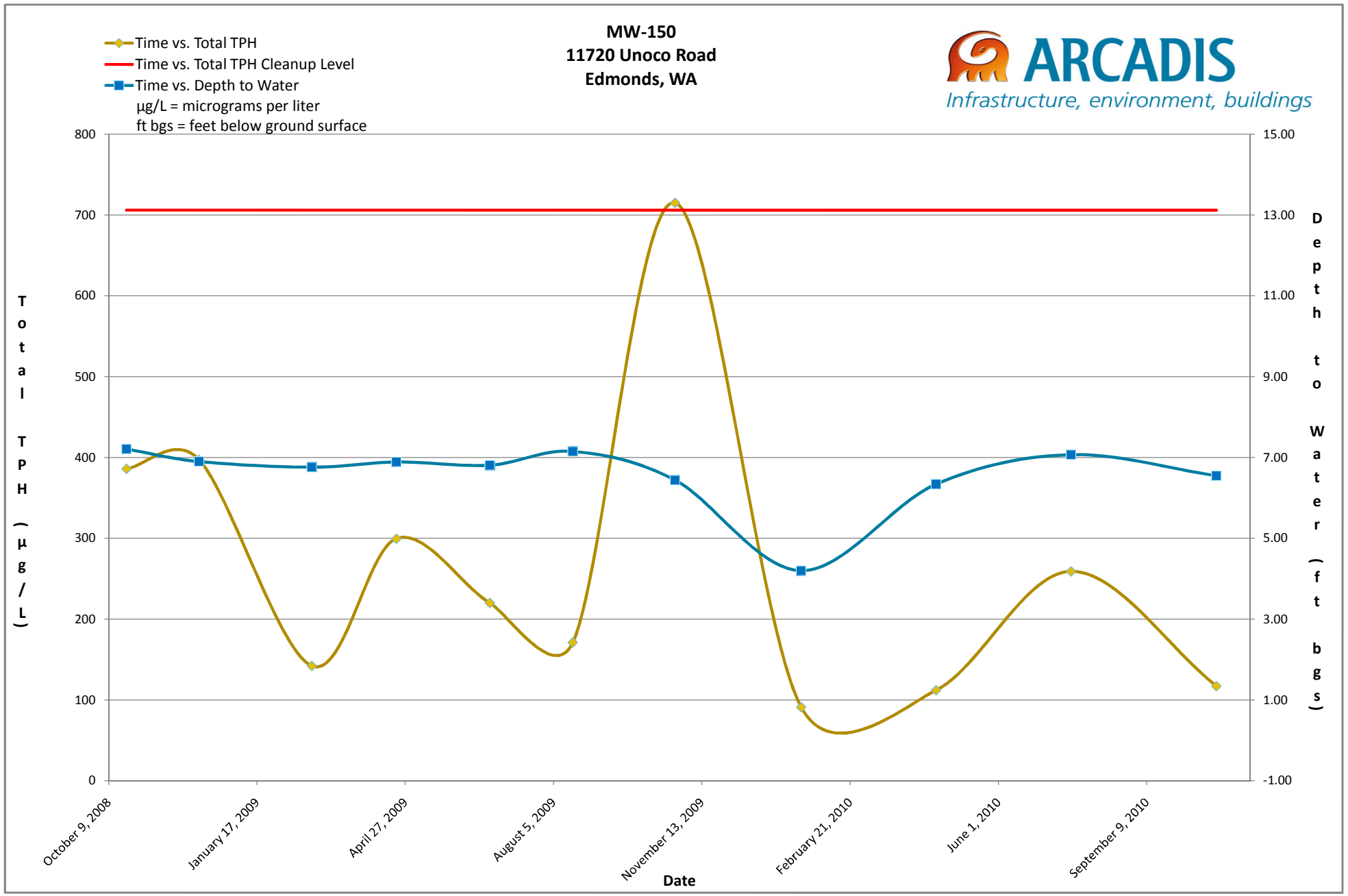

Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
µg/L = micrograms per liter
ft bgs = feet below ground surface
MW-143
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Total TPH (µg/L)
Depth to Water (ft bgs)
2,500
2,000
1,500
1,000
500
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
Date

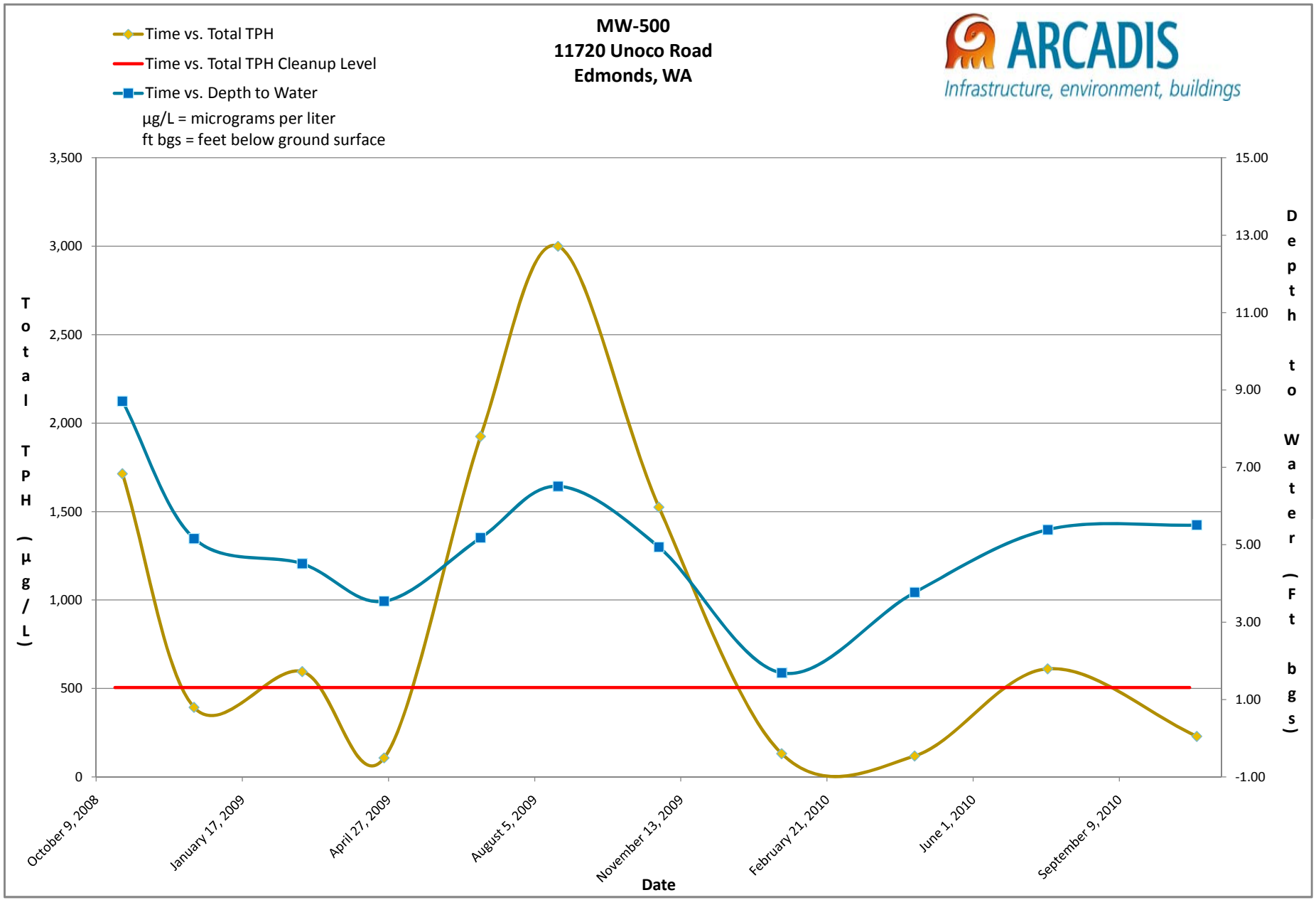

Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
µg/L = micrograms per liter
ft bgs = feet below ground surface
MW-147
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Total TPH (µg/L)
Depth to Water (ft bgs)
3000
2500
2000
1500
1000
500
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
Date

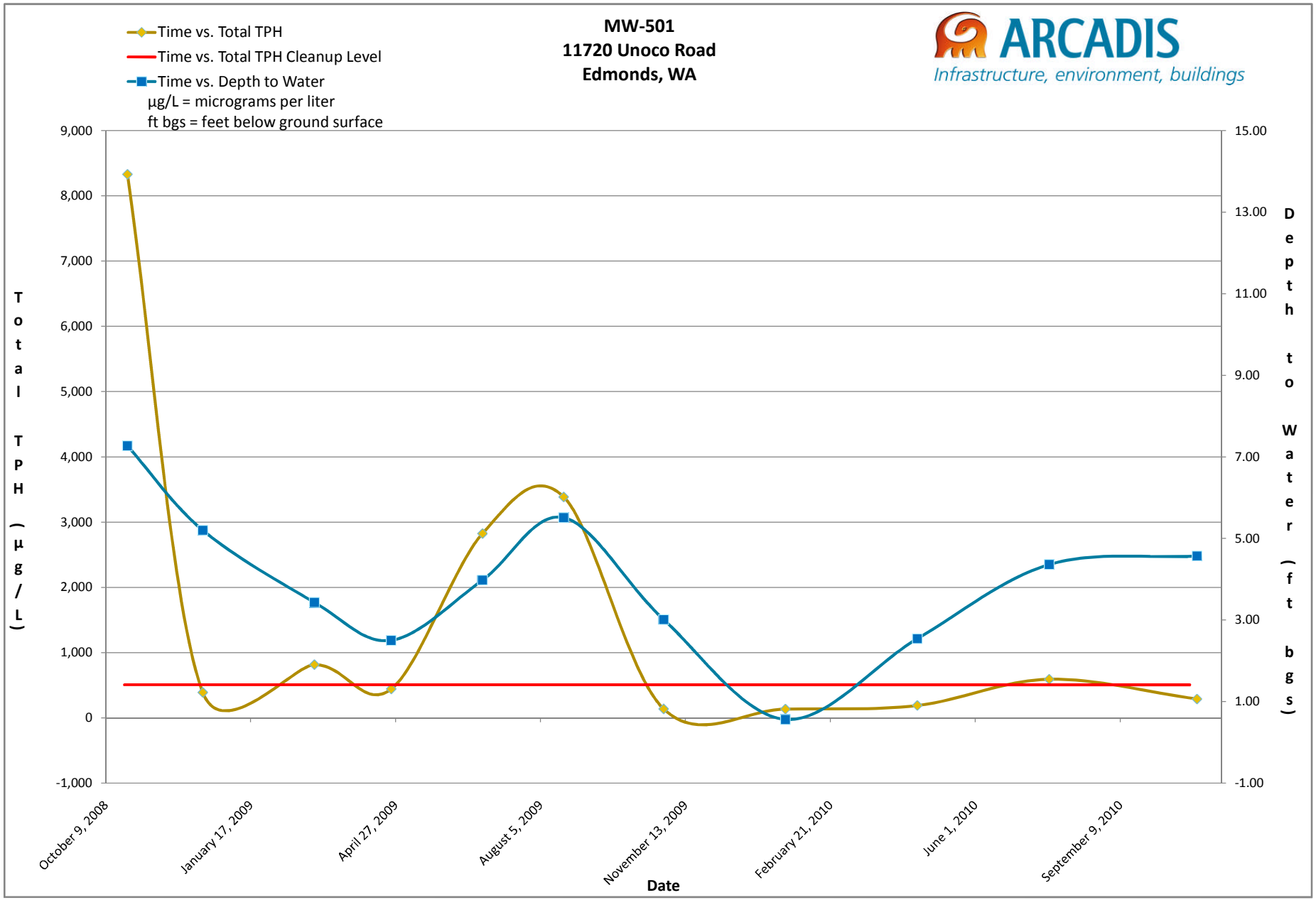
MW-149R
11720 Unoco Road
Edmonds, WA

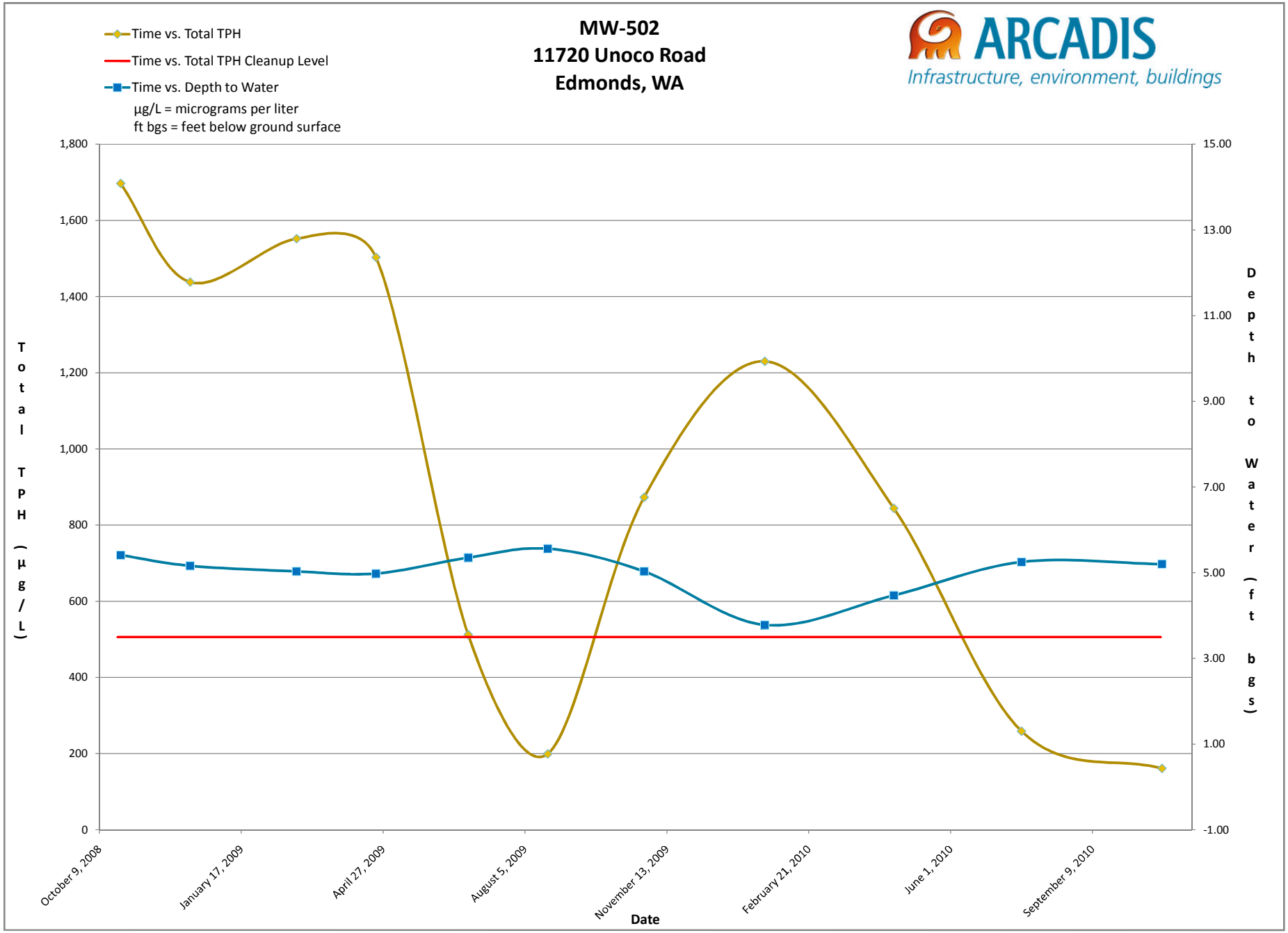
ARCADIS
Infrastructure, environment, buildings

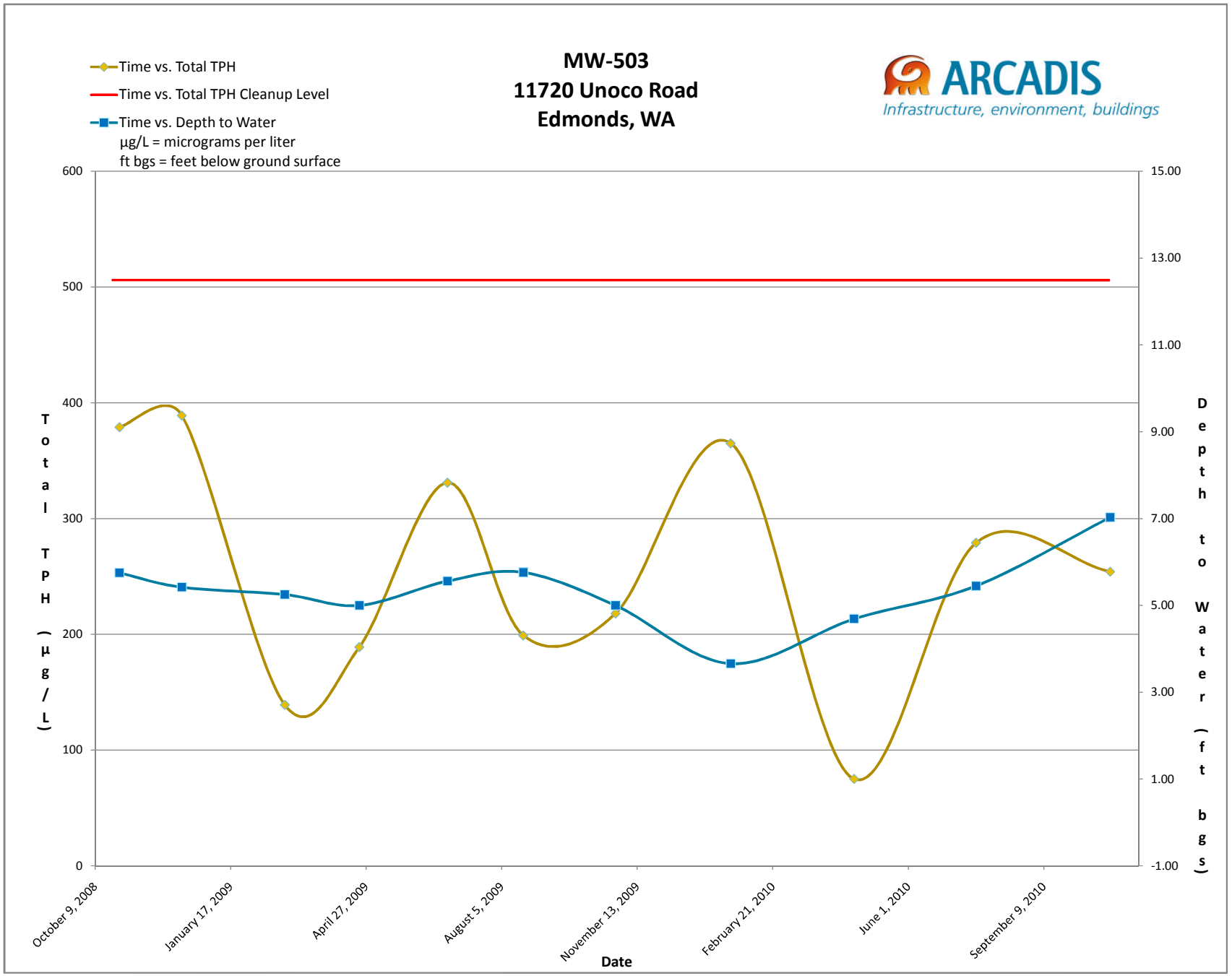


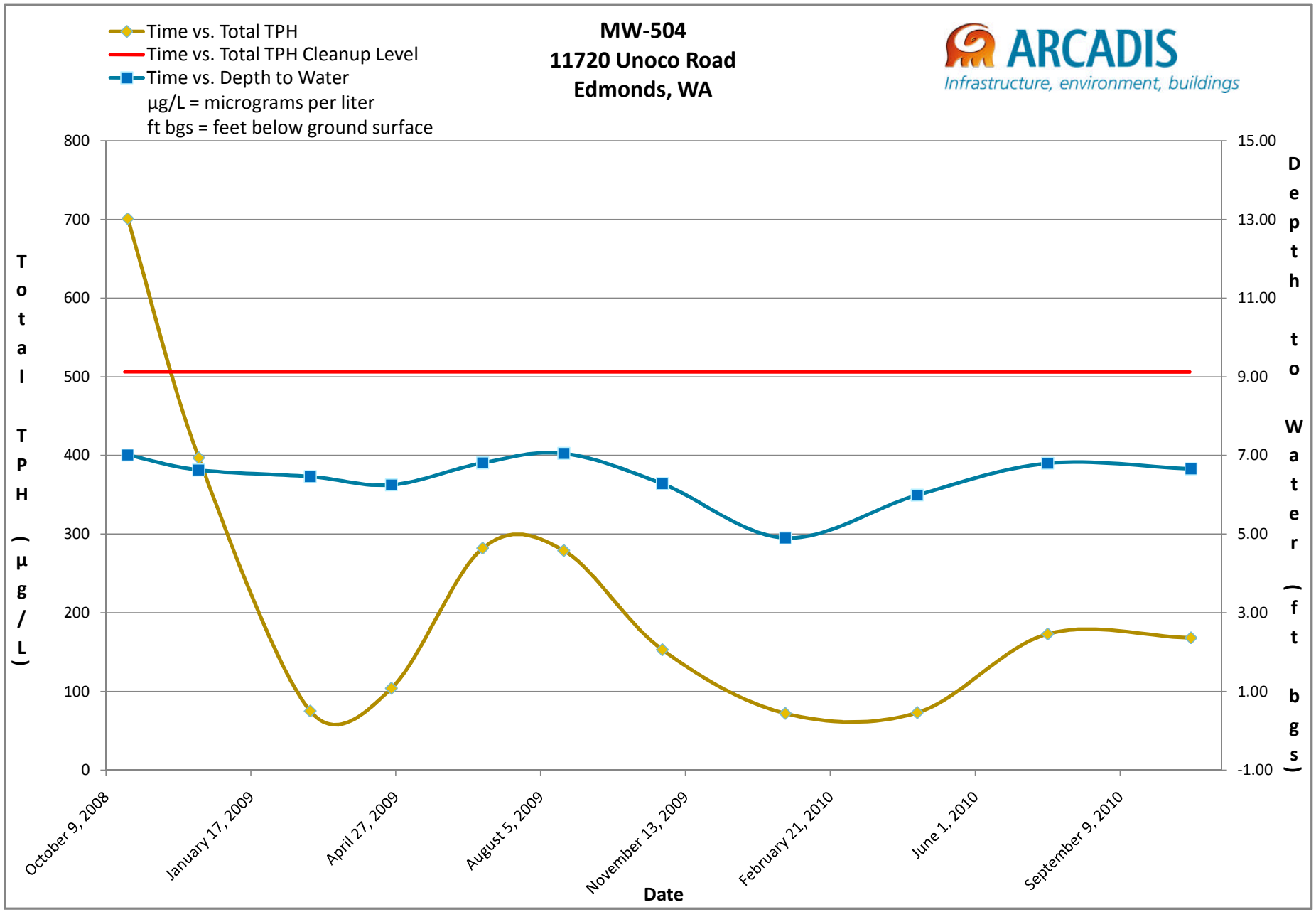

Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
µg/L = micrograms per liter
ft bgs = feet below ground surface
MW-150
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Total TPH (µg/L)
Depth to Water (ft bgs)
800
700
600
500
400
300
200
100
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
Date

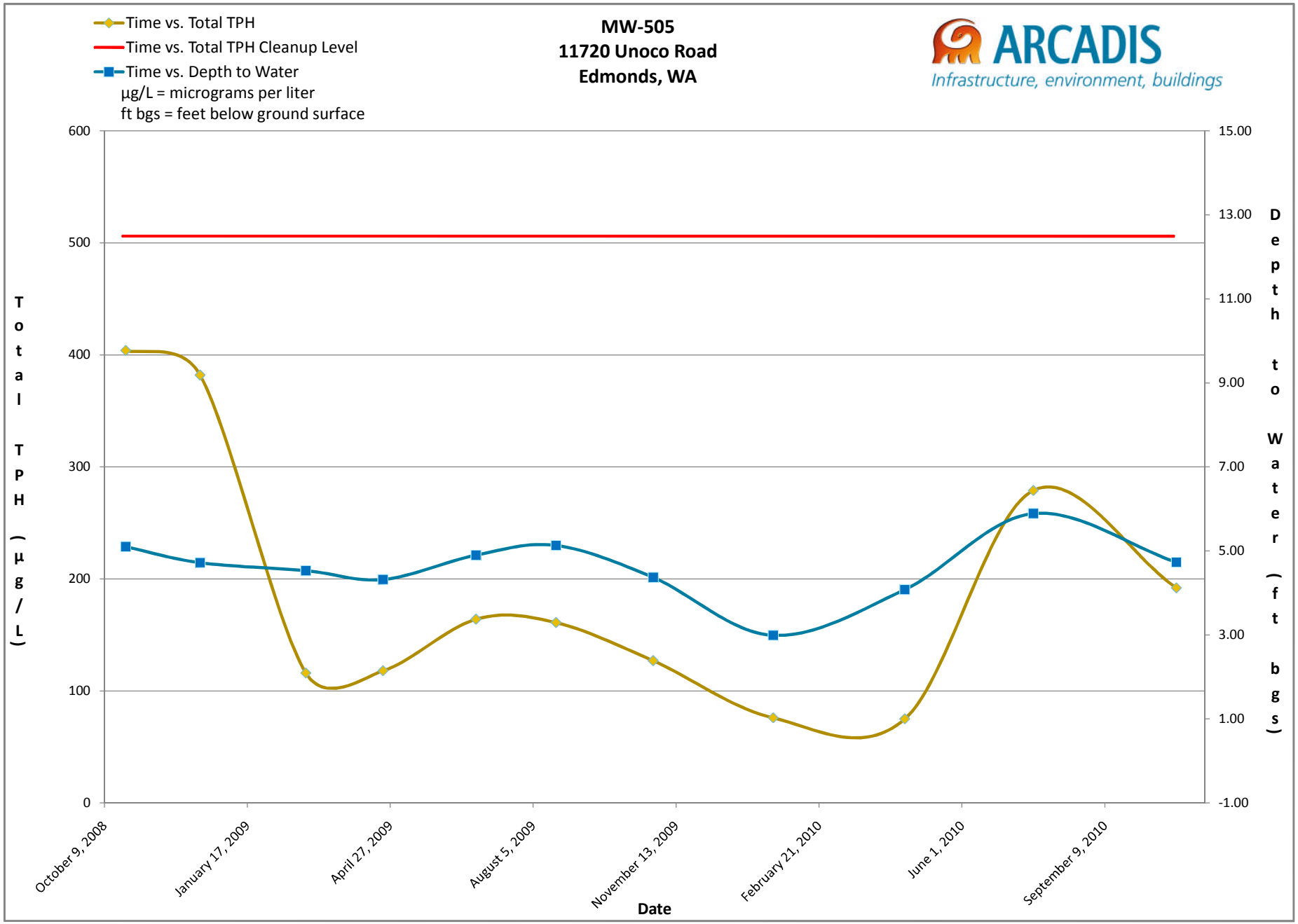

MW-500
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
µg/L = micrograms per liter
ft bgs = feet below ground surface
Total TPH (µg/L)
Depth to Water (Ft bgs)
3,500
3,000
2,500
2,000
1,500
1,000
500
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
Date

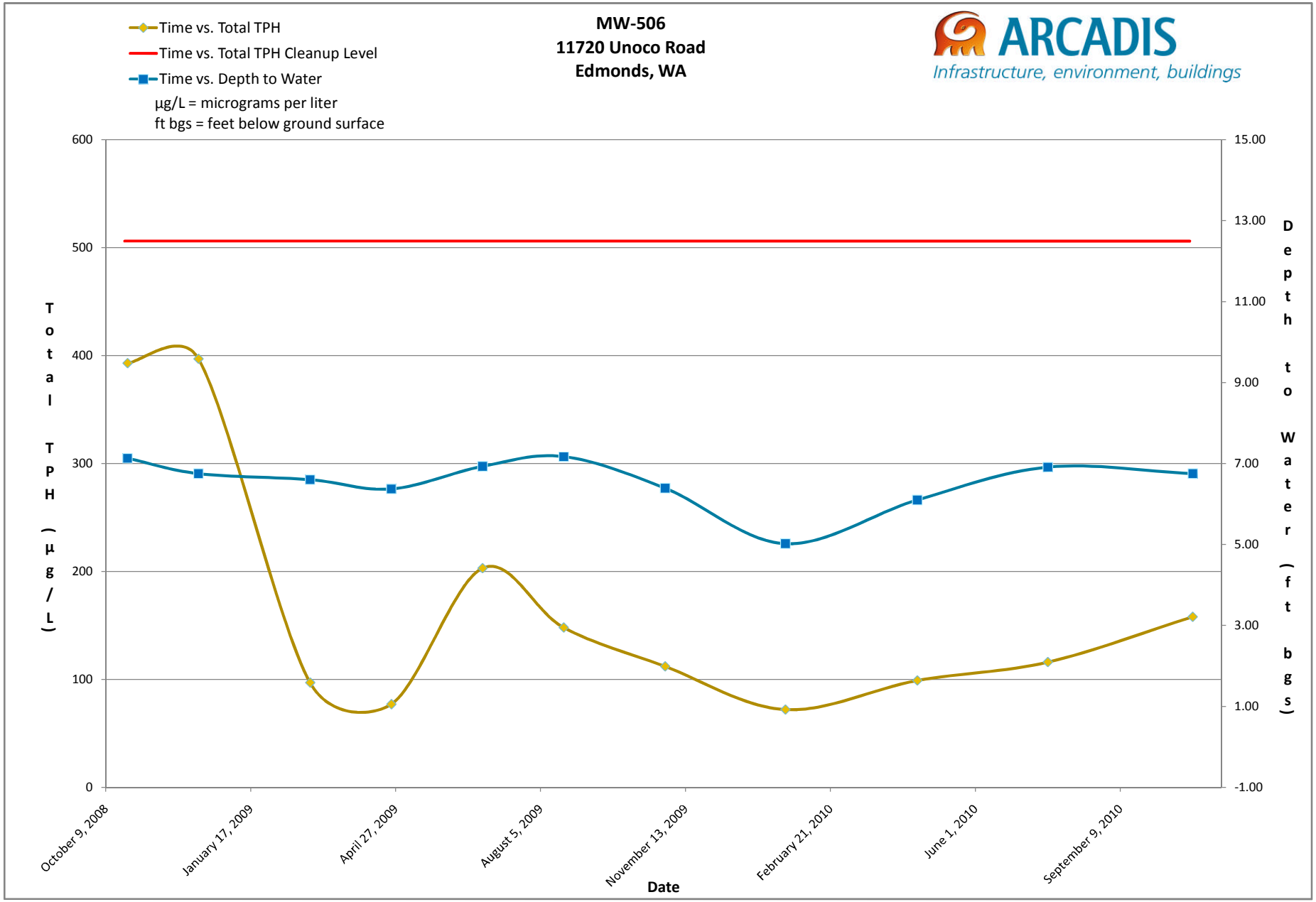

Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
µg/L = micrograms per liter
ft bgs = feet below ground surface
MW-501
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Total TPH (µg/L)
Depth to Water (ft bgs)
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
-1,000
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
Date

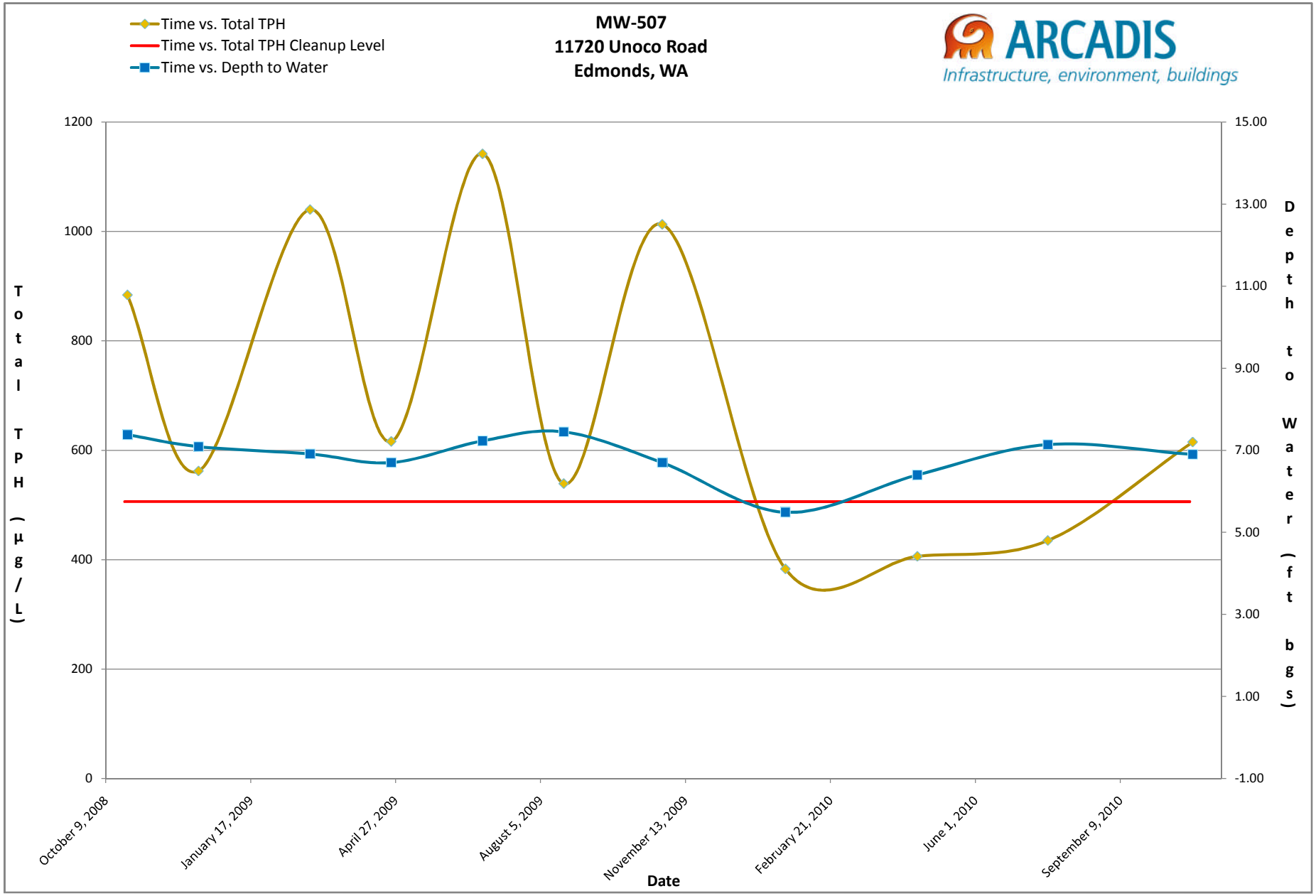

MW-502
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
µg/L = micrograms per liter
ft bgs = feet below ground surface
Total TPH (µg/L)
Depth to Water (ft bgs)
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
Date

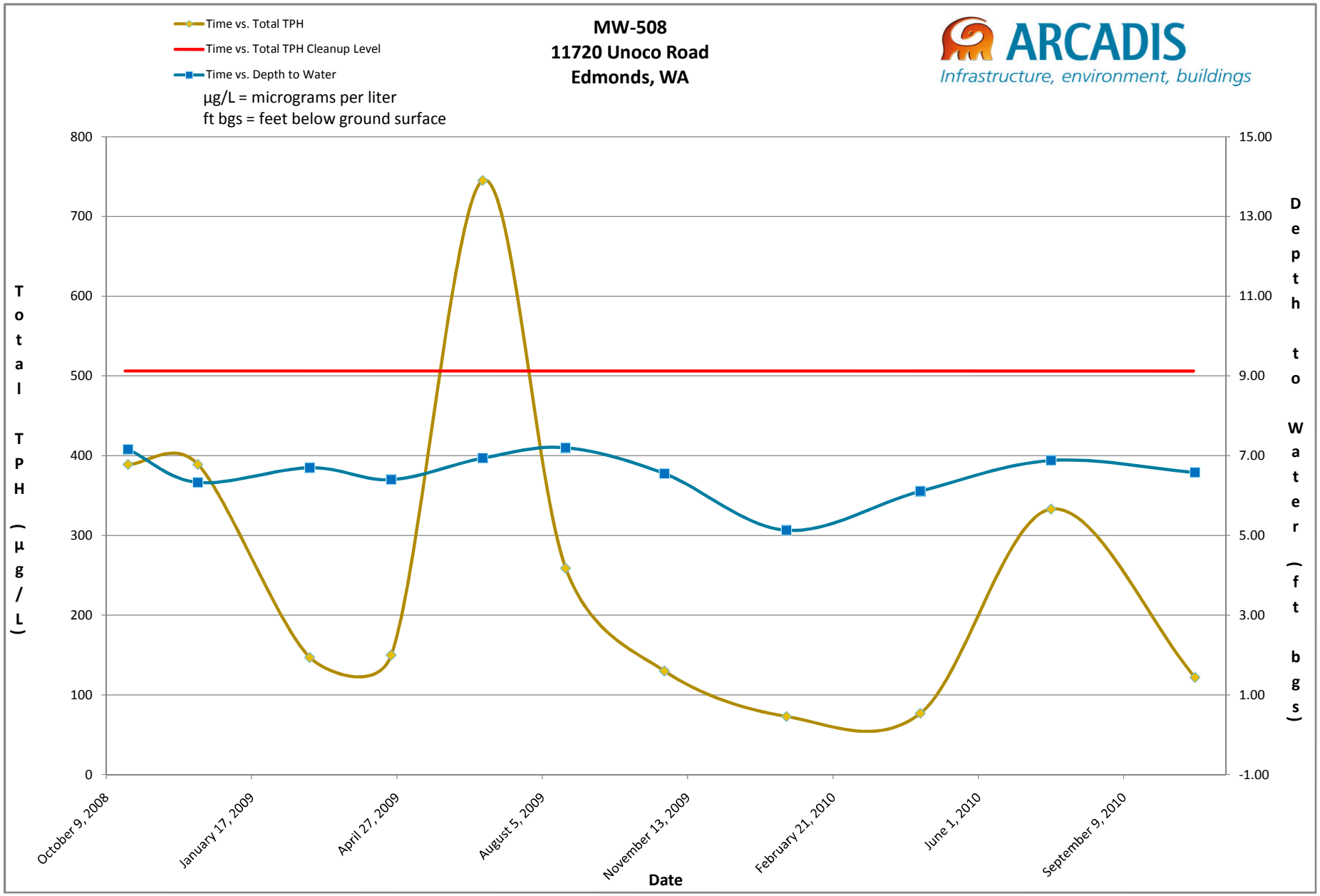

Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
µg/L = micrograms per liter
ft bgs = feet below ground surface
MW-503
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Total TPH (µg/L)
Depth to Water (ft bgs)
600
500
400
300
200
100
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
Date

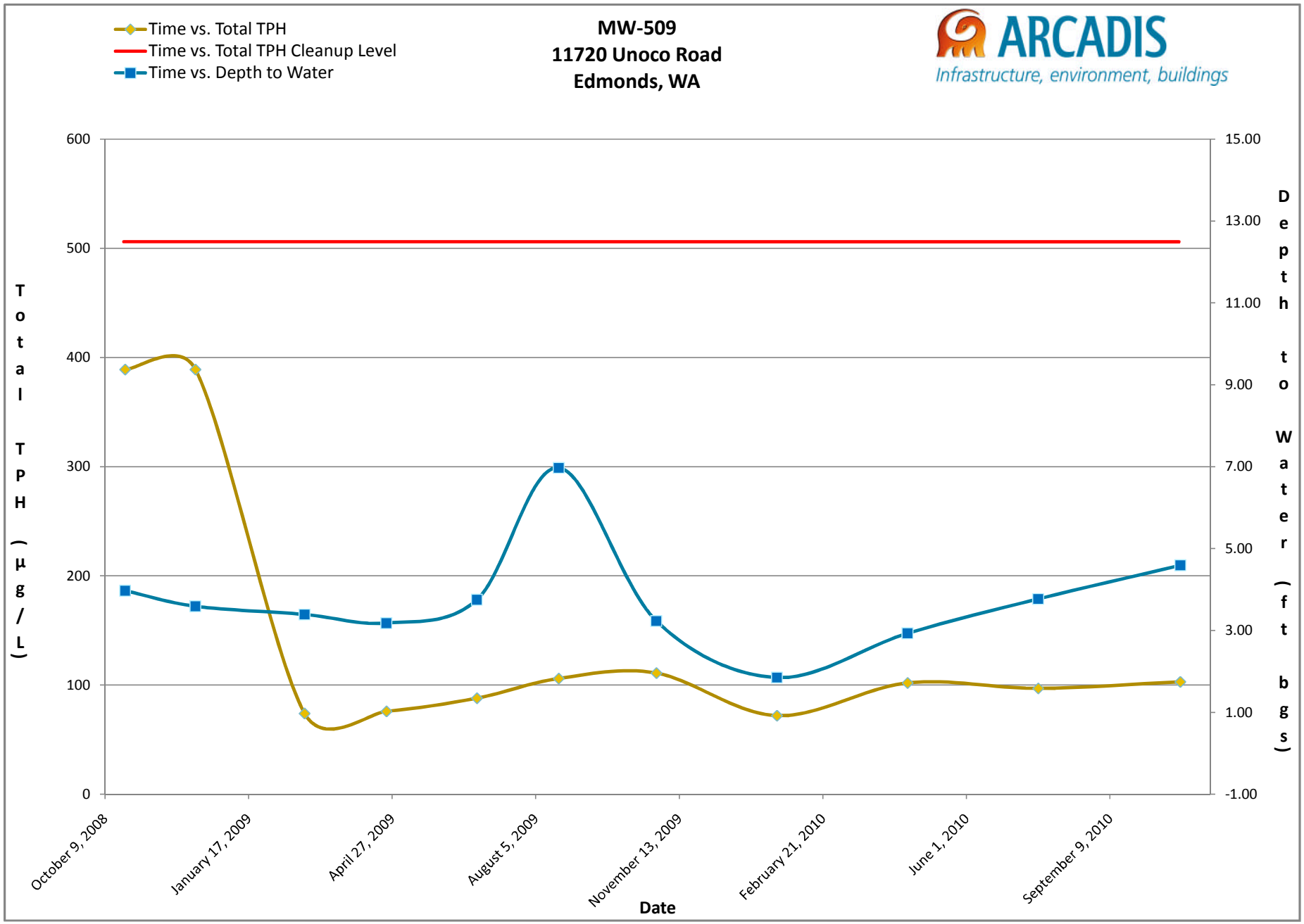

Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
µg/L = micrograms per liter
ft bgs = feet below ground surface
MW-504
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Total TPH (µg/L)
Depth to Water (ft bgs)
800
700
600
500
400
300
200
100
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
Date

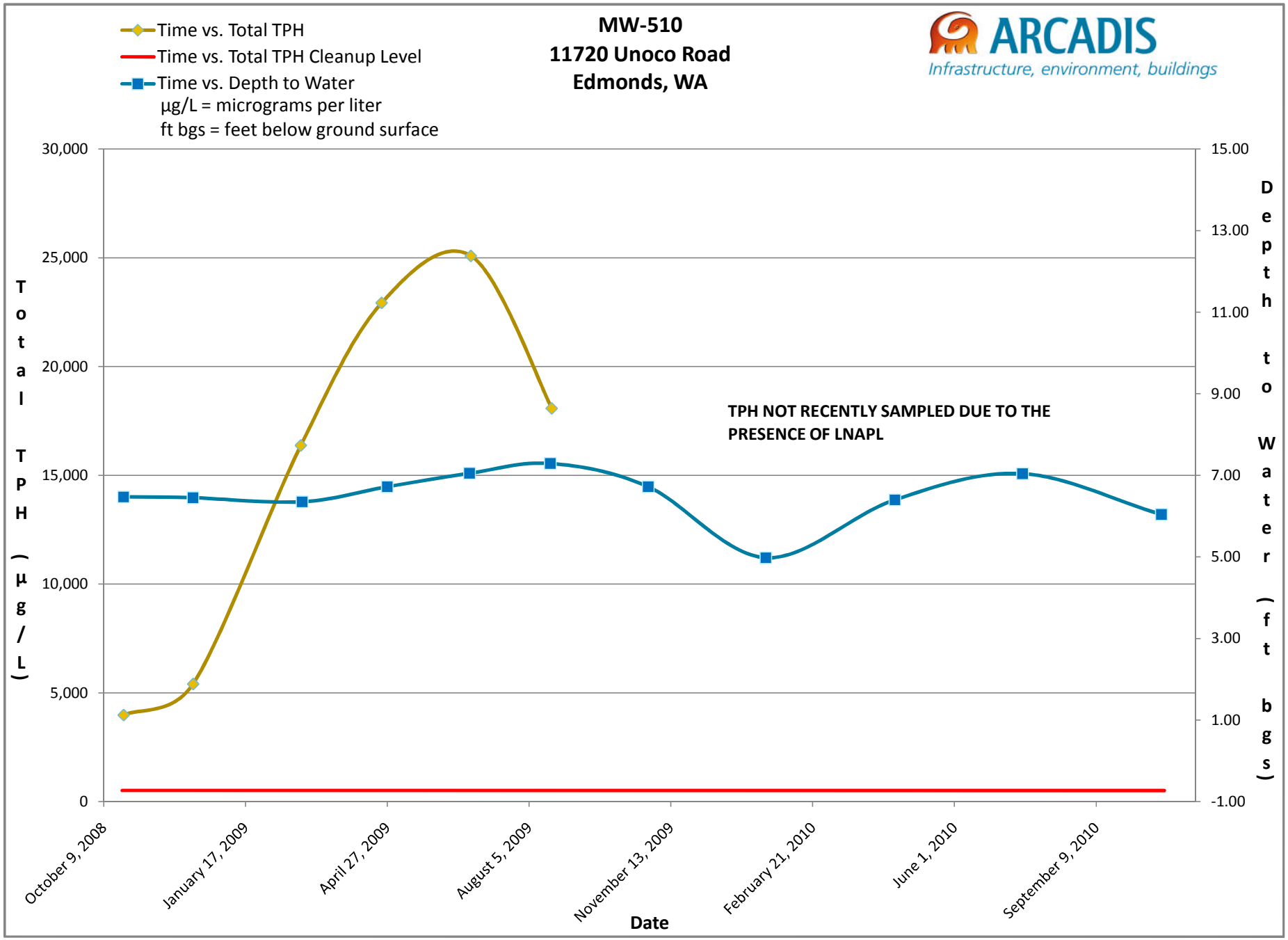

Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
µg/L = micrograms per liter
ft bgs = feet below ground surface
MW-505
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Total TPH (µg/L)
Depth to Water (ft bgs)
600
500
400
300
200
100
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
Date

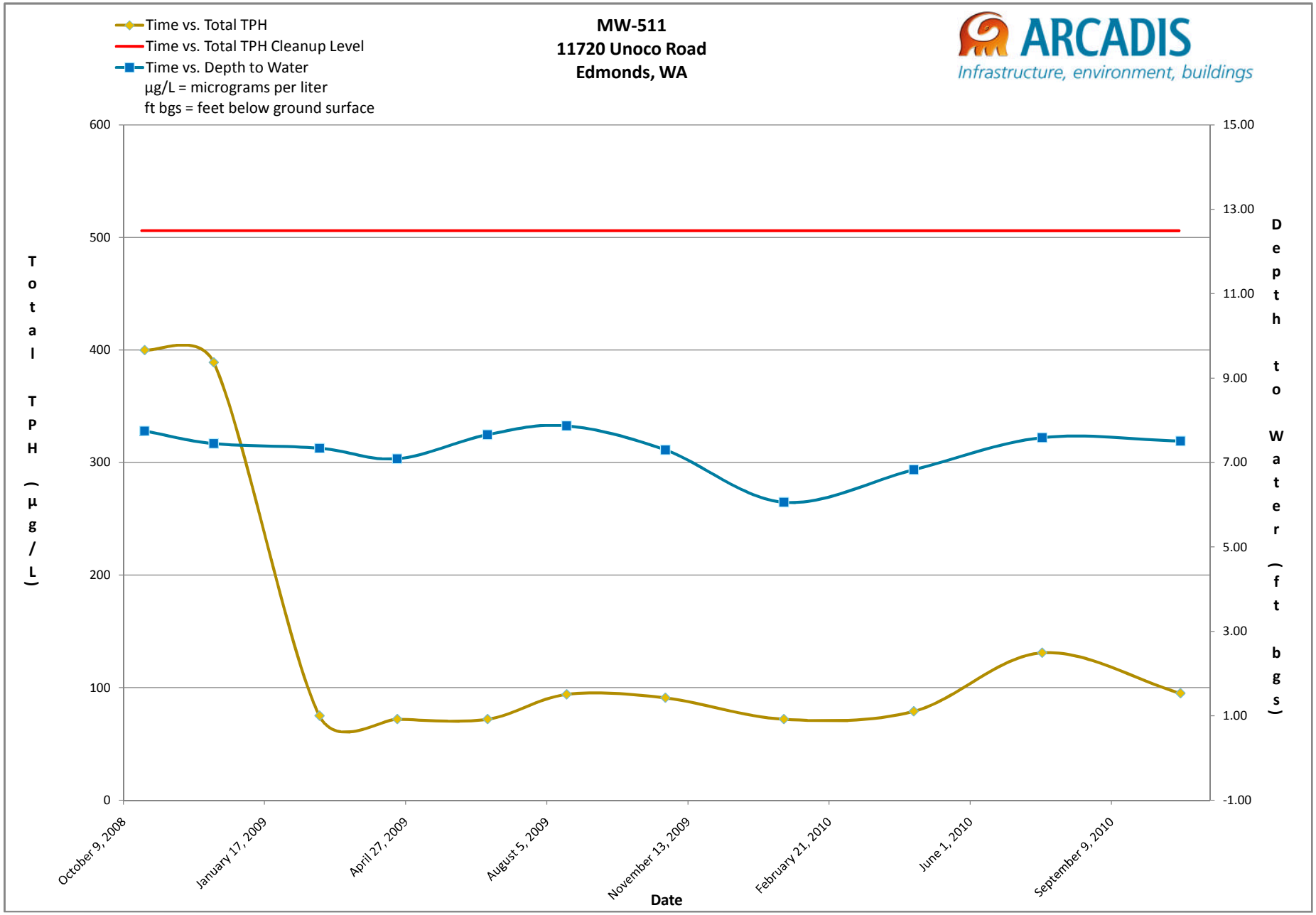

Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
µg/L = micrograms per liter
ft bgs = feet below ground surface
MW-506
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Total TPH (µg/L)
Depth to Water (ft bgs)
600
500
400
300
200
100
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
Date

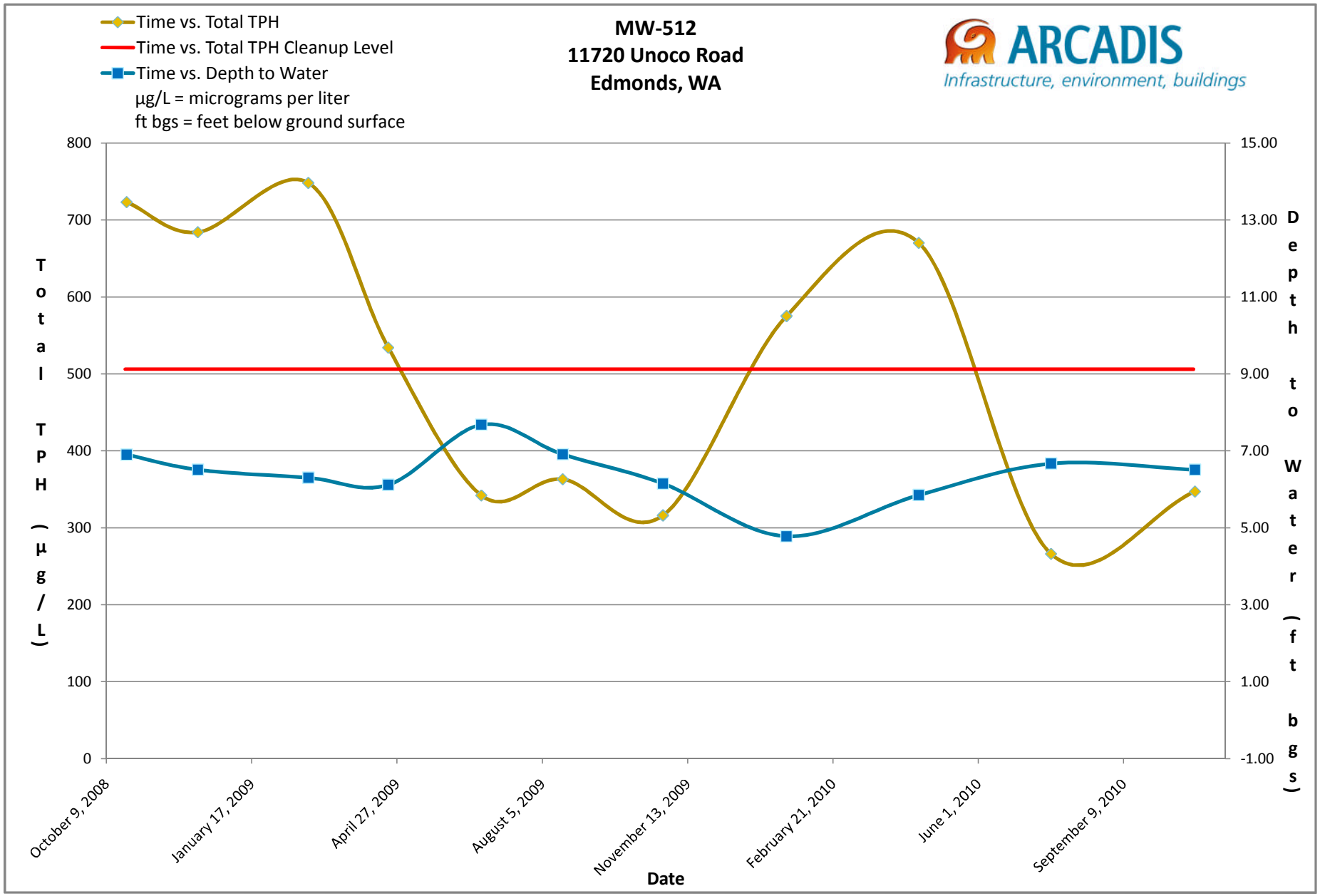

Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
MW-507
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Total TPH (µg/L)
Depth to Water (ft bgs)
1200
1000
800
600
400
200
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
Date

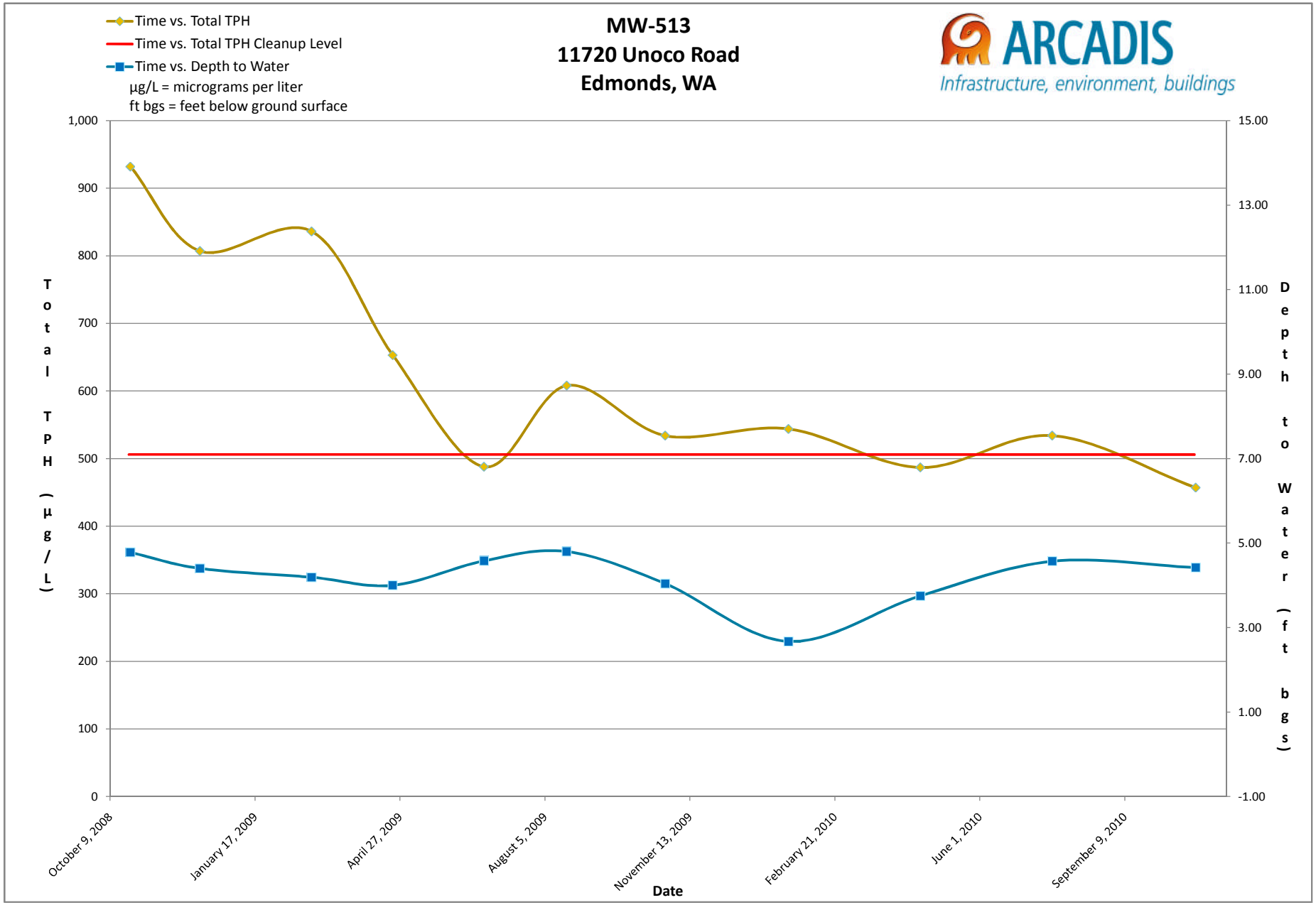

Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
µg/L = micrograms per liter
ft bgs = feet below ground surface
MW-508
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Total TPH (µg/L)
Depth to Water (ft bgs)
800
700
600
500
400
300
200
100
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
Date

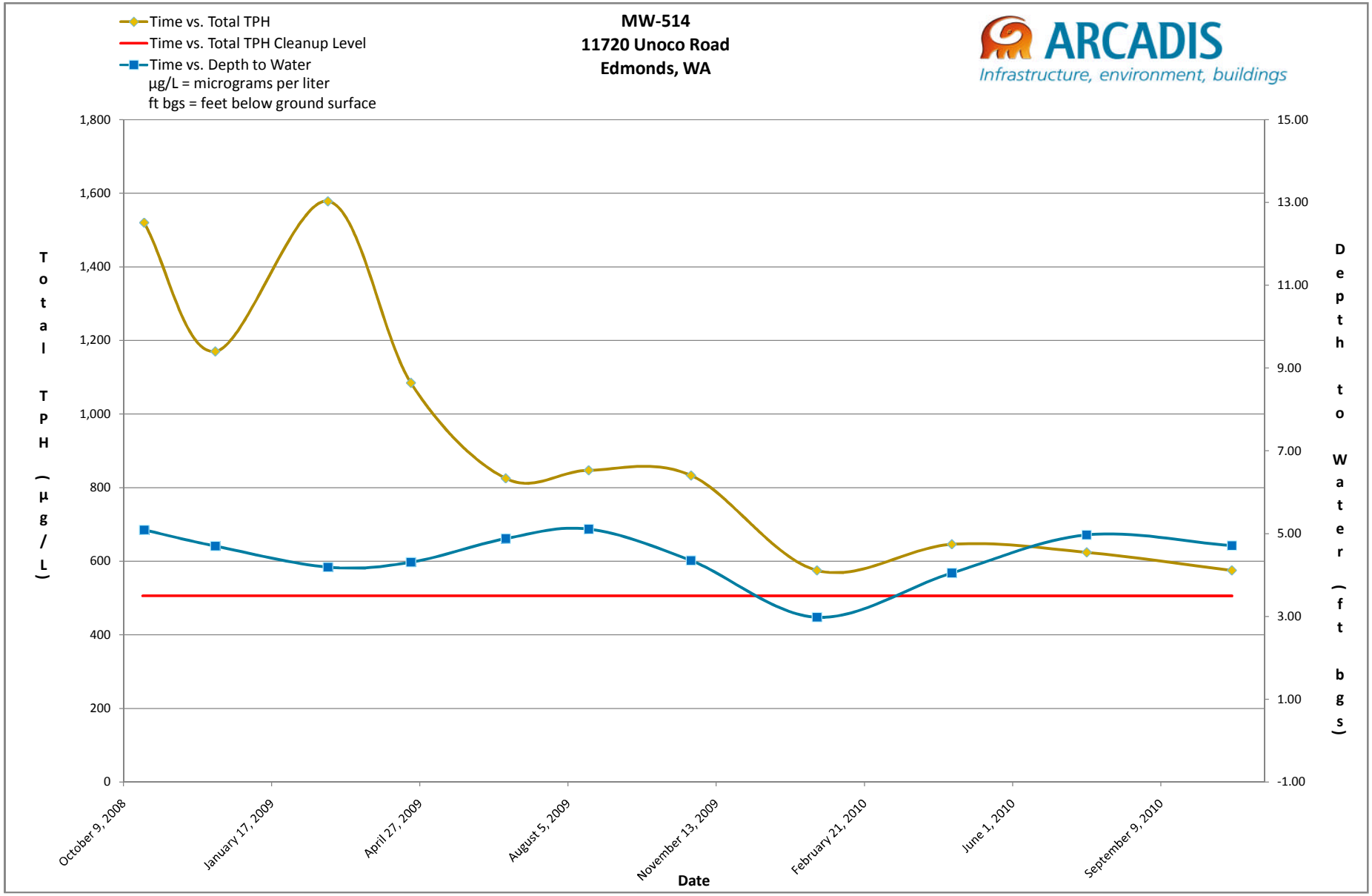

Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
MW-509
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
600
500
400
300
200
100
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
Total TPH (µg/L)
Depth to Water (ft bgs)
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
Date

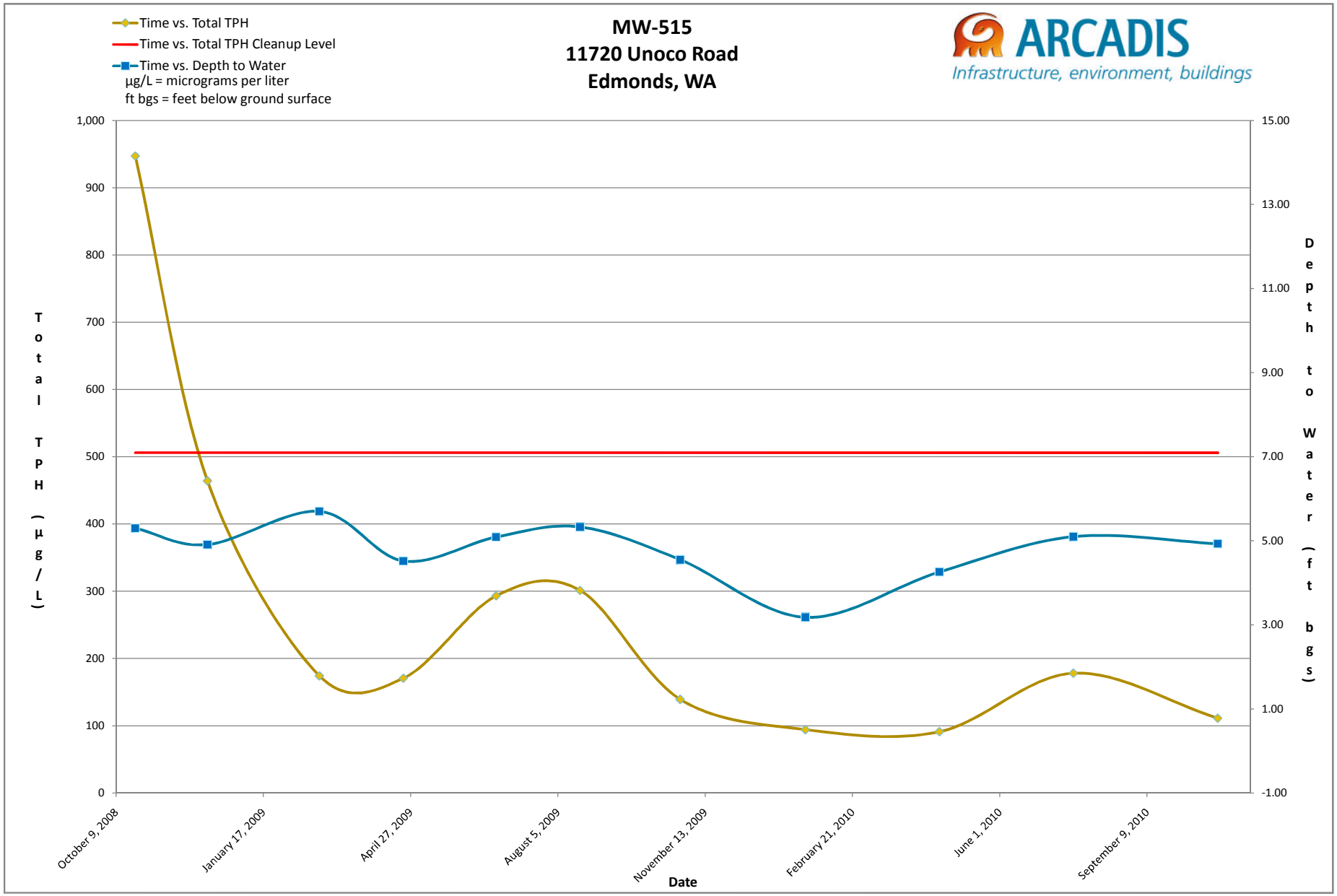

Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
µg/L = micrograms per liter
ft bgs = feet below ground surface
MW-510
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
TPH NOT RECENTLY SAMPLED DUE TO THE PRESENCE OF LNAPL
Total TPH (µg/L)
Depth to Water (ft bgs)
30,000
25,000
20,000
15,000
10,000
5,000
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
Date

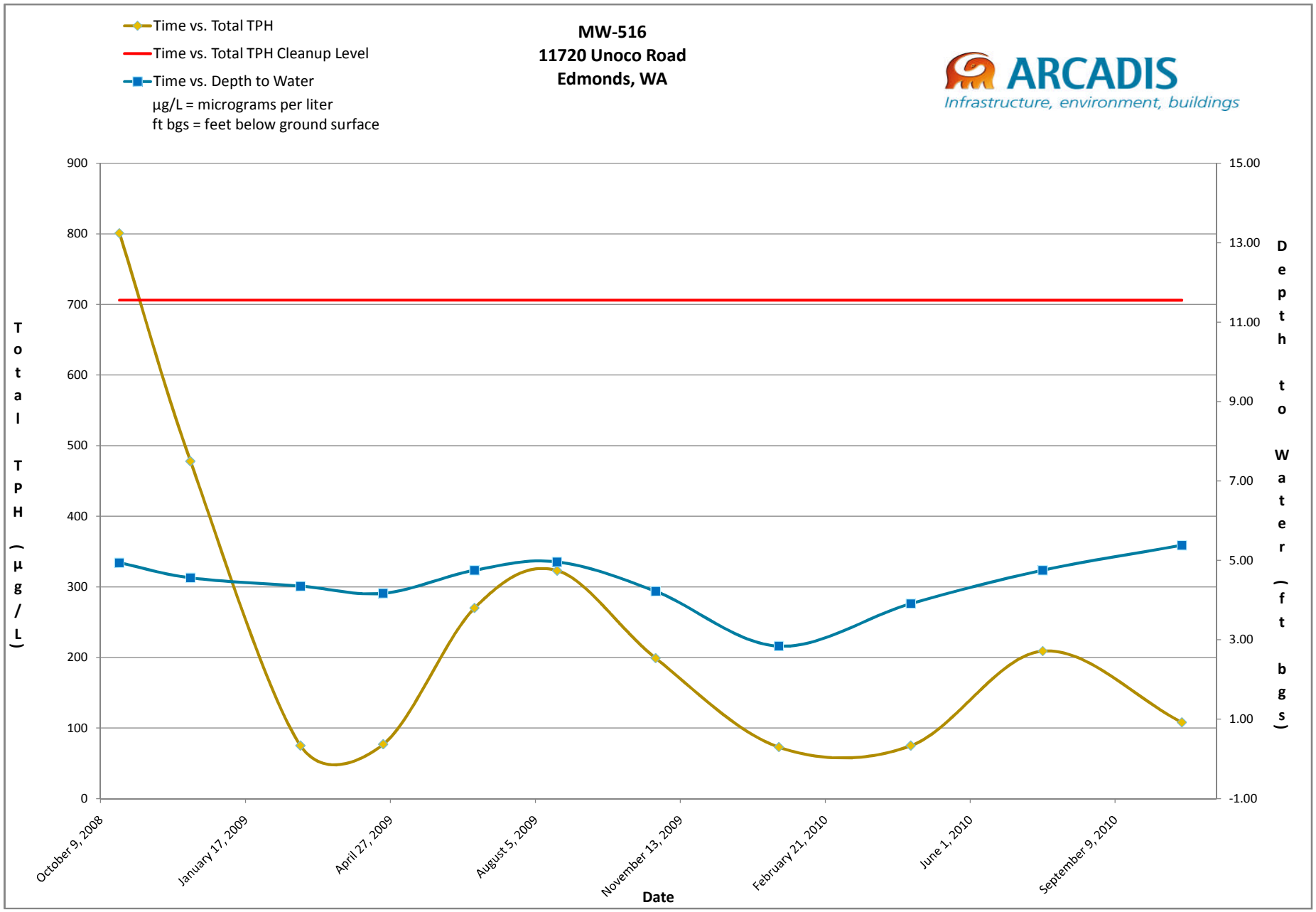

Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
µg/L = micrograms per liter
ft bgs = feet below ground surface
MW-511
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Total TPH (µg/L)
Depth to Water (ft bgs)
600
500
400
300
200
100
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
Date

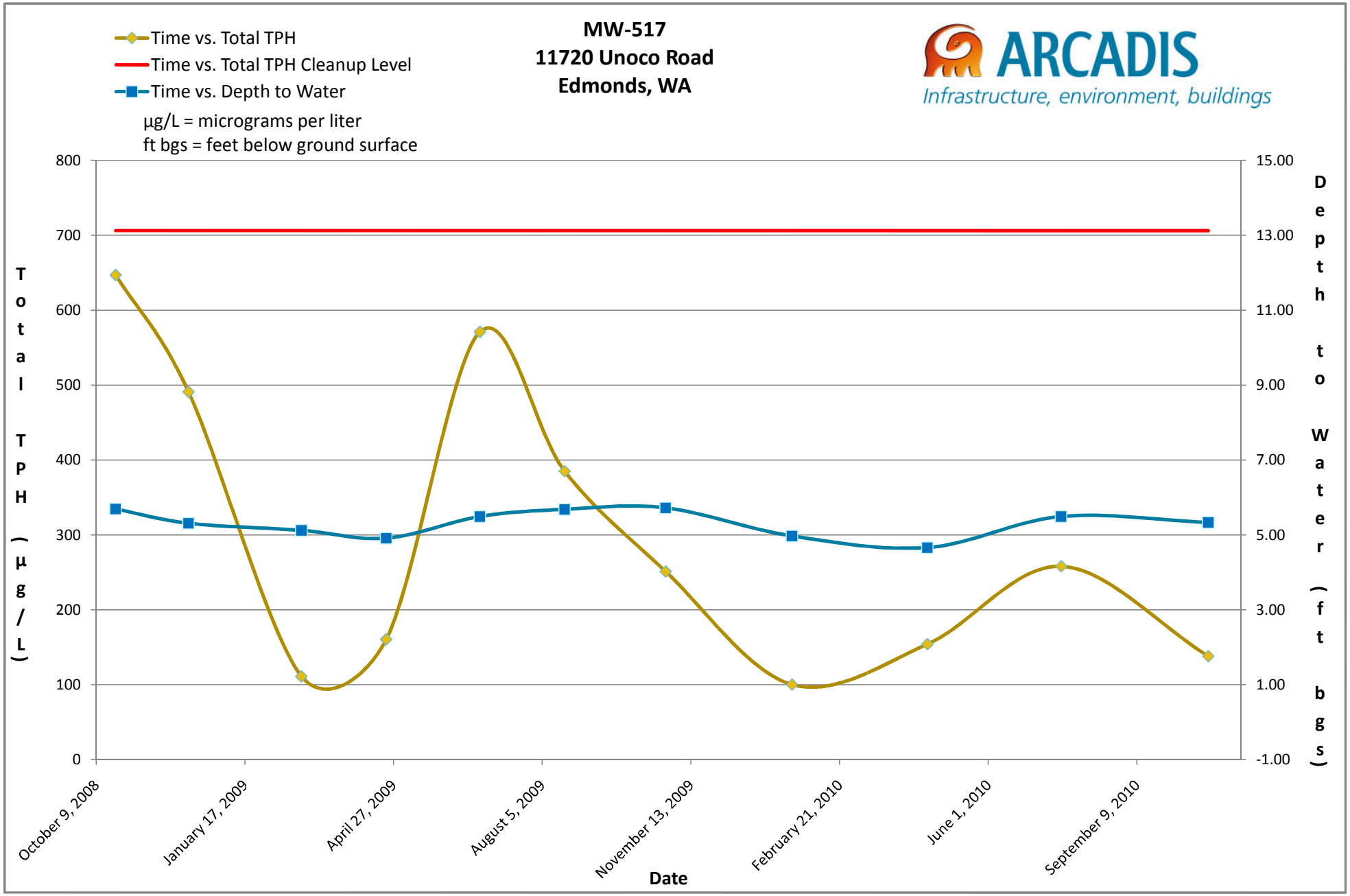

Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
µg/L = micrograms per liter
ft bgs = feet below ground surface
MW-512
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Total TPH (µg/L)
Depth to Water (ft bgs)
800
700
600
500
400
300
200
100
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
Date

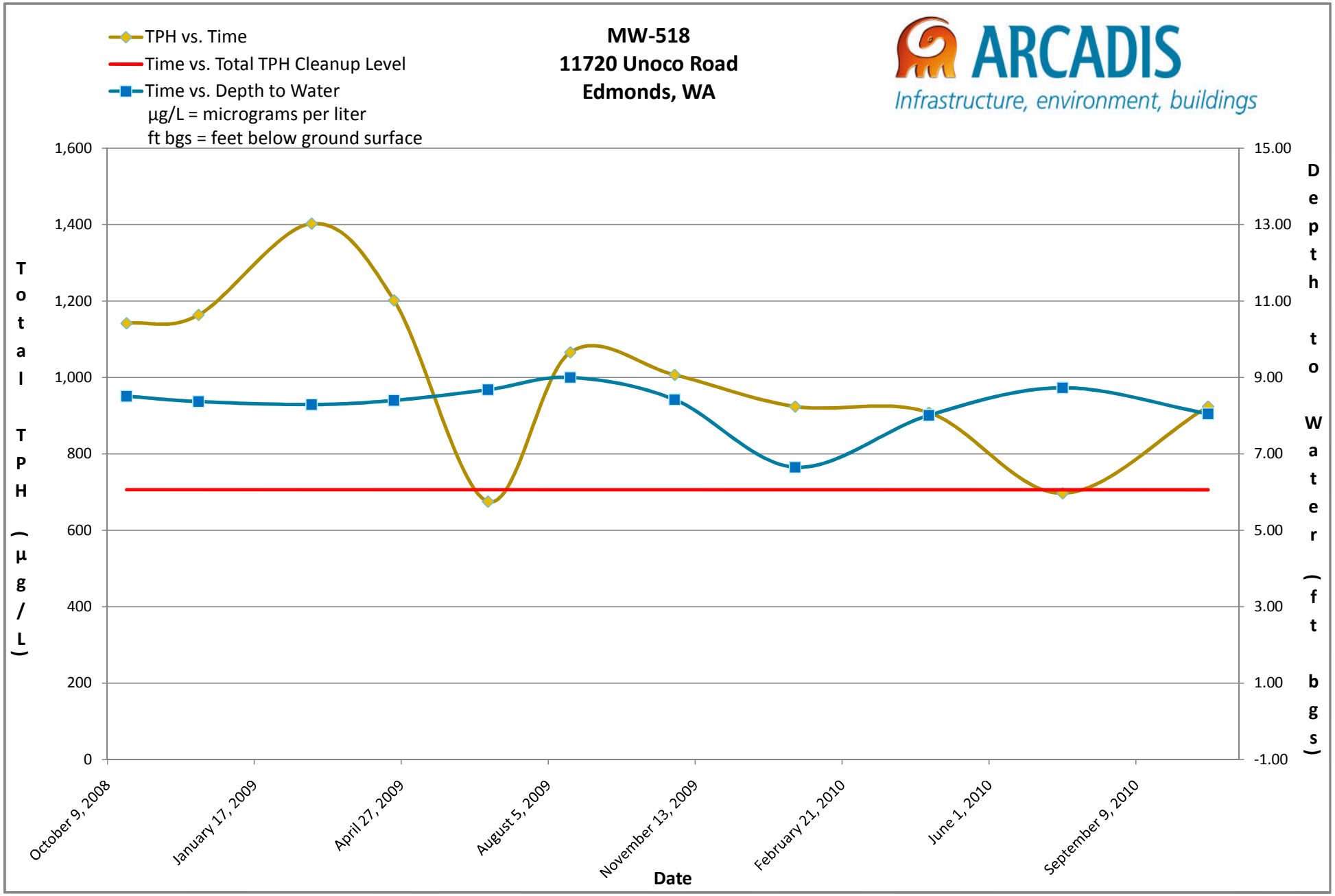

Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
µg/L = micrograms per liter
ft bgs = feet below ground surface
MW-513
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Total TPH (µg/L)
Depth to Water (ft bgs)
1,000
900
800
700
600
500
400
300
200
100
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
Date

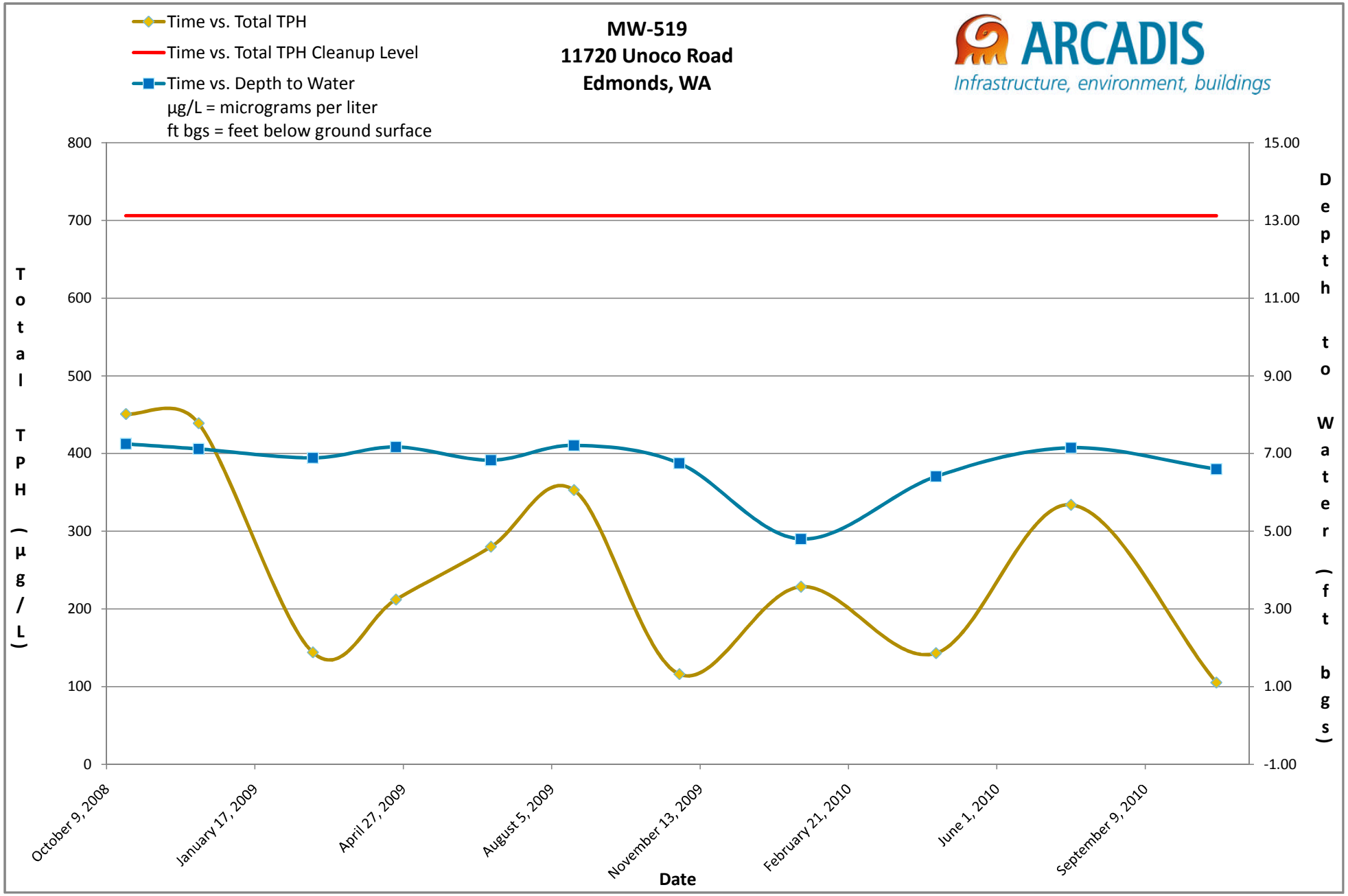

Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
µg/L = micrograms per liter
ft bgs = feet below ground surface
MW-514
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Total TPH (µg/L)
Depth to Water (ft bgs)
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
Date

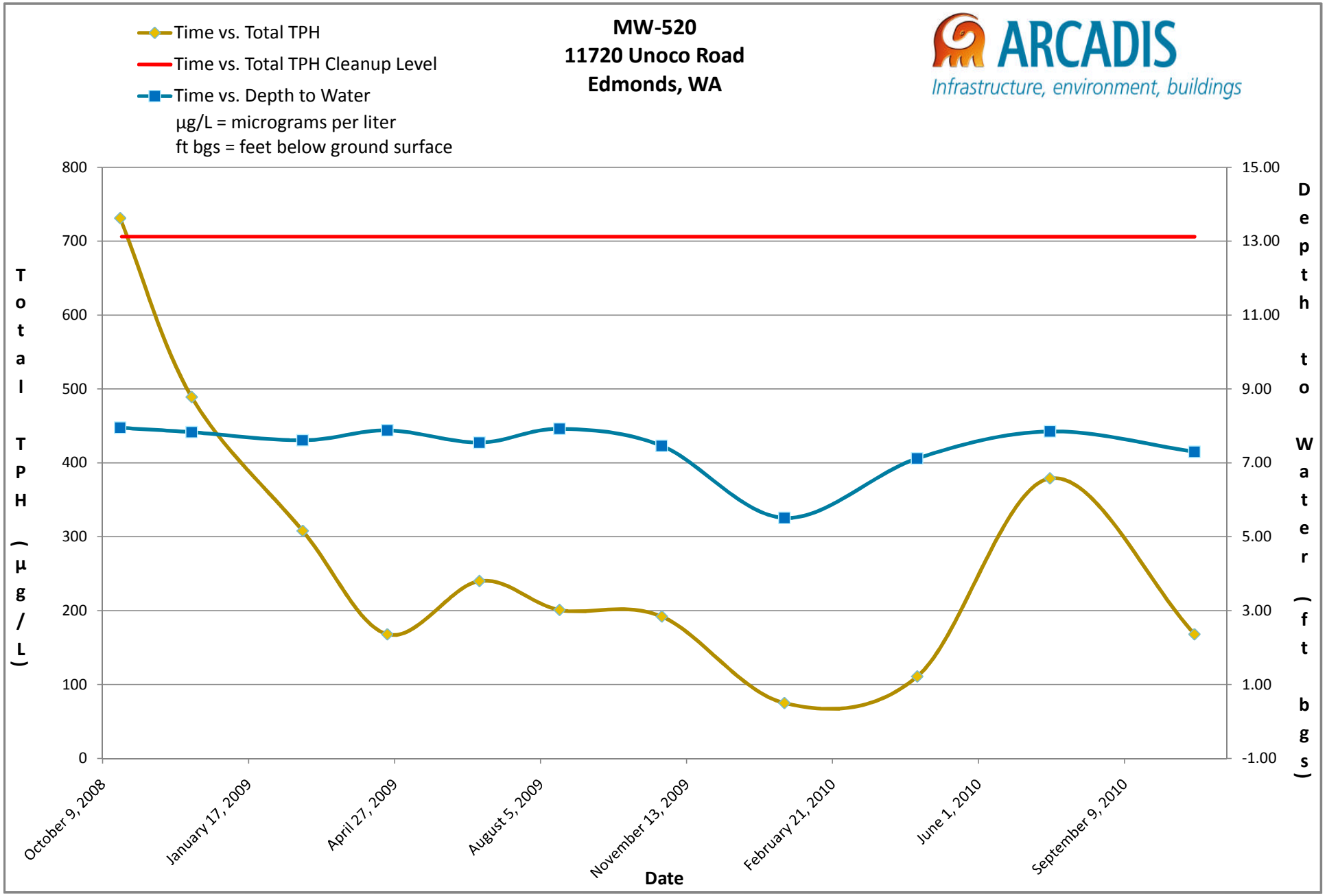

Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
µg/L = micrograms per liter
ft bgs = feet below ground surface
MW-515
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Total TPH (µg/L)
Depth to Water (ft bgs)
1,000
900
800
700
600
500
400
300
200
100
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
Date

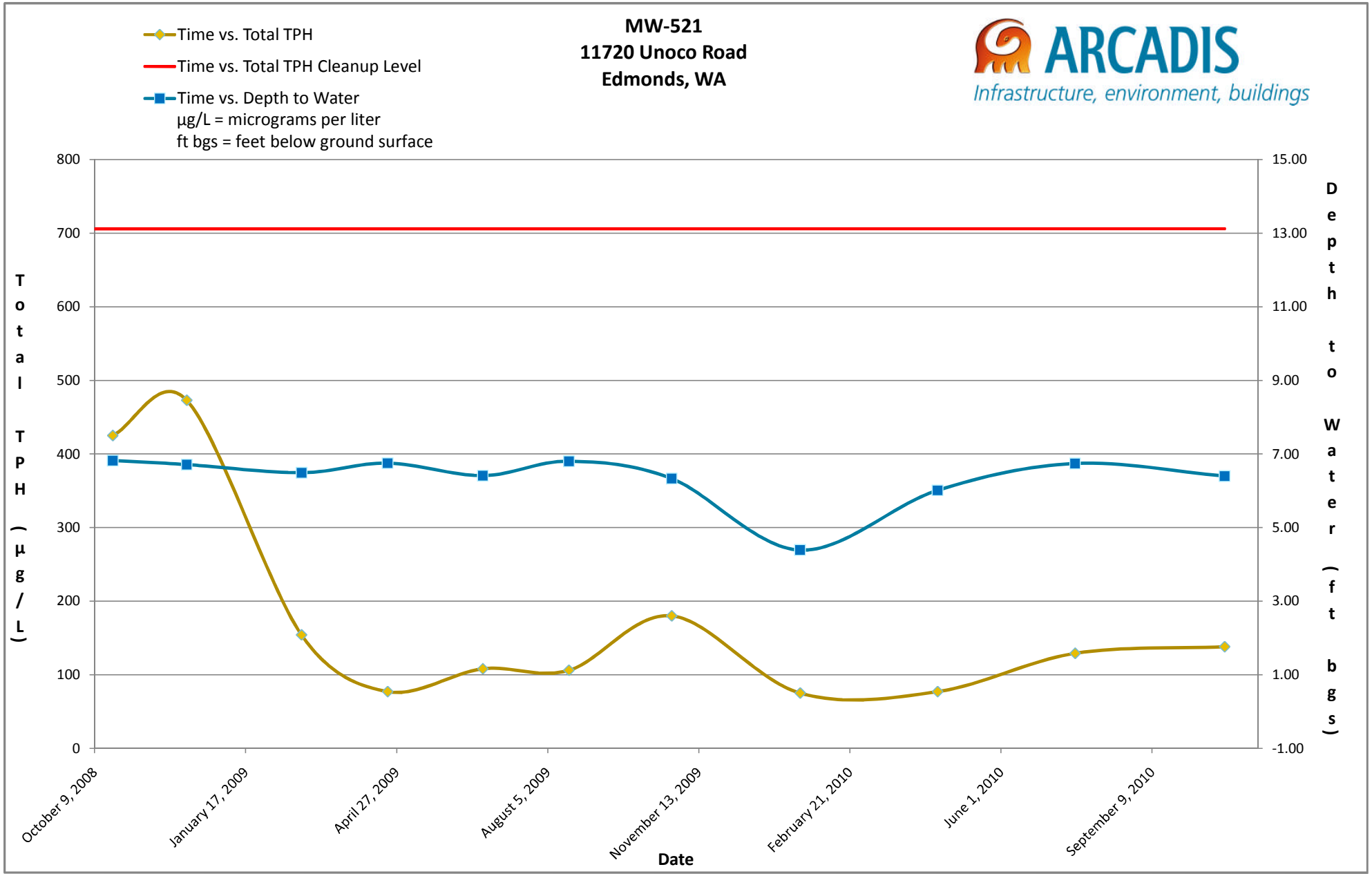

Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
µg/L = micrograms per liter
ft bgs = feet below ground surface
MW-516
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Total TPH (µg/L)
Depth to Water (ft bgs)
900
800
700
600
500
400
300
200
100
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
Date

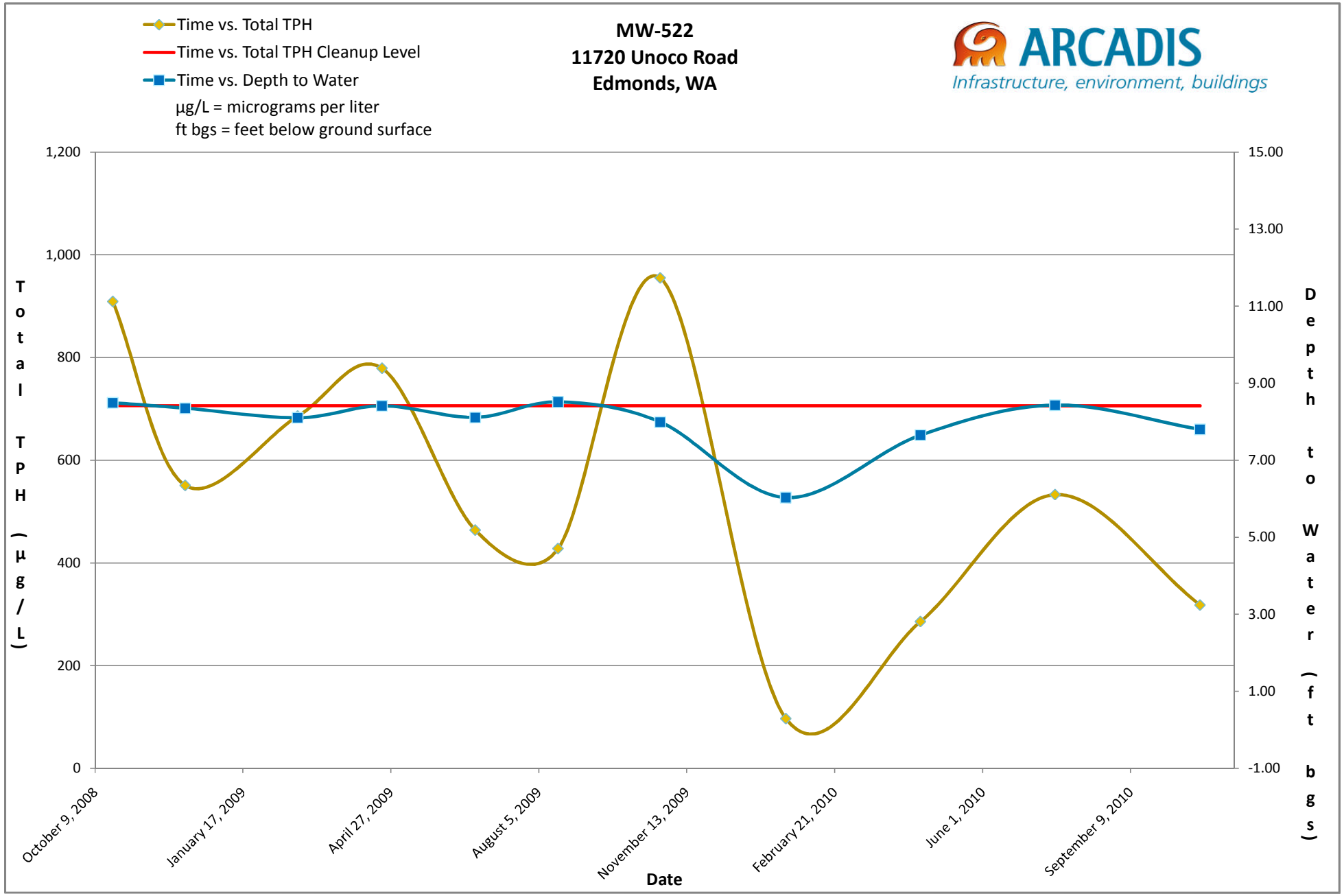

Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
µg/L = micrograms per liter
ft bgs = feet below ground surface
MW-517
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Total TPH (µg/L)
Depth to Water (ft bgs)
800
700
600
500
400
300
200
100
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
Date


TPH vs. Time
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
µg/L = micrograms per liter
ft bgs = feet below ground surface
MW-518
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Total TPH (µg/L)
Depth to Water (ft bgs)
1,600
1,400
1,200
1,000
800
600
400
200
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
Date


Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
µg/L = micrograms per liter
ft bgs = feet below ground surface
MW-519
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Total TPH (µg/L)
Depth to Water (ft bgs)
800
700
600
500
400
300
200
100
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
Date


Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
µg/L = micrograms per liter
ft bgs = feet below ground surface
MW-520
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Total TPH (µg/L)
Depth to Water (ft bgs)
800
700
600
500
400
300
200
100
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
Date


Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
µg/L = micrograms per liter
ft bgs = feet below ground surface
MW-521
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Total TPH (µg/L)
Depth to Water (ft bgs)
800
700
600
500
400
300
200
100
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
November 13, 2009
February 21, 2010
June 1, 2010
September 9, 2010
Date


Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
µg/L = micrograms per liter
ft bgs = feet below ground surface
MW-522
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Total TPH (µg/L)
Depth to Water (ft bgs)
1,200
1,000
800
600
400
200
0
15.00
13.00
11.00
9.00
7.00
5.00
3.00
1.00
-1.00
October 9, 2008
January 17, 2009
April 27, 2009
August 5, 2009
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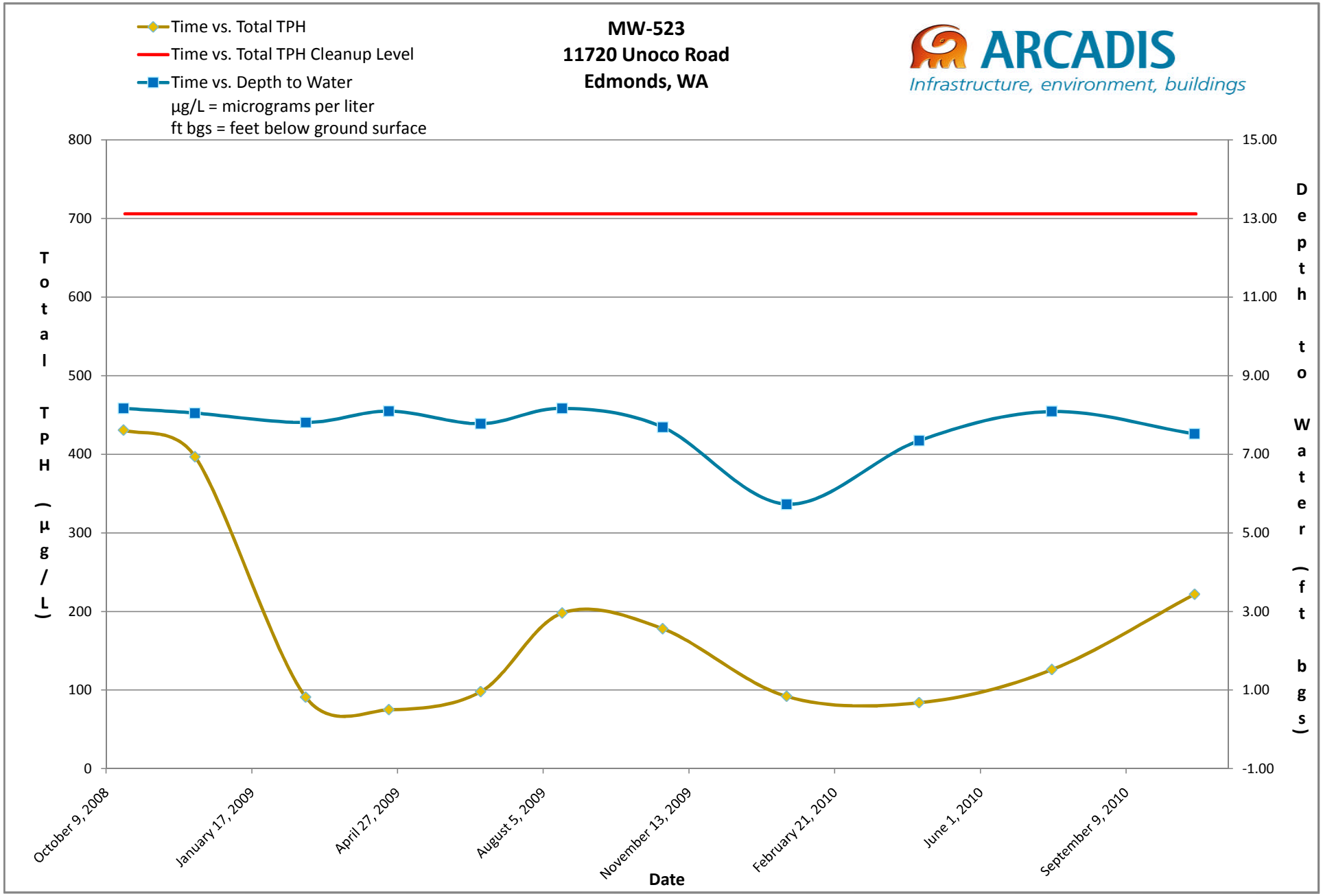
February 21, 2010
June 1, 2010
September 9, 2010
Date


Time vs. Total TPH
Time vs. Total TPH Cleanup Level
Time vs. Depth to Water
µg/L = micrograms per liter
ft bgs = feet below ground surface
MW-523
11720 Unoco Road
Edmonds, WA
ARCADIS
Infrastructure, environment, buildings
Total TPH (µg/L)
Depth to Water (ft bgs)
800
700
600
500
400
300
200
100
0
15.00
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3.00
1.00
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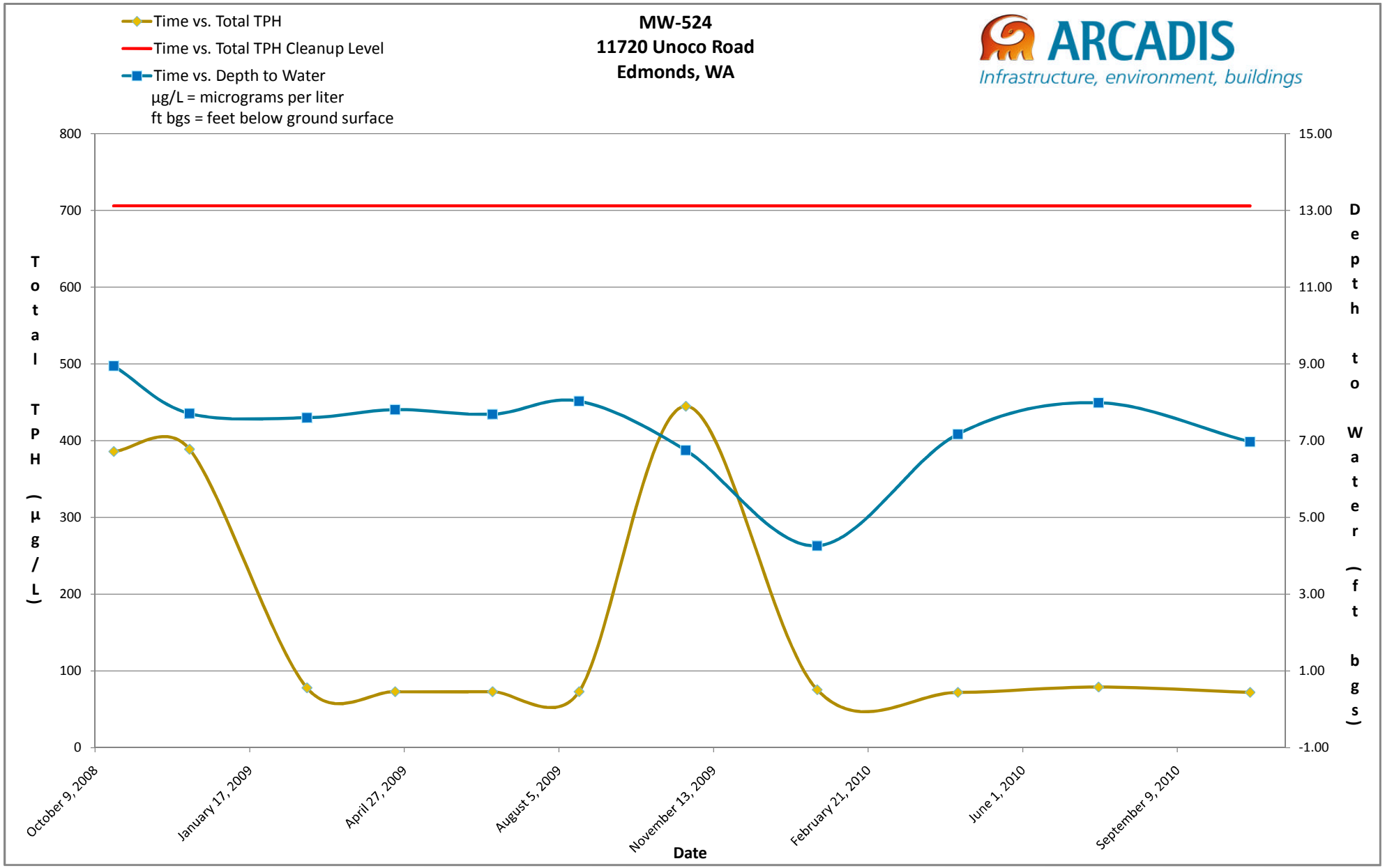
Time vs. Total TPH
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Infrastructure, environment, buildings
Total TPH (µg/L)
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-1.00
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February 21, 2010
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September 9, 2010
Date

ARCADIS

Appendix H

SoakEase™ Product Data Sheet

SoakEase™

Absorbent material for immediate response or minimal product.

Application

- **Passive LNAPL Recovery.**

Description

- 36 in Canister
- Absorbent Socks for 2 and 4 in Canisters

SoakEase™ is a product-selective absorbent sock housed inside a stainless steel canister. It is used as a passive collection system for free phase product such as jet fuel, gasoline or diesel fuel from 2 in and larger recovery wells, monitoring wells and recovery trenches.

The SoakEase™ can be used as a bailer for periodic product removal or as a dedicated system for a more continuous method of recovery. Prior to dedicating the SoakEase™, it is recommended that excess free product be removed by bailing with the SoakEase™.

To use SoakEase™ as a bailer, an absorbent sock is placed in the stainless steel canister; a cord is attached to the support loop and then lowered through the product layer. The full length of the sock should come into contact with the product for greater recovery. Immediately, the SoakEase™ will begin absorbing product at a rate of approximately 0.1 gallon per second, depending on the product viscosity. After some time, the SoakEase™ should be raised from the well; the sock removed from the canister and disposed of in accordance with regulations.

To use the SoakEase™ as a dedicated system, determine the amount of product present and the water table fluctuation using the PWI interface meter (TR-921). When these have been determined, the SoakEase™ may be installed to accommodate level changes up to 36 in.

Tech Tip: *The product absorption rate is determined by the viscosity of the product and can vary depending on site conditions. The SoakEase™ is designed to be used with hydrocarbon-based products. The user must determine the necessary replacement schedule by gauging site conditions. The socks can be squeezed out and reused. Approximately 80% of the original absorption can be recovered.*

SPECIFICATIONS		
Size Designation	**2 in**	**4 in**
Outside Diameter	1.7 in	3.5 in
Length	3 ft 3 in	
Weight (Net)	3.0 lb	6.0 lb
Canister Material	Stainless Steel Type 304, perforated	
Absorbent Sock Material	Polypropylene fibrous material contained in a white fabric sock	
Rated Absorption		
2 in Socks	3 US gal per case (1 qt per 2" sock)	
4 in Socks	9 US gal per case (3 qt per 4" sock)	
Incompatibility	Slight degradation may occur if exposed to strong oxidizing agents	
Warning	Not recommended for use with aggressive fluids, including strong acids, strong bases, oxidizers and hazardous materials	
Reaction time	Immediate	

ORDERING INFORMATION		
TB2-101	2 in Canister	2 lb
TB2-110	2 in SoakEase™ Refill (case of 12)	4 lb
TB4-101	4 in Canister	3 lb
TB4-110	4 in SoakEase™ Refill (case of 12)	7 lb