2015 ANNUAL SITE REPORT
BP WEST COAST PRODUCTS TERMINAL, HARBOR ISLAND
1652 SW LANDER STREET
SEATTLE, WASHINGTON

CONSENT DECREE NO. 00-2-05714-8SEA

April 2016

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Northwest Regional Office
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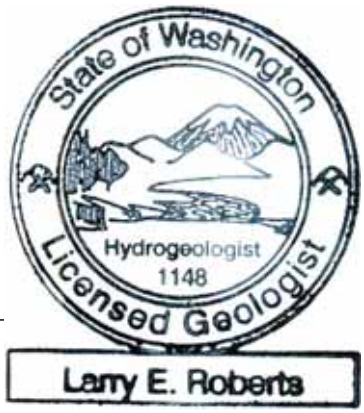

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List of Abbreviations and Acronyms

ARCO	-	Atlantic Richfield Company
BP	-	British Petroleum Company
BTEX	-	Benzene, Toluene, Ethylbenzene, Xylenes
cPAHs	-	Carcinogenic Polycyclic Aromatic Hydrocarbons
CAP	-	Cleanup Action Plan
CCR	-	Construction Completion Report
DAS	-	Diffused Air Stripper
Ecology	-	The Washington State Department of Ecology
EDR	-	Engineering Design Report
EPA	-	United States Environmental Protection Agency
ft/ft	-	Feet per Foot
IHSs	-	Indicator Hazardous Substances
KCDNR	-	King County Department of Natural Resources
LNAPL	-	Light Non-Aqueous Phase Liquid
µg/L	-	Micrograms per Liter
mg/kg	-	Milligrams per Kilogram
MTCA	-	Model Toxics Control Act
PPM	-	Parts Per Million
PRR	-	Periodic Review Report
PRP	-	Potentially Responsible Party
O&M	-	Operation and Maintenance
OU	-	Operable Unit
OWS	-	Oil Water Separator
PPM	-	Parts Per Million
PSCAA	-	Puget Sound Clean Air Agency
RI	-	Remedial Investigation
RI/FS	-	Remedial Investigation and Feasibility Study
S&GOU	-	Harbor Island Soil and Groundwater Operable Unit
SVE	-	Soil Vapor Extraction
TPH	-	Total Petroleum Hydrocarbons
USACE	-	United States Army Corps of Engineers
WQMP	-	Water Quality Monitoring Plan

Executive Summary

Remedial actions have been conducted since 2002 per a Consent Decree at the BP West Coast Products (BP) Terminal 21T (formerly ARCO) (the Site) located on Harbor Island, Seattle, Washington. These actions build upon interim actions conducted from 1992 to 2002. This report summarizes actions conducted in 2015. The Consent Decree, entered into in 2000, required implementation of remedies to address petroleum hydrocarbon impacted soil and groundwater. Remedies include operating active remediation systems in inaccessible areas (e.g. beneath structures) adjacent to the Duwamish Waterway, excavation of accessible soil "hot spots" at inland areas, and natural attenuation of inaccessible soil hot spots. A Groundwater Monitoring and Contingency Program was implemented to confirm that cleanup requirements are achieved. The Consent Decree established restoration timetables for removal of petroleum product, and for groundwater restoration as measured at property boundaries. Timetables have been extended and remedial actions are ongoing to meet cleanup objectives.

Monitoring data show that waterfront remedial actions are achieving cleanup goals. Ecology and BP determined that Plant 1 waterfront groundwater/LNAPL recovery, soil vapor extraction (SVE), and air sparging remediation systems effectively protect the Duwamish Waterway and have removed most LNAPL and hydrocarbons in this area. Waterfront SVE and air sparging have been discontinued with Ecology's approval, as their operation no longer benefits ongoing remedial actions. Groundwater samples from compliance wells located along the waterfront are mainly below cleanup levels for indicator hazardous substances (IHSs), except for benzene detected in previous years in two wells located at the southern end of Plant 1. In 2015, all eight samples analyzed for benzene from these two wells were below the cleanup level, continuing a declining concentration trend in these wells. The operating recovery system provides hydraulic control and recovers dissolved IHSs, including benzene, in this area.

Inland soil remedial actions (excavation, natural attenuation, and SVE) have been effective in protecting groundwater at property boundaries. Ecology determined that remedial actions at Plant 2, in the north-central portion of the Island, appear complete. At Plant 1, an old source of highly weathered hydrocarbons was located in the groundwater "smear" zone, inland from the waterfront near the Site's southern boundary. A second SVE system operated in this area from 2008 to 2014 to improve soil and groundwater conditions. Operation of the inland SVE system was discontinued in 2015, as the system was no longer benefiting ongoing remedial actions. Data collected from six years of system operation and groundwater monitoring indicate that the system operated as designed, and improved groundwater quality in the area.

BP continued planning to install a seawall along Plant 1's waterfront to enhance the Site's seismic stability. Installation was delayed in 2015 due to permitting and contracting issues. The Seawall installation's affect on Site hydrology continues to be evaluated.

In 2015, Ecology and EPA completed five-year reviews for the period from 2010 through 2014. These reviews determined that the requirements of the Consent Decree are being met and that no additional cleanup actions are required beyond ongoing Site-specific cleanup actions and compliance monitoring.

1. Introduction

TechSolve Environmental Inc. (TechSolve, formerly TechSolv Consulting Group, Inc.) has prepared this report on behalf of British Petroleum (BP) to summarize remedial investigation (RI) and cleanup activities conducted during 2015 at the BP West Coast Products (formerly Atlantic Richfield Company [ARCO]) Terminal (the Site) located on Harbor Island in Seattle, Washington. This report was prepared to satisfy Annual Reporting Requirements of Model Toxics Control Act (MTCA) Consent Decree No. 00-2-05714-8SEA, cooperatively entered into between ARCO and the Washington State Department of Ecology (Ecology). The Consent Decree was entered into court on March 24, 2000 (Ecology, 2000b) by the Washington State Attorney General.

This report is organized into seven sections and includes four appendices. Many of the required background and general discussion components summarized in this Annual Site Report have been further explained in previous documents submitted to Ecology and are referenced in the appropriate sections. The report is organized as follows:

- Section 1 – Provides a summary of the project, descriptions of the reporting requirements for the Site, and summarizes the organization of this report.
- Section 2 – Provides descriptions of the Site history and regulatory status, historical investigations, selection of remedial actions, and cleanup action levels for the Site.
- Section 3 – Summarizes remedial actions that have occurred at the Site.
- Section 4 – Summarizes groundwater monitoring activities conducted at the Site and provides results and findings of these activities.
- Section 5 – Summarizes additional activities conducted at the Site in 2015, including continued planning for a new seawall at Plant 1, and Ecology and United States Environmental Protection Agency (EPA) Five Year Reviews.
- Section 6 – Summarizes the information presented in this report.
- Section 7 – Documents the references cited in this report.
- Appendix A: KCDNR Discharge Reports – Provides the two 2015 semi-annual discharge reports provided to the King County Department of Natural Resources (KCDNR).
- Appendix B: Sheen Observations – Documents the occurrence of sheen within booms located on the Duwamish Waterway from 1996 through 2015.
- Appendix C: Groundwater Monitoring Hydrocarbon Results – Graphs of hydrocarbon analytical results for active groundwater monitoring wells.
- Appendix D: Seattle Terminal North Bulkhead Replacement Project – Most recent drawings of the proposed seawall design.

2. Site Description and History

The Site is located on Harbor Island and consists of two separate bulk fuel storage plants (Figure 1). Harbor Island is a 455-acre man-made island that lies between the East and West Waterways of the Duwamish River. Plant 1 occupies about 12 acres on the western portion of the island, along the West Waterway of the Duwamish River. Plant 2 occupies about 3.5 acres in the north-central part of the island. Both plants were constructed in the 1930s and have operated as bulk fuel storage and transfer facilities under several owners since that time. ARCO assumed operation of Plant 1 in the 1940s and Plant 2 in the 1950s.

Harbor Island was created primarily from marine sediments dredged from the Duwamish River. Currently, about 95 percent of the island is covered with industrial buildings, paved roads, or other impervious surfaces. The pervious surfaces of the island consist primarily of land adjacent to aboveground storage tanks and railroad tracks.

In the northern portion of the island, where the Site is located, groundwater flows radially outward from the island center and enters marine surface waters at the island's edge. This flow pattern was reconfirmed in 2015, as discussed in Section 4.1.6. Local groundwater recharge is from rainfall and, possibly, leaking underground utilities (e.g., storm sewers and public water supply piping). Recharge of island-wide groundwater from precipitation has decreased over the past several decades due to substantial increases in impermeable surface areas from island redevelopment. Ecology and the EPA have determined that groundwater beneath Harbor Island is non-potable, which is unlikely to change due to extensive industrial land use on the island.

2.1. Site Regulatory Status

Harbor Island was placed on the National Priorities List in 1983 as a Superfund Site due to elevated levels of hazardous substances in soil, primarily lead. The Harbor Island Superfund Site consists of several operable units (OUs). The BP Terminal is part of the Tank Farm OU, which include the adjacent Shell (formerly Equiva Services, LLC, Equilon, and Texaco) and Kinder Morgan (formerly GATX and Shell) terminals. Ecology is the lead regulatory agency for the Tank Farm OU. A large portion of the island is included in the Soil and Groundwater OU (S&GOU), which is under EPA jurisdiction. ARCO is involved with these two OUs as discussed below.

ARCO and Ecology cooperatively entered into Agreed Order No. DE 92 TC-N158 in 1992 (Ecology, 1992) to conduct Site characterization activities and develop remedial actions. Remedial Investigation/Feasibility Studies (RI/FS) completed in 1997 (Geraghty & Miller, 1994, 1996, and 1997) showed hazardous substances present in groundwater and soil at the Site were primarily highly weathered total petroleum hydrocarbons (TPH) as diesel (TPH-D) with lesser amounts of weathered gasoline (TPH-G) and heavier oil (TPH-O). The weathered TPH likely resulted from historic spills at the Site. The RI/FS showed the primary area of impact at the Site was a petroleum-based light non-aqueous phase liquid (LNAPL) plume located beneath the warehouse adjacent to the Duwamish River at Plant 1. Secondary areas of concern included petroleum impacted soils located within the Plant 1 and Plant 2 tank farms (Figure 2 and 3). Site-

specific cleanup alternatives for groundwater and soil were developed next and evaluated to protect human health and the environment at the Site.

ARCO entered into a Consent Decree with Ecology in 2000 for implementing remedial actions at the Site. Separate cleanup actions for the Plant 1 Waterfront area and for Plant 1 and 2 soils were specified in a Cleanup Action Plan (CAP) (Ecology, 1999) and in an Engineering Design Report (EDR) (TechSolv and AG&M, 2000a). Cleanup actions were selected from site-specific cleanup action alternatives developed as part of a Focused Feasibility Study (Geraghty & Miller, 1997). Elements of the selected cleanup actions include:

- Pumping and treatment for an LNAPL plume and dissolved hydrocarbon recovery.
- Excavation of accessible TPH impacted soil "hot spots" in the inland portions of Plant 1 and Plant 2.
- Air Sparging and Soil Vapor Extraction (SVE) for accelerated mass removal of residual hydrocarbons in inaccessible soils.
- Groundwater compliance monitoring.
- Natural attenuation.
- Deed restrictions.
- Institutional controls.

A period of 18 months was established for removal of LNAPL beneath the warehouse, and 5 years for groundwater restoration as measured at property boundaries. Additional contingency actions have been implemented at the Site, including continued operation of the waterfront recovery system beyond 5 years and former operation of a SVE system to address inaccessible hot spot soils inland from the waterfront at Plant 1, as further discussed in Section 3.3.

ARCO also entered into a Consent Decree with EPA in 1994 (EPA, 1994) for the S&GOU to have minor participation in the long term monitoring activities and for funding EPA oversight. ARCO, Lockheed, and Equilon equally share 75% of one share of the 8.75 total shares for the Potentially Responsible Party (PRP) group, bringing ARCO's overall commitment to the S&GOU to approximately 2.9%. As a PRP to the S&GOU, ARCO assisted with preparation and implementation of the Groundwater Monitoring Plan.

2.2. Cleanup Criteria

Indicator hazardous substances (IHSs) and Site cleanup levels for the Site were identified and defined in the CAP and are summarized below.

The TPH cleanup action level for subsurface soil at the primary area of concern (Plant 1) was set to meet remedial objectives of protecting surface water at property boundaries and shorelines. The Total TPH (TPH-G+TPH-D+TPH-O) cleanup level is also protective for other

chemical constituents in petroleum product (i.e., benzene, toluene, ethylbenzene, xylenes [BTEX]) and is:

Total TPH	10,000 milligrams/kilogram (mg/kg)

The TPH cleanup action level for subsurface soil at the secondary area of concern (Plant 2) was set to meet remedial objectives of protecting surface water at property boundaries by improving general groundwater conditions at the source. This cleanup level was also set to enhance the timely restoration of impacted areas through natural attenuation, and is:

Total TPH	20,000 mg/kg

Site groundwater cleanup levels established by Ecology were based on surface water standards, to be protective of aquatic organisms in the Duwamish River. These standards were adopted ambient water quality criteria (Washington Administrative Code 173-201A and Section 304 of the Federal Clean Water Act). Surface water standards were not established for TPH when the CAP was approved; therefore, groundwater cleanup levels for TPH-G, TPH-D, and TPH-O were selected by Ecology as protective cleanup goals. Site groundwater cleanup levels are:

Product (LNAPL)	No sheen
Benzene	71 micrograms/liter (µg/L)
Carcinogenic Polycyclic Aromatic Hydrocarbons (cPAHs)	0.031 µg/L
Copper	2.9 µg/L
TPH-G	1,000 µg/L
TPH-D	10,000 µg/L
TPH-O	10,000 µg/L

3. Summary of Selected Remedial Actions and Implementation

The following sections summarize remedial actions selected for the Site based on RI/FS and subsequent investigations, and their implementation status. Accessible soil remedies have been completed, as detailed in referenced documents. Inaccessible soil and groundwater remedies are ongoing and, therefore, discussed at greater length than accessible soil remedies.

3.1. Waterfront Remedial Actions

Groundwater remedial actions have been conducted along the waterfront at Plant 1 (Figure 2) since 1992. An interim groundwater/LNAPL recovery system operated from 1992 through 2002, and an interim SVE system operated from 1996 through 2002. Final remediation systems were installed in 2002, described in the EDR (TechSolv and AG&M, 2000), and are summarized below.

Final remediation system designs were based upon interim system success, and consisted of a combination of SVE, groundwater/LNAPL recovery, and air sparging. The groundwater/LNAPL recovery system was designed to capture LNAPL and dissolved hydrocarbons in groundwater and provide hydraulic control along the waterfront. The air sparging system was designed to mobilize LNAPL to aid in capture, to enhance in-situ biodegradation of residual hydrocarbons, and to strip volatile hydrocarbons from groundwater. The SVE system was designed to capture volatile hydrocarbons vapors and enhance in-situ biodegradation of residual hydrocarbons in the vadose zone. System components are located along the waterfront, in the warehouse areas and by the truck loading rack area of Plant 1 (Figure 4), and further discussed in following sections.

The 2001 Nisqually earthquake damaged the warehouse at the Site, delaying installation of final remediation systems until repairs were made (TechSolv, 2002). System construction activities were completed in 2003 and were detailed in the Construction Completion Report (CCR) (TechSolv, 2003c). The CCR was prepared following system testing and startup and documented that Consent Decree and EDR requirements were followed during system construction. The CCR was approved by Ecology in 2004 (Ecology, 2004a).

Operation and maintenance (O&M) requirements for the final remediation system were presented in the Final O&M Manual (TechSolv, 2003d), which was approved by Ecology in 2004 (Ecology, 2004a) The O&M Manual presents system descriptions, startup and shutdown procedures, alarm conditions and remedies, normal operating conditions, system safety features, waste handling, and vendor-supplied literature. The O&M manual is utilized as a working field document and is maintained on-site. The manual is updated as system operations or procedures change or as equipment is replaced.

3.1.1. Waterfront Groundwater/LNAPL Recovery System

The waterfront groundwater/LNAPL recovery system captures LNAPL and groundwater containing dissolved hydrocarbons. The system utilizes total-fluid pumps in recovery wells to

pump LNAPL and groundwater to the remediation system treatment area. The system consists of 10 recovery wells (GM-11S, RW-1, RW-2, RW-4, RW-5, RW-6, RW-7, RW-8, RW-9, RW-10) located along the waterfront at Plant 1 (Figure 4). Recovered LNAPL and groundwater are pumped into an oil water separator (OWS), which separates LNAPL from groundwater. Recovered LNAPL is recycled off-site. Separated groundwater enters a diffused air stripper (DAS), which strips dissolved volatile hydrocarbons from wastewater. Treated groundwater flows through a totalizer prior to discharge to the sanitary sewer. The OWS and DAS are utilized to comply with KCDNR sanitary sewer discharge requirements.

3.1.1.1. Recovery System History

Well RW-1 has been utilized for groundwater recovery since interim system startup in 1992. Well RW-4 operated as part of the interim system from 1998 to 1999 and has operated since 2001 with Wells RW-2, RW-5, and RW-6, following system installation activities north of the warehouse. Well GM-11S was converted from a monitoring well to a recovery well in 2000 after LNAPL was observed in the well. Wells RW-7, RW-8, RW-9, and RW-10 were completed during final system construction and brought on-line during final startup in 2002.

In 2003, decreased LNAPL recovery triggered a soil investigation at Plant 1 (TechSolv, 2003b). Soil cores evaluated for LNAPL presence showed no LNAPL existing outside recovery wells' capture zone, supporting data showing most LNAPL has been recovered from the warehouse area.

The groundwater/LNAPL recovery system is monitored weekly and maintenance is performed as needed to ensure that the system operates as designed and in accordance with permit requirements. Testing of influent and effluent streams (Table 1) is conducted monthly to ensure compliance with KCDNR Permit 7592-05 for Sample Site A43262 and Puget Sound Clean Air Agency (PSCAA) Discharge Authorization No. 9817 requirements.

In 2015, Permit 7592-05 required semi-annual submittal of compliance monitoring data and monthly submittal of gallons of processed groundwater discharged to sanitary sewer. Both 2015 semi-annual KCDNR Waste Discharge Self-Monitoring Reports are included in Appendix A. Results from compliance testing (Table 1, Figures 5 through 7) show that the recovery system treatment components effectively treated recovered groundwater and met discharge compliance requirements. Monitoring results collected during 2015 showed discharges were below permitted limits during all monitoring periods. Should discharges exceed permit guidelines, recovery systems will be shut down and KCDNR contacted regarding the exceedance. To date, monitoring of analytes has shown that the system continues to operate as designed.

PSCAA air discharge authorization Notice of Construction No. 9817 allows for continued air discharge from the DAS portion of the groundwater/LNAPL recovery system. Air monitoring data are collected to verify compliance with PSCAA's air discharge limits, and are provided to PSCAA upon request. Air discharges from the DAS in 2015 were below permitted levels and also below PSCAA's exemption thresholds for soil and groundwater remediation projects listed

in PSCAA Regulation I, Article 6, Section 6.03(c)(94), indicating air permitting is no longer required. Permits and air data are retained by TechSolve and are available upon request.

Groundwater samples are voluntarily collected semi-annually from individual recovery wells to evaluate trends in these wells (Table 2). In 2015, samples from two of ten recovery wells (RW-4 and RW-9) exceeded the TPH-D cleanup level, samples from two wells (RW-2 and RW-4) exceeded the TPH-G cleanup level, and samples from a single recovery well (RW-2) exceeded the benzene cleanup level. TPH and benzene concentrations detected in samples from the remaining six recovery wells (GM-11S, RW-1, RW-5, RW-6, RW-7, and RW-10) were below groundwater cleanup levels. These data are consistent with historical data from past years, and continue to show that groundwater/LNAPL recovery has reduced concentrations of dissolved hydrocarbons to below the groundwater cleanup levels, listed in Section 2.2, in most recovery wells and that much of the available TPH-D, TPH-G, and benzene has been recovered.

Based upon the sampling results listed above, recovery wells with groundwater concentrations of dissolved TPH-G and benzene above cleanup levels appears to be limited to the northern end of the warehouse and truck loading rack area. Recovery wells with remaining TPH-D above the cleanup level appears to be limited to the southern portion of the recovery system. These data have been consistent over the past several years. Recovery wells will continue to be voluntarily monitored in 2016 to evaluate data trends.

3.1.1.2. Recovery System Drawdown

The groundwater/LNAPL recovery system was designed to pump shallow groundwater, with water table drawdown extending to the bottom of the LNAPL smear zone (approximately 4 feet in total height, which was created by seasonal and tidal fluctuations in water table elevation). Pumping tests (TechSolv, 1999a) showed that an appropriate capture zone could be achieved with pumping rates from 0.7 to 0.9 gallons per minute per well. Recovery system startup testing confirmed these pumping rates achieved desired drawdown.

Operation data for the groundwater/LNAPL recovery system collected through 2015 (Table 1) show that desired water table drawdown and hydraulic capture/control are being achieved. Drawdown is also visually confirmed during routine O&M. These data and observations indicate fouling in soil formations surrounding the recovery wells has likely decreased recovery over time when compared to historic rates. Fouling is mainly from biological and mineral deposits generated by high iron and manganese concentrations in groundwater. Deposits are routinely cleaned from wells, pumps, and piping to prevent fouling and blockages. Preventative maintenance and redevelopment activities were performed on groundwater recovery wells in 2015 to remove fouling and attempt to improve pumping rates, as further discussed in Section 3.1.1.4. While fouling may reduce pumping rates, desired drawdown is being achieved, and the system continues to respond to tidally influenced changes in groundwater elevation.

Groundwater elevations vary daily in groundwater/LNAPL recovery wells due to tidal fluctuations in the adjacent Duwamish Waterway. Testing has shown that while the Duwamish Waterway fluctuates up to 14 feet during a daily tidal cycle, shallow groundwater only

fluctuates about 1 foot over the same period (TechSolv, 2004). The RI, determined that the difference in tidal response for shallow groundwater versus deeper groundwater is due to the dampening effect of the western warehouse foundation (driven interlocking sheet piling underlying the warehouse foundation), bulkheads at the island edge, and decreased seepage through a silty/clay layer that partially separates upper and lower water tables in some areas.

Pumping rate data, collected multiple times a day during various tidal stages, continue to show that fluctuations in tidal elevations affect groundwater/LNAPL recovery system pumping. These data show a direct correlation between tidal elevation and groundwater recovery rates (Figure 8). Data indicate that groundwater/LNAPL recovery system operation affects deeper groundwater and that the desired drawdown is achieved without adjustment to account for tidal fluctuations (i.e., total-fluids pumps automatically pump faster during high tides).

Since 2010, BP has been planning to install a new seawall along the northern shoreline at Plant 1 to enhance Site seismic stability. If installed, the seawall is anticipated to reduce tidal fluctuations in groundwater and affect the operation of the groundwater/LNAPL recovery system, as further discussed in Section 5.

3.1.1.3. LNAPL/Groundwater Recovery

Data from the operation of the groundwater/LNAPL recovery system indicate that most free LNAPL has been removed from beneath the warehouse and loading rack areas, as required by the Consent Decree. Table 1 details quantities of LNAPL and concentrations of dissolved hydrocarbons recovered since final groundwater/LNAPL recovery system startup in 2002. Low LNAPL and dissolved hydrocarbon recovery rates over the past several years indicate a minor amount of LNAPL remains beneath the warehouse and loading rack areas. LNAPL collection data shown in Table 1 are recorded when a sufficient quantity has been generated to warrant off-site recycling, which has not occurred since 2008. Most LNAPL currently recovered occurs as a sheen or thin layer that is removed from the recovery system with biological residue as waste, which cannot be quantified in LNAPL recovery totals.

The cumulative amount of LNAPL recovered by both interim and final groundwater/LNAPL recovery systems is about 10,105 gallons (Figure 9 and Table 3). The final system has recovered 395 gallons of LNAPL from October 2002 through December 2015, and 399 gallons of dissolved hydrocarbons (Tables 1 and 3). The total combined recovery including recovered LNAPL, dissolved hydrocarbons, historical SVE recovery, and biodegradation processes (discussed in Section 3.1.2), is about 29,762 gallons to date (Tables 1 and 3). Influent concentrations of IHSs in recovered groundwater for 2015 are shown on Figures 5 through 7, and listed in Table 1.

Influent concentrations of dissolved IHSs in recovered groundwater have decreased over time, consistent with decreasing IHS concentrations seen in individual recovery wells (Section 3.1.1.1), indicating groundwater conditions at the Site have improved. Concentrations of IHSs vary over time and often appear higher during winter months when the overall groundwater elevation is generally higher, as discussed in Section 4.1.6. Data indicate that the source of dissolved hydrocarbons is primarily residual hydrocarbons in the smear zone at the water table

and that groundwater recovery continues to be an effective means of reducing dissolved hydrocarbon concentrations in groundwater.

3.1.1.4. Recovery System Maintenance and Repairs

Since startup, the groundwater/LNAPL recovery system has remained operational to date. The system, or portions of the system, were taken off-line periodically in 2015 for maintenance or repair activities. Separate portions of the system were also shutdown from time to time to address sediment, scale, and biofouling buildup on pumps and in groundwater piping, attributed to high concentrations of iron and manganese in groundwater. All system shutdowns in 2015 were limited to less than one day.

Independent corrosion engineers have performed annual integrity inspections on steel total fluids piping since 2003. Piping is also inspected as part of routine system O&M activities. Inspections evaluate piping at recovery wellheads, along the waterway, and at other accessible areas. Corrosion inspections monitor losses in pipe wall thickness and serve to confirm that systems can continue operation, and also identify portions of the system that may need replacement. Annual reports, prepared by corrosion engineers, summarize the inspections. Reports are kept on file at TechSolve's office and are available for review upon request.

The most recent corrosion inspection was conducted on March 19, 2015. The results of this inspection determined that while steel total fluids piping is susceptible to corrosion, the thickness of system piping is adequate to safely convey recovered remediation fluids. The inspection also recommended the application of protective coatings to exposed piping, which has been applied to the extent practical.

Groundwater conveyance piping has been replaced as needed due to corrosion or when internal blockages could not be addressed by standard maintenance activities. No piping replacements occurred in 2015. The last major piping replacement event occurred in December 2012, as discussed in the 2012 Annual Site Report (TechSolve, 2013).

3.1.1.5. Recovery Well Redevelopment

Well redevelopment is conducted as needed to improve recovery well productivity by cleaning and removing sediment, scale, and biofouling from well screens and surrounding sand packs. Redevelopment activities have been conducted during previous years, as discussed in past reports (TechSolve, 2012 and TechSolve, 2013). In 2015, recovery wells were jetted, and pumped to remove sediment and fouling from the base of the wells. Improvements in production from redevelopment were evaluated by monitoring pumping rates at each well before and after treatment. Moderate improvements in production were observed. Redevelopment activities will be conducted as needed in 2016 to maintain and improve productivity from groundwater recovery wells.

3.1.2. Waterfront Soil Vapor Extraction System

Operation of the waterfront SVE system was discontinued in May 2008 as the system no longer recovered measurable concentrations of hydrocarbons and was no longer influencing biodegradation in inaccessible hot spot soils. SVE system shutdown was approved by Ecology during the 5-year review (Ecology, 2008).

About 3,582 gallons of TPH-G (as vapor) was recovered by the waterfront SVE system. Additionally, enhanced biodegradation from SVE system operation added about 16,075 gallons, for a total of 19,657 gallons of petroleum hydrocarbons recovered by SVE (Table 3, Figure 9), as calculated from SVE vapor stream monitoring data. Waterfront SVE system operation was discussed in greater detail in previous Annual Reports prepared during system operation (e.g. TechSolv, 2009).

3.1.3. Waterfront Air Sparging System

Air sparging along the waterfront was discontinued in May 2008 as SVE air monitoring data indicated air-sparging operations were no longer volatilizing measurable quantities of hydrocarbons. Additionally, air-sparging operations were likely causing increased fouling in the groundwater/LNAPL recovery system. Additional information on air sparging system operation was presented in previous Annual Reports prepared during system operation (e.g. TechSolv, 2009).

3.2. Containment Boom Monitoring

Two oil sorbent booms have been historically maintained in the West Duwamish Waterway adjacent to Plant 1 to contain oil sheens that have historically appeared on the water. Booms have been located near the loading rack area and middle of the warehouse (Figure 4). Boom locations were selected to best contain occasional sheens, likely originating from small cracks and discontinuities in the concrete warehouse foundation, with underlying sheet piling, or island bulkhead. The foundation and bulkhead act as a “hanging” wall, trapping LNAPL while allowing groundwater to flow beneath the base of the foundation and bulkhead.

Booms are monitored weekly, at a minimum, for the presence of oil sheens and integrity, and augmented by checks made by Terminal personnel. Booms are replaced when integrity monitoring determines it necessary. A Containment Boom Log (Table 4) is maintained on-site to document sheens occurrences, or lack thereof, within the booms and the date and time of inspection. The extent of observed sheens are recorded on a scale from zero to two, with zero representing no sheen, one representing a light sheen visible in a portion of the boom, and two representing a heavy sheen visible throughout the boom. The Duwamish Waterway tidal stage is also recorded to evaluate if sheens correlate with tidal stage. Results of containment boom monitoring from 1996 to date are included in Appendix B.

Results of sheen monitoring indicate that sheens on the Duwamish Waterway have been infrequent and minor since startup of the final system in October 2002. The number of sheen events in 2015 continued a decreasing trend when compared to previous years, with 3 light

sheens observed during the 104 inspections conducted in 2015. Detected sheens were located and contained within the warehouse area boom. The boom mitigated sheen impacts. Sheens detected in 2015 could not be correlated to any site activities or interruptions in system operation, as documented in past reports (TechSolve, 2015).

No sheen has been observed in the waterway adjacent to the loading rack since February 2009. As such, Ecology was petitioned to discontinue the use of recovery booms in this area in 2016 (TechSolve, 2016). Sheen inspections will continue to occur in the loading rack area and recovery boom will be reinstalled in this area if a sheen is observed in this area.

The Western Duwamish Waterway adjacent to the Terminal is also monitored for "orphan" sheens from off-site sources, occurring outside boomed areas. Historical orphan sheen occurrences often could not be correlated to specific sources; however, some sheens appeared to emanate from the Lander Street and Florida Street stormwater outfalls (Figure 2). The Terminal does not connect to storm sewer systems that feed these outfalls. The Terminal and TechSolve continue to monitor for orphan sheens and documentation of these sheen occurrences are maintained at TechSolve's office. No such sheen occurrences were observed in 2015, or in several preceding years.

3.3. Inland Soil and Groundwater Remedial Actions

Excavation of accessible "hot spot" soils was the primary remedy for soils above subsurface IHS soil cleanup action levels (Section 2.2). In-situ treatment methods, including natural attenuation and SVE, were also selected to treat remaining inaccessible hot spot soils located beneath buildings, paved drive areas, etc. Areas identified for cleanup actions are shown on Figures 2 and 3. Additionally, a Restrictive Covenant, effective May 30, 2000, restricts property to "industrial use" only and imposes restrictions on activities in selected areas of the Site (primarily soil disturbance activities or those that create new exposure routes in identified areas). Excavation and in-situ soil remedy plans were described in the EDR (TechSolv and AG&M, 2000a) and in the Inland Soils Plans and Specifications (TechSolv and AG&M, 2000b).

Cleanup actions for inland soils accessible for excavation at Plants 1 and 2 were completed in 2000. Excavations focused on predetermined areas with additional areas excavated as conditions dictated. A total of 3,470 cubic yards of contaminated soil was removed from Plant 1 and Plant 2, as detailed in the TPH Hot Spot Soils Excavation Completion Report (TechSolv and AG&M, 2001).

Inaccessible hot spot soils were identified at Plant 2 following soil excavations activities (Figure 10). These remaining soils are being treated by natural attenuation. Ongoing performance groundwater monitoring, conducted following the soil excavations, showed that cleanup objectives for inland soils at Plant 2 had been met. In 2004, Ecology concurred that "remedial actions appear to be complete at Plant 2" (Ecology, 2004a).

Inaccessible hot spot soils were identified at Plant 1 following soil excavation activities (Figure 11). At the southern property boundary, groundwater monitoring indicated that excavations had not restored groundwater quality to meet cleanup standards within the 5 years

restoration period. Groundwater monitoring for benzene, TPH-G, TPH-D, and TPH-O, showed that detected concentrations of benzene and TPH-G often fluctuated and exceeded associated cleanup levels, most notably in Well AR-03 (Section 4, Appendix C). Fluctuating concentrations of TPH detected in Well AR-03 directly correlated to seasonal fluctuations in water table elevation indicating the source was located in the vadose zone, which becomes saturated during periods of high precipitation.

A 2005 soil probing investigation, conducted south of the Plant 1 Tank Farm, showed TPH-G and benzene to exist within an approximate one-acre source area (Figure 12). This source area was shown to be responsible for continued groundwater impacts at the southern property boundary (TechSolv, 2006). Additional wells were installed in this area to monitor groundwater conditions, as discussed in Section 4.1.2, and contingency remedial actions were implemented as discussed below.

3.3.1. Inland SVE System

Contingency remedial actions for soil and groundwater were evaluated in 2007 to address the hydrocarbon source area at the southern property boundary of Plant 1 (Figure 12), described in the previous section. SVE with catalytic oxidation emission control was selected as the preferred remedial alternative, based upon the 2005 probing investigation (TechSolv, 2006) and subsequent evaluations. SVE system designs (Figure 13) were submitted to Ecology (TechSolv, 2007b), and Ecology subsequently granted approval to install the system (Ecology, 2007). Installation, pilot testing, and SVE system startup occurred in 2008 (TechSolv, 2009). The SVE system was operated from August 2008 to December 2014. The SVE system was only periodically shutdown over the six plus years of operation, mainly during periods of high groundwater elevation that flooded SVE well screens and caused system fouling.

Air samples were collected and analyzed monthly from the recovered SVE vapor stream while the SVE system was operating. Data from these analyses were used to calculate hydrocarbon recovery rates, monitor changes in the vapor stream, and ensure compliance with PSCAA requirements stipulated in Notice of Construction No. 9858.

Monitoring showed that the Inland SVE System recovered 1,291 gallons of TPH-G and 2.5 gallons of benzene (Table 5, Figure 14) over 6 years of operation. Monitoring also showed that concentrations of TPH-G and benzene in recovered influent vapor streams decreased sharply after initial system startup (Figure 15). TPH-G concentrations upon SVE startup in August 2008 were detected at concentrations as high as 5,870 parts per million (PPM), but quickly dropped below 10 PPM by January 2009. Benzene concentrations upon SVE startup in August 2008 were detected at concentrations as high as 24.5 PPM, but quickly dropped below 0.1 PPM by October 2008.

Rapid reductions in hydrocarbon recovery were anticipated to occur, as soil investigations (TechSolv, 2006) showed relative homogeneity and high porosity of the shallow unsaturated soils in this source zone, typified by silty sands. Additionally, SVE pilot testing showed the SVE

system to have a sufficient radius of influence to obtain capture throughout the identified source zone (Figure 12).

In addition to direct hydrocarbon recovery, SVE induced airflow within these soils enhanced biodegradation of residual hydrocarbons. Biodegradation calculations using flow rates and carbon dioxide levels above background levels (average atmospheric concentration) estimate that an additional 4,355 gallons of hydrocarbons were reduced by enhanced biodegradation, which brings combined biodegradation and vapor recovery of petroleum hydrocarbons to 5,642 gallons (Table 5 and Figure 16).

Reductions in biodegradation rates were expected to occur over time as the bulk of the source zone was recovered or degraded. As shown on Figure 15, carbon dioxide concentrations dropped off after SVE system startup in 2008. Upon SVE startup, concentrations of carbon dioxide were detected as high as 0.65% above the average atmospheric level of 0.04%. Concentrations dropped to around 0.25% above the atmospheric level by October 2008. From October 2008 through December 2011, carbon dioxide concentrations continued a decreasing trend to near atmospheric levels. For the last three years of SVE system operation, from January 2012 through December 2014, carbon dioxide concentrations were not detected above the 0.04% average atmospheric level.

SVE system operation was discontinued in December 2014 as the capture data listed above indicated that the bulk of available hydrocarbons to direct capture or enhanced biodegradation had been captured or reduced, respectively, within the SVE system's radius of influence. As discussed above, benzene and TPH concentrations measured in the recovered SVE vapor stream (Table 5) were mainly at or below laboratory detection limits from 2009 through 2014, indicating that the bulk of available hydrocarbons to direct capture had been recovered. Carbon dioxide concentrations measured in the recovered SVE vapor stream from 2012 through 2014 (Table 5) were mainly at atmospheric levels, indicating a lack of enhanced aerobic biological processes occurring in subsurface soils and that the bulk of hydrocarbons available to aerobic biodegradation have been reduced.

While SVE system operation has been discontinued, the system is maintained in an operative state. The system is tested weekly and maintenance is performed monthly to ensure that system operation could be reinitiated if warranted.

Groundwater conditions have improved at the southern property boundary since the inland SVE system began operation. TPH-G and benzene concentrations measured in groundwater are now mainly below the cleanup levels listed in Section 2.2, as further discussed in the following sections.

4. Groundwater Monitoring Activities

Groundwater monitoring activities have been conducted at the Site since 1997 on a network of selected wells. Monitoring activities were conducted voluntarily from 1997 through 1999. Since 2000, groundwater monitoring has been conducted per the requirements of the Consent Decree's Groundwater Compliance Monitoring and Contingency Program (TechSolv, 1999b) with periodic revisions as noted below.

Groundwater monitoring is conducted in accordance with the methods and procedures described in the Sampling and Analysis Plan included with the RI. Groundwater samples are analyzed for selected IHSs including TPH-G, TPH-D, TPH-O, benzene, and cPAHs. Monitoring activities also include monthly inspections for the presence of LNAPL in selected wells. Analytes and selected wells have been periodically deleted from the monitoring program with Ecology's approval, due to analyte concentrations consistently below cleanup levels. Wells have also been installed and added to the program. Voluntary and performance groundwater monitoring data are included in Tables 6 through 9. The results of groundwater monitoring activities are summarized in the following sections.

4.1. Plant 1 Performance Monitoring

Performance monitoring at Plant 1 has included quarterly groundwater monitoring for TPH-G, TPH-D, TPH-O, benzene, cPAHs, biochemical parameters, groundwater elevations, and the presence of LNAPL. Monitoring results at Plant 1 (Tables 6 through 9) and revisions to the monitoring program are discussed in the following sections.

4.1.1. Plant 1 Monitoring Well Network

The Plant 1 monitoring well network (Figure 17) currently includes Wells AMW-01 through AMW-05, GM-14S, GM-15S, GM-16S, GM-17S, GM-24S, AR-03, and MW-1-T9 through MW-4-T9. The monitoring history and rationale for these wells is based on the following:

- Monitoring Wells AMW-01 through AMW-05 were installed and first sampled in 2000 as compliance wells along the waterfront, per requirements of the Consent Decree. These wells are screened to allow representative sampling in the zone of groundwater discharge located beneath the existing warehouse foundation and Island bulkhead and above the brackish groundwater. These wells are screened deeper than other wells in the monitoring well network utilized to monitor shallower groundwater conditions.

- Monitoring Well GM-14S was added to the monitoring well network in 2007, as requested by Ecology. GM-14S was originally utilized to monitor for sheen presence on groundwater. As sheens are no longer being detected in this well, performance monitoring was initiated to monitor water quality in this area of the Site.

- Well GM-15S is located down-gradient from Plant 1 soil remedy excavations (Figure 2) and within the Inland SVE system's capture zone. Based upon limited hydrocarbon detections, the monitoring frequency of GM-15S was reduced, with concurrence from

Ecology (Ecology, 2009), from quarterly to semi-annually. Following 2013 detections of IHSs (TPH-G and benzene) above cleanup levels, the monitoring frequency of GM-15S was voluntarily increased to quarterly. While concentrations of IHSs fell to historic levels and below cleanup levels in the fourth quarter of 2013, GM-15S continues to be monitored quarterly to provide additional data from this well.

- Wells GM-16S and GM-17S are hydraulically up-gradient of the Site. Monitoring for IHSs was discontinued, with Ecology's approval in 2000 (Ecology, 2000a), as sufficient background data had been collected from these wells. Monitoring for IHSs resumed in 2007, as recommended by Ecology, to monitor for IHSs potentially migrating onto the property from up-gradient, off-site sources. The groundwater sampling frequency in these wells was reduced in 2009, with concurrence from Ecology (Ecology, 2009), from quarterly to semi-annually as IHS concentrations have been below cleanup levels since resuming sampling.

- Well GM-24S is located within the Plant 1 soil remedy excavation area.

- Well AR-03 is located south of the southern property boundary, down-gradient from the Plant 1 soil remedy excavations, and within the Inland SVE System capture zone.

- Wells MW-1-T9 through MW-4-T9 were installed and added to the monitoring well network in 2005 to further evaluate groundwater quality down-gradient from Plant 1 soil remedy excavations (TechSolv, 2007a). These wells are located within the Inland SVE system's capture zone.

4.1.2. Petroleum Hydrocarbon Monitoring

Compliance Monitoring Wells AMW-01 through AMW-05, located along the waterfront, have been below cleanup levels for TPH-G, TPH-D, and TPH-O for all quarterly groundwater monitoring events since installation (Table 6 and Appendix C). These wells have also been below cleanup levels for benzene, with the exception of Wells AMW-01 and AMW-02.

Well AMW-01 has exceeded the 71 µg/L cleanup standard for benzene in 40 of 61 quarters since monitoring began in the fourth quarter of 2000. However, over the past 5 years benzene has been below the cleanup level in 14 of 20 quarters and was below the cleanup level in the last 7 quarterly monitoring events, as shown in Appendix C.

Well AMW-02 has exceeded the benzene cleanup level in 13 of 36 quarters since benzene was first detected above the cleanup level in the first quarter of 2007. However, benzene has been below the cleanup level during the last 14 quarterly monitoring events, as shown in Appendix C.

Efforts made to determine a source of benzene in the area of AMW-01 and AMW-02 have been inconclusive; however, remedial actions implemented to mitigate known sources of benzene appear to have reduced benzene concentrations in these wells. The Inland SVE system that operated from 2008 to 2014 (Section 3.3) improved groundwater quality up-gradient of

Wells AMW-01 and AMW-02. Additionally, improvements in shallow groundwater quality above cleanup levels in these wells have been observed due to the ongoing waterfront remedial actions (Section 3.1).

In the up-gradient area of Plant 1, IHSs have not been detected at or above cleanup standards in Monitoring Wells GM-16S and GM-17S since monitoring was resumed in 2007. These wells will be monitored semi-annually in the first and third quarters of 2016 to evaluate for the potential migration of IHSs onto the Site from off-site sources.

Well GM-14S has been below cleanup levels for TPH-D, TPH-O, and benzene (Table 6 and Appendix C) since sampling resumed in this well in the third quarter of 2007, following the cessation of sheens being observed in the well (Section 3.2). Concentrations of TPH-G have been detected above the cleanup standard in 24 of 34 quarters since monitoring resumed in Well GM-14S in 2007. TPH-G concentrations detected in well GM-14S appear stable and this well is located hydraulically up-gradient from the groundwater/LNAPL recovery system.

Results of groundwater monitoring from wells in and down-gradient of the former soil hot spot area in Plant 1 (Wells GM-24S, AR-03, GM-15S, MW-1-T9, MW-2-T9, MW-3-T9, and MW-4-T9) show that soil removal actions completed in 2000 (Section 3.3) stabilized concentrations of dissolved hydrocarbons in this area. Groundwater quality improved further in this area from the operation of the Inland SVE System from 2008 through 2014, (Section 3.3.1). Groundwater quality improvements due to SVE operation can be seen in the decreasing concentrations of benzene and TPH-G in monitoring wells located within the SVE capture zone (Appendix C: Wells AR-03, GM-15S, MW-1-T9, MW-2-T9, MW-3-T9). Data presented in Table 6 show concentrations of IHSs in 2015 were below cleanup levels in all wells listed above except for TPH-G in Well GM-24S in the first and second quarters, TPH-G in Well MW-3-T9 in the first quarter, and TPH-D in Well MW-1-T9 in the first quarter.

Concentrations of TPH-G detected in Wells GM-24S and MW-3-T9 and TPH-D in Well MW-1-T9 were within historic ranges. IHS concentrations detected in these wells appear to be stable (Appendix C). These limited exceedances of IHSs in groundwater indicate that IHSs have been stabilized or reduced by the remedial actions listed in Section 3.3. Monitoring data will continue to be evaluated in 2016 and any trends will be discussed in future reports.

4.1.3. cPAH Monitoring

Selected wells at Plant 1 have been monitored for cPAHs. Monitoring for cPAHs was discontinued in 2003, per Ecology's approval (Ecology, 2003), as historical monitoring rarely detected these compounds (Table 7). Monitoring for cPAHs was voluntarily resumed in compliance monitoring Wells AMW-01 through AMW-05 in 2004 following a recommendation by Ecology and to assist in determining when cleanup objectives have been met. Since resuming monitoring, concentrations of cPAHs have rarely been detected, and occasional detections have often been associated with laboratory quality control deficiencies that affect the validity of reported data. These laboratory issues have been discussed in more detail in previous Annual Site Reports. The limited detections of cPAHs have only slightly exceeded the

laboratory detection limit (0.025 µg/L) for these compounds. Based upon these findings, the cPAH sampling frequency was decreased in 2009 to an annual basis, with concurrence from Ecology (Ecology, 2009).

There were no exceedances of the cPAHs cleanup levels during the most recent December 2015 monitoring event (Table 7). All cPAH data from this monitoring event were non-detections; however, the data were qualified as not detected at approximate quantitation limits due to surrogate recoveries below associated control limits in multiple samples. Monitoring for concentrations of cPAHs in these compliance wells will next occur in December 2016.

4.1.4. Biochemical Parameter Monitoring

Monitoring for biochemical parameters has been conducted at the Site to determine the effectiveness of natural attenuation in inaccessible soils containing TPH above cleanup levels. Monitoring of biochemical parameters has been suspended until additional Site cleanup goals are achieved (TechSolv, 2005). Results of the last biochemical sampling were included in the 2006 Annual Site Report (TechSolv, 2007a).

4.1.5. LNAPL Monitoring

The monitoring program includes monthly inspection for LNAPL presence in three monitoring wells in Plant 1 (Wells GM-11S, GM-12S, and GM-13S). Monitoring Well GM-14S (located inside the main Plant 1 tank farm) was removed from the monthly LNAPL monitoring program in 2004, with concurrence from Ecology (Ecology, 2004b), as this well had been free of LNAPL and sheens since June 1999.

Results of LNAPL monitoring have shown a reduction in LNAPL occurrence in Plant 1 (Table 8). No sheens or LNAPL have ever been detected in Well GM-12S (located up-gradient from the warehouse). Well GM-13S (located inside the southern end of the warehouse) has periodically had sheens over time, but no sheens have been observed in this well since November 2012.

Measurable LNAPL was detected in Well GM-11S (located outside the northeast end of the warehouse) in 1999 and the well was subsequently converted to an LNAPL recovery well in April 2000. Only a sheen has been detected in this well since being converted to a recovery well and the frequency of sheen appearances has decreased over time. No sheens have been observed in Well GM-11S since September 2013.

4.1.6. Groundwater Elevation Monitoring

Water table elevations were recorded quarterly in 2015 for Plant 1 (most Plant 2 monitoring has been discontinued as discussed in the following section) and corresponding water table elevation maps were prepared to show overall groundwater flow patterns for 2015 (Table 9, Figures 18 and 19). Monitoring Well MW-06, located in Plant 1 east of the northeast corner of the warehouse, is not part of the groundwater monitoring program but is used to provide water level data in this area. Wells closest to the waterfront that are part of the monitoring program

(GM-13S, and AMW-01 through AMW-05) are not used for water table elevation maps due to tidal fluctuations that affect these wells. Additionally, startup testing showed that groundwater elevation in Well GM-13S is depressed by operation of the groundwater/LNAPL recovery system.

Groundwater contour maps for the first and third quarters of 2015 (Figures 18 and 19) are included as they correspond to quarters with the highest and lowest groundwater elevations recorded in 2015, respectively. Groundwater elevations and flow patterns shown for 2015 are similar to those observed during the RI and in previous years. Groundwater contour maps are no longer required for this report (Ecology, 2009) due to consistent yearly flow patterns and are included voluntarily. Site flow directions can vary seasonally but are generally west towards the waterway, and south to southwest along the southern property boundary. Groundwater gradients are similar each year and range from approximately 0.001 feet per foot (ft/ft) from the main tank farm to the waterfront, to 0.01 ft/ft at the southern boundary of Plant 1.

Hydrographs for selected wells in the waterfront area (Figure 20) and in the southern boundary area of Plant 1 (Figure 21) show trends in water table elevations over time for the Site. The data for both areas show seasonal fluctuations of the water table and indicate that all wells are responding to these fluctuations (i.e., none of the wells are screened in groundwater isolated from the groundwater monitored by other wells, such as would occur with "perched" groundwater). Hydrographs show higher water table elevations generally occur during wetter winter and spring periods, when compared to the drier summer and fall periods. Groundwater elevations appear to have trended upward over the past decade. These variations and trends in water table elevation generally coincide with precipitation data for the area. Groundwater elevation data will continue to be monitored in 2016 to evaluate ongoing trends.

4.2. Plant 2 Performance Monitoring

Ongoing performance groundwater monitoring, conducted following soil excavations, showed that cleanup objectives for diesel impacted inland soils at the Plant 2 diesel tank farm had been met (see Section 3.3). However, concentrations of TPH-G and benzene were detected above cleanup levels following excavation activities in well GM-19S. Results of a subsequent investigation conducted in 2002 (TechSolv, 2003a) concluded that TPH-G and benzene detected in Well GM-19S was from an unidentified off-site source. Monitoring at Plant 2 was discontinued except for TPH-G and benzene in Monitoring Well GM-19S (Figure 22), as agreed to by Ecology (Ecology, 2004b). Additional details regarding discontinuing Plant 2 monitoring were included in previous reports (e.g. TechSolv, 2009). Well GM-19S continues to be monitored semi-annually for TPH-G and benzene during first and third quarters, which typically corresponds with the groundwater elevation seasonal high and low, respectively. The results of monitoring for TPH-G and benzene in 2015 are included in Table 6. Detected concentrations of benzene were below the cleanup level in both quarters in 2015. Benzene concentrations last exceeded the associated cleanup level in the third quarter of 2013. Detected concentrations of TPH-G were below the cleanup level in one of two quarters in 2015. The TPH-G concentration detected in GM-19S was at the cleanup level in the first quarter of 2015.

4.3. Data Validation

Laboratory analytical results were reported with associated laboratory quality assurance/quality control data. The analytical reports were reviewed and the data were validated per the requirements of the CAP. Data validation resulted in qualification of some analytical results. Data qualifiers modify the values reported by the laboratory, but do not affect our understanding of the overall conditions of the Site. The data qualifiers are included in Tables 6 and 7. Laboratory reports and additional information regarding the justification for data qualification are retained by TechSolve and are available upon request. All data qualifiers from the four quarters of 2015 were relatively minimal and are included with associated quarterly progress reports submitted to Ecology.

5. Additional Activities

Notable additional activities that occurred in 2015 included conducting a 5-year review with Ecology and the continuing preparation for the proposed replacement of a portion of the seawall at Plant 1. These activities are discussed in further detail below.

5.1. Third 5-Year Review

In 2015, Ecology and EPA completed independent Five Year Reviews (Ecology's third five-year review and EPA's fourth five-year review). These reviews of cleanup actions and monitoring results are performed by Ecology and EPA to ensure that human health and the environment are being protected at the Site. These reviews focused on the last five years from 2010 through 2014.

Ecology reviewed site data and reports, conducted a site visit, and interviewed BP staff and contractors in order to develop a Periodic Review Report (PRR) for BP Harbor Island Terminal for the five-year period from 2010 through 2014. The PRR satisfied MTCA periodic review requirements for Ecology, and was used to assist the EPA Five-Year Review for the Harbor Island Superfund Site. A public comment period on the PRR was held December 19, 2014 through January 26, 2015. Ecology notified BP that the PRR was finalized in March 2015 (Ecology, 2015b).

Ecology stated in the PRR report (Ecology, 2015a) for the BP Terminal that "the Department of Ecology has determined that the requirements of the Restrictive Covenant continue to be met. No additional cleanup actions are required by the property owner." No additional actions were identified in the PRR report other than continuation of specific cleanup actions and compliance monitoring detailed in this report. The next periodic review is scheduled for 2019.

EPA then completed their Five-Year Review Report for Harbor Island Superfund Site Seattle, Washington (EPA, 2015) in September 2015. The purpose of the report was to "review information to determine if the remedy is and will continue to be protective of human health and the environment." The performances of the individual operable units, including the Tank Farm Operable Unit 02 managed by Ecology, were reviewed in this report. This review found IHS concentrations at BP to be stable or decreasing and did not recommend any additional actions be taken, in addition to those referenced in this report, to ensure protectiveness.

During EPA's Third Five-Year Review, EPA requested "an evaluation of hydraulic containment near the shoreline at the BP Plant 1 remediation system to determine if contamination is reaching the West Waterway." This was due primarily to past benzene exceedances in Wells AMW-01 and AMW-02. EPA identified the status of this requirement as "complete" in the fourth Five-Year Review. This determination was based on 2010 through

2014 performance groundwater monitoring showing detected concentrations of benzene in Wells AMW-01 and AMW-02 mainly below the cleanup level (Section 4.1.2). Additionally, it was based upon BP's evaluations of hydraulic containment in this area and continued system operation (Sections 3.1.1 and 3.3.3) to improve groundwater quality.

5.2. Proposed Seawall Replacement

In 2010, BP initiated plans to install a new seawall waterward of the existing timber bulkhead that acts to separate the Duwamish West Waterway from Plant 1. The project is intended to provide long-term seismic protection of the Site. Seawall design details have evolved over time and have been provided to Ecology and summarized in previous reports (TechSolve, 2013 and TechSolve, 2014). The current seawall design calls for interlocking steel sheet piles to be installed waterward of the existing bulkhead, with anchored tiebacks. The proposed seawall would extend along the waterfront from the northern portion of Plant 1 to just south of the marine dock walkway, as shown in Appendix D. Changes to the final designs may occur and will be provided to Ecology when available.

The timeline for installing the new seawall is yet to be finalized. While much of the project permitting has been completed, there are outstanding permits that are being finalized at the time of this report. These outstanding permits include the City of Seattle Department of Planning and Development Building Permit, U.S. Army Corp of Engineers (USACE) Rivers and Harbors Act Section 10 and Clean Water Act Section 404 permitting, and King County Mitigations Reserve Program fee payment.

Ecology submitted a letter to BP in September 2015 (Ecology, 2015c), summarizing Ecology's comments for the proposed seawall and listing Water Quality Monitoring Plan (WQMP) requirements to be conducted prior to, during, and following seawall installation. As requested by Ecology, BP will submit a draft WQMP to Ecology at least 30 days prior to seawall construction start of work.

Seawall designs and construction activities have been reviewed to ensure compliance with the requirements of the Consent Decree and Restrictive Covenant, and have been modified to avoid potentially damaging existing remediation system components and monitoring wells. Ecology will be notified and consulted if modifications or alterations to the monitoring well network or recovery systems are required.

Recovery system components located adjacent to the seawall will be inspected for integrity throughout seawall construction and will be repaired or replaced, as needed, if damaged. Best management practices will be implemented during construction, such as booming waterways to contain sheens generated by construction activities.

Installation of the seawall will affect hydrology at the Site and waterfront groundwater/LNAPL recovery system groundwater capture. Formal evaluations of the seawall's

impact on Site hydrology will be conducted following completion of the seawall installation, as requested by Ecology (Ecology, 2012).

6. Summary of Activities/Conclusions

Activities completed at the Site during 2015 and resulting conclusions are summarized below.

- Operation of the groundwater/LNAPL recovery system continues to protect the Duwamish Waterway by removing petroleum hydrocarbons from groundwater. The system provides hydraulic control along the waterfront and is helping to achieve cleanup objectives.

- Maintenance and inspection of the groundwater/LNAPL recovery system indicate the system operates as designed, is intact, and can continue operation. Detailed corrosion evaluations continue to be conducted annually. Field staff continue to conduct routine inspections to ensure system integrity and system components are replaced or upgraded as necessary. Well redevelopment activities are also conducted to maintain groundwater production in wells.

- Recovery systems have removed most recoverable LNAPL from beneath the warehouse and truck loading rack areas. LNAPL was only detected as a sheen or thin film in a few wells and the frequency of sheens observed during monthly monitoring is decreasing.

- Monitoring results show that remediation systems have reduced both dissolved hydrocarbons in groundwater and the frequency of hydrocarbon sheens in the Duwamish Waterway. Concentrations of IHSs detected in all compliance wells (AMW-01 through AMW-05) were below cleanup levels in 2015.

- Groundwater data collected in and down-gradient of a former soil hot spot area at Plant 1 indicate that remedial actions stabilized and reduced petroleum hydrocarbons in this area. Some residual hydrocarbons may remain in inaccessible soils in this area, affecting groundwater during seasonal water table highs. SVE operation have captured the bulk of residual hydrocarbons in this area both directly and indirectly by enhanced biodegradation. Since 2008, operation of the Inland SVE System recovered 1,291 gallons of TPH-G. SVE has also contributed to the enhanced biodegradation of an estimated 4,355 gallons. Data indicate that the SVE system has captured or degraded most of the available hydrocarbons in this area. Due to a lack of direct hydrocarbons capture and biodegradation, the SVE system was shutoff in December 2014. The SVE system is currently maintained in an operative state in case concentrations rebound and future system operation is warranted.

- Groundwater monitoring activities through 2015 at Plant 2 show a continuing reduction in dissolved hydrocarbons detected in Monitoring Well GM-19S, which is impacted by an off-site source. TPH-G and benzene concentrations in groundwater have steadily declined in GM-19S over time. TPH-G concentrations have been at or below the cleanup level since 2007. Benzene concentrations last exceeded the cleanup level in 2013. All

other remediation and monitoring activities required for this portion of the Site have been successfully completed.

- A new seawall is proposed to be installed waterward of the existing Island bulkhead along the waterfront at Plant 1 to enhance seismic stability of the Site. Seawall designs are reviewed and shared with Ecology to ensure compliance with the requirements of the Consent Decree. BP will submit a WQMP to Ecology over 30 days prior to initiation of construction activities, as requested. The WQMP will document monitoring activities to be conducted prior to, during, and following seawall construction. The effects of the new seawall on the Site hydrology and continuing remedial actions will be evaluated following seawall installation, as previously discussed with Ecology.

- Ecology and EPA completed independent five-year reviews for the period from 2010 to 2014. These reviews were finalized in 2015 and determined that the requirements of the Consent Decree are being met and that no additional cleanup actions are required, other than continuing the ongoing specific cleanup actions and compliance monitoring documented in this report.

- EPA's fourth five-year review determined that the request from the third five-year review to complete an evaluation of hydraulic containment along the shoreline at Plant 1 had been completed. This determination was based upon improvements in groundwater quality, as measured in compliance wells AMW-01 and AMW-02.

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TABLES

Table 1. Waterfront Groundwater System Petroleum Hydrocarbon Recovery Rates
BP West Coast Products Terminal 21T, Harbor Island, Seattle, Washington

GROUNDWATER SYSTEM EFFICIENCIES

SAMPLE DATE	UNITS	Influent Benzene	Effluent Benzene	% Reduction	Influent Diesel	Effluent Diesel	% Reduction	Influent Ethylbenzene	Effluent Ethylbenzene	% Reduction	Influent Gasoline	Effluent Gasoline	% Reduction	Influent Oil	Effluent Oil	% Reduction	Influent Toluene	Effluent Toluene	% Reduction	Influent Xylenes	Effluent Xylenes	% Reduction
2002 Averages	µg/L	225.3	14.3	91%	7,315	7,020	4%	55.2	6.2	75%	1,770	336	82%	831	804	5%	17.0	2.5	88%	88.8	9.9	87%
2003 Averages	µg/L	137.7	19.5	76%	4,945	4,648	-1%	44.5	12.9	69%	1,854	678	62%	760	763	0%	42.7	5.4	61%	154.1	50.3	68%
2004 Averages	µg/L	93.5	3.2	82%	10,285	9,342	-6%	76.8	4.7	79%	4,383	840	59%	762	1,026	-8%	116.6	2.2	82%	356.6	23.0	75%
2005 Averages	µg/L	76.7	14.5	84%	4,162	5,987	-9%	170.8	45.4	81%	10,090	3,229	70%	864	750	15%	566.9	121.0	84%	1,327.7	367.9	78%
2006 Averages	µg/L	38.9	1.2	89%	11,263	2,174	42%	42.1	0.9	90%	4,944	202	94%	665	666	0%	55.6	0.8	77%	485.1	5.2	96%
2007 Averages	µg/L	8.8	1.5	60%	1,223	906	18%	6.6	0.8	56%	407	115	63%	598	598	0%	1.0	0.5	21%	19.8	1.9	50%
2008 Averages	µg/L	10.0	1.1	70%	540	468	6%	5.5	0.7	39%	279	76	61%	505	504	0%	0.7	0.5	40%	10.6	1.6	65%
2009 Averages	µg/L	5.2	1.0	48%	369	561	8%	4.1	1.6	31%	407	182	46%	497	489	2%	0.8	0.7	44%	15.2	7.4	33%
2010 Averages	µg/L	3.9	0.7	76%		2,193	*NA*	6.8	1.7	78%	915	336	*65%*		*410*	*NA*	*0.9*	*0.9*	*NA*	26.3	6.7	69%
2011 Averages	µg/L	3.2	0.5	80%		1,714	*NA*	2.4	1.0	53%	439	89	*69%*		*492*	*NA*	*1.0*	*1.0*	*NA*	7.1	3.0	29%
2012 Averages	µg/L	3.6	1.3	48%		2,787	*NA*	1.9	1.2	37%	362	144	*61%*		*636*	*NA*	*1.0*	*1.0*	*NA*	5.7	3.4	48%
2013 Averages	µg/L	1.0	0.5	45%		1,333	*NA*	1.1	0.5	49%	356	124	*57%*		*433*	*NA*	*0.5*	*0.5*	*NA*	2.4	1.0	78%
2014 Averages	µg/L	1.7	0.3	61%		1,699	*NA*	0.6	0.3	46%	539	122	*79%*		*236*	*NA*	*0.5*	*0.3*	*NA*	1.5	0.5	61%
1/14/2015	µg/L	0.71	*0.14*	80%		12,000	*NA*	0.38	*0.13*	66%	400	*150*	*63%*		1100	*NA*	*0.16*	*0.16*	*NA*	1.40	*0.12*	91%
2/11/2015	µg/L	7.5	*0.14*	98%		2,200	*NA*	1.90	*0.13*	93%	770	*170*	*78%*		390	*NA*	*0.16*	*0.16*	*NA*	2.10	*0.12*	94%
3/15/2018	µg/L	3.9	*0.42*	89%		2,400	*NA*	1.30	*0.44*	66%	1,100	*270*	*75%*		160	*NA*	*0.44*	*0.44*	*NA*	2.60	*0.50*	81%
4/15/2015	µg/L	*0.42*	*0.42*	*NA*		2,400	*NA*	*0.51*	*0.51*	*NA*	840	*98*	*88%*		180	*NA*	*0.44*	*0.44*	*NA*	0.93	*0.50*	46%
5/14/2015	µg/L	*0.42*	*0.42*	*NA*		1,800	*NA*	0.51	*0.51*	*NA*	820	110	*87%*		160	*NA*	*0.44*	*0.44*	*NA*	*0.50*	*0.50*	NA
6/17/2015	µg/L	0.72	*0.42*	42%		2,500	*NA*	0.98	*0.51*	48%	740	170	*77%*		210	*NA*	*0.44*	*0.44*	*NA*	2.00	*0.50*	75%
7/15/2015	µg/L	3.7	*0.42*	89%		4,500	*NA*	1.20	*0.51*	58%	1,400	480	*66%*		380	*NA*	1.60	*0.44*	*73%*	2.20	*0.50*	77%
8/12/2015	µg/L	1.8	*0.42*	77%		4,400	*NA*	0.56	*0.51*	9%	590	*500*	*15%*		310	*NA*	*0.44*	*0.44*	*NA*	0.60	*0.50*	17%
9/16/2015	µg/L	0.62	*0.42*	32%		1,600	*NA*	*0.51*	*0.51*	*NA*	300	48	*84%*		120	*NA*	*0.44*	*0.44*	*NA*	*0.50*	*0.50*	NA
10/14/2015	µg/L	0.77	*0.42*	45%		7,900	*NA*	*0.51*	*0.51*	*NA*	630	280	56%		500	*NA*	*0.44*	*0.44*	*NA*	*0.50*	*0.50*	NA
11/18/2015	µg/L	0.49	*0.43*	12%		9,400	*NA*	1.00	*0.51*	49%	460	*400*	*13%*		720	*NA*	1.10	*0.44*	*60%*	9.20	0.68	93%
12/10/2015	µg/L	7.1	*0.42*	94%		11,000	*NA*	10.00	*0.51*	95%	5,700	2200	*61%*		520	*NA*	*0.44*	*0.44*	*NA*	11.00	0.56	95%
SURFACE WATER CLEANUP LEVELS		71 µg/L			10,000 µg/L			NA			1,000 µg/L			10,000 µg/L			NA			NA		
KCDNR DISCHARGE LIMITS			70 µg/L			100,000 µg/L			1,700 µg/L			NA			100,000 µg/L			1,400 µg/L			NA	
2015 Averages		2.3 µg/L	.37 µg/L	66%	NA	5,175 µg/L	NA	1.61 µg/L	.44 µg/L	60%	1,146 µg/L	406 µg/L	64%	NA	396 µg/L	NA	.55 µg/L	.39 µg/L	NA	2.8 µg/L	.46 µg/L	74%

METRO DISCHARGE DATA

Observation Date	Days Operational since last monitoring reading	Average flow (GPM)	Total Flow Between Observation dates (gallons)	Pounds of Benzene Removed	Pounds of Gasoline Removed	Pounds of Diesel Removed	Pounds of Oil Removed	Pounds of Toluene Removed	Pounds of Ethylbenzene Removed	Pounds of Xylenes Recovered	Total Gallons Gas, Diesel, and Oil
2002 Totals and Averages	65	4.18	322,785	0.62	4.99	19.42	2.30	0.05	0.13	0.22	**3.90**
2003 Totals and Averages	361	8.03	4,114,867	4.43	62.20	169.14	26.05	1.18	1.47	5.05	**37.76**
2004 Totals and Averages	338	9.58	4,570,461	3.54	175.70	419.25	28.95	5.35	3.16	14.66	**92.43**
2005 Totals and Averages	359	11.17	5,827,144	3.43	447.43	155.78	41.55	25.29	7.69	59.98	**100.52**
2006 Totals and Averages	365	6.40	3,220,733	0.80	192.72	663.65	19.09	2.85	1.89	20.04	**128.92**
2007 Totals and Averages	360	3.17	1,599,607	0.15	9.08	18.30	8.40	0.02	0.11	0.48	**5.20**
2008 Totals and Averages	363	3.19	1,645,810	0.14	3.95	7.21	6.95	0.01	0.08	0.15	**2.59**
2009 Totals and Averages	369	2.98	1,569,390	0.07	5.75	7.81	6.40	0.01	0.06	0.22	**2.89**
2010 Totals and Averages	372	2.17	1,185,127	0.04	8.62	18.84	4.26	0.01	0.05	0.19	**4.66**
2011 Totals and Averages	356	1.90	949,880	0.03	5.13	17.55	3.54	0.01	0.03	0.13	**3.81**
2012 Totals and Averages	371	1.89	948,600	0.03	3.97	25.92	3.47	0.01	0.02	0.04	**4.81**
2013 Totals and Averages	365	1.33	700,450	0.01	2.26	8.80	3.43	0.00	0.01	0.02	**2.08**
2014 Totals and Averages	332	1.62	761,480	0.01	3.43	10.95	1.55	0.00	0.00	0.01	**2.33**
1/14/2015	28	1.95	78,690	0.0005	0.24	4.99	0.47	0.0001	0.0002	0.0005	**0.82**
2/11/2015	28	1.83	73,910	0.0025	0.36	4.38	0.46	0.0001	0.0007	0.0011	**0.75**
3/18/2015	35	1.60	80,760	0.0038	0.63	1.55	0.19	0.0002	0.0011	0.0016	**0.35**
4/15/2015	28	1.51	60,830	0.0011	0.49	1.22	0.09	0.0002	0.0005	0.0009	**0.27**
5/14/2015	29	1.47	61,430	0.0002	0.43	1.08	0.09	0.0002	0.0003	0.0004	**0.23**
6/17/2015	34	1.52	74,500	0.0004	0.48	1.34	0.12	0.0003	0.0005	0.0008	**0.29**
7/15/2015	28	1.51	61,060	0.0011	0.55	1.78	0.15	0.0005	0.0006	0.0011	**0.36**
8/12/2015	28	1.63	65,770	0.0015	0.55	2.44	0.19	0.0006	0.0005	0.0008	**0.46**
9/16/2015	35	1.65	82,990	0.0008	0.31	2.08	0.15	0.0003	0.0004	0.0004	**0.37**
10/14/2015	28	1.67	67,160	0.0004	0.26	2.66	0.17	0.0002	0.0003	0.0003	**0.45**
11/18/2015	35	1.92	96,690	0.0005	0.44	6.98	0.49	0.0006	0.0006	0.0039	**1.14**
12/10/2015	22	2.24	70,890	0.0022	1.82	6.03	0.37	0.0005	0.0033	0.0060	**1.21**
2015 Totals and Averages	358	1.71	874,680	0.02	6.56	36.53	2.92	0.00	0.01	0.02	**6.68**
		TOTALS:	**28,291,014 gal**	**13.31**	**931.78**	**1579.14**	**158.88**	**34.79**	**14.72**	**101.21**	
Maximum permitted GPM:		**17.5**	**Gallons Gas, Diesel, & Oil Recovered:**		**151.51**	**226.24**	**20.82**		**TOTAL GALLONS RECOVERED:**		**398.57**

Oil Water Separator Data

Observation Date	Monthly LNAPL Recovery (gal)
February-03	19.6
April-03	6.9
May-03	2.5
July-03	2
December-03	20
January-04	25
June-04	35
August-04	50
September-04	8
November-04	10
December-04	3.5
January-05	0
February-05	35
July-05	110
February-06	5
March-06	2
December-06	30
March-08	30
Total Gallons LNAPL Recovered	**395**

TOTAL PETROLEUM RECOVERY	
Total lbs Dissolved Gas, Diesel, and Oil Recovered in Groundwater (2002-Present)	2,670 lbs
Total Gallons Dissolved Gas, Diesel, and Oil Recovered in Groundwater (2002-Present)*	**399 gal**
Total Gallons LNAPL Recovered by Final Recovery System (2002-Present)	**395 gal**
Total Gallons LNAPL Recovered by Interim Recovery System (1992-2002)	**9,312 gal**
Total Gallons of TPH Vapor Recovered by Final SVE System (2003-2008)**	**2,334 gal**
Total Gallons of TPH Vapor Recovered by Interim SVE System (1996-2002)**	**1,248 gal**
Total Gallons TPH Recovered from Final SVE System due to Biodegradation (2003-2008)***	**11,411 gal**
Total Gallons TPH Recovered from Interim SVE System due to Biodegradation (1996-2002)***	**4,664 gal**
Total Gallons Recovered by Final Recovery Systems (2002-Present)	**14,539 gal**
Total Gallons Recovered by Interim Recovery Systems (1992-2002)	**15,223 gal**
Total Gallons of Petroleum Removed (1992-Present)	**29,762 gal**

Definitions:

gal - gallons
GPM - Gallons per minute
NA - Not available
LNAPL - Light non-aqueous phase liquid (oil)
SVE - Soil vapor extraction
TPH - Total petroleum hydrocarbons
µg/L - micrograms per liter

Notes:

LNAPL Recovery is recorded periodically when sufficient product has been accumulated to be transported off-site for disposal.
Influent diesel and oil samples are no longer analyzed, as influent and effluent samples are collected before and after, respectively, a diffused air stripper, which is not intended or effective at removing diesel or oil.
Effluent sample data are representative of the outflow water to King County Metro sanitary sewer.
The average µg/L of the preceding month and the month of reference are used to calculate pounds of compound removed.
If the influent concentrations are below the laboratories method detection limit, the percent reduction is calculated using the method detection limit. The actual percent reduction is ≥ the reported value.

* Calculation of lbs of Recovered Product:
To convert µg/L to lbs/gallon - (µg/L)x(3.785l/gal)=ug/gal, (ug/gal)x(ug/(2.2046x10-9lbs))=lbs/gal
lbs/gal of chemical constituent x total gallons recovered =lbs of chemical recovered
Density of Gasoline utilized for conversions from pounds to gallons is 6.15 lbs/gal
Density of Diesel utilized for conversions from pounds to gallons 6.98 lbs/gal
Density of Oil utilized for conversions from pounds to gallons 7.63 lbs/gal
Benzene, toluene, ethylbenzene, and xylenes volumes are not included in the Total Gallons calculations, as they are assumed to be included in TPH as gasoline.

** / *** SVE Recovery Calculations for TPH and Biodegradation, which are maintained in separate tables.

C = Average Influent TPH concentration (ppmv)
Q = Influent Flow Rate (SCFM)
Mc = Molecular wt. of Carbon Dioxide = 44
Mg = Molecular wt. of Gasoline = 87
Density of Gasoline for conversions is 6.15 lbs/gal

** TPH recovered by SVE system was calculated in lbs/hr = $C \times Q \times Mg \times 1.583 \times 10^{-7}$
1.583×10^{-7} is a constant and is derived as follows:
10^{-6} ppmv x 60min/1hr x 1 lb Mole/379 cu.ft.
SVE TPH recovery calculations are based on TPH concentrations in the SVE stream, SVE hrs of operation, and SVE measured flow rates.

Table 2. Waterfront Groundwater Recovery Wells Petroleum Hydrocarbon History
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well ID	Date	Gasoline mg/l	Diesel mg/l	Oil mg/l	Benzene ug/l	Toluene ug/l	Ethylbenzene ug/l	Xylenes ug/l
RW-10	Nov-03	0.625			1.2	0.892	2.42	3.07
RW-10	Aug-04	0.661	**36.2**	3.46	0.5	0.5	0.653	1.99
RW-10	Feb-05	0.473	1.21	0.75	0.5	0.5	0.5	1.41
RW-10	Nov-05	0.420	13.3	1.63	0.5	0.5	0.5	1
RW-10	Mar-06	0.066	4.14	0.75	0.5	0.5	0.5	1
RW-10	Nov-06	0.930	3.48	1.09	0.5	0.5	0.5	1
RW-10	May-07	0.073	0.255	*0.5*	0.5	0.5	0.5	1
RW-10	Nov-07	0.246	4.65	0.841	0.5	0.5	0.5	1
RW-10	Apr-08	0.235	1.91	*0.515*	0.5	0.5	0.5	1
RW-10	Nov-08	0.347	8.21	0.946	0.5	0.5	0.5	1
RW-10	Apr-09	0.448	5.95	0.804	0.5	0.5	0.5	1.36
RW-10	Nov-09	0.320	5.2	0.78	*0.5*	*1*	*1*	*2*
RW-10	Apr-10	0.460	2.3	*0.49*	*0.5*	*1*	*1*	*2*
RW-10	Nov-10	0.251	2.4	0.65	*0.5*	*1*	*1*	*3*
RW-10	Apr-11	0.6	1.5	0.68	*0.5*	*1*	*1*	*3*
RW-10	Nov-11	0.171	0.22	*0.39*	*0.5*	*1*	*1*	*3*
RW-10	Apr-12	0.366	0.51	0.46	*0.5*	*1*	*1*	*3*
RW-10	Nov-12	*0.1*	*0.11*	*0.11*	*0.5*	*0.5*	*0.5*	*1.5*
RW-10	Apr-13	0.2	0.36	*0.49*	*0.5*	*0.5*	*0.5*	*0.5*
RW-10	Nov-13	0.13	*0.25*	*0.25*	*0.5*	*0.5*	*0.5*	*1*
RW-10	Apr-14	0.16	1.6	0.73	*0.14*	*0.16*	*0.13*	0.13
RW-10	Nov-14	0.11	0.78	0.36	*1.0*	*1.0*	*1.0*	*3.0*
RW-10	Apr-15	0.091	0.97	0.8	*2.0*	*2.0*	*3.0*	*3.0*
RW-10	Nov-15	0.67	1.5	0.28	4.3	*2.0*	*3.0*	0.73
RW-10	Average	0.3	4.2	0.8	0.8	0.8	0.9	1.7
RW-9	Nov-03	**13.1**			5	43.2	146	1180
RW-9	Aug-04	**1.24**	**94.9**	2.19	0.5	0.5	1.23	1.64
RW-9	Feb-05	0.907	**22.1**	<15	0.5	0.5	3.64	4.74
RW-9	Nov-05	0.568	4.31	0.708	0.5	0.5	0.968	1.45
RW-9	Mar-06	0.166	1.68	0.75	0.5	0.5	0.5	1
RW-9	Nov-06	0.359	5.98	1.17	0.5	0.5	0.647	1.09
RW-9	May-07	0.402	2.08	*0.5*	5.43	0.5	1.4	1.49
RW-9	Nov-07	0.184	**70.1**	**11.6**	0.5	*0.5*	*0.5*	*1*
RW-9	Apr-08	0.170	**18.2**	2.94	3.21	*0.5*	*0.5*	*1*
RW-9	Nov-08	0.130	**49.5**	8.21	0.5	*0.5*	*0.5*	*1*
RW-9	Apr-09	0.280	**45.1**	6.71	0.5	*0.5*	*0.5*	*1*
RW-9	Nov-09	0.670	**32**	6.8	1.5	*1*	*1*	*2*
RW-9	Apr-10	**6.0**	**110**	**24**	*0.5*	*1*	*1*	*2*
RW-9	Nov-10	0.207	2.0	0.53	*0.5*	*1*	*1*	*3*
RW-9	Apr-11	**1.12**	**276**	**45.9**	*0.5*	*1*	*1*	*3*
RW-9	Nov-11	0.289	2.3	*0.39*	*0.5*	*1*	*1*	*3*
RW-9	Apr-12	0.113	**33.2**	5.3	0.72	*1*	*1*	*3*
RW-9	Nov-12	*0.1*	8.2	8.4	0.5	*0.5*	*0.5*	*1.5*
RW-9	Apr-13	0.1	**44.0**	8.5	*0.5*	*0.5*	*0.5*	*0.5*
RW-9	Nov-13	0.062	**14.0**	2.6	*0.5*	*0.5*	*0.5*	*1*
RW-9	Apr-14	0.14	**56.0**	**16**	*0.14*	*0.16*	*0.13*	*0.12*
RW-9	Nov-14	0.14	7.1	2.7	*1.0*	*1.0*	*1.0*	*3.0*
RW-9	Apr-15	0.18	**14.0**	4.9	*2.0*	*2.0*	*3.0*	*3.0*
RW-9	Nov-15	0.32	**7.6**	3.0	*2.0*	*2.0*	*3.0*	*3.0*
RW-9	Average	**1.1**	**40.0**	7.4	1.2	2.5	7.1	51.0
RW-8	Nov-03	0.367			0.5	0.5	0.787	2.23
RW-8	Aug-04	0.181	**19.8**	2.19	0.5	0.5	0.53	2.13
RW-8	Feb-05	0.218	2.58	0.75	0.5	0.5	0.564	3.04
RW-8	Nov-05	0.099	0.575	0.721	0.5	0.5	0.5	1
RW-8	Mar-06	0.050	1.44	0.75	0.5	0.5	0.5	1
RW-8	Nov-06	0.050	3.58	0.762	0.5	0.5	0.5	1
RW-8	May-07	0.068	0.273	*0.5*	0.5	0.5	0.5	1
RW-8	Nov-07	0.065	0.29	0.543	0.5	0.5	0.5	1
RW-8	Apr-08	0.067	0.279	*0.529*	0.5	0.5	0.5	1
RW-8	Nov-08	0.088	3.85	0.492	0.5	0.5	0.5	1
RW-8	Apr-09	0.091	0.255	*0.476*	0.5	0.5	0.5	1
RW-8	Nov-09	0.140	1.3	*0.47*	*0.5*	*1*	*1*	*2*
RW-8	Apr-10	0.150	1.1	*0.49*	*0.5*	*1*	*1*	*2*
RW-8	Nov-10	0.105	1.0	*0.39*	*0.5*	*1*	*1*	*3*
RW-8	Apr-11	0.0995	2.6	0.59	*0.5*	*1*	*1*	*3*
RW-8	Nov-11	0.183	1.7	*0.39*	*0.5*	*1*	*1*	*3*
RW-8	Apr-12	*0.05*	1.3	*0.39*	*0.5*	*1*	*1*	*3*
RW-8	Nov-12	0.185	4.0	3.6	*0.5*	*0.5*	*0.5*	*1.5*
RW-8	Apr-13	0.062	2.7	0.52	*0.5*	*0.5*	*0.5*	*0.5*
RW-8	Nov-13	0.1	0.82	*0.25*	*0.5*	*0.5*	*0.5*	*1*
RW-8	Apr-14	0.13	3.40	0.91	0.15	*0.16*	*0.13*	0.52
RW-8	Nov-14	0.14	**10.0**	3.2	*1.0*	*1.0*	*1.0*	*3.0*
RW-8	Apr-15	0.13	5.2	2.0	*2.0*	*2.0*	*3.0*	*3.0*
RW-8	Nov-15	0.39	5.5	1.5	0.91	*2.0*	*3.0*	*3.0*
RW-8	Average	0.1	3.2	1.0	0.6	0.8	0.9	1.8
Groundwater Cleanup Level		**1.0**	**10.0**	**10.0**	**71**			
Reporting Limits/Units		0.05 mg/l	0.25 mg/l	.750 mg/l	0.5 ug/l	0.5 ug/l	0.5 ug/l	1.0 ug/l

Table 2. Waterfront Groundwater Recovery Wells Petroleum Hydrocarbon History
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well ID	Date	Gasoline mg/l	Diesel mg/l	Oil mg/l	Benzene ug/l	Toluene ug/l	Ethylbenzene ug/l	Xylenes ug/l
RW-7	Nov-03	0.148			0.5	0.5	0.518	2.87
RW-7	Aug-04	0.050	7.6	1.2	0.5	0.5	0.5	1.09
RW-7	Feb-05	0.050	1.21	0.75	0.5	0.5	0.5	1
RW-7	Nov-05	0.050	0.35	0.728	0.5	0.5	0.5	1
RW-7	Mar-06	0.050	0.25	0.75	0.5	0.5	0.5	1
RW-7	Nov-06	0.063	3.16	1.34	0.5	0.5	0.5	1
RW-7	May-07	0.414	0.49	*0.515*	0.5	0.5	0.5	1
RW-7	Nov-07	0.187	0.25	*0.5*	0.5	0.5	0.5	1
RW-7	Apr-08	0.063	0.25	*0.5*	0.5	0.5	0.5	1
RW-7	Nov-08	0.071	0.236	*0.472*	0.5	0.5	0.5	1
RW-7	Apr-09	0.123	0.238	*0.476*	0.5	0.5	0.5	1
RW-7	Nov-09	0.075	0.69	*0.47*	*0.5*	*1*	*1*	*2*
RW-7	Apr-10	0.140	0.85	*0.49*	*0.5*	*1*	*1*	*2*
RW-7	Nov-10	0.11	0.46	*0.4*	*0.5*	*1*	*1*	*3*
RW-7	Apr-11	0.207	1.1	*0.41*	*0.5*	*1*	*1*	*3*
RW-7	Nov-11	*0.05*	0.13	*0.4*	*0.5*	*1*	*1*	*3*
RW-7	Apr-12	*0.05*	0.21	*0.42*	*0.5*	*1*	*1*	*3*
RW-7	Nov-12	*0.1*	0.32	0.37	*0.5*	*0.5*	*0.5*	*1.5*
RW-7	Apr-13	0.081	0.63	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*
RW-7	Nov-13	*0.05*	0.45	*0.24*	*0.5*	*0.5*	*0.5*	*1*
RW-7	Apr-14	0.07	2.4	0.6	0.17	*0.16*	0.17	0.23
RW-7	Nov-14	0.064	0.92	*0.25*	*1.0*	*1.0*	*1.0*	*3.0*
RW-7	Apr-15	0.073	5.2	1.6	*2.0*	*2.0*	*3.0*	*3.0*
RW-7	Nov-15	0.11	0.41	0.88	*2.0*	*2.0*	*3.0*	*3.0*
RW-7	Average	0.1	1.2	0.6	0.6	0.8	0.8	1.7
RW-1	Nov-03	0.858	8.73	1.34	1.03	0.758	2.71	3.39
RW-1	Aug-04	**1.00**	**31.6**	2.08	0.685	0.787	2.1	4.18
RW-1	Feb-05	**1.03**	**18.9**	0.75	10.5	4.66	4.06	20.2
RW-1	Nov-05	0.547	2.19	0.708	0.5	0.5	0.5	1.67
RW-1	Mar-06	0.144	4.78	0.802	0.5	0.5	0.5	1
RW-1	Nov-06	0.173	3.28	*0.487*	0.5	0.5	0.5	1
RW-1	May-07	0.081	0.972	*0.526*	0.5	0.5	0.5	1
RW-1	Nov-07	0.056	0.596	*0.505*	0.5	0.5	0.5	1
RW-1	Apr-08	0.068	0.25	*0.5*	0.5	0.5	0.5	1
RW-1	Nov-08	0.050	0.274	*0.472*	0.5	0.5	0.5	1
RW-1	Apr-09	0.074	0.332	*0.481*	0.5	0.5	0.5	1
RW-1	Nov-09	0.073	0.44	*0.47*	*0.5*	*1*	*1*	*2*
RW-1	Apr-10	0.071	0.31	*0.49*	*0.5*	*1*	*1*	*2*
RW-1	Nov-10	0.143	0.32	*0.39*	*0.5*	*1*	*1*	*3*
RW-1	Apr-11	0.0991	0.95	*0.39*	*0.5*	*1*	*1*	*3*
RW-1	Nov-11	0.14	6.9	1.6	*0.5*	*1*	*1*	*3*
RW-1	Apr-12	0.131	0.86	*0.4*	0.53	*1*	*1*	*3*
RW-1	Nov-12	*0.1*	0.23	0.35	*0.5*	*0.5*	*0.5*	*1.5*
RW-1	Apr-13	0.15	0.47	*0.5*	*0.5*	*0.5*	*0.5*	*0.5*
RW-1	Nov-13	0.12	0.4	*0.25*	*0.5*	*0.5*	*0.5*	*1*
RW-1	Apr-14	0.17	0.9	0.34	0.3	*0.16*	0.35	0.44
RW-1	Nov-14	0.19	0.72	*0.25*	*1.0*	*1.0*	*1.0*	*3.0*
RW-1	Apr-15	0.18	5.0	1.2	*2.0*	*2.0*	*3.0*	*3.0*
RW-1	Nov-15	0.52	0.96	0.18	2.6	*2.0*	*3.0*	*3.0*
RW-1	Average	0.3	3.8	0.6	1.1	1.0	1.2	2.7
RW-6	Nov-03	**1.81**			**569**	23.1	10	116
RW-6	Aug-04	0.067	0.25	0.75	0.5	0.5	0.5	1
RW-6	Feb-05	0.101	0.25	0.75	0.5	0.5	0.788	1.3
RW-6	Nov-05	**8.19**	**115**	***14.7***	7.62	2.56	53.6	524
RW-6	Mar-06	**31.80**	**560**	**300**	12.7	9.15	96.7	568
RW-6	Nov-06	**1.14**	**26.8**	*1.05*	0.591	0.5	0.636	10
RW-6	May-07	**1.02**	**38.9**	*5.05*	34	1.44	16.6	15.2
RW-6	Nov-07	0.05	1.9	*5.32*	0.5	0.5	0.5	1
RW-6	Apr-08	0.33	5.56	0.542	10.2	1.22	9.56	6.9
RW-6	Nov-08	0.05	0.734	*0.472*	0.5	0.5	0.5	1
RW-6	Apr-09	0.175	1.14	*0.476*	6.93	0.5	3.08	3.32
RW-6	Nov-09	*0.050*	0.73	*0.47*	*0.5*	*1*	*1*	*2*
RW-6	Apr-10	**1.10**	3.2	*0.49*	53	2	9.4	6.7
RW-6	Nov-10	0.266	2.5	*0.39*	*0.5*	*1*	*1*	*3*
RW-6	Apr-11	0.595	*0.37*	*0.41*	15.1	*1*	9.5	6.7
RW-6	Nov-11	*0.05*	0.21	*0.38*	*0.5*	*1*	*1*	*3*
RW-6	Apr-12	*0.05*	0.98	*0.4*	1.1	*1*	*1*	*3*
RW-6	Nov-12	*0.1*	*0.11*	*0.11*	*0.5*	*0.5*	*0.5*	*1.5*
RW-6	Apr-13	0.18	1.1	*0.49*	0.82	*0.5*	*0.5*	0.55
RW-6	Nov-13	0.052	0.29	*0.25*	*0.5*	*0.5*	*0.5*	*1*
RW-6	Apr-14	0.19	1.4	0.36	2.1	0.34	1.3	0.64
RW-6	Nov-14	0.068	0.46	*0.25*	*1.0*	*1.0*	*1.0*	*3.0*
RW-6	Apr-15	0.13	0.46	*0.26*	*2.0*	*2.0*	*3.0*	*3.0*
RW-6	Nov-15	0.097	0.6	0.14	*2.0*	*2.0*	*3.0*	*3.0*
RW-6	Average	**2.0**	**33.2**	**14.5**	30.1	2.3	9.4	53.5
Groundwater Cleanup Level		**1.0**	**10.0**	**10.0**	**71**			
Reporting Limits/Units		0.05 mg/l	0.25 mg/l	.750 mg/l	0.5 ug/l	0.5 ug/l	0.5 ug/l	1.0 ug/l

Table 2. Waterfront Groundwater Recovery Wells Petroleum Hydrocarbon History
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well ID	Date	Gasoline mg/l	Diesel mg/l	Oil mg/l	Benzene ug/l	Toluene ug/l	Ethylbenzene ug/l	Xylenes ug/l
RW-5	Nov-03	**2.10**	4.13	0.75	5.21	0.657	83.5	186
RW-5	Aug-04	**7.60**	**14.5**	1.55	1.93	1.67	324	630
RW-5	Feb-05	**3.18**	**17.4**	***15***	**37.8**	40	38.5	287
RW-5	Nov-05	**19.60**	**1240**	***361***	**43.2**	42	66.2	879
RW-5	Mar-06	**1.79**	**13.3**	7.5	1.06	24.2	8.03	129
RW-5	Nov-06	0.741	8	1.67	0.5	0.5	0.732	4.23
RW-5	May-07	**2.920**	**13.9**	2.01	22.1	0.705	16.7	60.1
RW-5	Nov-07	1.430	2.16	0.639	1.08	0.5	1.87	2.07
RW-5	Apr-08	0.240	7.71	2.17	5.64	0.5	1.19	1.48
RW-5	Nov-08	**1.520**	0.916	*0.472*	6.32	0.5	2.85	3.55
RW-5	Apr-09	0.873	**11.7**	2.45	**93.3**	2.42	8.74	16.5
RW-5	Nov-09	0.066	0.4	*0.47*	*0.5*	*1*	*1*	*2*
RW-5	Apr-10	0.570	1.4	*0.49*	7.3	*1*	15	29
RW-5	Nov-10	0.785	0.9	*0.39*	30.5	*1*	2	5.3
RW-5	Apr-11	0.801	1.3	*0.41*	10.3	*1*	3.5	7
RW-5	Nov-11	0.18	1.2	*0.39*	9.2	*1*	5.6	3.9
RW-5	Apr-12	0.746	0.35	*0.41*	14.1	*1*	6.8	26
RW-5	Nov-12	*0.1*	0.38	0.41	1.6	*0.5*	*0.5*	*1.5*
RW-5	Apr-13	0.18	**26**	2.2	0.57	*0.5*	*0.5*	*0.5*
RW-5	Nov-13	0.22	*0.25*	*0.25*	0.83	*0.5*	*0.5*	*1*
RW-5	Apr-14	0.46	2.8	0.79	5.2	0.55	1.9	4.1
RW-5	Nov-14	0.28	1.7	0.56	*1.0*	*1.0*	*1.0*	*3.0*
RW-5	Apr-15	0.45	2.4	0.89	3.2	*2.0*	*3.0*	*3.0*
RW-5	Nov-15	0.39	2.2	0.36	*2.0*	*2.0*	*3.0*	*3.0*
RW-5	Average	**2.0**	**57.3**	**16.8**	12.7	5.3	24.9	95.3
RW-4	Nov-03	**4.89**			36.1	44.3	337	281
RW-4	Aug-04	**182.0**	**681**	***150***	**617**	7740	2750	15,200
RW-4	Feb-05	**49.4**	**2,610**	***765***	**347**	2830	834	7,210
RW-4	Nov-05	**77.5**	**3,650**	***1820***	**341**	6940	1100	8,010
RW-4	Mar-06	**26.1**	**440**	**150**	30.2	654	346	3,340
RW-4	Nov-06	**7.23**	**139**	*5.26*	65.2	157	47	1,090
RW-4	May-07	0.82	8.08	*0.543*	3.97	0.547	3.89	77.5
RW-4	Nov-07	**1.29**	0.553	*0.543*	1.97	0.536	3.5	106
RW-4	Apr-08	0.07	2.91	*0.532*	0.5	0.5	0.5	4.57
RW-4	Nov-08	0.73	6.43	*0.472*	6.86	0.5	3.6	28.2
RW-4	Apr-09	0.565	7.93	*0.481*	8.17	0.5	1.43	18.3
RW-4	Nov-09	**5.5**	**25**	1.2	22	1.9	30	310
RW-4	Apr-10	**4.2**	**10**	*0.49*	46	1.6	24	155
RW-4	Nov-10	**2.61**	**20**	0.86	39.9	*1.0*	15	47.9
RW-4	Apr-11	**5.73**	**29.5**	1.2	67.9	1.2	44.8	158
RW-4	Nov-11	**4.51**	**56.2**	1.4	48.5	*1.0*	43.6	98.3
RW-4	Apr-12	**6.24**	**38.1**	1.4	56.8	*1.2*	45.3	106
RW-4	Nov-12	0.771	**10.7**	9.2	7.5	*0.5*	3.9	10.1
RW-4	Apr-13	**1.1**	7.1	*0.5*	16	*0.5*	5.4	2.32
RW-4	Nov-13	0.77	0.63	*0.25*	12	*0.5*	6.2	12
RW-4	Apr-14	**3.7**	**50**	2.7	14	0.49	14	22
RW-4	Nov-14	**1.9**	8.7	0.57	15	*1.0*	16	23
RW-4	Apr-15	**3.0**	4.1	0.35	13	*2.0*	18	18
RW-4	Nov-15	**2.3**	**18**	0.95	13	0.45	5.3	7.6
RW-4	Average	**16.4**	**340**	**127**	**76.2**	766	237	1,514
RW-2	Nov-03	**2.07**			**820**	369	34.5	124
RW-2	Aug-04	**7.03**	46	1.41	**2,270**	382	354	1,180
RW-2	Feb-05	**4.65**	1.02	0.75	**1,690**	450	296	752
RW-2	Nov-05	**2.82**	0.76	0.708	**1,540**	299	159	353
RW-2	Mar-06	**2.39**	6.84	3.75	**1,120**	112	138	224
RW-2	Nov-06	**13.10**	**14.3**	1.05	**1,830**	516	410	1,810
RW-2	May-07	**8.25**	6.35	*0.505*	**254**	33.1	237	1,150
RW-2	Nov-07	**3.55**	3.32	*0.538*	**895**	5	79.4	172
RW-2	Apr-08	**2.06**	**10.0**	*0.515*	**245**	5	58	190
RW-2	Nov-08	**1.42**	1.1	*0.481*	**360**	4.04	17.6	40
RW-2	Apr-09	0.497	0.864	*0.476*	49	1.78	9.49	22
RW-2	Nov-09	**2.4**	2.6	*0.48*	**400**	23	150	410
RW-2	Apr-10	**1.5**	1.0	*0.49*	**200**	1.5	66	98
RW-2	Nov-10	0.36	8.1	*0.6*	34.9	*1.0*	7.7	23.3
RW-2	Apr-11	**1.0**	1.5	*0.39*	**146**	1.3	27.8	51.7
RW-2	Nov-11	0.96	0.69	*0.39*	**363**	4.7	36.5	63.8
RW-2	Apr-12	0.57	**13.9**	*0.74*	**139**	*1.0*	13.7	17.4
RW-2	Nov-12	0.71	1.0	*0.91*	**196**	1.2	11.2	8.3
RW-2	Apr-13	0.47	3.0	*0.49*	**230**	2.0	20	6.6
RW-2	Nov-13	0.40	4.6	*0.25*	**80**	2.9	6.2	5.5
RW-2	Apr-14	**2.20**	7.2	0.53	**290**	100	84	79
RW-2	Nov-14	**2.30**	3.2	0.29	**460**	10	140	140
RW-2	Apr-15	**2.20**	2.7	0.3	**340**	28	77	55
RW-2	Nov-15	**1.6**	2.4	0.15	**330**	1.9	20	19
RW-2	Average	**2.7**	6.2	0.7	**595**	98.1	102	291
Groundwater Cleanup Level		**1.0**	**10.0**	**10.0**	**71**			
Reporting Limits/Units		0.05 mg/l	0.25 mg/l	.750 mg/l	0.5 ug/l	0.5 ug/l	0.5 ug/l	1.0 ug/l

Table 2. Waterfront Groundwater Recovery Wells Petroleum Hydrocarbon History
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well ID	Date	Gasoline mg/l	Diesel mg/l	Oil mg/l	Benzene ug/l	Toluene ug/l	Ethylbenzene ug/l	Xylenes ug/l
GM-11S	Nov-03	**2.28**			**614**	38.3	67.2	141
GM-11S	Aug-04	**2.06**	**57**	3.93	**506**	2.17	49.3	84.1
GM-11S	Feb-05	**2.42**	**25.1**	<15	55.6	0.848	25.5	17.3
GM-11S	Nov-05	**2.15**	**37.4**	<7.14	**124**	3.66	13.7	5.34
GM-11S	Mar-06	**1.41**	**17.8**	7.5	**218**	2.5	24.5	5
GM-11S	Nov-06	0.131	**10.8**	*1.05*	13.5	0.5	2.86	1.59
GM-11S	May-07	**1.68**	1.1	*0.556*	**175**	2.5	81.2	35.1
GM-11S	Nov-07	**2.20**	2.34	*0.505*	56.2	4.16	48.4	34.3
GM-11S	Apr-08	**1.93**	0.319	*0.532*	65.7	1.76	185	132
GM-11S	Nov-08	**1.66**	1.23	*0.472*	**95.3**	1.76	44.5	14.8
GM-11S	Apr-09	**1.26**	0.942	*0.481*	5.34	0.898	19.1	11.1
GM-11S	Aug-09	**1.90**	1.2	*0.48*	71	2.4	37	6.3
GM-11S	Nov-09	**1.50**	3.6	*0.48*	36	1.1	48	24
GM-11S	Apr-10	**3.00**	5	0.5	46	1.6	93	156
GM-11S	Nov-10	**1.39**	1.8	*0.48*	42	1.9	64.9	37.1
GM-11S	Apr-11	**1.42**	0.52	*0.4*	18.4	*1*	26.5	20.1
GM-11S	Nov-11	**2.28**	0.47	*0.38*	30.9	1.7	22.9	10.3
GM-11S	Apr-12	**2.24**	1.1	*0.38*	33	1.7	59.2	40.4
GM-11S	Nov-12	0.671	0.83	0.62	11.4	0.86	44.6	27.9
GM-11S	Apr-13	0.5	0.35	*0.49*	20	0.52	23	9.1
GM-11S	Nov-13	0.33	0.47	0.58	4.1	0.6	10	1
GM-11S	Apr-14	**1.2**	3.9	1.4	10	0.82	23	2.7
GM-11S	Nov-14	0.72	0.83	0.4	6.5	8.7	*1.0*	*3.0*
GM-11S	Apr-15	0.2	0.51	0.35	*2.0*	*2.0*	*3.0*	*3.0*
GM-11S	Nov-15	0.5	0.77	0.41	1.6	0.54	0.52	0.70
GM-11S	Average	**1.5**	7.3	1.0	**90.5**	3.4	40.7	32.9
Groundwater Cleanup Level		**1.0**	**10.0**	**10.0**	**71**			
Reporting Limits/Units		0.05 mg/l	0.25 mg/l	.750 mg/l	0.5 ug/l	0.5 ug/l	0.5 ug/l	1.0 ug/l

Detection limits for many of the Oil analyses were raised due to sample dilution for diesel analyses.
These samples are listed with a "<" notation.
Values highlighted in bold exceed the cleanup level

Total Gallonage of Recovered Petroleum Hydrocarbons

Date	Monthly LNAPL Recovery	Dissolved LNAPL Recovery*	Cumulative LNAPL Recovery	Monthly SVE Recovery (Vapor Phase)	Monthly SVE Recovery (Biodegredation)	Cumulative SVE Recovery	Total Recovery
9-Aug-92	0.0	NA	0	NA	NA	NA	0
10-Aug-92	1.2	NA	1	NA	NA	NA	1
11-Aug-92	27.4	NA	29	NA	NA	NA	29
19-Aug-92	43.6	NA	72	NA	NA	NA	72
25-Aug-92	7.3	NA	80	NA	NA	NA	80
26-Aug-92	19.0	NA	99	NA	NA	NA	99
27-Aug-92	19.4	NA	118	NA	NA	NA	118
11-Sep-92	5.4	NA	123	NA	NA	NA	123
13-Sep-92	31.8	NA	155	NA	NA	NA	155
18-Dec-92	17.8	NA	173	NA	NA	NA	173
4-Jan-93	45.0	NA	218	NA	NA	NA	218
3-Feb-93	120.3	NA	338	NA	NA	NA	338
4-Feb-93	11.1	NA	349	NA	NA	NA	349
5-Feb-93	14.8	NA	364	NA	NA	NA	364
8-Feb-93	38.9	NA	403	NA	NA	NA	403
16-Feb-93	72.7	NA	476	NA	NA	NA	476
18-Feb-93	23.5	NA	499	NA	NA	NA	499
1-Mar-93	89.4	NA	589	NA	NA	NA	589
15-Mar-93	253.8	NA	842	NA	NA	NA	842
16-Mar-93	20.2	NA	863	NA	NA	NA	863
25-Mar-93	98.0	NA	961	NA	NA	NA	961
31-Mar-93	52.1	NA	1,013	NA	NA	NA	1,013
8-Apr-93	108.6	NA	1,121	NA	NA	NA	1,121
12-Apr-93	86.5	NA	1,208	NA	NA	NA	1,208
14-Apr-93	37.5	NA	1,245	NA	NA	NA	1,245
15-Apr-93	21.8	NA	1,267	NA	NA	NA	1,267
29-Apr-93	114.0	NA	1,381	NA	NA	NA	1,381
5-May-93	57.9	NA	1,439	NA	NA	NA	1,439
10-May-93	128.9	NA	1,568	NA	NA	NA	1,568
14-May-93	175.4	NA	1,743	NA	NA	NA	1,743
19-May-93	236.7	NA	1,980	NA	NA	NA	1,980
28-May-93	279.7	NA	2,260	NA	NA	NA	2,260
3-Jun-93	2.4	NA	2,262	NA	NA	NA	2,262
4-Jun-93	78.0	NA	2,340	NA	NA	NA	2,340
11-Jun-93	40.5	NA	2,380	NA	NA	NA	2,380
25-Jun-93	216.6	NA	2,597	NA	NA	NA	2,597
6-Jul-93	167.9	NA	2,765	NA	NA	NA	2,765
9-Jul-93	15.1	NA	2,780	NA	NA	NA	2,780
16-Jul-93	3.3	NA	2,783	NA	NA	NA	2,783
29-Jul-93	9.2	NA	2,792	NA	NA	NA	2,792
30-Oct-93	1007.6	NA	3,800	NA	NA	NA	3,800
15-Mar-94	900.0	NA	4,700	NA	NA	NA	4,700
30-Jun-94	900.0	NA	5,600	NA	NA	NA	5,600
28-Sep-94	300.0	NA	5,900	NA	NA	NA	5,900
27-Dec-94	300.0	NA	6,200	NA	NA	NA	6,200
27-Mar-95	300.0	NA	6,500	NA	NA	NA	6,500
25-Jun-95	300.0	NA	6,800	NA	NA	NA	6,800
23-Sep-95	100.0	NA	6,900	NA	NA	NA	6,900
22-Dec-95	98.0	NA	6,998	NA	NA	NA	6,998
1-Jan-96	103.0	NA	7,101	11.4	24.8	36	7,137
28-Feb-96	140.0	NA	7,241	22.7	49.6	108	7,349

Note: NA - The soil vapor extraction system was not brought online until January of 1996
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Total Gallonage of Recovered Petroleum Hydrocarbons

Date	Monthly LNAPL Recovery	Dissolved LNAPL Recovery*	Cumulative LNAPL Recovery	Monthly SVE Recovery (Vapor Phase)	Monthly SVE Recovery (Biodegredation)	Cumulative SVE Recovery	Total Recovery
28-Mar-96	229.0	NA	7,470	88.5	155.4	352	7,822
24-Apr-96	60.5	NA	7,531	64.9	126.4	544	8,074
31-May-96	56.0	NA	7,586	54.4	150.8	749	8,335
26-Jun-96	61.0	NA	7,648	60.7	139.8	949	8,597
17-Jul-96	201.9	NA	7,849	62.9	158.0	1,170	9,020
16-Aug-96	312.9	NA	8,162	85.3	242.3	1,498	9,660
18-Sep-96	216.2	NA	8,379	23.8	74.8	1,596	9,975
16-Oct-96	120.5	NA	8,499	72.9	248.3	1,918	10,417
20-Nov-96	99.3	NA	8,598	30.8	155.2	2,104	10,702
12-Dec-96	17.2	NA	8,615	8.4	79.5	2,192	10,807
16-Jan-97	38.9	NA	8,654	8.3	75.8	2,276	10,930
14-Feb-97	2.3	NA	8,657	6.4	53.8	2,336	10,993
13-Mar-97	23.1	NA	8,680	7.5	42.4	2,386	11,066
14-Apr-97	86.6	NA	8,766	14.3	16.3	2,417	11,183
15-May-97	164.9	NA	8,931	18.2	42.0	2,477	11,408
24-Jun-97	70.2	NA	9,001	0.0	0.0	2,477	11,478
24-Jul-97	41.1	NA	9,043	2.7	13.9	2,493	11,536
24-Aug-97	0.0	NA	9,043	1.9	9.6	2,505	11,547
30-Sep-97	6.26	NA	9,049	2.2	11.4	2,518	11,567
31-Oct-97	23.68	NA	9,072	0.0	0.0	2,518	11,591
30-Nov-97	9.04	NA	9,081	0.0	0.0	2,518	11,600
15-Dec-97	7.19	NA	9,089	0.5	2.5	2,521	11,610
14-Jan-98	10.29	NA	9,099	1.0	5.0	2,527	11,626
13-Feb-98	6.5	NA	9,105	3.4	17.5	2,548	11,654
16-Mar-98	5.72	NA	9,111	2.4	12.2	2,563	11,674
14-Apr-98	0.01	NA	9,111	4.1	20.9	2,588	11,699
19-May-98	0.0	NA	9,111	5.1	25.9	2,619	11,730
15-Jun-98	0.0	NA	9,111	0.6	3.1	2,622	11,734
15-Jul-98	0.0	NA	9,111	0.0	0.0	2,622	11,734
15-Aug-98	0.0	NA	9,111	0.0	0.0	2,622	11,734
15-Sep-98	0.0	NA	9,111	0.0	0.0	2,622	11,734
15-Oct-98	7.7	NA	9,119	2.6	13.1	2,638	11,757
18-Nov-98	0.33	NA	9,119	4.8	24.5	2,667	11,787
13-Dec-98	0.0	NA	9,119	3.5	18.0	2,689	11,808
14-Jan-99	0.08	NA	9,119	3.3	16.9	2,709	11,828
17-Feb-99	0.0	NA	9,119	4.6	23.8	2,737	11,857
15-Mar-99	0.0	NA	9,119	3.8	19.4	2,761	11,880
15-Apr-99	0.0	NA	9,119	4.0	20.6	2,785	11,905
13-May-99	0.0	NA	9,119	3.9	20.2	2,809	11,929
15-Jun-99	0.0	NA	9,119	3.9	19.7	2,833	11,952
15-Jul-99	0.0	NA	9,119	4.1	21.2	2,858	11,978
17-Aug-99	0.0	NA	9,119	4.0	20.6	2,883	12,002
16-Sep-99	0.0	NA	9,119	3.9	19.8	2,907	12,026
20-Oct-99	0.0	NA	9,119	4.1	20.8	2,932	12,051
19-Nov-99	0.0	NA	9,119	3.7	18.8	2,954	12,073
21-Dec-99	0.0	NA	9,119	3.7	18.9	2,977	12,096
21-Jan-00	0.0	NA	9,119	3.5	18.1	2,998	12,118
16-Feb-00	0.0	NA	9,119	3.2	16.6	3,018	12,137
21-Mar-00	0.0	NA	9,119	4.4	22.6	3,045	12,164
14-Apr-00	0.0	NA	9,119	4.5	23.2	3,073	12,192
15-May-00	0.0	NA	9,119	2.6	13.5	3,089	12,208

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Total Gallonage of Recovered Petroleum Hydrocarbons

Date	Monthly LNAPL Recovery	Dissolved LNAPL Recovery*	Cumulative LNAPL Recovery	Monthly SVE Recovery (Vapor Phase)	Monthly SVE Recovery (Biodegredation)	Cumulative SVE Recovery	Total Recovery
15-Jun-00	0.1	NA	9,119	4.2	21.3	3,114	12,234
19-Jul-00	0.0	NA	9,119	3.9	20.2	3,138	12,258
18-Aug-00	0.1	NA	9,119	1.5	7.7	3,148	12,267
20-Sep-00	7.3	NA	9,127	2.8	14.1	3,165	12,291
12-Oct-00	0.0	NA	9,127	2.4	12.3	3,179	12,306
14-Nov-00	32.9	NA	9,160	2.9	14.8	3,197	12,357
14-Dec-00	20.1	NA	9,180	2.6	13.5	3,213	12,393
11-Jan-01	0.9	NA	9,181	2.5	12.6	3,228	12,409
15-Feb-01	0.0	NA	9,181	0.5	2.5	3,231	12,412
15-Mar-01	0.2	NA	9,181	0.0	0.0	3,231	12,412
20-Apr-01	0.0	NA	9,181	0.0	0.1	3,231	12,412
18-May-01	0.0	NA	9,181	6.8	35.0	3,273	12,454
11-Jun-01	0.8	NA	9,182	10.8	55.1	3,339	12,520
24-Jul-01	0.1	NA	9,182	43.9	224.4	3,607	12,789
21-Aug-01	0.3	NA	9,182	0.0	0.0	3,607	12,789
6-Sep-01	0.1	NA	9,182	0.0	0.0	3,607	12,789
19-Oct-01	0.0	NA	9,182	13.5	69.2	3,690	12,872
15-Nov-01	106.9	NA	9,289	33.7	172.2	3,896	13,185
10-Dec-01	17.5	NA	9,306	0.0	0.0	3,896	13,202
16-Jan-02	5.6	NA	9,312	34.6	177.0	4,107	13,419
21-Feb-02	0.0	NA	9,312	39.5	202.1	4,349	13,661
15-Mar-02	0.0	NA	9,312	0.0	0.0	4,349	13,661
15-Apr-02	0.0	NA	9,312	0.0	0.0	4,349	13,661
15-May-02	0.0	NA	9,312	0.0	0.0	4,349	13,661
15-Jun-02	0.0	NA	9,312	0.0	0.0	4,349	13,661
15-Jul-02	0.0	NA	9,312	0.0	0.0	4,349	13,661
15-Aug-02	0.0	NA	9,312	0.0	0.0	4,349	13,661
24-Sep-02	0.0	NA	9,312	0.0	0.0	4,349	13,661
15-Oct-02	0.0	0.0	9,312	68.5	254.2	4,672	13,984
26-Nov-02	0.0	1.2	9,313	137.6	525.5	5,335	14,648
26-Dec-02	0.0	2.7	9,316	94.0	482.8	5,912	15,227
16-Jan-03	19.6	2.6	9,338	49.5	451.8	6,413	15,751
20-Feb-03	0.0	3.7	9,342	33.5	320.1	6,766	16,108
11-Mar-03	0.0	4.6	9,346	27.5	328.1	7,122	16,468
15-Apr-03	6.9	3.9	9,357	15.4	423.1	7,560	16,918
15-May-03	2.5	2.8	9,362	18.3	346.5	7,925	17,288
17-Jun-03	0.0	1.8	9,364	18.6	353.4	8,297	17,661
15-Jul-03	2.0	1.3	9,367	32.4	290.4	8,620	17,987
13-Aug-03	0.0	2.4	9,370	49.2	295.0	8,964	18,334
16-Sep-03	0.0	2.6	9,373	26.5	364.0	9,355	18,727
14-Oct-03	0.0	2.5	9,375	23.0	316.1	9,694	19,069
19-Nov-03	0.0	3.2	9,378	36.6	404.9	10,135	19,514
17-Dec-03	20.0	6.4	9,405	12.0	317.3	10,465	19,869
13-Jan-04	25.0	31.3	9,461	2.8	293.2	10,761	20,222
10-Feb-04	0.0	19.7	9,481	3.8	186.1	10,951	20,431
17-Mar-04	0.0	1.5	9,482	5.2	297.0	11,253	20,735
15-Apr-04	0.0	0.8	9,483	11.0	198.0	11,462	20,945
25-May-04	0.0	3.0	9,486	40.4	356.7	11,859	21,345
17-Jun-04	35.0	2.7	9,524	57.1	103.2	12,019	21,543
13-Jul-04	0.0	8.2	9,532	64.7	260.4	12,344	21,876
13-Aug-04	50.0	11.9	9,594	22.1	233.1	12,599	22,193

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Total Gallonage of Recovered Petroleum Hydrocarbons

Date	Monthly LNAPL Recovery	Dissolved LNAPL Recovery*	Cumulative LNAPL Recovery	Monthly SVE Recovery (Vapor Phase)	Monthly SVE Recovery (Biodegredation)	Cumulative SVE Recovery	Total Recovery
16-Sep-04	8.0	6.3	9,608	32.0	147.8	12,779	22,387
13-Oct-04	0.0	1.8	9,610	62.2	117.5	12,959	22,568
19-Nov-04	10.0	3.1	9,623	118.5	156.7	13,234	22,856
15-Dec-04	3.5	2.0	9,629	84.4	124.7	13,443	23,071
13-Jan-05	0.0	3.7	9,632	80.6	90.3	13,614	23,245
15-Feb-05	35.0	5.3	9,673	83.4	128.0	13,825	23,494
15-Mar-05	0.0	2.7	9,675	121.9	162.7	14,110	23,781
15-Apr-05	0.0	6.2	9,681	136.0	170.8	14,417	24,094
20-May-05	0.0	13.6	9,695	83.0	156.7	14,656	24,347
16-Jun-05	0.0	13.6	9,709	61.6	106.7	14,825	24,529
15-Jul-05	110.0	15.9	9,835	86.0	168.1	15,079	24,909
12-Aug-05	0.0	7.9	9,842	100.3	142.0	15,321	25,159
15-Sep-05	0.0	10.2	9,853	96.4	145.9	15,564	25,412
14-Oct-05	0.0	7.7	9,860	66.3	179.5	15,809	25,671
17-Nov-05	0.0	5.8	9,866	92.2	188.9	16,090	25,958
19-Dec-05	0.0	7.8	9,874	49.2	104.0	16,244	26,119
25-Jan-06	0.0	77.0	9,951	83.8	152.8	16,480	26,433
14-Feb-06	5.0	35.5	9,992	40.3	74.2	16,595	26,629
15-Mar-06	2.0	3.1	9,997	59.4	112.3	16,766	26,838
14-Apr-06	0.0	4.0	10,001	47.3	116.2	16,930	27,005
17-May-06	0.0	4.9	10,005	37.9	132.2	17,100	27,179
14-Jun-06	0.0	1.1	10,007	20.7	93.2	17,214	27,298
12-Jul-06	0.0	0.2	10,007	13.8	76.5	17,304	27,389
08-Aug-06	0.0	0.0	10,007	9.2	28.7	17,342	27,427
16-Aug-06	0.0	0.2	10,007	2.4	20.9	17,365	27,451
13-Sep-06	0.0	0.7	10,008	6.4	70.7	17,442	27,528
12-Oct-06	0.0	0.5	10,008	5.2	71.9	17,519	27,606
17-Nov-06	0.0	0.6	10,009	2.8	100.3	17,622	27,710
19-Dec-06	30.0	1.1	10,040	0.6	97.3	17,720	27,839
19-Jan-07	0.0	1.2	10,041	0.0	93.0	17,813	27,933
16-Feb-07	0.0	0.7	10,042	0.8	81.7	17,896	28,016
16-Mar-07	0.0	0.5	10,042	1.8	89.2	17,987	28,108
19-Apr-07	0.0	0.8	10,043	2.8	123.9	18,113	28,235
03-May-07	0.0	0.0	10,043	1.9	52.2	18,168	28,289
17-May-07	0.0	0.7	10,044	2.6	47.2	18,217	28,286
14-Jun-07	0.0	0.4	10,044	7.8	96.2	18,321	28,390
13-Jul-07	0.0	0.3	10,044	7.3	107.5	18,436	28,505
16-Aug-07	0.0	0.2	10,045	5.2	139.9	18,581	28,650
10-Sep-07	0.0	0.1	10,045	4.4	116.7	18,703	28,772
17-Oct-07	0.0	0.1	10,045	6.4	160.4	18,869	28,939
16-Nov-07	0.0	0.2	10,045	5.1	112.7	18,987	29,056
14-Dec-07	0.0	0.1	10,045	12.6	103.2	19,103	29,172
22-Jan-08	0.0	0.4	10,046	22.0	143.0	19,268	29,337
14-Feb-08	0.0	0.4	10,046	5.9	83.5	19,357	29,427
14-Mar-08	30.0	0.3	10,076	5.1	86.1	19,448	29,518
18-Apr-08	0.0	0.2	10,076	5.4	111.5	19,565	29,642
16-May-08	0.0	0.1	10,077	4.1	88.0	19,657	29,734
18-Jun-08	0.0	0.1	10,077	0.0	0.0	19,657	29,734
16-Jul-08	0.0	0.2	10,077	0.0	0.0	19,657	29,734
18-Aug-08	0.0	0.2	10,077	0.0	0.0	19,657	29,735
16-Sep-08	0.0	0.1	10,077	0.0	0.0	19,657	29,735

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Total Gallonage of Recovered Petroleum Hydrocarbons

Date	Monthly LNAPL Recovery	Dissolved LNAPL Recovery*	Cumulative LNAPL Recovery	Monthly SVE Recovery (Vapor Phase)	Monthly SVE Recovery (Biodegredation)	Cumulative SVE Recovery	Total Recovery
15-Oct-08	0.0	0.1	10,077	0.0	0.0	19,657	29,735
14-Nov-08	0.0	0.2	10,078	0.0	0.0	19,657	29,735
11-Dec-08	0.0	0.1	10,078	0.0	0.0	19,657	29,735
14-Jan-09	0.0	0.2	10,078	0.0	0.0	19,657	29,735
18-Feb-09	0.0	0.1	10,078	0.0	0.0	19,657	29,736
17-Mar-09	0.0	0.1	10,078	0.0	0.0	19,657	29,736
16-Apr-09	0.0	0.1	10,078	0.0	0.0	19,657	29,736
14-May-09	0.0	0.1	10,078	0.0	0.0	19,657	29,736
16-Jun-09	0.0	0.1	10,079	0.0	0.0	19,657	29,736
22-Jul-09	0.0	0.3	10,079	0.0	0.0	19,657	29,736
17-Aug-09	0.0	0.4	10,079	0.0	0.0	19,657	29,737
14-Sep-09	0.0	0.3	10,080	0.0	0.0	19,657	29,737
20-Oct-09	0.0	0.2	10,080	0.0	0.0	19,657	29,737
18-Nov-09	0.0	0.6	10,080	0.0	0.0	19,657	29,738
15-Dec-09	0.0	0.3	10,081	0.0	0.0	19,657	29,738
21-Jan-10	0.0	1.7	10,082	0.0	0.0	19,657	29,740
17-Feb-10	0.0	0.8	10,083	0.0	0.0	19,657	29,740
17-Mar-10	0.0	0.4	10,084	0.0	0.0	19,657	29,741
15-Apr-10	0.0	0.3	10,084	0.0	0.0	19,657	29,741
19-May-10	0.0	0.3	10,084	0.0	0.0	19,657	29,741
16-Jun-10	0.0	0.1	10,084	0.0	0.0	19,657	29,742
28-Jul-10	0.0	0.1	10,084	0.0	0.0	19,657	29,742
18-Aug-10	0.0	0.0	10,084	0.0	0.0	19,657	29,742
21-Sep-10	0.0	0.1	10,084	0.0	0.0	19,657	29,742
19-Oct-10	0.0	0.1	10,084	0.0	0.0	19,657	29,742
29-Nov-10	0.0	0.1	10,085	0.0	0.0	19,657	29,742
22-Dec-10	0.0	0.7	10,085	0.0	0.0	19,657	29,743
19-Jan-11	0.0	1.2	10,087	0.0	0.0	19,657	29,744
15-Feb-11	0.0	0.5	10,087	0.0	0.0	19,657	29,744
29-Mar-11	0.0	0.5	10,088	0.0	0.0	19,657	29,745
21-Apr-11	0.0	0.2	10,088	0.0	0.0	19,657	29,745
18-May-11	0.0	0.5	10,088	0.0	0.0	19,657	29,746
14-Jun-11	0.0	0.3	10,088	0.0	0.0	19,657	29,746
20-Jul-11	0.0	0.1	10,089	0.0	0.0	19,657	29,746
17-Aug-11	0.0	0.0	10,089	0.0	0.0	19,657	29,746
14-Sep-11	0.0	0.0	10,089	0.0	0.0	19,657	29,746
11-Oct-11	0.0	0.1	10,089	0.0	0.0	19,657	29,746
22-Nov-11	0.0	0.3	10,089	0.0	0.0	19,657	29,746
13-Dec-11	0.0	0.1	10,089	0.0	0.0	19,657	29,747
23-Jan-12	0.0	1.8	10,091	0.0	0.0	19,657	29,748
14-Feb-12	0.0	0.9	10,092	0.0	0.0	19,657	29,749
13-Mar-12	0.0	0.2	10,092	0.0	0.0	19,657	29,749
16-Apr-12	0.0	0.8	10,093	0.0	0.0	19,657	29,750
16-May-12	0.0	0.5	10,093	0.0	0.0	19,657	29,751
13-Jun-12	0.0	0.1	10,093	0.0	0.0	19,657	29,751
20-Jul-12	0.0	0.1	10,093	0.0	0.0	19,657	29,751
23-Aug-12	0.0	0.2	10,094	0.0	0.0	19,657	29,751
5-Sep-12	0.0	0.1	10,094	0.0	0.0	19,657	29,751
24-Oct-12	0.0	0.2	10,094	0.0	0.0	19,657	29,751
18-Dec-12	0.0	0.0	10,094	0.0	0.0	19,657	29,751
23-Jan-13	0.0	0.5	10,094	0.0	0.0	19,657	29,752

Note: NA - The soil vapor extraction system was not brought online until January of 1996
* - Dissolved LNAPL recovery was not recorded until completion of the final remediation system in Oct 2002.

Total Gallonage of Recovered Petroleum Hydrocarbons

Date	Monthly LNAPL Recovery	Dissolved LNAPL Recovery*	Cumulative LNAPL Recovery	Monthly SVE Recovery (Vapor Phase)	Monthly SVE Recovery (Biodegredation)	Cumulative SVE Recovery	Total Recovery
21-Feb-13	0.0	0.1	10,095	0.0	0.0	19,657	29,752
13-Mar-13	0.0	0.1	10,095	0.0	0.0	19,657	29,752
17-Apr-13	0.0	0.2	10,095	0.0	0.0	19,657	29,752
22-May-13	0.0	0.1	10,095	0.0	0.0	19,657	29,752
12-Jun-13	0.0	0.1	10,095	0.0	0.0	19,657	29,752
24-Jul-13	0.0	0.3	10,095	0.0	0.0	19,657	29,753
20-Aug-13	0.0	0.2	10,095	0.0	0.0	19,657	29,753
24-Sep-13	0.0	0.1	10,096	0.0	0.0	19,657	29,753
15-Oct-13	0.0	0.0	10,096	0.0	0.0	19,657	29,753
20-Nov-13	0.0	0.2	10,096	0.0	0.0	19,657	29,753
18-Dec-13	0.0	0.2	10,096	0.0	0.0	19,657	29,753
14-Jan-14	0.0	0.1	10,096	0.0	0.0	19,657	29,754
11-Feb-14	0.0	0.1	10,096	0.0	0.0	19,657	29,754
20-Mar-14	0.0	0.3	10,097	0.0	0.0	19,657	29,754
16-Apr-14	0.0	0.2	10,097	0.0	0.0	19,657	29,754
21-May-14	0.0	0.2	10,097	0.0	0.0	19,657	29,754
19-Jun-14	0.0	0.1	10,097	0.0	0.0	19,657	29,754
24-Jul-14	0.0	0.0	10,097	0.0	0.0	19,657	29,755
13-Aug-14	0.0	0.2	10,097	0.0	0.0	19,657	29,755
17-Sep-14	0.0	0.4	10,098	0.0	0.0	19,657	29,755
15-Oct-14	0.0	0.2	10,098	0.0	0.0	19,657	29,755
19-Nov-14	0.0	0.2	10,098	0.0	0.0	19,657	29,755
17-Dec-14	0.0	0.4	10,098	0.0	0.0	19,657	29,756
14-Jan-15	0.0	0.8	10,099	0.0	0.0	19,657	29,757
11-Feb-15	0.0	0.7	10,100	0.0	0.0	19,657	29,757
18-Mar-15	0.0	0.3	10,100	0.0	0.0	19,657	29,758
15-Apr-15	0.0	0.3	10,101	0.0	0.0	19,657	29,758
15-May-15	0.0	0.2	10,101	0.0	0.0	19,657	29,758
17-Jun-15	0.0	0.3	10,101	0.0	0.0	19,657	29,758
15-Jul-15	0.0	0.4	10,101	0.0	0.0	19,657	29,759
12-Aug-15	0.0	0.5	10,102	0.0	0.0	19,657	29,759
16-Sep-16	0.0	0.4	10,102	0.0	0.0	19,657	29,760
14-Oct-16	0.0	0.4	10,103	0.0	0.0	19,657	29,760
18-Nov-15	0.0	1.1	10,104	0.0	0.0	19,657	29,761
10-Dec-15	0.0	1.2	10,105	0.0	0.0	19,657	29,762

Total LNAPL Recovery (gal)	Total Dissolved LNAPL Recovery* (gal)	Total LNAPL Recovery (gal)	Total SVE Recovery (vapor phase) (gal)	Total SVE Recovery (biodegredation) (gal)	Total SVE Recovery (gal)	Total Recovery (gal)
9,706	399	10,105	3,582	16,075	19,657	29,762

Note: NA - The soil vapor extraction system was not brought online until January of 1996
* - Dissolved LNAPL recovery was not recorded until completion of the final remediation system in Oct 2002.

Table 4. Containment Boom Sheen Monitoring
BP West Coast Products Terminal 21T, Harbor Island, Seattle

Date	Tidal Stage		Warehouse Area Sheen Observations		Loading Rack Area Sheen Observations	
	Low, Medium (ebb & flood), High	Tide Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)
4/29/1996	high	2	**Yes**	2.0		
4/30/1996	low	0	**Yes**	1.0		
4/30/1996	flood	1	**Yes**	2.0		
5/15/1996	low	0	No	0.0		
5/20/1996			No	0.0		
5/22/1996	ebb	1	**Yes**	1.0		
5/24/1996			**Yes**	1.0		
6/7/1996	ebb	1	**Yes**	1.0		
6/10/1996			**Yes**	0.5		
6/13/1996			No	0.0		
6/19/1996	high	2	No	0.0		
6/24/1996	medium	1	No	0.0		
7/30/1996	ebb	1	No	0.0		
8/14/1996	medium	1	No	0.0		
8/16/1996	ebb	1	**Yes**	1.0		
8/19/1996	ebb	1	**Yes**	1.0		
8/29/1996	ebb	1	**Yes**	1.0		
10/3/1996	low	0	**Yes**	1.0		
10/4/1996	ebb	1	**Yes**	0.5		
10/7/1996	flood	1	**Yes**	2.0	No	0.0
10/10/1996	low	0	No	0.0	No	0.0
10/11/1996	low	0	No	0.0	No	0.0
10/23/1996	low	0	No	0.0	No	0.0
10/25/1996	high	2	No	0.0	No	0.0
10/30/1996	high	2	**Yes**	2.0	No	0.0
11/1/1996	medium	1	**Yes**	2.0	No	0.0
11/4/1996	medium	1	No	0.0	No	0.0
11/5/1996			No	0.0	No	0.0
11/6/1996	low	0	**Yes**	2.0	No	0.0
11/7/1996	low	0	**Yes**	2.0	No	0.0
11/12/1996			**Yes**	0.5	No	0.0
11/13/1996			No	0.0	No	0.0
11/14/1996			**Yes**	1.0	No	0.0
11/18/1996	high	2	No	0.0	No	0.0
11/19/1996	low	0	**Yes**	1.0	No	0.0
11/20/1996	low	0	**Yes**	1.0	No	0.0
11/21/1996	low	0	**Yes**	1.0	No	0.0
12/6/1996	ebb	1	No	0.0	No	0.0
12/9/1996	medium	1	No	0.0	No	0.0
12/10/1996	flood	1	No	0.0	**Yes**	0.5
12/12/1996	flood	1	No	0.0	No	0.0
12/13/1996	flood	1	No	0.0	No	0.0

Table 4. Containment Boom Sheen Monitoring
BP West Coast Products Terminal 21T, Harbor Island, Seattle

Date	Tidal Stage		Warehouse Area Sheen Observations		Loading Rack Area Sheen Observations	
	Low, Medium (ebb & flood), High	Tide Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)
12/16/1996	flood	1	**Yes**	1.0	**Yes**	2.0
12/17/1996	flood	1	**Yes**	1.0	No	0.0
12/18/1996	flood	1	**Yes**	1.0	**Yes**	3.0
1/2/1997	high	2	No	0.0	**Yes**	1.0
1/8/1997	high	2	No	0.0	**Yes**	3.0
1/9/1997			**Yes**	1.0	**Yes**	3.0
1/9/1997	ebb	1	**Yes**	1.0	**Yes**	3.0
1/9/1997	high	2	**Yes**	3.0	**Yes**	3.0
1/14/1997	low	0	**Yes**	1.0	**Yes**	1.0
1/15/1997	low	0	No	0.0	**Yes**	2.0
1/16/1997	low	0	**Yes**	1.0	**Yes**	3.0
1/17/1997			No	0.0	**Yes**	1.5
1/20/1997	low	0	No	0.0	**Yes**	3.0
1/20/1997	high	2	**Yes**	1.0	**Yes**	2.0
1/21/1997	high	2	**Yes**	0.5	**Yes**	2.5
1/22/1997	flood	1	No	0.0	**Yes**	1.0
1/23/1997	flood	1	No	0.0	**Yes**	1.0
1/24/1997	flood	1	**Yes**	0.5	**Yes**	2.0
1/27/1997	low	0	**Yes**	1.0	**Yes**	1.0
1/27/1997	low	0	No	0.0	**Yes**	3.0
1/28/1997	low	0	**Yes**	1.0	No	0.0
1/28/1997	high	2	No	0.0	**Yes**	2.0
1/30/1997	low	0	**Yes**	1.0	**Yes**	0.5
1/31/1997	low	0	**Yes**	0.5	**Yes**	0.5
2/3/1997	flood	1	**Yes**	0.5	**Yes**	1.0
2/4/1997	flood	1	**Yes**	3.0	**Yes**	3.0
2/5/1997	high	2	**Yes**	0.5	**Yes**	0.5
2/6/1997	flood	1	**Yes**	0.5	**Yes**	2.0
2/7/1997	flood	1	**Yes**	1.0	**Yes**	2.0
2/10/1997	low	0	No	0.0	No	0.0
2/11/1997	low	0	No	0.0	No	0.0
2/12/1997	low	0	No	0.0	No	0.0
2/14/1997	low	0	**Yes**	0.5	**Yes**	0.5
2/14/1997	flood	1	No	0.0	**Yes**	0.5
2/20/1997	ebb	1	**Yes**	2.0	**Yes**	2.0
12/3/1997	high	2	No	0	No	0.0
12/4/1997	ebb	1	No	0	No	0.0
1/11/2000	medium	1	No	0.0	**Yes**	1.0
1/21/2000	high	2	No	0.0	No	0.0
2/16/2000	medium	1	No	0.0	No	0.0

Table 4. Containment Boom Sheen Monitoring
BP West Coast Products Terminal 21T, Harbor Island, Seattle

Date	Tidal Stage		Warehouse Area Sheen Observations		Loading Rack Area Sheen Observations	
	Low, Medium (ebb & flood), High	Tide Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)
2/22/2000	high	2	No	0.0	No	0.0
2/23/2000	medium	1	No	0.0	No	0.0
2/24/2000	low	0	No	0.0	No	0.0
3/15/2000	medium	1	No	0.0	No	0.0
3/16/2000	medium	1	No	0.0	No	0.0
3/21/2000	low	0	No	0.0	**Yes**	**1.0**
4/14/2000	medium	1	No	0.0	**Yes**	**1.0**
6/15/2000	low	0	No	0.0	No	0.0
6/28/2000	low	0	**Yes**	**1.0**	No	0.0
6/29/2000	low	0	No	0.0	No	0.0
7/11/2000	high	2	No	0.0	No	0.0
7/19/2000	low	0	No	0.0	No	0.0
8/15/2000	low	0	No	0.0	No	0.0
10/12/2000	low	0	No	0.0	No	0.0
11/14/2000	medium	1	No	0.0	No	0.0
12/14/2000	high	2	No	0.0	No	0.0
1/11/2001	medium	1	No	0.0	No	0.0
2/15/2001	medium	1	No	0.0	No	0.0
4/12/2001	medium	1	**Yes**	**1.0**	No	0.0
4/13/2001	medium	1	No	0.0	No	0.0
5/16/2001	low	0	No	0.0	No	0.0
5/17/2001	low	0	No	0.0	No	0.0
5/18/2001	low	0	No	0.0	No	0.0
5/21/2001	low	0	No	0.0	No	0.0
5/23/2001	low	0	No	0.0	No	0.0
5/29/2001	low	0	No	0.0	No	0.0
6/11/2001	medium	1	No	0.0	No	0.0
7/23/2001	low	0	No	0.0	No	0.0
8/21/2001	medium	1	No	0.0	No	0.0
9/6/2001	high	2	No	0.0	No	0.0
10/16/2001	low	0	No	0.0	No	0.0
11/15/2001	medium	1	No	0.0	No	0.0
12/10/2001	medium	1	No	0.0	No	0.0
1/4/2002	high	2	No	0.0	No	0.0
1/9/2002	medium	1	No	0.0	**Yes**	**1.0**
1/11/2002	medium	1	No	0.0	**Yes**	**1.0**
1/16/2002	high	2	No	0.0	**Yes**	**1.0**
1/22/2002	medium	1	No	0.0	**Yes**	**1.0**
1/23/2002	low	0	No	0.0	**Yes**	**1.0**
2/4/2002	high	2	No	0.0	No	0.0

Table 4. Containment Boom Sheen Monitoring
BP West Coast Products Terminal 21T, Harbor Island, Seattle

Date	Tidal Stage		Warehouse Area Sheen Observations		Loading Rack Area Sheen Observations	
	Low, Medium (ebb & flood), High	Tide Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)
2/18/2002	medium	1	**Yes**	**1.0**	No	0.0
2/21/2002	medium	1	No	0.0	**Yes**	**2.0**
3/21/2002	medium	1	No	0.0	**Yes**	**1.0**
3/25/2002	medium	1	No	0.0	No	0.0
3/26/2002	medium	1	No	0.0	No	0.0
3/27/2002	medium	1	No	0.0	**Yes**	2.0
4/4/2002	high	2	No	0.0	No	0.0
5/3/2002	low	0	No	0.0	No	0.0
5/7/2002	medium	1	**Yes**	**1.0**	No	0.0
5/21/2002	medium	1	**Yes**	**1.0**	**Yes**	**1.0**
6/6/2002	medium	1	**Yes**	**1.0**	No	0.0
6/18/2002	low	0	No	0.0	No	0.0
6/27/2002	high	2	**Yes**	**1.0**	**Yes**	**1.0**
7/10/2002	medium	1	**Yes**	**1.0**	**Yes**	**1.0**
7/29/2002	medium	1	**Yes**	**1.0**	No	0.0
8/21/2002	low	0	No	0.0	No	0.0
9/9/2002	high	2	**Yes**	**1.0**	**Yes**	**1.0**
9/20/2002	medium	1	**Yes**	**1.0**	No	0.0
10/9/2002	high	2	No	0.0	No	0.0
11/25/2002	high	2	No	0.0	No	0.0
11/27/2002	high	2	No	0.0	No	0.0
12/19/2002	medium	1	No	0.0	No	0.0
12/20/2002	high	2	No	0.0	No	0.0
1/16/2003	medium	1	No	0.0	No	0.0
2/3/2003	medium	1	No	0.0	No	0.0
2/10/2003	medium	1	No	0.0	No	0.0
2/10/2003	low	0	No	0.0	No	0.0
2/11/2003	medium	1	No	0.0	No	0.0
2/11/2003	high	2	No	0.0	No	0.0
2/11/2003	low	0	No	0.0	No	0.0
2/12/2003	medium	1	No	0.0	No	0.0
2/13/2003	high	2	No	0.0	No	0.0
2/13/2003	medium	1	No	0.0	No	0.0
2/14/2003	high	2	No	0.0	No	0.0
2/20/2003	high	2	No	0.0	No	0.0
2/20/2003	medium	1	No	0.0	No	0.0
2/20/2003	low	0	No	0.0	No	0.0
2/21/2003	high	2	No	0.0	No	0.0
2/21/2003	medium	1	No	0.0	No	0.0
3/3/2003	medium	1	No	0.0	No	0.0
3/10/2003	medium	1	No	0.0	No	0.0

Table 4. Containment Boom Sheen Monitoring
BP West Coast Products Terminal 21T, Harbor Island, Seattle

Date	Tidal Stage		Warehouse Area Sheen Observations		Loading Rack Area Sheen Observations	
	Low, Medium (ebb & flood), High	Tide Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)
3/11/2003	high	2	No	0.0	No	0.0
3/18/2003	medium	1	No	0.0	No	0.0
4/1/2003	low	0	No	0.0	No	0.0
4/8/2003	high	2	No	0.0	**Yes**	**2.0**
4/15/2003	low	0	No	0.0	**Yes**	**2.0**
4/21/2003	high	2	No	0.0	No	0.0
5/15/2003	low	0	No	0.0	No	0.0
5/20/2003	medium	1	No	0.0	No	0.0
5/21/2003	medium	1	No	0.0	No	0.0
5/27/2003	low	0	No	0.0	No	0.0
6/3/2003	medium	1	No	0.0	No	0.0
6/17/2003	medium	1	No	0.0	No	0.0
7/15/2003	medium	1	No	0.0	No	0.0
7/21/2003	low	0	No	0.0	No	0.0
8/7/2003	low	0	No	0.0	No	0.0
8/13/2003	medium	1	No	0.0	No	0.0
9/15/2003	high	2	No	0.0	No	0.0
9/16/2003	high	2	No	0.0	No	0.0
9/17/2003	medium	1	No	0.0	No	0.0
9/19/2003	medium	1	No	0.0	No	0.0
10/9/2003	medium	1	**Yes**	**1.0**	No	0.0
10/14/2003	high	2	No	0.0	No	0.0
11/12/2003	high	2	No	0.0	No	0.0
11/19/2003	high	2	No	0.0	No	0.0
12/17/2003	medium	1	No	0.0	No	0.0
12/23/2003	medium	1	No	0.0	No	0.0
1/13/2004	medium	1	No	0.0	**Yes**	**1.0**
1/24/2004	high	2	No	0.0	No	0.0
2/10/2004	medium	1	No	0.0	**Yes**	**1.0**
2/23/2004	medium	1	**Yes**	**1.0**	No	0.0
3/17/2004	medium	1	No	0.0	No	0.0
3/19/2004	medium	1	No	0.0	No	0.0
4/15/2004	medium	1	**Yes**	**1.0**	No	0.0
4/19/2004	medium	1	No	0.0	No	0.0
4/22/2004	medium	1	No	0.0	No	0.0
5/24/2004	medium	1	No	0.0	No	0.0
5/25/2004	medium	1	No	0.0	No	0.0
6/14/2004	medium	1	No	0.0	No	0.0
6/15/2004	low	0	No	0.0	No	0.0
6/23/2004	high	2	No	0.0	No	0.0
6/28/2004	low	0	No	0.0	No	0.0

Table 4. Containment Boom Sheen Monitoring
BP West Coast Products Terminal 21T, Harbor Island, Seattle

Date	Tidal Stage		Warehouse Area Sheen Observations		Loading Rack Area Sheen Observations	
	Low, Medium (ebb & flood), High	Tide Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)
6/29/2004	medium	1	No	0.0	No	0.0
6/30/2004	medium	1	No	0.0	No	0.0
7/12/2004	low	0	No	0.0	No	0.0
7/13/2004	low	0	No	0.0	No	0.0
8/11/2004	high	2	No	0.0	No	0.0
8/12/2004	low	0	No	0.0	No	0.0
8/24/2004	medium	1	No	0.0	No	0.0
9/2/2004	high	2	No	0.0	No	0.0
9/3/2004	high	2	No	0.0	No	0.0
9/7/2004	medium	1	No	0.0	No	0.0
9/10/2004	low	0	No	0.0	No	0.0
9/16/2004	high	2	No	0.0	No	0.0
9/21/2004	medium	1	No	0.0	No	0.0
9/22/2004	medium	1	No	0.0	No	0.0
9/23/2004	medium	1	No	0.0	No	0.0
10/5/2004	medium	1	No	0.0	No	0.0
10/13/2004	medium	1	**Yes**	**1.0**	No	0.0
10/15/2004	high	2	No	0.0	No	0.0
10/18/2004	high	2	No	0.0	No	0.0
10/25/2004	low	0	No	0.0	No	0.0
11/4/2004	medium	1	No	0.0	No	0.0
11/18/2004	high	2	No	0.0	No	0.0
11/23/2004	medium	1	No	0.0	No	0.0
12/3/2004	low	0	No	0.0	No	0.0
12/15/2004	high	2	No	0.0	No	0.0
12/23/2004	medium	1	No	0.0	No	0.0
1/4/2005	high	2	No	0.0	No	0.0
1/13/2005	high	2	No	0.0	No	0.0
1/21/2005	low	0	No	0.0	No	0.0
2/1/2005	high	**2**	**No**	**0.0**	**Yes**	**1.0**
2/2/2005	high	**2**	**No**	**0.0**	**Yes**	**2.0**
2/3/2005	medium	**1**	**No**	**0.0**	**Yes**	**1.0**
2/4/2005	medium	**1**	**No**	**0.0**	**Yes**	**1.0**
2/7/2005	low	**0**	**No**	**0.0**	**Yes**	**1.0**
2/8/2005	low	0	No	0.0	No	0.0
2/15/2005	high	2	No	0.0	No	0.0
2/25/2005	high	2	No	0.0	No	0.0
3/2/2005	high	2	No	0.0	No	0.0
3/8/2005	low	0	No	0.0	No	0.0
3/15/2005	high	2	No	0.0	No	0.0
4/4/2005	low	0	No	0.0	No	0.0

Table 4. Containment Boom Sheen Monitoring
BP West Coast Products Terminal 21T, Harbor Island, Seattle

Date	Tidal Stage		Warehouse Area Sheen Observations		Loading Rack Area Sheen Observations	
	Low, Medium (ebb & flood), High	Tide Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)
4/11/2015	high	**2**	**No**	**0.0**	**Yes**	**1.0**
4/13/2005	medium	**1**	**No**	**0.0**	**Yes**	**2.0**
4/14/2005	high	**2**	**No**	**0.0**	**Yes**	**1.0**
4/15/2005	medium	**1**	**No**	**0.0**	**Yes**	**2.0**
4/18/2005	low	0	No	0.0	No	0.0
4/25/2005	medium	1	No	0.0	No	0.0
5/2/2005	low	0	No	0.0	No	0.0
5/9/2005	medium	1	No	0.0	No	0.0
5/16/2005	low	0	No	0.0	No	0.0
5/20/2005	low	0	No	0.0	No	0.0
5/23/2005	medium	1	No	0.0	No	0.0
5/30/2005	medium	1	No	0.0	No	0.0
6/6/2005	medium	1	No	0.0	No	0.0
6/10/2005	medium	1	No	0.0	No	0.0
6/13/2005	high	2	No	0.0	No	0.0
6/20/2005	low	0	No	0.0	No	0.0
6/27/2005	high	2	No	0.0	No	0.0
7/4/2005	medium	1	No	0.0	No	0.0
7/11/2005	high	**2**	No	0.0	**Yes**	**1.0**
7/15/2005	medium	1	No	0.0	No	0.0
7/18/2005	low	0	No	0.0	No	0.0
7/25/2005	high	2	No	0.0	No	0.0
8/1/2005	low	0	No	0.0	No	0.0
8/8/2005	high	2	No	0.0	No	0.0
8/12/2005	medium	1	No	0.0	No	0.0
8/15/2005	low	0	No	0.0	No	0.0
8/22/2005	medium	1	No	0.0	No	0.0
8/29/2005	low	0	No	0.0	No	0.0
9/5/2005	medium	1	No	0.0	No	0.0
9/12/2005	medium	1	No	0.0	No	0.0
9/14/2005	low	0	No	0.0	No	0.0
9/19/2005	medium	1	No	0.0	No	0.0
9/26/2005	low	0	No	0.0	No	0.0
10/3/2005	medium	1	No	0.0	No	0.0
10/10/2005	medium	1	No	0.0	No	0.0
10/14/2005	low	0	No	0.0	No	0.0
10/17/2005	medium	1	No	0.0	No	0.0
10/24/2005	medium	1	No	0.0	No	0.0
10/31/2005	low	0	No	0.0	No	0.0
11/7/2005	high	2	No	0.0	No	0.0
11/14/2005	low	0	No	0.0	No	0.0
11/21/2005	high	2	No	0.0	No	0.0

Table 4. Containment Boom Sheen Monitoring
BP West Coast Products Terminal 21T, Harbor Island, Seattle

	Tidal Stage		Warehouse Area Sheen Observations		Loading Rack Area Sheen Observations	
Date	Low, Medium (ebb & flood), High	Tide Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)
11/23/2005	medium	1	No	0.0	No	0.0
11/28/2005	low	0	No	0.0	No	0.0
11/29/2005	medium	1	No	0.0	No	0.0
11/30/2005	medium	1	No	0.0	No	0.0
12/1/2005	high	2	No	0.0	No	0.0
12/2/2005	high	2	No	0.0	No	0.0
12/5/2005	high	2	No	0.0	No	0.0
12/6/2005	medium	1	No	0.0	No	0.0
12/7/2005	high	2	No	0.0	No	0.0
12/9/2005	high	2	No	0.0	No	0.0
12/15/2005	high	**2**	No	0.0	**Yes**	**1.0**
12/19/2005	high	**2**	No	0.0	**Yes**	**1.0**
1/25/2006	low	0	**Yes**	**2.0**	**Yes**	**2.0**
2/8/2006			No	0.0	**Yes**	**1.0**
2/9/2006			No	0.0	**Yes**	**1.0**
2/10/2006			No	0.0	**Yes**	**1.0**
2/13/2006	medium	1	No	0.0	**Yes**	**1.0**
2/14/2006	medium	1	No	0.0	**Yes**	**1.0**
3/15/2006	low	0	No	0.0	No	0.0
3/17/2006	low	0	No	0.0	No	0.0
3/21/2006	high	2	No	0.0	No	0.0
3/27/2006	low	0	No	0.0	No	0.0
4/3/2006	high	2	No	0.0	No	0.0
4/11/2006	medium	1	No	0.0	No	0.0
4/14/2006	medium	1	No	0.0	No	0.0
4/17/2006	high	2	No	0.0	No	0.0
4/24/2006	low	0	No	0.0	No	0.0
4/25/2006	medium	1	No	0.0	No	0.0
4/26/2006	medium	1	No	0.0	No	0.0
4/27/2006	medium	1	No	0.0	No	0.0
4/28/2006	medium	1	No	0.0	No	0.0
5/1/2006	medium	1	No	0.0	No	0.0
5/9/2006	low	0	No	0.0	No	0.0
5/17/2006	high	2	No	0.0	No	0.0
5/18/2006	high	2	No	0.0	No	0.0
5/22/2006	low	0	No	0.0	No	0.0
5/30/2006	medium	1	No	0.0	No	0.0
5/31/2006	high	2	No	0.0	No	0.0
6/1/2006	high	2	No	0.0	No	0.0
6/5/2006	medium	1	**Yes**	**0.5**	No	0.0
6/12/2006	low	0	No	0.0	No	0.0

Table 4. Containment Boom Sheen Monitoring
BP West Coast Products Terminal 21T, Harbor Island, Seattle

Date	Tidal Stage		Warehouse Area Sheen Observations		Loading Rack Area Sheen Observations	
	Low, Medium (ebb & flood), High	Tide Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)
6/14/2006	medium	1	No	0.0	No	0.0
7/12/2006	low	0	No	0.0	No	0.0
7/19/2006	medium	1	**Yes**	**1.0**	No	0.0
7/24/2006	high	2	No	0.0	No	0.0
7/25/2006	low	0	**Yes**	**1.0**	No	0.0
7/31/2006	high	2	No	0.0	**Yes**	**1.0**
8/2/2006	high	2	No	0.0	No	0.0
8/8/2006	high	2	No	0.0	No	0.0
8/14/2006	high	2	**Yes**	**1.0**	**Yes**	**1.0**
8/16/2006	medium	1	**Yes**	**2.0**	**Yes**	**1.0**
8/21/2006	low	0	No	0.0	No	0.0
8/25/2006	high	2	**Yes**	**0.5**	**Yes**	**0.5**
8/28/2006	high	2	**Yes**	**0.5**	No	0.0
8/29/2006	high	2	No	0.0	No	0.0
9/1/2006	medium	1	No	0.0	No	0.0
9/5/2006	low	0	No	0.0	No	0.0
9/6/2006	low	0	No	0.0	No	0.0
9/11/2006	high	2	No	0.0	No	0.0
9/13/2006	high	2	**Yes**	**1.0**	**Yes**	**1.0**
9/18/2006	low	0	No	0.0	**Yes**	**1.0**
9/19/2006	low	0	**Yes**	**2.0**	No	0.0
9/22/2006	high	2	No	0.0	No	0.0
9/25/2006	high	2	No	0.0	**Yes**	**1.0**
9/27/2006	high	2	No	0.0	No	0.0
10/2/2006	medium	1	No	0.0	No	0.0
10/5/2006	low	0	No	0.0	No	0.0
10/6/2006	high	2	No	0.0	No	0.0
10/9/2006	high	2	No	0.0	No	0.0
10/12/2006	high	2	No	0.0	No	0.0
10/16/2006	medium	1	No	0.0	No	0.0
10/17/2006	high	2	**Yes**	**1.0**	No	0.0
10/23/2006	high	2	No	0.0	No	0.0
10/25/2006	high	2	No	0.0	No	0.0
10/30/2006	high	2	No	0.0	No	0.0
10/31/2006	high	2	**Yes**	**1.0**	No	0.0
11/1/2006	medium	1	No	0.0	No	0.0
11/6/2006	high	2	No	0.0	No	0.0
11/7/2006	high	2	No	0.0	No	0.0
11/8/2006	high	2	No	0.0	No	0.0
11/9/2006	high	2	No	0.0	No	0.0
11/13/2006	high	2	No	0.0	**Yes**	**1.0**
11/17/2006	medium	1	No	0.0	No	0.0

Table 4. Containment Boom Sheen Monitoring
BP West Coast Products Terminal 21T, Harbor Island, Seattle

Date	Tidal Stage		Warehouse Area Sheen Observations		Loading Rack Area Sheen Observations	
	Low, Medium (ebb & flood), High	Tide Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)
11/20/2006	high	2	No	0.0	No	0.0
11/27/2006	high	2	No	0.0	No	0.0
11/30/2006	high	2	No	0.0	No	0.0
12/4/2006	medium	1	No	0.0	**Yes**	**1.0**
12/5/2006	high	2	**Yes**	**1.0**	No	0.0
12/11/2006	high	2	No	0.0	No	0.0
12/12/2006	medium	1	No	0.0	No	0.0
12/13/2006	high	2	No	0.0	No	0.0
12/14/2006	high	2	No	0.0	No	0.0
12/15/2006	medium	1	**Yes**	**1.0**	No	0.0
12/16/2006	medium	1	No	0.0	No	0.0
12/18/2006	medium	1	No	0.0	No	0.0
12/19/2006	high	2	No	0.0	**Yes**	**1.0**
12/21/2006	high	2	No	0.0	No	0.0
12/22/2006	high	2	No	0.0	No	0.0
1/2/2007	high	2	No	0.0	No	0.0
1/5/2007	high	2	No	0.0	No	0.0
1/8/2007	high	2	No	0.0	No	0.0
1/9/2007	high	2	No	0.0	No	0.0
1/10/2007	high	2	No	0.0	No	0.0
1/15/2007	high	2	No	0.0	No	0.0
1/19/2007	high	2	No	0.0	**Yes**	**1.0**
1/22/2007	high	2	No	0.0	**Yes**	**0.5**
1/29/2007	high	2	No	0.0	**Yes**	**1.0**
1/31/2007	high	2	**Yes**	**1.0**	No	0.0
2/2/2007	high	2	No	0.0	No	0.0
2/5/2007	high	2	No	0.0	No	0.0
2/6/2007	high	2	No	0.0	No	0.0
2/7/2007	high	2	No	0.0	No	0.0
2/12/2007	high	2	No	0.0	No	0.0
2/14/2007	high	2	No	0.0	No	0.0
2/16/2007	high	2	No	0.0	No	0.0
2/20/2007	high	2	No	0.0	No	0.0
2/26/2007	high	2	No	0.0	No	0.0
3/5/2007	medium	1	No	0.0	No	0.0
3/7/2007	medium	1	No	0.0	No	0.0
3/13/2007	high	2	No	0.0	No	0.0
3/16/2007	medium	1	No	0.0	No	0.0
3/19/2007	low	0	No	0.0	No	0.0
3/20/2007	medium	1	No	0.0	No	0.0
3/21/2007	high	2	No	0.0	No	0.0

Table 4. Containment Boom Sheen Monitoring
BP West Coast Products Terminal 21T, Harbor Island, Seattle

Date	Tidal Stage		Warehouse Area Sheen Observations		Loading Rack Area Sheen Observations	
	Low, Medium (ebb & flood), High	Tide Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)
3/22/2007	high	2	No	0.0	No	0.0
3/26/2007	high	2	No	0.0	No	0.0
3/30/2007	medium	1	No	0.0	No	0.0
4/2/2007	high	2	No	0.0	No	0.0
4/6/2007	high	2	**Yes**	**1.0**	No	0.0
4/9/2007	high	2	No	0.0	No	0.0
4/12/2007	high	2	No	0.0	No	0.0
4/13/2007	medium	1	No	0.0	No	0.0
4/16/2007	low	0	No	0.0	No	0.0
4/19/2007	medium	1	No	0.0	No	0.0
4/23/2007	high	2	No	0.0	No	0.0
4/24/2007	high	2	**Yes**	**1.0**	No	0.0
4/26/2007	medium	1	No	0.0	No	0.0
4/27/2007	high	2	No	0.0	No	0.0
4/30/2007	low	0	No	0.0	No	0.0
5/3/2007	medium	1	No	0.0	No	0.0
5/8/2007	high	2	No	0.0	No	0.0
5/9/2007	high	2	No	0.0	No	0.0
5/14/2007	low	0	No	0.0	No	0.0
5/17/2007	medium	1	No	0.0	No	0.0
5/21/2007	high	2	No	0.0	No	0.0
5/23/2007	medium	1	No	0.0	No	0.0
6/1/2007	medium	1	No	0.0	No	0.0
6/4/2007	high	2	**Yes**	**1.0**	**Yes**	**1.0**
6/6/2007	high	2	No	0.0	No	0.0
6/7/2007	medium	1	**Yes**	**1.0**	No	0.0
6/11/2007	low	0	No	0.0	No	0.0
6/13/2007	low	0	No	0.0	No	0.0
6/14/2007	low	0	No	0.0	No	0.0
6/18/2007	medium	1	No	0.0	No	0.0
6/19/2007	high	2	No	0.0	No	0.0
6/25/2007	low	0	No	0.0	No	0.0
7/2/2007	high	2	**Yes**	**2.0**	No	0.0
7/9/2007	low	0	No	0.0	No	0.0
7/13/2007	low	0	No	0.0	No	0.0
7/16/2007	low	0	No	0.0	No	0.0
7/23/2007	low	0	No	0.0	No	0.0
7/30/2007	medium	1	No	0.0	No	0.0
7/31/2007	high	2	**Yes**	**1.0**	No	0.0
8/6/2007	medium	1	No	0.0	No	0.0
8/8/2007	low	0	No	0.0	No	0.0
8/13/2007	medium	1	No	0.0	No	0.0

Table 4. Containment Boom Sheen Monitoring
BP West Coast Products Terminal 21T, Harbor Island, Seattle

Date	Tidal Stage		Warehouse Area Sheen Observations		Loading Rack Area Sheen Observations	
	Low, Medium (ebb & flood), High	Tide Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)
8/16/2007	high	2	No	0.0	No	0.0
8/20/2007	high	2	No	0.0	No	0.0
8/22/2007	medium	1	No	0.0	No	0.0
8/23/2007	medium	1	No	0.0	No	0.0
8/24/2007	low	0	No	0.0	No	0.0
8/27/2007	low	0	No	0.0	No	0.0
8/30/2007	low	0	No	0.0	No	0.0
9/4/2007	medium	1	No	0.0	No	0.0
9/10/2007	medium	1	No	0.0	No	0.0
9/13/2007	medium	1	No	0.0	No	0.0
9/14/2007	high	2	No	0.0	No	0.0
9/17/2007	high	2	No	0.0	No	0.0
9/18/2007	high	2	No	0.0	No	0.0
9/19/2007	high	2	No	0.0	No	0.0
9/20/2007	medium	1	No	0.0	No	0.0
9/24/2007	low	0	No	0.0	No	0.0
10/1/2007	high	2	No	0.0	No	0.0
10/2/2007	high	2	No	0.0	No	0.0
10/3/2007	medium	1	No	0.0	No	0.0
10/5/2007	low	0	No	0.0	No	0.0
10/8/2007	medium	1	No	0.0	No	0.0
10/9/2007	high	2	No	0.0	No	0.0
10/11/2007	high	2	No	0.0	No	0.0
10/15/2007	high	2	No	0.0	No	0.0
10/17/2007	medium	1	No	0.0	No	0.0
10/22/2007	low	0	No	0.0	No	0.0
10/24/2007	medium	1	No	0.0	No	0.0
10/25/2007	high	2	No	0.0	No	0.0
10/29/2007	high	2	No	0.0	No	0.0
10/31/2007	low	0	No	0.0	No	0.0
11/1/2007	low	0	No	0.0	No	0.0
11/2/2007	low	0	No	0.0	No	0.0
11/5/2007	low	0	No	0.0	No	0.0
11/6/2007	low	0	No	0.0	No	0.0
11/12/2007	high	2	No	0.0	No	0.0
11/13/2007	high	2	No	0.0	No	0.0
11/15/2007	high	2	No	0.0	No	0.0
11/16/2007	high	2	No	0.0	No	0.0
11/19/2007	medium	1	No	0.0	No	0.0
11/26/2007	high	2	No	0.0	No	0.0
11/27/2007	high	2	**Yes**	**0.5**	No	0.0
12/3/2007	high	2	No	0.0	No	0.0

Table 4. Containment Boom Sheen Monitoring
BP West Coast Products Terminal 21T, Harbor Island, Seattle

Date	Tidal Stage		Warehouse Area Sheen Observations		Loading Rack Area Sheen Observations	
	Low, Medium (ebb & flood), High	Tide Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)
12/10/2007	high	2	No	0.0	No	0.0
12/11/2007	high	2	No	0.0	No	0.0
12/14/2007	high	2	No	0.0	No	0.0
12/17/2007	high	2	No	0.0	No	0.0
12/19/2007	high	2	No	0.0	No	0.0
12/20/2007	high	2	No	0.0	No	0.0
12/24/2007	medium	1	No	0.0	No	0.0
1/2/2008	high	2	No	0.0	Yes	1.0
1/7/2008	high	2	No	0.0	No	0.0
1/11/2008	high	2	No	0.0	No	0.0
1/14/2008	high	2	No	0.0	No	0.0
1/21/2008	high	2	No	0.0	No	0.0
1/22/2008	high	2	No	0.0	No	0.0
1/28/2008	high	2	No	0.0	No	0.0
1/29/2008	high	2	No	0.0	No	0.0
2/4/2008	high	2	**Yes**	**0.5**	No	0.0
2/11/2008	medium	1	No	0.0	No	0.0
2/12/2008	high	2	No	0.0	No	0.0
2/14/2008	high	2	No	0.0	No	0.0
2/19/2008	high	2	No	0.0	No	0.0
2/20/2008	high	2	No	0.0	No	0.0
2/25/2008	high	2	No	0.0	No	0.0
2/28/2008	high	2	No	0.0	No	0.0
3/3/2008	medium	1	No	0.0	No	0.0
3/4/2008	medium	1	No	0.0	No	0.0
3/10/2008	high	2	No	0.0	No	0.0
3/11/2008	high	2	No	0.0	No	0.0
3/12/2008	high	2	No	0.0	No	0.0
3/14/2008	high	2	No	0.0	No	0.0
3/17/2008	medium	1	No	0.0	No	0.0
3/24/2008	high	2	No	0.0	No	0.0
3/26/2008	high	2	No	0.0	No	0.0
3/31/2008	medium	1	No	0.0	No	0.0
4/1/2008	medium	1	No	0.0	No	0.0
4/7/2008	high	2	No	0.0	No	0.0
4/10/2008	medium	1	**Yes**	**0.5**	No	0.0
4/11/2008	medium	1	No	0.0	No	0.0
4/15/2008	medium	1	No	0.0	No	0.0
4/16/2008	low	0	No	0.0	No	0.0
4/18/2008	low	0	No	0.0	No	0.0
4/21/2008	medium	1	No	0.0	No	0.0

Table 4. Containment Boom Sheen Monitoring
BP West Coast Products Terminal 21T, Harbor Island, Seattle

Date	Tidal Stage		Warehouse Area Sheen Observations		Loading Rack Area Sheen Observations	
	Low, Medium (ebb & flood), High	Tide Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)
4/22/2008	medium	1	No	0.0	No	0.0
4/28/2008	medium	1	No	0.0	No	0.0
5/2/2008	low	0	No	0.0	No	0.0
5/5/2008	medium	1	No	0.0	No	0.0
5/12/2008	medium	1	No	0.0	No	0.0
5/16/2008	medium	1	No	0.0	No	0.0
5/19/2008	low	0	No	0.0	No	0.0
5/21/2008	low	0	No	0.0	No	0.0
5/23/2008	high	2	No	0.0	No	0.0
5/27/2008	medium	1	**Yes**	**0.5**	No	0.0
5/29/2008	medium	1	No	0.0	No	0.0
6/2/2008	low	0	No	0.0	No	0.0
6/9/2008	medium	1	No	0.0	No	0.0
6/12/2008	medium	1	No	0.0	No	0.0
6/17/2008	low	0	No	0.0	No	0.0
6/18/2008	low	0	No	0.0	No	0.0
6/19/2008	medium	1	No	0.0	No	0.0
6/23/2008	high	2	Yes	1.0	No	0.0
6/25/2008	medium	1	No	0.0	No	0.0
6/26/2008	medium	1	No	0.0	No	0.0
6/27/2008	low	0	No	0.0	No	0.0
6/30/2008	low	0	No	0.0	No	0.0
7/7/2008	high	2	No	0.0	No	0.0
7/8/2008	high	2	No	0.0	No	0.0
7/14/2008	low	0	No	0.0	No	0.0
7/16/2008	medium	1	**Yes**	**1.0**	**Yes**	**1.0**
7/21/2008	high	2	No	0.0	No	0.0
7/22/2008	high	2	No	0.0	No	0.0
7/23/2008	high	2	No	0.0	No	0.0
7/28/2008	low	0	No	0.0	No	0.0
7/30/2008	low	0	No	0.0	No	0.0
7/31/2008	low	0	No	0.0	No	0.0
8/4/2008	high	2	No	0.0	No	0.0
8/5/2008	high	2	No	0.0	No	0.0
8/6/2008	high	2	No	0.0	No	0.0
8/7/2008	high	2	No	0.0	No	0.0
8/8/2008	medium	1	No	0.0	No	0.0
8/11/2008	low	0	No	0.0	No	0.0
8/12/2008	low	0	No	0.0	No	0.0
8/13/2008	low	0	No	0.0	No	0.0
8/18/2008	medium	1	No	0.0	No	0.0
8/19/2008	high	2	Yes	1.0	No	0.0

Table 4. Containment Boom Sheen Monitoring
BP West Coast Products Terminal 21T, Harbor Island, Seattle

Date	Tidal Stage		Warehouse Area Sheen Observations		Loading Rack Area Sheen Observations	
	Low, Medium (ebb & flood), High	Tide Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)
8/20/2008	high	2	No	0.0	No	0.0
8/21/2008	high	2	No	0.0	No	0.0
8/25/2008	medium	1	No	0.0	No	0.0
8/27/2008	low	0	No	0.0	No	0.0
9/2/2008	medium	1	No	0.0	No	0.0
9/8/2008	medium	1	No	0.0	No	0.0
9/16/2008	medium	1	No	0.0	No	0.0
9/17/2008	high	2	No	0.0	No	0.0
9/18/2008	high	2	No	0.0	No	0.0
9/19/2008	high	2	No	0.0	No	0.0
9/22/2008	high	2	No	0.0	No	0.0
9/23/2008	medium	1	No	0.0	No	0.0
9/24/2008	low	0	No	0.0	No	0.0
9/29/2008	high	2	No	0.0	No	0.0
9/30/2008	high	2	No	0.0	No	0.0
10/1/2008	high	2	No	0.0	No	0.0
10/2/2008	high	2	No	0.0	No	0.0
10/6/2008	high	2	No	0.0	No	0.0
10/13/2008	medium	1	No	0.0	No	0.0
10/15/2008	medium	1	No	0.0	No	0.0
10/17/2008	high	2	No	0.0	No	0.0
10/20/2008	high	2	No	0.0	No	0.0
10/21/2008	high	2	No	0.0	No	0.0
10/24/2008	low	0	No	0.0	No	0.0
10/25/2008	medium	1	No	0.0	No	0.0
10/27/2008	high	2	No	0.0	No	0.0
11/3/2008	high	2	No	0.0	No	0.0
11/6/2008	high	2	No	0.0	No	0.0
11/10/2008	medium	1	No	0.0	No	0.0
11/14/2008	high	2	No	0.0	No	0.0
11/17/2008	high	2	No	0.0	No	0.0
11/18/2008	high	2	No	0.0	No	0.0
11/21/2008	medium	1	No	0.0	No	0.0
11/24/2008	medium	1	No	0.0	No	0.0
11/25/2008	high	2	No	0.0	No	0.0
12/1/2008	high	2	No	0.0	No	0.0
12/2/2008	high	2	No	0.0	No	0.0
12/3/2008	high	2	No	0.0	No	0.0
12/8/2008	high	2	No	0.0	No	0.0
12/11/2008	high	2	No	0.0	No	0.0
12/12/2008	high	2	No	0.0	No	0.0
12/15/2008	high	2	No	0.0	No	0.0

Table 4. Containment Boom Sheen Monitoring
BP West Coast Products Terminal 21T, Harbor Island, Seattle

Date	Tidal Stage		Warehouse Area Sheen Observations		Loading Rack Area Sheen Observations	
	Low, Medium (ebb & flood), High	Tide Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)
12/16/2008	high	2	No	0.0	No	0.0
12/17/2008	high	2	No	0.0	No	0.0
12/23/2008	high	2	No	0.0	No	0.0
12/29/2008	high	2	No	0.0	No	0.0
1/5/2009	high	2	No	0.0	No	0.0
1/12/2009	high	2	No	0.0	No	0.0
1/14/2009	high	2	No	0.0	No	0.0
1/15/2009	high	2	No	0.0	No	0.0
1/16/2009	high	2	No	0.0	No	0.0
1/20/2009	high	2	No	0.0	No	0.0
1/22/2009	high	2	No	0.0	No	0.0
1/26/2009	medium	1	No	0.0	No	0.0
1/27/2009	high	2	No	0.0	No	0.0
1/28/2009	medium	1	No	0.0	No	0.0
1/29/2009	medium	1	No	0.0	No	0.0
1/30/2009	medium	1	No	0.0	No	0.0
2/2/2009	high	2	No	0.0	No	0.0
2/5/2009	high	2	No	0.0	**Yes**	**0.5**
2/9/2009	high	2	No	0.0	No	0.0
2/11/2009	medium	1	No	0.0	No	0.0
2/17/2009	high	2	**Yes**	**0.5**	No	0.0
2/18/2009	high	2	No	0.0	No	0.0
2/23/2009	high	2	No	0.0	No	0.0
2/26/2009	medium	1	No	0.0	No	0.0
3/3/2009	high	2	No	0.0	No	0.0
3/9/2009	medium	1	No	0.0	No	0.0
3/11/2009	medium	1	No	0.0	No	0.0
3/16/2009	medium	1	No	0.0	No	0.0
3/17/2009	high	2	No	0.0	No	0.0
3/18/2009	high	2	No	0.0	No	0.0
3/23/2009	medium	1	No	0.0	No	0.0
3/30/2009	high	2	No	0.0	No	0.0
3/31/2009	high	2	No	0.0	No	0.0
4/6/2009	medium	1	No	0.0	No	0.0
4/7/2009	medium	1	No	0.0	No	0.0
4/13/2009	high	2	No	0.0	No	0.0
4/15/2009	high	2	No	0.0	No	0.0
4/16/2009	low	0	No	0.0	No	0.0
4/21/2009	low	0	No	0.0	No	0.0
4/27/2009	medium	1	No	0.0	No	0.0
4/28/2009	high	2	No	0.0	No	0.0

Table 4. Containment Boom Sheen Monitoring
BP West Coast Products Terminal 21T, Harbor Island, Seattle

Date	Tidal Stage		Warehouse Area Sheen Observations		Loading Rack Area Sheen Observations	
	Low, Medium (ebb & flood), High	Tide Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)
4/29/2009	high	2	No	0.0	No	0.0
5/4/2009	low	0	No	0.0	No	0.0
5/11/2009	medium	1	No	0.0	No	0.0
5/14/0009	high	2	No	0.0	No	0.0
5/15/2009	high	2	No	0.0	No	0.0
5/18/2009	medium	1	No	0.0	No	0.0
5/26/2009	medium	1	No	0.0	No	0.0
5/27/2009	medium	1	No	0.0	No	0.0
6/1/2009	medium	1	No	0.0	No	0.0
6/2/2009	medium	1	No	0.0	No	0.0
6/4/2009	low	0	No	0.0	No	0.0
6/8/2009	medium	1	No	0.0	No	0.0
6/10/2009	high	2	No	0.0	No	0.0
6/11/2009	medium	1	No	0.0	No	0.0
6/15/2009	high	2	No	0.0	No	0.0
6/16/2009	medium	1	No	0.0	No	0.0
6/19/2009	high	2	No	0.0	No	0.0
6/22/2009	low	0	No	0.0	No	0.0
6/25/2009	high	2	No	0.0	No	0.0
6/29/2009	high	2	No	0.0	No	0.0
7/6/2009	low	0	No	0.0	No	0.0
7/13/2009	high	2	No	0.0	No	0.0
7/15/2009	high	2	No	0.0	No	0.0
7/16/2009	low	0	No	0.0	No	0.0
7/20/2009	low	0	No	0.0	No	0.0
7/22/2009	low	0	No	0.0	No	0.0
7/27/2009	high	2	No	0.0	No	0.0
8/3/2009	low	0	No	0.0	No	0.0
8/10/2009	high	2	**Yes**	**0.5**	No	0.0
8/14/2009	low	0	No	0.0	No	0.0
8/17/2009	low	0	No	0.0	No	0.0
8/18/2009	low	0	No	0.0	No	0.0
8/24/2009	high	2	No	0.0	No	0.0
8/31/2009	low	0	No	0.0	No	0.0
9/1/2009	medium	1	No	0.0	No	0.0
9/8/2009	high	2	No	0.0	No	0.0
9/11/2009	high	2	No	0.0	No	0.0
9/14/2009	medium	1	No	0.0	No	0.0
9/16/2009	medium	1	No	0.0	No	0.0
9/17/2009	medium	1	No	0.0	No	0.0
9/18/2009	high	2	No	0.0	No	0.0
9/21/2009	high	2	No	0.0	No	0.0

Table 4. Containment Boom Sheen Monitoring
BP West Coast Products Terminal 21T, Harbor Island, Seattle

Date	Tidal Stage		Warehouse Area Sheen Observations		Loading Rack Area Sheen Observations	
	Low, Medium (ebb & flood), High	Tide Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)
9/28/2009	low	0	No	0.0	No	0.0
10/1/2009	medium	1	No	0.0	No	0.0
10/7/2009	high	2	No	0.0	No	0.0
10/12/2009	medium	1	No	0.0	No	0.0
10/20/2009	high	2	**Yes**	**0.5**	No	0.0
10/21/2009	high	2	No	0.0	No	0.0
10/26/2009	medium	1	No	0.0	No	0.0
10/27/2009	medium	1	No	0.0	No	0.0
11/2/2009	medium	1	No	0.0	No	0.0
11/3/2009	high	2	No	0.0	No	0.0
11/10/2009	medium	1	No	0.0	No	0.0
11/16/2009	high	2	No	0.0	No	0.0
11/17/2009	high	2	No	0.0	No	0.0
11/18/2009	high	2	No	0.0	No	0.0
11/23/2009	high	2	No	0.0	No	0.0
11/24/2009	high	2	No	0.0	No	0.0
11/30/2009	high	2	No	0.0	No	0.0
12/3/2009	high	2	No	0.0	No	0.0
12/4/2009	high	2	No	0.0	No	0.0
12/7/2009	high	2	No	0.0	No	0.0
12/8/2009	high	2	No	0.0	No	0.0
12/9/2009	high	2	No	0.0	No	0.0
12/10/2009	medium	1	No	0.0	No	0.0
12/11/2009	high	2	No	0.0	No	0.0
12/14/2009	high	2	**Yes**	**1.0**	No	0.0
12/15/2009	high	2	No	0.0	No	0.0
12/16/2009	high	2	No	0.0	No	0.0
12/17/2009	high	2	No	0.0	No	0.0
12/21/2009	high	2	No	0.0	No	0.0
12/28/2009	high	2	No	0.0	No	0.0
1/4/2010	high	2	No	0.0	No	0.0
1/5/2010	high	2	No	0.0	No	0.0
1/6/2010	high	2	No	0.0	No	0.0
1/7/2010	high	2	No	0.0	No	0.0
1/11/2010	high	2	No	0.0	No	0.0
1/14/2010	high	2	No	0.0	No	0.0
1/19/2010	high	2	No	0.0	No	0.0
1/20/2010	high	2	No	0.0	No	0.0
1/21/2010	high	2	No	0.0	No	0.0
1/25/2010	high	2	No	0.0	No	0.0
1/27/2010	high	2	No	0.0	No	0.0

Table 4. Containment Boom Sheen Monitoring
BP West Coast Products Terminal 21T, Harbor Island, Seattle

Date	Tidal Stage		Warehouse Area Sheen Observations		Loading Rack Area Sheen Observations	
	Low, Medium (ebb & flood), High	Tide Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)
2/1/2010	high	2	No	0.0	No	0.0
2/2/2010	high	2	No	0.0	No	0.0
2/8/2010	high	2	No	0.0	No	0.0
2/9/2010	high	2	No	0.0	No	0.0
2/16/2010	high	2	No	0.0	No	0.0
2/17/2010	high	2	No	0.0	No	0.0
2/18/2010	high	2	No	0.0	No	0.0
2/19/2010	high	2	No	0.0	No	0.0
2/22/2010	high	2	No	0.0	No	0.0
3/1/2010	high	2	**Yes**	**1.0**	No	0.0
3/8/2010	high	2	No	0.0	No	0.0
3/12/2010	high	2	No	0.0	No	0.0
3/16/2010	high	2	No	0.0	No	0.0
3/17/2010	medium	1	No	0.0	No	0.0
3/19/2010	high	2	No	0.0	No	0.0
3/22/2010	high	2	No	0.0	No	0.0
3/25/2010	high	2	No	0.0	No	0.0
3/30/2010	high	2	No	0.0	No	0.0
3/31/2010	high	2	No	0.0	No	0.0
4/1/2010	high	2	No	0.0	No	0.0
4/2/2010	high	2	No	0.0	No	0.0
4/5/2010	high	2	No	0.0	No	0.0
4/6/2010	high	2	No	0.0	No	0.0
4/9/2010	medium	1	No	0.0	No	0.0
4/12/2010	medium	1	No	0.0	No	0.0
4/14/2010	medium	1	No	0.0	No	0.0
4/15/2010	medium	1	No	0.0	No	0.0
4/16/2010	medium	1	No	0.0	No	0.0
4/19/2010	high	2	No	0.0	No	0.0
4/20/2010	high	2	No	0.0	No	0.0
4/27/2010	high	2	No	0.0	No	0.0
4/28/2010	high	2	No	0.0	No	0.0
4/29/2010	high	2	No	0.0	No	0.0
5/3/2010	high	2	No	0.0	No	0.0
5/5/2010	medium	1	No	0.0	No	0.0
5/6/2010	medium	1	No	0.0	No	0.0
5/7/2010	medium	1	No	0.0	No	0.0
5/10/2010	medium	1	No	0.0	No	0.0
5/17/2010	high	2	No	0.0	No	0.0
5/18/2010	high	2	No	0.0	No	0.0
5/24/2010	low	0	No	0.0	No	0.0
6/1/2010	medium	1	No	0.0	No	0.0

Table 4. Containment Boom Sheen Monitoring
BP West Coast Products Terminal 21T, Harbor Island, Seattle

Date	Tidal Stage		Warehouse Area Sheen Observations		Loading Rack Area Sheen Observations	
	Low, Medium (ebb & flood), High	Tide Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)
6/7/2010	low	0	No	0.0	No	0.0
6/9/2010	low	0	No	0.0	No	0.0
6/10/2010	low	0	No	0.0	No	0.0
6/14/2010	high	2	No	0.0	No	0.0
6/16/2010	high	2	No	0.0	No	0.0
6/17/2010	medium	1	No	0.0	No	0.0
6/21/2010	low	0	No	0.0	No	0.0
6/24/2010	low	0	No	0.0	No	0.0
6/28/2010	high	2	No	0.0	No	0.0
7/6/2010	low	0	No	0.0	No	0.0
7/8/2010	low	0	No	0.0	No	0.0
7/12/2010	medium	1	No	0.0	No	0.0
7/13/2010	medium	1	No	0.0	No	0.0
7/14/2010	medium	1	No	0.0	No	0.0
7/15/2010	high	2	No	0.0	No	0.0
7/16/2010	high	2	No	0.0	No	0.0
7/19/2010	low	0	**Yes**	**1.0**	No	0.0
7/20/2010	medium	1	**Yes**	**1.0**	No	0.0
7/21/2010	low	0	No	0.0	No	0.0
7/22/2010	low	0	No	0.0	No	0.0
7/26/2010	high	1	No	0.0	No	0.0
7/28/2010	medium	1	No	0.0	No	0.0
7/29/2010	medium	1	No	0.0	No	0.0
8/2/2010	medium	1	No	0.0	No	0.0
8/3/2010	low	0	No	0.0	No	0.0
8/9/2010	medium	1	No	0.0	No	0.0
8/11/2010	high	2	No	0.0	No	0.0
8/16/2010	medium	1	No	0.0	No	0.0
8/18/2010	low	0	No	0.0	No	0.0
8/19/2010	low	0	No	0.0	No	0.0
8/23/2010	medium	1	No	0.0	No	0.0
8/24/2010	high	2	No	0.0	No	0.0
8/30/2010	high	2	No	0.0	No	0.0
8/31/2010	high	2	No	0.0	No	0.0
9/1/2010	high	2	No	0.0	No	0.0
9/2/2010	low	0	No	0.0	No	0.0
9/3/2010	low	0	No	0.0	No	0.0
9/7/2010	low	0	No	0.0	No	0.0
9/14/2010	medium	1	No	0.0	No	0.0
9/15/2010	low	0	No	0.0	No	0.0
9/16/2010	low	0	No	0.0	No	0.0
9/20/2010	medium	1	No	0.0	No	0.0

Table 4. Containment Boom Sheen Monitoring
BP West Coast Products Terminal 21T, Harbor Island, Seattle

Date	Tidal Stage		Warehouse Area Sheen Observations		Loading Rack Area Sheen Observations	
	Low, Medium (ebb & flood), High	Tide Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)
9/21/2010	medium	1	No	0.0	No	0.0
9/22/2010	medium	1	No	0.0	No	0.0
9/27/2010	high	2	No	0.0	No	0.0
9/30/2010	high	2	No	0.0	No	0.0
10/4/2010	low	0	No	0.0	No	0.0
10/7/2010	medium	1	No	0.0	No	0.0
10/11/2010	high	2	No	0.0	No	0.0
10/14/2010	medium	1	No	0.0	No	0.0
10/18/2010	medium	1	No	0.0	No	0.0
10/19/2010	medium	1	No	0.0	No	0.0
10/20/2010	medium	1	No	0.0	No	0.0
10/21/2010	medium	1	No	0.0	No	0.0
10/25/2010	high	2	No	0.0	No	0.0
10/29/2010	high	2	No	0.0	No	0.0
11/1/2010	low	0	No	0.0	No	0.0
11/2/2010	medium	1	No	0.0	No	0.0
11/8/2010	high	2	No	0.0	No	0.0
11/11/2010	high	2	No	0.0	No	0.0
11/15/2010	medium	1	No	0.0	No	0.0
11/16/2010	medium	1	No	0.0	No	0.0
11/17/2010	medium	1	No	0.0	No	0.0
11/18/2010	medium	1	No	0.0	No	0.0
11/22/2010	high	2	No	0.0	No	0.0
11/29/2010	high	2	No	0.0	No	0.0
11/30/2010	medium	1	No	0.0	No	0.0
12/1/2010	medium	1	No	0.0	No	0.0
12/2/2010	medium	1	No	0.0	No	0.0
12/3/2010	medium	1	No	0.0	No	0.0
12/6/2010	high	2	No	0.0	No	0.0
12/7/2010	high	2	No	0.0	No	0.0
12/8/2010	high	2	No	0.0	No	0.0
12/13/2010	high	2	No	0.0	No	0.0
12/14/2010	high	2	No	0.0	No	0.0
12/15/2010	high	2	No	0.0	No	0.0
12/16/2010	high	2	No	0.0	No	0.0
12/20/2010	high	2	No	0.0	No	0.0
12/22/2010	high	2	No	0.0	No	0.0
12/23/2010	high	2	No	0.0	No	0.0
12/24/2010	high	2	No	0.0	No	0.0
12/27/2010	high	2	No	0.0	No	0.0
1/3/2011	high	2	No	0.0	No	0.0

Table 4. Containment Boom Sheen Monitoring
BP West Coast Products Terminal 21T, Harbor Island, Seattle

Date	Tidal Stage		Warehouse Area Sheen Observations		Loading Rack Area Sheen Observations	
	Low, Medium (ebb & flood), High	Tide Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)
1/10/2011	high	2	No	0.0	No	0.0
1/17/2011	high	2	No	0.0	No	0.0
1/18/2011	high	2	No	0.0	No	0.0
1/19/2011	high	2	No	0.0	No	0.0
1/24/2011	high	2	No	0.0	No	0.0
1/27/2011	high	2	No	0.0	No	0.0
1/31/2011	high	2	No	0.0	No	0.0
2/4/2011	high	2	No	0.0	No	0.0
2/7/2011	high	2	No	0.0	No	0.0
2/8/2011	high	2	No	0.0	No	0.0
2/14/2011	high	2	No	0.0	No	0.0
2/15/2011	high	2	No	0.0	No	0.0
2/16/2011	high	2	No	0.0	No	0.0
2/22/2011	high	2	No	0.0	No	0.0
2/25/2011	high	2	No	0.0	No	0.0
2/28/2011	high	2	No	0.0	No	0.0
3/2/2011	high	2	No	0.0	No	0.0
3/9/2011	high	2	No	0.0	No	0.0
3/10/2011	high	2	No	0.0	No	0.0
3/11/2011	high	2	No	0.0	No	0.0
3/14/2011	high	2	No	0.0	No	0.0
3/21/2011	high	2	No	0.0	No	0.0
3/22/2011	high	2	No	0.0	No	0.0
3/23/2011	high	2	No	0.0	No	0.0
3/24/2011	high	2	No	0.0	No	0.0
3/28/2011	high	2	No	0.0	No	0.0
3/29/2011	high	2	No	0.0	No	0.0
4/4/2011	high	2	No	0.0	No	0.0
4/5/2011	high	2	No	0.0	No	0.0
4/11/2011	high	2	No	0.0	No	0.0
4/12/2011	high	2	No	0.0	No	0.0
4/13/2011	high	2	No	0.0	No	0.0
4/19/2011	high	2	No	0.0	No	0.0
4/20/2011	high	2	No	0.0	No	0.0
4/21/2011	high	2	No	0.0	No	0.0
4/22/2011	high	2	No	0.0	No	0.0
4/25/2011	medium	1	No	0.0	No	0.0
4/27/2011	medium	1	**Yes**	**1.0**	No	0.0
5/2/2011	high	2	No	0.0	No	0.0
5/9/2011	high	2	No	0.0	No	0.0
5/16/2011	medium	1	No	0.0	No	0.0
5/18/2011	high	2	No	0.0	No	0.0

Table 4. Containment Boom Sheen Monitoring
BP West Coast Products Terminal 21T, Harbor Island, Seattle

Date	Tidal Stage		Warehouse Area Sheen Observations		Loading Rack Area Sheen Observations	
	Low, Medium (ebb & flood), High	Tide Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)
5/19/2011	high	2	No	0.0	No	0.0
5/23/2011	high	2	No	0.0	No	0.0
6/1/2011	medium	1	No	0.0	No	0.0
6/6/2011	high	2	No	0.0	No	0.0
6/10/2011	medium	1	**Yes**	**1.0**	No	0.0
6/13/2011	low	0	No	0.0	No	0.0
6/14/2011	low	0	No	0.0	No	0.0
6/15/2011	low	0	No	0.0	No	0.0
6/20/2011	high	2	No	0.0	No	0.0
6/22/2011	medium	1	**Yes**	**0.5**	No	0.0
6/23/2011	medium	1	No	0.0	No	0.0
6/27/2011	low	0	No	0.0	No	0.0
6/30/2011	medium	1	No	0.0	No	0.0
7/6/2011	high	2	No	0.0	No	0.0
7/11/2011	low	0	No	0.0	No	0.0
7/18/2011	high	2	No	0.0	No	0.0
7/19/2011	high	2	No	0.0	No	0.0
7/20/2011	high	2	No	0.0	No	0.0
7/25/2011	low	0	No	0.0	No	0.0
7/29/2011	medium	1	No	0.0	No	0.0
8/1/2011	high	2	No	0.0	No	0.0
8/8/2011	low	0	No	0.0	No	0.0
8/15/2011	high	2	No	0.0	No	0.0
8/16/2011	high	2	No	0.0	No	0.0
8/17/2011	high	2	No	0.0	No	0.0
8/22/2011	low	0	No	0.0	No	0.0
8/24/2011	high	2	No	0.0	No	0.0
8/29/2011	medium	1	No	0.0	No	0.0
8/31/2011	medium	1	No	0.0	No	0.0
9/6/2011	medium	1	No	0.0	No	0.0
9/12/2011	high	2	No	0.0	No	0.0
9/13/2011	high	2	No	0.0	No	0.0
9/14/2011	high	2	No	0.0	No	0.0
9/20/2011	medium	1	No	0.0	No	0.0
9/26/2011	medium	1	No	0.0	No	0.0
9/27/2011	high	2	No	0.0	No	0.0
9/28/2011	high	2	No	0.0	No	0.0
9/29/2011	high	2	No	0.0	No	0.0
10/3/2011	high	2	No	0.0	No	0.0
10/10/2011	high	2	No	0.0	No	0.0
10/11/2011	high	2	No	0.0	No	0.0
10/12/2011	high	2	No	0.0	No	0.0

Table 4. Containment Boom Sheen Monitoring
BP West Coast Products Terminal 21T, Harbor Island, Seattle

Date	Tidal Stage		Warehouse Area Sheen Observations		Loading Rack Area Sheen Observations	
	Low, Medium (ebb & flood), High	Tide Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)
10/17/2011	high	2	No	0.0	No	0.0
10/18/2011	high	2	No	0.0	No	0.0
10/19/2011	high	2	No	0.0	No	0.0
10/20/2011	high	2	No	0.0	No	0.0
10/24/2011	medium	1	No	0.0	No	0.0
10/31/2011	high	2	No	0.0	No	0.0
11/8/2011	medium	1	No	0.0	No	0.0
11/14/2011	high	2	No	0.0	No	0.0
11/21/2011	medium	1	No	0.0	No	0.0
11/22/2011	high	2	No	0.0	No	0.0
11/23/2011	high	2	No	0.0	No	0.0
11/28/2011	high	2	No	0.0	No	0.0
11/29/2011	high	2	No	0.0	No	0.0
12/5/2011	medium	1	No	0.0	No	0.0
12/12/2011	high	2	No	0.0	No	0.0
12/13/2011	high	2	No	0.0	No	0.0
12/14/2011	high	2	No	0.0	No	0.0
12/19/2011	high	2	No	0.0	No	0.0
12/20/2011	high	2	No	0.0	No	0.0
12/21/2011	high	2	No	0.0	No	0.0
12/27/2011	high	2	No	0.0	No	0.0
1/3/2012	high	2	No	0.0	No	0.0
1/9/2012	high	2	No	0.0	No	0.0
1/17/2012	high	2	No	0.0	No	0.0
1/23/2012	high	2	No	0.0	No	0.0
1/24/2012	high	2	No	0.0	No	0.0
1/25/2012	high	2	No	0.0	No	0.0
1/27/2012	high	2	No	0.0	No	0.0
1/30/2012	high	2	No	0.0	No	0.0
2/6/2012	high	2	No	0.0	No	0.0
2/13/2012	high	2	No	0.0	No	0.0
2/21/2012	medium	1	No	0.0	No	0.0
2/27/2012	high	2	No	0.0	No	0.0
2/24/2012	high	2	No	0.0	No	0.0
3/1/2012	medium	1	No	0.0	No	0.0
3/2/2012	high	2	No	0.0	No	0.0
3/5/2012	high	2	No	0.0	No	0.0
3/12/2012	high	2	No	0.0	No	0.0
3/13/2012	high	2	No	0.0	No	0.0
3/14/2012	medium	1	No	0.0	No	0.0
3/15/2012	high	2	No	0.0	No	0.0

Table 4. Containment Boom Sheen Monitoring
BP West Coast Products Terminal 21T, Harbor Island, Seattle

Date	Tidal Stage		Warehouse Area Sheen Observations		Loading Rack Area Sheen Observations	
	Low, Medium (ebb & flood), High	Tide Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)
3/19/2012	high	2	No	0.0	No	0.0
3/20/2012	high	2	No	0.0	No	0.0
.3/21/2012	high	2	No	0.0	No	0.0
3/22/2012	high	2	No	0.0	No	0.0
3/26/2012	high	2	No	0.0	No	0.0
3/28/2012	high	2	No	0.0	No	0.0
4/2/2012	medium	1	No	0.0	No	0.0
4/5/2012	medium	1	No	0.0	No	0.0
4/9/2012	high	2	No	0.0	No	0.0
4/16/2012	medium	1	No	0.0	No	0.0
4/17/2012	medium	1	No	0.0	No	0.0
4/18/2012	high	2	No	0.0	No	0.0
4/19/2012	medium	1	No	0.0	No	0.0
4/23/2012	medium	1	No	0.0	No	0.0
4/30/2012	medium	1	No	0.0	No	0.0
5/2/2012	medium	1	No	0.0	No	0.0
5/7/2012	high	2	No	0.0	No	0.0
5/8/2012	high	2	No	0.0	No	0.0
5/14/2012	medium	1	No	0.0	No	0.0
5/15/2012	low	0	No	0.0	No	0.0
5/16/2012	medium	1	No	0.0	No	0.0
5/21/2012	high	2	No	0.0	No	0.0
5/22/2012	high	2	No	0.0	No	0.0
5/23/2012	high	2	No	0.0	No	0.0
5/24/2012	high	2	No	0.0	No	0.0
5/29/2012	high	2	No	0.0	No	0.0
5/31/2012	low	0	No	0.0	No	0.0
6/4/2012	medium	1	No	0.0	No	0.0
6/11/2012	medium	1	No	0.0	No	0.0
6/12/2012	medium	1	No	0.0	No	0.0
6/13/2012	medium	1	No	0.0	No	0.0
6/20/2012	high	2	No	0.0	No	0.0
6/25/2012	medium	1	No	0.0	No	0.0
7/2/2012	low	0	No	0.0	No	0.0
7/9/2012	medium	1	**Yes**	**0.5**	No	0.0
7/10/2012	high	2	No	0.0	No	0.0
7/11/2012	high	2	No	0.0	No	0.0
7/12/2012	high	2	**Yes**	**0.5**	No	0.0
7/16/2012	low	0	No	0.0	No	0.0
7/17/2012	low	0	No	0.0	No	0.0
7/19/2012	low	0	No	0.0	No	0.0
7/20/2012	low	0	No	0.0	No	0.0

Table 4. Containment Boom Sheen Monitoring
BP West Coast Products Terminal 21T, Harbor Island, Seattle

Date	Tidal Stage		Warehouse Area Sheen Observations		Loading Rack Area Sheen Observations	
	Low, Medium (ebb & flood), High	Tide Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)
7/23/2012	high	2	No	0.0	No	0.0
7/30/2012	low	0	No	0.0	No	0.0
8/6/2012	high	2	No	0.0	No	0.0
8/7/2012	medium	1	No	0.0	No	0.0
8/10/2012	medium	1	No	0.0	No	0.0
8/13/2012	low	0	No	0.0	No	0.0
8/14/2012	low	0	No	0.0	No	0.0
8/15/2012	low	0	No	0.0	No	0.0
8/20/2012	high	2	No	0.0	No	0.0
8/23/2012	high	2	No	0.0	No	0.0
8/28/2012	low	0	No	0.0	No	0.0
8/29/2012	low	0	No	0.0	No	0.0
9/4/2012	high	2	No	0.0	No	0.0
9/5/2012	high	2	No	0.0	No	0.0
9/7/2012	high	2	No	0.0	No	0.0
9/10/2012	low	0	No	0.0	No	0.0
9/11/2012	low	0	No	0.0	No	0.0
9/17/2012	high	2	No	0.0	No	0.0
9/18/2012	high	2	No	0.0	No	0.0
9/19/2012	high	2	No	0.0	No	0.0
9/20/2012	high	2	No	0.0	No	0.0
9/21/2012	high	2	No	0.0	No	0.0
9/25/2102	low	0	No	0.0	No	0.0
9/26/2012	low	0	No	0.0	No	0.0
9/27/2012	low	0	No	0.0	No	0.0
10/1/2012	high	2	No	0.0	No	0.0
10/9/2012	low	0	No	0.0	No	0.0
10/15/2012	high	2	No	0.0	No	0.0
10/16/2012	high	2	No	0.0	No	0.0
10/22/2012	high	2	No	0.0	No	0.0
10/23/2012	high	2	No	0.0	No	0.0
10/24/2012	high	2	No	0.0	No	0.0
10/25/2012	high	2	No	0.0	No	0.0
10/26/2012	high	2	No	0.0	No	0.0
10/29/2012	high	2	No	0.0	No	0.0
11/7/2012	high	2	**Yes**	**0.5**	No	0.0
11/12/2012	high	2	No	0.0	No	0.0
11/13/2012	medium	1	No	0.0	No	0.0
11/19/2012	high	2	No	0.0	No	0.0
11/27/2012	high	2	**Yes**	**0.5**	No	0.0
11/28/2012	high	2	No	0.0	No	0.0
12/5/2012	high	2	No	0.0	No	0.0

Table 4. Containment Boom Sheen Monitoring
BP West Coast Products Terminal 21T, Harbor Island, Seattle

	Tidal Stage		Warehouse Area Sheen Observations		Loading Rack Area Sheen Observations	
Date	Low, Medium (ebb & flood), High	Tide Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)
12/6/2012	high	2	**Yes**	**0.5**	No	0.0
12/7/2012	high	2	No	0.0	No	0.0
12/12/2012	medium	1	**Yes**	**0.5**	No	0.0
12/13/2012	medium	1	No	0.0	No	0.0
12/14/2012	medium	1	No	0.0	No	0.0
12/17/2012	high	2	No	0.0	No	0.0
12/18/2012	high	2	No	0.0	No	0.0
12/19/2012	high	2	No	0.0	No	0.0
12/20/2012	high	2	No	0.0	No	0.0
12/24/2012	high	2	No	0.0	No	0.0
1/2/2013	high	2	No	0.0	No	0.0
1/3/2013	high	2	No	0.0	No	0.0
1/7/2013	high	2	No	0.0	No	0.0
1/14/2013	high	2	No	0.0	No	0.0
1/22/2013	high	2	No	0.0	No	0.0
1/23/2013	high	2	No	0.0	No	0.0
1/28/2013	high	2	No	0.0	No	0.0
1/30/2013	high	2	No	0.0	No	0.0
1/31/2013	high	2	No	0.0	No	0.0
2/1/2013	high	2	No	0.0	No	0.0
2/4/2013	high	2	No	0.0	No	0.0
2/11/2013	high	2	No	0.0	No	0.0
2/19/2013	high	2	No	0.0	No	0.0
2/20/2013	high	2	No	0.0	No	0.0
2/21/2013	high	2	No	0.0	No	0.0
2/25/2013	high	2	No	0.0	No	0.0
3/5/2013	high	2	No	0.0	No	0.0
3/6/2013	medium	1	No	0.0	No	0.0
3/11/2013	medium	1	No	0.0	No	0.0
3/12/2013	high	2	No	0.0	No	0.0
3/13/2013	high	2	No	0.0	No	0.0
3/18/2013	high	2	No	0.0	No	0.0
3/25/2013	high	2	No	0.0	No	0.0
4/1/2013	high	2	No	0.0	No	0.0
4/2/2013	high	2	No	0.0	No	0.0
4/8/2013	medium	1	No	0.0	No	0.0
4/9/2013	medium	1	No	0.0	No	0.0
4/10/2013	high	2	No	0.0	No	0.0
4/15/2013	high	2	No	0.0	No	0.0
4/16/2013	high	2	No	0.0	No	0.0
4/18/2013	high	2	No	0.0	No	0.0

Table 4. Containment Boom Sheen Monitoring
BP West Coast Products Terminal 21T, Harbor Island, Seattle

Date	Tidal Stage		Warehouse Area Sheen Observations		Loading Rack Area Sheen Observations	
	Low, Medium (ebb & flood), High	Tide Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)
4/22/2013	medium	1	No	0.0	No	0.0
4/23/2013	medium	1	No	0.0	No	0.0
4/24/2013	low	0	No	0.0	No	0.0
4/25/2013	medium	1	No	0.0	No	0.0
4/29/2013	high	2	No	0.0	No	0.0
4/30/2013	high	2	No	0.0	No	0.0
5/6/2013	low	0	No	0.0	No	0.0
5/7/2013	medium	1	No	0.0	No	0.0
5/13/2013	high	2	No	0.0	No	0.0
5/17/2013	medium	1	No	0.0	No	0.0
5/20/2013	medium	1	No	0.0	No	0.0
5/21/2013	medium	1	No	0.0	No	0.0
5/22/2013	medium	1	No	0.0	No	0.0
5/23/2013	medium	1	No	0.0	No	0.0
5/28/2013	high	2	No	0.0	No	0.0
6/3/2013	medium	1	No	0.0	No	0.0
6/5/2013	low	0	No	0.0	No	0.0
6/10/2013	high	2	No	0.0	No	0.0
6/11/2013	high	2	No	0.0	No	0.0
6/12/2013	high	2	No	0.0	No	0.0
6/17/2013	medium	1	No	0.0	No	0.0
6/18/2013	medium	1	No	0.0	No	0.0
6/19/2013	medium	1	No	0.0	No	0.0
6/24/2013	high	2	No	0.0	No	0.0
6/25/2013	high	2	No	0.0	No	0.0
6/26/2013	high	2	No	0.0	No	0.0
7/1/2013	medium	1	No	0.0	No	0.0
7/8/2013	medium	1	No	0.0	No	0.0
7/15/2013	medium	1	No	0.0	No	0.0
7/18/2013	high	2	No	0.0	No	0.0
7/22/2013	medium	1	No	0.0	No	0.0
7/23/2013	medium	1	No	0.0	No	0.0
7/24/2013	high	2	No	0.0	No	0.0
7/29/2013	medium	1	No	0.0	No	0.0
8/5/2013	medium	1	No	0.0	No	0.0
8/12/2013	high	2	No	0.0	No	0.0
8/19/2013	low	0	No	0.0	No	0.0
8/20/2013	medium	1	No	0.0	No	0.0
8/21/2013	high	2	No	0.0	No	0.0
8/26/2013	high	2	No	0.0	No	0.0
8/27/2013	medium	1	No	0.0	No	0.0
9/3/2013	medium	1	No	0.0	No	0.0

Table 4. Containment Boom Sheen Monitoring
BP West Coast Products Terminal 21T, Harbor Island, Seattle

Date	Tidal Stage		Warehouse Area Sheen Observations		Loading Rack Area Sheen Observations	
	Low, Medium (ebb & flood), High	Tide Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)
9/9/2013	high	2	No	0.0	No	0.0
9/10/2013	high	2	No	0.0	No	0.0
9/11/2013	medium	1	No	0.0	No	0.0
9/12/2013	medium	1	No	0.0	No	0.0
9/16/2013	low	0	No	0.0	No	0.0
9/17/2013	medium	1	No	0.0	No	0.0
9/23/2013	high	2	No	0.0	No	0.0
9/24/2013	high	2	**Yes**	**0.5**	No	0.0
9/25/2013	high	2	No	0.0	No	0.0
9/27/2013	high	2	No	0.0	No	0.0
9/30/2013	medium	1	No	0.0	No	0.0
10/2/2013	medium	1	No	0.0	No	0.0
10/7/2013	high	2	No	0.0	No	0.0
10/9/2013	high	2	No	0.0	No	0.0
10/14/2013	low	0	No	0.0	No	0.0
10/15/2013	low	0	No	0.0	No	0.0
10/21/2013	high	2	No	0.0	No	0.0
10/28/2013	high	2	No	0.0	No	0.0
10/29/2013	medium	1	No	0.0	No	0.0
10/30/2013	medium	1	**Yes**	**0.5**	No	0.0
10/31/2013	medium	1	No	0.0	No	0.0
11/4/2013	high	2	No	0.0	No	0.0
11/11/2013	high	2	No	0.0	No	0.0
11/13/2013	medium	1	**Yes**	**0.5**	No	0.0
11/18/2013	medium	1	No	0.0	No	0.0
11/19/2013	high	2	No	0.0	No	0.0
11/20/2013	high	2	No	0.0	No	0.0
11/25/2013	high	2	No	0.0	No	0.0
12/2/2013	high	2	No	0.0	No	0.0
12/3/2013	high	2	No	0.0	No	0.0
12/9/2013	high	2	No	0.0	No	0.0
12/16/2013	high	2	No	0.0	No	0.0
12/17/2013	high	2	No	0.0	No	0.0
12/18/2013	high	2	No	0.0	No	0.0
12/23/2013	high	2	No	0.0	No	0.0
12/30/2013	medium	1	No	0.0	No	0.0
1/3/2014	high	2	No	0.0	No	0.0
1/6/2014	high	2	No	0.0	No	0.0
1/13/2014	high	2	No	0.0	No	0.0
1/14/2014	high	2	No	0.0	No	0.0
1/15/2014	high	2	No	0.0	No	0.0

Table 4. Containment Boom Sheen Monitoring
BP West Coast Products Terminal 21T, Harbor Island, Seattle

Date	Tidal Stage		Warehouse Area Sheen Observations		Loading Rack Area Sheen Observations	
	Low, Medium (ebb & flood), High	Tide Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)
1/21/2014	high	2	No	0.0	No	0.0
1/27/2014	high	2	No	0.0	No	0.0
1/28/2014	high	2	No	0.0	No	0.0
2/4/2014	high	2	No	0.0	No	0.0
2/10/2014	high	2	No	0.0	No	0.0
2/11/2014	high	2	No	0.0	No	0.0
2/12/2014	high	2	No	0.0	No	0.0
2/18/2014	high	2	No	0.0	No	0.0
2/21/2014	high	2	No	0.0	No	0.0
2/24/2014	high	2	No	0.0	No	0.0
3/3/2014	high	2	No	0.0	No	0.0
3/10/2014	high	2	No	0.0	No	0.0
3/11/2014	high	2	No	0.0	No	0.0
3/12/2014	high	2	No	0.0	No	0.0
3/17/2014	high	2	No	0.0	No	0.0
3/19/2014	high	2	No	0.0	No	0.0
3/20/2014	high	2	No	0.0	No	0.0
3/24/2014	high	2	No	0.0	No	0.0
3/26/2014	high	2	No	0.0	No	0.0
3/27/2014	high	2	No	0.0	No	0.0
3/31/2014	high	2	No	0.0	No	0.0
4/2/2014	high	2	No	0.0	No	0.0
4/7/2014	high	2	No	0.0	No	0.0
4/14/2014	medium	1	No	0.0	No	0.0
4/15/2014	medium	1	No	0.0	No	0.0
4/16/2014	high	2	No	0.0	No	0.0
4/17/2014	high	2	No	0.0	No	0.0
4/21/2014	high	2	No	0.0	No	0.0
4/22/2014	medium	1	No	0.0	No	0.0
4/23/2014	medium	1	No	0.0	No	0.0
4/28/2014	medium	1	No	0.0	No	0.0
4/29/2014	high	2	No	0.0	No	0.0
5/5/2014	high	2	**Yes**	**0.5**	No	0.0
5/12/2014	medium	1	No	0.0	No	0.0
5/13/2014	medium	1	No	0.0	No	0.0
5/14/2014	medium	1	No	0.0	No	0.0
5/19/2014	high	2	No	0.0	No	0.0
5/20/2014	high	2	No	0.0	No	0.0
5/21/2014	medium	1	No	0.0	No	0.0
5/27/2014	low	0	No	0.0	No	0.0
6/2/2014	high	2	No	0.0	No	0.0
6/9/2014	low	0	No	0.0	No	0.0

Table 4. Containment Boom Sheen Monitoring
BP West Coast Products Terminal 21T, Harbor Island, Seattle

Date	Tidal Stage		Warehouse Area Sheen Observations		Loading Rack Area Sheen Observations	
	Low, Medium (ebb & flood), High	Tide Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)
6/10/2014	medium	1	No	0.0	No	0.0
6/16/2014	high	2	No	0.0	No	0.0
6/17/2014	high	2	No	0.0	No	0.0
6/18/2014	high	2	No	0.0	No	0.0
6/23/2014	low	0	No	0.0	No	0.0
6/24/2014	low	0	**Yes**	**1.0**	No	0.0
6/30/2014	high	2	No	0.0	No	0.0
7/72014	medium	1	No	0.0	No	0.0
7/8/2014	medium	1	No	0.0	No	0.0
7/14/2014	high	2	No	0.0	No	0.0
7/15/2014	high	2	No	0.0	No	0.0
7/21/2014	low	0	No	0.0	No	0.0
7/25/2014	medium	1	No	0.0	No	0.0
7/28/2014	high	2	No	0.0	No	0.0
7/30/2014	low	0	No	0.0	No	0.0
8/4/2014	medium	1	No	0.0	No	0.0
8/11/2014	medium	1	No	0.0	No	0.0
8/12/2014	high	2	No	0.0	No	0.0
8/13/2014	high	2	No	0.0	No	0.0
8/18/2014	low	0	No	0.0	No	0.0
8/20/2014	medium	1	No	0.0	No	0.0
8/25/2014	high	2	No	0.0	No	0.0
9/2/2014	low	0	No	0.0	No	0.0
9/8/2014	medium	1	No	0.0	No	0.0
9/9/2014	high	2	No	0.0	No	0.0
9/10/2014	high	2	No	0.0	No	0.0
9/16/2014	medium	1	No	0.0	No	0.0
9/17/2014	medium	1	No	0.0	No	0.0
9/22/2014	medium	1	No	0.0	No	0.0
9/29/2014	high	2	No	0.0	No	0.0
10/6/2014	medium	1	No	0.0	No	0.0
10/9/2014	high	2	No	0.0	No	0.0
10/14/2014	high	2	No	0.0	No	0.0
10/15/2014	high	2	No	0.0	No	0.0
10/20/2014	medium	1	No	0.0	No	0.0
10/21/2014	medium	1	No	0.0	No	0.0
10/27/2014	high	2	No	0.0	No	0.0
10/28/2014	high	2	No	0.0	No	0.0
11/3/2014	medium	1	No	0.0	No	0.0
11/10/2014	high	2	No	0.0	No	0.0
11/17/2014	medium	1	No	0.0	No	0.0
11/18/2014	medium	1	No	0.0	No	0.0

Table 4. Containment Boom Sheen Monitoring
BP West Coast Products Terminal 21T, Harbor Island, Seattle

Date	Tidal Stage		Warehouse Area Sheen Observations		Loading Rack Area Sheen Observations	
	Low, Medium (ebb & flood), High	Tide Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)
11/19/2014	medium	1	No	0.0	No	0.0
11/24/2014	high	2	No	0.0	No	0.0
12/1/2014	high	2	No	0.0	No	0.0
12/2/2014	high	2	No	0.0	No	0.0
12/3/2014	medium	1	No	0.0	No	0.0
12/4/2014	high	2	No	0.0	No	0.0
12/8/2014	high	2	No	0.0	No	0.0
12/9/2014	high	2	No	0.0	No	0.0
12/10/2014	high	2	No	0.0	No	0.0
12/15/2014	high	2	No	0.0	No	0.0
12/16/2014	high	2	No	0.0	No	0.0
12/17/2014	high	2	No	0.0	No	0.0
12/22/2014	high	2	No	0.0	No	0.0
12/29/2014	high	2	No	0.0	No	0.0
1/5/2015	high	2	No	0.0	No	0.0
1/12/2015	high	2	No	0.0	No	0.0
1/13/2015	high	2	No	0.0	No	0.0
1/14/2015	high	2	No	0.0	No	0.0
1/20/2015	high	2	No	0.0	No	0.0
1/26/2015	high	2	No	0.0	No	0.0
1/27/2015	high	2	No	0.0	No	0.0
2/3/2015	high	2	No	0.0	No	0.0
2/4/2015	medium	1	No	0.0	No	0.0
2/9/2015	high	2	No	0.0	No	0.0
2/10/2015	high	2	No	0.0	No	0.0
2/11/2015	high	2	No	0.0	No	0.0
2/17/2015	medium	1	No	0.0	No	0.0
2/18/2015	medium	1	No	0.0	No	0.0
2/23/2015	high	2	No	0.0	No	0.0
2/27/2015	high	2	No	0.0	No	0.0
3/2/2015	medium	1	No	0.0	No	0.0
3/9/2015	high	2	No	0.0	No	0.0
3/16/2015	medium	1	No	0.0	No	0.0
3/17/2015	medium	1	No	0.0	No	0.0
3/18/2015	high	2	No	0.0	No	0.0
3/19/2015	high	2	No	0.0	No	0.0
3/23/2015	high	2	**Yes**	**0.5**	No	0.0
3/24/2015	high	2	No	0.0	No	0.0
3/25/2015	high	2	No	0.0	No	0.0
3/30/2015	medium	1	No	0.0	No	0.0
4/1/2015	medium	1	No	0.0	No	0.0

Table 4. Containment Boom Sheen Monitoring
BP West Coast Products Terminal 21T, Harbor Island, Seattle

Date	Tidal Stage		Warehouse Area Sheen Observations		Loading Rack Area Sheen Observations	
	Low, Medium (ebb & flood), High	Tide Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)
4/6/2015	high	2	No	0.0	No	0.0
4/7/2015	high	2	No	0.0	No	0.0
4/13/2015	medium	1	**Yes**	**0.5**	No	0.0
4/14/2015	low	0	No	0.0	No	0.0
4/15/2015	low	0	No	0.0	No	0.0
4/20/2015	high	2	No	0.0	No	0.0
4/21/2015	high	2	No	0.0	No	0.0
4/27/2015	medium	1	No	0.0	No	0.0
4/28/2015	medium	1	No	0.0	No	0.0
5/4/2015	medium	1	No	0.0	No	0.0
5/5/2015	high	2	No	0.0	No	0.0
5/12/2015	high	2	No	0.0	No	0.0
5/13/2015	medium	1	No	0.0	No	0.0
5/14/2015	medium	1	No	0.0	No	0.0
5/18/2015	high	2	No	0.0	No	0.0
5/26/2015	low	0	No	0.0	No	0.0
6/1/2015	low	0	No	0.0	No	0.0
6/8/2015	high	2	No	0.0	No	0.0
6/9/2015	high	2	No	0.0	No	0.0
6/10/2015	high	2	No	0.0	No	0.0
6/15/2015	medium	1	No	0.0	No	0.0
6/16/2015	low	0	No	0.0	No	0.0
6/17/2015	medium	1	No	0.0	No	0.0
6/22/2015	medium	1	No	0.0	No	0.0
6/29/2015	low	0	No	0.0	No	0.0
7/6/2015	high	2	No	0.0	No	0.0
7/13/2015	low	0	No	0.0	No	0.0
7/14/2015	low	0	No	0.0	No	0.0
7/15/2015	low	0	No	0.0	No	0.0
7/20/2015	high	2	No	0.0	No	0.0
7/21/2015	high	2	No	0.0	No	0.0
7/22/2015	medium	1	No	0.0	No	0.0
7/27/2015	low	0	No	0.0	No	0.0
7/28/2015	low	0	No	0.0	No	0.0
7/29/2015	low	0	No	0.0	No	0.0
8/3/2015	high	2	No	0.0	No	0.0
8/10/2015	low	0	No	0.0	No	0.0
8/11/2015	low	0	No	0.0	No	0.0
8/17/2015	high	2	No	0.0	No	0.0
8/24/2015	low	0	No	0.0	No	0.0
8/31/2015	high	2	No	0.0	No	0.0
9/1/2015	high	2	No	0.0	No	0.0

Table 4. Containment Boom Sheen Monitoring
BP West Coast Products Terminal 21T, Harbor Island, Seattle

Date	Tidal Stage		Warehouse Area Sheen Observations		Loading Rack Area Sheen Observations	
	Low, Medium (ebb & flood), High	Tide Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)
9/8/2015	low	0	No	0.0	No	0.0
9/14/2015	high	2	No	0.0	No	0.0
9/15/2015	high	2	No	0.0	No	0.0
9/16/2015	high	2	No	0.0	No	0.0
9/17/2015	high	2	No	0.0	No	0.0
9/21/2015	medium	1	**Yes**	**0.5**	No	0.0
9/28/2015	high	2	No	0.0	No	0.0
9/29/2015	high	2	No	0.0	No	0.0
10/5/2015	medium	1	No	0.0	No	0.0
10/8/2015	low	0	No	0.0	No	0.0
10/12/2015	high	2	No	0.0	No	0.0
10/13/2015	high	2	No	0.0	No	0.0
10/14/2015	high	2	No	0.0	No	0.0
10/19/2015	high	2	No	0.0	No	0.0
10/20/2015	high	2	No	0.0	No	0.0
10/26/2015	high	2	No	0.0	No	0.0
11/2/2015	high	2	No	0.0	No	0.0
11/10/2015	medium	1	No	0.0	No	0.0
11/11/2015	medium	1	No	0.0	No	0.0
11/13/2015	high	2	No	0.0	No	0.0
11/16/2015	high	2	No	0.0	No	0.0
11/17/2015	high	2	No	0.0	No	0.0
11/18/2015	high	2	No	0.0	No	0.0
11/23/2015	medium	1	No	0.0	No	0.0
11/30/2015	high	2	No	0.0	No	0.0
12/2/2015	medium	1	No	0.0	No	0.0
12/3/2015	medium	1	No	0.0	No	0.0
12/7/2015	high	2	No	0.0	No	0.0
12/9/2015	high	2	No	0.0	No	0.0
12/10/2015	high	2	No	0.0	No	0.0
12/14/2015	high	2	No	0.0	No	0.0
12/15/2015	high	2	No	0.0	No	0.0
12/16/2015	high	2	No	0.0	No	0.0
12/21/2015	high	2	No	0.0	No	0.0
12/28/2015	high	2	No	0.0	No	0.0
1/4/2016	high	2	No	0.0	No	0.0
1/11/2016	high	2	No	0.0	No	0.0
1/12/2016	high	2	No	0.0	No	0.0
1/13/2016	high	2	No	0.0	No	0.0
1/19/2016	high	2	No	0.0	No	0.0
1/20/2016	medium	2	No	0.0	No	0.0

Table 4. Containment Boom Sheen Monitoring
BP West Coast Products Terminal 21T, Harbor Island, Seattle

	Tidal Stage		Warehouse Area Sheen Observations		Loading Rack Area Sheen Observations	
Date	Low, Medium (ebb & flood), High	Tide Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)	Sheen (**Yes**/No)	Sheen Rating (See Notes)
1/25/2016	high	2	No	0.0	No	0.0
2/1/2016	high	2	No	0.0	No	0.0
2/8/2016	high	2	No	0.0	No	0.0
2/9/2016	high	2	No	0.0	No	0.0
2/10/2016	high	2	No	0.0	No	0.0

Notes:
Bold entries represent sheen detections.

* Sheen Appearance is rated from 0.0 to 3.0 using criteria below;
0.0 No sheen present
1.0 Light sheen visible in one location
2.0 Sheen visible in several locations and is brightly colored
3.0 Sheen covers large areas of boom, outside boom, and/or LNAPL floating on surface

** Tide Level is rated from 0.0 to 2.0 using the criteria below;
0.0 Low Tide
1.0 Medium Tide (Ebb Tide & Flood Tide)
2.0 High Tide

Table 5. Inland SVE System Petroleum Hydrocarbon Recovery Rates
BP West Coast Products Terminal 21T, Seattle, Washington

Date	Hours of Operation	Hours operated over period	Total HSVE Flow Rate from wells (SCFM)	Influent Gasoline Range Organics (GRO) (mg/m^3)	GRO recovered over period (lbs)	Cumulative GRO recovery (lbs)	GRO avg lbs/day over period	Influent Benzene (mg/m^3)	Benzene recovered over period (lbs)	Cumulative benzene recovery (lbs)	Avg CO2 %-Atmospheric concentration (0.04%)	Pounds GRO Destruction due to Enhanced Biodegredation over period (lbs)	Cumulative GRO Destruction due to Enhanced Biodegredation (gal)
8/22/2008	31	18	45	24,500	68.9	924	93.4	79.4	0.22	1.07	0.66	12	2
8/27/2008	152	50	43	19,500	164.7	1,349	79.7	62.9	0.53	2.45	0.635	78	15
9/2/2008	296	92	39	19,600	290.3	1,807	75.6	57.7	0.90	3.86	0.585	80	28
9/8/2008	440	68	94	13,200	376.6	2,399	133.7	24.2	0.94	5.34	0.41	92	43
9/15/2008	611	71	207	11,700	590.0	3,557	199.5	7.59	0.75	6.82	0.285	171	70
9/22/2008	777	117	239	5,240	905.1	4,825	186.4	0.37	0.43	7.41	0.285	246	110
9/30/2008	965	188	252	3,260	732.7	5,558	93.8	0.154	0.05	7.46	0.285	305	160
10/13/2008	1,277	169	273	1,050	372.6	6,236	53.0	0.154	0.03	7.51	0.26	495	240
10/20/2008	1,445	168	277	746	155.0	6,391	22.2	0.149	0.03	7.53	0.26	278	285
11/17/2008	2,118	169	277	295	96.0	6,773	13.6	*0.129*	0.03	7.63	0.26	283	331
12/11/2008	2,690	572	273	230	154.8	6,928	6.5	*0.5*	0.19	7.82	0.26	951	486
1/16/2009	3,556	866	224	40	108.6	7,036	3.0	*0.1*	0.24	8.06	0.26	1,298	697
2/18/2009	4,347	792	257	59	35.1	7,072	1.1	*0.1*	0.07	8.13	0.26	1,149	884
3/17/2009	4,993	646	270	42	32.2	7,104	1.2	*0.1*	0.06	8.20	0.335	1,324	1,099
4/16/2009	5,709	716	271	59	36.5	7,140	1.2	*0.1*	0.07	8.27	0.055	247	1,139
5/14/2009	6,384	674	263	11	23.4	7,164	0.8	*0.1*	0.07	8.34	0.135	563	1,231
6/16/2009	7,027	643	231	133	42.8	7,207	1.6	*0.1*	0.06	8.40	0.26	959	1,387
7/27/2009	7,864	837	249	190	121.7	7,328	3.5	*0.061*	0.06	8.46	0.36	1,681	1,660
8/18/2009	8,391	527	264	63	64.0	7,392	2.9	*0.14*	0.05	8.51	0.285	894	1,806
9/14/2009	9,065	674	264	30	31.0	7,423	1.1	*0.14*	0.09	8.60	0.235	970	1,963
10/20/2009	9,901	836	262	38	28.0	7,451	0.8	*0.13*	0.11	8.71	0.235	1,198	2,158
11/17/2009	10,577	676	286	17.0	19.1	7,470	0.7	*0.14*	0.09	8.81	0.185	796	2,288
12/15/2009	11,245	668	253	*9.0*	8.8	7,479	0.3	*0.14*	0.09	8.90	0.16	668	2,396
1/22/2010	12,152	907	221	*7.9*	6.8	7,486	0.2	*0.12*	0.10	9.00	0.21	1,048	2,567
2/18/2010	12,757	605	284	*7.2*	4.3	7,490	0.2	*0.11*	0.07	9.07	0.21	746	2,688
3/17/2010	13,404	647	264	2.7	3.3	7,493	0.1	*0.112*	0.07	9.14	0.21	864	2,828
4/14/2010	14,098	694	253	9.0	3.9	7,497	0.1	*0.14*	0.08	9.23	0.21	873	2,970
5/19/2010	14,887	789	234	*8.7*	*6.4*	7,504	0.2	*0.14*	0.10	9.33	0.21	936	3,123
6/17/2010	15,582	695	245	*8.5*	*5.4*	7,509	0.2	*0.13*	0.08	9.41	0.21	812	3,255
7/28/2010	16,590	1,009	269	9.1	*8.6*	7,518	0.2	*0.064*	0.09	9.51	0.21	1,266	3,460
8/19/2010	17,332	742	265	10.9	7.4	7,525	0.2	*0.52*	0.22	9.72	0.18	832	3,596
9/27/2010	18,028	695	232	*7.4*	5.9	7,531	0.2	*0.55*	0.35	10.07	0.205	827	3,730
10/20/2010	18,578	551	251	*6.5*	3.5	7,534	0.2	*0.49*	0.26	10.33	0.16	494	3,811
11/30/2010	19,562	984	280	15.6	10.8	7,545	0.3	*0.49*	0.48	10.81	0.075	455	3,884
12/13/2010	19,872	310	280	15.6	4.9	7,550	0.4	*1.49*	0.31	11.12	0.04	81	3,898
System shutdown due to high groundwater elevation on 12/13/2010. As measurements could not be collected, recovery calculations were based off data collected from the 11/30/2010 O&M event.													
6/6/2011	19,920	0	238	250	0.0	7,550	0.0	*0.52*	0.00	11.12	0.12	0	3,898
6/15/2011	20,136	216	266	250	50.9	7,601	5.7	*0.52*	0.11	11.22	0.12	151	3,922
7/20/2011	20,425	289	248	*8.2*	35.9	7,637	3.0	*0.62*	0.16	11.38	0.39	671	4,031
8/8/2011	20,434	9	256	*8.2*	0.1	7,637	0.2	*0.62*	0.01	11.39	0.39	20	4,035
8/16/2011	20,651	217	230	*7.4*	1.5	7,638	0.2	*0.55*	0.12	11.50	0.25	303	4,084
9/14/2011	21,320	670	268	11.3	5.8	7,644	0.2	*0.55*	0.34	11.85	0.11	426	4,153
10/12/2011	21,997	677	240	*9.1*	6.6	7,651	0.2	*0.68*	0.40	12.24	0.11	438	4,225
11/23/2011	23,000	1,003	226	14.3	10.2	7,661	0.2	*0.52*	0.53	12.77	0.11	597	4,322
12/14/2011	23,503	503	252	10.4	5.6	7,667	0.3	*0.45*	0.22	12.99	0.05	140	4,344
1/24/2012	24,344	841	222	47.3	21.5	7,688	0.6	*0.52*	0.36	13.35	0	0	4,344
2/15/2012	24,869	525	229	9.6	12.6	7,701	0.6	*0.55*	0.24	13.59	0	0	4,344

Table 5. Inland SVE System Petroleum Hydrocarbon Recovery Rates
BP West Coast Products Terminal 21T, Seattle, Washington

Date	Hours of Operation	Hours operated over period	Total HSVE Flow Rate from wells (SCFM)	Influent Gasoline Range Organics (GRO) (mg/m^3)	GRO recovered over period (lbs)	Cumulative GRO recovery (lbs)	GRO avg lbs/day over period	Influent Benzene (mg/m^3)	Benzene recovered over period (lbs)	Cumulative benzene recovery (lbs)	Avg CO2 %-Atmospheric concentration (0.04%)	Pounds GRO Destruction due to Enhanced Biodegredation over period (lbs)	Cumulative GRO Destruction due to Enhanced Biodegredation (gal)
3/14/2012	25,537	668	260	*6.5*	4.9	7,706	0.2	*0.49*	0.32	13.90	0	0	4,344
4/18/2012	26,376	840	248	*6.9*	5.4	7,711	0.2	*0.52*	0.40	14.31	0	0	4,344
5/16/2012	27,046	670	251	*6.9*	4.3	7,715	0.2	*0.52*	0.33	14.63	0	0	4,344
6/13/2012	27,718	672	259	*6.1*	4.2	7,720	0.1	*0.45*	0.31	14.94	0	0	4,344
7/20/2012	28,608	891	237	10.0	6.6	7,726	0.2	*0.58*	0.43	15.37	0	0	4,344
8/15/2012	29,229	621	250.6	*7.8*	5.2	7,731	0.2	*0.58*	0.34	15.71	0.01	35	4,350
9/6/2012	29,753	524	249.0	*10.0*	4.3	7,736	0.2	*0.78*	0.33	16.04	0.01	30	4,355
10/24/2012	30,906	1,153	261.6	*6.1*	8.9	7,745	0.2	*0.45*	0.68	16.72	0	0	4,355
11/28/2012	31,631	725	244.1	21.3	9.4	7,754	0.3	*0.52*	0.33	17.05	0	0	4,355
System shutdown due to high groundwater elevation on 11/28/2012. System will be restarted once groundwater elevations fall to a level that will not interfere with system operation.													
4/17/2013	31,764	133	267.7	*22*	2.8	7,757	0.5	*NA*	0.03	17.08	0	0	4,355
5/17/2013	32,484	721	270.8	*37*	21.4	7,778	0.7	*0.00076*	0.19	17.27	0	0	4,355
6/12/2013	33,106	621	258.3	*28*	20.0	7,798	0.8	*0.00079*	0.0005	17.27	0	0	4,355
7/24/2013	34,114	1,009	236.8	*24*	24.3	7,823	0.6	*0.00013*	0.0004	17.27	0	0	4,355
8/21/2013	34,786	672	265.9	*35*	18.7	7,841	0.7	*0.00097*	0.0003	17.27	0	0	4,355
9/25/2013	35,625	839	260.7	*27*	21.1	7,862	0.6	*0.00075*	0.0007	17.28	0	0	4,355
10/15/2013	36,104	479	258.7	*35*	14.4	7,877	0.7	*0.00097*	0.0004	17.28	0	0	4,355
11/20/2013	36,967	863	259.2	*27*	26.0	7,903	0.7	*0.00074*	0.0007	17.28	0	0	4,355
12/18/2013	37,638	670.7	234	4.4	9.7	7,912	0.3	0.04	0.0126	17.29	0	0	4,355
1/15/2014	38,308	670.6	235.4	12.0	4.8	7,917	0.2	0.99	0.3037	17.59	0	0	4,355
2/12/2014	38,979	671.0	266.7	2.3	4.5	7,922	0.2	*0.017*	0.3177	17.91	0	0	4,355
3/20/2014	39,620	641	260.4	*1.8*	1.3	7,923	0.05	*0.017*	0.0108	17.92	0	0	4,355
4/16/2014	40,263	643	262.8	*1.5*	1.0	7,924	0.04	0.017	0.0107	17.93	0	0	4,355
5/21/2014	41,101	838	249.2	5.9	3.0	7,927	0.09	*0.017*	0.0137	17.95	0	0	4,355
6/18/2014	41,771	670	251.0	*1.9*	2.4	7,929	0.09	*0.017*	0.0107	17.96	0	0	4,355
7/25/2014	42,657	886	267.6	*0.82*	1.2	7,931	0.0	*0.0013*	0.0079	17.96	0	0	4,355
8/13/2014	43,113	456	252.8	NR	1.9	7,933	0.10	*0.029*	0.0067	17.97	0	0	4,355
9/17/2014	43,953	840	241.8	7.9	3.4	7,936	0.10	*0.087*	0.0451	18.02	0	0	4,355
10/14/2014	44,625	672	260.3	1.4	2.9	7,939	0.10	*0.0013*	0.0279	18.04	0	0	4,355
11/18/2014	45,464	839	257.6	*0.82*	0.9	7,940	0.03	*0.0013*	0.0011	18.05	0	0	4,355
12/17/2014	46,135	670	250.6	*0.82*	0.5	7,940	0.02	*0.0013*	0.0008	18.05	0	0	4,355
Total Combined Recovery lbs (Bio+GRO): 34,723				**Total lbs of Gasoline (GRO): 7,940**				**Total lbs Benzene: 18.05**			**Total lbs due to Biodegredation: 26,783**		
Total Combined Recovery gal (Bio+GRO): 5,646				**Total gal of Gasoline (GRO): 1,291**				**Total gal of Benzene: 2.46**			**Total gal due to Biodegredation: 4,355**		

Table 5. Inland SVE System Petroleum Hydrocarbon Recovery Rates
BP West Coast Products Terminal 21T, Seattle, Washington

Date	Hours of Operation	Hours operated over period	Total HSVE Flow Rate from wells (SCFM)	Influent Gasoline Range Organics (GRO) (mg/m^3)	GRO recovered over period (lbs)	Cumulative GRO recovery (lbs)	GRO avg lbs/day over period	Influent Benzene (mg/m^3)	Benzene recovered over period (lbs)	Cumulative benzene recovery (lbs)	Avg CO2 %- Atmospheric concentration (0.04%)	Pounds GRO Destruction due to Enhanced Biodegredation over period (lbs)	Cumulative GRO Destruction due to Enhanced Biodegredation (gal)

Notes:

Samples are collected from the SVE influent vapor stream (air) for all analyses.

Samples are analyzed for concentrations of gasoline range organics (GRO) and benzene, toluene, ethylbenzene, & xylenes (BTEX) at an accredited lab.

Samples analysis methodologies utilized include TO-3 or NWTPH-Gx for GRO and TO-15, TO-3, or 8021b for BTEX.

Pounds of gasoline are converted to gallons by assuming that 6.15 lbs equals 1.0 gallons.

Pounds of benzene are converted to gallons by assuming that 7.33 lbs equals 1.0 gallons.

Total pounds of recovered gasoline starts at 839 pounds, as this was the amount recovered during pilot testing.

Total pounds of recovered benzene starts at 0.80 pounds, as this was the amount recovered during pilot testing.

Benzene and Gasoline recovery are biased high, as recoveries are calculated assuming analytes are present at associated detection limits. This provides a protective estimate of analyte concentrations below detection limits.

Analytes were not detected from analyses for all values listed in *italic* . The associated detection limits for the analyses are the value listed in *italic* .

The SVE system was shutdown from December 2010 through June 2011 and November 2012 through April 2013 due to high groundwater elevations that submerged horizontal SVE screens. The SVE system was restarted once the groundwater elevation had fallen to a save level for system operation.

Due to a laboratory oversight, benzene concentrations could not be quantified for the April 17, 2013 air sample. The May 17, 2013 air sample was analyzed for benzene using EPA Method TO-15, which generated data to a much lower detection limit than historically reported. No benzene was detected in this sample.

August 2014 GRO concentrations were not utilized to calculate GRO recovery. Laboratory analyses for GRO were biased high by the presence of non-target analytes, identified as siloxane compounds not typically found in gasoline and are not present at the site. This data was excluded to avoid artificially elevating gasoline capture.

Definitions:

Avg - average
Bio - biodegradation of petroleum hydrocarbons
CO_2 - carbon dioxide
gal - gallons
GRO - gasoline range organics (gasoline range petroleum hydrocarbons)
hr - hour
HSVE - horizontal soil vapor extraction
lbs - pounds
mg/m^3 - milligrams per cubic meter
NA - not available (see reasons above)
NR - not reported
SCFM - standard cubic feet per minute
SVE - soil vapor extraction
TPH - total petroleum hydrocarbons

Enhanced Biodegradation Calculations:

C = Average Influent CO_2 concentration (%)
Q = Influent Flow Rate (SCFM)
Mc = Molecular wt. of Carbon Dioxide = 44
CO_2 recovery (lbs/hr) = C x Q x Mc x 5.277 x 10-4
5.277 x 10-4 is a constant and is derived as follows:
1/100% x 60min/1hr x 1 lb Mole/379 cu.ft. x 1/3
Note: SVE TPH as CO_2 recovery rates were calculated by assuming that for every 3 lbs of CO_2 detected, 1 lb of TPH is metabolized, and that all CO_2 present in vapor stream above background atmospheric concentrations (0.04%) is attributable to microbial degradation of hydrocarbons in soil.

Table 6. Groundwater Monitoring Analytical Results for TPH and Benzene
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	TPH-G WTPH-G (µg/L)	TPH-D WTPH-DX (µg/L)	TPH-O WTPH-DX (µg/L)	Benzene EPA 8021 & 8260 (µg/L)
Plant 1					
AMW-01	12/21/2000	ND	1,310	ND	14.0
AMW-01	3/28/2001	59.3	2,600	ND	69.6
AMW-01	6/13/2001	105 U	944	ND	**470**
AMW-01	10/4/2001	ND	851	ND	**152**
AMW-01	12/12/2001	ND	1700 J	ND UJ	**1,260**
AMW-01	3/7/2002	153	1,410	ND	**1,410**
AMW-01	6/12/2002	143 J	2,100	ND	**1,680**
AMW-01	9/19/2002	139 J	571 J	ND UJ	**1,180**
AMW-01	12/17/2002	196	2,190	ND	**74.6**
AMW-01	3/26/2003	101	2,100	ND	**933**
AMW-01	6/27/2003	ND	2,090	ND	**1,260**
AMW-01	9/18/2003	55	2,140	ND	48.5
AMW-01	12/22/2003	136	1750 J	ND	**571**
AMW-01	3/8/2004	ND UJ	ND	ND	**961**
AMW-01	6/16/2004	138	386	ND	**1,540**
AMW-01	9/28/2004	83	ND	ND	**292**
AMW-01	12/6/2004	103	ND	ND	**411**
AMW-01	3/10/2005	113	ND	ND	**812**
AMW-01	6/21/2005	129	ND	ND	**1,130**
AMW-01	9/27/2005	77	ND UJ	ND	**181 J**
AMW-01	12/13/2005	ND UJ	342	ND	**132**
AMW-01	3/21/2006	88	ND	ND	**363**
AMW-01	7/6/2006	ND UJ	ND	ND	**912**
AMW-01	9/18/2006	91.7	ND	ND	7.38
AMW-01	12/12/2006	**1,650 J**	ND UJ	ND UJ	**539 J**
AMW-01	3/21/2007	89.9	ND	ND	**457**
AMW-01	6/6/2007	61	ND	ND	**486**
AMW-01	9/12/2007	65	ND	ND	**157**
AMW-01	12/18/2007	ND	ND	ND	10.6 J
AMW-01	3/25/2008	ND	ND	ND	**76**
AMW-01	6/25/2008	64.9	ND	ND	**370**
AMW-01	9/17/2008	55.0	ND	ND	**162**
AMW-01	12/16/2008	ND	ND	ND	**330**
AMW-01	3/11/2009	ND	ND	ND	**374**
AMW-01	6/10/2009	ND	R	R	**240 J**
AMW-01	9/16/2009	ND	ND	ND	7.4
AMW-01	12/16/2009	ND	ND	ND	**280**
AMW-01	3/30/2010	ND	ND	ND	**310**
AMW-01	6/9/2010	ND	720	ND	**280**
AMW-01	9/14/2010	ND	ND	ND	69.7
AMW-01	12/14/2010	ND	ND	ND	**282**
AMW-01	3/22/2011	ND	ND	ND	**247**
AMW-01	6/22/2011	ND	300 J	ND	39.6
AMW-01	9/27/2011	ND	ND	ND	22.2
AMW-01	12/20/2011	ND	ND	ND UJ	**151**
Cleanup Level		1,000	10,000	10,000	71
Method Reporting Limit		50	250	750	0.5

Table 6. Groundwater Monitoring Analytical Results for TPH and Benzene
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	TPH-G WTPH-G (µg/L)	TPH-D WTPH-DX (µg/L)	TPH-O WTPH-DX (µg/L)	Benzene EPA 8021 & 8260 (µg/L)
Plant 1, continued					
AMW-01	3/20/2012	ND	ND	ND	**178**
AMW-01	6/21/2012	ND	ND	ND	**77**
AMW-01	9/10/2012	ND	ND	ND	38.7 J
AMW-01	12/19/2012	ND	ND	ND	61.2
AMW-01	3/19/2013	ND	ND	ND	**110**
AMW-01	6/25/2013	ND	ND	ND	12
AMW-01	9/10/2013	ND	ND	ND	17
AMW-01	12/10/2013	ND	ND	ND	17
AMW-01	3/11/2014	ND	990 J	ND	**77**
AMW-01	6/10/2014	ND UJ	1,100	ND	7.3
AMW-01	9/9/2014	ND	440 J	ND UJ	8.4
AMW-01	12/9/2014	ND	1,500	570	20
AMW-01	3/10/2015	ND U	1,200 J	ND	68
AMW-01	6/9/2015	ND	450	ND	50
AMW-01	9/22/2015	ND	250	ND	12
AMW-01	12/15/2015	ND	430 J	ND UJ	38 J
AMW-02	12/21/2000	ND	803	ND	3.14
AMW-02	3/28/2001	Not accessible due to earthquake damage to warehouse.			
AMW-02	6/13/2001	ND	999	ND	3.88 U
AMW-02	10/4/2001	ND	1,200	ND	10.90
AMW-02	12/12/2001	ND	1,500 J	ND UJ	5.47
AMW-02	3/7/2002	Not accessible due to repair of earthquake damage to warehouse.			
AMW-02	6/12/2002	ND	2,420	ND	1.49
AMW-02	9/19/2002	ND UJ	495 J	ND UJ	1.61
AMW-02	12/17/2002	ND	1,890	ND	4.08
AMW-02	3/26/2003	ND	2,200	ND	5.23
AMW-02	6/27/2003	ND	1,680	ND	1.11
AMW-02	9/18/2003	ND	2,430	790	2.01
AMW-02	12/22/2003	ND	1,880 J	ND	ND
AMW-02	3/8/2004	ND	ND	ND	ND
AMW-02	6/16/2004	ND	ND	ND	2.40
AMW-02	9/28/2004	ND	ND	ND	0.85
AMW-02	12/8/2004	ND	ND	ND	23.2
AMW-02	3/10/2005	ND	ND	ND	38.4
AMW-02	6/21/2005	ND	ND	ND	16.1
AMW-02	9/27/2005	ND	ND	ND	9.04
AMW-02	12/13/2005	ND	366	ND	7.26
AMW-02	3/21/2006	ND	ND	ND	2.16
AMW-02	7/6/2006	ND	ND	ND	41.1
AMW-02	9/18/2006	ND	ND	ND	3.18
AMW-02	12/12/2006	84.5 UJ	ND UJ	ND UJ	25.8 J
AMW-02	3/21/2007	ND	ND	ND	**92.2**
AMW-02	6/6/2007	ND	ND	ND	**442**
AMW-02	9/12/2007	ND	ND	ND	4.03 J
Cleanup Level		1,000	10,000	10,000	71
Method Reporting Limit		50	250	750	0.5

Table 6. Groundwater Monitoring Analytical Results for TPH and Benzene
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	TPH-G WTPH-G (µg/L)	TPH-D WTPH-DX (µg/L)	TPH-O WTPH-DX (µg/L)	Benzene EPA 8021 & 8260 (µg/L)
Plant 1, continued					
AMW-02	9/17/2008	ND	ND	ND	30.7
AMW-02	12/18/2007	ND	ND	ND	66.2
AMW-02	3/25/2008	75.9	ND	ND	**343**
AMW-02	6/25/2008	ND	ND	ND	**125**
AMW-02	12/16/2008	ND	ND	ND	**189**
AMW-02	3/11/2009	ND	ND	ND	**421**
AMW-02	6/10/2009	ND	R	R	**100**
AMW-02	9/14/2010	ND	ND	ND	22.6
AMW-02	12/14/2010	ND	ND	ND	**96.2**
AMW-02	9/16/2009	ND	ND	ND	12
AMW-02	12/16/2009	ND	ND	ND	**110**
AMW-02	3/30/2010	ND	1,000	ND	**210**
AMW-02	6/9/2010	ND	1,000	260	**130**
AMW-02	3/22/2011	ND	ND	ND	**149**
AMW-02	6/22/2011	ND	ND	ND	20.0
AMW-02	9/27/2011	ND	ND	ND	6.5
AMW-02	12/20/2011	ND	ND	ND	12.2
AMW-02	3/20/2012	ND	ND	ND	31.6
AMW-02	6/21/2012	ND	ND	ND	**82.5**
AMW-02	9/10/2012	ND	ND	ND	12.7 J
AMW-02	12/19/2012	ND	ND	ND	12.4
AMW-02	3/19/2013	ND	ND	ND	9.3
AMW-02	6/25/2015	ND	ND	ND	13.0
AMW-02	9/10/2013	ND	ND	ND	8.1
AMW-02	12/10/2013	ND	ND	ND	5.7
AMW-02	3/11/2014	ND	ND	ND	19.0
AMW-02	6/10/2014	ND UJ	320	ND	12.0
AMW-02	9/9/2014	ND	270	ND	29.0
AMW-02	12/9/2014	ND	530	ND	15.0
AMW-02	3/10/2015	ND U	370	ND	ND
AMW-02	6/9/2015	ND	ND	ND	3.1
AMW-02	9/22/2015	ND	ND	ND	2.0
AMW-02	12/15/2015	ND	ND	ND	4.4
AMW-03	12/21/2000	127	1,420	ND	ND
AMW-03	3/28/2001	Not accessible due to earthquake damage to warehouse.			
AMW-03	6/13/2001	ND	745	ND	ND
AMW-03	10/4/2001	ND	1,210	ND	ND
AMW-03	12/12/2001	ND	1,080 J	ND UJ	ND
AMW-03	3/7/2002	Not accessible due to earthquake damage to warehouse.			
AMW-03	6/12/2002	ND	1,070	ND	ND
AMW-03	9/19/2002	ND UJ	643 J	ND UJ	ND UJ
AMW-03	12/17/2002	ND	1,160	ND	ND
AMW-03	3/26/2003	ND	1,240	ND	ND
AMW-03	6/27/2003	ND	713	ND	ND
Cleanup Level		1,000	10,000	10,000	71
Method Reporting Limit		50	250	750	0.5

Table 6. Groundwater Monitoring Analytical Results for TPH and Benzene
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	TPH-G WTPH-G (µg/L)	TPH-D WTPH-DX (µg/L)	TPH-O WTPH-DX (µg/L)	Benzene EPA 8021 & 8260 (µg/L)
Plant 1, continued					
AMW-03	9/18/2003	ND	1,050	ND	ND
AMW-03	12/22/2003	ND	374 J	ND	ND
AMW-03	3/8/2004	ND	ND	ND	ND
AMW-03	6/16/2004	ND	ND	ND	1.02
AMW-03	9/28/2004	ND	ND	ND	ND
AMW-03	12/8/2004	ND	ND UJ	ND UJ	ND
AMW-03	3/10/2005	ND	ND	ND	1.56
AMW-03	6/21/2005	ND	ND	ND	0.99
AMW-03	9/27/2005	ND	ND UJ	ND	0.997
AMW-03	12/13/2005	ND	ND	ND	0.828
AMW-03	3/21/2006	ND	ND	ND	2.770
AMW-03	7/6/2006	ND	ND	ND	2.28
AMW-03	9/18/2006	ND	ND	ND	ND
AMW-03	12/12/2006	ND UJ	ND UJ	ND UJ	0.974 J
AMW-03	3/21/2007	ND	ND	ND	ND
AMW-03	6/6/2007	ND	ND	ND	ND
AMW-03	9/12/2007	ND	ND	ND	ND UJ
AMW-03	12/18/2007	ND	ND	ND	ND
AMW-03	3/25/2008	ND	ND	ND	ND
AMW-03	6/25/2008	ND	ND	ND	ND
AMW-03	9/17/2008	ND	ND	ND	ND
AMW-03	12/16/2008	ND	ND	ND	ND
AMW-03	3/11/2009	ND	ND	ND	ND
AMW-03	6/10/2009	ND	R	R	ND
AMW-03	9/16/2009	ND	ND	ND	ND
AMW-03	12/16/2009	ND	ND	ND	ND
AMW-03	3/30/2010	ND	400	ND	ND
AMW-03	6/9/2010	ND	230	ND	ND
AMW-03	9/14/2010	ND	ND	ND	ND
AMW-03	12/14/2010	ND	ND	ND	ND
AMW-03	3/22/2011	ND	ND	ND	0.54
AMW-03	6/22/2011	ND	ND	ND	ND
AMW-03	9/27/2011	ND	ND	ND	ND
AMW-03	12/20/2011	ND	ND	ND	ND
AMW-03	3/20/2012	ND	ND	ND	0.52
AMW-03	6/21/2012	ND	ND	ND	ND
AMW-03	9/10/2012	ND	ND	ND	ND
AMW-03	12/19/2012	ND	ND	ND	ND
AMW-03	3/19/2013	ND	ND	ND	ND
AMW-03	6/25/2013	ND	ND	ND	ND
AMW-03	9/10/2013	ND	ND	ND	ND
AMW-03	12/10/2013	ND	ND	ND	ND
AMW-03	3/11/2014	ND	320 J	ND	ND
AMW-03	6/10/2014	ND UJ	430	ND	ND
AMW-03	9/9/2014	ND	360	ND	ND
Cleanup Level		1,000	10,000	10,000	71
Method Reporting Limit		50	250	750	0.5

Table 6. Groundwater Monitoring Analytical Results for TPH and Benzene
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	TPH-G WTPH-G (µg/L)	TPH-D WTPH-DX (µg/L)	TPH-O WTPH-DX (µg/L)	Benzene EPA 8021 & 8260 (µg/L)
Plant 1, continued					
AMW-03	12/9/2014	ND	570	ND	ND
AMW-03	3/10/2015	ND U	650	ND	ND
AMW-03	6/9/2015	ND	410	ND	ND
AMW-03	9/22/2015	ND	ND	ND	ND
AMW-03	12/15/2015	ND	ND	ND	ND
AMW-04	12/21/2000	ND	1,570	ND	0.66
AMW-04	3/28/2001	ND	1,660	ND	0.766
AMW-04	6/13/2001	ND	987	ND	ND
AMW-04	10/4/2001	ND	379	ND	ND
AMW-04	12/12/2001	ND	930 J	ND UJ	ND
AMW-04	3/7/2002	ND	519	ND	2.94
AMW-04	6/12/2002	ND	1,200	ND	0.63
AMW-04	9/19/2002	ND UJ	760 J	ND UJ	1.45 J
AMW-04	12/17/2002	ND	1,070	ND	ND
AMW-04	3/26/2003	ND	1,240	ND	0.84
AMW-04	6/27/2003	ND	875	ND	ND
AMW-04	9/18/2003	ND	1,660	ND	ND
AMW-04	12/22/2003	ND	686 J	ND	1.73
AMW-04	3/8/2004	ND	ND	ND	ND
AMW-04	6/16/2004	ND	ND	ND	ND
AMW-04	9/27/2004	ND	ND	ND	ND
AMW-04	12/6/2004	ND	ND	ND	ND
AMW-04	3/10/2005	ND	ND	ND	ND
AMW-04	6/21/2005	ND	ND	ND	ND
AMW-04	9/27/2005	ND	ND UJ	ND	ND
AMW-04	12/13/2005	ND UJ	ND	ND	ND UJ
AMW-04	3/21/2006	ND	ND	ND	0.65
AMW-04	7/6/2006	ND UJ	ND	ND	ND UJ
AMW-04	9/18/2006	ND	ND	ND	ND
AMW-04	12/12/2006	ND UJ	ND UJ	ND UJ	ND UJ
AMW-04	3/21/2007	ND	ND	ND	0.64
AMW-04	6/6/2007	ND	ND	ND	ND
AMW-04	9/12/2007	ND	ND	ND	ND UJ
AMW-04	12/18/2007	ND	ND	ND	ND
AMW-04	3/26/2008	ND	ND	ND	ND
AMW-04	6/25/2008	ND	ND	ND	ND
AMW-04	9/17/2008	ND	ND	ND	ND
AMW-04	12/16/2008	ND	ND	ND	0.63
AMW-04	3/11/2009	ND	ND	ND	ND
AMW-04	6/10/2009	ND	R	R	ND
AMW-04	9/16/2009	ND	ND	ND	ND
AMW-04	12/16/2009	ND UJ	ND	ND	ND
AMW-04	3/30/2010	ND	610	ND	0.57
AMW-04	6/9/2010	ND	430	ND	ND
Cleanup Level		1,000	10,000	10,000	71
Method Reporting Limit		50	250	750	0.5

Table 6. Groundwater Monitoring Analytical Results for TPH and Benzene
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	TPH-G WTPH-G (µg/L)	TPH-D WTPH-DX (µg/L)	TPH-O WTPH-DX (µg/L)	Benzene EPA 8021 & 8260 (µg/L)
Plant 1, continued					
AMW-04	9/14/2010	ND	ND	ND	ND
AMW-04	12/14/2010	ND	ND	ND	ND
AMW-04	3/22/2011	ND	ND	ND	ND
AMW-04	6/22/2011	ND	ND	ND	ND
AMW-04	9/27/2011	ND	ND	ND	ND
AMW-04	12/27/2011	ND	ND	ND	ND
AMW-04	3/20/2012	ND	ND	ND	ND
AMW-04	6/21/2012	ND	ND	ND	ND
AMW-04	9/10/2012	ND	ND	ND	ND
AMW-04	12/19/2012	ND	ND	ND	ND
AMW-04	3/19/2013	ND	ND	ND	ND
AMW-04	6/25/2013	ND	ND	ND	ND
AMW-04	9/10/2013	ND	ND	ND	ND
AMW-04	12/10/2013	ND	ND	ND	ND
AMW-04	3/11/2014	ND	780 J	ND	ND
AMW-04	6/10/2014	ND UJ	400	ND	ND
AMW-04	9/9/2014	ND	480	ND	ND
AMW-04	12/9/2014	ND	630	ND	ND
AMW-04	3/10/2015	ND U	590	ND	ND
AMW-04	6/9/2015	ND	420	ND	ND
AMW-04	9/22/2015	ND	ND	ND	ND
AMW-04	12/15/2015	ND	ND	ND	ND
AMW-05	12/21/2000	ND	1,450	ND	ND
AMW-05	3/28/2001	ND	1,360	ND	ND
AMW-05	6/13/2001	ND	440	ND	ND
AMW-05	10/4/2001	71.4 U	318	ND	ND
AMW-05	12/12/2001	ND	940 J	ND UJ	ND
AMW-05	3/7/2002	ND	1,100	ND	2.12
AMW-05	6/12/2002	78	1,180	ND	0.701
AMW-05	9/19/2002	ND UJ	760 J	ND UJ	1.45 J
AMW-05	12/17/2002	ND	1,820	ND	ND
AMW-05	3/26/2003	ND	1,900	ND	0.577
AMW-05	3/27/2003	ND	381 J	ND UJ	ND
AMW-05	9/19/2003	ND	2,150	ND	ND
AMW-05	12/22/2003	ND	1,420 J	ND	0.833
AMW-05	3/8/2004	ND	ND	ND	ND
AMW-05	6/16/2004	ND	ND	ND	ND
AMW-05	9/27/2004	ND	ND	ND	ND
AMW-05	12/6/2004	ND	ND	ND	ND
AMW-05	3/10/2005	ND	ND	ND	ND
AMW-05	6/21/2005	ND	ND	ND	ND
AMW-05	9/27/2005	ND	ND UJ	ND	ND
AMW-05	12/13/2005	ND	ND	ND	0.727
Cleanup Level		1,000	10,000	10,000	71
Method Reporting Limit		50	250	750	0.5

Table 6. Groundwater Monitoring Analytical Results for TPH and Benzene
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	TPH-G WTPH-G (µg/L)	TPH-D WTPH-DX (µg/L)	TPH-O WTPH-DX (µg/L)	Benzene EPA 8021 & 8260 (µg/L)
Plant 1, continued					
AMW-05	3/21/2006	ND	ND	ND	0.692
AMW-05	7/6/2006	ND	ND	ND	ND
AMW-05	9/18/2006	ND	ND	ND	ND
AMW-05	12/12/2006	ND UJ	ND UJ	ND UJ	0.565 J
AMW-05	3/21/2007	ND	ND	ND	1.11
AMW-05	6/6/2007	ND	ND	ND	ND
AMW-05	9/12/2007	ND	ND	ND	ND UJ
AMW-05	12/18/2007	ND	ND	ND	ND
AMW-05	3/26/2008	ND	ND	ND	ND
AMW-05	6/25/2008	ND	ND	ND UJ	ND
AMW-05	9/17/2008	ND	ND	ND UJ	ND
AMW-05	12/16/2008	ND	ND	ND	0.768
AMW-05	3/11/2009	ND	ND	ND	0.885
AMW-05	6/10/2009	ND	R	R	ND
AMW-05	9/16/2009	54	ND	ND	ND
AMW-05	12/16/2009	ND UJ	ND	ND	ND
AMW-05	3/30/2010	ND	890	ND	1.3
AMW-05	6/9/2010	ND	640	ND	ND
AMW-05	9/14/2010	ND	ND	ND	ND
AMW-05	12/14/2010	ND	ND	ND	ND
AMW-05	3/22/2011	ND	ND	ND	ND
AMW-05	6/22/2011	ND	ND	ND	ND
AMW-05	9/27/2011	ND	ND	ND	ND
AMW-05	12/20/2011	ND	ND	ND	ND
AMW-05	3/20/2012	ND	ND	ND	ND
AMW-05	6/21/2012	ND	ND	ND	ND
AMW-05	9/10/2012	ND	ND	ND	ND
AMW-05	12/19/2012	ND	ND	ND	ND
AMW-05	3/19/2013	ND	ND	ND	ND
AMW-05	6/25/2013	ND	ND	ND	ND
AMW-05	9/10/2013	ND	ND	ND	ND
AMW-05	12/10/2013	ND	ND	ND	ND
AMW-05	3/11/2014	ND	ND	ND	ND
AMW-05	6/10/2014	ND UJ	560	ND	ND
AMW-05	9/9/2014	ND	300	ND	ND
AMW-05	12/9/2014	ND	460	ND	ND
AMW-05	3/10/2015	ND	480	ND	ND
AMW-05	6/9/2015	ND	300	ND	ND
AMW-05	9/22/2015	ND	ND	ND	ND
AMW-05	12/15/2015	ND	ND	ND	ND
GM-11S	4/10/1997	**3,910**	2,210	1,230	**616 J**
GM-11S	7/8/1997	960 J	1,090	ND	46.9 J
GM-11S	10/21/1997	**1,570**	1,260	ND	**126**
GM-11S	1/21/1998	390	788	ND	**250**
Cleanup Level		1,000	10,000	10,000	71
Method Reporting Limit		50	250	750	0.5

Table 6. Groundwater Monitoring Analytical Results for TPH and Benzene
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	TPH-G WTPH-G (µg/L)	TPH-D WTPH-DX (µg/L)	TPH-O WTPH-DX (µg/L)	Benzene EPA 8021 & 8260 (µg/L)
Plant 1, continued					
GM-11S	3/11/1998	**1,800**	776	ND	**640**
GM-11S	7/6/1998	680	470 J	ND	41
GM-11S	10/20/1998	260	584	ND	27
GM-11S	12/15/1998	**1,300**	1,090	ND	**500**
GM-11S	3/26/1999	**1,100**	779	ND	**220**
GM-11S	6/23/1999	710	520	ND	**92**
GM-11S	CONVERTED TO RECOVERY WELL - SAMPLING DISCONTINUED				
GM-12S	4/10/1997	140	4,500	2,720	42.9
GM-12S	7/8/1997	160	4,590	3,450	ND
GM-12S	10/20/1997	ND	600	1,630	ND
GM-12S	1/21/1998	ND	1,210	2,040	ND
GM-12S	3/10/1998	ND	2,040	ND	ND
GM-12S	7/6/1998	140	2,830	1,980	0.8
GM-12S	10/20/1998	77	1,200	775	ND
GM-12S	3/26/1999	280	2,080 J	1,100 J	0.5
GM-12S	6/23/1999	260	1,530	ND	ND
GM-12S	WELL DELETED FROM MONITORING PROGRAM				
GM-14S	9/13/2007	608	1020	ND	0.97
GM-14S	12/20/2007	389	341	ND	1.02
GM-14S	3/27/2008	172	ND	ND	0.538
GM-14S	6/27/2008	**2,680 J**	577	ND	2.5 J
GM-14S	9/19/2008	**1,440**	719	ND	1.32
GM-14S	12/17/2008	**1,630 J**	963	ND	1.6
GM-14S	3/12/2009	**1,300**	562	ND	7.98
GM-14S	6/11/2009	**2,500**	R	R	ND
GM-14S	9/18/2009	**2,300**	1,600	ND	ND
GM-14S	12/17/2009	750	870	ND	ND
GM-14S	4/1/2010	**2,000**	880	ND	ND
GM-14S	6/10/2010	**1,900 J**	3,200	560	11 J
GM-14S	9/16/2010	**2,070**	690	ND	ND
GM-14S	12/15/2010	245	400	ND	ND
GM-14S	3/23/2011	748	350	ND	ND
GM-14S	6/23/2011	**2,190**	590	ND	ND
GM-14S	9/28/2011	**3,660**	840	ND	ND
GM-14S	12/21/2011	**3,150**	1,200	ND	ND
GM-14S	3/21/2012	903	480	ND	ND
GM-14S	6/22/2012	**3,050**	500	ND	ND
GM-14S	9/11/2012	**3,330**	920	ND	ND
GM-14S	12/20/2012	464	480	ND	ND
GM-14S	3/20/2013	**1,400**	340	ND	ND
GM-14S	6/26/2013	**2,200**	770	ND	1.3
GM-14S	9/11/2013	**1,700**	810	ND	0.77
GM-14S	12/11/2013	**3,300**	570	ND	ND
Cleanup Level		1,000	10,000	10,000	71
Method Reporting Limit		50	250	750	0.5

Table 6. Groundwater Monitoring Analytical Results for TPH and Benzene
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	TPH-G WTPH-G (µg/L)	TPH-D WTPH-DX (µg/L)	TPH-O WTPH-DX (µg/L)	Benzene EPA 8021 & 8260 (µg/L)
Plant 1, continued					
GM-14S	3/12/2014	760	1,600	940	0.53
GM-14S	6/11/2014	**2,000 J**	1,300	ND	1.2
GM-14S	9/10/2014	**2,900 J**	1,100	ND	0.87
GM-14S	12/10/2014	**1,000**	1,800	1,200	0.84
GM-14S	3/11/2015	**2,000 J**	1,300	ND	1.0
GM-14S	6/9/2015	**2,500 J**	2,000	ND	1.6
GM-14S	9/23/2015	**2,500**	1,600	ND	1.0
GM-14S	12/16/2015	450	1,200	850	1.0
GM-15S	4/9/1997	ND	290	ND	ND
GM-15S	7/8/1997	170	800	ND	1.4
GM-15S	10/21/1997	ND	ND	ND	ND
GM-15S	1/21/1998	ND	293	ND	ND
GM-15S	3/11/1998	ND	ND	ND	ND
GM-15S	7/7/1998	54	253	ND	ND
GM-15S	10/21/1998	310	550	ND	ND
GM-15S	12/15/1998	120	342	ND	ND
GM-15S	3/25/1999	ND	ND	ND	ND
GM-15S	6/23/1999	76	ND	ND	ND
GM-15S	9/27/1999	NS	NS	NS	NS
GM-15S	12/14/1999	160 U	316	ND	ND
GM-15S	3/24/2000	ND	451	ND	ND
GM-15S	6/30/2000	167	1,200	ND	ND
GM-15S	9/27/2000	355 J	1,130 J	ND	ND UJ
GM-15S	12/21/2000	801	1,990	ND	ND
GM-15S	3/27/2001	548	2,810	ND	0.747 J
GM-15S	6/12/2001	909	1,040	ND	2.58 U
GM-15S	10/3/2001	955	1,220	ND	10.9 J
GM-15S	12/11/2001	578	1,100	ND	9.62
GM-15S	3/6/2002	434	1,430	ND	12.1
GM-15S	6/10/2002	786	2,530	ND	14.7
GM-15S	9/18/2002	825 J	1,320 J	ND UJ	9.38 J
GM-15S	12/16/2002	738	1,690 J	ND	4.16
GM-15S	3/25/2003	833 J	2,920	ND	3.57 J
GM-15S	6/26/2003	616	2,940 J	ND	2.49 J
GM-15S	9/19/2003	636	1,530	ND	1.58
GM-15S	12/22/2003	672	647 J	ND	1.47 J
GM-15S	3/8/2004	458 J	ND	ND	2.83 J
GM-15S	6/17/2004	836 J	356	ND	1.26
GM-15S	9/28/2004	655	ND	ND	1.62 J
GM-15S	12/8/2004	847	ND	ND	1.53
GM-15S	3/11/2005	587	ND	ND	1.07 J
GM-15S	6/22/2005	984 J	ND	ND	0.682
GM-15S	9/28/2005	840	ND	ND	1.43 J
GM-15S	12/14/2005	702	ND	ND	1.27
Cleanup Level		1,000	10,000	10,000	71
Method Reporting Limit		50	250	750	0.5

Table 6. Groundwater Monitoring Analytical Results for TPH and Benzene
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	TPH-G WTPH-G (µg/L)	TPH-D WTPH-DX (µg/L)	TPH-O WTPH-DX (µg/L)	Benzene EPA 8021 & 8260 (µg/L)
Plant 1, continued					
GM-15S	3/22/2006	317	ND	ND	0.614
GM-15S	7/7/2006	647	ND	ND	0.767
GM-15S	9/19/2006	533	ND	ND	0.836
GM-15S	12/13/2006	494 J	ND UJ	ND UJ	ND UJ
GM-15S	3/22/2007	420	ND	ND	ND
GM-15S	6/7/2007	404	ND	ND	0.505
GM-15S	9/13/2007	180	ND	ND	ND UJ
GM-15S	12/19/2007	549	ND	ND	0.943
GM-15S	3/26/2008	404	ND	ND	0.613
GM-15S	6/26/2008	480	ND	ND	0.665
GM-15S	9/18/2008	445	ND	ND	0.599
GM-15S	12/17/2008	Well not sampled, sampling reduced to a semi-annual event			
GM-15S	3/12/2009	695	ND	ND	19.6
GM-15S	9/16/2009	390	ND	ND	ND
GM-15S	3/30/2010	670	520	ND	1.1
GM-15S	9/15/2010	269	ND	ND	6.6
GM-15S	3/23/2011	ND	ND	ND	ND
GM-15S	9/27/2011	427	ND	ND	0.79
GM-15S	3/20/2012	143	ND	ND	ND
GM-15S	9/10/2012	ND	ND	ND	ND
GM-15S	3/19/2013	92	ND	ND	**100**
GM-15S	6/25/2013	**1,300**	ND	ND	**400**
GM-15S	9/10/2013	270	ND	ND	**110**
GM-15S	12/11/2013	320	ND	ND	1.3
GM-15S	3/12/2014	110	430 J	ND	ND
GM-15S	6/11/2014	ND	ND	ND	ND
GM-15S	9/9/2014	180	870	ND	ND
GM-15S	12/9/2014	250	520	ND	ND
GM-15S	3/10/2015	ND	340	ND	ND
GM-15S	6/9/2015	72	400	ND	ND
GM-15S	9/22/2015	430	ND	ND	ND
GM-15S	12/15/2015	370	ND	ND	ND
GM-16S	4/9/1997	ND	3,980	1,630	
GM-16S	7/8/1997	ND	3,890	1,710	ND
GM-16S	10/21/1997	ND	720	ND	ND
GM-16S	1/21/1998	ND	1,390	ND	ND
GM-16S	3/12/1998	ND	5,780	1,620	ND
GM-16S	7/7/1998	ND	1,310	ND	ND
GM-16S	10/20/1998	ND	ND	ND	ND
GM-16S	12/17/1998	ND	2,170	871	ND
GM-16S	3/26/1999	NS	1,990	960	NS
GM-16S	6/28/1999	NS	480	ND	NS
GM-16S	WELL DELETED FROM MONITORING PROGRAM / REINITIATED 3RD QUARTER 2007 ON ECOLOGYS REQUEST				
Cleanup Level		1,000	10,000	10,000	71
Method Reporting Limit		50	250	750	0.5

Table 6. Groundwater Monitoring Analytical Results for TPH and Benzene
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	TPH-G WTPH-G (µg/L)	TPH-D WTPH-DX (µg/L)	TPH-O WTPH-DX (µg/L)	Benzene EPA 8021 & 8260 (µg/L)
Plant 1, continued					
GM-16S	9/13/2007	ND	ND	ND	ND UJ
GM-16S	12/20/2007	ND	ND	ND	ND
GM-16S	3/27/2008	65.3	ND	ND	ND
GM-16S	6/27/2008	81.1	ND	ND	ND
GM-16S	9/19/2008	72.7	ND	ND	ND
GM-16S	12/17/2008	Well not sampled, sampling has been reduced to a semi-annual event			
GM-16S	3/12/2009	ND	456	ND	ND
GM-16S	9/18/2009	300	750	ND	ND
GM-16S	3/31/2010	390	1,800	ND	ND
GM-16S	9/16/2010	263	490	ND	ND
GM-16S	3/23/2011	193	350	ND	ND
GM-16S	9/28/2011	377	400	ND	ND
GM-16S	3/21/2012	ND	290	ND	ND
GM-16S	9/11/2012	ND	ND	ND	ND
GM-16S	3/20/2013	79	ND	ND	ND
GM-16S	9/11/2013	62	ND	ND	ND
GM-16S	3/12/2014	ND	1,600	ND	ND
GM-16S	9/10/2014	960	1,200	ND	ND
GM-16S	3/11/2015	400	2,200	970	ND
GM-16S	9/23/2015	170	910	ND	ND
GM-17S	4/9/1997	ND	1,720	900	ND
GM-17S	7/9/1997	ND	720	ND	ND
GM-17S	10/21/1997	ND	ND	ND	ND
GM-17S	1/22/1998	ND	320	ND	ND
GM-17S	3/11/1998	ND	926	ND	ND
GM-17S	7/7/1998	52 J	410 J	ND UJ	ND UJ
GM-17S	10/21/1998	ND	ND	ND	ND
GM-17S	12/15/1998	ND	1,060	ND	ND
GM-17S	3/26/1999	NS	851	ND	NS
GM-17S	6/28/1999	NS	393	ND	NS
	WELL DELETED FROM MONITORING PROGRAM / REINITIATED 3RD QUARTER 2007				
GM-17S		ON ECOLOGYS REQUEST			
GM-17S	9/13/2007	ND	ND	ND	ND UJ
GM-17S	12/20/2007	ND	ND	ND	ND
GM-17S	3/27/2008	ND	ND	ND	ND
GM-17S	6/27/2008	ND	ND	ND	ND
GM-17S	9/19/2008	ND	ND	ND	ND
GM-17S	12/17/2008	Well not sampled, sampling has been reduced to a semi-annual event			
GM-17S	3/12/2009	ND	ND	ND	ND
GM-17S	9/18/2009	53	ND	ND	ND
GM-17S	3/31/2010	ND	ND	ND	ND
GM-17S	9/16/2010	ND	ND	ND	ND
GM-17S	3/23/2011	ND	ND	ND	ND
GM-17S	9/28/2011	ND	ND	ND	ND
Cleanup Level		1,000	10,000	10,000	71
Method Reporting Limit		50	250	750	0.5

Table 6. Groundwater Monitoring Analytical Results for TPH and Benzene
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	TPH-G WTPH-G (µg/L)	TPH-D WTPH-DX (µg/L)	TPH-O WTPH-DX (µg/L)	Benzene EPA 8021 & 8260 (µg/L)
Plant 1, continued					
GM-17S	3/21/2012	ND	ND	ND	ND
GM-17S	9/11/2012	ND	ND	ND	ND
GM-17S	3/20/2013	ND	ND	ND	ND
GM-17S	9/11/2013	ND	ND	ND	ND
GM-17S	3/12/2014	ND	420	ND	ND
GM-17S	9/10/2014	ND	ND	ND	ND
GM-17S	3/11/2015	ND U	ND	ND	ND
GM-17S	9/23/2015	ND	250	ND	ND
GM-24S	4/9/1997	970	2,180	1,070	ND
GM-24S	7/9/1997	**4,040**	1,200	ND	ND
GM-24S	10/22/1997	**2,760**	710	ND	1.1
GM-24S	1/22/1998	**1,300**	841	ND	2.1
GM-24S	3/11/1998	370	765	ND	ND
GM-24S	7/7/1998	**1,500 J**	762 J	ND UJ	ND UJ
GM-24S	10/20/1998	800	929	ND	1.6
GM-24S	12/17/1998	**1,100**	867	ND	ND
GM-24S	3/26/1999	**3,500**	1,470	ND	ND
GM-24S	6/28/1999	**2,600**	1,390	ND	**2,600**
GM-24S	9/29/1999	**2,200**	1,030	ND	0.8
GM-24S	12/14/1999	**1,900**	857	ND	1.3 U
GM-24S	3/24/2000	**2,860**	1,230	ND	ND
GM-24S	6/30/2000	**4,570**	2,110	ND	ND
GM-24S	9/27/2000	**3,080 J**	2,690 J	ND	ND UJ
GM-24S	12/21/2000	**3,420**	4,100	947	ND
GM-24S	3/27/2001	**2,570**	3,120	884	0.704 J
GM-24S	6/12/2001	Tank Farm was inaccessible to sampling activities			
GM-24S	10/3/2001	**2,820**	1,800	ND	3.88 J
GM-24S	12/11/2001	**1,560**	2,250	ND	1.13 J
GM-24S	3/6/2002	**2,180**	2,170	ND	12.1
GM-24S	6/10/2002	**2,230**	1,800	ND	2.2 J
GM-24S	9/18/2002	**1,930 J**	1,130 J	ND UJ	3.79 J
GM-24S	12/16/2002	**1,330**	4,250	949	2.32
GM-24S	3/25/2003	**1,510**	1,930	850	0.667 J
GM-24S	6/25/2003	**3,510 J**	ND UJ	ND UJ	3.38 J
GM-24S	9/19/2003	**2,490**	1,610	ND	3.49
GM-24S	12/23/2003	**2,890**	2,220 J	ND	1.66 J
GM-24S	3/9/2004	**2,850**	345	ND	0.928 J
GM-24S	6/17/2004	**2,800**	567	ND	1.66
GM-24S	9/29/2004	**2,190**	0.365	ND	2.25
GM-24S	12/9/2004	**1,910**	ND	ND	2.34
GM-24S	3/11/2005	**2,670**	0.365	ND	1.61
GM-24S	6/22/2005	**3,990**	261	ND	3.68
GM-24S	9/28/2005	**4,190**	296	ND	3.23 J
GM-24S	12/14/2005	**2,430**	293	ND	2.79
Cleanup Level		1,000	10,000	10,000	71
Method Reporting Limit		50	250	750	0.5

Table 6. Groundwater Monitoring Analytical Results for TPH and Benzene
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	TPH-G WTPH-G (µg/L)	TPH-D WTPH-DX (µg/L)	TPH-O WTPH-DX (µg/L)	Benzene EPA 8021 & 8260 (µg/L)
Plant 1, continued					
GM-24S	3/22/2006	**2,310**	303	ND	1.95 J
GM-24S	7/7/2006	**2,700**	ND	ND	1.82
GM-24S	9/19/2006	**2,480**	535	ND	2.03
GM-24S	12/14/2006	**1,070 J**	ND UJ	ND UJ	ND UJ
GM-24S	3/22/2007	**2,750 J**	427 J	ND	2.97 J
GM-24S	6/7/2007	**2,600 J**	429	ND	2.25
GM-24S	9/13/2007	**1,390 J**	346 J	ND	1.16 J
GM-24S	12/20/2007	**ND UJ**	ND	ND	ND
GM-24S	3/27/2008	578	ND	ND	0.59
GM-24S	6/26/2008	**1,980**	439	ND	2.13
GM-24S	9/19/2008	**1,210**	252	ND	1.34
GM-24S	12/17/2008	**1,260**	ND	ND	1.32 J
GM-24S	3/12/2009	**1,260**	309	ND	1.35
GM-24S	6/11/2009	**1,200**	R	R	ND
GM-24S	9/17/2009	**1,600 J**	850	ND	ND
GM-24S	12/17/2009	620 J	430	ND	ND
GM-24S	4/1/2010	990 J	370	ND	ND
GM-24S	6/10/2010	**1,200**	760 J	ND	2.9 J
GM-24S	9/16/2010	**1,480 J**	460 J	ND	ND
GM-24S	12/15/2010	448	ND	ND	ND
GM-24S	3/23/2011	**2,260**	350	ND	ND
GM-24S	6/23/2011	**1,140 J**	380	ND	ND
GM-24S	9/28/2011	806 J	710 J	ND	ND
GM-24S	12/21/2011	**2,080**	260	ND	ND
GM-24S	3/21/2012	462 J	260	ND	ND
GM-24S	6/22/2012	**1,220**	270	ND	ND
GM-24S	9/11/2012	**2,460**	550	ND	ND
GM-24S	12/20/2012	244	ND	ND	ND
GM-24S	3/20/2013	**1,100**	270	ND	ND
GM-24S	6/26/2013	850 J	390	ND	ND
GM-24S	9/11/2013	500 J	470	ND	ND UJ
GM-24S	12/11/2013	**1,700**	450 J	ND	ND
GM-24S	3/12/2014	200 J	300 J	ND	ND
GM-24S	6/11/2014	**1,000**	450	ND	ND
GM-24S	9/10/2014	620 J	720	ND	ND
GM-24S	12/10/2014	840 J	320	ND	ND
GM-24S	3/11/2015	**1,400**	610	ND	ND
GM-24S	6/10/2015	**1,100**	500	ND	ND
GM-24S	9/23/2015	490 J	630 J	ND	ND
GM-24S	12/16/2015	170 J	ND	ND	ND UJ
AR-03	4/9/1997	**4,560**	5,890 J	1,070 J	**2,780 J**
AR-03	7/8/1997	**2,690**	7,600	1,640	**311**
AR-03	10/21/1997	**2,460**	730	ND	**204**
AR-03	1/21/1998	570	1,740	ND	41
Cleanup Level		1,000	10,000	10,000	71
Method Reporting Limit		50	250	750	0.5

Table 6. Groundwater Monitoring Analytical Results for TPH and Benzene
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	TPH-G WTPH-G (µg/L)	TPH-D WTPH-DX (µg/L)	TPH-O WTPH-DX (µg/L)	Benzene EPA 8021 & 8260 (µg/L)
Plant 1, continued					
AR-03	3/10/1998	**2,800**	2,490	ND	**850**
AR-03	7/6/1998	**2,900**	2,030	ND	35
AR-03	10/20/1998	990	2,230	ND	ND
AR-03	12/15/1998	780	1,200	ND	50
AR-03	3/25/1999	**3,800**	2,480	ND	**1,600**
AR-03	6/23/1999	**3,300**	2,390	ND	**290**
AR-03	9/29/1999	**3,400**	2,570	ND	10
AR-03	12/14/1999	**2,400**	1,390	ND	**340**
AR-03	3/24/2000	**1,380**	3,600	ND	**574**
AR-03	6/30/2000	**3,230**	7,980	1,040	**523**
AR-03	9/27/2000	**2,320 J**	3,700 J	772	ND UJ
AR-03	12/21/2000	**2,480**	5,140	ND	41.9
AR-03	3/27/2001	**2,050**	3,500	812	**583**
AR-03	6/14/2001	**1,330 J**	2,220	ND	1.59 R
AR-03	10/3/2001	533	1,640	ND	ND
AR-03	12/11/2001	**1,870**	1,790	ND	**661**
AR-03	3/6/2002	**2,890**	4,520	ND	**1800**
AR-03	6/10/2002	**2280 J**	5,590	794	**160 J**
AR-03	9/18/2002	484 J	1,890 J	ND UJ	6.01 J
AR-03	12/16/2002	321	2,830	ND	ND
AR-03	3/26/2003	**2,090**	6,190	ND	**1070 J**
AR-03	6/26/2003	610 J	2,790	ND	28.1
AR-03	9/19/2003	297	1,630	ND	ND
AR-03	12/23/2003	918	1640 J	ND	**228**
AR-03	3/9/2004	**2,350**	ND	ND	**659**
AR-03	6/17/2004	769 J	675	ND	34.3
AR-03	9/29/2004	332	ND	ND	ND
AR-03	12/8/2004	344	ND	ND	6.65
AR-03	3/11/2005	454	ND	ND	12.6
AR-03	6/22/2005	288	ND	ND	1.47
AR-03	9/28/2005	389	ND	ND	ND
AR-03	12/14/2005	520	408	ND	32.7
AR-03	3/22/2006	**2,450**	947	ND	**451**
AR-03	7/7/2006	860	ND	ND	67.3
AR-03	9/19/2006	323	ND	ND	ND
AR-03	12/13/2006	**1,210 J**	ND UJ	ND UJ	**134 J**
AR-03	3/22/2007	**1,880 J**	518	ND	**304**
AR-03	6/7/2007	**1,503**	ND	ND	**148**
AR-03	9/13/2007	186	ND	ND	ND
AR-03	12/19/2007	317	ND	ND	1.59
AR-03	3/26/2008	**2,010**	263	ND	172
AR-03	6/26/2008	**2,580**	ND	ND	**72.0**
AR-03	9/17/2008	758	ND	ND	0.79
AR-03	12/17/2008	**1,030 J**	384	ND	0.94
AR-03	3/13/2009	157	462	ND	ND
Cleanup Level		1,000	10,000	10,000	71
Method Reporting Limit		50	250	750	0.5

Table 6. Groundwater Monitoring Analytical Results for TPH and Benzene
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	TPH-G WTPH-G (µg/L)	TPH-D WTPH-DX (µg/L)	TPH-O WTPH-DX (µg/L)	Benzene EPA 8021 & 8260 (µg/L)
Plant 1, continued					
AR-03	6/11/2009	940	R	R	3.30
AR-03	9/17/2009	**1,200**	590	ND	ND
AR-03	12/16/2009	160	1,100	ND	ND
AR-03	3/31/2010	230	3,700	ND	ND
AR-03	6/10/2010	810	**14,000**	930	ND
AR-03	9/15/2010	676	180	ND	ND
AR-03	12/15/2010	ND	130	ND	ND
AR-03	3/24/2011	ND	390	ND	ND
AR-03	6/23/2011	297	380	ND	ND
AR-03	9/28/2011	821	270	ND	ND
AR-03	12/21/2011	940	170	ND	ND
AR-03	3/21/2012	ND	ND	ND	ND
AR-03	6/21/2012	ND	340	ND	ND
AR-03	9/10/2012	815 J	650 J	ND	ND
AR-03	12/20/2012	ND	460	ND	ND
AR-03	3/20/2013	78	ND	ND	ND
AR-03	6/26/2013	370	ND	ND	ND
AR-03	9/11/2013	540	280	ND	ND
AR-03	12/11/2013	390	560	ND	ND
AR-03	3/12/2014	ND	1,100 J	ND	ND
AR-03	6/10/2014	ND UJ	2,700	ND	ND
AR-03	9/9/2014	260	3,100	850	ND
AR-03	12/10/2014	ND	2,100	1,100	ND
AR-03	3/10/2015	ND U	1,800	ND	ND
AR-03	6/10/2015	330	3,100	860	ND
AR-03	9/23/2015	620	390	ND	ND
AR-03	12/16/2015	ND	1,100	ND	ND
MW-1-T9	12/15/2005	434	785	ND	ND
MW-1-T9	3/22/2006	**1,600**	214	ND	**78.9**
MW-1-T9	7/7/2006	816	ND	ND	0.852
MW-1-T9	9/19/2006	236	ND	ND	ND
MW-1-T9	12/13/2006	307 J	ND UJ	ND UJ	ND UJ
MW-1-T9	3/22/2007	922 J	510	ND	15.8 J
MW-1-T9	6/7/2007	**1,130**	428	ND	0.779
MW-1-T9	9/14/2007	536	ND	ND	ND
MW-1-T9	12/19/2007	120	ND	ND	ND
MW-1-T9	3/26/2008	879	467	ND	18.3
MW-1-T9	6/26/2008	**1,050 J**	ND	ND	7.02
MW-1-T9	9/18/2008	919	ND	ND	0.5
MW-1-T9	12/17/2008	374	ND	ND	ND
MW-1-T9	3/13/2009	377	445	ND	0.666
MW-1-T9	6/11/2009	**1,000**	R	R	1.7
MW-1-T9	9/17/2009	980	770	ND	0.5
MW-1-T9	12/17/2009	98	590	ND	ND
Cleanup Level		1,000	10,000	10,000	71
Method Reporting Limit		50	250	750	0.5

Table 6. Groundwater Monitoring Analytical Results for TPH and Benzene
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	TPH-G WTPH-G (µg/L)	TPH-D WTPH-DX (µg/L)	TPH-O WTPH-DX (µg/L)	Benzene EPA 8021 & 8260 (µg/L)
Plant 1, continued					
MW-1-T9	3/31/2010	**1,300 J**	**11,000**	ND	1.4
MW-1-T9	6/10/2010	820	**14,000**	1,200	0.7
MW-1-T9	9/15/2010	473	160	ND	ND
MW-1-T9	12/15/2010	147	120	ND	ND
MW-1-T9	3/24/2011	256	440	ND	ND
MW-1-T9	6/22/2011	437	370	ND	ND
MW-1-T9	9/29/2011	338	ND	ND	ND
MW-1-T9	12/21/2011	438	110	ND	ND
MW-1-T9	3/22/2012	121	ND	ND	ND
MW-1-T9	6/22/2012	268	260	ND	ND
MW-1-T9	9/10/2012	338	580	ND	ND
MW-1-T9	12/20/2012	170	530	ND	ND
MW-1-T9	3/20/2013	300	ND	ND	ND
MW-1-T9	6/26/2013	380	ND	ND	ND
MW-1-T9	9/11/2013	270	ND	ND	ND
MW-1-T9	12/11/2013	560	160	ND	ND
MW-1-T9	3/12/2014	160	3,700 J	890 J	ND
MW-1-T9	6/11/2014	360	5,800	940	ND
MW-1-T9	9/10/2014	350	3,700	700	ND
MW-1-T9	12/10/2014	160	1,600	ND	ND
MW-1-T9	3/11/2015	250	**12,000**	2,500	ND
MW-1-T9	6/10/2015	320	5,300	1,400	ND
MW-1-T9	9/23/2015	250	540	ND	ND
MW-1-T9	12/16/2015	170	1,100	ND	ND
MW-2-T9	12/15/2005	**7,870**	2,270	ND	63.9
MW-2-T9	3/22/2006	**8,070**	212	ND	49.6
MW-2-T9	7/7/2006	**2,670 J**	ND	ND	17.8
MW-2-T9	9/19/2006	**1,280**	ND	ND	13.4
MW-2-T9	12/13/2006	**1,980 J**	ND UJ	ND UJ	7.17 J
MW-2-T9	3/22/2007	**3,700 J**	ND	ND	24.1 J
MW-2-T9	6/7/2007	**2830 J**	0.261	ND	16.6 J
MW-2-T9	9/14/2007	748	ND	ND	4.69 J
MW-2-T9	12/19/2007	869	ND	ND	3.82
MW-2-T9	3/26/2008	**3,420**	ND	ND	21.5
MW-2-T9	6/26/2008	**1,170 J**	ND	ND	7.1
MW-2-T9	9/18/2008	**1,100**	ND	ND	1.62
MW-2-T9	12/17/2008	**1,110**	ND	ND	1.93
MW-2-T9	3/13/2009	**1,140**	ND	ND	2.92
MW-2-T9	6/11/2009	**2,200**	R	R	0.75
MW-2-T9	9/17/2009	940	370	ND	ND
MW-2-T9	12/17/2009	**1,200**	1,500	ND	ND
MW-2-T9	3/31/2010	**2,200 J**	1,100	ND	0.75
MW-2-T9	6/10/2010	**1500 J**	3,100	340	1.5
MW-2-T9	9/15/2010	683	ND	ND	ND
Cleanup Level		1,000	10,000	10,000	71
Method Reporting Limit		50	250	750	0.5

Table 6. Groundwater Monitoring Analytical Results for TPH and Benzene
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	TPH-G WTPH-G (µg/L)	TPH-D WTPH-DX (µg/L)	TPH-O WTPH-DX (µg/L)	Benzene EPA 8021 & 8260 (µg/L)
Plant 1, continued					
MW-2-T9	12/15/2010	**1,810**	390	ND	0.53
MW-2-T9	3/24/2011	**2,000**	430	ND	ND
MW-2-T9	6/23/2011	**1,400**	250	ND	ND
MW-2-T9	9/29/2011	962	320	ND	ND
MW-2-T9	12/21/2011	**1,280**	120	ND	ND
MW-2-T9	3/22/2012	426	ND	ND	ND
MW-2-T9	6/22/2012	766	270	ND	ND
MW-2-T9	9/10/2012	**1,710**	460	ND	ND
MW-2-T9	12/20/2012	513	ND UJ	ND UJ	ND
MW-2-T9	3/20/2013	580	ND	ND	ND
MW-2-T9	6/26/2013	650	ND	ND	ND
MW-2-T9	9/10/2013	700	ND	ND	ND
MW-2-T9	12/11/2013	700	240	ND	ND
MW-2-T9	3/12/2014	740	1,400 J	ND	ND
MW-2-T9	6/11/2014	380	1,000	ND	ND
MW-2-T9	9/10/2014	520	680	ND	ND
MW-2-T9	12/10/2014	360	1,100	ND	ND
MW-2-T9	3/11/2015	270	1,000	ND	ND
MW-2-T9	6/10/2015	620	1,100	ND	ND
MW-2-T9	9/23/2015	410	680	ND	ND
MW-2-T9	12/16/2015	770	830	ND	ND
MW-3-T9	12/15/2005	509	860	ND	2.08
MW-3-T9	3/22/2006	572	543	ND	2.67
MW-3-T9	7/7/2006	749	ND	ND	3.48
MW-3-T9	9/19/2006	609	317	ND	1.48
MW-3-T9	12/13/2006	541	ND	ND	1.33
MW-3-T9	3/22/2007	722	ND	ND	2.33
MW-3-T9	6/7/2007	603	ND	ND	2.1
MW-3-T9	9/14/2007	536	ND	ND	1.68 J
MW-3-T9	12/19/2007	578	ND	ND	1.61
MW-3-T9	3/26/2008	522	ND	ND	1.36
MW-3-T9	6/26/2008	711	ND	ND	4.78
MW-3-T9	9/17/2008	502	ND	ND	0.585
MW-3-T9	12/17/2008	668	ND	ND	5.35
MW-3-T9	3/13/2009	275	ND	ND	0.553
MW-3-T9	6/11/2009	630	2,400	1,800	7
MW-3-T9	9/17/2009	490	ND	ND	ND
MW-3-T9	12/17/2009	580	1,000	ND	ND
MW-3-T9	3/31/2010	690 J	790	ND	5.1
MW-3-T9	6/10/2010	500	2,500	ND	5.2
MW-3-T9	9/15/2010	331	ND	ND	3.8
MW-3-T9	12/15/2010	449	ND	ND	15
MW-3-T9	3/24/2011	826	270	ND	**87.7**
MW-3-T9	6/23/2011	632	ND	ND	69.6
Cleanup Level		1,000	10,000	10,000	71
Method Reporting Limit		50	250	750	0.5

Table 6. Groundwater Monitoring Analytical Results for TPH and Benzene
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	TPH-G WTPH-G (µg/L)	TPH-D WTPH-DX (µg/L)	TPH-O WTPH-DX (µg/L)	Benzene EPA 8021 & 8260 (µg/L)
Plant 1 Continued					
MW-3-T9	9/29/2011	468	ND	ND	40.1
MW-3-T9	12/21/2011	788	ND	ND	58.2
MW-3-T9	3/22/2012	825	ND	ND	**191**
MW-3-T9	6/21/2012	596	ND	ND	**113**
MW-3-T9	9/10/2012	679	ND	ND	**94.9**
MW-3-T9	12/20/2012	617	760	ND	**172**
MW-3-T9	3/20/2013	700	ND	ND	68
MW-3-T9	6/26/2013	520	ND	ND	55
MW-3-T9	9/10/2013	490	ND	ND	39
MW-3-T9	12/11/2013	980	ND	ND	39
MW-3-T9	3/12/2014	**1,000**	1,400 J	ND	28
MW-3-T9	6/11/2014	670	1,300	ND	14
MW-3-T9	9/10/2014	650	1,400	ND	14
MW-3-T9	12/10/2014	800	1,000	ND	13
MW-3-T9	3/11/2015	**1,000**	2,100	ND	2.1
MW-3-T9	6/10/2015	760	1,100	ND	0.74
MW-3-T9	9/22/2015	560	250	ND	0.62
MW-3-T9	12/16/2015	930	590	ND	2.4
MW-4-T9	12/15/2005	ND	ND	ND	1.26
MW-4-T9	3/22/2006	ND	ND	ND	0.836
MW-4-T9	7/7/2006	ND	ND	ND	0.745
MW-4-T9	9/19/2006	ND	ND	ND	1.53
MW-4-T9	12/13/2006	ND UJ	ND UJ	ND UJ	1.46
MW-4-T9	3/22/2007	ND	ND	ND	0.625
MW-4-T9	6/7/2007	81	ND	ND	ND
MW-4-T9	9/14/2007	ND	ND	ND	0.599 J
MW-4-T9	12/19/2007	ND	ND	ND	1.55
MW-4-T9	3/26/2008	ND	ND	ND	ND
MW-4-T9	6/26/2008	ND	ND	ND	ND
MW-4-T9	9/18/2008	ND	ND	ND	0.92
MW-4-T9	12/17/2008	ND	ND	ND	1.1
MW-4-T9	3/13/2009	ND	ND	ND	0.506
MW-4-T9	6/11/2009	ND	R	R	ND
MW-4-T9	9/17/2009	60	ND	ND	ND
MW-4-T9	12/16/2009	ND	ND	ND	ND
MW-4-T9	3/31/2010	ND	ND	ND	ND
MW-4-T9	6/10/2010	ND	210	ND	ND
MW-4-T9	9/15/2010	ND	ND	ND	ND
MW-4-T9	12/15/2010	ND	ND	ND	ND
MW-4-T9	3/24/2011	ND	ND	ND	ND
MW-4-T9	6/23/2011	ND	ND	ND	ND
MW-4-T9	9/28/2011	ND	ND	ND	ND
MW-4-T9	12/21/2011	ND	ND	ND	ND
MW-4-T9	3/21/2012	ND	ND	ND	ND
Cleanup Level		1,000	10,000	10,000	71
Method Reporting Limit		50	250	750	0.5

Table 6. Groundwater Monitoring Analytical Results for TPH and Benzene
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	TPH-G WTPH-G (µg/L)	TPH-D WTPH-DX (µg/L)	TPH-O WTPH-DX (µg/L)	Benzene EPA 8021 & 8260 (µg/L)
Plant 1 Continued					
MW-4-T9	6/21/2012	ND	ND	ND	ND
MW-4-T9	9/10/2012	ND	ND	ND	ND
MW-4-T9	12/20/2012	ND	ND	ND	ND
MW-4-T9	3/20/2013	ND	ND	ND	ND
MW-4-T9	6/26/2013	ND	ND	ND	ND
MW-4-T9	9/10/2013	ND	ND	ND	ND
MW-4-T9	12/11/2013	ND	ND	ND	ND
MW-4-T9	3/12/2014	ND	290 J	ND	ND
MW-4-T9	6/11/2014	ND	480	ND	ND
MW-4-T9	9/9/2014	ND	400	ND	ND
MW-4-T9	12/10/2014	ND	360	ND	ND
MW-4-T9	3/10/2015	ND U	ND	ND	ND
MW-4-T9	6/10/2015	ND	300	ND	ND
MW-4-T9	9/23/2015	ND	320	ND	ND
MW-4-T9	12/16/2015	ND	320	ND	ND
Plant 2					
GM-19S	4/10/1997	**1,070**	4,260	1,840	1.3
GM-19S	7/9/1997	**1,030**	1,840	1,150	0.9 J
GM-19S	10/22/1997	800	370	ND	3.6
GM-19S	1/22/1998	400 J	1,320	ND	1.8
GM-19S	3/12/1998	180	1,860	ND	ND
GM-19S	7/8/1998	**1,000 J**	1,660 J	ND UJ	ND UJ
GM-19S	10/21/1998	570	1,260	ND	2.5
GM-19S	12/17/1998	650	1,970	ND	0.9
GM-19S	3/25/1999	72	1,420	793	ND
GM-19S	6/22/1999	**1,600**	1,100	ND	1.5
GM-19S	9/27/1999	**1,900 J**	NS	NS	44 J
GM-19S	12/13/1999	**1,500 J**	1,160	ND	**470**
GM-19S	3/24/2000	ND	1,530	ND	**955**
GM-19S	7/3/2000	771	1,380	ND	**2,330 J**
GM-19S	9/29/2000	ND UJ	2,290 J	776 J	**4,010 J**
GM-19S	12/21/2000	ND	3,150	806	**2,660**
GM-19S	3/28/2001	**2,940**	2,320	994	**1,730**
GM-19S	6/15/2001	**3,270**	1,230	ND	**3,390**
GM-19S	10/5/2001	Not accessible due to island redevelopment activities			
GM-19S	12/13/2001	**5,140**	2,350	985	**1,990**
GM-19S	3/8/2002	**11,000**	1,940	NS	**723**
GM-19S	6/11/2002	**2,720 J**	3,210	810	**710 J**
GM-19S	9/18/2002	**1,320 J**	2,430 J	ND UJ	**1,960 J**
GM-19S	12/16/2002	730	4590 J	1,770	**2,320 J**
GM-19S	3/25/2003	**9,540**	3,350	960	**1,960**
GM-19S	6/25/2003	**3,640**	3,740 J	1,380 J	**596**
GM-19S	9/19/2003	**1,290**	2,010	ND	**469**
GM-19S	12/23/2003	**1,070 J**	2,190 J	ND	**496**
Cleanup Level		1,000	10,000	10,000	71
Method Reporting Limit		50	250	750	0.5

Table 6. Groundwater Monitoring Analytical Results for TPH and Benzene
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	TPH-G WTPH-G (µg/L)	TPH-D WTPH-DX (µg/L)	TPH-O WTPH-DX (µg/L)	Benzene EPA 8021 & 8260 (µg/L)
Plant 2, continued					
GM-19S	3/9/2004	**1,450**	ND	ND	**832**
GM-19S	6/17/2004	**1,150**	498	ND	**307**
GM-19S	9/29/2004	679 J	NS	NS	**87.8**
GM-19S	12/9/2004	501	NS	NS	47
GM-19S	3/11/2005	649	NS	NS	**210.0**
GM-19S	6/22/2005	NS	NS	NS	**99.7**
GM-19S	9/28/2005	467	NS	NS	43.9
GM-19S	12/14/2005	581	NS	NS	**508**
GM-19S	3/22/2006	**1,710**	NR	NR	**853**
GM-19S	7/7/2006	850	NR	NR	**426**
GM-19S	9/19/2006	389	NS	NS	63
GM-19S	12/13/2006	445 J	NS	NS	**167 J**
GM-19S	3/22/2007	**1,070 J**	NS	NS	**1,400**
GM-19S	6/7/2007	200 J	NS	NS	15
GM-19S	9/13/2007	484	NS	NS	**956**
GM-19S	12/19/2007	88	NS	NS	**140**
GM-19S	3/27/2008	560	NS	NS	**869**
GM-19S	6/26/2008	958	NS	NS	**164**
GM-19S	9/19/2008	530	NS	NS	**178**
GM-19S	12/18/2008	Well not sampled, sampling has been reduced to a semi-annual event			
GM-19S	3/12/2009	261	NS	NS	**186**
GM-19S	9/17/2009	510	NS	NS	**140**
GM-19S	3/31/2010	220	NS	NS	**110**
GM-19S	9/15/2010	372	NS	NS	**111**
GM-19S	3/23/2011	56.5	NS	NS	26.9
GM-19S	9/28/2011	709	NS	NS	31.0
GM-19S	3/21/2012	355	NS	NS	8.4
GM-19S	9/11/2012	312	NS	NS	47.0
GM-19S	3/20/2013	330	NR	NR	38.0
GM-19S	9/11/2013	750	NR	NR	**160**
GM-19S	3/12/2014	ND	NR	NR	10
GM-19S	9/10/2014	53	NR	NR	44
GM-19S	3/11/2015	**1,000 J**	NR	NR	4.6
GM-19S	9/23/2015	860	NR	NR	5.8
GM-19D	4/10/1997	ND	6,680	2,050	**234**
GM-19D	7/9/1997	ND	5,910	1,780	**330**
GM-19D	10/22/1997	70	ND	ND	**263**
GM-19D	1/22/1998	ND	1,820	ND	**260**
GM-19D	3/12/1998	ND	2,630	ND	**140**
GM-19D	7/8/1998	ND UJ	2,120 J	ND UJ	**360 J**
GM-19D	10/21/1998	ND	1,930	ND	**180**
GM-19D	12/17/1998	ND	2,260	ND	**170**
GM-19D	3/25/1999	57	2,280	ND	**150**
GM-19D	6/22/1999	150	1,520	ND	**150**
Cleanup Level		1,000	10,000	10,000	71
Method Reporting Limit		50	250	750	0.5

Table 6. Groundwater Monitoring Analytical Results for TPH and Benzene
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	TPH-G WTPH-G (µg/L)	TPH-D WTPH-DX (µg/L)	TPH-O WTPH-DX (µg/L)	Benzene EPA 8021 & 8260 (µg/L)
Plant 2, continued					
GM-19D	9/27/1999	75 J	2,460 J	ND UJ	**120 J**
GM-19D	12/13/1999	550 J	1,930	ND	**170**
GM-19D	3/22/2000	ND	2,490	ND	**208**
GM-19D	7/3/2000	ND	5,260	1,280	**225**
GM-19D	9/29/2000	ND UJ	6,490 J	1,470 J	**210 J**
GM-19D	12/21/2000	ND	8,700	984	**225**
GM-19D	3/28/2001	ND	8,100	1,990	**163**
GM-19D	6/12/2001	ND	2,650	ND	**278**
GM-19D	10/5/2001	Not accessible due to island redevelopment activities			
GM-19D	12/13/2001	ND	7,830	1,880	**265**
GM-19D	3/8/2002	ND	3,400	ND	**281**
GM-19D	6/11/2002	63	7,810	1,470	**220**
GM-19D	9/18/2002	59.8 J	1,960 UJ	ND UJ	**215**
GM-19D	12/16/2002	52 J	6880 J	1,020	**263**
GM-19D	3/26/2003	ND	2,880	ND UJ	**270**
GM-19D	6/25/2003	ND	6,930	1,770	**222**
GM-19D	9/19/2003	ND	2,300	ND	**241**
GM-19D	12/23/2003	ND	7710 J	1,140	**261**
GM-19D	3/9/2004	82	ND	ND	**173**
GM-19D	6/17/2004	56.1	3,430	ND	**169**
GM-19D		WELL DELETED FROM MONITORING PROGRAM			
GM-21S	4/10/1997	ND	4,640	2,960	ND
GM-21S	7/9/1997	ND	5,080	2,420	ND
GM-21S	10/23/1997	ND	ND	ND	ND
GM-21S	1/23/1998	ND	1,710	ND	ND
GM-21S	3/12/1998	ND	615	ND	ND
GM-21S	7/9/1998	ND	2,190	ND	ND
GM-21S	10/21/1998	ND	694	ND	ND
GM-21S	12/17/1998	ND	1,050	ND	ND
GM-21S	3/25/1999	NS	793	ND	NS
GM-21S	6/22/1999	NS	875	ND	NS
GM-21S	9/27/1999	NS	3,330 J	ND UJ	NS
GM-21S	12/13/1999	NS	648	ND	NS
GM-21S	3/23/2000	ND	1,480	ND	ND
GM-21S	7/6/2000	ND	3,020	ND	ND
GM-21S	9/29/2000	ND UJ	3,310 J	924 J	ND UJ
GM-21S	12/21/2000	NS	NS	NS	NS
GM-21S	3/28/2001	Not accessible due to island redevelopment activities			
GM-21S	6/12/2001	Not accessible due to island redevelopment activities			
GM-21S	10/5/2001	Not accessible due to island redevelopment activities			
GM-21S	12/13/2001	Not accessible due to island redevelopment activities			
GM-21S	3/6/2002	ND	454	ND	ND
GM-21S		WELL DELETED FROM MONITORING PROGRAM			
Cleanup Level		1,000	10,000	10,000	71
Method Reporting Limit		50	250	750	0.5

Table 6. Groundwater Monitoring Analytical Results for TPH and Benzene
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	TPH-G WTPH-G (µg/L)	TPH-D WTPH-DX (µg/L)	TPH-O WTPH-DX (µg/L)	Benzene EPA 8021 & 8260 (µg/L)
Plant 2, continued					
GM-21D	4/10/1997	ND	1,730 J	810 J	ND
GM-21D	7/9/1997	ND	1,860	ND	ND
GM-21D	10/23/1997	ND	ND	ND	ND
GM-21D	1/23/1998	ND	744	ND	ND
GM-21D	3/12/1998	ND	1,830	ND	ND
GM-21D	7/9/1998	ND	1,030 J	ND UJ	ND
GM-21D	10/21/1998	ND	684	ND	ND
GM-21D	12/17/1998	ND	926	ND	ND
GM-21D	6/22/1999	NS	1,100	ND	NS
GM-21D	9/27/1999	NS	2,330 J	ND UJ	NS
GM-21D	12/13/1999	NS	986	ND	NS
GM-21D		WELL DELETED FROM MONITORING PROGRAM			
GM-22S		WELL NOT SAMPLED BETWEEN 1997 AND 2000			
GM-22S	3/23/2000	ND	5,060	841	0.538
GM-22S	7/6/2000	ND	8,930	1,050	ND
GM-22S	9/29/2000	ND UJ	3,130 J	1,620 J	2.04 J
GM-22S	12/21/2000	ND	5,070	1,720	ND
GM-22S	3/28/2001	ND	5,430	2,500	ND
GM-22S	6/15/2001	ND	3,110	ND	ND
GM-22S	10/5/2001	Not accessible due to island redevelopment activities			
GM-22S	12/13/2001	55.3	4,780	2,320	ND
GM-22S	3/8/2002	ND	2,710	831	ND
GM-22S		WELL DELETED FROM MONITORING PROGRAM			
GM-23S	4/10/1997	NS	NS	NS	NS
GM-23S	7/9/1997	750	1,830	1,010	ND
GM-23S	10/22/1997	400	ND	ND	ND
GM-23S	1/23/1998	NS	NS	NS	NS
GM-23S	3/12/1998	NS	NS	NS	NS
GM-23S	7/8/1998	480 J	467 J	ND UJ	ND UJ
GM-23S	10/21/1998	500	1,250	ND	ND
GM-23S	12/17/1998	NS	NS	NS	NS
GM-23S	3/25/1999	NS	NS	NS	NS
GM-23S	6/22/1999	680	801	ND	ND
GM-23S	9/28/1999	940	682	ND	ND
GM-23S		WELL DELETED FROM MONITORING PROGRAM			
T-18-1	6/14/2001	ND	1,670	ND	ND
T-18-1	10/5/2001	ND	1,270	ND	ND
T-18-1	12/13/2001	ND	365	ND	ND
T-18-1	3/6/2002	ND	357	ND	ND
T-18-1		WELL DELETED FROM MONITORING PROGRAM			
T-18-2a	6/14/2001	ND	385	ND	ND
Cleanup Level		1,000	10,000	10,000	71
Method Reporting Limit		50	250	750	0.5

Table 6. Groundwater Monitoring Analytical Results for TPH and Benzene
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	TPH-G WTPH-G (µg/L)	TPH-D WTPH-DX (µg/L)	TPH-O WTPH-DX (µg/L)	Benzene EPA 8021 & 8260 (µg/L)
Plant 2, continued					
T-18-2a	10/5/2001	ND	339	ND	ND
T-18-2a	12/13/2001	ND	323	ND	ND
T-18-2a	3/6/2002	ND	256	ND	ND
T-18-2a		WELL DELETED FROM MONITORING PROGRAM			
MW-03R	6/11/2002	NS	**20,700**	ND	NS
MW-03R	9/18/2002	NS	9,690 J	1,990 J	NS
MW-03R	12/16/2002	NS	NS	NS	NS
MW-03R	3/25/2003	NS	ND	ND UJ	NS
MW-03R	6/26/2006	NS	**10,200**	2,500	NS
MW-03R	9/19/2003	NS	831	ND	NS
MW-03R	12/23/2003	NS	472 J	ND	NS
MW-03R	3/9/2004	NR	645	ND	NS
MW-03R	6/17/2004	NR	935	ND	NS
MW-03R		WELL DELETED FROM MONITORING PROGRAM			
Cleanup Level		1,000	10,000	10,000	71
Method Reporting Limit		50	250	750	0.5

Note: Values in **bold** exceed the cleanup level.

J Estimated value.
µg/L Micrograms per liter.
NA Not analyzed.
ND Constituent not detected above reporting limit.
NS Not sampled.
TPH Total petroleum hydrocarbons.
TPH-D Total petroleum hydrocarbons as diesel.
TPH-G Total petroleum hydrocarbons as gasoline.
TPH-O Total petroleum hydrocarbons as oil.
U Undetected.
WTPH-DX Washington State Method for Analysis of Diesel and Oil in Water - Extended.
WTPH-G Washington State Method for Analysis of Gasoline in Water.
EPA 8021 or EPA 9260 - EPA Methods for Analysis of Benzene in Water.

Table 7. Groundwater Monitoring Analytical Results for cPAHs
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	Benz(a)anthracene (µg/L)	Benzo(a)pyrene (µg/L)	Benzo(b)fluoranthene (µg/L)	Benzo(k)fluoranthene (µg/L)	Chrysene (µg/L)	Dibenz(a,h)anthracene (µg/L)	Indeno(1,2,3,-cd)pyrene (µg/L)
Plant 1								
GM-11S	4/10/1997	ND	ND	ND	ND	0.01	ND	ND
GM-11S	7/8/1997	ND	ND	ND	ND	0.01 J	ND	0.01 J
GM-11S	10/21/1997	0.02	0.01	0.02	0.01	0.02	0.01	0.01
GM-11S	1/21/1998	ND	ND	ND	ND	0.01 U	ND	ND
GM-11S				WELL DELETED FROM cPAH MONITORING PROGRAM				
GM-12S	4/10/1997	0.02	0.03	**0.04**	**0.04**	**0.06**	ND	**0.04**
GM-12S	7/8/1997	**0.06 J**	**0.07 J**	**0.11 J**	**0.09 J**	**0.13 J**	0.01 J	**0.06 J**
GM-12S	10/20/1997	**0.07 J**	**0.06 J**	**0.1 J**	**0.09 J**	**0.15 J**	0.01	**0.08 J**
GM-12S	1/21/1998	0.1 U	**0.11**	**0.12**	**0.12 U**	**0.16 U**	**0.04**	**0.11**
GM-12S	3/10/1998	**0.05**	**0.06**	**0.1**	**0.07**	**0.12**	0.02	**0.09**
GM-12S	7/6/1998	0.01	0.01	0.03	0.02	**0.04**	ND	0.03
GM-12S	10/20/1998	0.03	0.03	**0.05**	**0.04**	**0.07 J**	0.01	**0.05**
GM-12S	3/26/1999	0.01	0.01	0.02	0.02	0.02	ND	0.02 U
GM-12S	6/23/1999	ND	0.01	0.01	0.01	0.01	ND	0.01
GM-12S				WELL DELETED FROM cPAH MONITORING PROGRAM				
GM-15S	4/9/1997	ND	ND	ND	ND	ND	ND	ND
GM-15S	7/8/1997	ND	0.01 J	0.02 J	0.01 J	ND	ND	0.01 J
GM-15S	10/21/1997	ND	ND	ND	ND	ND	ND	ND
GM-15S	1/21/1998	ND	ND	ND	ND	ND	ND	ND
GM-15S				WELL DELETED FROM cPAH MONITORING PROGRAM				
GM-16S	4/9/1997	ND	ND	ND	ND	ND	ND	ND
GM-16S	7/8/1997	ND	ND	ND	ND	ND	ND	ND
GM-16S	10/21/1997	ND	ND	ND	ND	ND	ND	ND
GM-16S	1/21/1998	ND	ND	ND	ND	ND	ND	ND
GM-16S				WELL DELETED FROM cPAH MONITORING PROGRAM				
GM-17S	4/9/1997	ND	ND	ND	ND	ND	ND	ND
GM-17S	7/9/1997	0.01 J	ND	0.01 J	0.01 J	0.02 J	0.01 J	0.01 J
GM-17S	10/21/1997	ND	ND	ND	ND	ND	ND	ND
GM-17S	1/22/1998	ND	ND	ND	ND	ND	ND	ND
GM-17S				WELL DELETED FROM cPAH MONITORING PROGRAM				
GM-24S	4/9/1997	ND	ND	ND	ND	ND	ND	ND
GM-24S	7/9/1997	ND	ND	ND	ND	ND	ND	ND
GM-24S	10/22/1997	ND	ND	ND	ND	ND	ND	ND
GM-24S	1/22/1998	ND	ND	ND	ND	ND	ND	ND
GM-24S				WELL DELETED FROM cPAH MONITORING PROGRAM				
AR-03	4/9/1997	ND R	ND R	ND R	ND R	ND R	ND R	ND R
AR-03	7/8/1997	ND	ND	ND	ND	ND	ND	ND
AR-03	10/21/1997	ND	ND	ND	ND	ND	ND	ND
AR-03	1/21/1998	ND	ND	ND	ND	ND	ND	ND
AR-03				WELL DELETED FROM cPAH MONITORING PROGRAM				
Cleanup Level		0.031	0.031	0.031	0.031	0.031	0.031	0.031

Table 7. Groundwater Monitoring Analytical Results for cPAHs
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	Benz(a)anthracene (µg/L)	Benzo(a)pyrene (µg/L)	Benzo(b)fluoranthene (µg/L)	Benzo(k)fluoranthene (µg/L)	Chrysene (µg/L)	Dibenz(a,h)anthracene (µg/L)	Indeno(1,2,3,-cd)pyrene (µg/L)
Plant 1, continued								
AMW-01	12/21/2000	ND	ND	0.116	ND	ND	ND	ND
AMW-01	3/28/2001	**0.0372 J**	**0.0821 J**	**0.04585 * J**	**0.04585 * J**	**0.0347 J**	ND UJ	ND UJ
AMW-01	6/13/2001	ND	ND	ND *	ND *	ND	**0.052**	ND
AMW-01	10/4/2001	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-01	12/12/2001	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-01	3/7/2002	ND	ND	ND	ND	ND	ND	ND
AMW-01	6/12/2002	ND	ND	ND	ND	ND	ND	ND
AMW-01	9/19/2002	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-01	12/17/2002	0.0292 J	ND	ND	ND	ND	ND	ND
AMW-01	6/16/2004	ND	ND	ND	ND	ND	ND	ND
AMW-01	9/28/2004	ND	ND	ND	ND	ND	ND	ND
AMW-01	12/6/2004	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-01	3/10/2005	U	U	**0.0509**	U	**0.0637**	**0.0483**	**0.0506**
AMW-01	6/21/2005	0.024	ND	**0.0411**	**0.0502**	**0.0322**	ND	0.0222
AMW-01	9/27/2005	ND	ND	ND	ND	ND	ND	ND
AMW-01	12/13/2005	ND	ND	ND	ND	ND	ND	ND
AMW-01	3/21/2006	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-01	7/6/2006	ND	ND	ND	ND	ND	ND	ND
AMW-01	9/18/2006	ND	ND	ND	ND	ND	ND	ND
AMW-01	12/12/2006	ND R	ND R	ND R	ND R	ND R	NDR	ND R
AMW-01	3/21/2007	**0.212 J**	**0.177 J**	**0.22 J**	**0.29 J**	**0.215 J**	**0.237 J**	**0.229 J**
AMW-01	6/6/2007	ND	ND	ND	ND	ND	ND	ND
AMW-01	9/12/2007	0.0124 J	ND UJ	ND UJ	ND UJ	0.0133 J	ND UJ	ND UJ
AMW-01	12/18/2007	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-01	3/25/2008	ND	ND	ND	ND	ND	ND	ND
AMW-01	6/25/2008	cPAH Sampling Reduced to an Annual Event						
AMW-01	12/16/2008	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-01	12/16/2009	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-01	12/14/2010	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-01	12/21/2011	ND	ND	0.018	ND	ND	ND	ND
AMW-01	12/19/2012	ND	ND	ND	ND	ND	ND	ND
AMW-01	12/10/2013	ND	ND	ND	ND	ND	ND	ND
AMW-01	12/9/2014	ND	ND	ND	ND	ND	ND	ND
AMW-01	12/15/2015	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-02	12/21/2000	ND	ND	ND	ND	ND	ND	ND
AMW-02	3/28/2001	Warehouse not accessible due to earthquake damage.						
AMW-02	6/13/2001	ND UJ	ND UJ	ND UJ *	ND UJ *	ND UJ	**0.052 J**	ND UJ
AMW-02	10/4/2001	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-02	12/12/2001	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-02	6/12/2002	ND	ND	ND	ND	ND	ND	ND
AMW-02	9/19/2002	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-02	12/17/2002	ND	ND	ND	ND	ND	ND	ND
AMW-02	6/16/2004	ND	ND	ND	ND	**0.0322**	ND	ND
AMW-02	9/28/2004	ND	ND	ND	ND	ND	ND	ND
AMW-02	12/8/2004	ND	ND	ND	ND	ND	ND	ND
AMW-02	3/10/2005	U	U	0.136	U	U	0.0153	0.0143
AMW-02	6/21/2005	ND	ND	ND	ND	ND	ND	ND
Cleanup Level		0.031	0.031	0.031	0.031	0.031	0.031	0.031

Table 7. Groundwater Monitoring Analytical Results for cPAHs
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	Benz(a)anthracene (µg/L)	Benzo(a)pyrene (µg/L)	Benzo(b)fluoranthene (µg/L)	Benzo(k)fluoranthene (µg/L)	Chrysene (µg/L)	Dibenz(a,h)anthracene (µg/L)	Indeno(1,2,3,-cd)pyrene (µg/L)
Plant 1, continued								
AMW-02	9/27/2005	ND	ND	ND	ND	ND	ND	ND
AMW-02	12/13/2005	ND	ND	ND	ND	ND	ND	ND
AMW-02	3/21/2006	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-02	7/6/2006	ND	ND	ND	ND	ND	ND	ND
AMW-02	9/18/2006	ND	ND	ND	ND	ND	ND	ND
AMW-02	12/12/2006	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	NDUJ
AMW-02	3/21/2007	**0.201**	**0.191**	**0.207**	**0.237**	**0.215**	**0.226**	**0.232**
AMW-02	6/6/2007	ND	ND	ND	ND	ND	ND	ND
AMW-02	9/12/2007	ND UJ	ND UJ	ND UJ	ND UJ	0.0117 J	ND UJ	ND UJ
AMW-02	12/18/2008	ND	ND	ND	ND	ND	ND	ND
AMW-02	3/25/2008	ND	ND	ND	ND	ND	ND	ND
AMW-02	6/25/2008	cPAH Sampling Reduced to an Annual Event						
AMW-02	12/16/2008	ND	ND	ND	ND	ND	ND	ND
AMW-02	12/16/2009	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-02	12/14/2010	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-02	12/21/2011	ND	ND	ND	0.017	ND	ND	ND
AMW-02	12/19/2012	ND	ND	ND	ND	ND	ND	ND
AMW-02	12/10/2013	0.016	ND	ND	ND	ND	ND	ND
AMW-02	12/9/2014	ND	ND	ND	ND	ND	ND	ND
AMW-02	12/15/2015	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-03	12/21/2000	ND	ND	ND	ND	ND	ND	ND
AMW-03	3/28/2001	Warehouse not accessible due to earthquake damage.						
AMW-03	6/13/2001	ND	ND	ND *	ND *	ND	**0.051**	ND
AMW-03	10/4/2001	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-03	12/12/2001	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-03	6/12/2002	ND	ND	ND	ND	ND	ND	ND
AMW-03	9/19/2002	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-03	12/17/2002	ND	ND	ND	ND	ND	ND	ND
AMW-03	6/16/2004	ND	ND	ND	ND	ND	ND	ND
AMW-03	9/28/2004	ND	ND	ND	ND	ND	ND	ND
AMW-03	1/20/2005	ND	ND	ND	ND	ND	ND	ND
AMW-03	3/10/2005	U	ND	0.142	U	U	ND	ND
AMW-03	6/21/2005	ND	ND	ND	ND	ND	ND	ND
AMW-03	9/27/2005	ND	ND	ND	ND	ND	ND	ND
AMW-03	12/13/2005	ND	ND	ND	ND	ND	ND	ND
AMW-03	3/21/2006	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-03	7/6/2006	ND	ND	ND	ND	ND	ND	ND
AMW-03	9/18/2006	ND	ND	ND	ND	ND	ND	ND
AMW-03	12/12/2006	**0.0835J**	NDUJ	0.157J	**0.0387J**	**0.0784J**	**0.116J**	**0.125J**
AMW-03	3/21/2007	**0.0714**	**0.0689**	**0.0583**	**0.0773**	**0.0851**	**0.0823**	**0.0752**
AMW-03	6/6/2007	ND	ND	ND	ND	ND	ND	ND
AMW-03	9/12/2007	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-03	12/18/2007	ND	ND	ND	ND	ND	ND	ND
AMW-03	3/25/2008	ND	ND	ND	ND	ND	ND	ND
AMW-03	6/25/2008	cPAH Sampling Reduced to an Annual Event						
Cleanup Level		0.031	0.031	0.031	0.031	0.031	0.031	0.031

Table 7. Groundwater Monitoring Analytical Results for cPAHs
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	Benz(a)anthracene (µg/L)	Benzo(a)pyrene (µg/L)	Benzo(b)fluoranthene (µg/L)	Benzo(k)fluoranthene (µg/L)	Chrysene (µg/L)	Dibenz(a,h)anthracene (µg/L)	Indeno(1,2,3,-cd)pyrene (µg/L)
Plant 1, continued								
AMW-03	12/16/2008	ND	ND	ND	ND	ND	ND	ND
AMW-03	12/16/2009	ND	ND	ND	ND	ND	ND	ND
AMW-03	12/14/2010	ND	ND	ND	ND	ND	ND	ND
AMW-03	12/21/2011	0.017	0.028	**0.051**	0.017	0.030	ND	0.030
AMW-03	12/19/2012	ND	ND	ND	ND	ND	ND	ND
AMW-03	12/10/2013	ND	ND	ND	0.019	0.016	ND	ND
AMW-03	12/9/2014	ND	ND	0.024	ND	0.027	ND	ND
AMW-03	12/15/2015	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-04	12/21/2000	ND	ND	ND	ND	ND	ND	ND
AMW-04	3/28/2001	**0.0497**	**0.0762 J**	**0.04325 * J**	**0.04325 * J**	**0.0451 J**	ND UJ	ND UJ
AMW-04	6/13/2001	ND	ND	ND *	ND *	ND	**0.054**	ND
AMW-04	10/4/2001	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-04	12/12/2001	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-04	3/7/2002	0.0264	ND	0.0276	ND	**0.0350**	ND	ND
AMW-04	6/12/2002	ND	ND	ND	ND	ND	ND	ND
AMW-04	9/19/2002	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-04	12/17/2002	**0.0396 J**	ND	ND	ND	ND	ND	ND
AMW-04	6/16/2004	ND	ND	ND	ND	ND	ND	ND
AMW-04	9/27/2004	**0.0338**	ND	0.0116	0.0152	**0.0343**	ND	ND
AMW-04	12/6/2004	ND	ND	ND	ND	ND	ND	ND
AMW-04	3/10/2005	ND	ND	ND	ND	ND	ND	ND
AMW-04	6/21/2005	ND R	ND R	ND R	ND R	ND R	ND R	ND R
AMW-04	9/27/2005	ND	ND	ND	ND	ND	ND	ND
AMW-04	12/13/2005	ND	ND	ND	ND	ND	ND	ND
AMW-04	3/21/2006	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-04	7/6/2006	ND	ND	ND	ND	ND	ND	ND
AMW-04	9/18/2006	ND	ND	ND	ND	ND	ND	ND
AMW-04	12/12/2006	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-04	3/21/2007	ND	ND	ND	ND	ND	ND	ND
AMW-04	6/6/2007	ND	ND	ND	ND	ND	ND	ND
AMW-04	9/12/2007	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-04	12/18/2007	ND	ND	ND	ND	ND	ND	ND
AMW-04	3/26/2008	ND	ND	ND	ND	ND	ND	ND
AMW-04	6/25/2008			cPAH Sampling Reduced to an Annual Event				
AMW-04	12/16/2008	ND	ND	ND	ND	ND	ND	ND
AMW-04	12/16/2009	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-04	12/14/2010	**0.031 J**	0.23 J	**0.034 J**	**0.044 J**	**0.043 J**	**0.085 J**	**0.076 J**
AMW-04	12/21/2011	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-04	12/19/2012	ND	ND	ND	ND	ND	ND	ND
AMW-04	12/10/2013	ND	ND	ND	ND	ND	ND	ND
AMW-04	12/9/2014	ND	ND	ND	ND	ND	ND	ND
AMW-04	12/15/2015	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-05	12/21/2000	ND	ND	ND	ND	ND	ND	ND
AMW-05	3/28/2001	0.0280 J	**0.0750 J**	**0.0431 * J**	**0.0431 * J**	0.0301 J	ND UJ	ND UJ
Cleanup Level		0.031	0.031	0.031	0.031	0.031	0.031	0.031

Table 7. Groundwater Monitoring Analytical Results for cPAHs
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	Benz(a)anthracene (µg/L)	Benzo(a)pyrene (µg/L)	Benzo(b)fluoranthene (µg/L)	Benzo(k)fluoranthene (µg/L)	Chrysene (µg/L)	Dibenz(a,h)anthracene (µg/L)	Indeno(1,2,3,-cd)pyrene (µg/L)
Plant 1, continued								
AMW-05	6/13/2001	ND UJ	ND UJ	ND UJ *	ND UJ *	ND UJ	ND UJ	ND UJ
AMW-05	10/4/2001	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-05	12/12/2001	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-05	3/7/2002	ND	ND	ND	ND	ND	ND	ND
AMW-05	6/12/2002	ND	ND	ND	ND	ND	ND	ND
AMW-05	9/19/2002	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-05	12/17/2002	ND	ND	ND	ND	ND	ND	ND
AMW-05	6/16/2004	ND	ND	ND	ND	ND	ND	ND
AMW-05	6/16/2004	ND	ND	ND	ND	ND	ND	ND
AMW-05	12/6/2004	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-05	3/10/2005	ND	ND	ND	ND	ND	ND	ND
AMW-05	6/21/2005	0.0132	ND	0.0189	0.0185	0.0178	ND	0.0142
AMW-05	9/27/2005	ND	ND	ND	ND	ND	ND	ND
AMW-05	12/13/2005	ND	ND	ND	ND	ND	ND	ND
AMW-05	3/21/2006	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-05	7/6/2006	ND	ND	ND	ND	ND	ND	ND
AMW-05	9/18/2006	ND	ND	ND	ND	**0.0832 J**	ND	ND
AMW-05	12/12/2006	**0.0771J**	**NDUJ**	**0.157J**	**0.0397J**	**0.0768J**	**0.121J**	**0.129J**
AMW-05	3/21/2007	**0.0499**	**0.0534**	**0.0551**	**0.51**	**0.0562**	**0.051**	**0.0633**
AMW-05	6/6/2007	ND	ND	ND	ND	ND	ND	ND
AMW-05	9/12/2007	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-05	12/18/2007	ND	ND	ND	ND	ND	ND	ND
AMW-05	3/26/2008	0.0159	ND	ND	ND	0.0116	ND	ND
AMW-05	6/25/2008	cPAH Sampling Reduced to an Annual Event						
AMW-05	12/16/2008	ND	ND	ND	ND	ND	ND	ND
AMW-05	12/16/2009	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
AMW-05	12/14/2010	0.019 J	0.018 J	0.021 J	0.020 J	0.025 J	ND UJ	ND UJ
AMW-05	12/21/2011	ND	ND	0.018	ND	ND	ND	ND
AMW-05	12/19/2012	ND	ND	ND	ND	ND	ND	ND
AMW-05	12/10/2013	**0.037**	**0.031**	**0.053**	ND	**0.051**	ND	0.030
AMW-05	12/9/2014	ND	ND	ND	ND	ND	ND	ND
AMW-05	12/15/2015	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ	ND UJ
Plant 2								
GM-19S	4/10/1997	ND	ND	ND	ND	ND	ND	ND
GM-19S	7/9/1997	ND	ND	ND	ND	ND	ND	ND
GM-19S	10/22/1997	ND	ND	ND	ND	ND	ND	ND
GM-19S	1/22/1998	ND	ND	ND	ND	ND	ND	ND
GM-19S	WELL DELETED FROM cPAH MONITORING PROGRAM							
GM-19D	4/10/1997	ND	ND	ND	ND	ND	ND	ND
GM-19D	7/9/1997	ND	ND	ND	ND	ND	ND	ND
GM-19D	10/22/1997	ND	ND	ND	ND	ND	ND	ND
GM-19D	1/22/1998	ND	ND	ND	ND	ND	ND	ND
GM-19D	WELL DELETED FROM cPAH MONITORING PROGRAM							
Cleanup Level		0.031	0.031	0.031	0.031	0.031	0.031	0.031

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BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	Benz(a)anthracene (µg/L)	Benzo(a)pyrene (µg/L)	Benzo(b)fluoranthene (µg/L)	Benzo(k)fluoranthene (µg/L)	Chrysene (µg/L)	Dibenz(a,h)anthracene (µg/L)	Indeno(1,2,3,-cd)pyrene (µg/L)
Plant 2, continued								
GM-21S	4/10/1997	ND	ND	ND	ND	ND	ND	ND
GM-21S	7/9/1997	ND	ND	ND	ND	ND	ND	ND
GM-21S	10/23/1997	ND	ND	ND	ND	ND	ND	ND
GM-21S	1/23/1998	ND	ND	ND	ND	ND	ND	ND
GM-21S				WELL DELETED FROM cPAH MONITORING PROGRAM				
GM-21D	4/10/1997	ND	ND	ND	ND	ND	ND	ND
GM-21D	7/9/1997	0.01 J	0.01 J	0.02 J	0.02 J	0.02 UJ	ND	0.01 J
GM-21D	10/23/1997	ND	ND	ND	ND	ND	ND	ND
GM-21D	1/23/1998	ND	ND	ND	ND	ND	ND	ND
GM-21D				WELL DELETED FROM cPAH MONITORING PROGRAM				
GM-23S	7/9/1997	ND	ND	ND	ND	ND	ND	ND
GM-23S	10/22/1997	ND	ND	ND	ND	ND	ND	ND
GM-23S				WELL DELETED FROM cPAH MONITORING PROGRAM				
Cleanup Level		0.031	0.031	0.031	0.031	0.031	0.031	0.031

Note: Values in **bold** exceed the cleanup level.

cPAHs Carcinogenic polynuclear aromatic hydrocarbons.
J Estimated value.
µg/L Micrograms per liter.
NA Not analyzed.
ND Constituent not detected above reporting limit.
R Rejected; the presence or absence of the constituent cannot be verified.
U Undetected.

Table 8. Monthly Groundwater LNAPL and Sheen Monitoring
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	Free Product
Plant 1		
GM-11S	9/29/1999	**~0.29 foot**
GM-11S	10/19/1999	**~0.59 foot**
GM-11S	11/19/1999	**~0.51 foot**
GM-11S	12/28/1999	**~0.10 foot**
GM-11S	1/21/2000	**~0.01 foot**
GM-11S	2/16/2000	**~0.01 foot**
GM-11S	3/27/2000	**~0.01 foot**
GM-11S	4/14/2000	**~0.01 foot**
GM-11S	5/15/2000	**~0.34 foot**
GM-11S	6/26/2000	**~0.07 foot**
GM-11S	7/19/2000	None
GM-11S	8/15/2000	None
GM-11S	9/29/2000	**Sheen**
GM-11S	10/12/2000	None
GM-11S	11/14/2000	**~0.03 foot**
GM-11S	12/14/2000	None
GM-11S	1/11/2001	**~0.01 foot**
GM-11S	2/15/2001	None
GM-11S	3/15/2001	None
GM-11S	4/13/2001	None
GM-11S	5/16/2001	**~0.13 foot**
GM-11S	6/11/2001	None
GM-11S	7/24/2001	None
GM-11S	8/21/2001	None
GM-11S	9/6/2001	**Sheen**
GM-11S	10/19/2001	None
GM-11S	11/15/2001	**Sheen**
GM-11S	12/10/2001	**Sheen**
GM-11S	1/16/2002	**Sheen**
GM-11S	2/21/2002	**Sheen**
GM-11S	3/18/2002	**Sheen**
GM-11S	4/18/2002	**Sheen**
GM-11S	5/20/2002	**Sheen**
GM-11S	6/19/2002	**Sheen**
GM-11S	7/15/2002	**Sheen**
GM-11S	8/20/2002	**Sheen**
GM-11S	9/20/2002	**Sheen**
GM-11S	10/15/2002	**Sheen**
GM-11S	11/27/2002	**Sheen**
GM-11S	12/18/2002	**Sheen**
GM-11S	1/16/2003	**Sheen**
GM-11S	2/11/2003	**Sheen**
GM-11S	3/11/2003	**Sheen**
GM-11S	4/15/2003	**Sheen**
GM-11S	5/15/2003	**Sheen**
GM-11S	6/17/2003	**Sheen**
GM-11S	7/15/2003	**Sheen**
GM-11S	8/13/2003	**Sheen**
GM-11S	9/16/2003	**Sheen**
GM-11S	10/14/2003	**Sheen**
GM-11S	11/19/2003	**Sheen**
GM-11S	12/17/2003	**Sheen**
GM-11S	1/13/2004	**Sheen**
GM-11S	2/10/2004	**Sheen**
Cleanup Level		No Sheen

Table 8. Monthly Groundwater LNAPL and Sheen Monitoring
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	Free Product
Plant 1, continued		
GM-11S	3/17/2004	**Sheen**
GM-11S	4/15/2004	**Sheen**
GM-11S	5/25/2004	**Sheen**
GM-11S	6/13/2004	**Sheen**
GM-11S	7/13/2004	**Sheen**
GM-11S	8/12/2004	**Sheen**
GM-11S	9/16/2004	**Sheen**
GM-11S	10/13/2004	**Sheen**
GM-11S	11/18/2004	**Sheen**
GM-11S	12/16/2004	**Sheen**
GM-11S	1/13/2005	**Sheen**
GM-11S	2/15/2005	**Sheen**
GM-11S	3/15/2005	**Sheen**
GM-11S	4/15/2005	**Sheen**
GM-11S	5/20/2005	**Sheen**
GM-11S	6/10/2005	**Sheen**
GM-11S	7/15/2005	**Sheen**
GM-11S	8/12/2005	**Sheen**
GM-11S	9/14/2005	**Sheen**
GM-11S	10/14/2005	**Sheen**
GM-11S	11/23/2005	**Sheen**
GM-11S	12/19/2005	**Sheen**
GM-11S	1/25/2006	**Sheen**
GM-11S	2/14/2006	**Sheen**
GM-11S	3/15/2006	**Sheen**
GM-11S	4/14/2006	**Sheen**
GM-11S	5/17/2006	**Sheen**
GM-11S	6/14/2006	**Sheen**
GM-11S	7/12/2006	**Sheen**
GM-11S	8/16/2006	**Sheen**
GM-11S	9/13/2006	**Sheen**
GM-11S	10/12/2006	**Sheen**
GM-11S	11/17/2006	**Sheen**
GM-11S	12/19/2006	**Sheen**
GM-11S	1/19/2007	**Sheen**
GM-11S	2/16/2007	**Sheen**
GM-11S	3/19/2007	**Sheen**
GM-11S	4/19/2007	**Sheen**
GM-11S	5/17/2007	**Sheen**
GM-11S	6/14/2007	**Sheen**
GM-11S	7/13/2007	**Sheen**
GM-11S	8/16/2007	**Sheen**
GM-11S	9/10/2007	**Sheen**
GM-11S	10/17/2007	**Sheen**
GM-11S	11/16/2007	**Sheen**
GM-11S	12/14/2007	**Sheen**
GM-11S	1/22/2008	**Sheen**
GM-11S	2/14/2008	**Sheen**
GM-11S	3/14/2008	**Sheen**
GM-11S	4/18/2008	**Sheen**
GM-11S	5/16/2008	**Sheen**
GM-11S	6/18/2008	**Sheen**
GM-11S	7/16/2008	**Sheen**
GM-11S	8/18/2008	**Sheen**
Cleanup Level		No Sheen

Table 8. Monthly Groundwater LNAPL and Sheen Monitoring
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	Free Product
Plant 1, continued		
GM-11S	9/16/2008	**Sheen**
GM-11S	10/15/2008	**Sheen**
GM-11S	11/14/2008	**Sheen**
GM-11S	12/11/2008	**Sheen**
GM-11S	1/14/2009	**Sheen**
GM-11S	2/18/2009	**Sheen**
GM-11S	3/17/2009	**Sheen**
GM-11S	4/16/2009	None
GM-11S	5/14/2009	None
GM-11S	6/16/2009	None
GM-11S	7/22/2009	**Sheen**
GM-11S	8/18/2009	**Sheen**
GM-11S	9/14/2009	**Sheen**
GM-11S	10/20/2009	**Sheen**
GM-11S	11/18/2009	None
GM-11S	12/15/2009	None
GM-11S	1/21/2010	**Sheen**
GM-11S	2/17/2010	**Sheen**
GM-11S	3/16/2010	**Sheen**
GM-11S	4/15/2010	None
GM-11S	5/18/2010	**Sheen**
GM-11S	6/17/2010	**Sheen**
GM-11S	7/29/2010	**Sheen**
GM-11S	8/19/2010	**Sheen**
GM-11S	9/22/2010	**Sheen**
GM-11S	10/20/2010	**Sheen**
GM-11S	11/30/2010	**Sheen**
GM-11S	12/23/2010	**Sheen**
GM-11S	1/19/2011	**Sheen**
GM-11S	2/16/2011	**Sheen**
GM-11S	3/29/2011	**Sheen**
GM-11S	4/21/2011	**Sheen**
GM-11S	5/19/2011	**Sheen**
GM-11S	6/15/2011	**Sheen**
GM-11S	7/20/2011	None
GM-11S	8/17/2011	None
GM-11S	9/14/2011	None
GM-11S	10/12/2011	None
GM-11S	11/23/2011	None
GM-11S	12/14/2011	None
GM-11S	1/24/2012	None
GM-11S	2/15/2012	None
GM-11S	3/16/2012	None
GM-11S	4/18/2012	None
GM-11S	5/16/2012	None
GM-11S	6/13/2012	None
GM-11S	7/20/2012	None
GM-11S	9/6/2012	None
GM-11S	10/24/2012	None
GM-11S	11/28/2012	None
GM-11S	12/18/2012	None
GM-11S	1/23/2013	**Sheen**
GM-11S	2/21/2013	**Sheen**
GM-11S	8/15/2012	None
Cleanup Level		No Sheen

Table 8. Monthly Groundwater LNAPL and Sheen Monitoring
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	Free Product
Plant 1, continued		
GM-11S	3/13/2013	None
GM-11S	4/17/2013	None
GM-11S	5/22/2013	None
GM-11S	6/12/2013	None
GM-11S	7/24/2013	**Sheen**
GM-11S	8/21/2013	None
GM-11S	9/25/2013	**Sheen**
GM-11S	10/15/2013	None
GM-11S	11/20/2013	None
GM-11S	12/18/2013	None
GM-11S	1/15/2014	None
GM-11S	2/12/2014	None
GM-11S	3/20/2014	None
GM-11S	4/16/2014	None
GM-11S	5/21/2014	None
GM-11S	6/18/2014	None
GM-11S	7/25/2014	None
GM-11S	8/13/2014	None
GM-11S	9/17/2014	None
GM-11S	10/15/2014	None
GM-11S	11/18/2014	None
GM-11S	12/17/2014	None
GM-11S	1/14/2015	None
GM-11S	2/11/2015	None
GM-11S	3/18/2015	None
GM-11S	4/15/2015	None
GM-11S	5/14/2015	None
GM-11S	6/17/2015	None
GM-11S	7/15/2015	None
GM-11S	8/12/2015	None
GM-11S	9/16/2015	None
GM-11S	10/14/2015	None
GM-11S	11/18/2015	None
GM-11S	12/10/2015	None
GM-11S	1/13/2016	None
GM-11S	2/10/2016	None
GM-12S	4/14/2000	None
GM-12S	5/15/2000	NM
GM-12S	6/15/2000	NM
GM-12S	7/19/2000	NM
GM-12S	8/15/2000	NM
GM-12S	9/29/2000	None
GM-12S	10/12/2000	None
GM-12S	11/14/2000	None
GM-12S	12/14/2000	None
GM-12S	1/11/2001	None
GM-12S	2/15/2001	None
GM-12S	3/15/2001	None
GM-12S	4/13/2001	None
GM-12S	5/16/2001	None
GM-12S	6/11/2001	None
GM-12S	7/24/2001	None
GM-12S	8/21/2001	None
GM-12S	9/6/2001	None
Cleanup Level		No Sheen

Table 8. Monthly Groundwater LNAPL and Sheen Monitoring
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	Free Product
Plant 1, continued		
GM-12S	10/19/2001	None
GM-12S	11/15/2001	None
GM-12S	12/10/2001	None
GM-12S	1/16/2002	NM
GM-12S	2/21/2002	None
GM-12S	3/18/2002	None
GM-12S	4/18/2002	None
GM-12S	5/20/2002	None
GM-12S	6/19/2002	None
GM-12S	7/15/2002	None
GM-12S	8/20/2002	None
GM-12S	9/20/2002	None
GM-12S	10/15/2002	None
GM-12S	11/27/2002	None
GM-12S	12/18/2002	None
GM-12S	1/16/2003	None
GM-12S	2/11/2003	None
GM-12S	3/11/2003	None
GM-12S	4/15/2003	None
GM-12S	5/15/2003	None
GM-12S	6/17/2003	None
GM-12S	7/15/2003	None
GM-12S	8/13/2003	None
GM-12S	9/16/2003	None
GM-12S	10/14/2003	None
GM-12S	11/19/2003	None
GM-12S	12/17/2003	None
GM-12S	1/13/2004	None
GM-12S	2/10/2004	None
GM-12S	3/17/2004	None
GM-12S	4/15/2004	None
GM-12S	5/25/2004	None
GM-12S	6/13/2004	None
GM-12S	7/13/2004	None
GM-12S	8/12/2004	None
GM-12S	9/16/2004	None
GM-12S	10/13/2004	None
GM-12S	11/18/2004	None
GM-12S	12/16/2004	None
GM-12S	1/13/2005	None
GM-12S	2/15/2005	None
GM-12S	3/15/2005	None
GM-12S	4/15/2005	None
GM-12S	5/20/2005	None
GM-12S	6/10/2005	None
GM-12S	7/15/2005	None
GM-12S	8/12/2005	None
GM-12S	9/14/2005	None
GM-12S	10/14/2005	None
GM-12S	11/23/2005	None
GM-12S	12/19/2005	None
GM-12S	1/25/2006	None
GM-12S	2/14/2006	None
GM-12S	3/15/2006	None
GM-12S	4/14/2006	None
Cleanup Level		No Sheen

Table 8. Monthly Groundwater LNAPL and Sheen Monitoring
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	Free Product
Plant 1, continued		
GM-12S	5/17/2006	None
GM-12S	6/14/2006	None
GM-12S	7/12/2006	None
GM-12S	8/16/2006	None
GM-12S	9/13/2006	None
GM-12S	10/12/2006	None
GM-12S	11/17/2006	None
GM-12S	12/19/2006	None
GM-12S	1/19/2007	None
GM-12S	2/16/2007	None
GM-12S	3/19/2007	None
GM-12S	4/19/2007	None
GM-12S	5/17/2007	None
GM-12S	6/14/2007	None
GM-12S	7/13/2007	None
GM-12S	8/16/2007	None
GM-12S	9/10/2007	None
GM-12S	10/17/2007	None
GM-12S	11/16/2007	None
GM-12S	12/14/2007	None
GM-12S	1/22/2008	None
GM-12S	2/14/2008	None
GM-12S	3/14/2008	None
GM-12S	4/18/2008	None
GM-12S	5/16/2008	None
GM-12S	6/18/2008	None
GM-12S	7/16/2008	None
GM-12S	8/18/2008	None
GM-12S	9/16/2008	None
GM-12S	10/15/2008	None
GM-12S	11/14/2008	None
GM-12S	12/11/2008	None
GM-12S	1/14/2009	None
GM-12S	2/18/2009	None
GM-12S	3/17/2009	None
GM-12S	4/16/2009	None
GM-12S	5/14/2009	None
GM-12S	6/16/2009	None
GM-12S	7/22/2009	None
GM-12S	8/18/2009	None
GM-12S	9/14/2009	None
GM-12S	10/20/2009	None
GM-12S	11/18/2009	None
GM-12S	12/15/2009	None
GM-12S	1/21/2010	None
GM-12S	2/17/2010	None
GM-12S	3/16/2010	None
GM-12S	4/15/2010	None
GM-12S	5/18/2010	None
GM-12S	6/17/2010	None
GM-12S	7/29/2010	None
GM-12S	8/19/2010	None
GM-12S	9/22/2010	None
GM-12S	10/20/2010	None
GM-12S	11/30/2010	None
Cleanup Level		No Sheen

Table 8. Monthly Groundwater LNAPL and Sheen Monitoring
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	Free Product
Plant 1, continued		
GM-12S	12/23/2010	None
GM-12S	1/19/2011	None
GM-12S	2/16/2011	None
GM-12S	3/29/2011	None
GM-12S	4/21/2011	None
GM-12S	5/19/2011	None
GM-12S	6/15/2011	None
GM-12S	7/20/2011	None
GM-12S	8/17/2011	None
GM-12S	9/14/2011	None
GM-12S	10/12/2011	None
GM-12S	11/23/2011	None
GM-12S	12/14/2011	None
GM-12S	1/24/2012	None
GM-12S	2/15/2012	None
GM-12S	3/16/2012	None
GM-12S	4/18/2012	None
GM-12S	5/16/2012	None
GM-12S	6/13/2012	None
GM-12S	7/20/2012	None
GM-12S	8/15/2012	None
GM-12S	9/6/2012	None
GM-12S	10/24/2012	None
GM-12S	11/28/2012	None
GM-12S	12/18/2012	None
GM-12S	1/23/2012	None
GM-12S	2/21/2013	None
GM-12S	3/13/2013	None
GM-12S	4/17/2013	None
GM-12S	5/22/2013	None
GM-12S	6/12/2013	None
GM-12S	7/24/2013	None
GM-12S	8/21/2013	None
GM-12S	9/25/2013	None
GM-12S	10/15/2013	None
GM-12S	11/20/2013	None
GM-12S	12/18/2013	None
GM-12S	1/15/2014	None
GM-12S	2/12/2014	None
GM-12S	3/20/2014	None
GM-12S	4/16/2014	None
GM-12S	5/21/2014	None
GM-12S	6/18/2014	None
GM-12S	7/25/2014	None
GM-12S	8/13/2014	None
GM-12S	9/17/2014	None
GM-12S	10/15/2014	None
GM-12S	11/18/2014	None
GM-12S	12/17/2014	None
GM-12S	1/14/2015	None
GM-12S	2/11/2015	None
GM-12S	3/18/2015	None
GM-12S	4/15/2015	None
GM-12S	5/14/2015	None
GM-12S	6/17/2015	None
Cleanup Level		No Sheen

Well	Date	Free Product
Plant 1, continued		
GM-12S	7/15/2015	None
GM-12S	8/12/2015	None
GM-12S	9/16/2015	None
GM-12S	10/14/2015	None
GM-12S	11/18/2015	None
GM-12S	12/10/2015	None
GM-12S	1/13/2016	None
GM-12S	2/10/2016	None
GM-13S	7/6/1998	**Yes***
GM-13S	10/20/1998	**~0.08 foot**
GM-13S	11/18/1998	**~0.08 foot**
GM-13S	12/15/1998	**~0.01 foot**
GM-13S	2/17/1999	**~0.08 foot**
GM-13S	3/15/1999	**~0.34 foot**
GM-13S	4/14/1999	**~0.20 foot**
GM-13S	5/13/1999	**~0.44 foot**
GM-13S	6/15/1999	**~0.35 foot**
GM-13S	7/15/1999	**~0.31 foot**
GM-13S	8/17/1999	**~0.19 foot**
GM-13S	9/16/1999	**~0.09 foot**
GM-13S	10/19/1999	**~0.10 foot**
GM-13S	11/19/1999	**~0.11 foot**
GM-13S	12/28/1999	**~0.12 foot**
GM-13S	1/21/2000	**~0.11 foot**
GM-13S	2/16/2000	
GM-13S	3/21/2000	**~0.11 foot**
GM-13S	4/14/2000	**~0.13 foot**
GM-13S	5/15/2000	**~0.10 foot**
GM-13S	6/16/2000	**Sheen**
GM-13S	7/19/2000	**Sheen**
GM-13S	8/15/2000	**Sheen**
GM-13S	9/29/2000	None
GM-13S	10/12/2000	**Sheen**
GM-13S	11/14/2000	**~0.01 foot**
GM-13S	12/14/2000	NM
GM-13S	1/11/2001	NM
GM-13S	2/15/2001	NM
GM-13S	3/15/2001	NM
GM-13S	4/13/2001	NM
GM-13S	5/16/2001	None
GM-13S	6/11/2001	None
GM-13S	7/24/2001	None
GM-13S	8/21/2001	None
GM-13S	9/6/2001	**Sheen**
GM-13S	10/19/2001	None
GM-13S	11/15/2001	None
GM-13S	12/10/2001	**Sheen**
GM-13S	1/16/2002	**Sheen**
GM-13S	2/21/2002	NM
GM-13S	3/18/2002	None
GM-13S	4/18/2002	None
GM-13S	5/20/2002	None
GM-13S	6/19/2002	None
GM-13S	7/15/2002	None
Cleanup Level		No Sheen

Table 8. Monthly Groundwater LNAPL and Sheen Monitoring
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	Free Product
Plant 1, continued		
GM-13S	8/20/2002	None
GM-13S	9/20/2002	None
GM-13S	10/15/2002	None
GM-13S	11/27/2002	None
GM-13S	12/18/2002	None
GM-13S	1/16/2003	None
GM-13S	2/11/2003	None
GM-13S	3/11/2003	**Sheen**
GM-13S	4/15/2003	**Sheen**
GM-13S	5/15/2003	**Sheen**
GM-13S	6/17/2003	None
GM-13S	7/15/2003	None
GM-13S	8/13/2003	None
GM-13S	9/16/2003	None
GM-13S	10/14/2003	None
GM-13S	11/19/2003	None
GM-13S	12/17/2003	None
GM-13S	1/13/2004	None
GM-13S	2/10/2004	None
GM-13S	3/17/2004	None
GM-13S	4/15/2004	None
GM-13S	5/25/2004	**Sheen**
GM-13S	6/13/2004	**Sheen**
GM-13S	7/13/2004	**Sheen**
GM-13S	8/12/2004	None
GM-13S	9/16/2004	None
GM-13S	10/13/2004	None
GM-13S	11/18/2004	None
GM-13S	12/16/2004	None
GM-13S	1/13/2005	None
GM-13S	2/15/2005	None
GM-13S	3/15/2005	None
GM-13S	4/15/2005	None
GM-13S	5/20/2005	None
GM-13S	6/10/2005	None
GM-13S	7/15/2005	None
GM-13S	8/12/2005	None
GM-13S	9/14/2005	None
GM-13S	10/14/2005	None
GM-13S	11/23/2005	None
GM-13S	12/19/2005	None
GM-13S	1/25/2006	None
GM-13S	2/14/2006	None
GM-13S	3/15/2006	None
GM-13S	4/14/2006	None
GM-13S	5/17/2006	None
GM-13S	6/14/2006	None
GM-13S	7/12/2006	None
GM-13S	8/16/2006	**Sheen**
GM-13S	9/13/2006	**Sheen**
GM-13S	10/12/2006	None
GM-13S	11/17/2006	None
GM-13S	12/19/2006	None
GM-13S	1/19/2007	None
GM-13S	2/16/2007	None
Cleanup Level		No Sheen

Table 8. Monthly Groundwater LNAPL and Sheen Monitoring
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	Free Product
Plant 1, continued		
GM-13S	3/19/2007	**Sheen**
GM-13S	4/19/2007	None
GM-13S	5/17/2007	None
GM-13S	6/14/2007	None
GM-13S	7/13/2007	None
GM-13S	8/16/2007	None
GM-13S	9/10/2007	None
GM-13S	10/17/2007	None
GM-13S	11/16/2007	None
GM-13S	12/14/2007	None
GM-13S	1/22/2008	None
GM-13S	2/14/2008	None
GM-13S	3/14/2008	None
GM-13S	4/18/2008	None
GM-13S	5/16/2008	None
GM-13S	6/18/2008	None
GM-13S	7/16/2008	None
GM-13S	8/18/2008	None
GM-13S	9/16/2008	None
GM-13S	10/15/2008	None
GM-13S	11/14/2008	None
GM-13S	12/11/2008	None
GM-13S	1/14/2009	None
GM-13S	2/18/2009	None
GM-13S	3/17/2009	None
GM-13S	4/16/2009	None
GM-13S	5/14/2009	None
GM-13S	6/16/2009	None
GM-13S	7/22/2009	None
GM-13S	8/18/2009	None
GM-13S	9/14/2009	None
GM-13S	10/20/2009	None
GM-13S	11/18/2009	None
GM-13S	12/15/2009	None
GM-13S	1/21/2010	None
GM-13S	2/17/2010	**Sheen**
GM-13S	3/16/2010	**Film**
GM-13S	4/15/2010	**Film**
GM-13S	5/18/2010	**Film**
GM-13S	6/17/2010	**Film**
GM-13S	7/29/2010	**Sheen**
GM-13S	8/19/2010	None
GM-13S	9/22/2010	**Film**
GM-13S	10/20/2010	None
GM-13S	11/30/2010	None
GM-13S	12/23/2010	None
GM-13S	1/19/2011	None
GM-13S	2/16/2011	None
GM-13S	3/29/2011	**Film**
GM-13S	4/21/2011	**~0.01 foot**
GM-13S	5/19/2011	**Film**
GM-13S	6/15/2011	None
GM-13S	7/20/2011	**Film**
GM-13S	8/17/2011	None
GM-13S	9/14/2011	None
Cleanup Level		No Sheen

Table 8. Monthly Groundwater LNAPL and Sheen Monitoring
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	Free Product
Plant 1, continued		
GM-13S	10/12/2011	None
GM-13S	11/23/2011	None
GM-13S	12/14/2011	None
GM-13S	1/24/2012	None
GM-13S	2/15/2012	None
GM-13S	3/16/2012	None
GM-13S	4/18/2012	None
GM-13S	5/16/2012	None
GM-13S	6/13/2012	None
GM-13S	7/20/2012	**Film**
GM-13S	8/15/2012	**Film**
GM-13S	9/6/2012	**Film**
GM-13S	10/24/2012	**Film**
GM-13S	11/28/2012	**Film**
GM-13S	12/18/2012	None
GM-13S	1/23/2013	None
GM-13S	2/21/2013	None
GM-13S	3/13/2013	None
GM-13S	4/17/2013	None
GM-13S	5/22/2013	None
GM-13S	6/13/2013	None
GM-13S	7/24/2013	None
GM-13S	8/21/2013	None
GM-13S	9/25/213	None
GM-13S	10/15/2013	None
GM-13S	11/20/2013	None
GM-13S	12/18/2013	None
GM-13S	1/15/2014	None
GM-13S	2/12/2014	None
GM-13S	3/20/2014	None
GM-13S	4/16/2014	None
GM-13S	5/21/2014	None
GM-13S	6/18/2014	None
GM-13S	7/25/2014	None
GM-13S	8/13/2014	None
GM-13S	9/17/2014	None
GM-13S	10/15/2014	None
GM-13S	11/18/2014	None
GM-13S	12/17/2014	None
GM-13S	1/14/2015	None
GM-13S	2/11/2015	None
GM-13S	3/18/2015	None
GM-13S	4/15/2015	None
GM-13S	5/14/2015	None
GM-13S	6/17/2015	None
GM-13S	7/15/2015	None
GM-13S	8/12/2015	None
GM-13S	9/16/2015	None
GM-13S	10/14/2015	None
GM-13S	11/18/2015	None
GM-13S	12/10/2015	None
GM-13S	1/13/2016	None
GM-13S	2/10/2016	None
GM-14S	4/9/1997	**Sheen**
Cleanup Level		No Sheen

Table 8. Monthly Groundwater LNAPL and Sheen Monitoring
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	Free Product
Plant 1, continued		
GM-14S	7/9/1997	**Sheen**
GM-14S	10/22/1997	**Sheen**
GM-14S	1/22/1998	**Sheen**
GM-14S	3/12/1998	**Sheen**
GM-14S	7/6/1998	**Sheen**
GM-14S	10/20/1998	**Sheen**
GM-14S	12/15/1998	**Sheen**
GM-14S	3/26/1999	**Sheen**
GM-14S	6/28/1999	**Sheen**
GM-14S	9/28/1999	None
GM-14S	8/15/2000	None
GM-14S	9/29/2000	None
GM-14S	10/12/2000	None
GM-14S	11/14/2000	None
GM-14S	12/14/2000	None
GM-14S	1/11/2001	None
GM-14S	2/15/2001	None
GM-14S	3/15/2001	None
GM-14S	4/13/2001	None
GM-14S	5/16/2001	None
GM-14S	6/11/2001	None
GM-14S	7/24/2001	None
GM-14S	8/21/2001	None
GM-14S	9/6/2001	None
GM-14S	10/19/2001	None
GM-14S	11/15/2001	None
GM-14S	12/10/2001	None
GM-14S	1/16/2002	None
GM-14S	2/21/2002	None
GM-14S	3/18/2002	None
GM-14S	4/18/2002	None
GM-14S	5/20/2002	None
GM-14S	6/19/2002	None
GM-14S	7/15/2002	None
GM-14S	8/20/2002	None
GM-14S	9/20/2002	None
GM-14S	10/15/2002	None
GM-14S	11/27/2002	None
GM-14S	12/18/2002	None
GM-14S	1/16/2003	None
GM-14S	2/11/2003	None
GM-14S	3/11/2003	None
GM-14S	4/15/2003	None
GM-14S	5/15/2003	None
GM-14S	6/17/2003	None
GM-14S	7/15/2003	None
GM-14S	8/13/2003	None
GM-14S	9/16/2003	None
GM-14S	10/14/2003	None
GM-14S	11/19/2003	None
GM-14S	12/17/2003	None
GM-14S	1/13/2004	None
GM-14S	2/10/2004	None
GM-14S	3/17/2004	None
GM-14S	4/15/2004	None
Cleanup Level		No Sheen

Table 8. Monthly Groundwater LNAPL and Sheen Monitoring
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	Free Product
Plant 2, continued		
GM-14S	5/25/2004	None
	Deleted from Monitoring	
Plant 2		
MW-03	1/25/1999	NM
MW-03	2/17/1999	None
MW-03	3/15/1999	None
MW-03	4/15/1999	NM
MW-03	5/13/1999	None
MW-03	6/15/1999	NM
MW-03	7/15/1999	NM
MW-03	8/17/1999	**~0.43 foot**
MW-03	9/16/1999	**~0.50 foot**
MW-03	10/19/1999	**~0.42 foot**
MW-03	11/19/1999	**~0.49 foot**
MW-03	12/28/1999	**~0.34 foot**
MW-03	1/21/2000	**~0.02 foot**
MW-03	2/16/2000	**~0.02 foot**
MW-03	3/27/2000	**~0.03 foot**
MW-03	4/14/2000	**~0.04 foot**
	Abandoned	
MW-03R	8/21/2001	None
MW-03R	9/16/2001	NM
MW-03R	10/19/2001	NM
MW-03R	11/15/2001	NM
MW-03R	12/10/2001	NM
MW-03R	1/16/2002	NM
MW-03R	2/21/2002	NM
MW-03R	3/18/2002	None
MW-03R	4/18/2002	None
MW-03R	5/20/2002	None
MW-03R	6/19/2002	None
MW-03R	7/15/2002	None
MW-03R	8/20/2002	None
MW-03R	9/20/2002	None
MW-03R	10/15/2002	None
MW-03R	11/27/2002	None
MW-03R	12/18/2002	NM
MW-03R	1/16/2003	NM
MW-03R	2/11/2003	NM
MW-03R	3/11/2003	NM
MW-03R	3/25/2003	None
MW-03R	4/15/2003	None
MW-03R	5/15/2003	None
MW-03R	6/17/2003	None
MW-03R	7/15/2003	None
MW-03R	8/13/2003	None
MW-03R	9/16/2003	None
MW-03R	10/14/2003	None
MW-03R	11/19/2003	None
MW-03R	12/17/2003	None
MW-03R	1/13/2004	None
MW-03R	2/10/2004	None
MW-03R	3/17/2004	None
Cleanup Level		No Sheen

Table 8. Monthly Groundwater LNAPL and Sheen Monitoring
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	Free Product
Plant 2, continued		
MW-03R	4/15/2004	None
MW-03R	5/25/2004	None
MW-03R	6/13/2004	None
MW-03R	7/13/2004	None
MW-03R	8/12/2004	Deleted from Monitoring
Cleanup Level		No Sheen

Notes: Values in **bold** exceed the cleanup level.

Due to maintenance of a sorbent "sock" placed in GM-13S and MW-03, these measurements do not necessarily reflect actual product thicknesses in the wells.

Active product recovery from GM-11S began in April 2000. Product thickness recorded in GM-11S after that date is not representative of static conditions.

MW-03 was destroyed during Island redevelopment activities and was replaced by MW-03R.

* Free product present, thickness not measured.

~ Approximately.

NM Not measured due to inaccessibility.

Table 9. 2015 Quarterly Performance Monitoring Groundwater Elevations
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	TOC Elevation (ft msl)	Depth to Water (ft below TOC)	Groundwater Elevation (ft msl)
Plant 1				
GM-14S	3/11/2015	8.57	4.16	4.41
GM-14S	6/10/2015		4.87	3.70
GM-14S	9/23/2015		5.12	3.45
GM-14S	12/16/2015		2.76	5.81
GM-15S	3/10/2015	8.92	5.05	3.87
GM-15S	6/9/2015		5.66	3.26
GM-15S	9/22/2015		5.96	2.96
GM-15S	12/15/2015		3.92	5.00
GM-16S	3/11/2015	8.53	4.49	4.04
GM-16S	6/10/2015		5.24	3.29
GM-16S	9/23/2015		5.50	3.03
GM-16S	12/16/2015		3.48	5.05
GM-17S	3/11/2015	9.19	4.31	4.88
GM-17S	6/10/2015		5.26	3.93
GM-17S	9/23/2015		5.72	3.47
GM-17S	12/16/2015		3.38	5.81
GM-24S	3/11/2015	7.62	3.13	4.49
GM-24S	6/10/2015		4.00	3.62
GM-24S	9/23/2015		4.35	3.27
GM-24S	12/16/2015		1.93	5.69
AR-03	3/10/2015	9.35	5.65	3.70
AR-03	6/10/2015		6.32	3.03
AR-03	9/23/2015		6.63	2.72
AR-03	12/16/2015		4.75	4.60
AMW-01	3/10/2015	8.88	4.52	4.36
AMW-01	6/9/2015		7.13	1.75
AMW-01	9/22/2015		8.57	0.31
AMW-01	12/15/2015		3.68	5.20
AMW-02	3/10/2015	12.14	7.87	4.27
AMW-02	6/9/2015		11.90	0.24
AMW-02	9/22/2015		12.60	-0.46
AMW-02	12/15/2015		6.86	5.28
AMW-03	3/10/2015	12.07	7.97	4.10
AMW-03	6/9/2015		11.33	0.74
AMW-03	9/22/2015		13.14	-1.07
AMW-03	12/15/2015		7.01	5.06
AMW-04	3/10/2015	8.00	5.45	2.55
AMW-04	6/9/2015		5.86	2.14
AMW-04	9/22/2015		4.98	3.02
AMW-04	12/15/2015		5.57	2.43

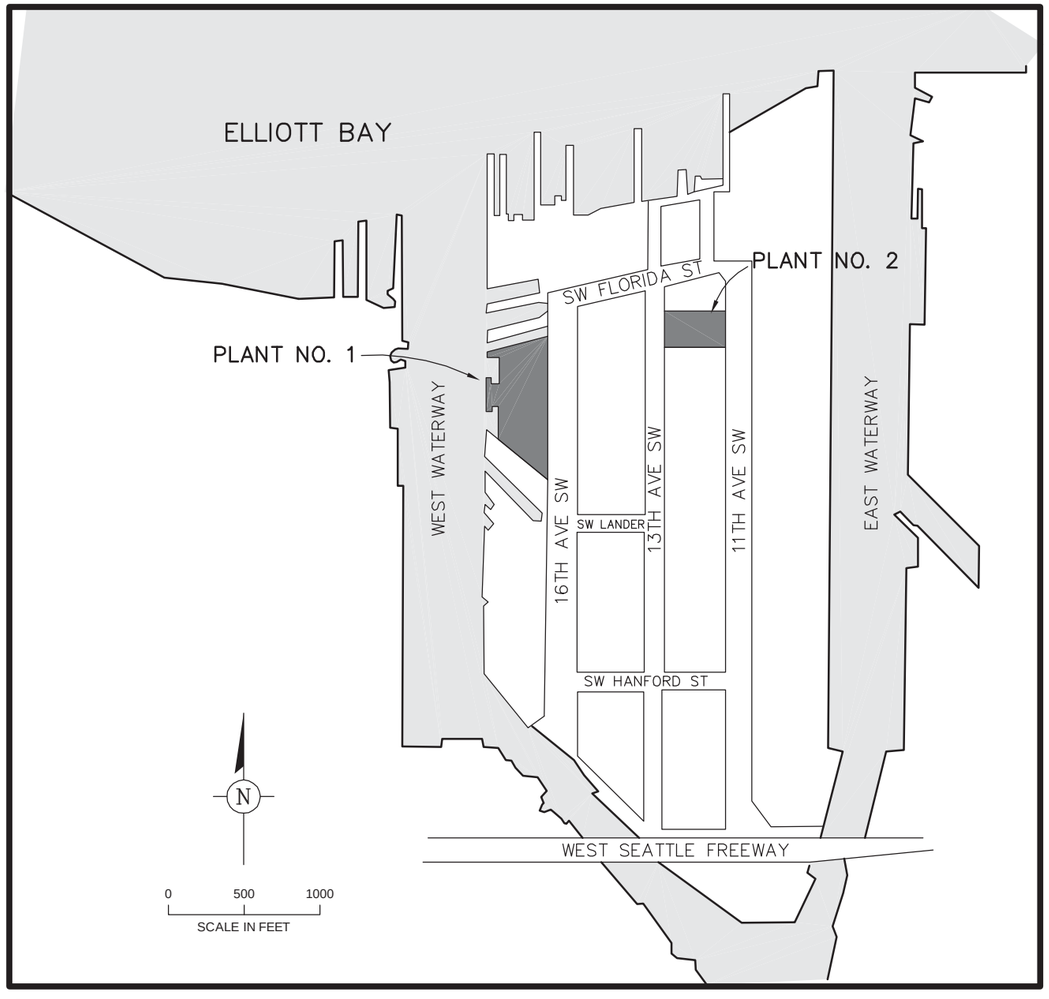
Table 9. 2015 Quarterly Performance Monitoring Groundwater Elevations
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington

Well	Date	TOC Elevation (ft msl)	Depth to Water (ft below TOC)	Groundwater Elevation (ft msl)
Plant 1 Continued				
AMW-05	3/10/2015	8.14	4.71	3.43
AMW-05	6/9/2015		5.54	2.60
AMW-05	9/22/2015		6.22	1.92
AMW-05	12/15/2015		4.03	4.11
GM-13S	3/19/2015	11.90	8.08	3.82
GM-13S	6/17/2015		8.56	3.34
GM-13S	9/16/2015		8.48	3.42
GM-13S	12/10/2015		7.28	4.62
GM-12S	3/18/2015	8.32	4.03	4.29
GM-12S	6/17/2015		4.96	3.36
GM-12S	9/16/2015		5.08	3.24
GM-12S	12/10/2015		3.93	4.39
MW-06	3/10/2015	8.03	3.98	4.05
MW-06	6/10/2015		5.09	2.94
MW-06	9/22/2015		5.29	2.74
MW-06	12/15/2015		3.28	4.75
MW-1-T9	3/11/2015	9.07	5.47	3.60
MW-1-T9	6/10/2015		6.10	2.97
MW-1-T9	9/23/2015		6.42	2.65
MW-1-T9	12/16/2015		4.59	4.48
MW-2-T9	3/11/2015	9.23	5.26	3.97
MW-2-T9	6/10/2015		5.98	3.25
MW-2-T9	9/23/2015		6.36	2.87
MW-2-T9	12/16/2015		4.25	4.98
MW-3-T9	3/11/2015	8.73	4.93	3.80
MW-3-T9	6/10/2015		5.51	3.22
MW-3-T9	9/22/2015		5.76	2.97
MW-3-T9	12/16/2015		3.87	4.86
MW-4-T9	3/10/2015	10.65	7.05	3.60
MW-4-T9	6/10/2015		7.66	2.99
MW-4-T9	9/23/2015		7.94	2.71
MW-4-T9	12/16/2015		6.13	4.52
Plant 2				
GM-19S	3/11/2015	7.68	3.13	4.55
GM-19S	9/23/2015		4.44	3.24

ft	Feet
msl	Mean sea level in National Geodetic Vertical Datum of 1929 (NGVD29).
TOC	Top of casing

FIGURES

AREA PLAN



SITE PLAN

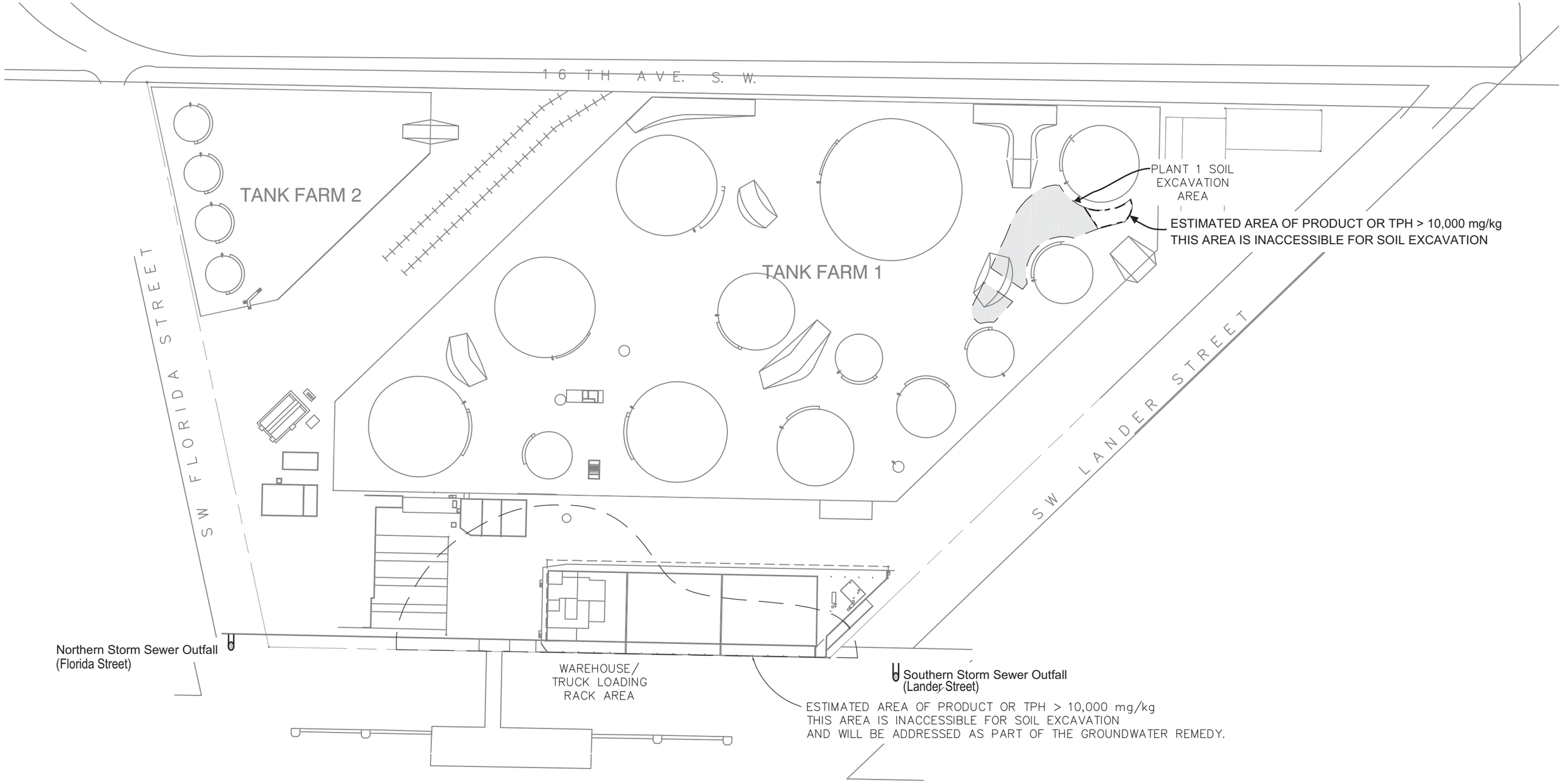
TECHSOLVE ENVIRONMENTAL
7518 NE 169th Street, Kenmore, WA 98126
(425) 402 – 8277 Fax: (425) 402 - 7917

Site Location Map

BP West Coast Products Terminal 21T
1652 Southwest Lander Street
Seattle, WA 98134

FIGURE
1

C:\DCS_PROJECTS\TechSolve PROJECTS\BP21T\ARCD 21T\dwg\VMAP2.dwg JAN 13 2011 12:26:16



LEGEND

ESTIMATED AREA WITH PRODUCT OR TPH > 20,000 ppm

EXCAVATED REMEDIATION AREAS

N

0 50 100

SCALE IN FEET

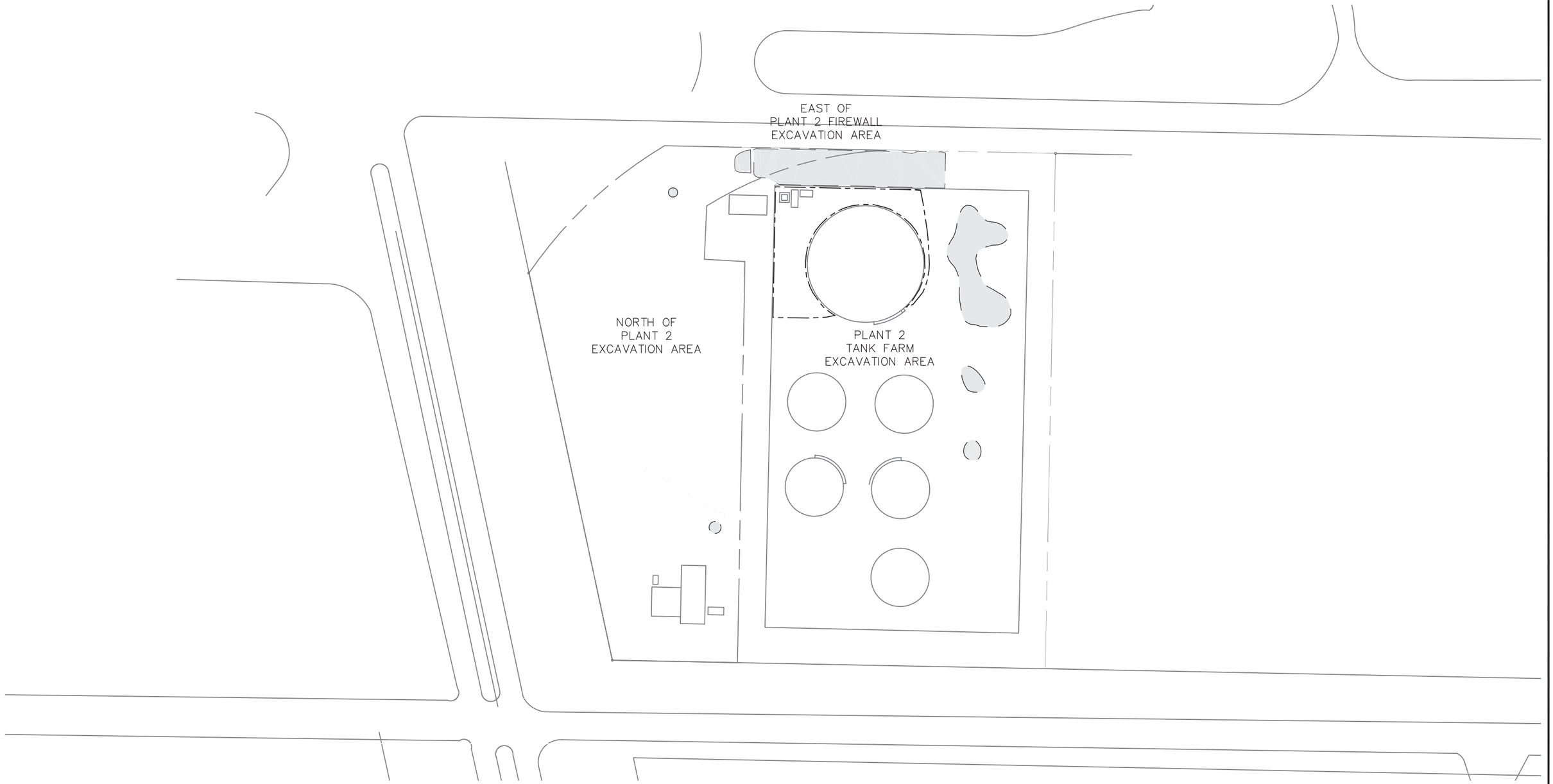
TECHSOLVE ENVIRONMENTAL
7518 NE 169th Street, Kenmore, WA 98126
(425) 402 – 8277 Fax: (425) 402 - 7917

Areas of Remediation - Plant 1

BP West Coast Products Terminal 21T
1652 Southwest Lander Street
Seattle, WA 98134

FIGURE
2

C:\Data\CAD\LDD2 Projects\TechSolv - ARCO 21T\dwg\ARCO21T.dwg MAR 24 2003 16:39:14 (bCAD)



LEGEND

ESTIMATED AREA WITH PRODUCT OR TPH > 20,000 ppm

EXCAVATED REMEDIATION AREAS

N

0 50 100

SCALE IN FEET

TECHSOLVE ENVIRONMENTAL
7518 NE 169th Street, Kenmore, WA 98126
(425) 402 – 8277 Fax: (425) 402 - 7917

Areas of Remediation - Plant 2

BP West Coast Products Terminal 21T
2406 13th Avenue SW
Seattle, WA 98134

FIGURE 3

C:\Data\CAD\LDD2 Projects\TechSolv - ARCO 21T\dwg\ARCO21T.dwg MAR 24 2003 17:07:02 (loCAD)

C:\Data\CAD\LDD2 Projects\TechSolv - ARCO 21T.dwg\ARCO2a.dwg << Plant 1 Remediation System >> DEC 10 2003 00:03:06 (bCAD)

TANK 20

ARCO 21T PLANT 1 TANK FARM

RECOVERED LNAPL LINE

ASPHALT

LIFT STATION

SVEH-2

PUMPS

LOADING RACKS

GM-11S

SVEH-2

REMEDIATION SYSTEM TREATMENT AREA

ARCO OFFICE

OFFICES

WAREHOUSE

CONCRETE

ASPHALT

AMW-05

RW-2

RW-4

AS-3

AMW-04

AS-4

RW-5

AS-5

RW-6

RW-1

AS-6

AMW-03

AS-7

RW-7

AS-8

AS-9

RW-8

AMW-02

AS-10

AS-11

RW-9

AS-12

GM-13D

GM-13S

AS-14

AS-1

AS-2

AS-13

RW-10

AMW-01

PRIMARY PIPE RACK

WALKWAY

SECONDARY PIPE RACK

RIP RAP

Northern Boom

PIER

SEAWALL/BULKHEAD

Duwamish Waterway

Southern Boom

RIP RAP

LEGEND

RW-5	GROUNDWATER RECOVERY WELL
	HORIZONTAL SOIL VAPOR EXTRACTION WELL SCREEN
MW-2	GROUNDWATER MONITORING WELL
AS-1	AIR SPARGE WELL
AMW-04	PERFORMANCE/CONFIRMATION WELL
	LNAPL LINE TO TANK 20
	AIR SPARE LINES

0 20 40

SCALE IN FEET

TECHSOLVE ENVIRONMENTAL
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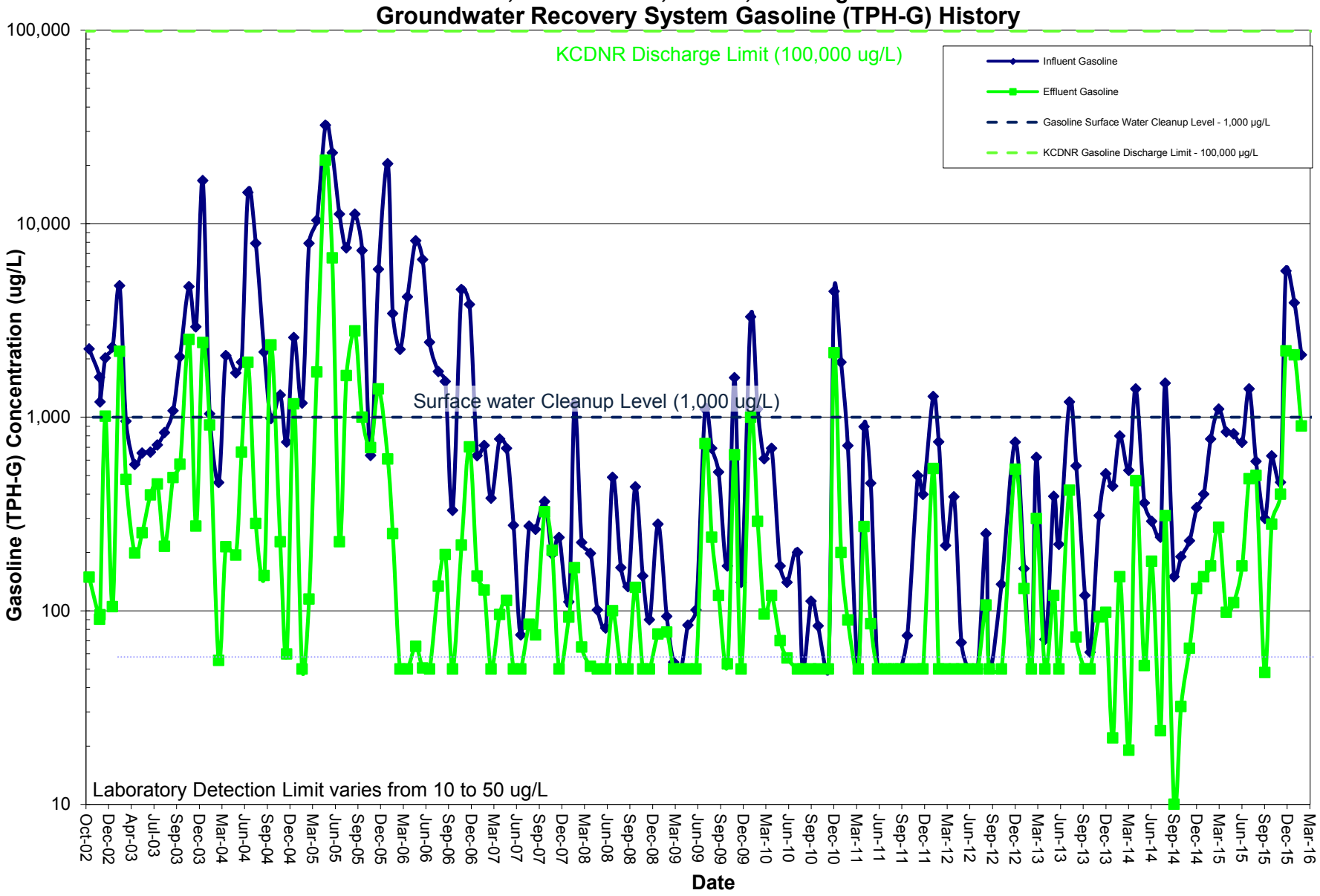
(425) 402 – 8277 Fax: (425) 402 - 7917

Plant 1 Remediation System

BP West Coast Products Terminal 21T
1652 Southwest Lander Street
Seattle, WA 98134

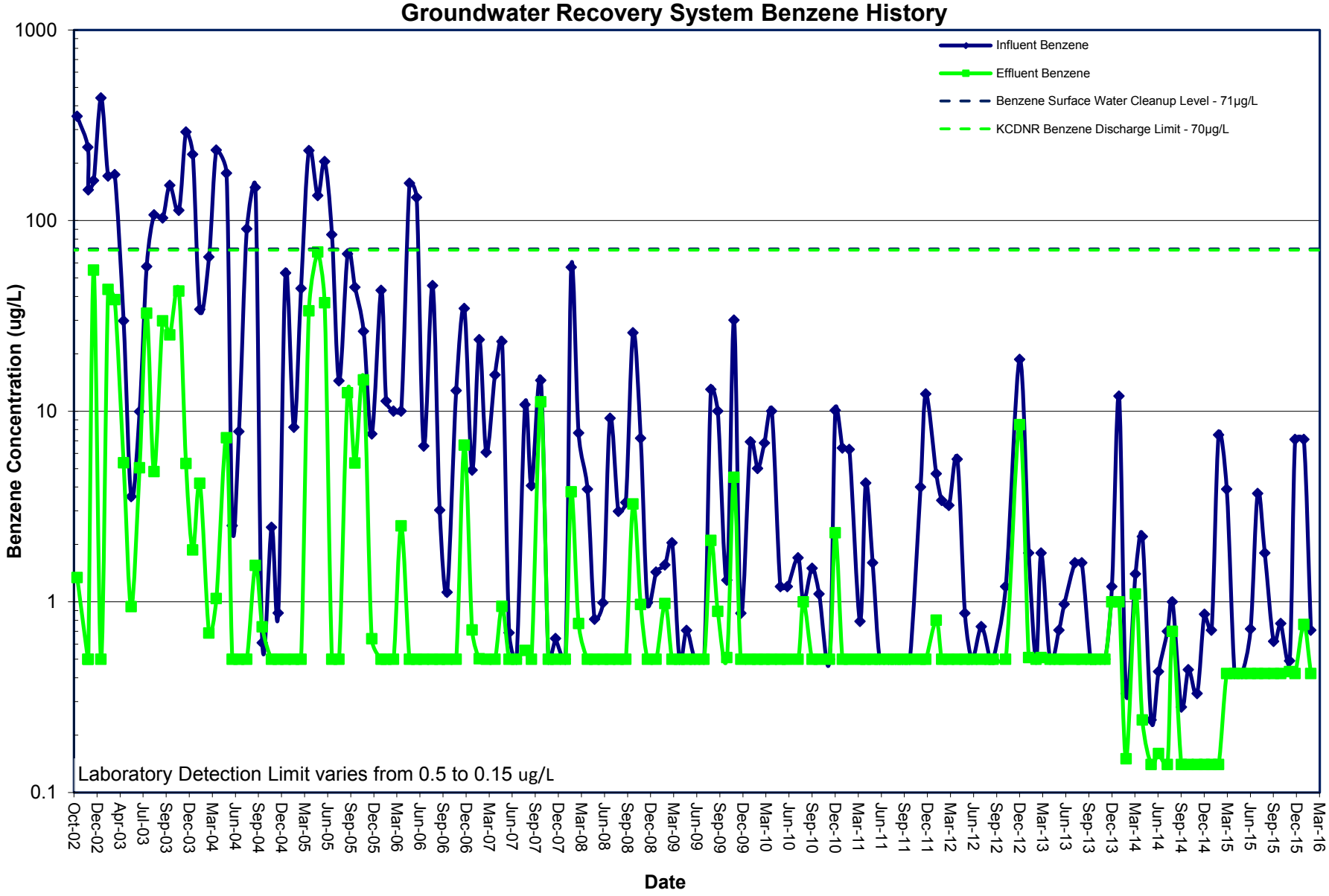
FIGURE
4

Figure 5. Final System Influent vs. Effluent Groundwater Gasoline Concentrations
October 2002 through February 2016
BP West Coast Products Terminal 21T, Harbor Island, Seattle, Washington



Note: Data is included since the startup of the final groundwater/product recovery system in October 2002.

Figure 6. Final System Influent vs. Effluent Groundwater Benzene Concentrations
October 2002 through February 2016
BP West Coast Products Terminal 21T, Harbor Island, Seattle, Washington



Note: Data is included since the startup of the final groundwater/product recovery system in October 2002.

Figure 7. Final System Influent vs. Effluent Diesel Groundwater Concentrations
October 2002 through February 2016
BP West Coast Products Terminal 21T, Seattle, Washington

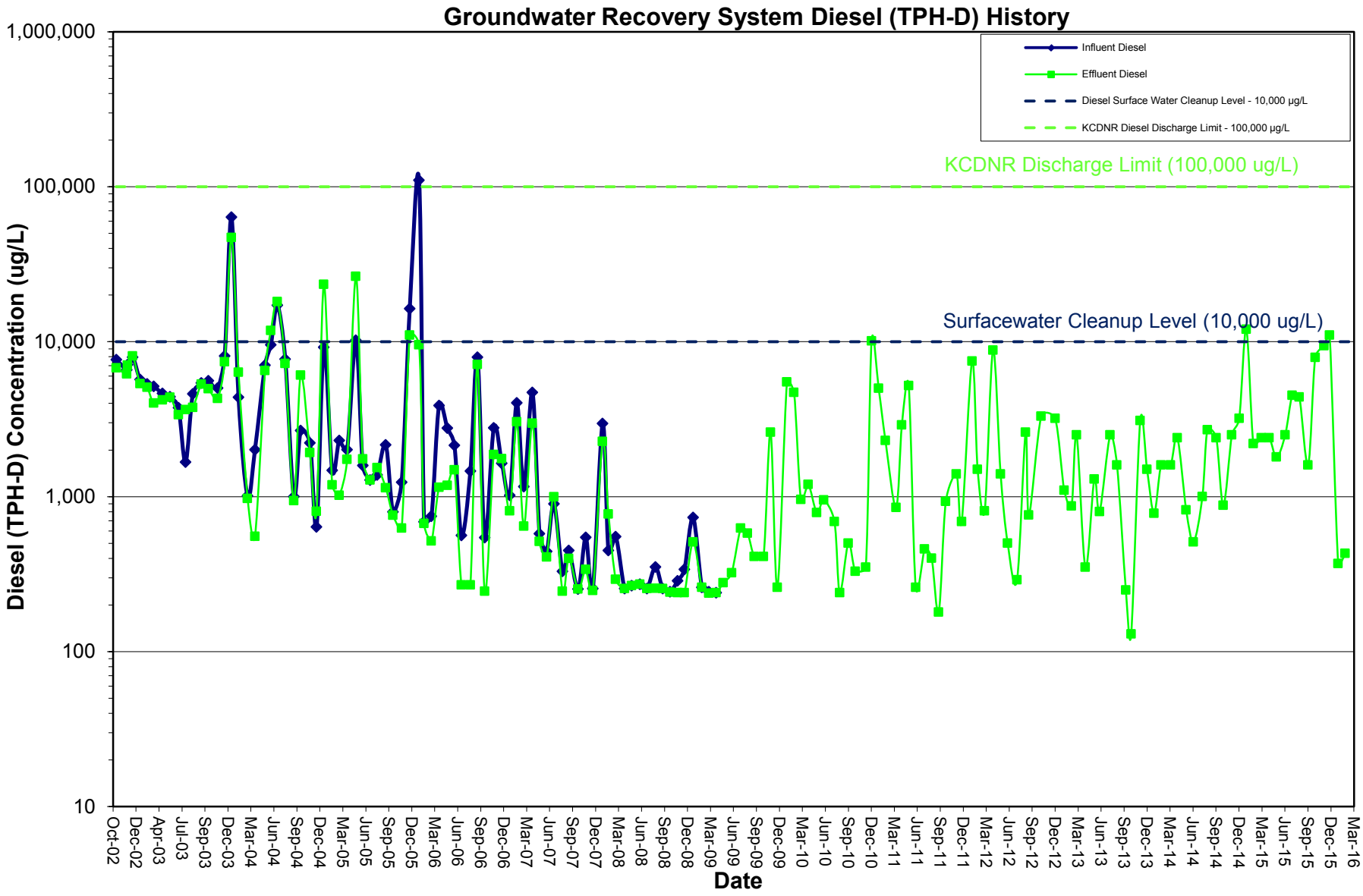
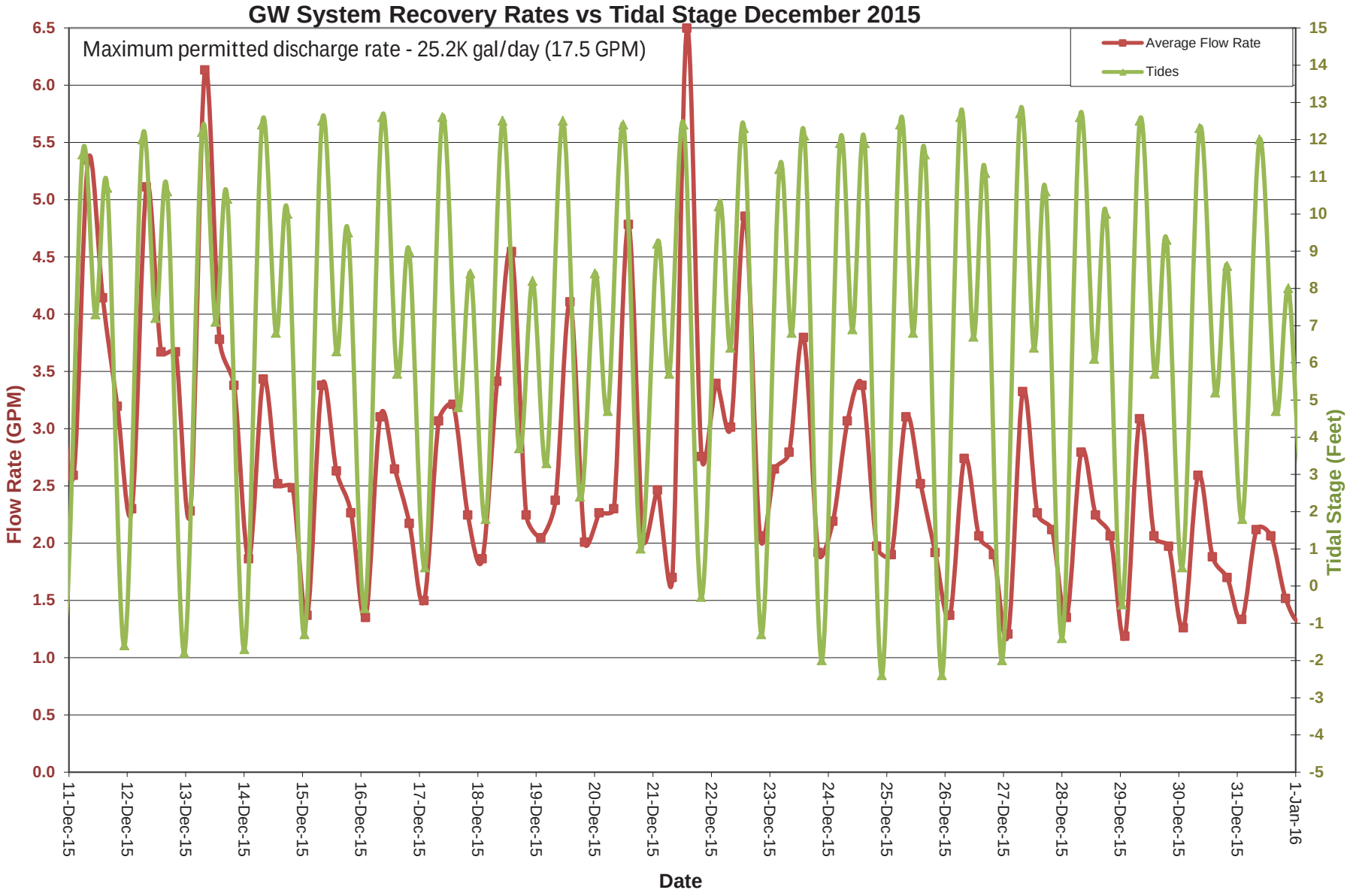
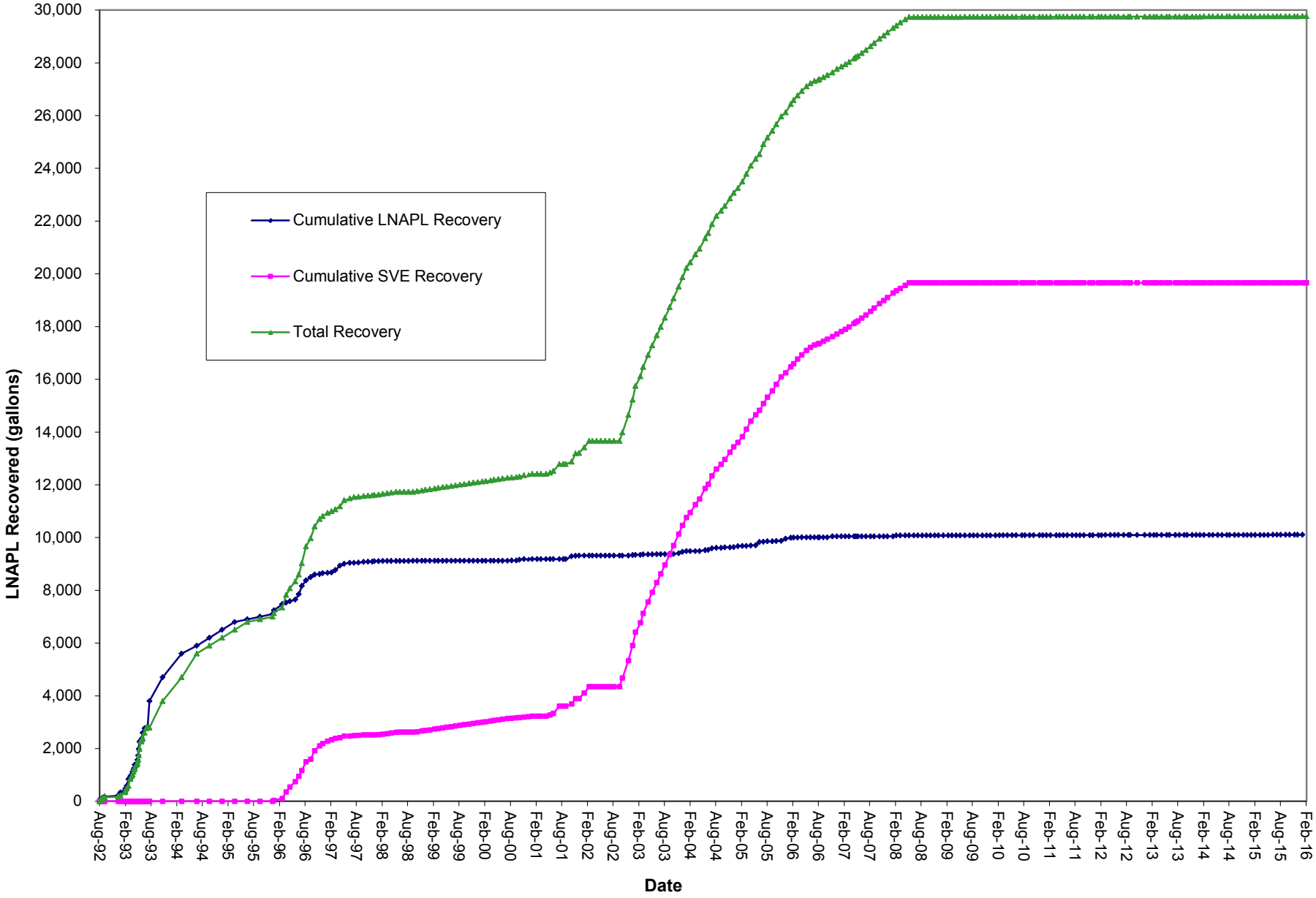


Figure 8. Groundwater Recovery Rates vs. Tidal Stage
BP West Coast Products Terminal 21T, Harbor Island, Seattle, Washington

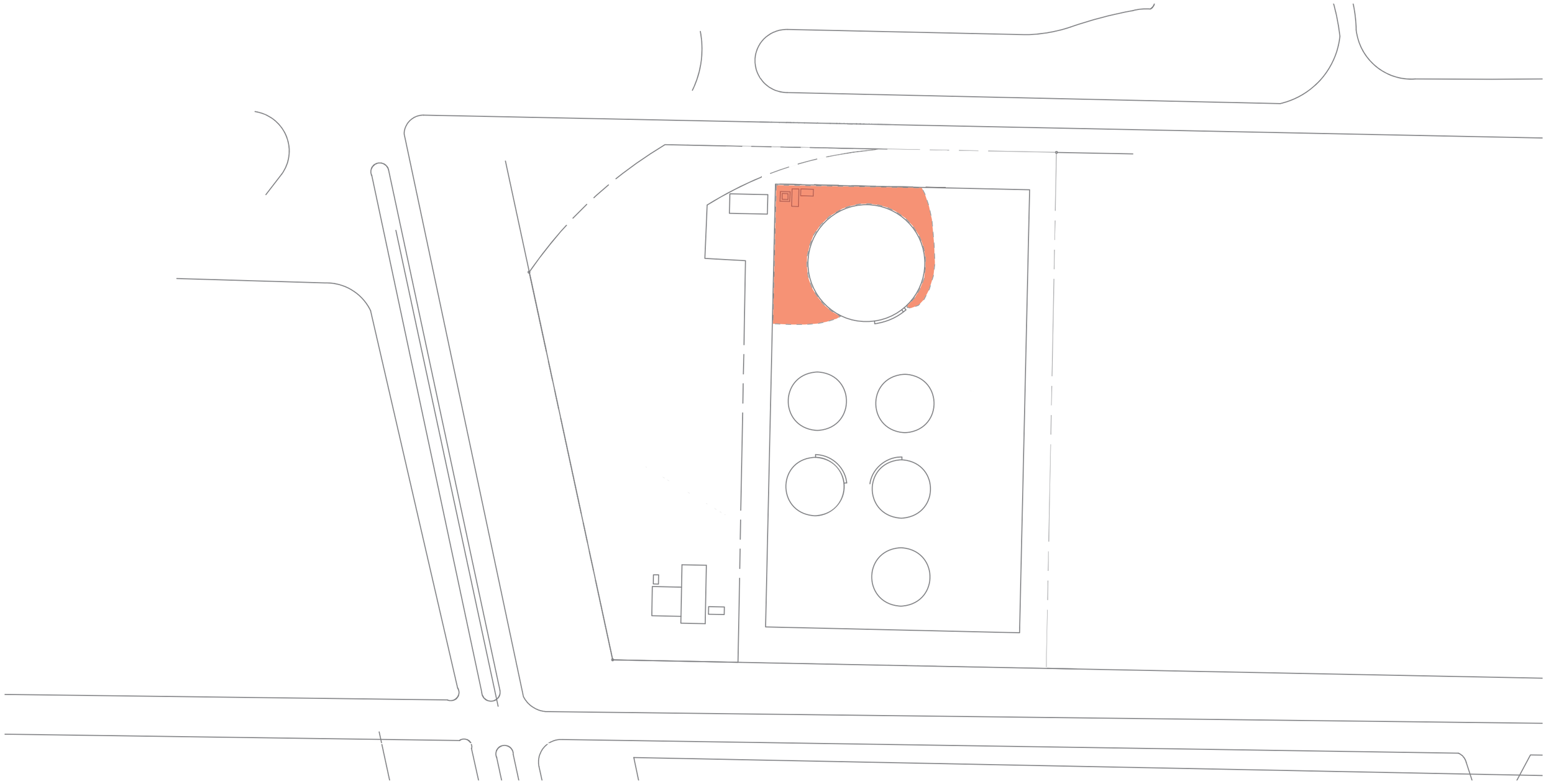


Note: Tidal elevations are from NOAA tidal predictions for Lockheed Shipyard, Harbor Island, WA Station 9447110
Presented data shows the effect of tidal fluctuations on pumping rates. It represents a portion of data collected to date.

Figure 9. **Cumulative Waterfront LNAPL Recovery Through February 2016**
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington



Note: Soil vapor extraction recovery occurred January 1996 through May 2008.



LEGEND

Areas where construction or soil excavation activities are regulated by the Restrictive Covenant of the Consent Decree due to total petroleum hydrocarbons potentially above cleanup levels.

N

0 50 100

SCALE IN FEET

TECHSOLVE ENVIRONMENTAL
7518 NE 169th Street, Kenmore, WA 98126
(425) 402 – 8277 Fax: (425) 402 - 7917

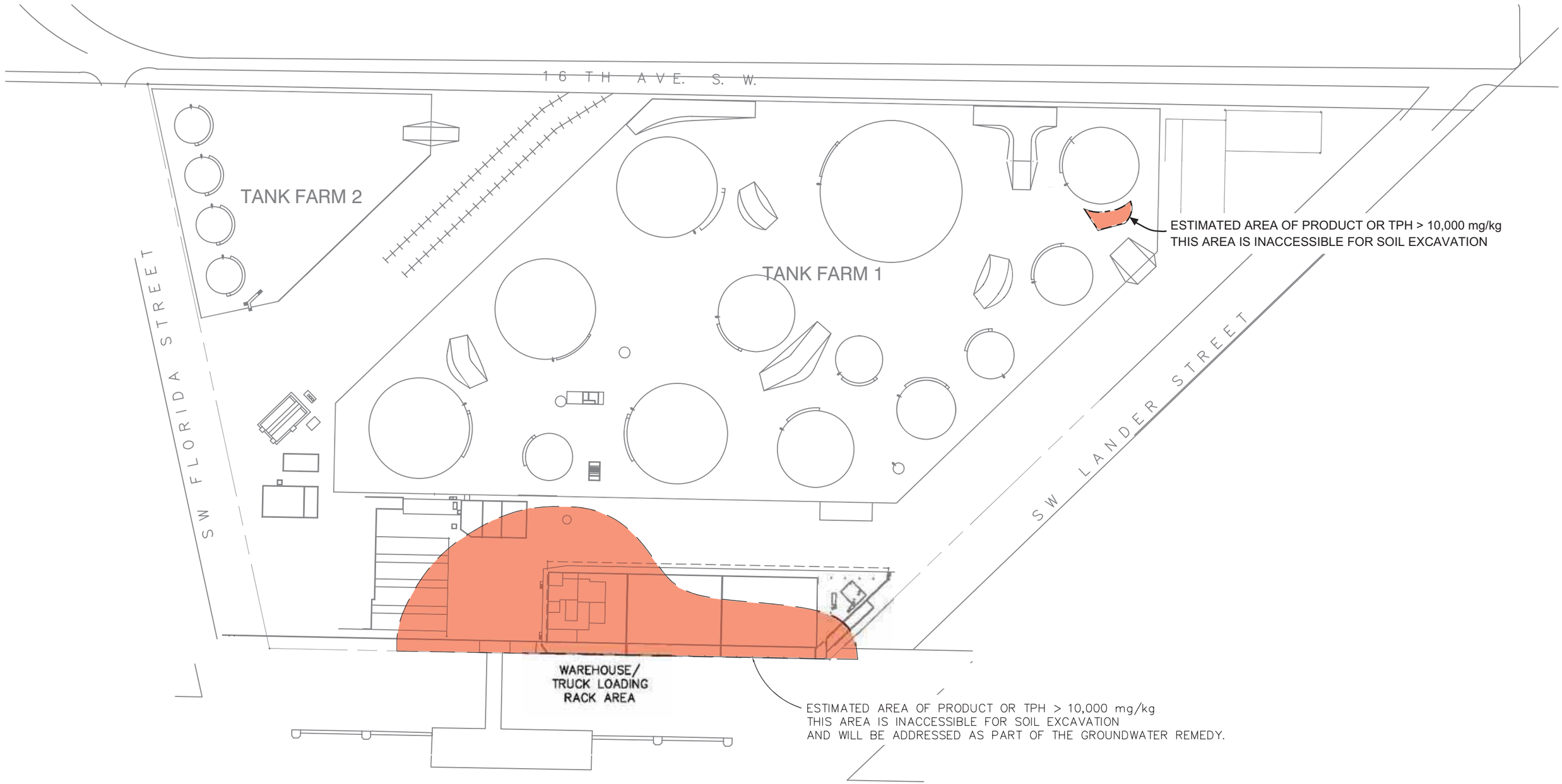
Areas of Restriction - Plant 2

BP West Coast Products Terminal 21T
2406 13th Avenue SW
Seattle, WA 98134

FIGURE

10

C:\Data\CAD\LD02 Projects\TechSolv - ARCO 21T\dwg\ARCO21T.dwg MAR 24 2003 17:07:02 (kCAD)



LEGEND

Areas where construction or soil excavation activities are regulated by the Restrictive Covenant of the Consent Decree due to total petroleum hydrocarbons potentially above cleanup levels.

N

0 50 100

SCALE IN FEET

TECHSOLVE ENVIRONMENTAL
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(425) 402 – 8277 Fax: (425) 402 - 7917

Areas of Restriction - Plant 1

BP West Coast Products Terminal 21T
1652 Southwest Lander Street
Seattle, WA 98134

FIGURE

11

C:\Data\CAD\LDD2 Projects\TechSolv - ARCD 21T\dwg\ARCD21T.dwg MAR 24 2003 16:39:14 (bCAD)

TANK 9

TANK 13

TANK 10

NK 14

4.32
WALL RET COR..

B-004
10
ND

MW-1-T9
B-012
ND
ND

B-005
12
0.0845

B-003
3290
4.32

MW-2-T9

P1

B-011
13900
16.8

B-006
5790
1.4.4

B-002
59
0.185

P2

AR03

B-010
8510
8.53

B-007
55
0.217

B-001
904
1.21

P3

MW-3-T9

B-009
1760
ND

B-008
ND
ND

GM-15S

MW-4-T9

10,000 mg/kg

2,685 sq.ft.

1,000 mg/kg

14,185 sq.ft.

100 mg/kg

26,560 sq.ft.

10 mg/kg

46,900 sq.ft.

LANDER ST

LEGEND

B-002 BORING LOCATION

59 TOTAL PETROLEUM HYDROCARBONS (MG/KG)
0.185 BENZENE (MG/KG)

GRAPHIC SCALE

0 15 30
(IN FEET)

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PRJCT NO.: PRJCTNO
DRAWING: DRAWING2
CHECKED: CHECKER
APPROVED: APPROVED
DRAFTER: DRAFTER

Former Hydrocarbon Mass Distribution
Plant 1 Southern Property Boundary

BP West Coast Products Terminal 21T
1652 SW Lander Street, Seattle, WA 98134

FIGURE
12

TANK 9

TANK 13

TREATMENT SYSTEM ENCLOSURE

4" TILE DRAIN LINE FROM TRUCK WASH DEPTH UNKNOWN

UNKNOWN ELECTRICAL CONDUIT 27" BGS TO TOP OF PIPE

0+00 BOP

UNKNOWN UTILITY 1" LINE 31" BGS.

UNKNOWN BURIED UTILITY 12' FROM TANK WALL 26" BGS.

R16.87'

TRENCH DEPTH 39"

N-5

S-5

UNKNOWN 4" PIPE TERMINATES IN TRENCH 18" BGS.

N-4

P1

STORM DRAIN LINE: 6" STEEL PIPE APPROX. 28" BGS. TO TOP OF PIPE

5' (MIN) OFFSET FROM TANK FARM WALL

S-4

FIRE SUPRESSION LINE ESTIMATE 5' FROM TANK WALL AT 4.3' BGS.

N-3

S-3

UNKNOWN PIPES (1-3" DIA. 2-1" DIA.) APPROX. 26" BGS.

N-2

P2

2+00 N

S-2

N-1

APPROX. LOCATION OF STORM LINE ACROSS SOUTH TRENCH APPROX. 28" BGS.

P3

N-END

S-1

S-END

LEGEND

HORIZONTAL SCREEN

S-4 TERMINATION OF HORIZONTAL SCREEN, SPARE VACUUM MANIFOLD, DURATEC AIR LINE AND ELECTRICAL CONDUIT

TERMINATION POINT STATIONS

SOUTH EXTRACTION LINE	S-1	2 + 54 S
	S-2	2 + 11 S
	S-3	1 + 68 S
	S-4	1 + 25 S
	S-5	0 + 68 S
	S-END	2 + 94 S
NORTH EXTRACTION LINE	N-1	2 + 28 N
	N-2	1 + 84 N
	N-3	1 + 40 N
	N-4	0 + 96 N
	N-5	0 + 53 N
	N-END	2 + 67 N

GRAPHIC SCALE
0 15 30
(IN FEET)
1 inch = 15 ft.

TECHSOLVE ENVIRONMENTAL
7518 NE 169th Street
Kenmore, WA 98082
(425) 402-8277 FAX (425) 402-7917

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SCALE VERIFICATION
THIS BAR REPRESENTS ONE INCH ON THE ORIGINAL DRAWING
USE TO VERIFY FIGURE REPRODUCTION SCALE

REV. NO.	DATE	DESCRIPTION	BY	APPR.
1	MAR.07	ADDED ELECTRICAL CONDUITS FOR FUTURE USE	DK	LR
2	SEPT.07	RELOCATED NORTH TRENCH AND REDUCED TRENCH DEPTH	DK	LR
3	SEPT.08	AS-BUILT	DK	LR

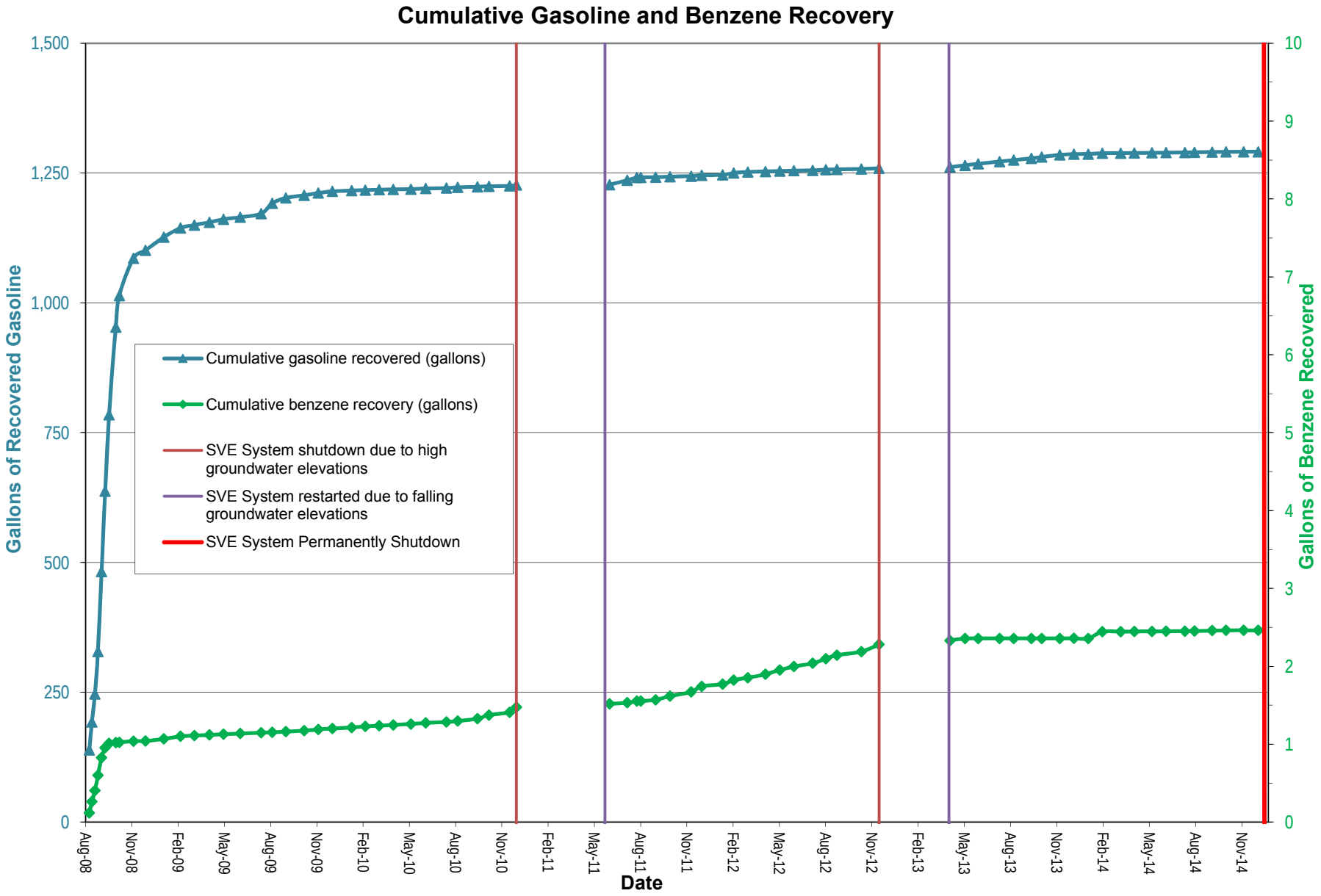
DWG DATE: 4/24/08
PROJCT NO.: ATR10066.02.G
DRAWING: SVEDESIGN-AS-BUILT.DWG
CHECKED: ROBERTS
APPROVED: D.WHITE/J.KIRKPATRICK
DESIGNER: KIDD

Inland SVE System Remediation System Layout

BP West Coast Products Terminal 21T
1652 Southwest Lander Street
Seattle, WA 98134

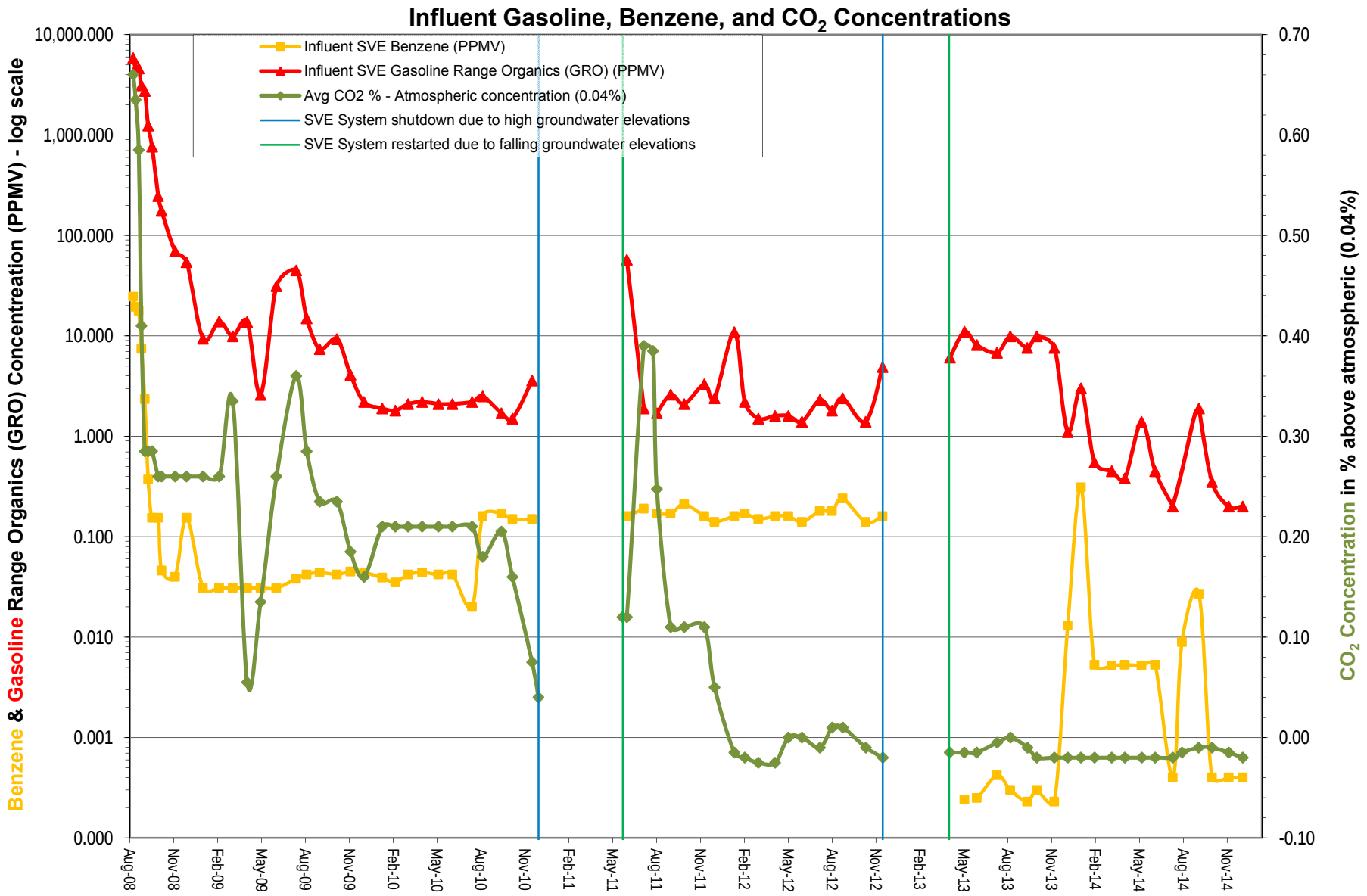
FIGURE
13

Figure 14. Inland SVE System Cumulative Hydrocarbon Recovery
BP West Coast Products Terminal 21T, Harbor Island, Seattle, Washington



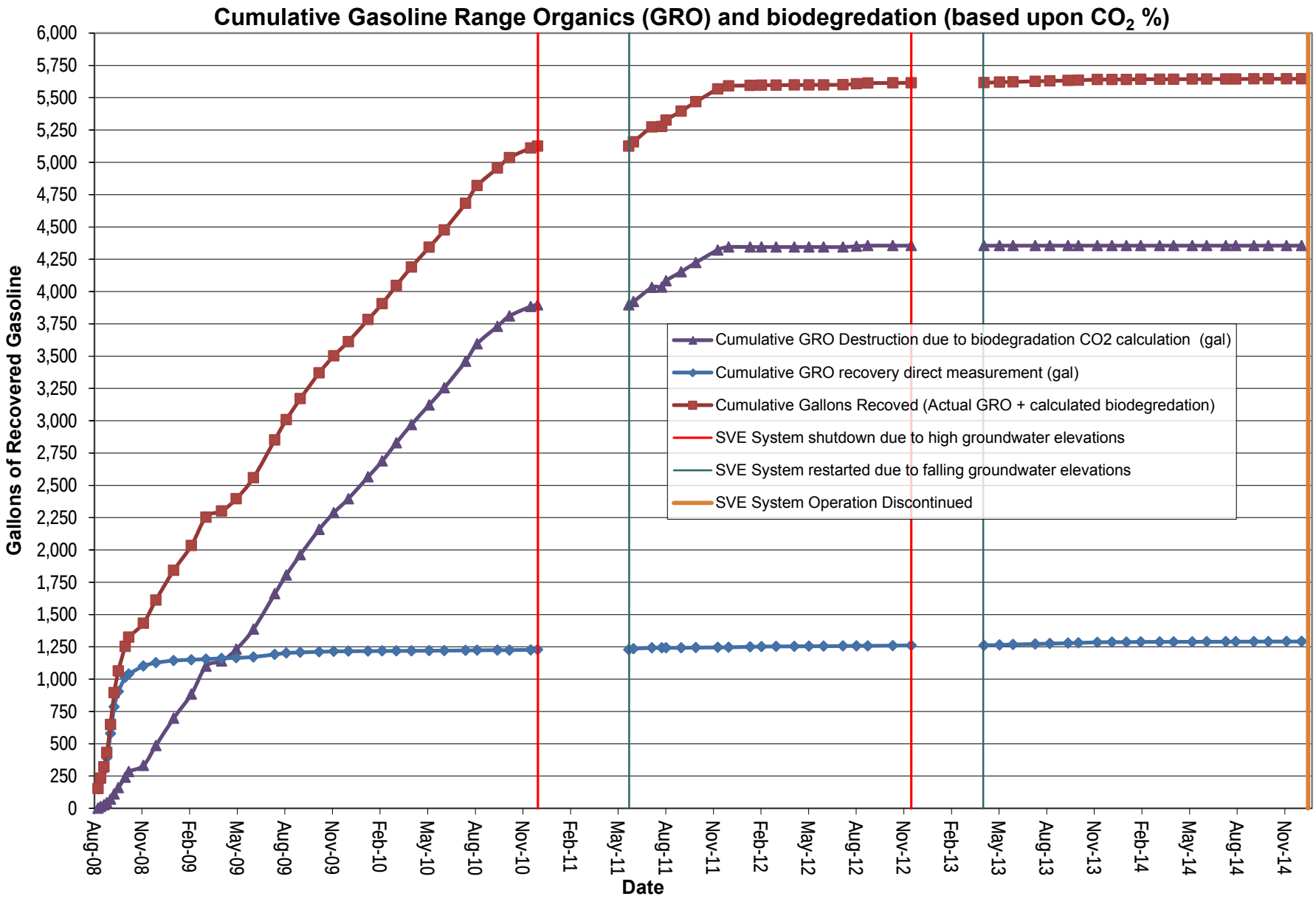
Note: Benzene and gasoline recovery are biased high as recovery is calculated assuming that benzene and gasoline are present at the laboratory decection limit for all samples reported as non detections from the laboratory.

Figure 15. Inland SVE System Gasoline, Benzene, and Carbon Dioxide History
BP West Coast Products Terminal 21T, Harbor Island, Seattle, Washington



Notes:
GRO - Gasoline Range Organic concentration by EPA TO-3
CO_2 - Concentration by detector tube minus atmospheric CO_2 concentration of 0.04%
PPMV - Parts Per Million Volume

Figure 16. Inland SVE Biodegradation and Vapor Recovery
BP West Coast Products Terminal 21T, Harbor Island, Seattle, Washington



LEGEND

GM-16S	MONITORING WELL
AMW-01	PERFORMANCE/CONFIRMATION WELL
GM-13D	PERFORMANCE WELL
GM-13S	PRODUCT PERFORMANCE WELL

N

0 50 100

SCALE IN FEET

TECHSOLVE ENVIRONMENTAL
7518 NE 169th Street, Kenmore, WA 98126
(425) 402 – 8277 Fax: (425) 402 - 7917

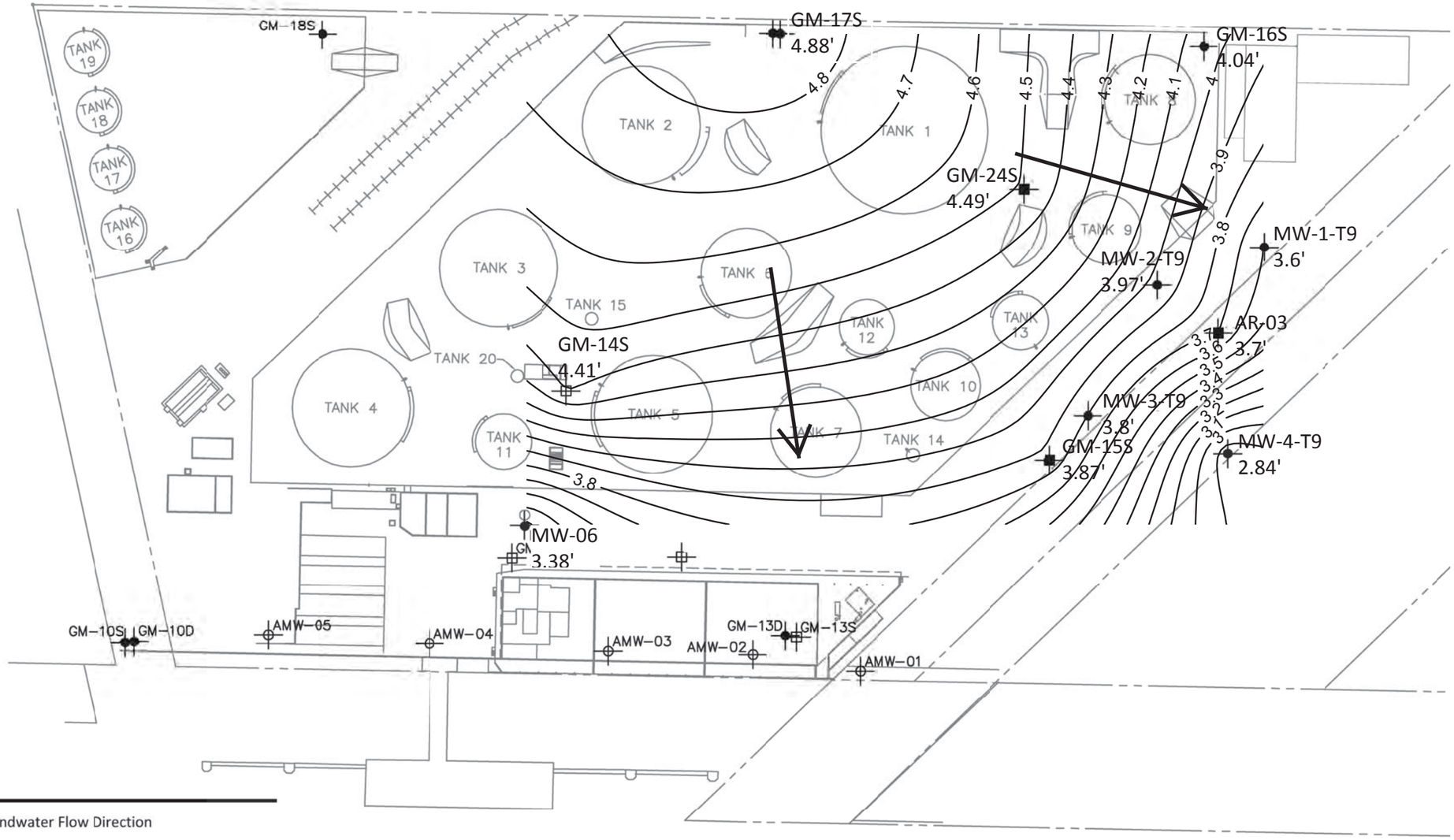
Plant 1 Monitoring Well Network

BP West Coast Products Terminal 21T
1652 Southwest Lander Street
Seattle, WA 98134

FIGURE

17

\\server\ServerData\data\Aproject\ARCO 21T\Drawings and CAD files\Autocad files\Quarterly GWM Figures



LEGEND

- Groundwater Flow Direction
- 3.2' Groundwater Contour Interval (Feet Above Mean Sea Level)
- GM-16S Monitoring Well
- AMW-01 Performance/Confirmation Well
- GM-13D Performance Well
- GM-13S Product Performance Well

N

0 50 100

SCALE IN FEET

TECHSOLVE ENVIRONMENTAL
7518 NE 169th Street, Kenmore, WA 98126
(425) 402 – 8277 Fax: (425) 402 - 7917

First Quarter 2015 Groundwater Elevation Map

BP West Coast Products Terminal 21T
1652 SW Lander Street
Seattle, WA 98134

FIGURE
18

C:\DOCS_PROJECTS\TechSolve PROJECTS\BP21T\ARCD 21T\dwg\11433ab2.dwg JAN 13 2011 12:06:07

LEGEND

- Groundwater Flow Direction
- 3.2' Groundwater Contour Interval (Feet Above Mean Sea Level)
- GM-16S Monitoring Well
- AMW-01 Performance/Confirmation Well
- GM-13D Performance Well
- GM-13S Product Performance Well

N

0 50 100

SCALE IN FEET

TECHSOLVE ENVIRONMENTAL
7518 NE 169th Street, Kenmore, WA 98126
(425) 402 – 8277 Fax: (425) 402 - 7917

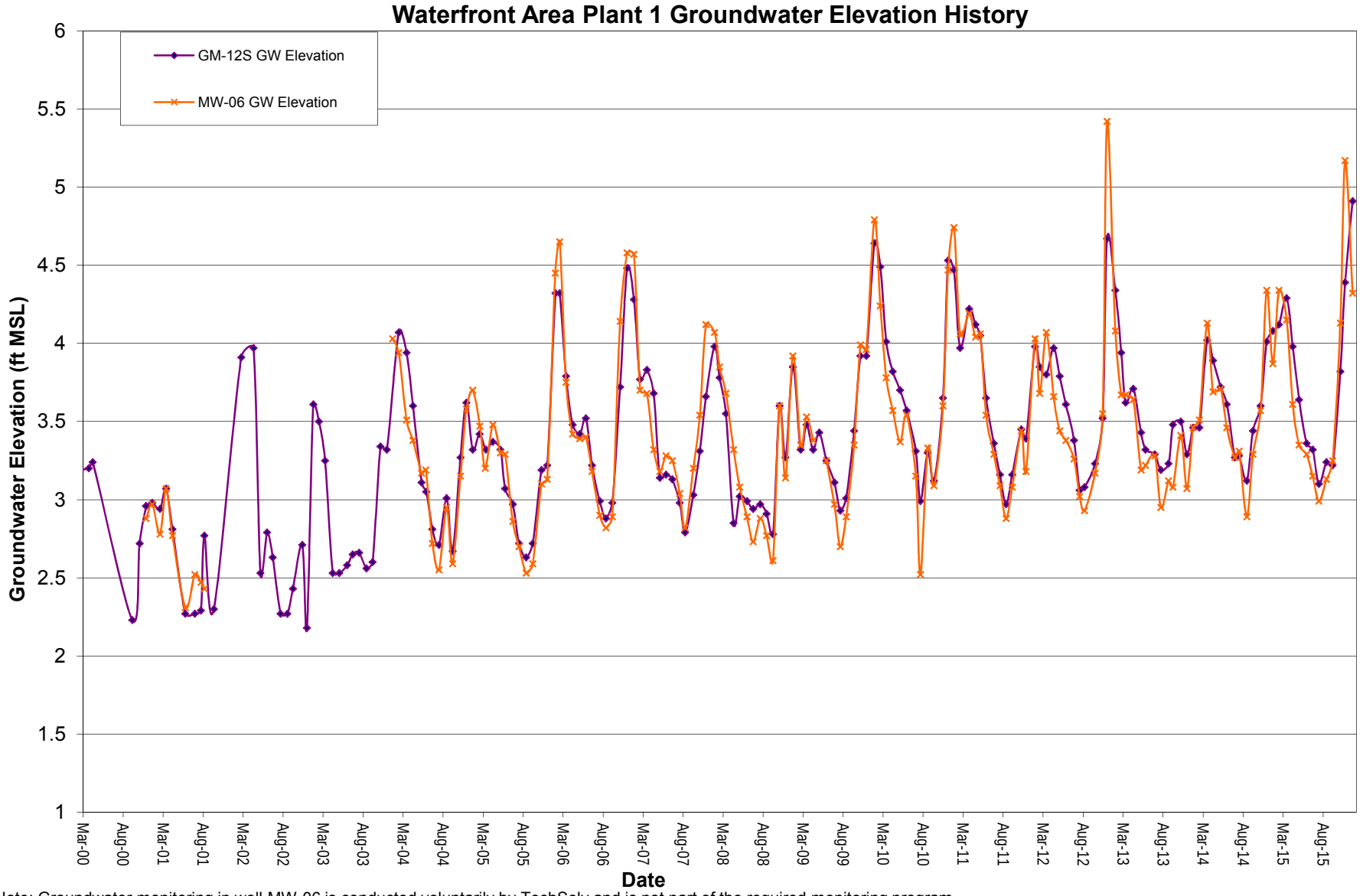
Third Quarter 2015 Groundwater Elevation Map

BP West Coast Products Terminal 21T
1652 SW Lander Street
Seattle, WA 98134

FIGURE
19

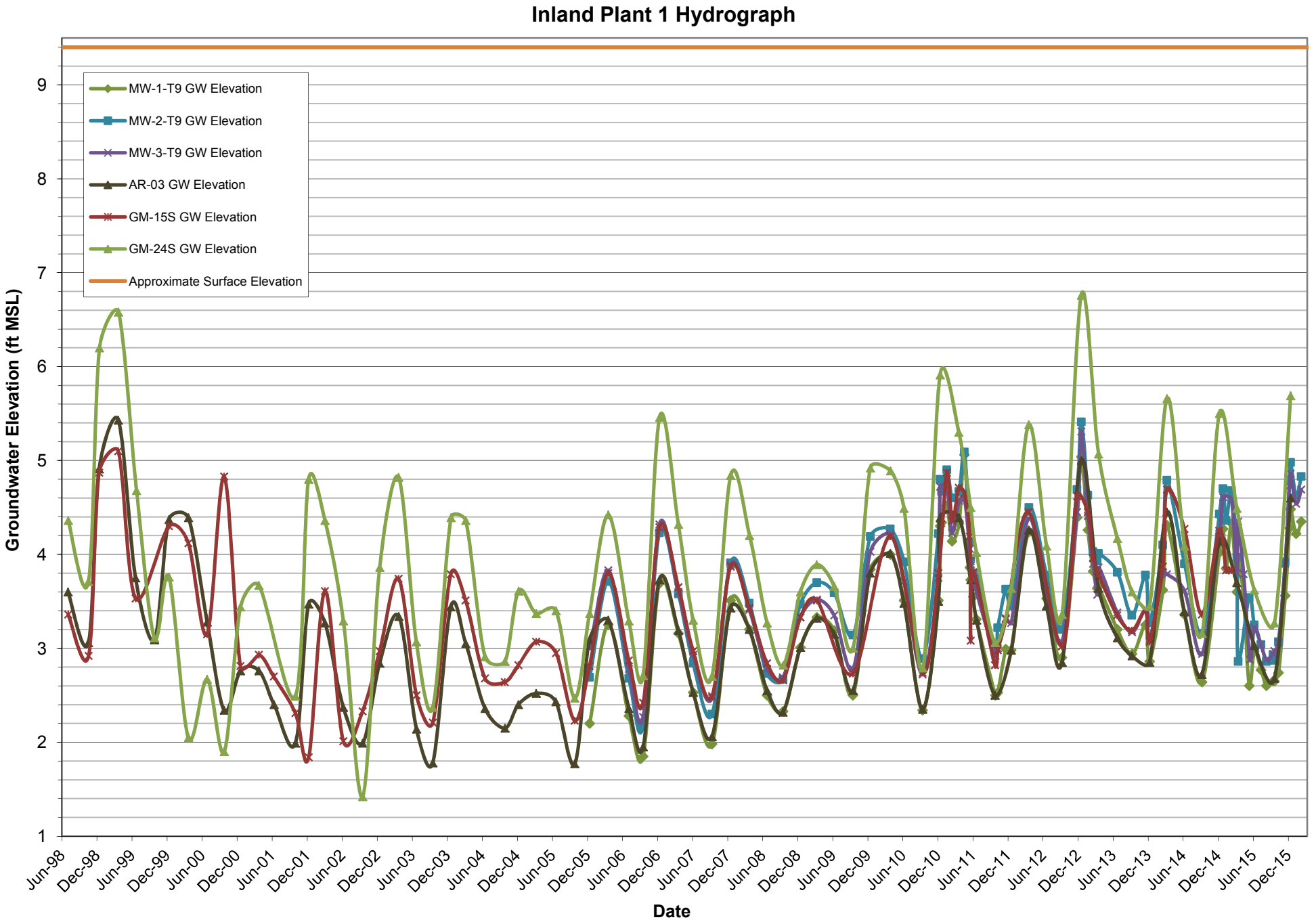
C:\Data\CADD\2 Projects\TechSolv - ARCO 21T\dwg\11433dd2.dwg MAR 24 2003 17:23:48 (bCAD)

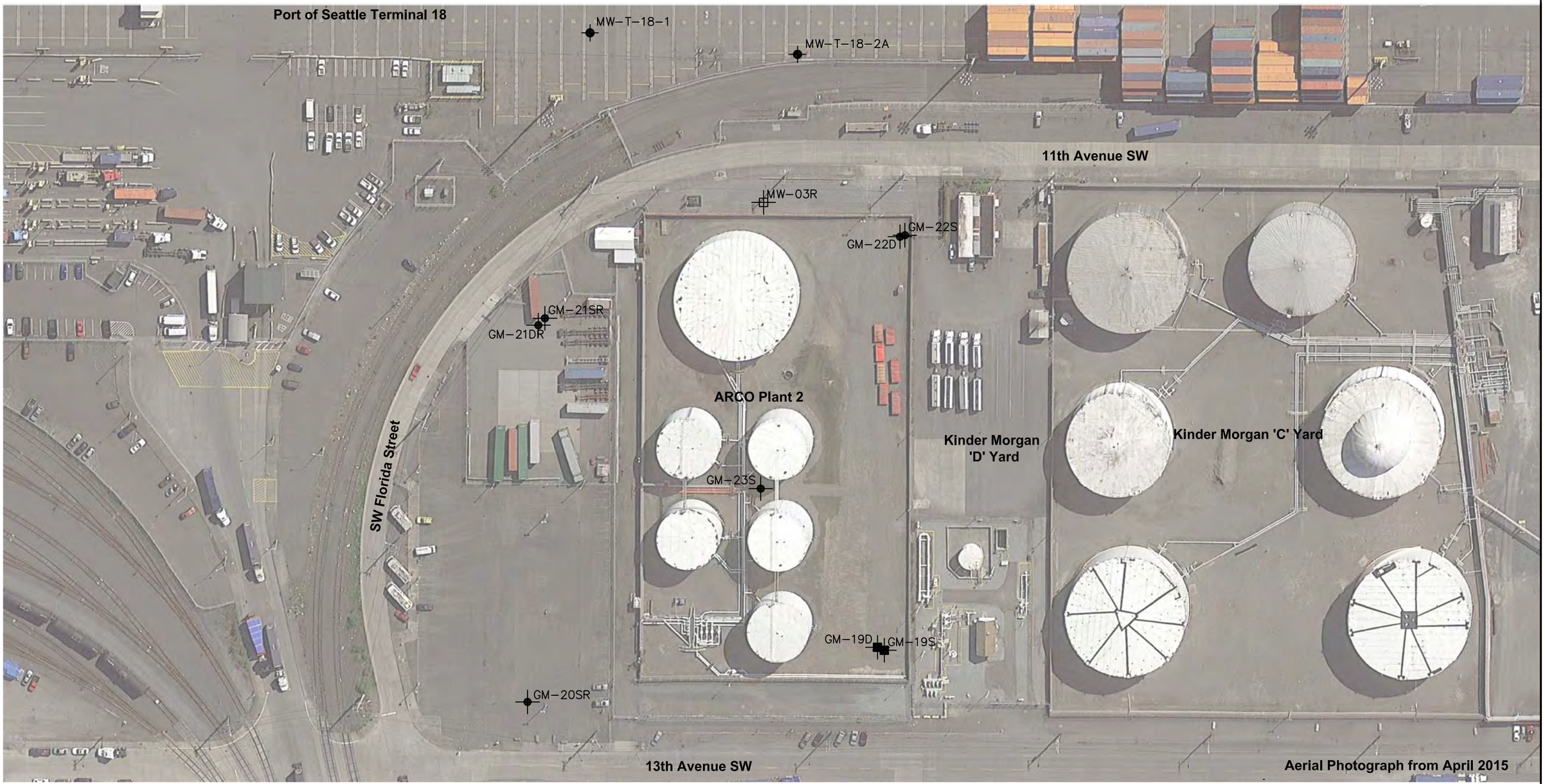
Figure 20. Plant 1 Waterfront Hydrograph
March 2000 through December 2015
BP West Coast Products Terminal 21T, Harbor Island, Seattle, Washington



Note: Groundwater monitoring in well MW-06 is conducted voluntarily by TechSolv and is not part of the required monitoring program.

Figure 21. Plant 1 Southern Boundary Area Hydrograph
BP West Coast Products, Terminal 21T, Harbor Island, Seattle, Washington





LEGEND

- GROUNDWATER MONITORING WELL
- PRODUCT PERFORMANCE WELL
- PERFORMANCE WELL

N

0 50 100

SCALE IN FEET

TECHSOLVE ENVIRONMENTAL
7518 N.E. 169th Street,
Kenmore, WA 98028
P:(425) 402-8277 F:(425) 402-7917

Plant 2 Monitoring Well Network

BP West Coast Products Terminal 21T
2406 13th Avenue SW
Seattle, WA 98134

FIGURE

22

C:\Data\CADProjects\TechSolv\ARCO 21T\dwg\ARCO21T.dwg << Plot 2 Monitoring Well Network >> OCT 07 2008 09:48:43 (bCAD)

APPENDIX A

King County Industrial Waste Semi-Annual Self-Monitoring Reports

Industrial Waste Semi-Annual Self-Monitoring Report

King County

Mail or FAX to: King County Industrial Waste
130 Nickerson Street, Suite 200
Seattle, WA 98109-1658
Phone 206-263-3000 / FAX 206-263-3001

Company Name: **BP West Coast Products LLC (co TechSolve)**

This form is available at www.kingcounty.gov/industrialwaste.

Please specify year: **2015** **Semi-Annual Report for Semester 1** **Sample Site No.:** **A43262** **Permit/DA No.:** **7592-04**

All units are mg/l unless otherwise noted. Note: Write in self-monitoring parameters, if not provided, e.g. Silver (Ag) or settleable solids (ml/L).

	Sample Date month/day	Sample Type C (Composite) G (Grab) BC (Batch)	Benzene	Toluene	Ethyl-benzene	Silver	Arsenic	Cadmium	Non-polar fats, oils & grease (FOG) (Record average of 3 grabs only)	Discharge Volume on sample day (gallons)	Total Monthly Flow (gallons)
Semester 1	Jan/14	G	<0.001	<0.001	<0.001				TPH-D – 12.0 TPH-O – 1.1	2,050	78,690
	Feb/11	G	<0.001	<0.001	<0.001				TPH-D – 2.2 TPH-O – 0.39	3,050	73,910
	Mar/18	G	<0.002	<0.002	<0.003				TPH-D – 2.4 TPH-O – 0.16	2,500	80,760
	Apr/15	G & C for FOG	<0.002	<0.002	<0.003	<0.002	0.0034	<0.002	<3.4 [FOG (1664A)]	1,190	60,830
	May/14	G	<0.002	<0.002	<0.003				TPH-D – 1.8 TPH-O – 0.16	2,240	61,430
	Jun/17	G	<0.002	<0.002	<0.003				TPH-D – 2.5 TPH-O – 0.21	2,190	74,500

—► Total Volume Semester 1: 430,120 gallons

—► Maximum daily flow from Semester 1: **4,440 gallons.** Date on which maximum daily flow occurred: **2/7/2015**

NOTES: **Page 1 of 2. Daily discharge volumes reported based upon flowmeter readings sent from telemetry unit. All analyses referenced in this report were performed by TestAmerica Laboratories, Inc. in Tacoma Washington. All laboratory reports are retained by TechSolve Environmental, Inc.**

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. I further certify that all data requiring a laboratory analysis were analyzed by a Washington State Department of Ecology accredited laboratory for each parameter tested.

Signature of Principal Executive or Authorized Agent

6/30/2015
Date

Due Date: Semi-annual report for Semester 1 is due by July 15 of each year. **Please Note:** Do not include original laboratory reports with this form unless otherwise requested. Keep the original laboratory reports on file and available for inspection for at least 3 years.

Industrial Waste Semi-Annual Self-Monitoring Report

King County

Mail or FAX to: King County Industrial Waste
130 Nickerson Street, Suite 200
Seattle, WA 98109-1658
Phone 206-263-3000 / FAX 206-263-3001

Company Name: BP West Coast Products LLC (co TechSolve)

This form is available at www.kingcounty.gov/industrialwaste.

Please specify year: **2015 Semi-Annual Report for Semester 1** **Sample Site No.:** A43262 **Permit/DA No.:** 7592-04

All units are mg/l unless otherwise noted. Note: Write in self-monitoring parameters, if not provided, e.g. Silver (Ag) or settleable solids (ml/L).

	Sample Date month/day	Sample Type C (Composite) G (Grab) BC (Batch)	Chromium	Copper	Mercury	Nickel	Lead	Zinc		Discharge Volume on sample day (gallons)	Total Monthly Flow (gallons)
Semester 1	Jan/14	G								2,050	78,690
	Feb/12	G								3,050	73,910
	Mar/20	G								2,500	80,760
	Apr/16	G & C for FOG	0.002	0.062	0.000073	0.0092	0.0030	0.069		1,190	60,830
	May/21	G								2,240	61,430
	Jun/17	G								2,190	74,500

—► Total Volume Semester 1: 430,120 gallons

—► Maximum daily flow from Semester 1: **4,440 gallons.** Date on which maximum daily flow occurred: **2/7/2015**

NOTES: **Page 2 of 2. Daily discharge volumes reported based upon flowmeter readings sent from telemetry unit. All analyses referenced in this report were performed by TestAmerica Laboratories, Inc. in Tacoma Washington. All laboratory reports are retained by TechSolve Environmental, Inc.**

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. I further certify that all data requiring a laboratory analysis were analyzed by a Washington State Department of Ecology accredited laboratory for each parameter tested.

6/30/2015
Date

Signature of Principal Executive or Authorized Agent

Due Date: Semi-annual report for Semester 1 is due by July 15 of each year. **Please Note:** Do not include original laboratory reports with this form unless otherwise requested. Keep the original laboratory reports on file and available for inspection for at least 3 years.

Industrial Waste Semi-Annual Self-Monitoring Report

King County

Mail or FAX to: King County Industrial Waste
130 Nickerson Street, Suite 200
Seattle, WA 98109-1658
Phone 206-263-3000 / FAX 206-263-3001

Company Name: **BP West Coast Products LLC (co TechSolve)**

This form is available at www.kingcounty.gov/industrialwaste.

Please specify year: **2015 Semi-Annual Report for Semester 2** **Sample Site No.:** **A43262** **Permit/DA No.:** **7592-05**

All units are mg/l unless otherwise noted. Note: Write in self-monitoring parameters, if not provided, e.g. Silver (Ag) or settleable solids (ml/L).

	Sample Date month/day	Sample Type C (Composite) G (Grab) BC (Batch)	Benzene	Toluene	Ethyl-benzene	Silver	Arsenic	Cadmium	Non-polar fats, oils & grease (FOG) (Record average of 3 grabs only)	Discharge Volume on sample day (gallons)	Total Monthly Flow (gallons)
Semester 2	Jul/15	G	<0.001	<0.001	<0.001				TPH-D – 4.5 TPH-O – 0.38	2,410	61,060
	Aug/12	G	<0.001	<0.001	<0.001				TPH-D – 4.4 TPH-O – 0.31	2,190	65,770
	Sep/16	G	<0.001	<0.001	<0.001				TPH-D – 1.6 TPH-O – 0.12	2,390	82,990
	Oct/15	G & C for FOG	<0.001	<0.001	<0.001	<0.05	<0.06	<0.02	TPH-D – 7.9 TPH-O – 0.5	2,560	67,160
	Nov/18	G	<0.001	<0.001	<0.001				FOG - <3.4 [TPH (1664A)] TPH-D – 9.4 TPH-O – 0.72	3,290	96,690
	Dec/10	G	<0.001	<0.001	<0.001				TPH-D – 11.0 TPH-O – 0.52	6,250	70,890

—► Total Volume Semester 2: 444,560 gallons

—► Maximum daily flow from Semester 2: **6,250 gallons.** Date on which maximum daily flow occurred: **12/10/2015**

NOTES: **Page 1 of 2. Daily discharge volumes reported based upon flowmeter readings sent from telemetry unit. All analyses referenced in this report were performed by TestAmerica Laboratories, Inc. in Tacoma Washington. All laboratory reports are retained by TechSolve Environmental, Inc. Reported TPH-D and TPH-O data are from NWTPH-Dx analyses for remediation recovery calculations and are voluntarily reported in addition to required Semi-Annual FOG to provide additional discharge data.**

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. I further certify that all data requiring a laboratory analysis were analyzed by a Washington State Department of Ecology accredited laboratory for each parameter tested.

Signature of Principal Executive or Authorized Agent

12/28/2015
Date

Due Date: Semi-annual report for Semester 2 is due by January 15 of each year. **Please Note:** Do not include original laboratory reports with this form unless otherwise requested. Keep the original laboratory reports on file and available for inspection for at least 3 years.

Industrial Waste Semi-Annual Self-Monitoring Report

King County

Mail or FAX to: King County Industrial Waste
130 Nickerson Street, Suite 200
Seattle, WA 98109-1658
Phone 206-263-3000 / FAX 206-263-3001

Company Name: **BP West Coast Products LLC (co TechSolve)**

This form is available at www.kingcounty.gov/industrialwaste.

Please specify year: **2015** **Semi-Annual Report for Semester 2** **Sample Site No.:** **A43262** **Permit/DA No.:** **7592-05**

All units are mg/l unless otherwise noted. Note: Write in self-monitoring parameters, if not provided, e.g. Silver (Ag) or settleable solids (ml/L).

	Sample Date month/day	Sample Type C (Composite) G (Grab) BC (Batch)	Chromium	Copper	Mercury	Nickel	Lead	Zinc		Discharge Volume on sample day (gallons)	Total Monthly Flow (gallons)
Semester 2	Jul/15	G								2,410	61,060
	Aug/12	G								2,190	65,770
	Sep/16	G								2,390	82,990
	Oct/15	G								2,560	67,160
	Nov/18	G & C for FOG	<0.025	<0.05	<0.0002	<0.02	<0.03	0.072		3,290	96,690
	Dec/10	G								6,250	70,890

—► Total Volume Semester 2: 444,560 gallons

—► Maximum daily flow from Semester 2: **6,250 gallons.** Date on which maximum daily flow occurred: **12/10/2015**

NOTES: **Page 2 of 2. Daily discharge volumes reported based upon flowmeter readings sent from telemetry unit. All analyses referenced in this report were performed by TestAmerica Laboratories, Inc. in Tacoma Washington. All laboratory reports are retained by TechSolve Environmental, Inc.**

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. I further certify that all data requiring a laboratory analysis were analyzed by a Washington State Department of Ecology accredited laboratory for each parameter tested.

12/28/2015
Date

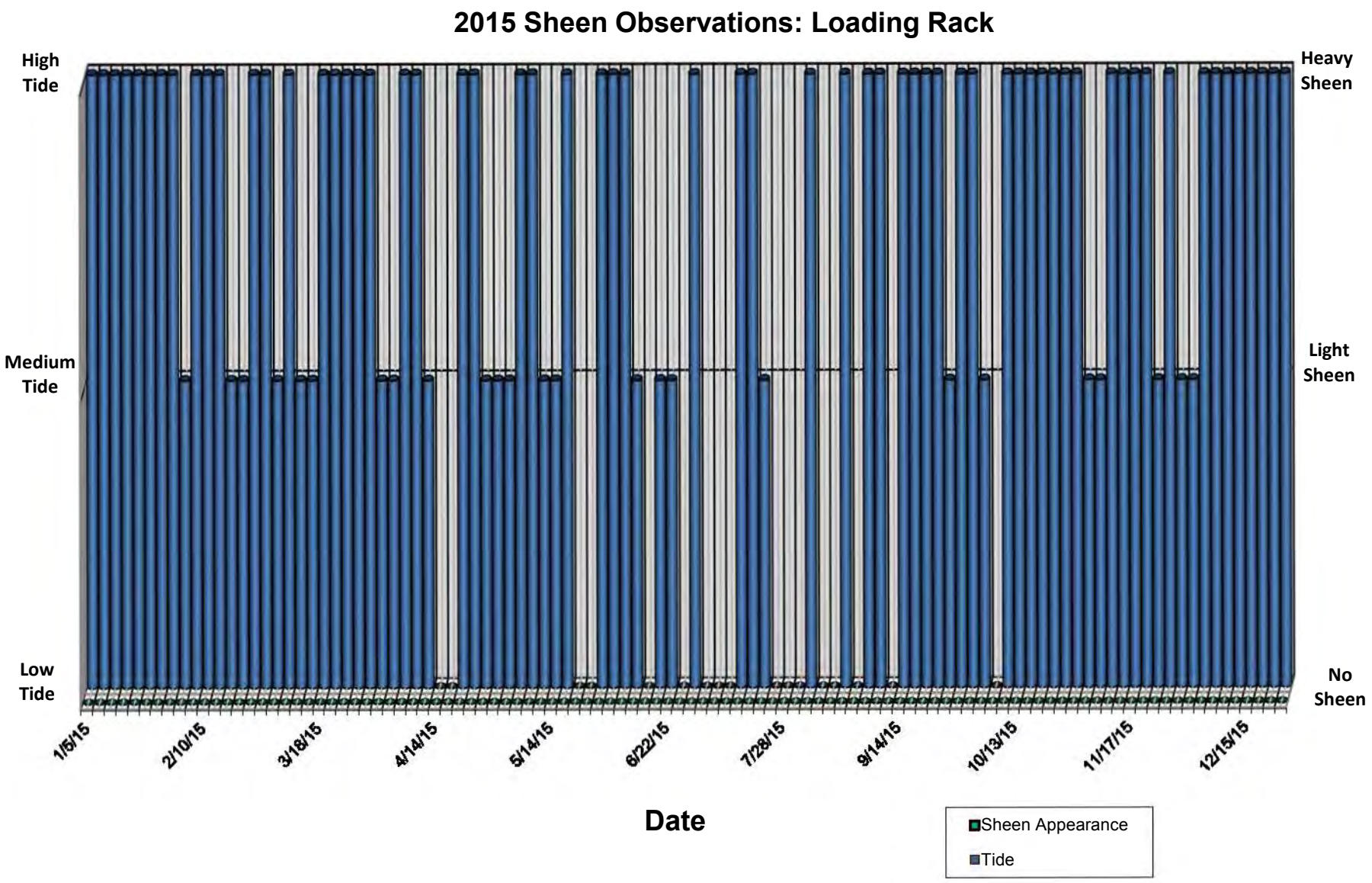
Signature of Principal Executive or Authorized Agent

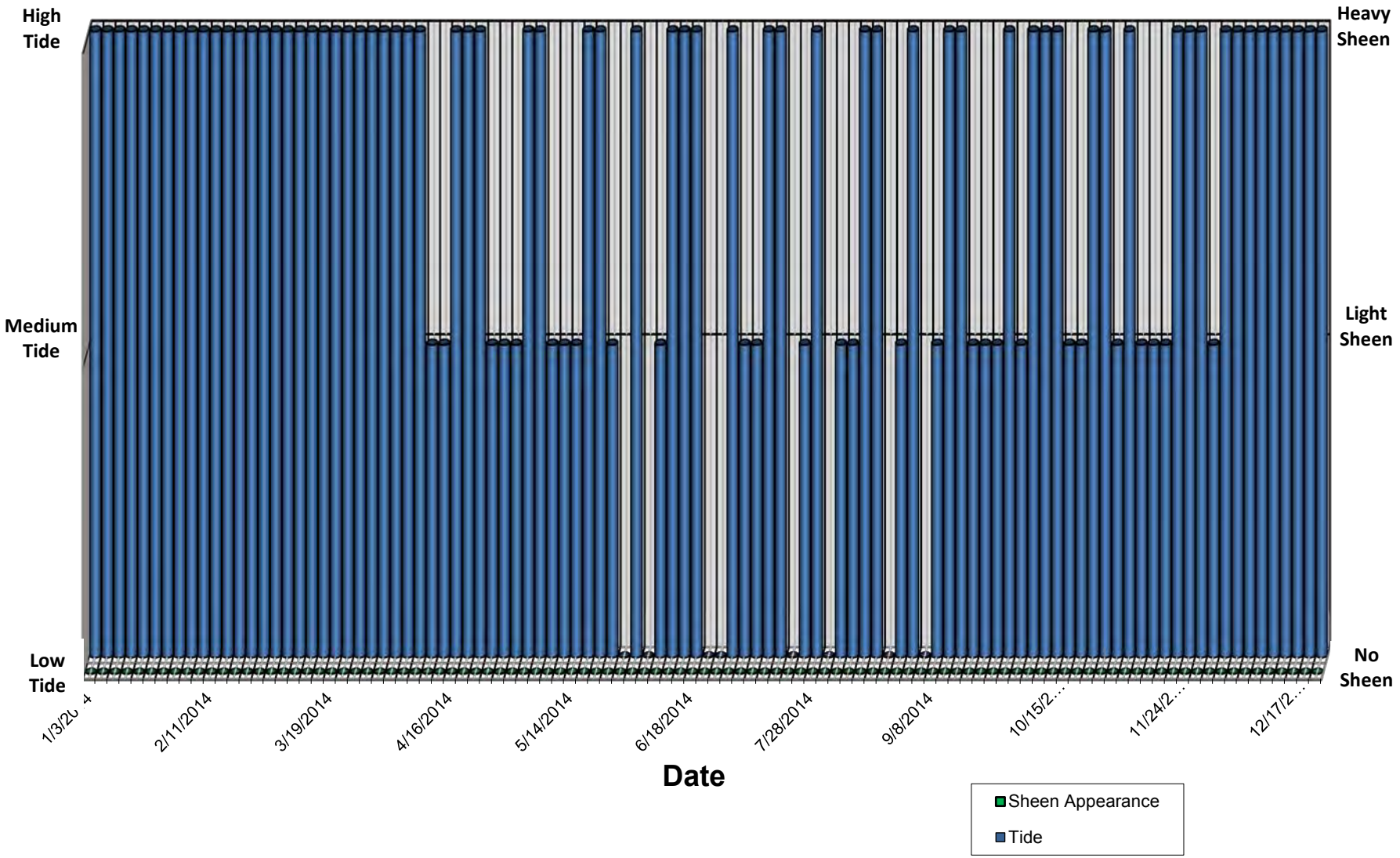
Due Date: Semi-annual report for Semester 2 is due by January 15 of each year. **Please Note:** Do not include original laboratory reports with this form unless otherwise requested. Keep the original laboratory reports on file and available for inspection for at least 3 years.

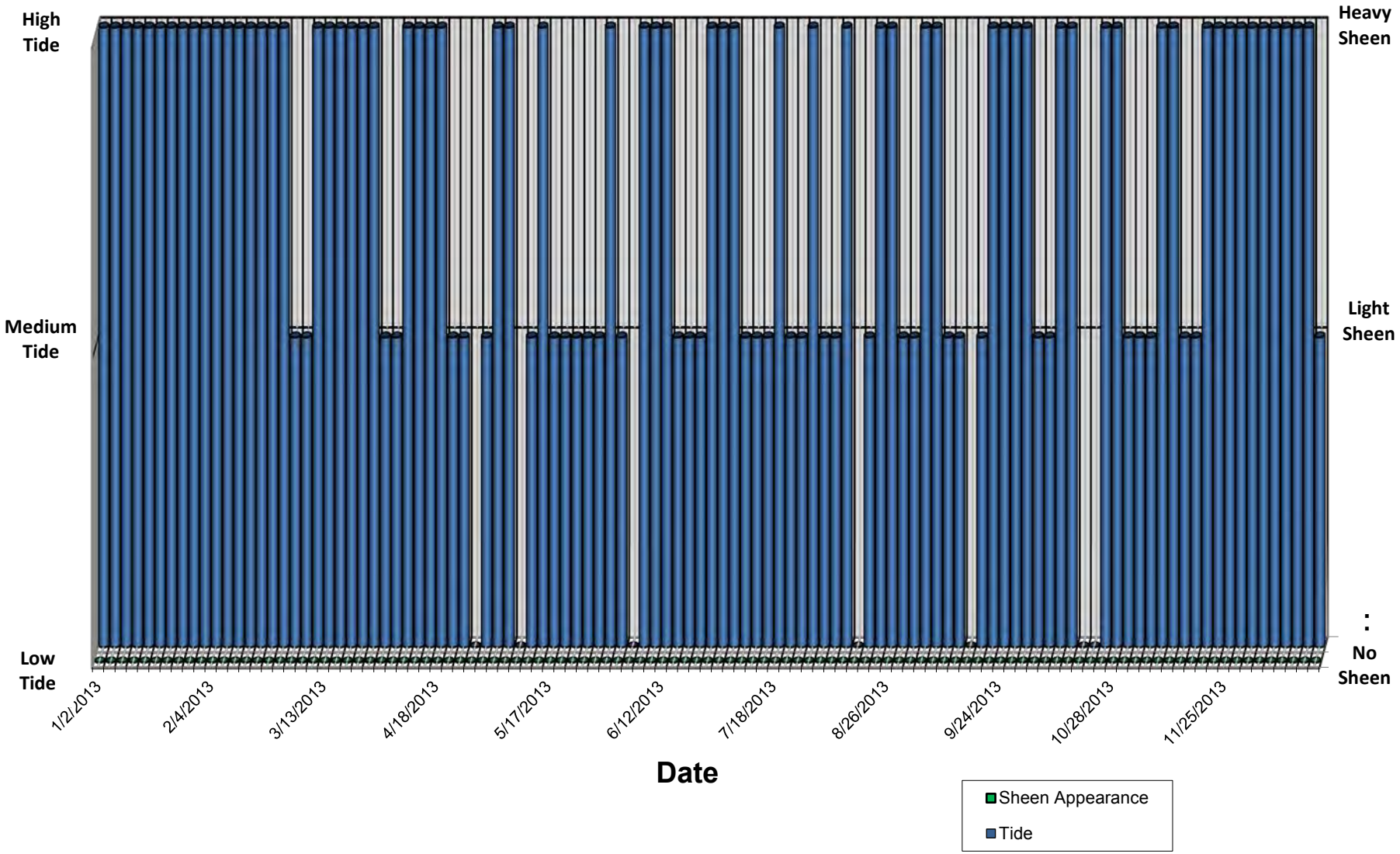
APPENDIX B

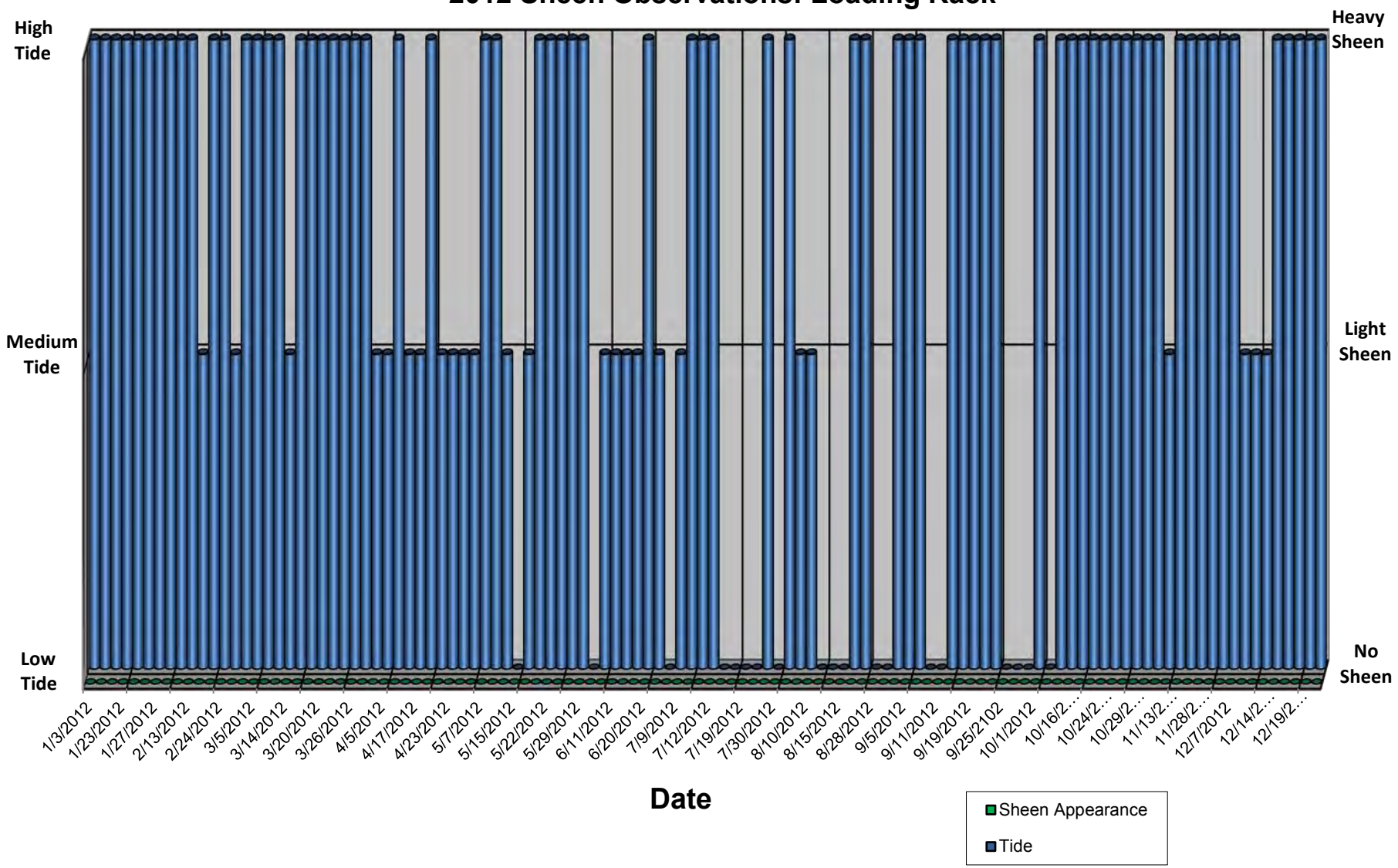
Sheen Observations – Loading Rack & Warehouse 2015 Through 1996

Sheen Observations - Loading Rack
BP West Coast Products Terminal 21T, Harbor Island, Seattle




2014 Sheen Observations: Loading Rack
High Tide
Medium Tide
Low Tide
Heavy Sheen
Light Sheen
No Sheen
1/3/20 4
2/11/2014
3/19/2014
4/16/2014
5/14/2014
6/18/2014
7/28/2014
9/8/2014
10/15/2…
11/24/2…
12/17/2…
Date
Sheen Appearance
Tide


2013 Sheen Observations: Loading Rack
High Tide
Medium Tide
Low Tide
Heavy Sheen
Light Sheen
No Sheen
1/2/2013
2/4/2013
3/13/2013
4/18/2013
5/17/2013
6/12/2013
7/18/2013
8/26/2013
9/24/2013
10/28/2013
11/25/2013
Date
Sheen Appearance
Tide


2012 Sheen Observations: Loading Rack
High Tide
Medium Tide
Low Tide
Heavy Sheen
Light Sheen
No Sheen
1/3/2012
1/23/2012
1/27/2012
2/13/2012
2/24/2012
3/5/2012
3/14/2012
3/20/2012
3/26/2012
4/5/2012
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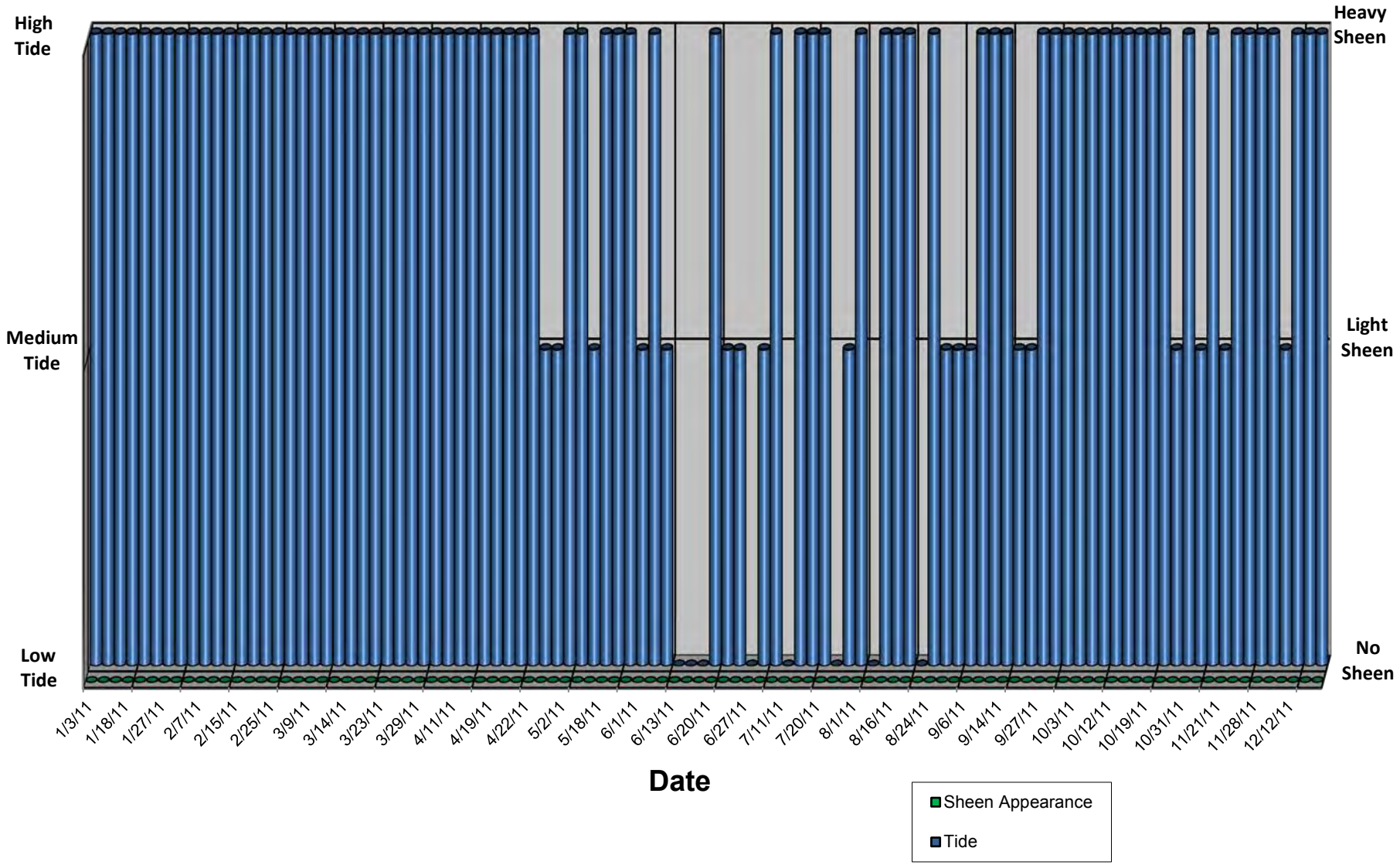
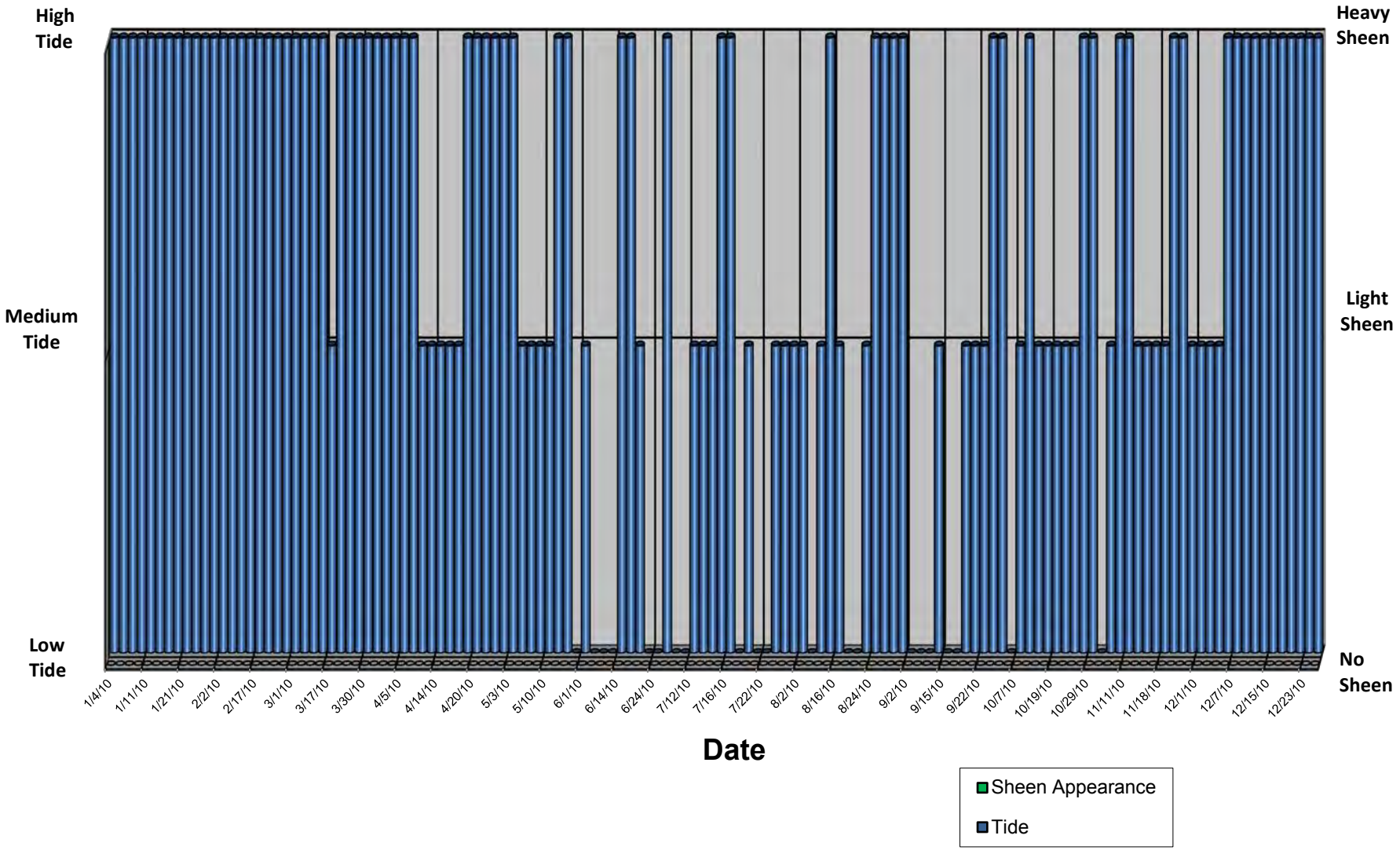
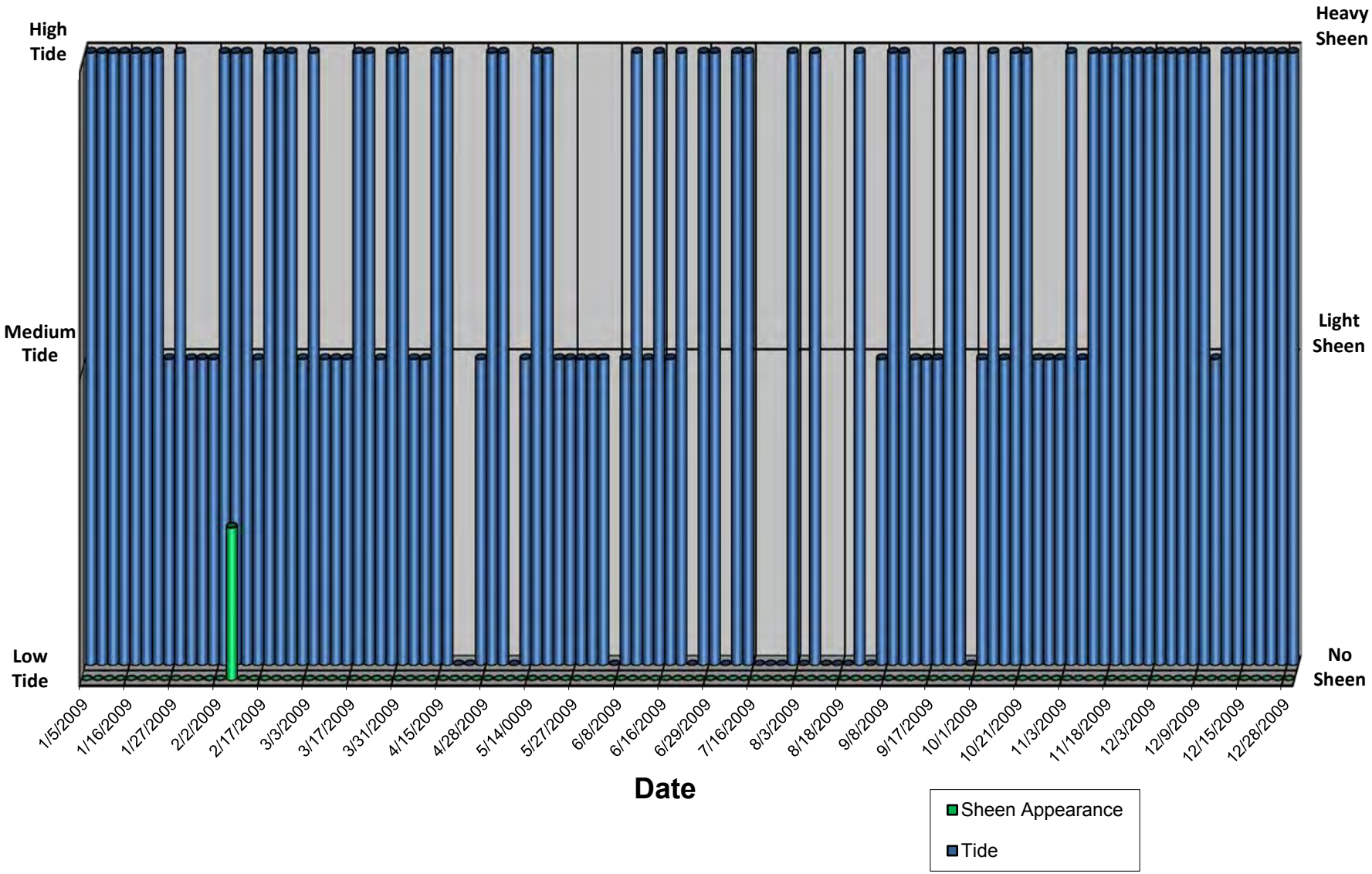
10/29/2…
11/13/2…
11/28/2…
12/7/2012
12/14/2…
12/19/2…
Date
Sheen Appearance
Tide

2011 Sheen Observations: Loading Rack



2010 Sheen Observations: Loading Rack




2009 Sheen Observations: Loading Rack
High Tide
Medium Tide
Low Tide
Heavy Sheen
Light Sheen
No Sheen
1/5/2009
1/16/2009
1/27/2009
2/2/2009
2/17/2009
3/3/2009
3/17/2009
3/31/2009
4/15/2009
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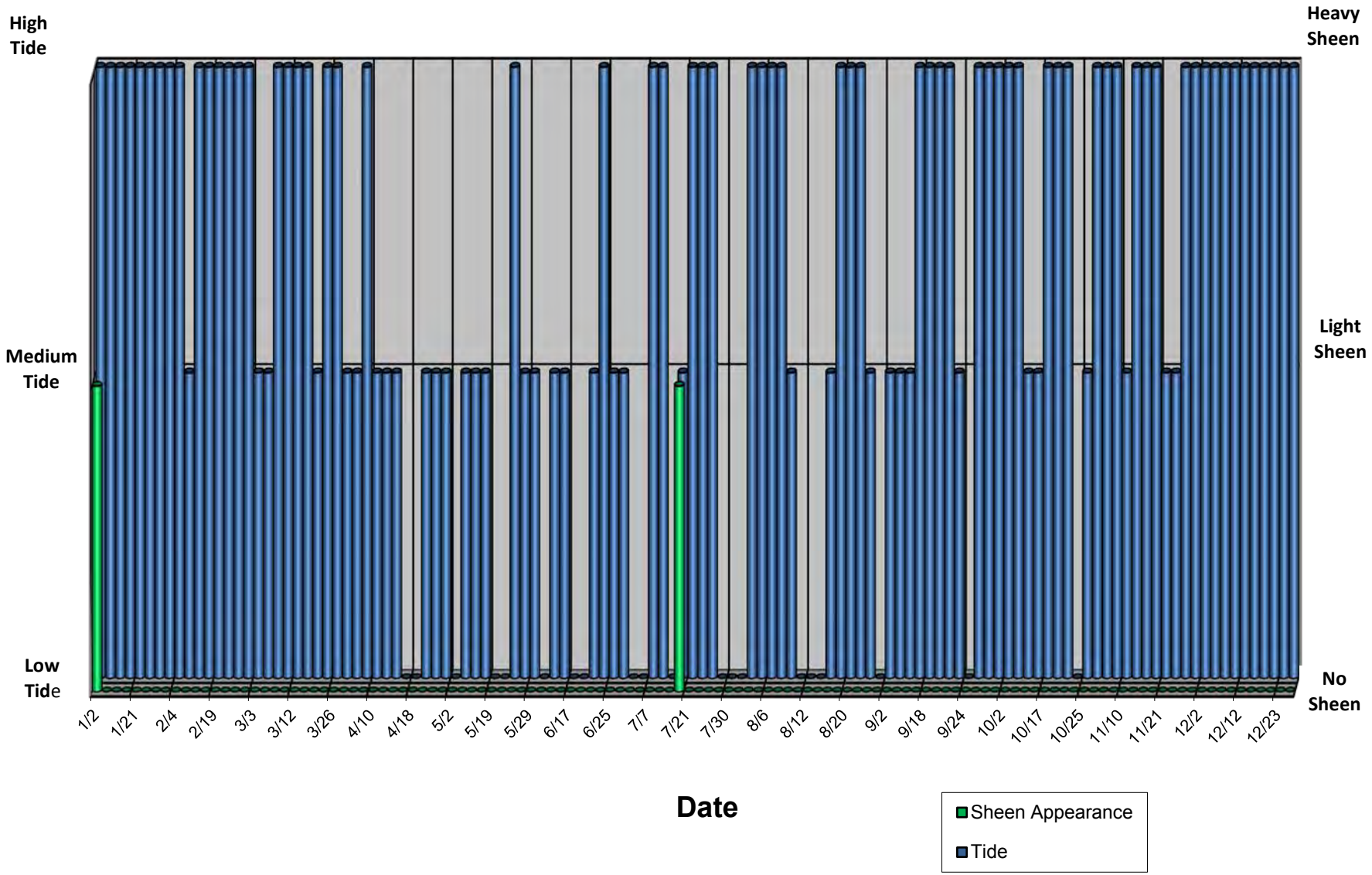
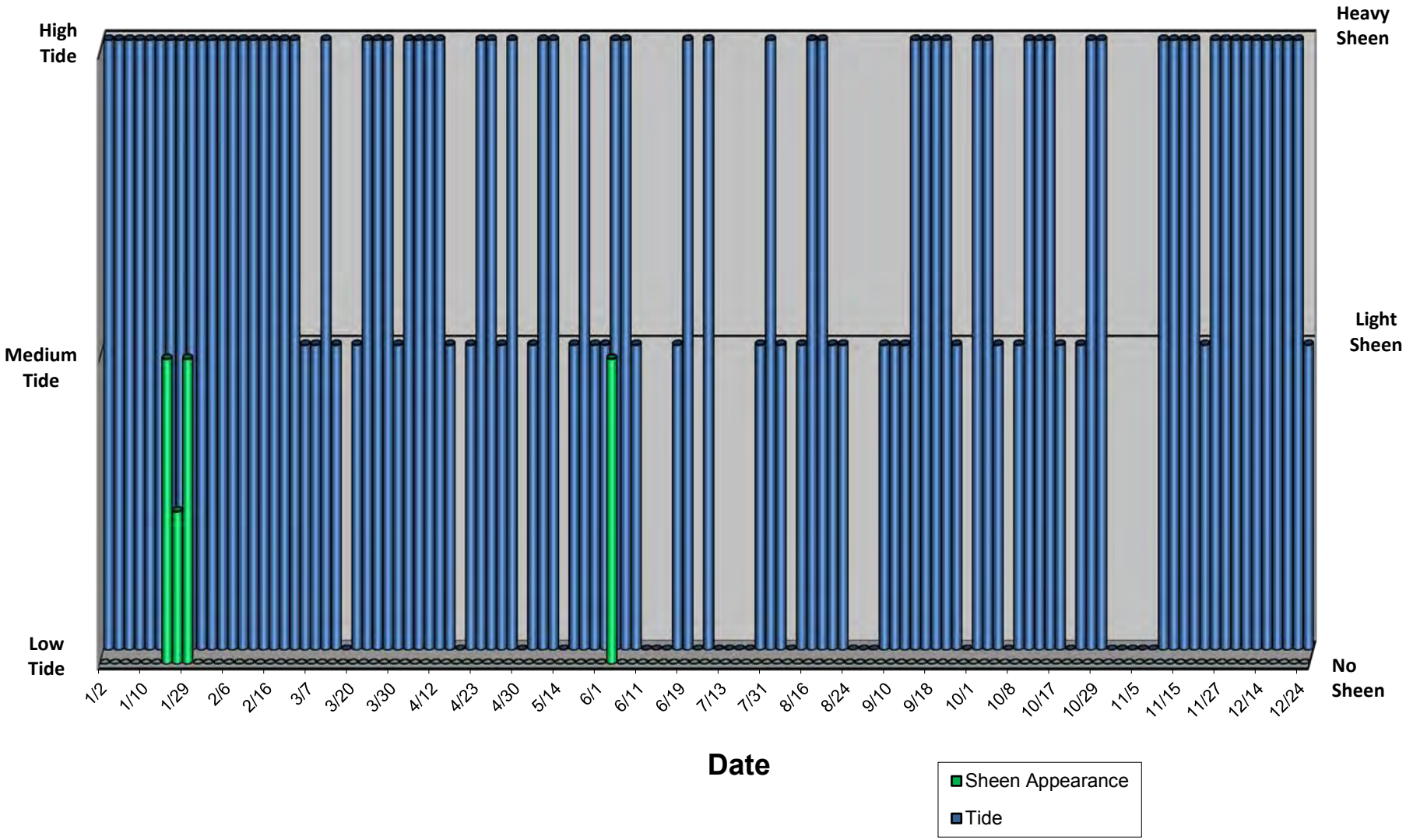
10/21/2009
11/3/2009
11/18/2009
12/3/2009
12/9/2009
12/15/2009
12/28/2009
Date
Sheen Appearance
Tide

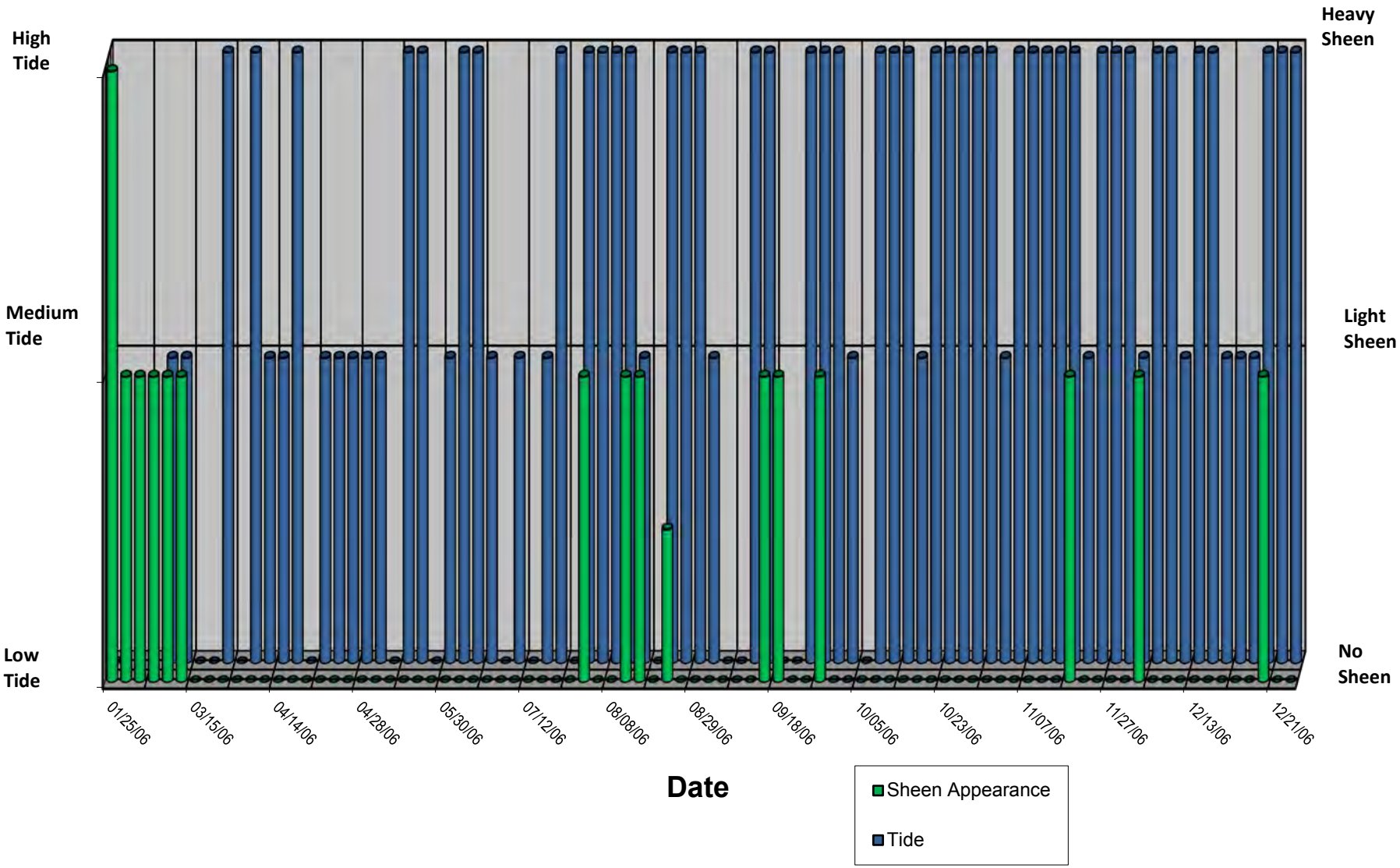
2008 Sheen Observations: Loading Rack



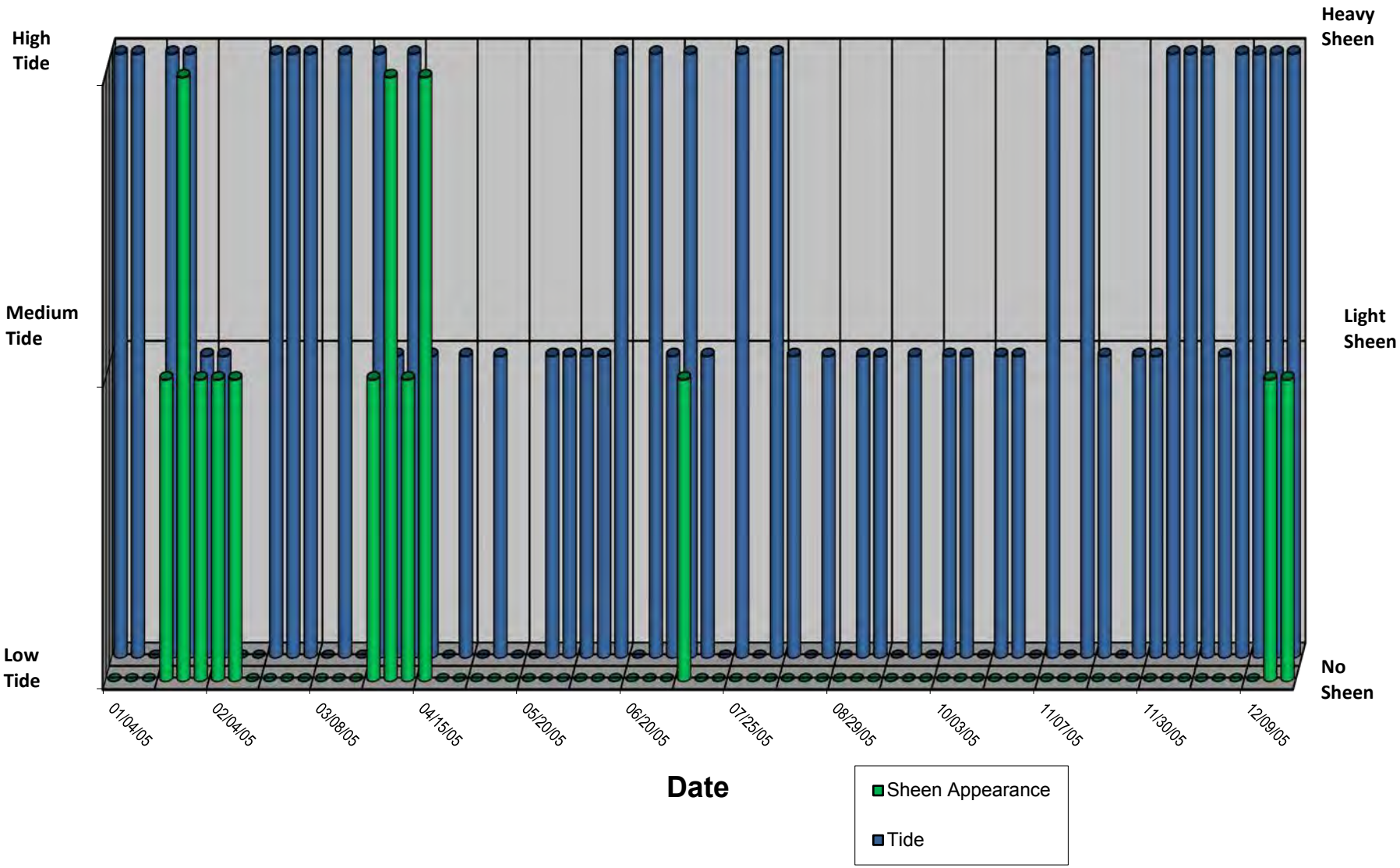
2007 Sheen Observations: Loading Rack

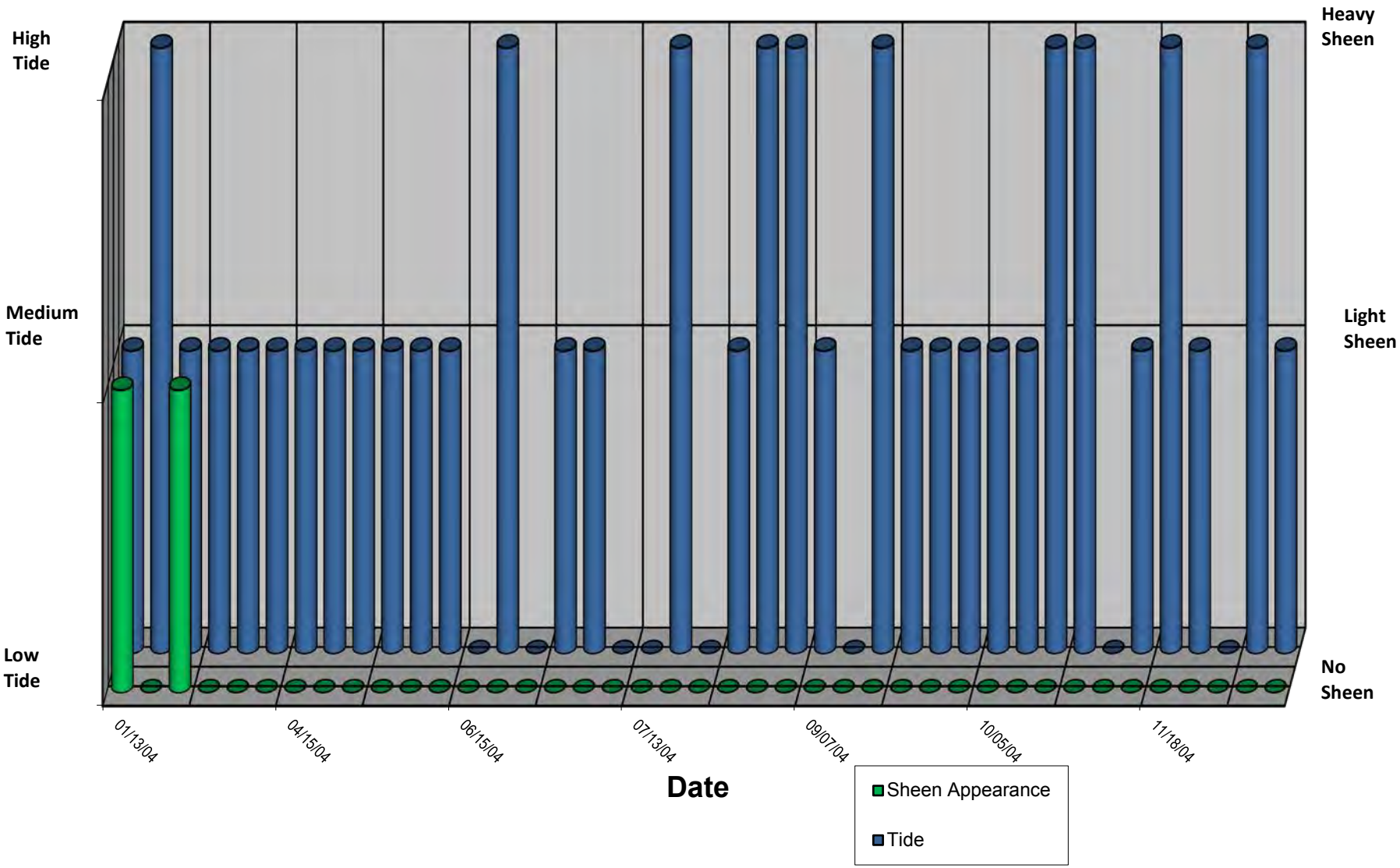


2006 Sheen Observations: Loading Rack

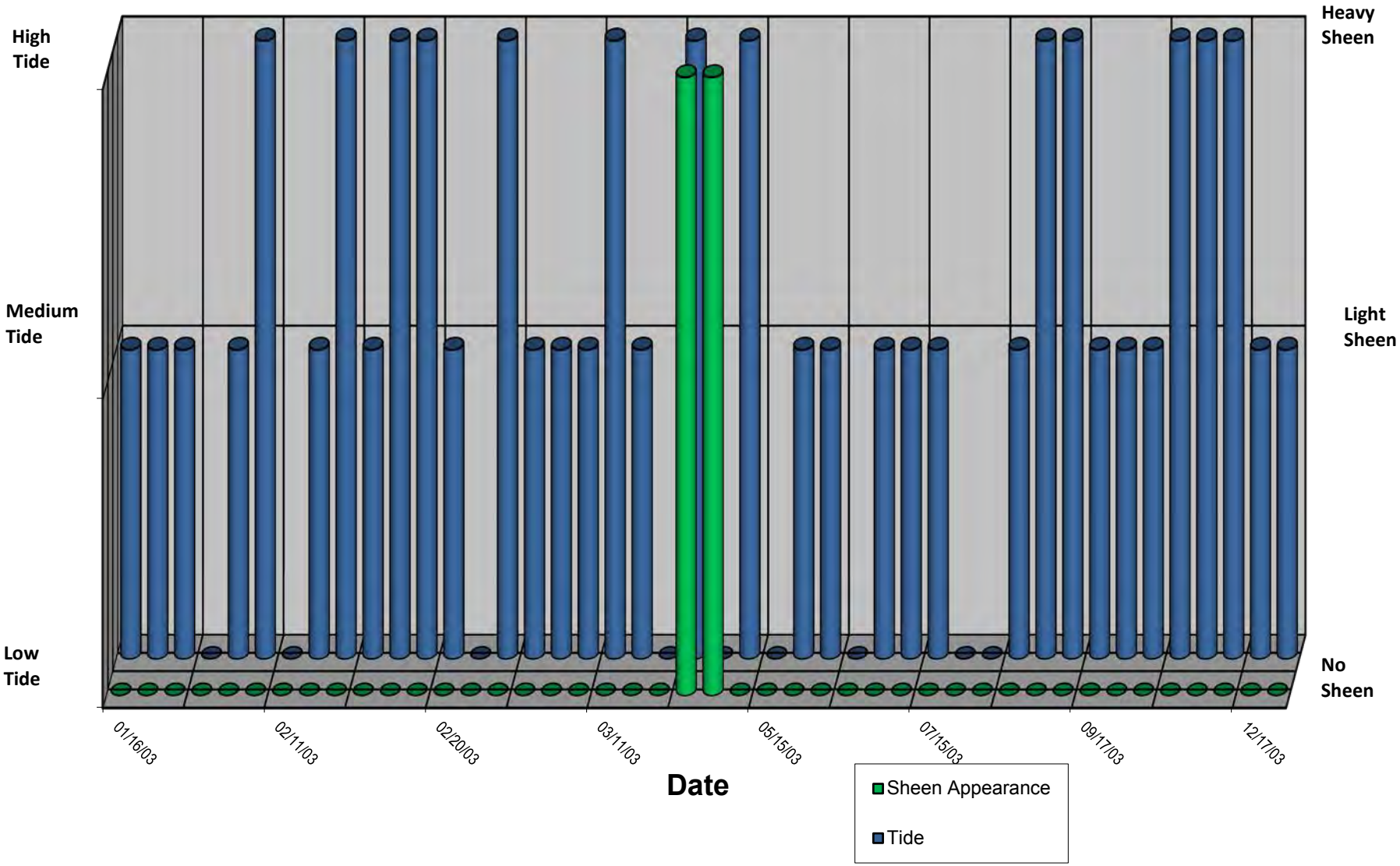


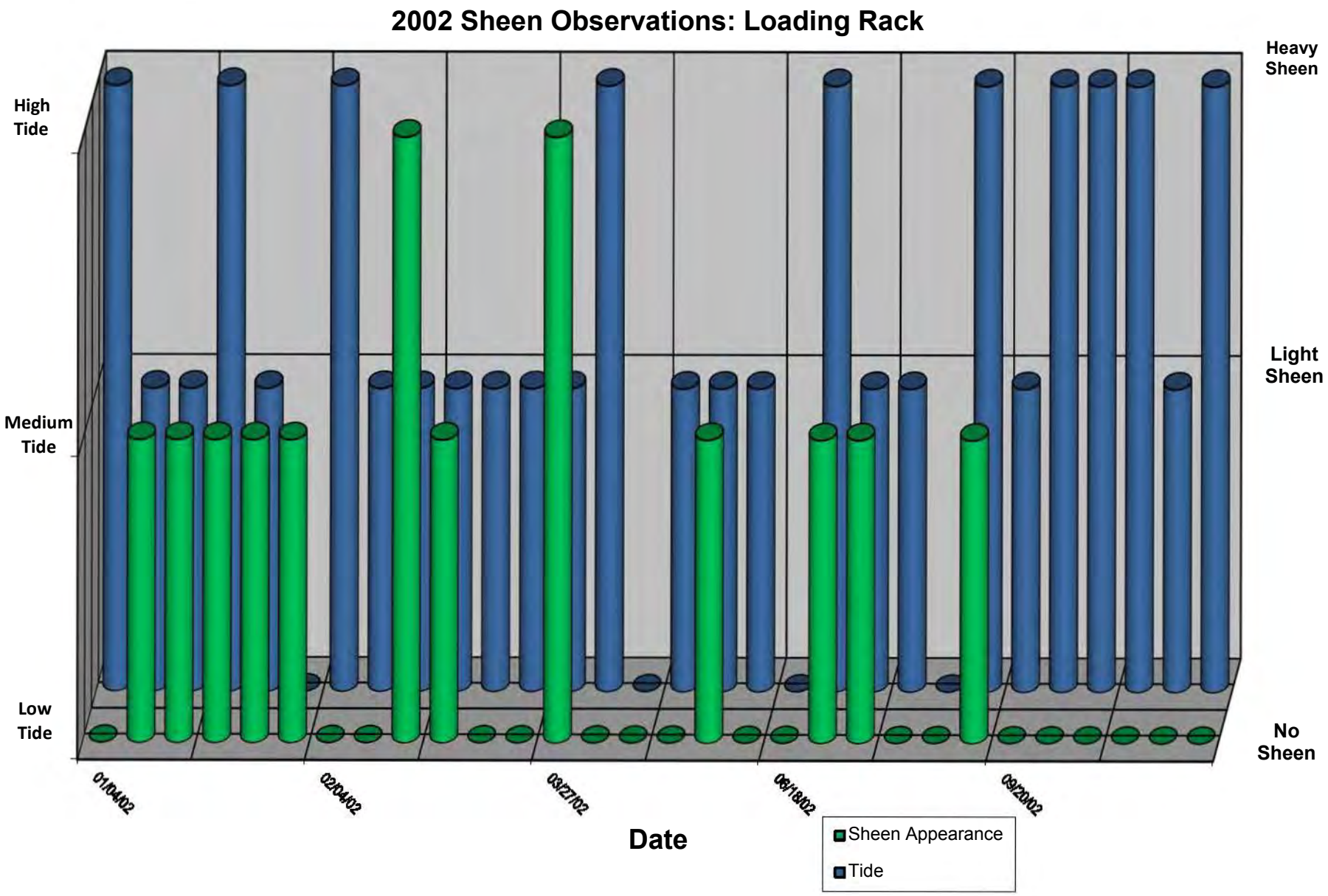
2005 Sheen Observations: Loading Rack

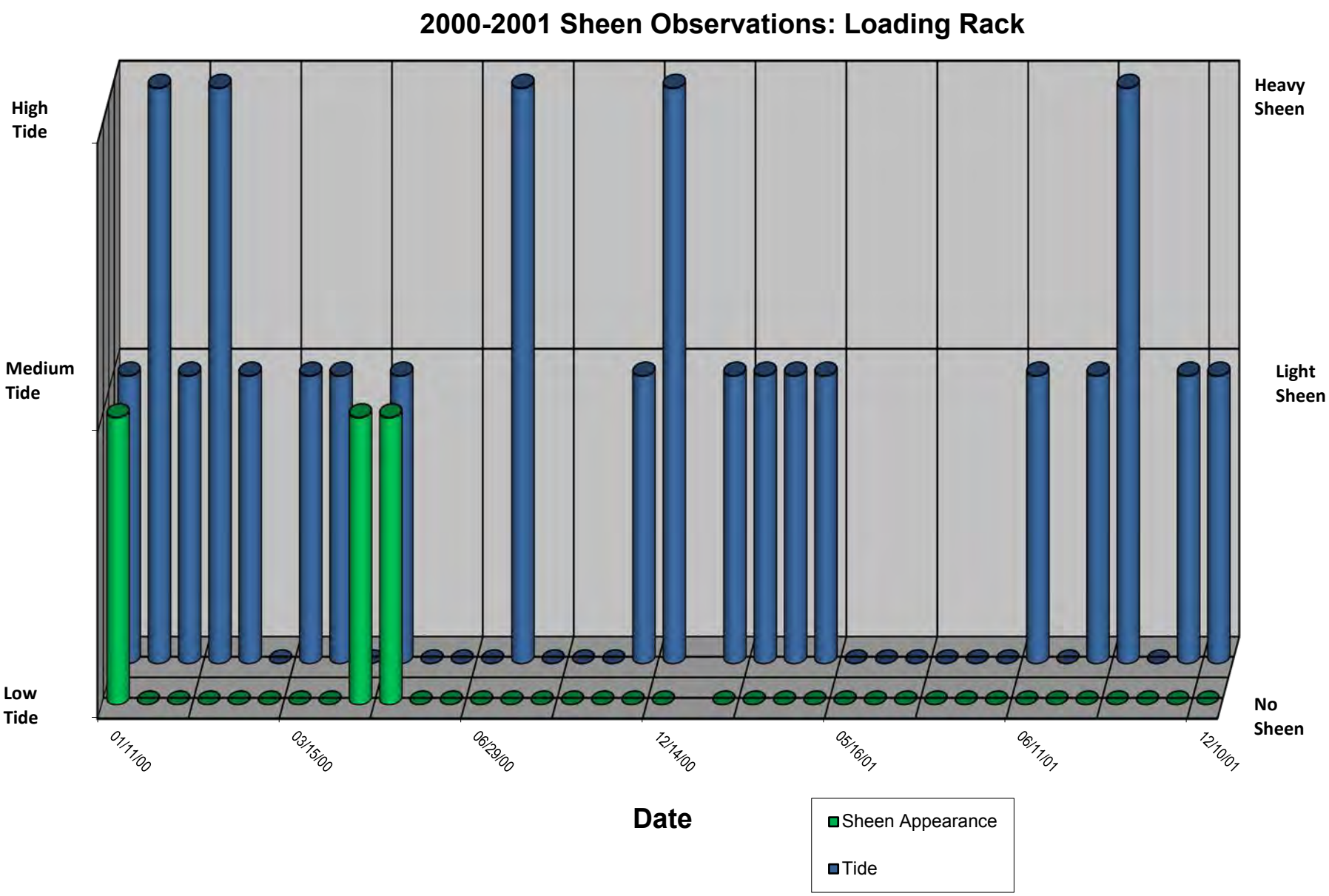



2004 Sheen Observations: Loading Rack
High Tide
Medium Tide
Low Tide
Heavy Sheen
Light Sheen
No Sheen
01/13/04
04/15/04
06/15/04
07/13/04
09/07/04
10/05/04
11/18/04
Date
Sheen Appearance
Tide

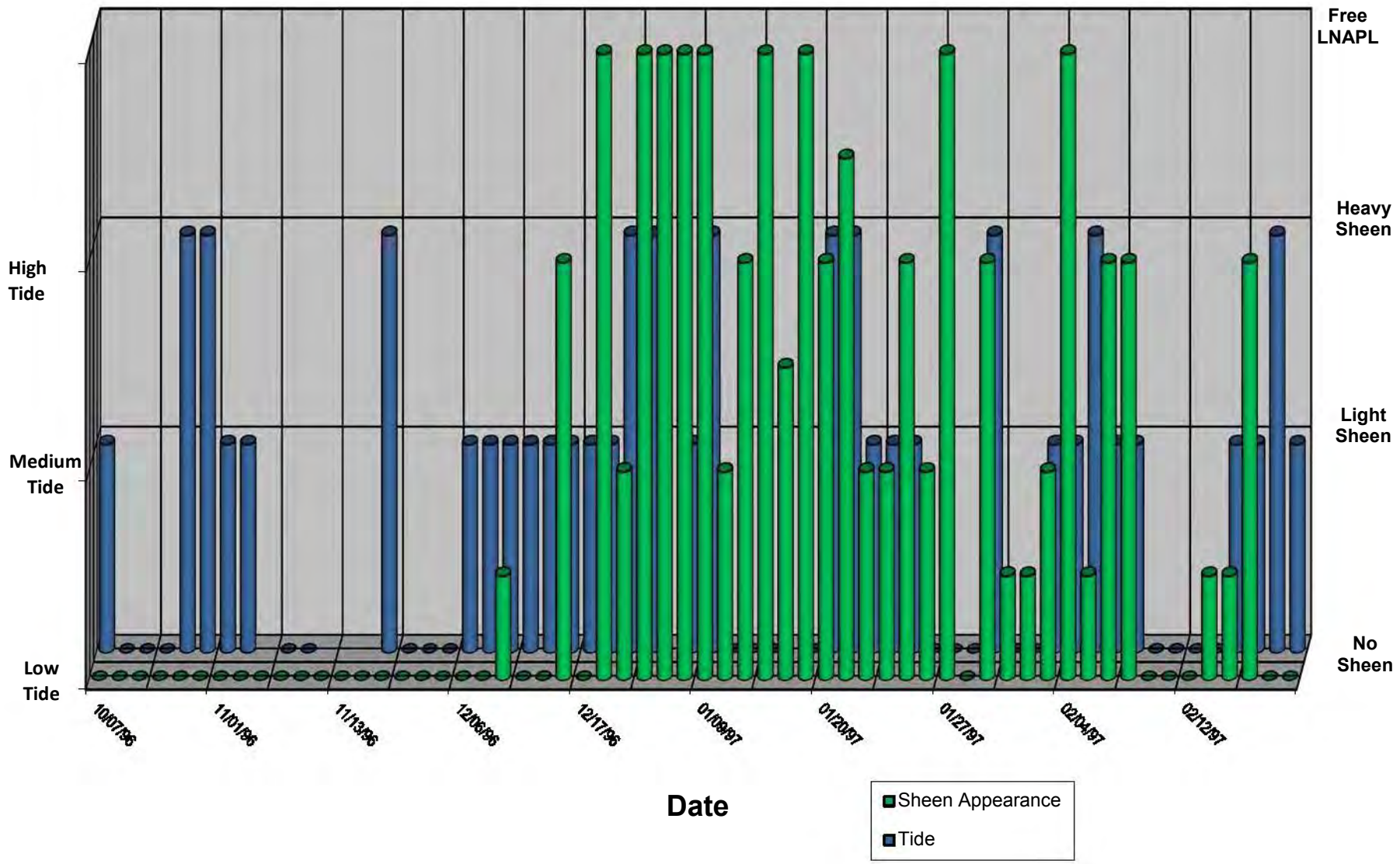
2003 Sheen Observations: Loading Rack



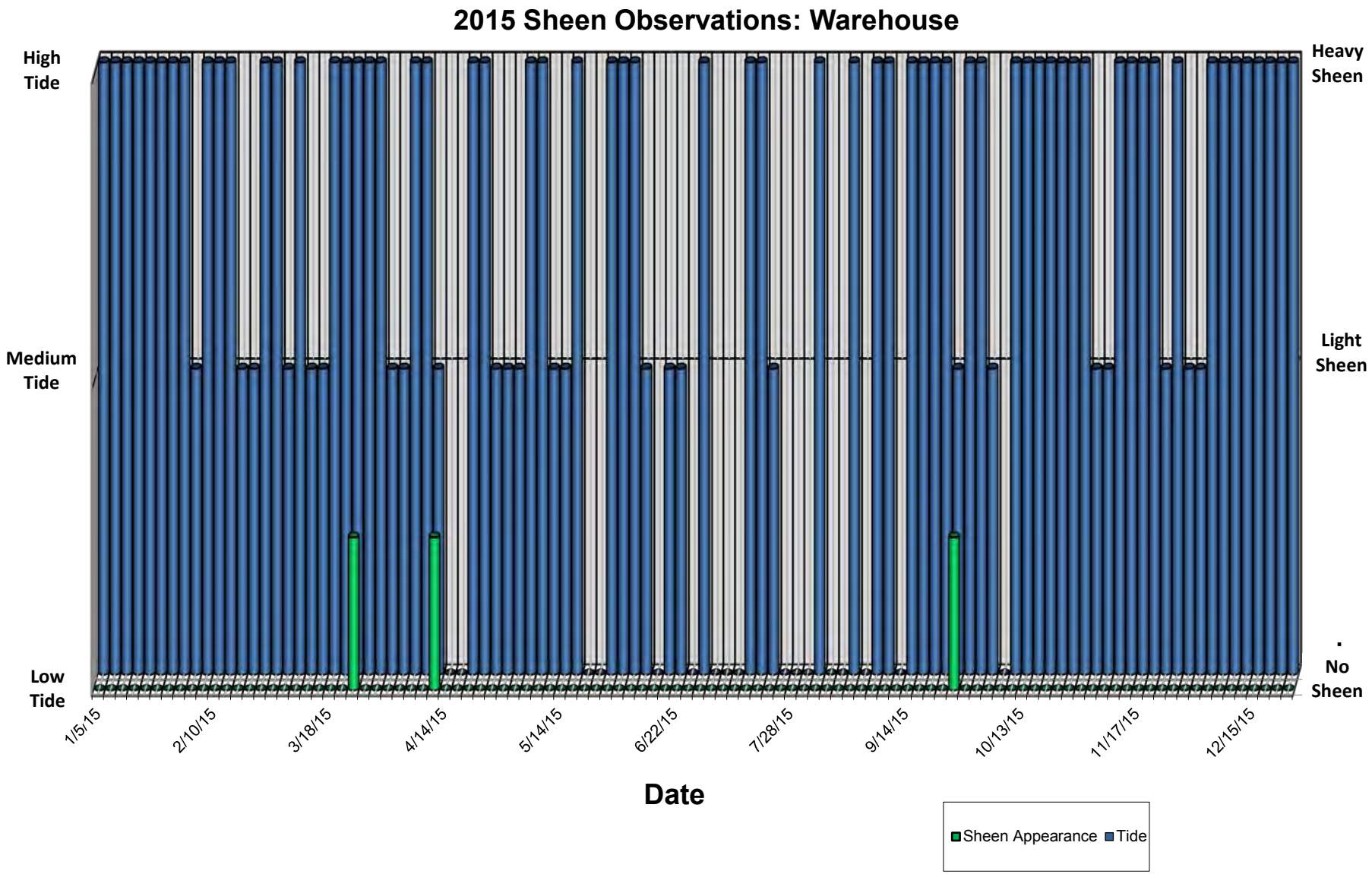

2002 Sheen Observations: Loading Rack
High Tide
Medium Tide
Low Tide
Heavy Sheen
Light Sheen
No Sheen
01/04/02
02/04/02
03/27/02
06/18/02
09/20/02
Date
Sheen Appearance
Tide

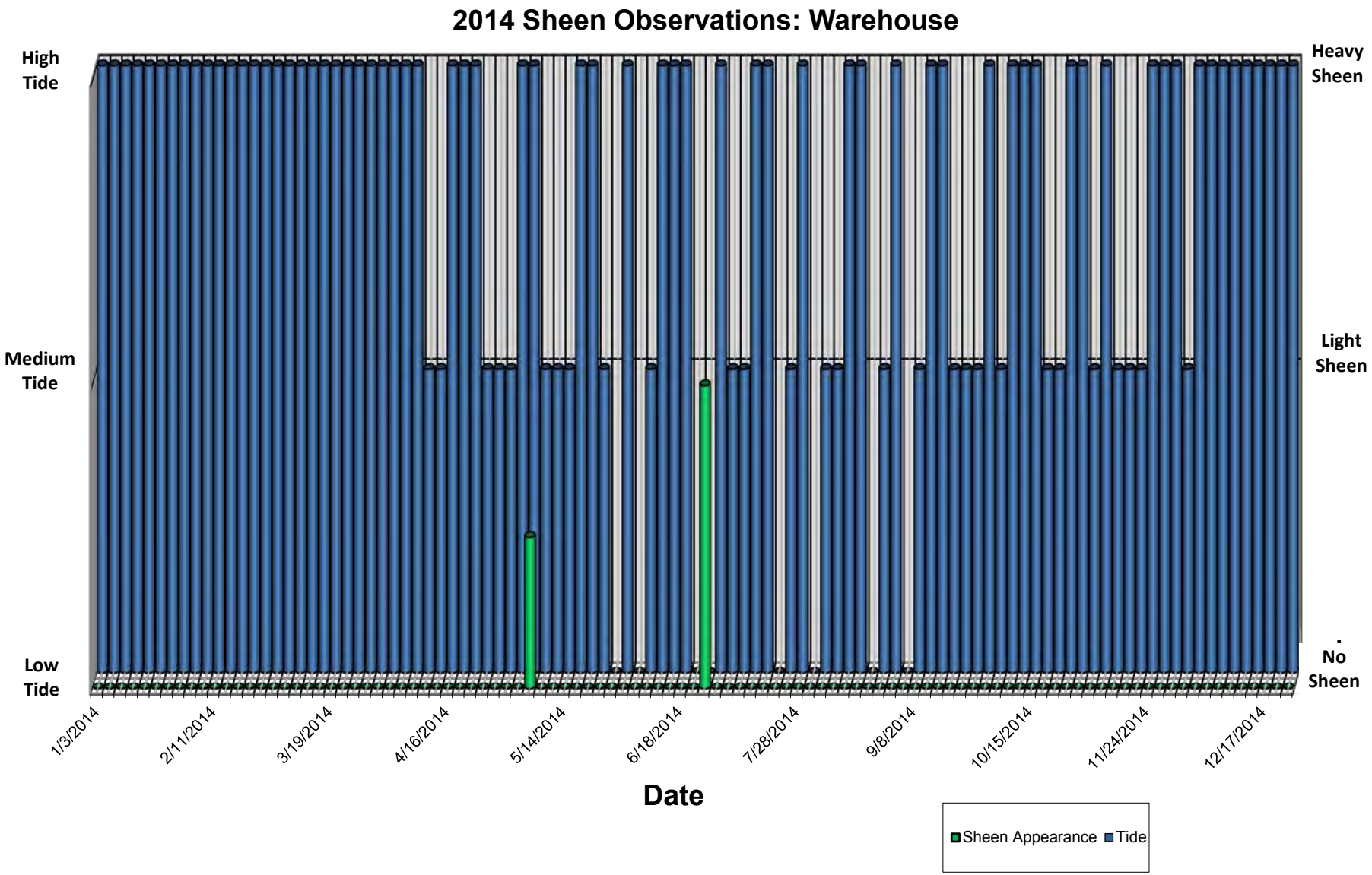

2000-2001 Sheen Observations: Loading Rack
High Tide
Medium Tide
Low Tide
Heavy Sheen
Light Sheen
No Sheen
01/11/00
03/15/00
06/29/00
12/14/00
05/16/01
06/11/01
12/10/01
Date
Sheen Appearance
Tide

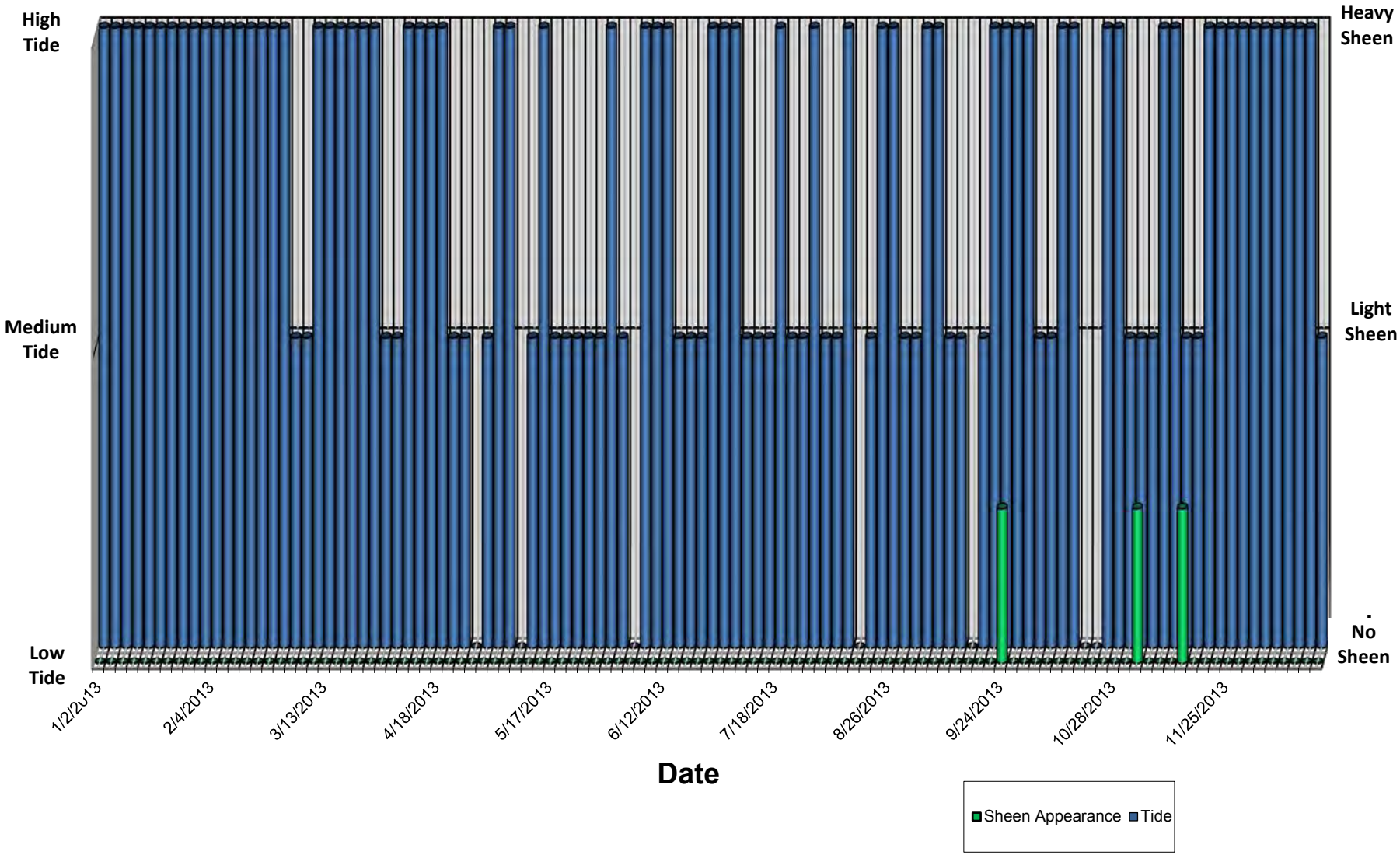
1996-1997 Sheen Observations: Loading Rack

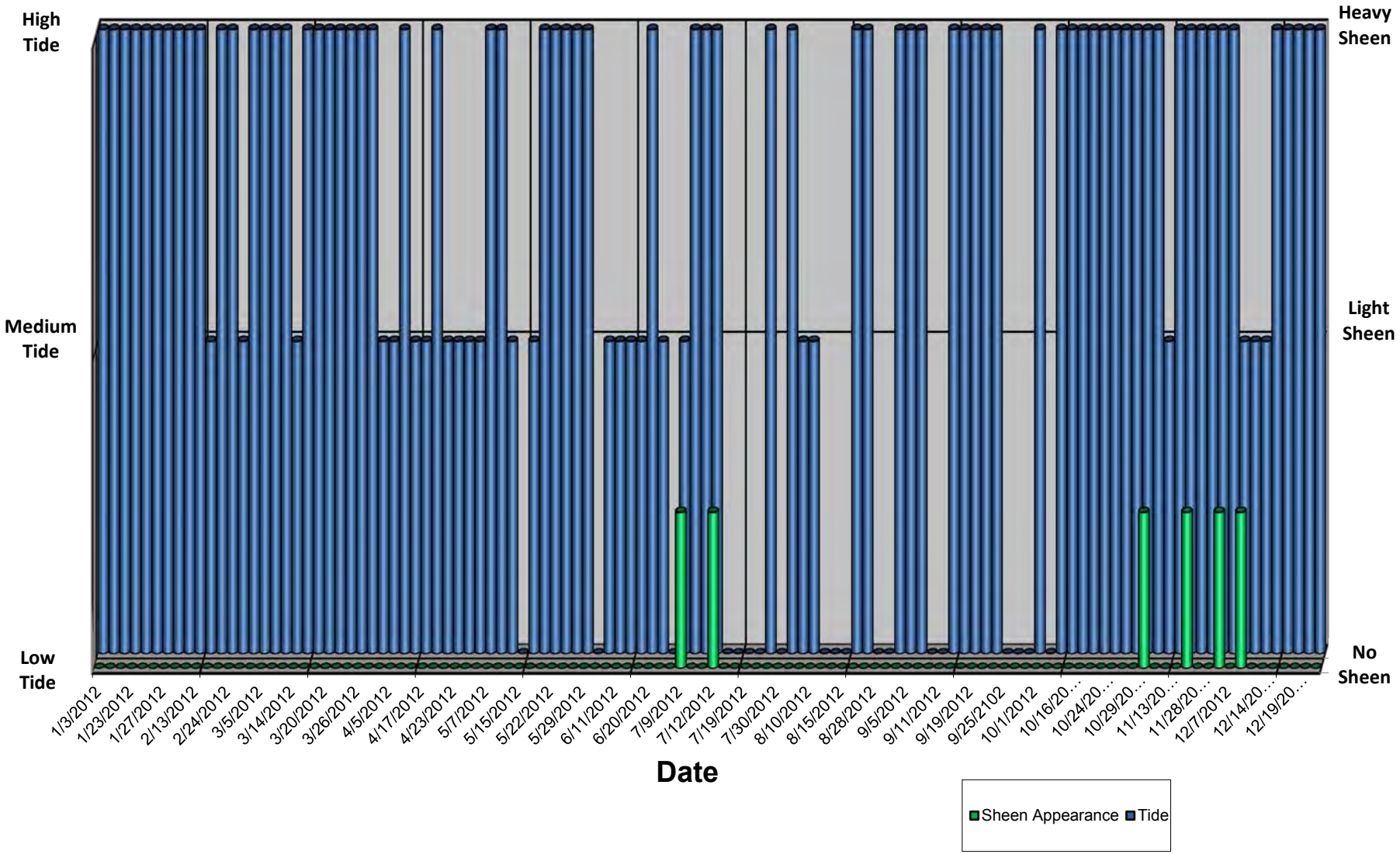


Sheen Observations - Warehouse
BP West Coast Products Terminal 21T, Harbor Island, Seattle

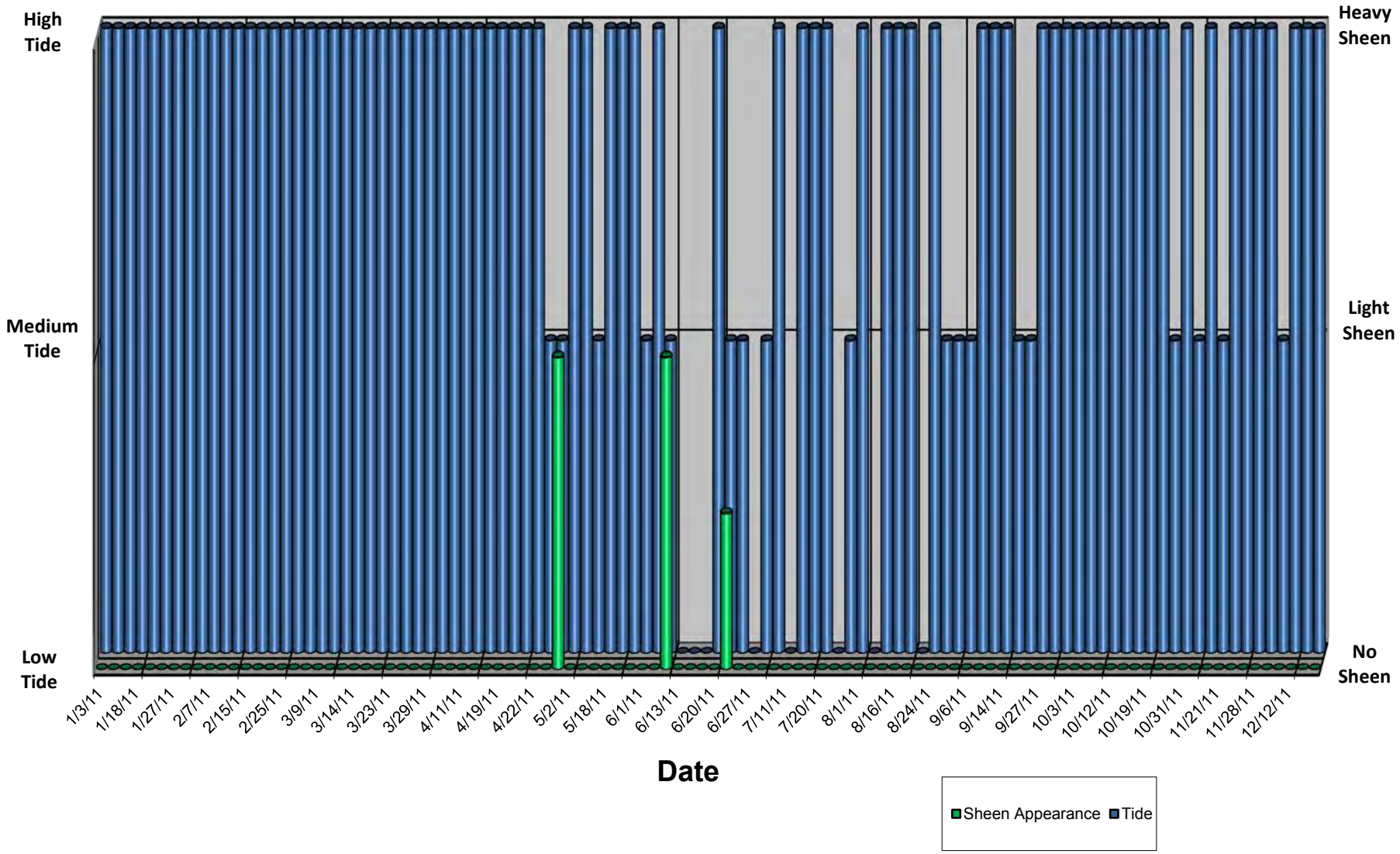



2014 Sheen Observations: Warehouse
High Tide
Medium Tide
Low Tide
Heavy Sheen
Light Sheen
No Sheen
1/3/2014
2/11/2014
3/19/2014
4/16/2014
5/14/2014
6/18/2014
7/28/2014
9/8/2014
10/15/2014
11/24/2014
12/17/2014
Date
Sheen Appearance
Tide

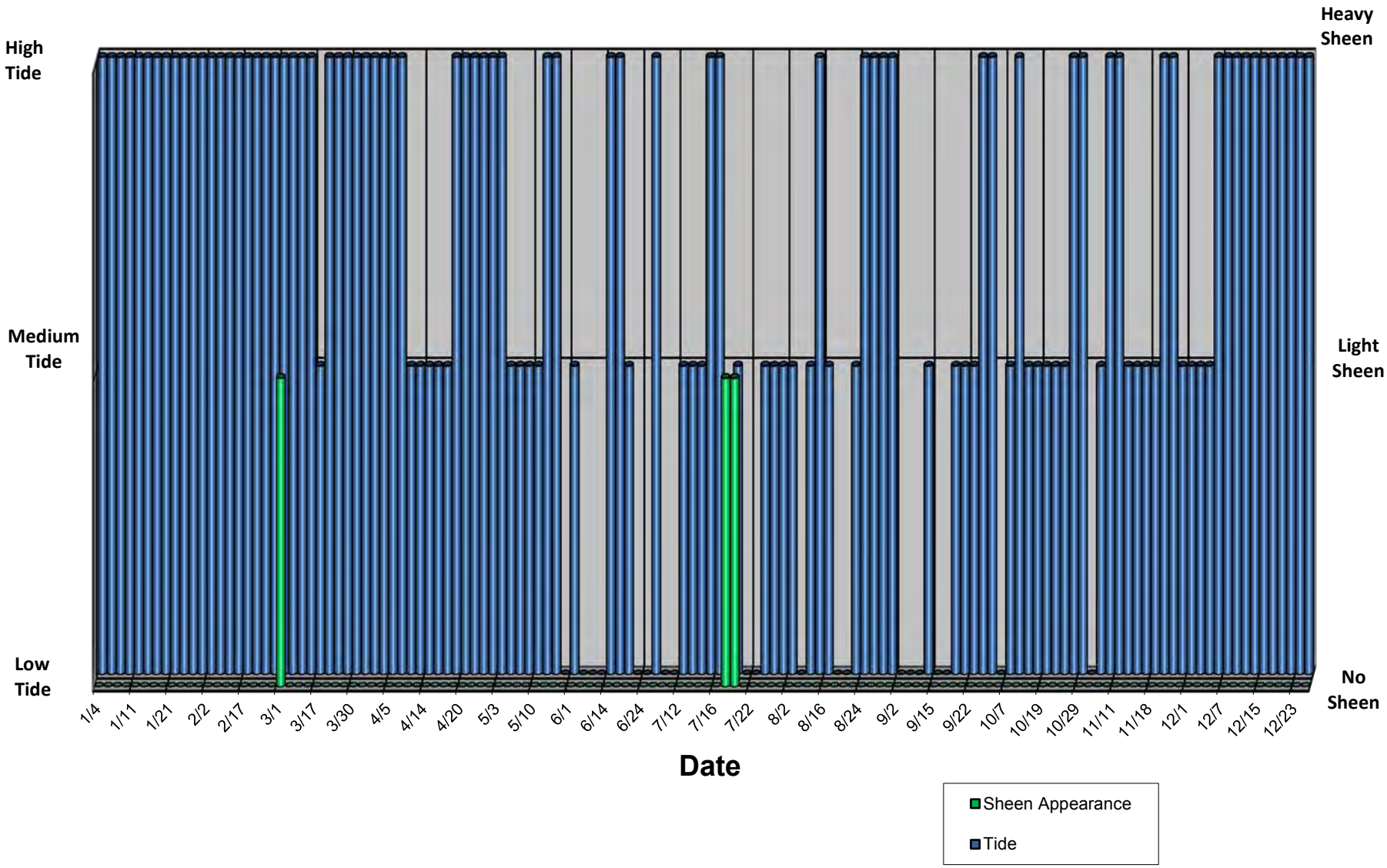

2013 Sheen Observations: Warehouse
High Tide
Medium Tide
Low Tide
Heavy Sheen
Light Sheen
No Sheen
1/2/2013
2/4/2013
3/13/2013
4/18/2013
5/17/2013
6/12/2013
7/18/2013
8/26/2013
9/24/2013
10/28/2013
11/25/2013
Date
Sheen Appearance
Tide

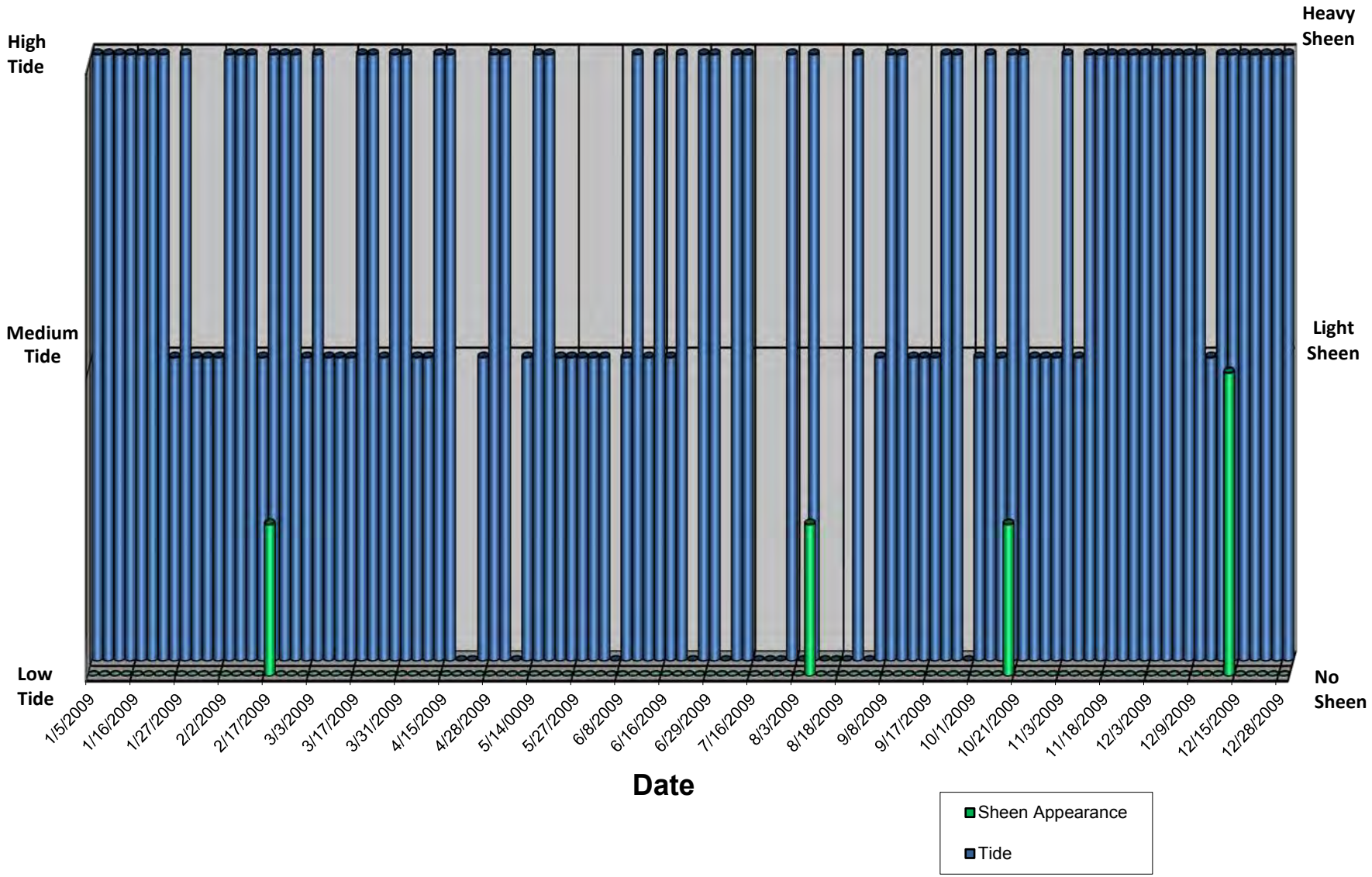

2012 Sheen Observations: Warehouse
High Tide
Medium Tide
Low Tide
Heavy Sheen
Light Sheen
No Sheen
1/3/2012
1/23/2012
1/27/2012
2/13/2012
2/24/2012
3/5/2012
3/14/2012
3/20/2012
3/26/2012
4/5/2012
4/17/2012
4/23/2012
5/7/2012
5/15/2012
5/22/2012
5/29/2012
6/11/2012
6/20/2012
7/9/2012
7/12/2012
7/19/2012
7/30/2012
8/10/2012
8/15/2012
8/28/2012
9/5/2012
9/11/2012
9/19/2012
9/25/2102
10/1/2012
10/16/20…
10/24/20…
10/29/20…
11/13/20…
11/28/20…
12/7/2012
12/14/20…
12/19/20…
Date
Sheen Appearance
Tide

2011 Sheen Observations: Warehouse

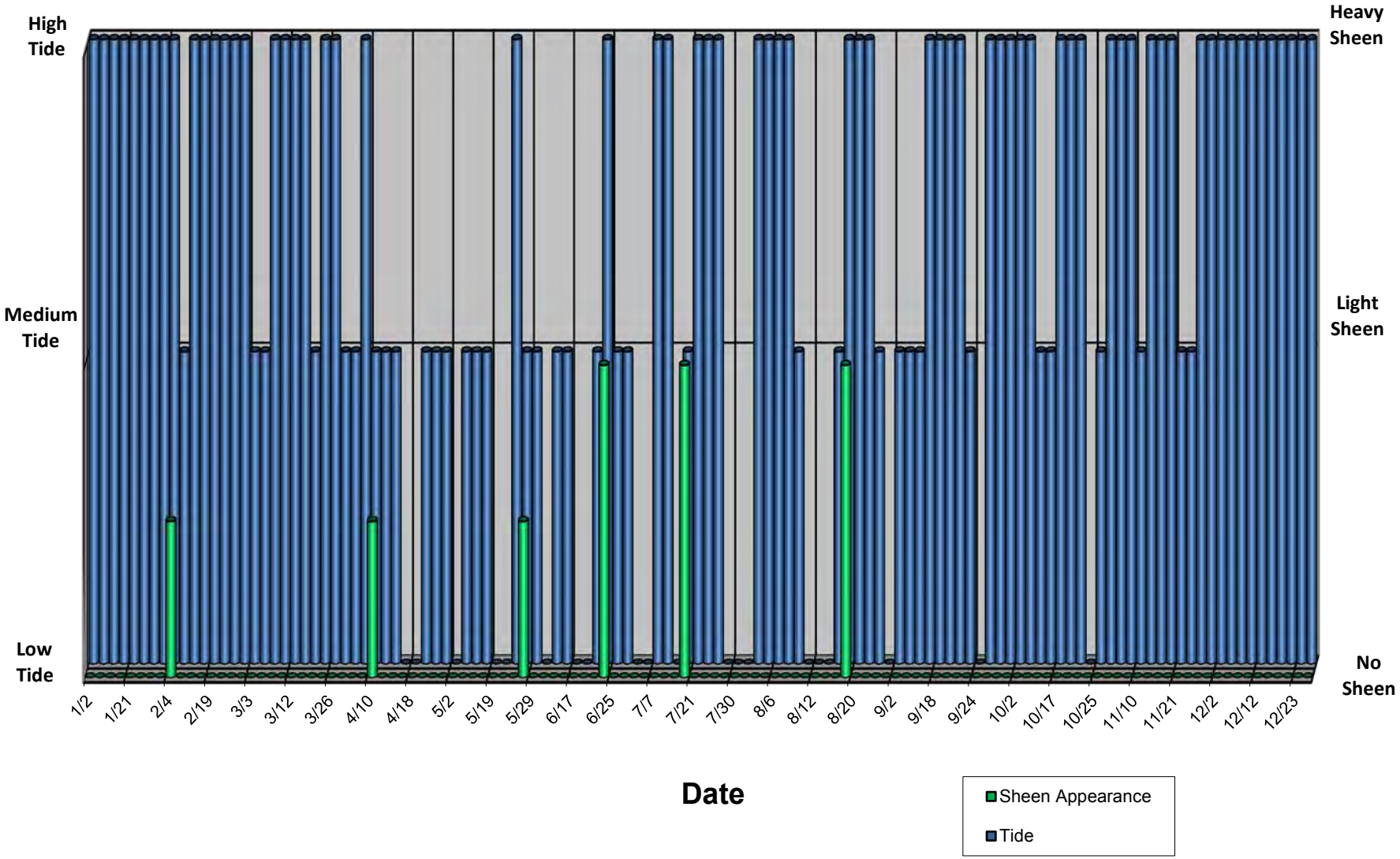


2010 Sheen Observations: Warehouse

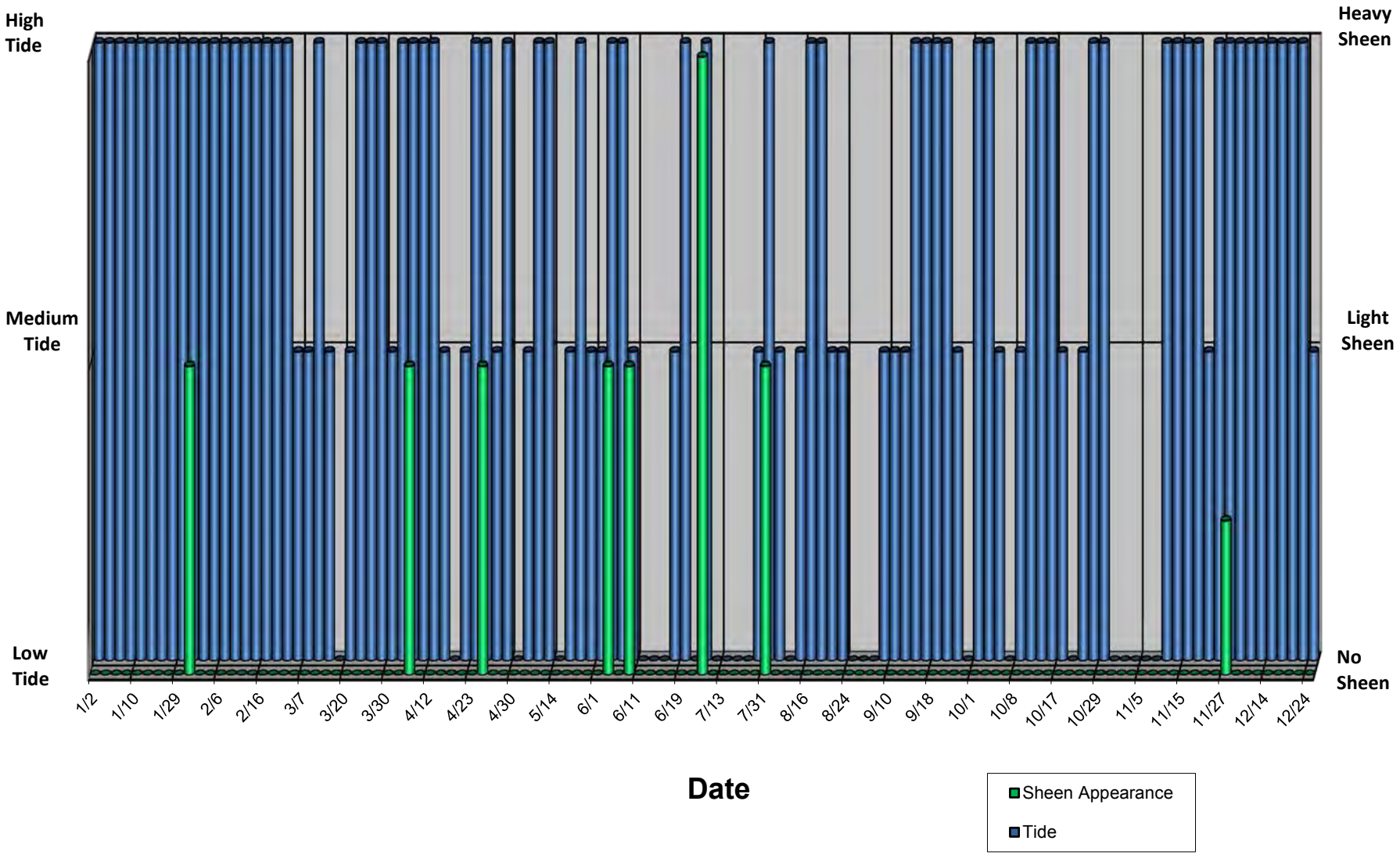



2009 Sheen Observations: Warehouse
High Tide
Medium Tide
Low Tide
Heavy Sheen
Light Sheen
No Sheen
1/5/2009
1/16/2009
1/27/2009
2/2/2009
2/17/2009
3/3/2009
3/17/2009
3/31/2009
4/15/2009
4/28/2009
5/14/0009
5/27/2009
6/8/2009
6/16/2009
6/29/2009
7/16/2009
8/3/2009
8/18/2009
9/8/2009
9/17/2009
10/1/2009
10/21/2009
11/3/2009
11/18/2009
12/3/2009
12/9/2009
12/15/2009
12/28/2009
Date
Sheen Appearance
Tide

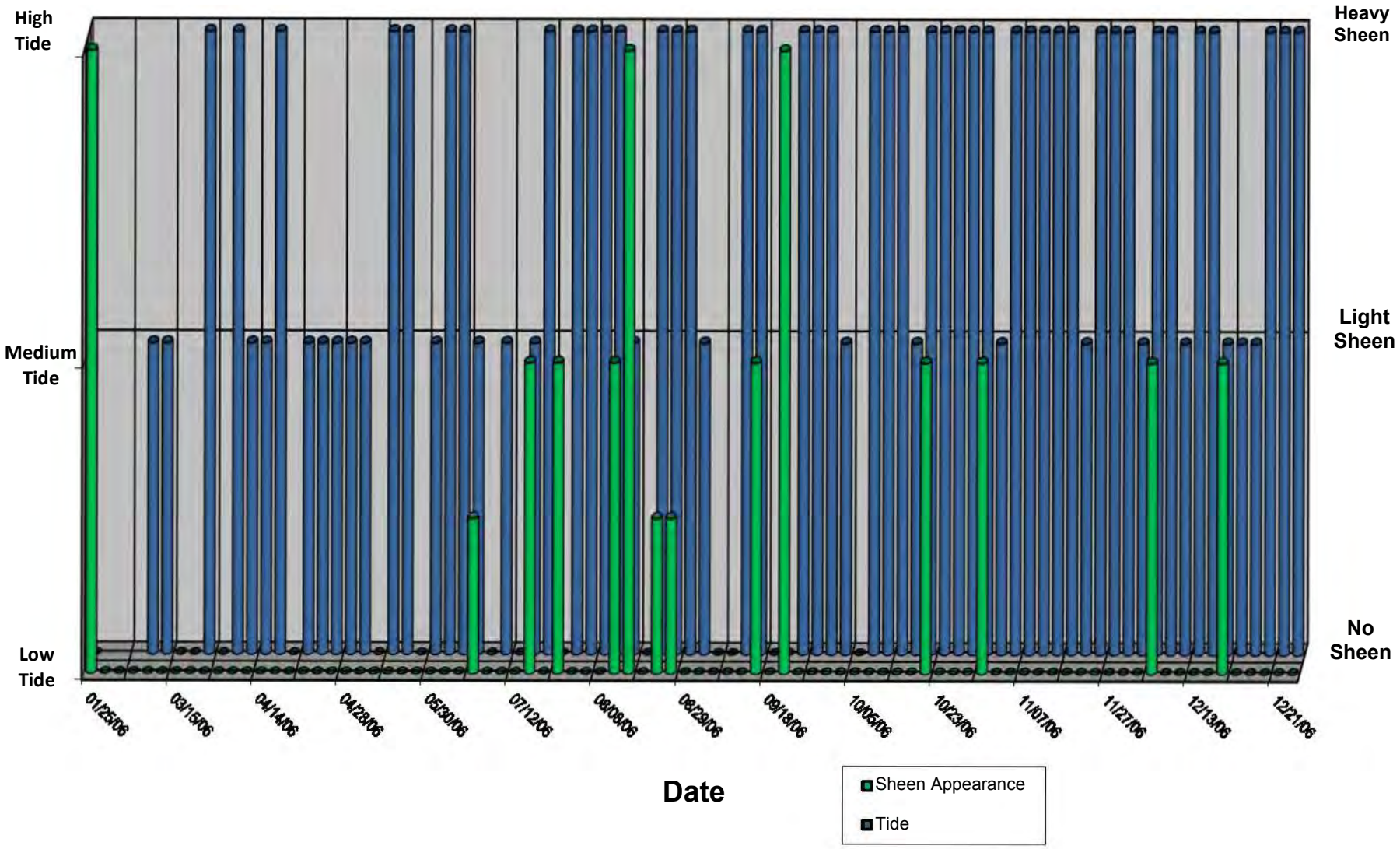
2008 Sheen Observations: Warehouse



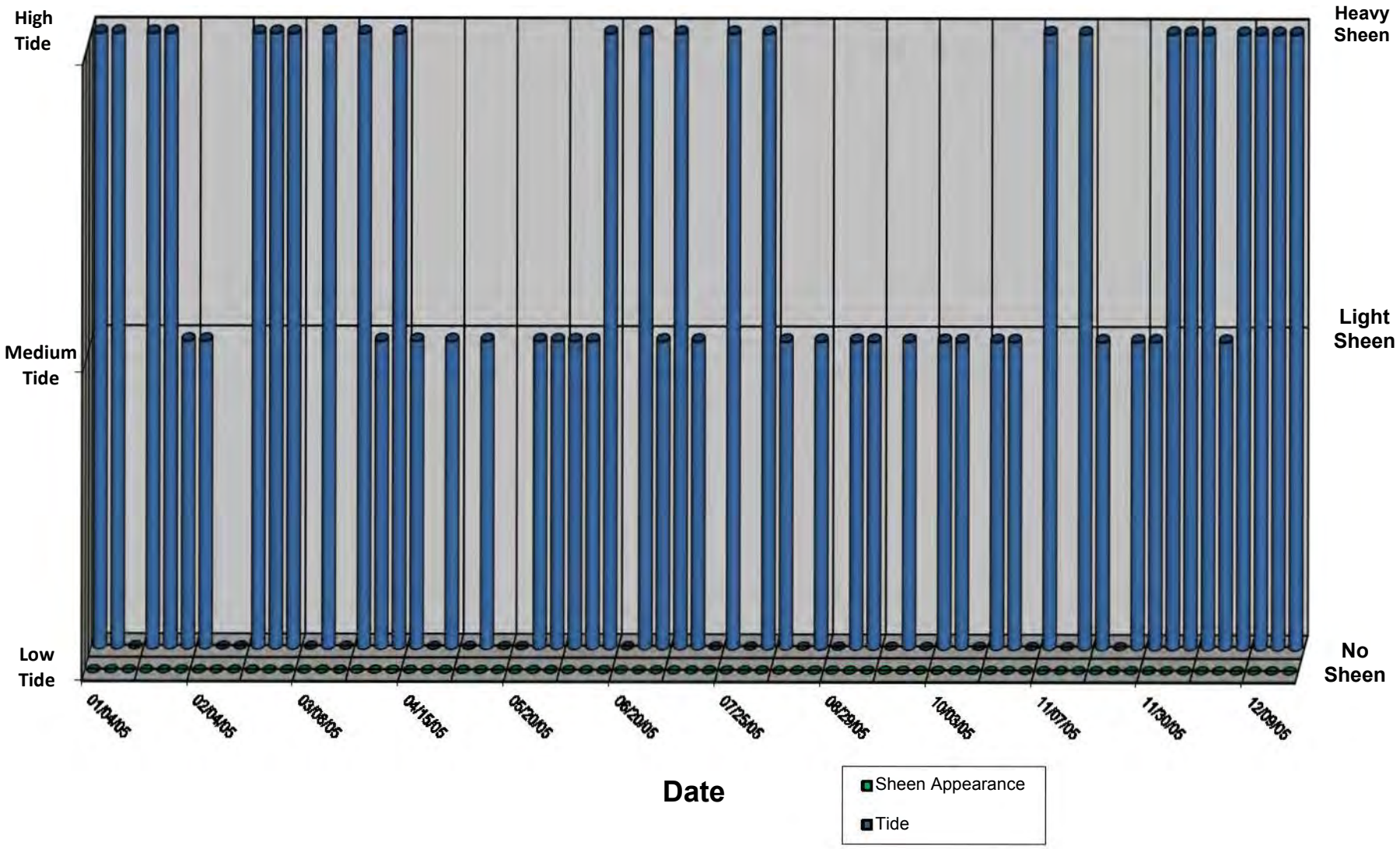
2007 Sheen Observations: Warehouse



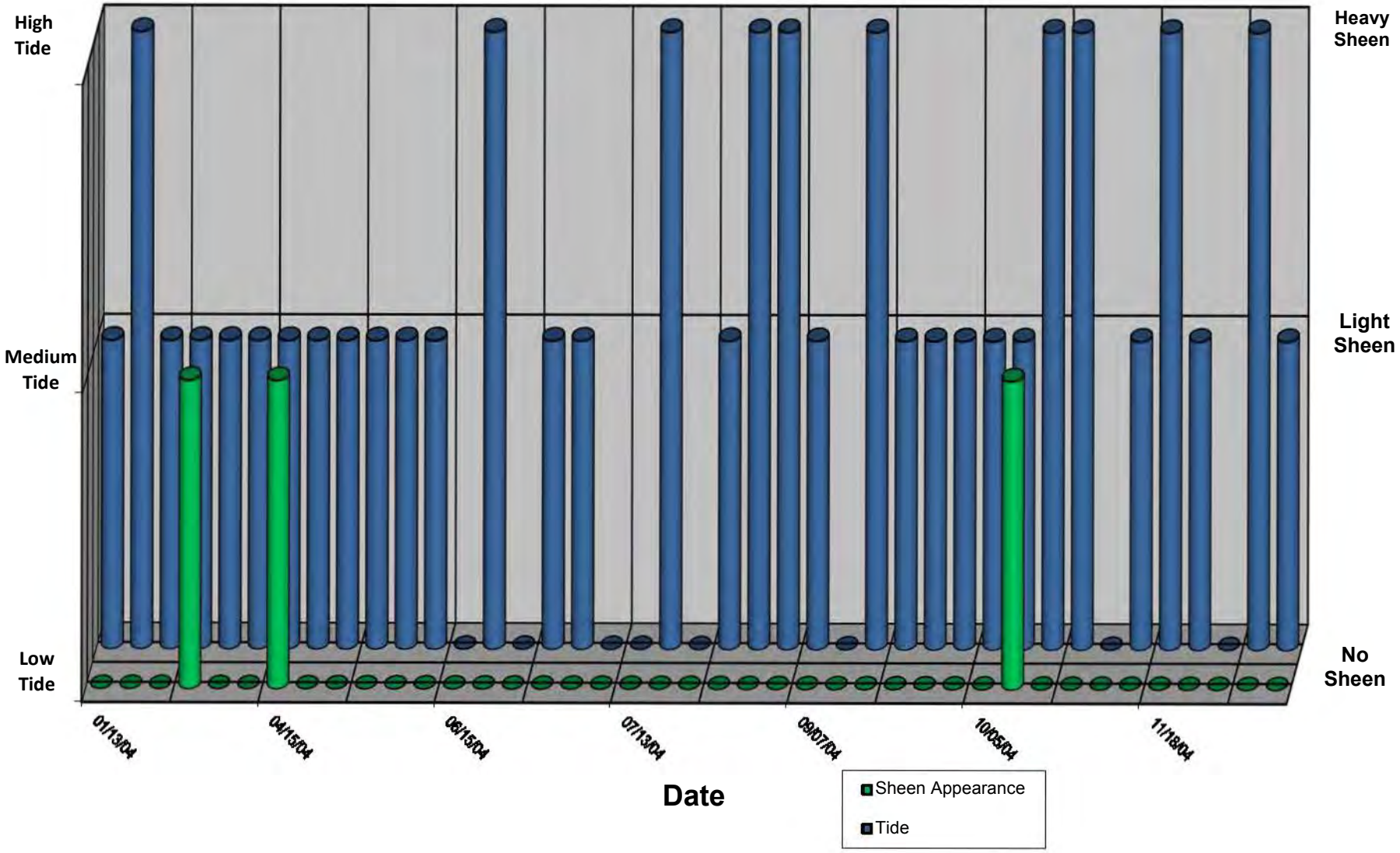
2006 Sheen Observations: Warehouse



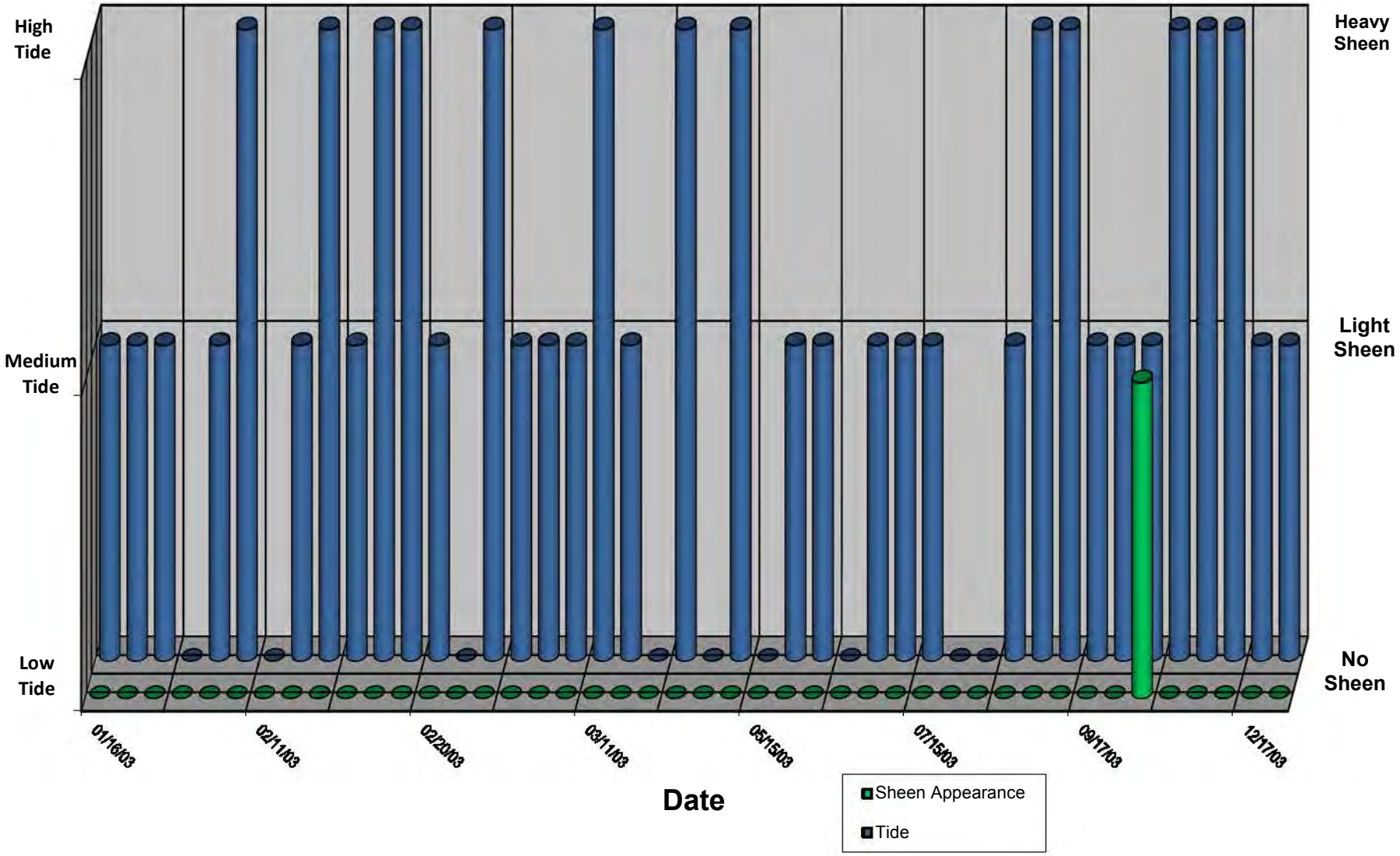
2005 Sheen Observations: Warehouse



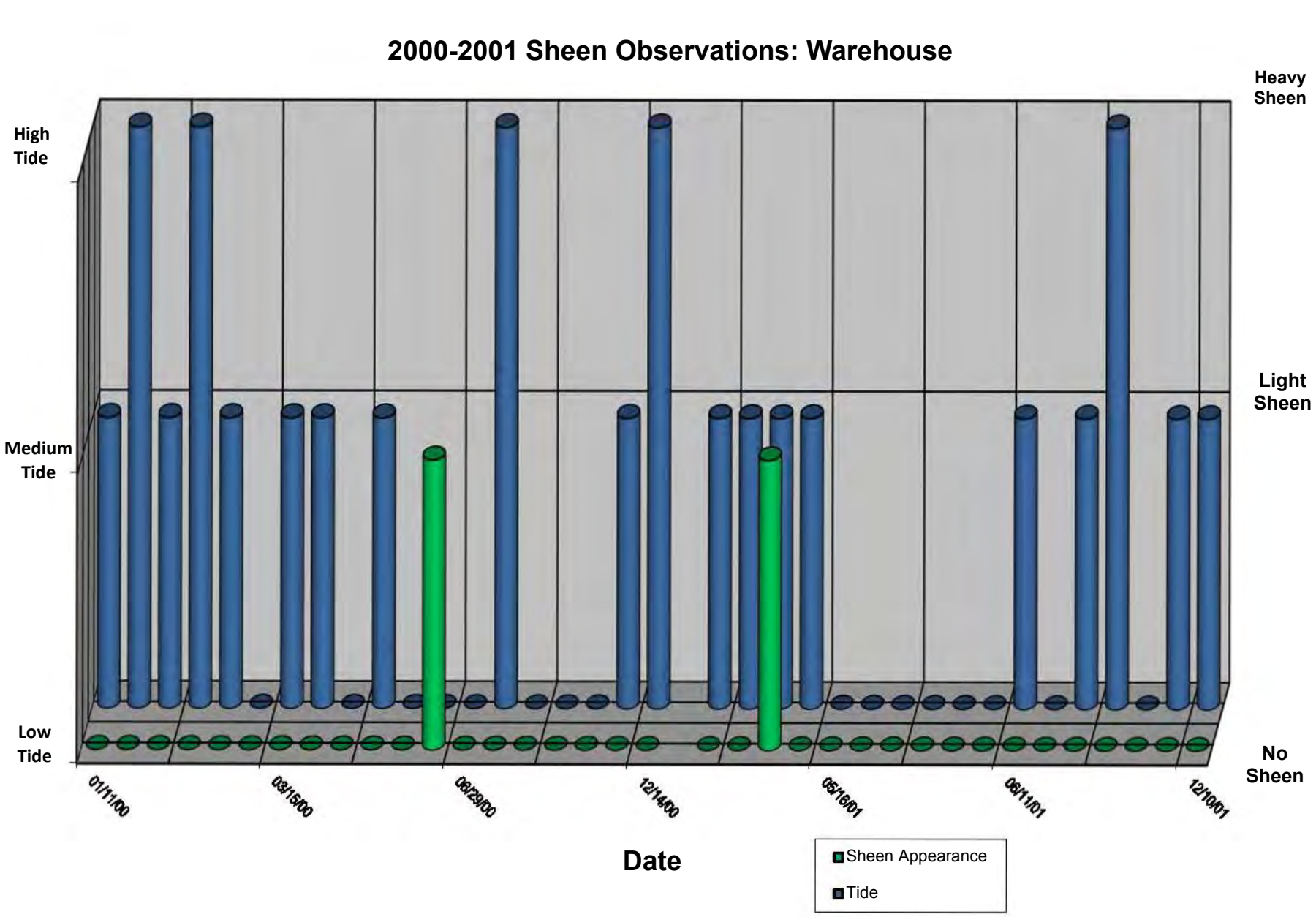
2004 Sheen Observations: Warehouse



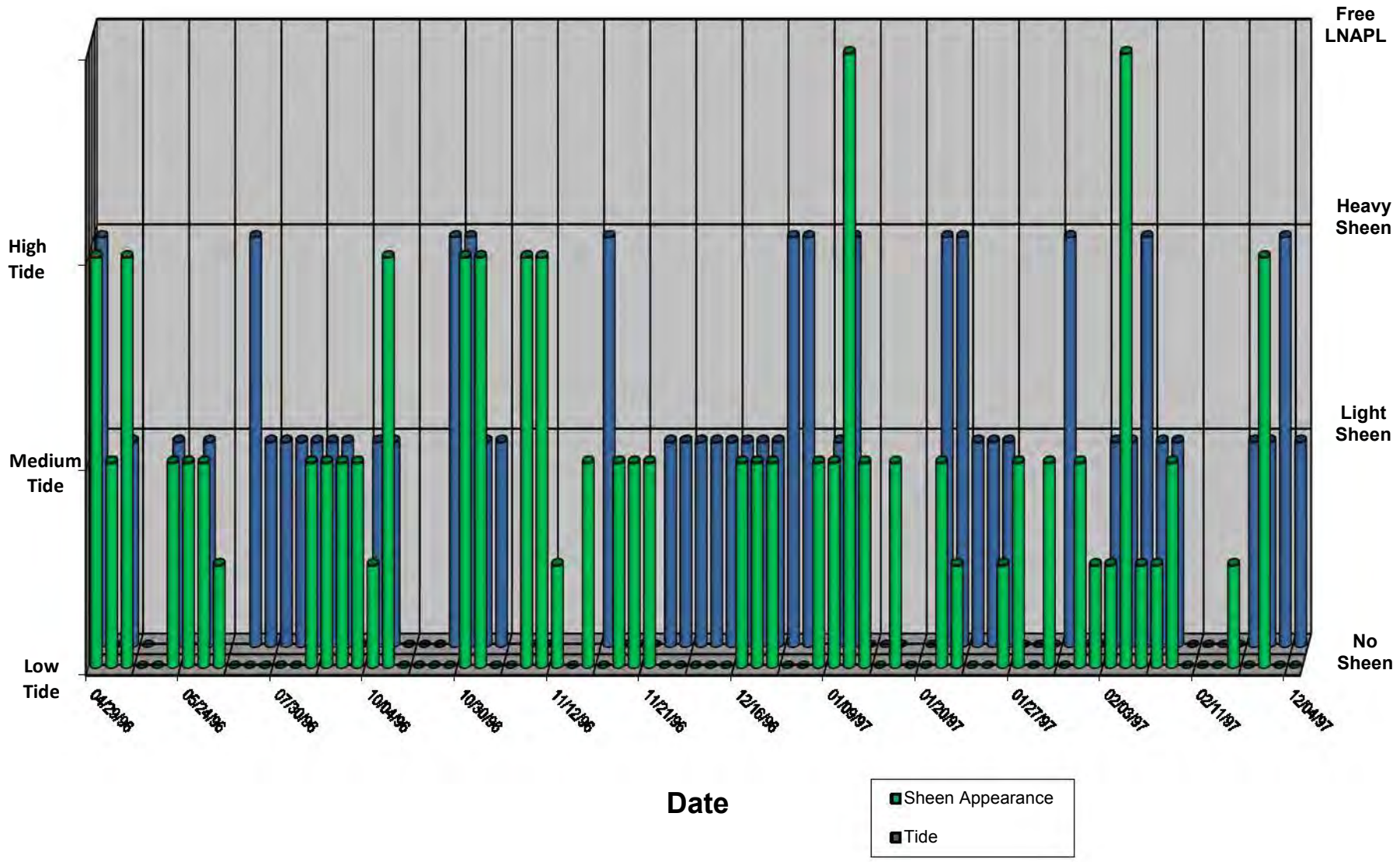
2003 Sheen Observations: Warehouse




2002 Sheen Observations: Warehouse
High Tide
Medium Tide
Low Tide
Heavy Sheen
Light Sheen
No Sheen
01/04/02
02/04/02
03/27/02
06/18/02
09/20/02
Date
Sheen Appearance
Tide

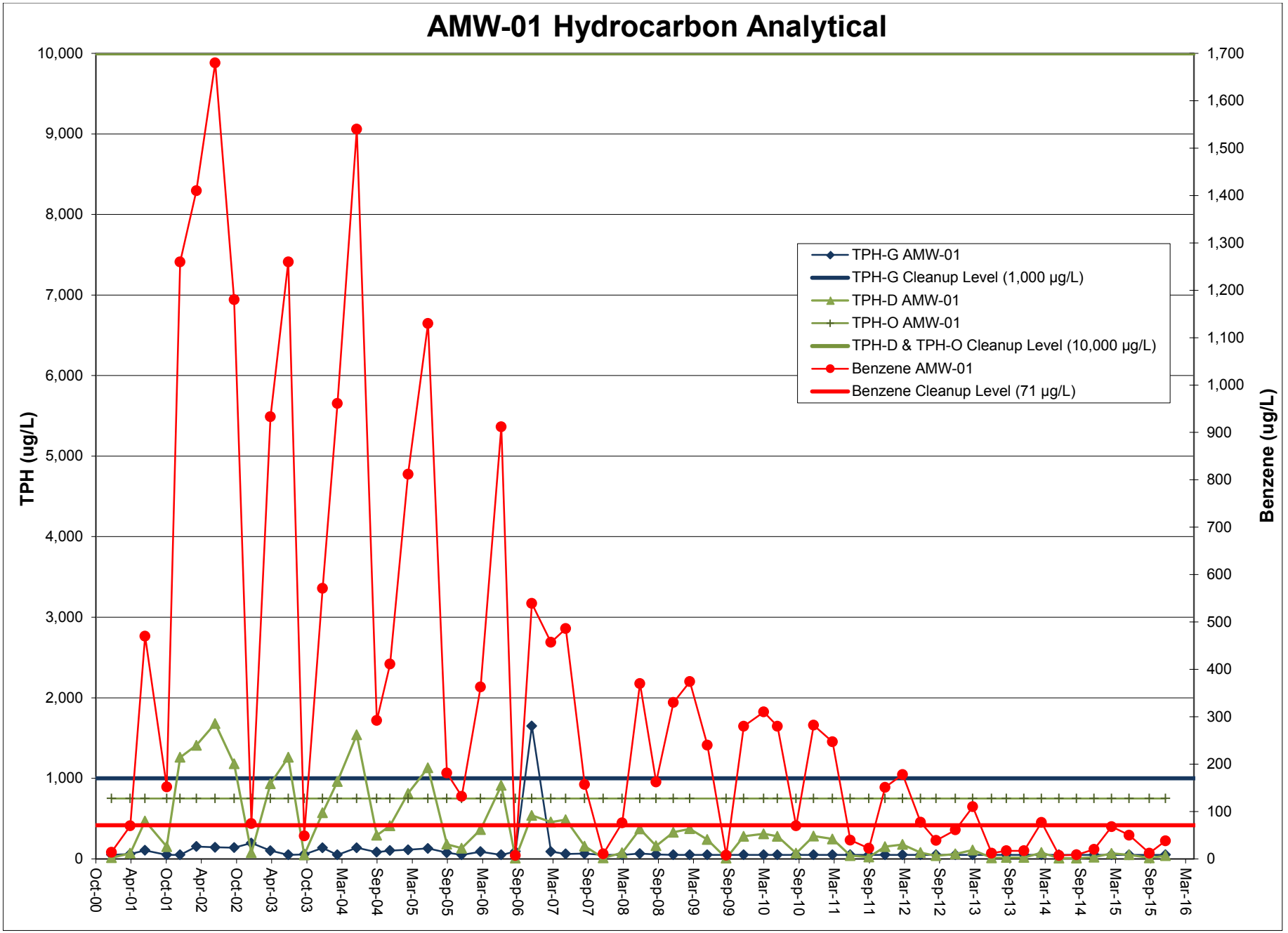

2000-2001 Sheen Observations: Warehouse
High Tide
Medium Tide
Low Tide
Heavy Sheen
Light Sheen
No Sheen
01/11/00
03/15/00
06/29/00
12/14/00
05/16/01
08/11/01
12/10/01
Date
Sheen Appearance
Tide

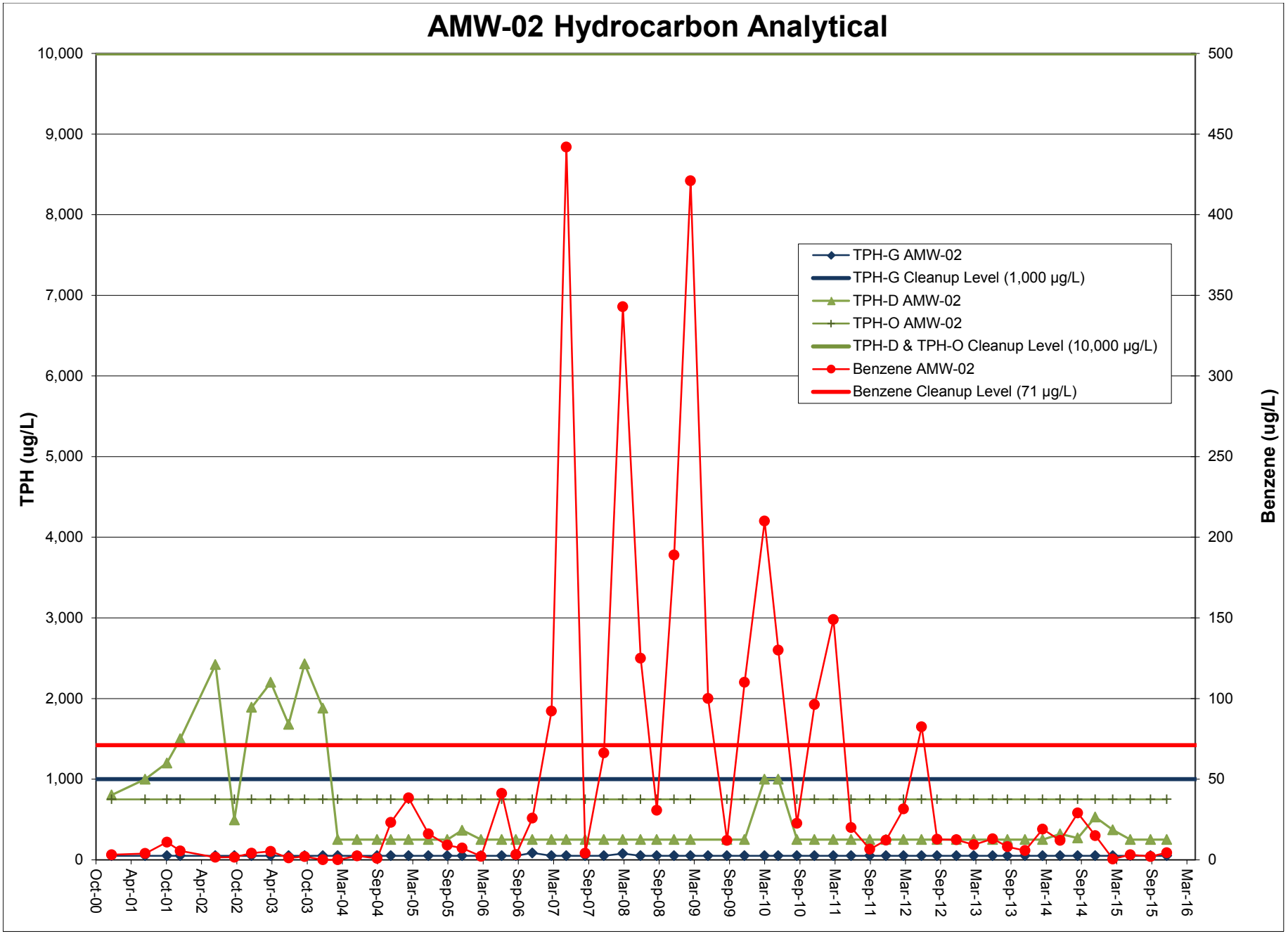
1996-1997 Sheen Observations: Warehouse

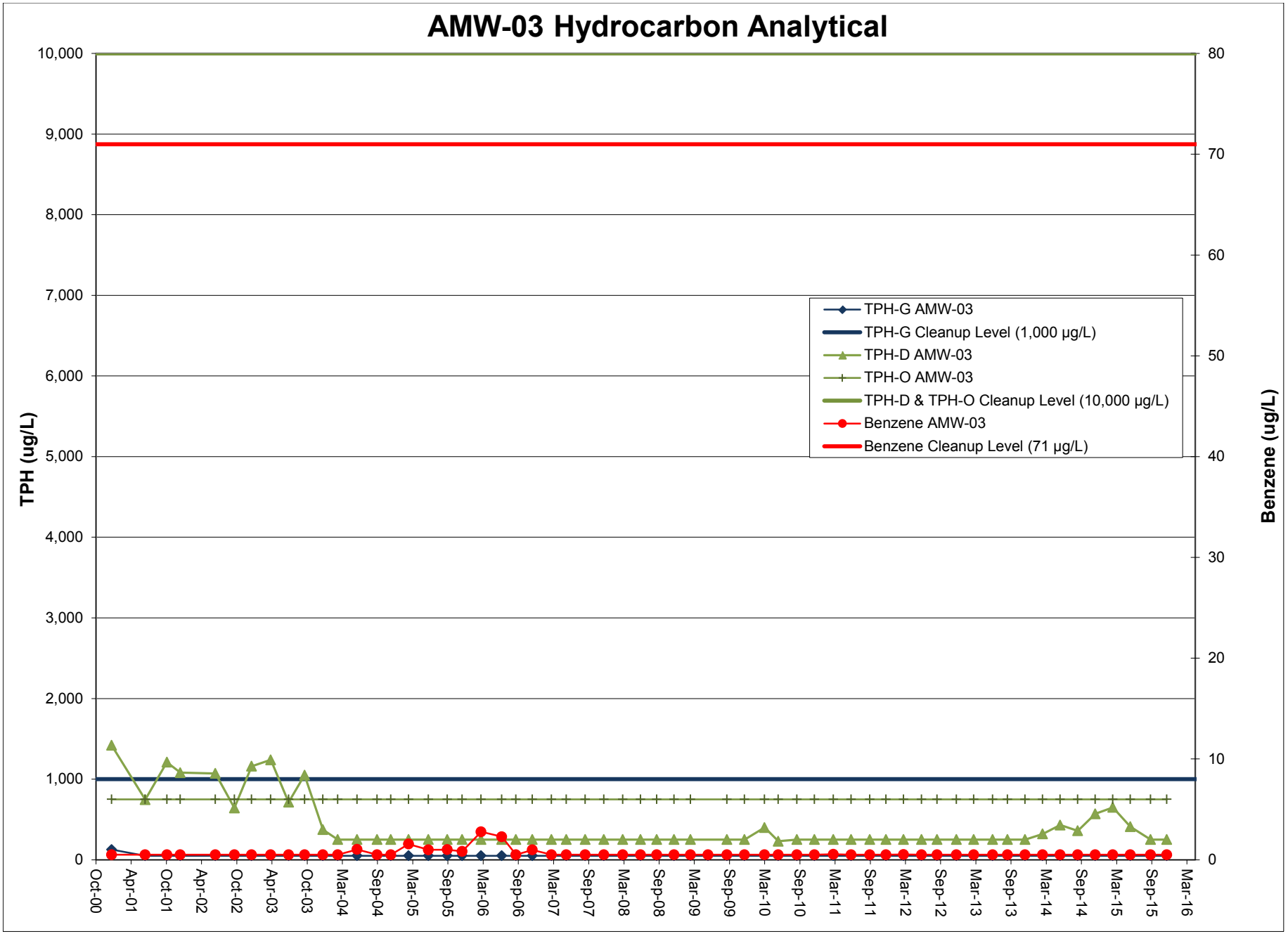


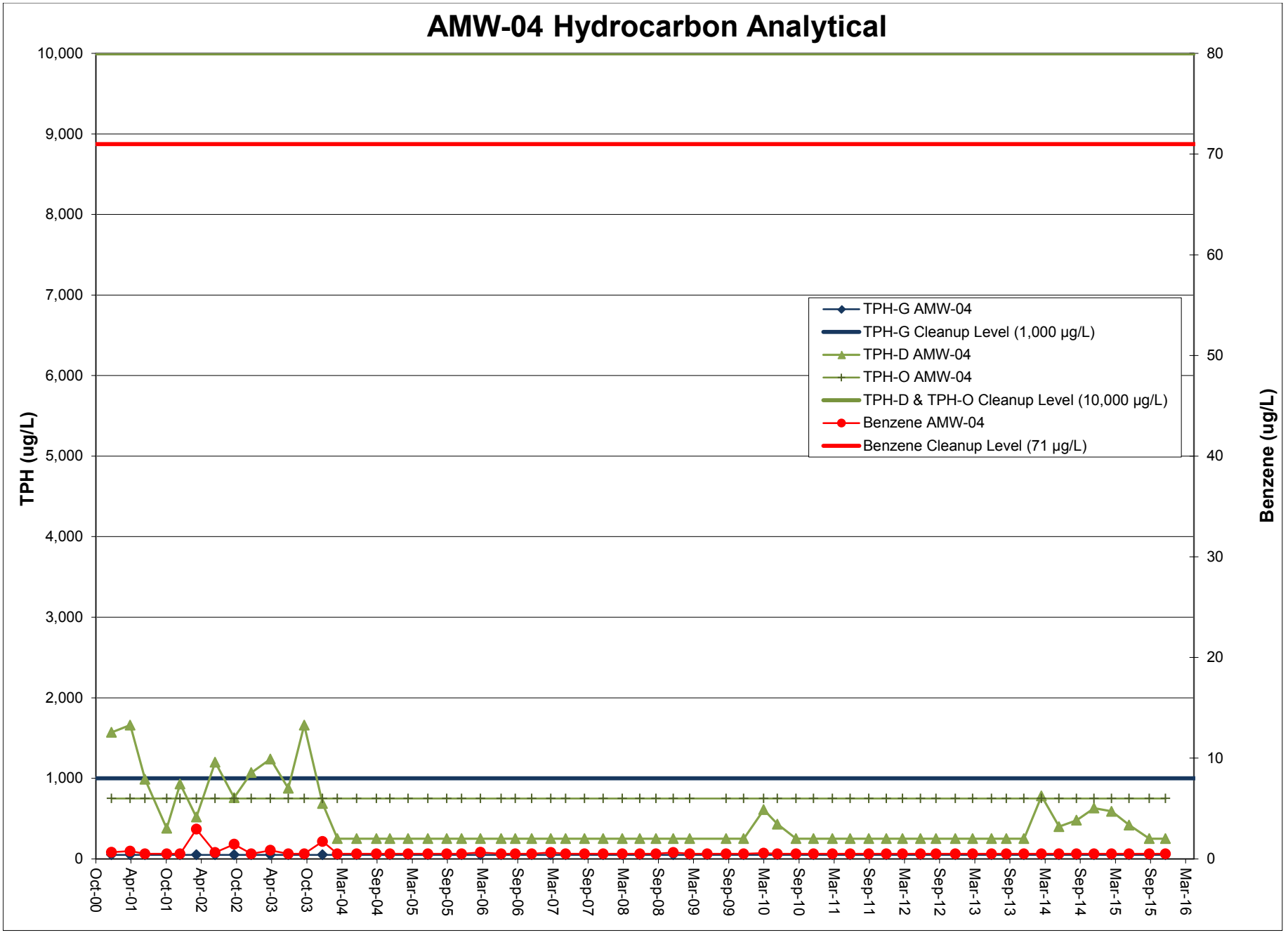
APPENDIX C

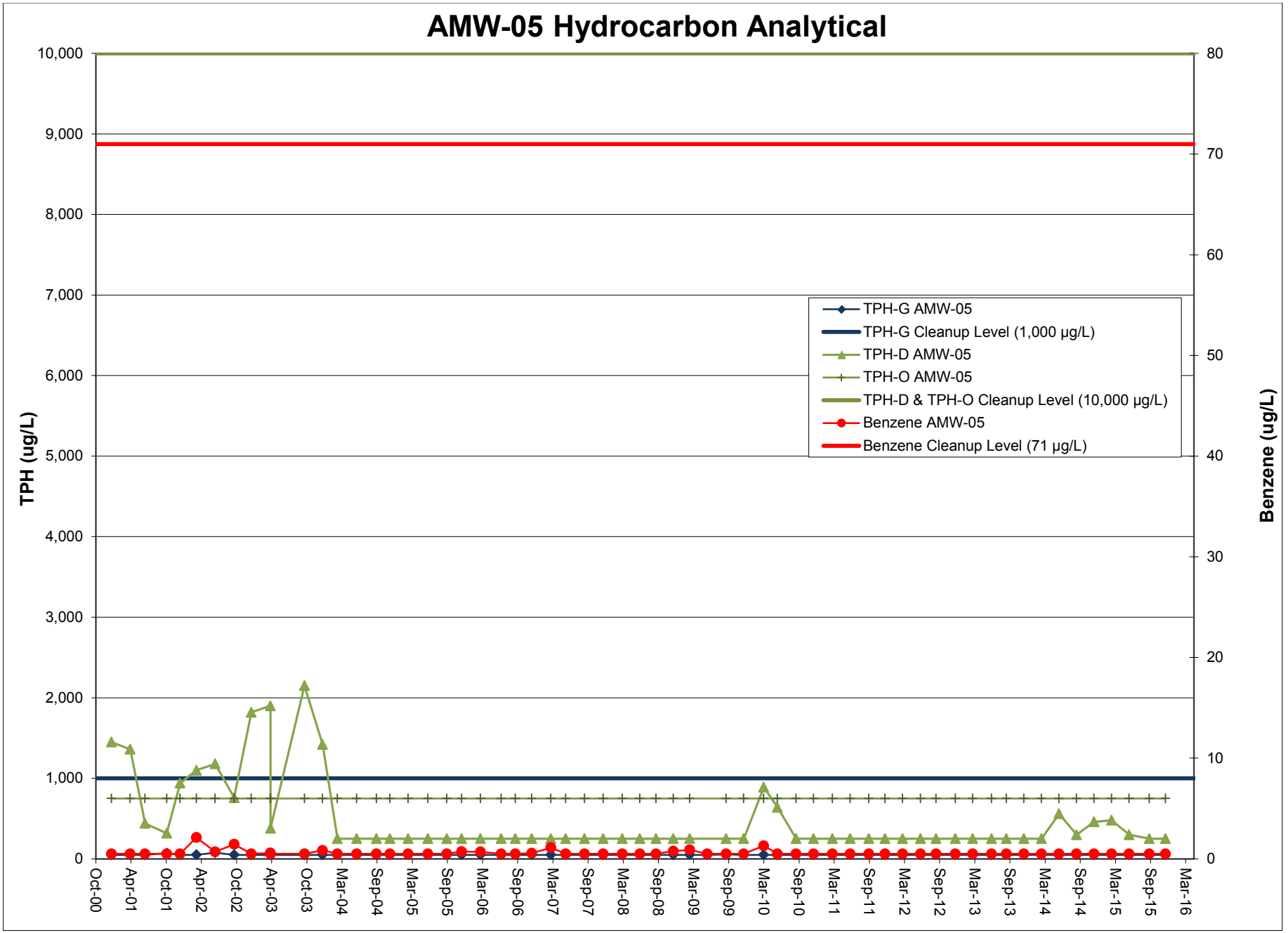
Groundwater Monitoring Wells Hydrocarbon Analytical Graphs

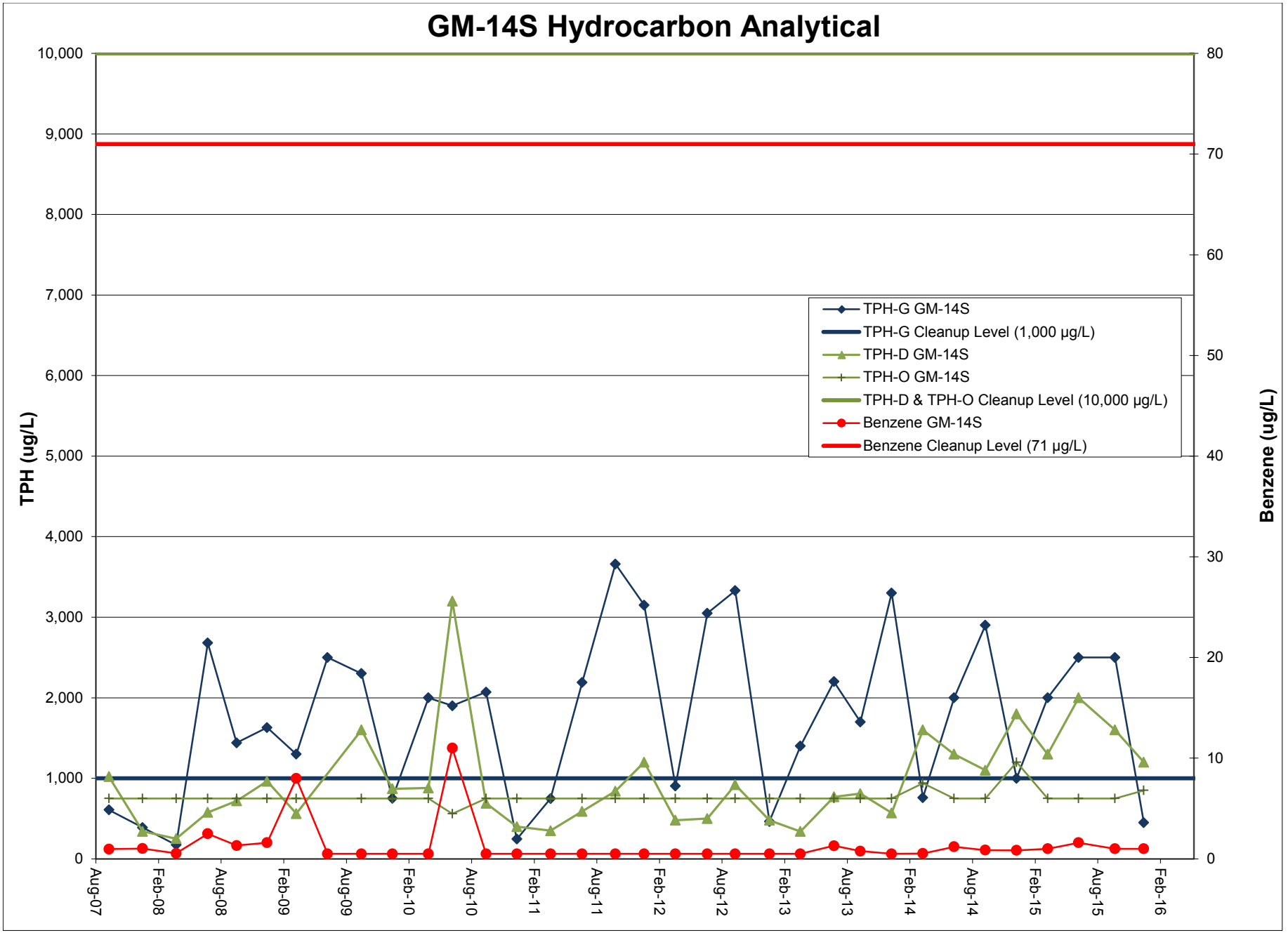

AMW-01 Hydrocarbon Analytical
TPH (ug/L)
Benzene (ug/L)
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
1,700
1,600
1,500
1,400
1,300
1,200
1,100
1,000
900
800
700
600
500
400
300
200
100
0
Oct-00
Apr-01
Oct-01
Apr-02
Oct-02
Apr-03
Oct-03
Mar-04
Sep-04
Mar-05
Sep-05
Mar-06
Sep-06
Mar-07
Sep-07
Mar-08
Sep-08
Mar-09
Sep-09
Mar-10
Sep-10
Mar-11
Sep-11
Mar-12
Sep-12
Mar-13
Sep-13
Mar-14
Sep-14
Mar-15
Sep-15
Mar-16
TPH-G AMW-01
TPH-G Cleanup Level (1,000 µg/L)
TPH-D AMW-01
TPH-O AMW-01
TPH-D & TPH-O Cleanup Level (10,000 µg/L)
Benzene AMW-01
Benzene Cleanup Level (71 µg/L)

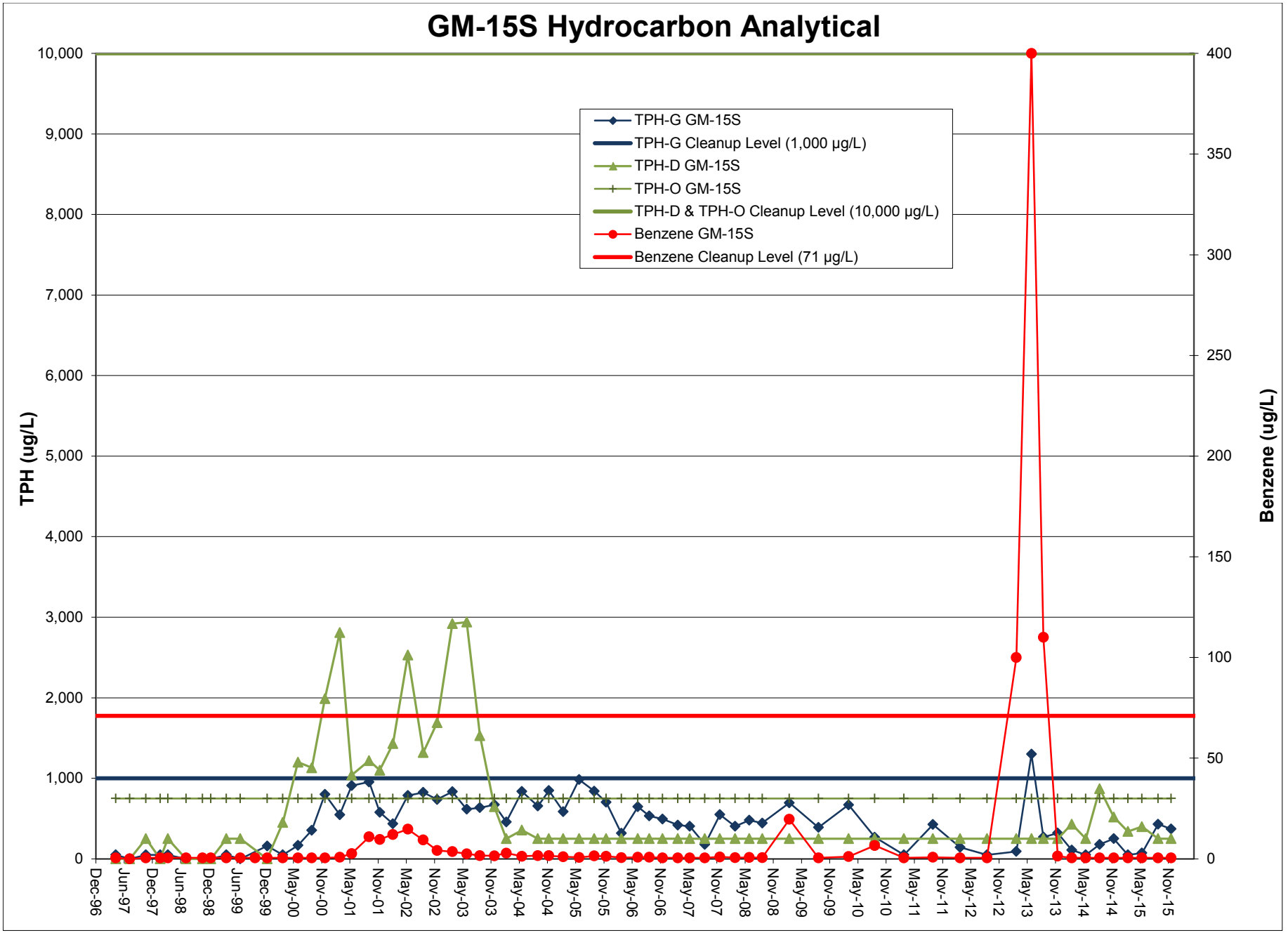

AMW-02 Hydrocarbon Analytical
TPH (ug/L)
Benzene (ug/L)
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
500
450
400
350
300
250
200
150
100
50
0
Oct-00
Apr-01
Oct-01
Apr-02
Oct-02
Apr-03
Oct-03
Mar-04
Sep-04
Mar-05
Sep-05
Mar-06
Sep-06
Mar-07
Sep-07
Mar-08
Sep-08
Mar-09
Sep-09
Mar-10
Sep-10
Mar-11
Sep-11
Mar-12
Sep-12
Mar-13
Sep-13
Mar-14
Sep-14
Mar-15
Sep-15
Mar-16
TPH-G AMW-02
TPH-G Cleanup Level (1,000 µg/L)
TPH-D AMW-02
TPH-O AMW-02
TPH-D & TPH-O Cleanup Level (10,000 µg/L)
Benzene AMW-02
Benzene Cleanup Level (71 µg/L)

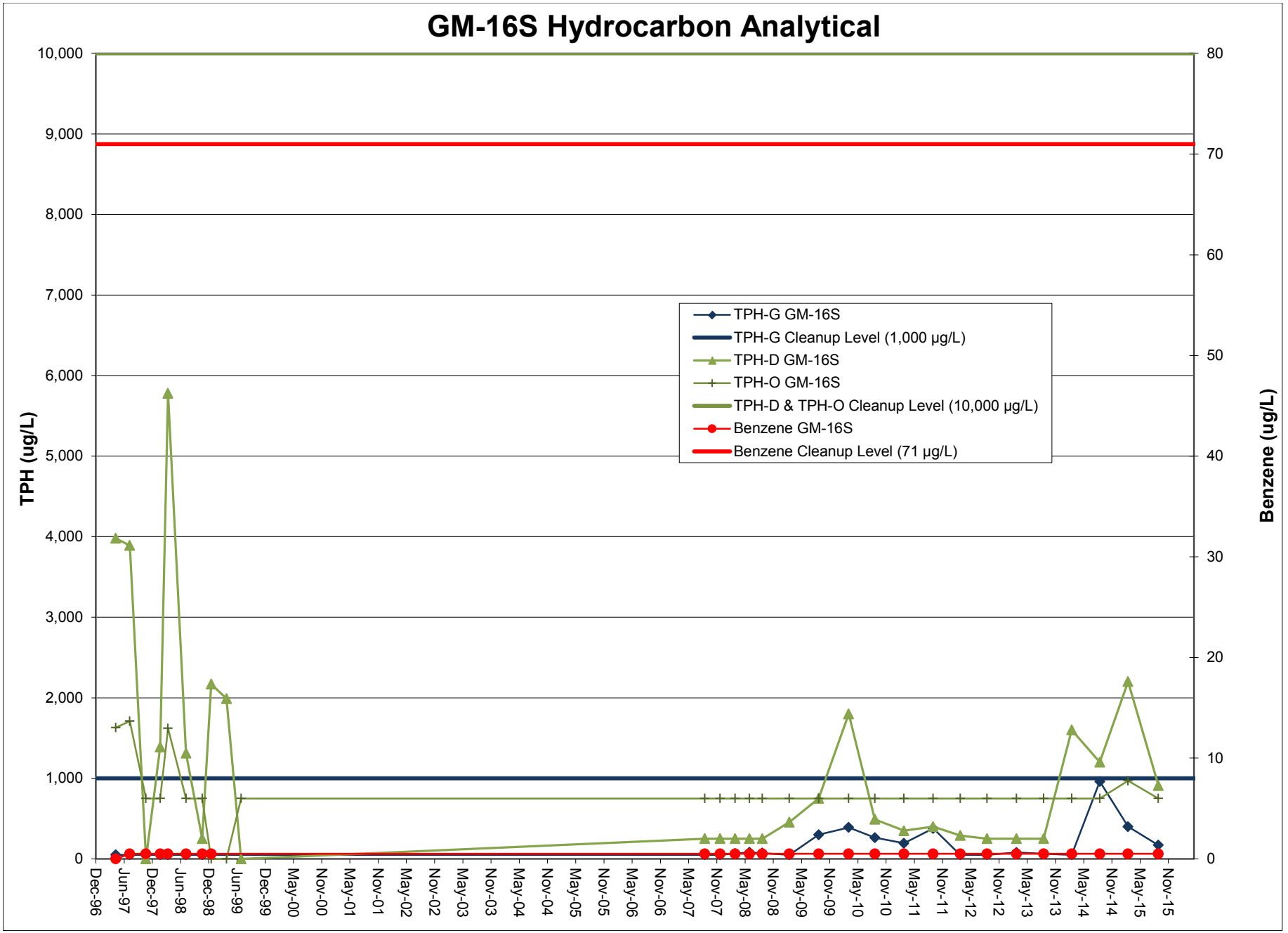

AMW-03 Hydrocarbon Analytical
TPH (ug/L)
Benzene (ug/L)
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
80
70
60
50
40
30
20
10
0
TPH-G AMW-03
TPH-G Cleanup Level (1,000 µg/L)
TPH-D AMW-03
TPH-O AMW-03
TPH-D & TPH-O Cleanup Level (10,000 µg/L)
Benzene AMW-03
Benzene Cleanup Level (71 µg/L)
Oct-00
Apr-01
Oct-01
Apr-02
Oct-02
Apr-03
Oct-03
Mar-04
Sep-04
Mar-05
Sep-05
Mar-06
Sep-06
Mar-07
Sep-07
Mar-08
Sep-08
Mar-09
Sep-09
Mar-10
Sep-10
Mar-11
Sep-11
Mar-12
Sep-12
Mar-13
Sep-13
Mar-14
Sep-14
Mar-15
Sep-15
Mar-16


AMW-04 Hydrocarbon Analytical
TPH (ug/L)
Benzene (ug/L)
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
80
70
60
50
40
30
20
10
0
TPH-G AMW-04
TPH-G Cleanup Level (1,000 µg/L)
TPH-D AMW-04
TPH-O AMW-04
TPH-D & TPH-O Cleanup Level (10,000 µg/L)
Benzene AMW-04
Benzene Cleanup Level (71 µg/L)
Oct-00
Apr-01
Oct-01
Apr-02
Oct-02
Apr-03
Oct-03
Mar-04
Sep-04
Mar-05
Sep-05
Mar-06
Sep-06
Mar-07
Sep-07
Mar-08
Sep-08
Mar-09
Sep-09
Mar-10
Sep-10
Mar-11
Sep-11
Mar-12
Sep-12
Mar-13
Sep-13
Mar-14
Sep-14
Mar-15
Sep-15
Mar-16


AMW-05 Hydrocarbon Analytical
TPH (ug/L)
Benzene (ug/L)
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
80
70
60
50
40
30
20
10
0
TPH-G AMW-05
TPH-G Cleanup Level (1,000 µg/L)
TPH-D AMW-05
TPH-O AMW-05
TPH-D & TPH-O Cleanup Level (10,000 µg/L)
Benzene AMW-05
Benzene Cleanup Level (71 µg/L)
Oct-00
Apr-01
Oct-01
Apr-02
Oct-02
Apr-03
Oct-03
Mar-04
Sep-04
Mar-05
Sep-05
Mar-06
Sep-06
Mar-07
Sep-07
Mar-08
Sep-08
Mar-09
Sep-09
Mar-10
Sep-10
Mar-11
Sep-11
Mar-12
Sep-12
Mar-13
Sep-13
Mar-14
Sep-14
Mar-15
Sep-15
Mar-16


GM-14S Hydrocarbon Analytical
TPH (ug/L)
Benzene (ug/L)
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
80
70
60
50
40
30
20
10
0
Aug-07
Feb-08
Aug-08
Feb-09
Aug-09
Feb-10
Aug-10
Feb-11
Aug-11
Feb-12
Aug-12
Feb-13
Aug-13
Feb-14
Aug-14
Feb-15
Aug-15
Feb-16
TPH-G GM-14S
TPH-G Cleanup Level (1,000 µg/L)
TPH-D GM-14S
TPH-O GM-14S
TPH-D & TPH-O Cleanup Level (10,000 µg/L)
Benzene GM-14S
Benzene Cleanup Level (71 µg/L)


GM-15S Hydrocarbon Analytical
TPH (ug/L)
Benzene (ug/L)
TPH-G GM-15S
TPH-G Cleanup Level (1,000 µg/L)
TPH-D GM-15S
TPH-O GM-15S
TPH-D & TPH-O Cleanup Level (10,000 µg/L)
Benzene GM-15S
Benzene Cleanup Level (71 µg/L)
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
400
350
300
250
200
150
100
50
0
Dec-96
Jun-97
Dec-97
Jun-98
Dec-98
Jun-99
Dec-99
May-00
Nov-00
May-01
Nov-01
May-02
Nov-02
May-03
Nov-03
May-04
Nov-04
May-05
Nov-05
May-06
Nov-06
May-07
Nov-07
May-08
Nov-08
May-09
Nov-09
May-10
Nov-10
May-11
Nov-11
May-12
Nov-12
May-13
Nov-13
May-14
Nov-14
May-15
Nov-15


GM-16S Hydrocarbon Analytical
TPH (ug/L)
Benzene (ug/L)
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
80
70
60
50
40
30
20
10
0
TPH-G GM-16S
TPH-G Cleanup Level (1,000 µg/L)
TPH-D GM-16S
TPH-O GM-16S
TPH-D & TPH-O Cleanup Level (10,000 µg/L)
Benzene GM-16S
Benzene Cleanup Level (71 µg/L)
Dec-96
Jun-97
Dec-97
Jun-98
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Jun-99
Dec-99
May-00
Nov-00
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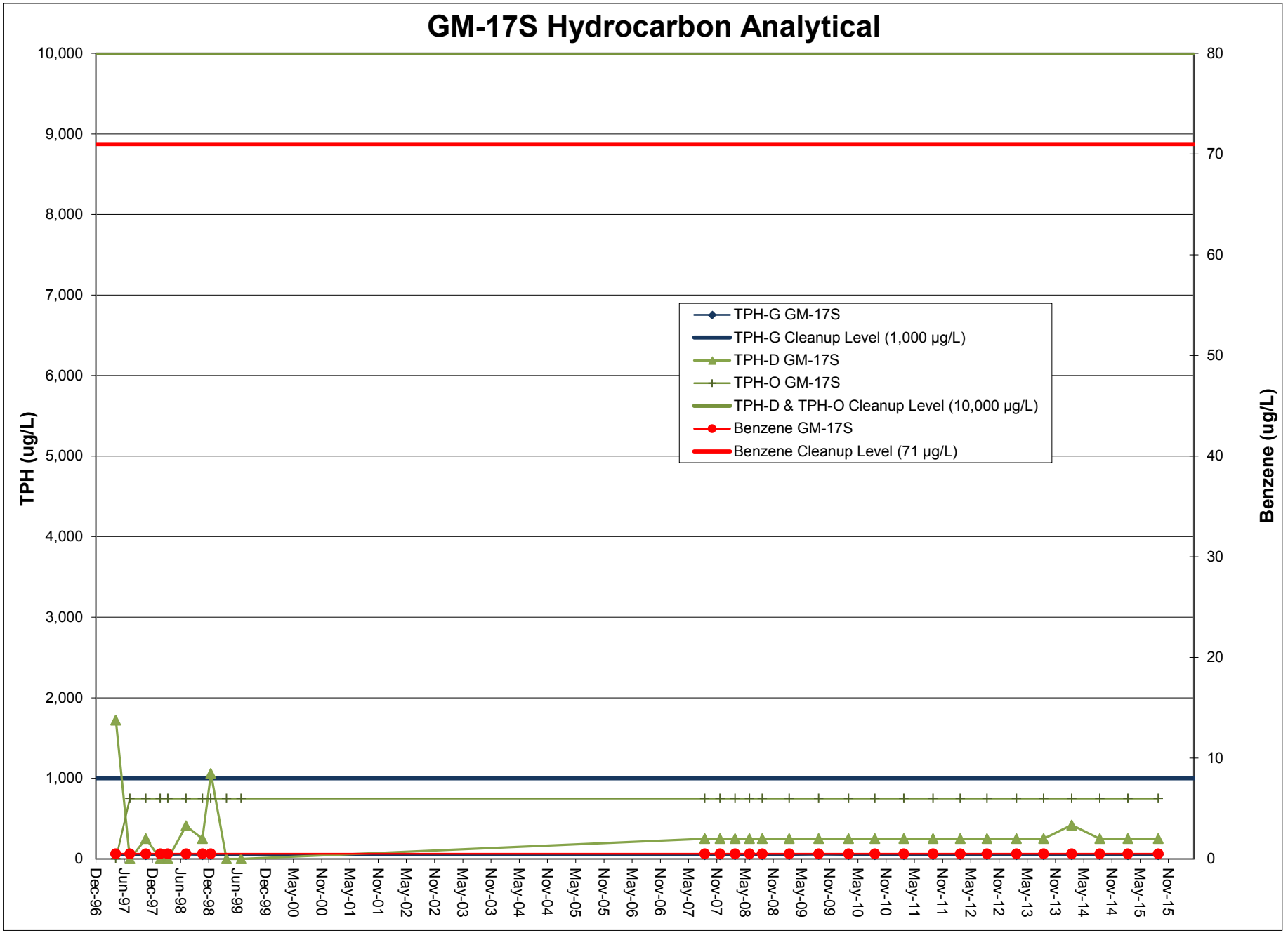
Nov-15


GM-17S Hydrocarbon Analytical
TPH (ug/L)
Benzene (ug/L)
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
80
70
60
50
40
30
20
10
0
TPH-G GM-17S
TPH-G Cleanup Level (1,000 µg/L)
TPH-D GM-17S
TPH-O GM-17S
TPH-D & TPH-O Cleanup Level (10,000 µg/L)
Benzene GM-17S
Benzene Cleanup Level (71 µg/L)
Dec-96
Jun-97
Dec-97
Jun-98
Dec-98
Jun-99
Dec-99
May-00
Nov-00
May-01
Nov-01
May-02
Nov-02
May-03
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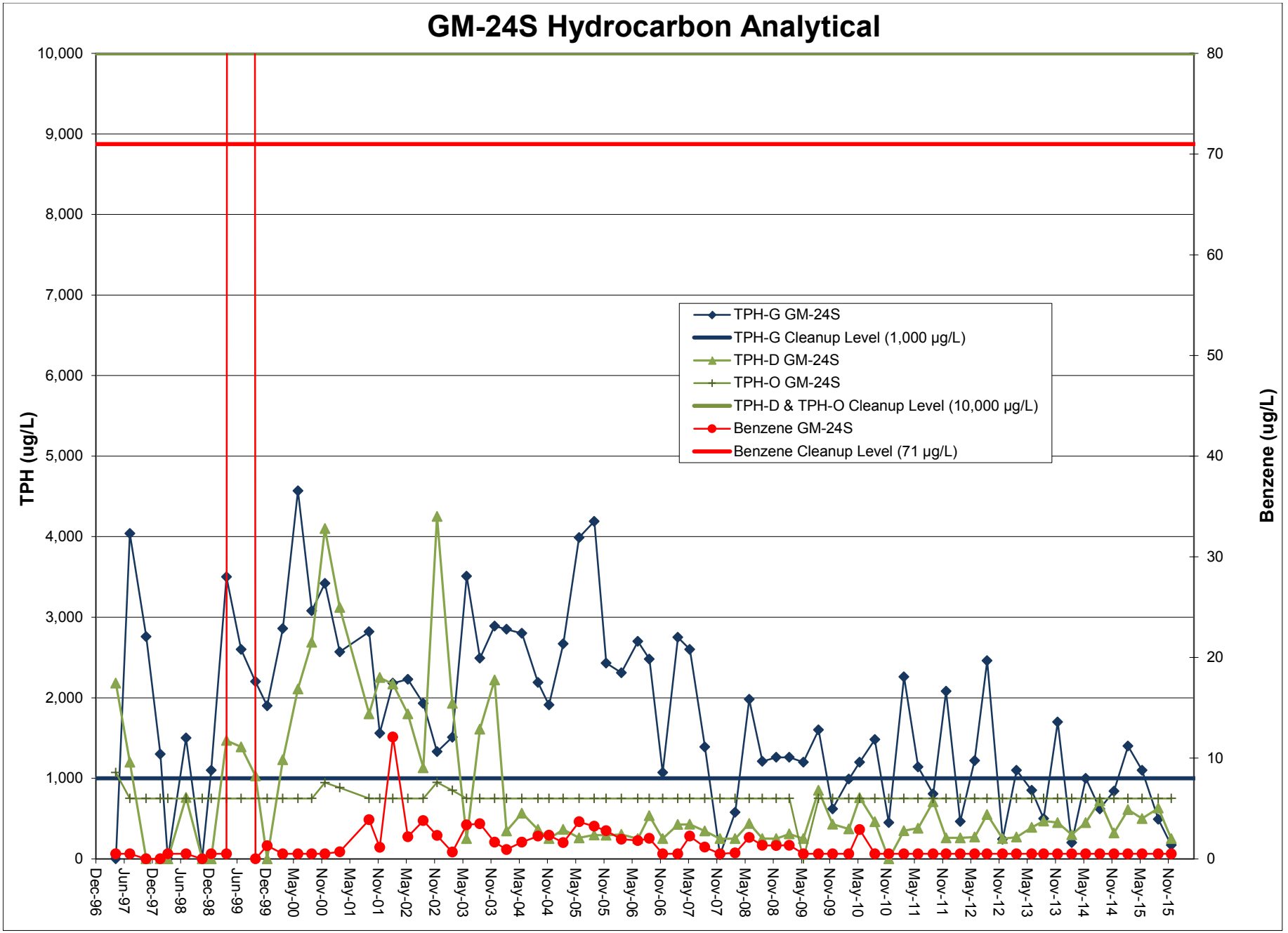
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Benzene (ug/L)
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8,000
7,000
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5,000
4,000
3,000
2,000
1,000
0
80
70
60
50
40
30
20
10
0
TPH-G GM-24S
TPH-G Cleanup Level (1,000 µg/L)
TPH-D GM-24S
TPH-O GM-24S
TPH-D & TPH-O Cleanup Level (10,000 µg/L)
Benzene GM-24S
Benzene Cleanup Level (71 µg/L)
Dec-96
Jun-97
Dec-97
Jun-98
Dec-98
Jun-99
Dec-99
May-00
Nov-00
May-01
Nov-01
May-02
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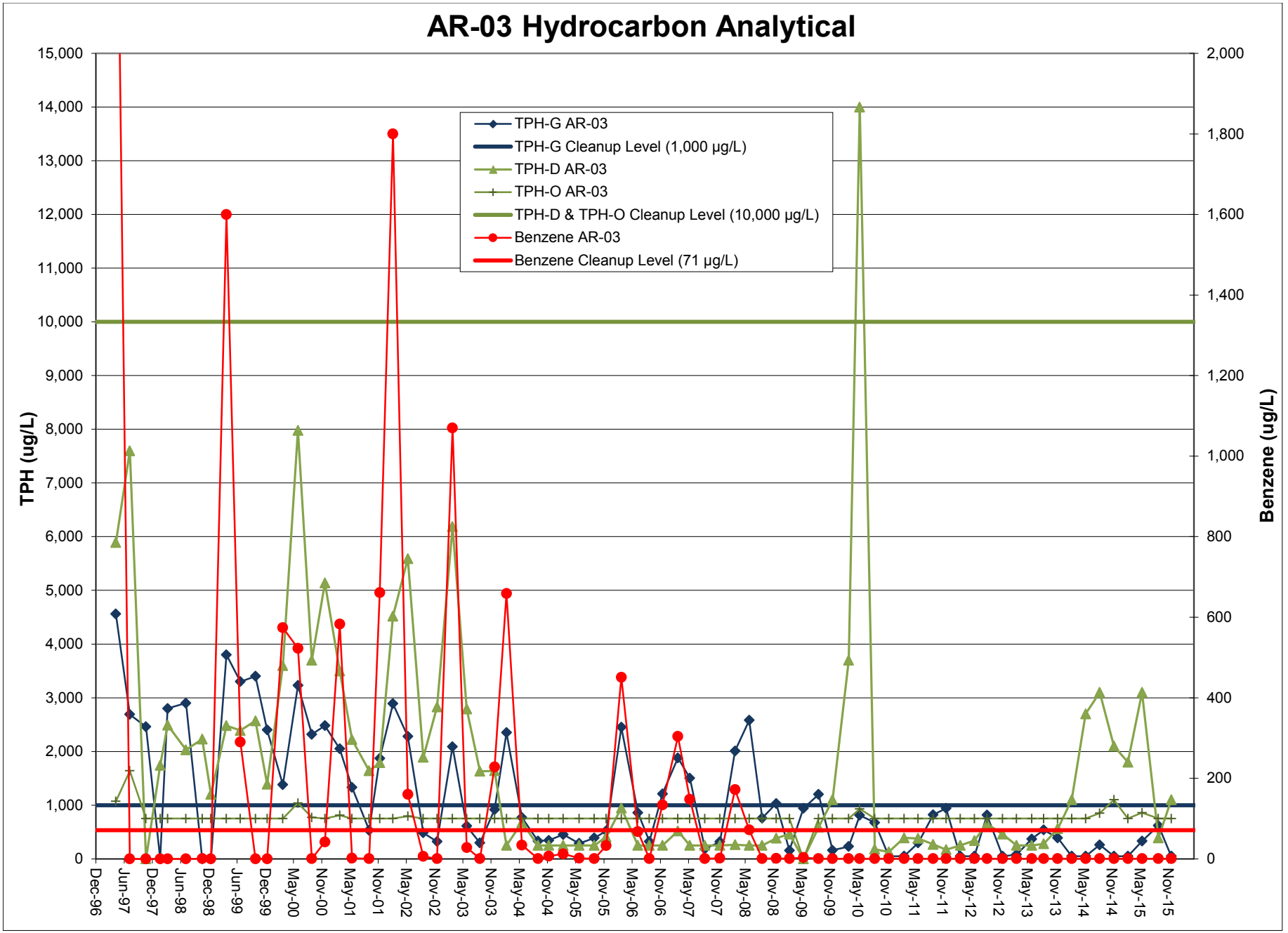
AR-03 Hydrocarbon Analytical
TPH (ug/L)
Benzene (ug/L)
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TPH-G Cleanup Level (1,000 µg/L)
TPH-D AR-03
TPH-O AR-03
TPH-D & TPH-O Cleanup Level (10,000 µg/L)
Benzene AR-03
Benzene Cleanup Level (71 µg/L)
15,000
14,000
13,000
12,000
11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
2,000
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1,400
1,200
1,000
800
600
400
200
0
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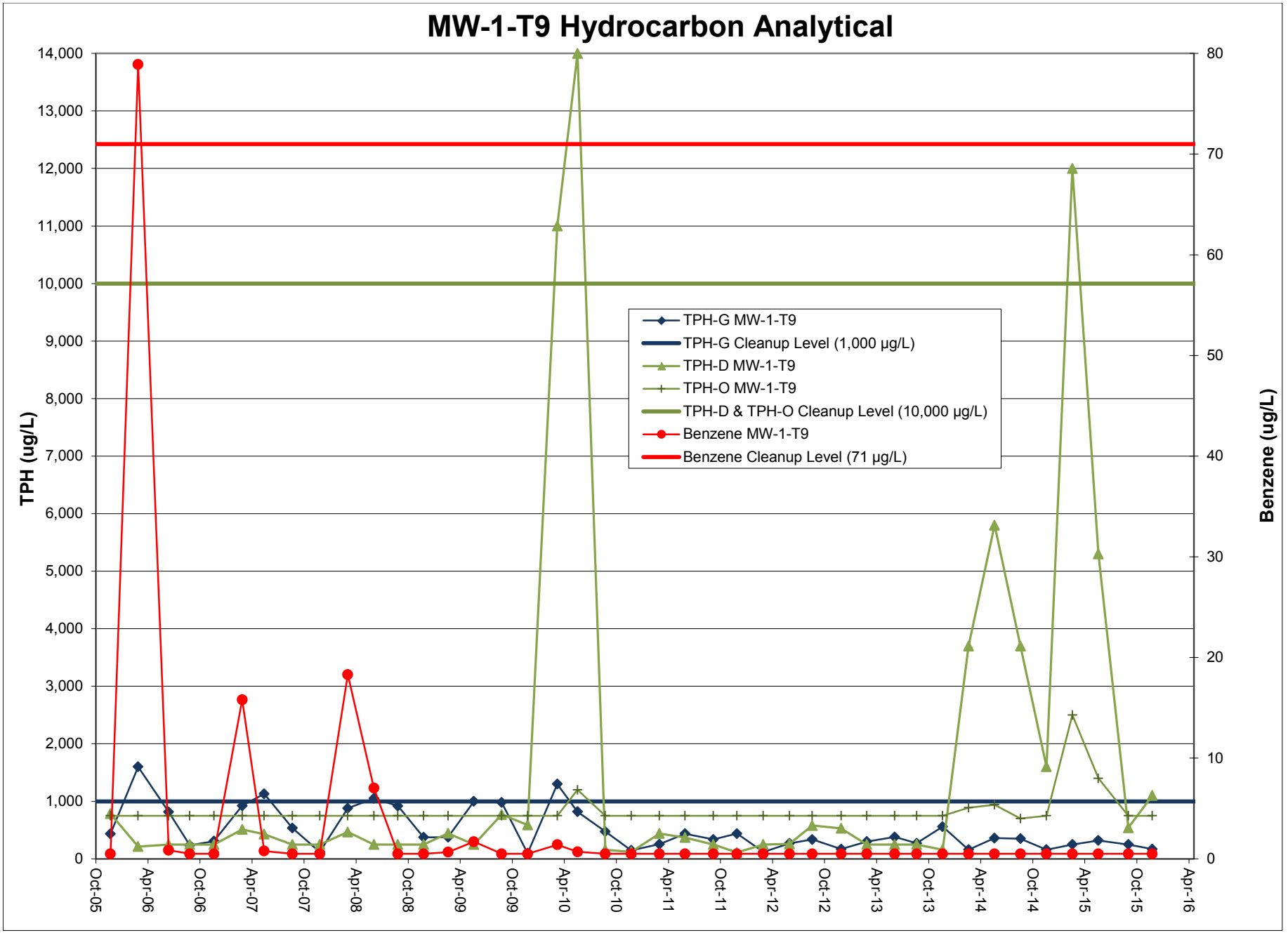
MW-1-T9 Hydrocarbon Analytical
TPH (ug/L)
Benzene (ug/L)
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13,000
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7,000
6,000
5,000
4,000
3,000
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1,000
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30
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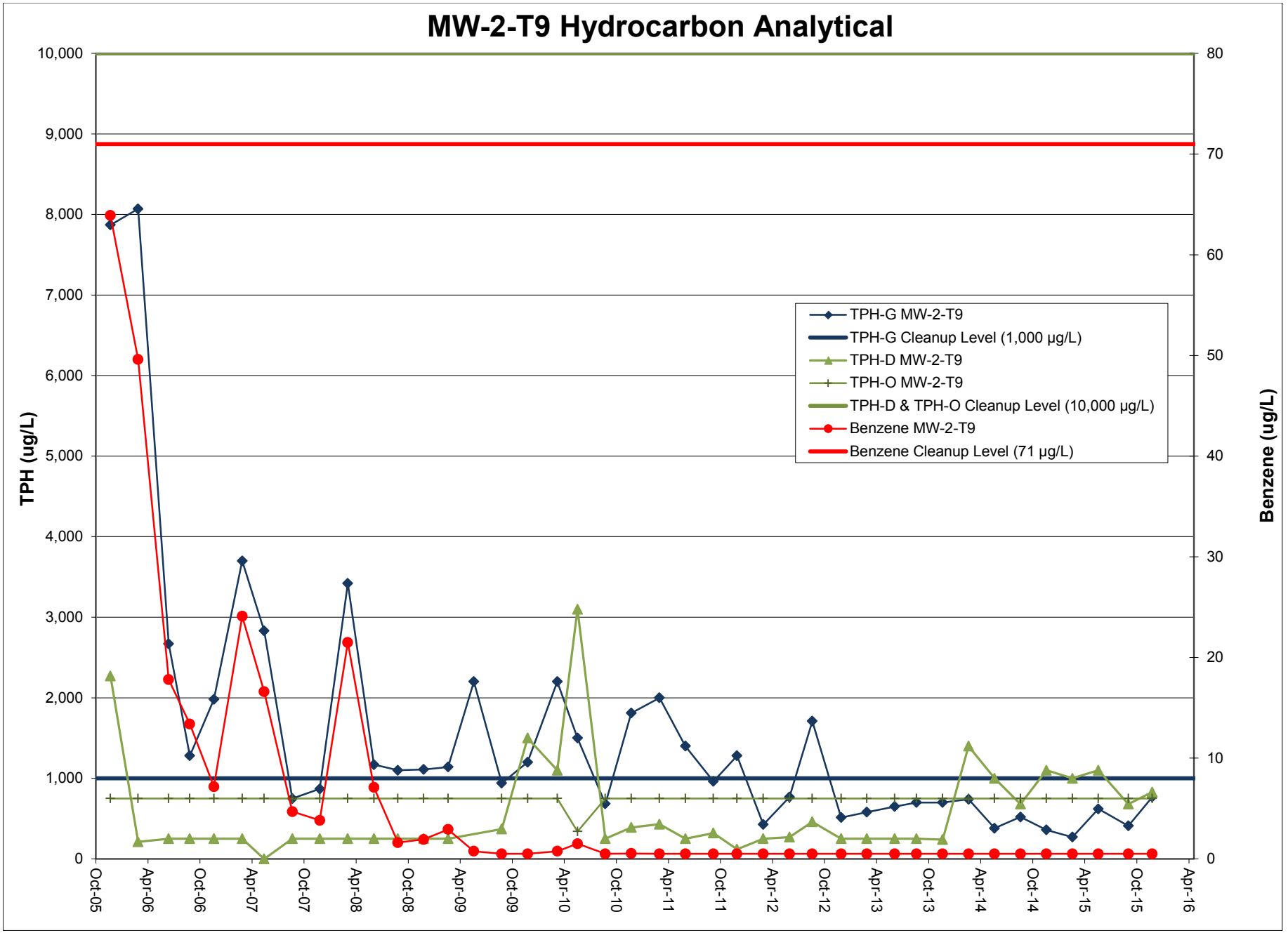
Oct-15
Apr-16
TPH-G MW-1-T9
TPH-G Cleanup Level (1,000 µg/L)
TPH-D MW-1-T9
TPH-O MW-1-T9
TPH-D & TPH-O Cleanup Level (10,000 µg/L)
Benzene MW-1-T9
Benzene Cleanup Level (71 µg/L)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TPH (ug/L)
Benzene (ug/L)
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7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
80
70
60
50
40
30
20
10
0
Oct-05
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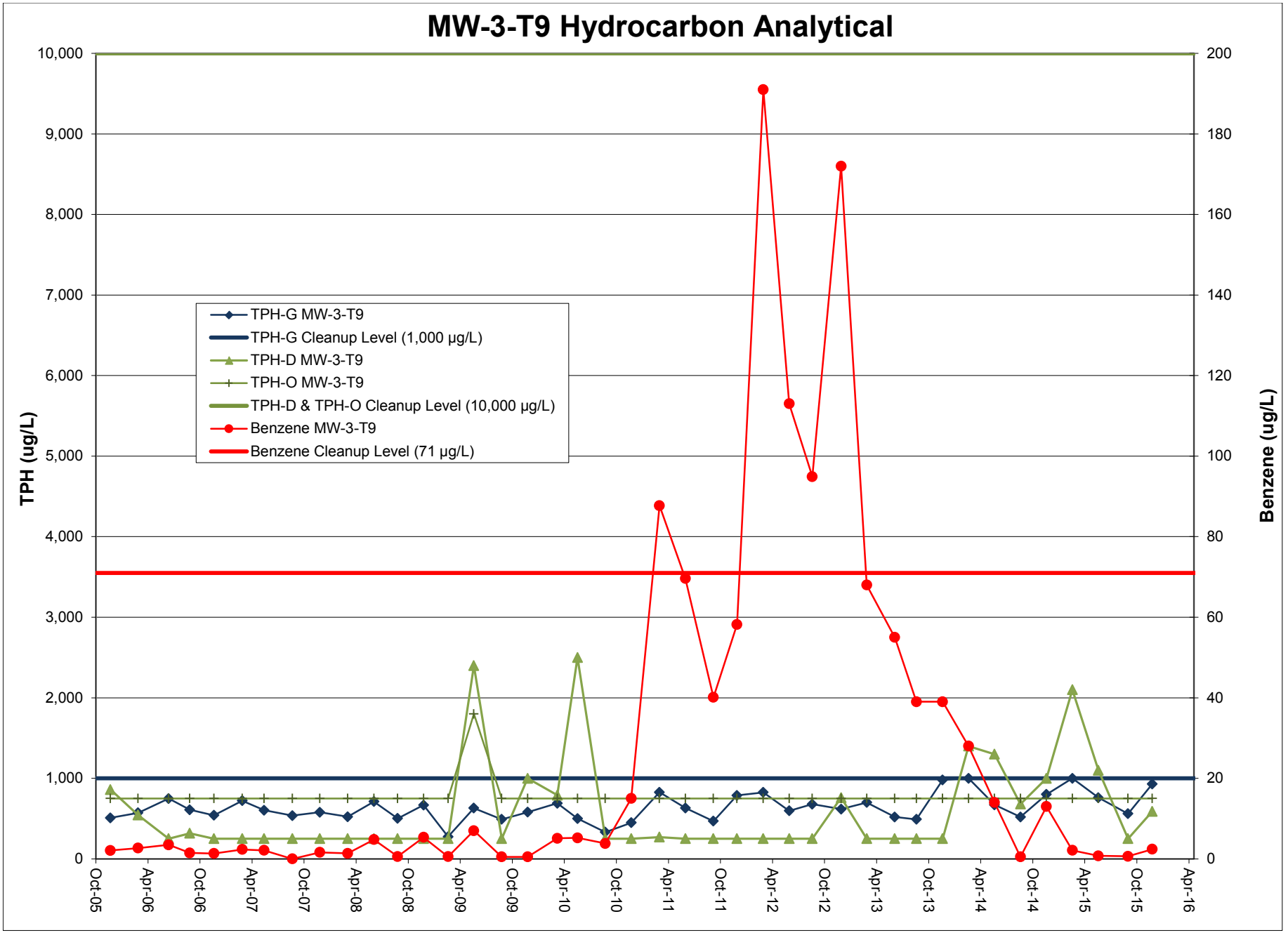
Apr-13
Oct-13
Apr-14
Oct-14
Apr-15
Oct-15
Apr-16
TPH-G MW-2-T9
TPH-G Cleanup Level (1,000 µg/L)
TPH-D MW-2-T9
TPH-O MW-2-T9
TPH-D & TPH-O Cleanup Level (10,000 µg/L)
Benzene MW-2-T9
Benzene Cleanup Level (71 µg/L)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TPH (ug/L)
Benzene (ug/L)
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4,000
3,000
2,000
1,000
0
200
180
160
140
120
100
80
60
40
20
0
TPH-G MW-3-T9
TPH-G Cleanup Level (1,000 µg/L)
TPH-D MW-3-T9
TPH-O MW-3-T9
TPH-D & TPH-O Cleanup Level (10,000 µg/L)
Benzene MW-3-T9
Benzene Cleanup Level (71 µg/L)
Oct-05
Apr-06
Oct-06
Apr-07
Oct-07
Apr-08
Oct-08
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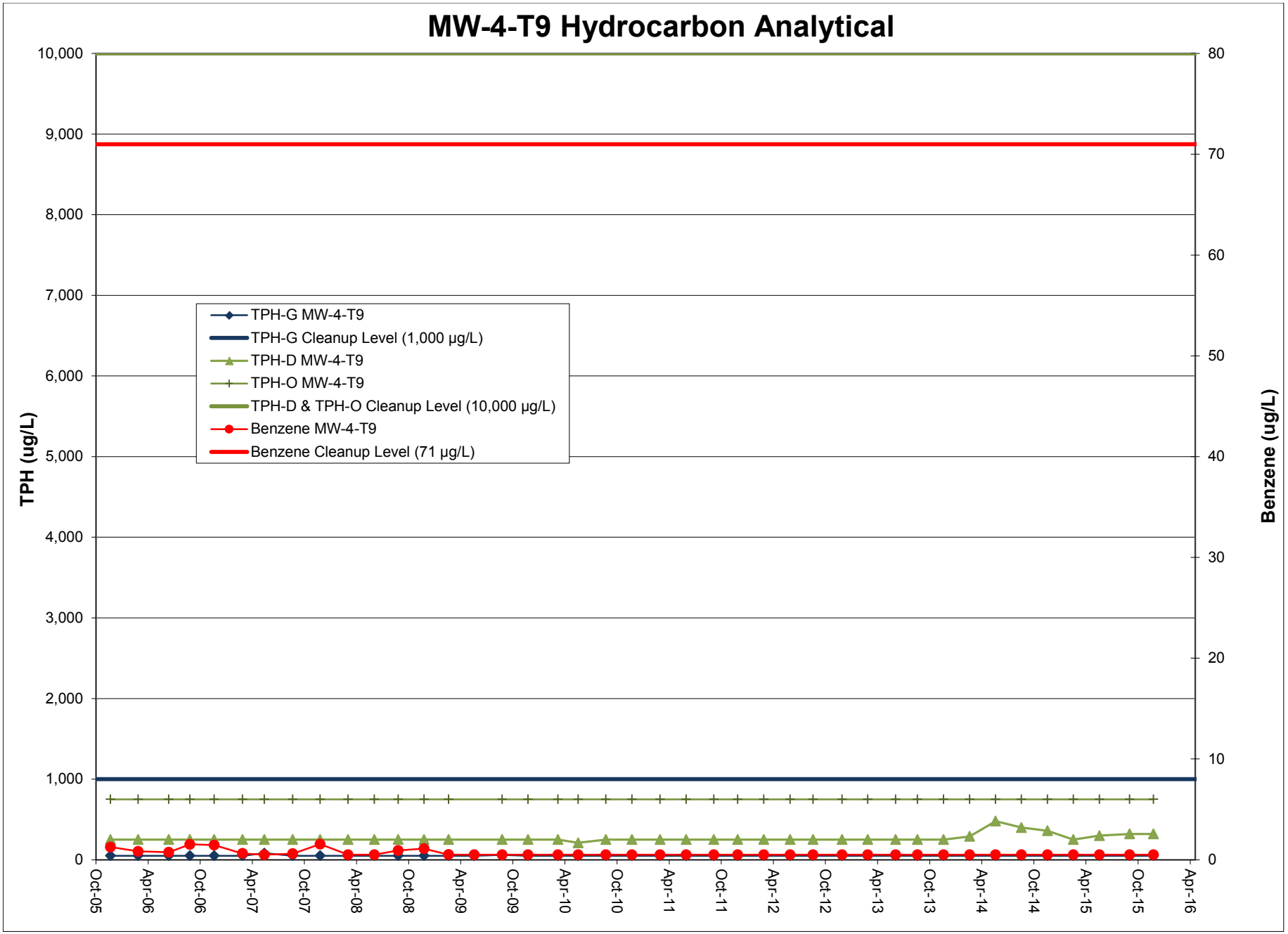
Apr-16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TPH (ug/L)
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5,000
4,000
3,000
2,000
1,000
0
80
70
60
50
40
30
20
10
0
TPH-G MW-4-T9
TPH-G Cleanup Level (1,000 µg/L)
TPH-D MW-4-T9
TPH-O MW-4-T9
TPH-D & TPH-O Cleanup Level (10,000 µg/L)
Benzene MW-4-T9
Benzene Cleanup Level (71 µg/L)
Oct-05
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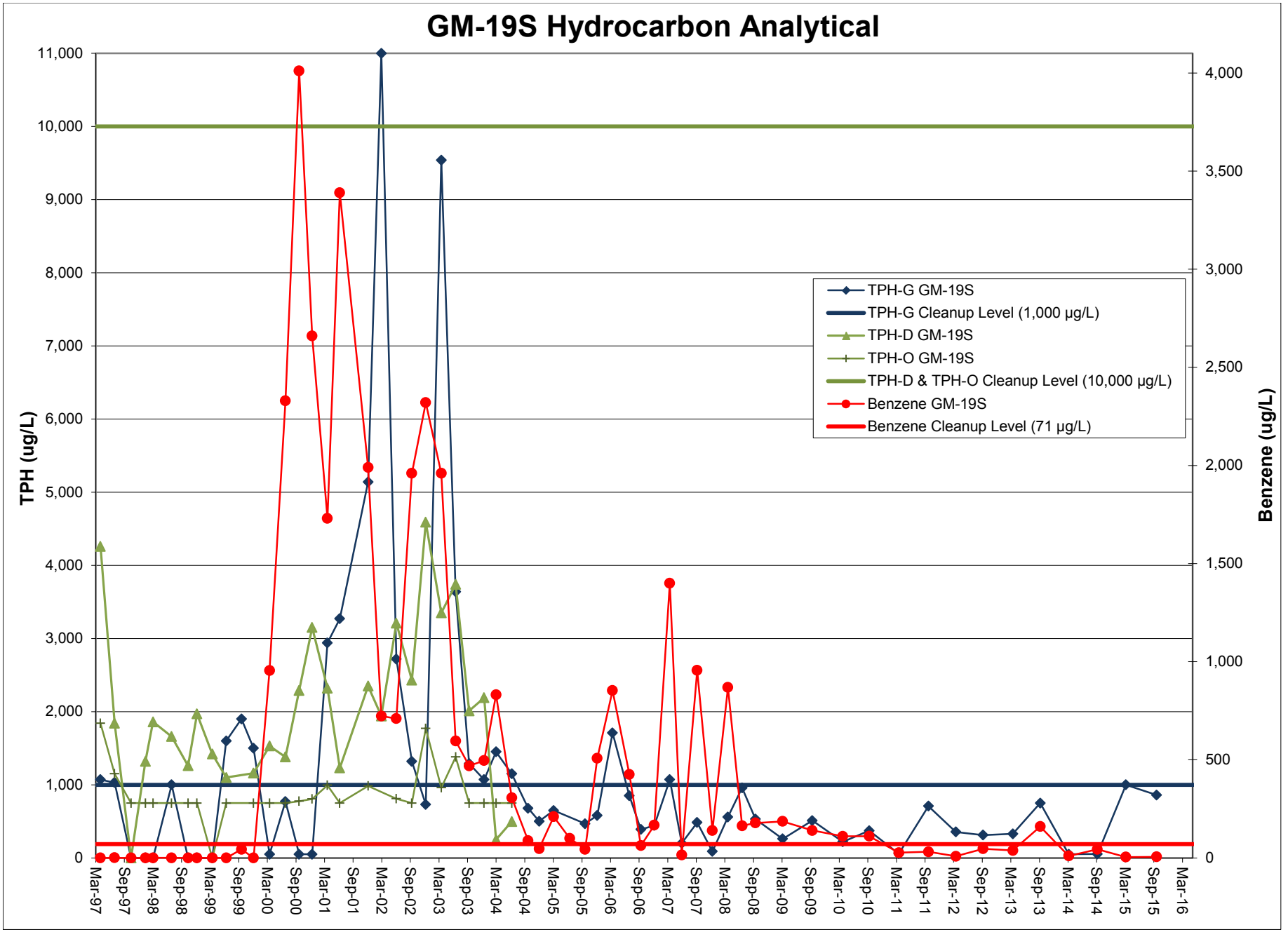
Apr-16


GM-19S Hydrocarbon Analytical
TPH (ug/L)
Benzene (ug/L)
11,000
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
TPH-G GM-19S
TPH-G Cleanup Level (1,000 µg/L)
TPH-D GM-19S
TPH-O GM-19S
TPH-D & TPH-O Cleanup Level (10,000 µg/L)
Benzene GM-19S
Benzene Cleanup Level (71 µg/L)
Mar-97
Sep-97
Mar-98
Sep-98
Mar-99
Sep-99
Mar-00
Sep-00
Mar-01
Sep-01
Mar-02
Sep-02
Mar-03
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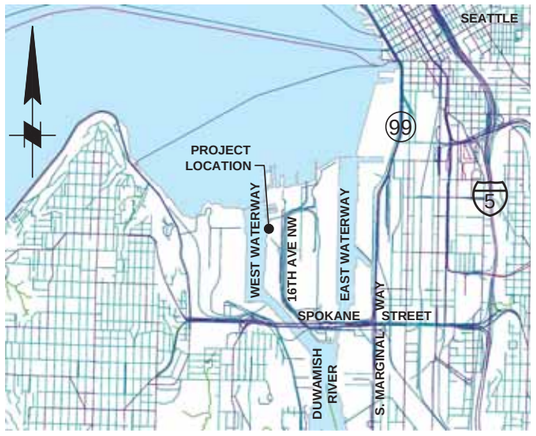
Sep-15
Mar-16

APPENDIX D

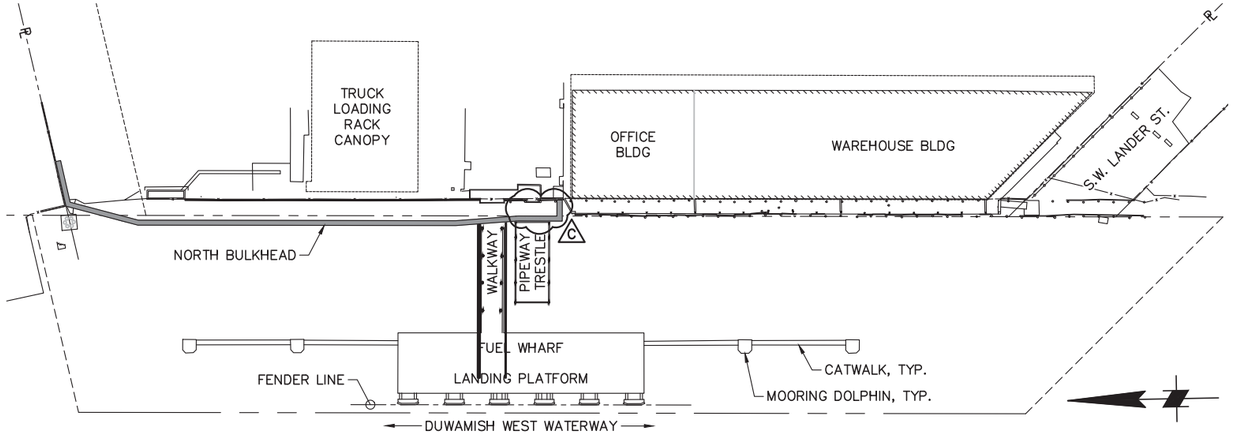
Seattle Terminal North Bulkhead Replacement Project Drawings

File: P:\6883-03 BP Bulkhead Replacement Design Project\500 CADD\520 Submittals\2014-11-20 Addendum 1 FINAL\6883-03; Plotted: 12/16/2014 8:46 PM by GREENE, CHRIS; Saved: 12/16/2014 8:26 PM by GREENE

PETROLEUM PRODUCT HANDLING WHARF
BP US PIPELINES & LOGISTICS
SEATTLE TERMINAL
NORTH BULKHEAD REPLACEMENT PROJECT



VICINITY MAP
SCALE: N.T.S.



PROJECT SITE PLAN
SCALE: N.T.S.

INDEX OF DRAWINGS		
DRAWING NUMBER	SHEET NUMBER	SHEET TITLE
SE-1-S-10197403	G1	TITLE SHEET & DRAWING INDEX
SE-1-S-10197404	G2	NOTES & DESIGN CRITERIA
SE-1-S-10197405	G3	ABBREVIATIONS & LEGEND
SE-1-S-10197406	C1	EXISTING SITE PLAN
SE-1-S-10197407	C2	BULKHEAD LAYOUT & SUGGESTED CONSTRUCTION SEQUENCE
SE-1-S-10197408	C3	LAYDOWN AREA & CONSTRUCTION BMP'S
SE-1-S-10197409	C4	DEMOLITION PLAN (1 OF 2)
SE-1-S-10197410	C5	DEMOLITION PLAN (2 OF 2)
SE-1-S-10197411	C6	GRADING PLAN
SE-1-S-10197412	C7	GRADING & ASPHALT DETAILS
SE-1-S-10197413	C8	GRADING DETAILS
SE-1-S-10197414	S1	BULKHEAD PLAN & ELEVATION (1 OF 2)
SE-1-S-10197415	S2	BULKHEAD PLAN & ELEVATION (2 OF 2)
SE-1-S-10197416	S3	TYPICAL SECTIONS
SE-1-S-10197417	S4	REINFORCEMENT DETAILS (1 OF 4)
SE-1-S-10197418	S5	REINFORCEMENT DETAILS (2 OF 4)
SE-1-S-10197419	S6	REINFORCEMENT DETAILS (3 OF 4)
SE-1-S-10197420	S7	REINFORCEMENT DETAILS (4 OF 4)
SE-1-S-10197421	S8	RAMP DETAILS
SE-1-S-10197422	S9	GUARDRAIL DETAILS
SE-1-S-10197423	S10	FENCE & GATE DETAILS

C

NOT TO BE USED FOR CONSTRUCTION

SHT NO.: G1

INDEX REV

REF DWG NO	DESCRIPTION

moffatt & nichol
600 UNIVERSITY STREET
SUITE# 610
SEATTLE, WA 98101
(206) 622-0222

REV	DATE	PROJ#	R&I NO.	REVISION	CONTRACTOR	CKD	PIC
C	12/17/14	P5-0047Q		ADDENDUM 1: UPDATED WALL LENGTH	M&N	PJ	TJM
B	5/24/13	P5-0047Q		ISSUED FOR PERMITS	M&N	PJ	TJM
A	8/17/12	P5-0047Q		ISSUED FOR BID	M&N	PJ	TJM

OLD DWG. NO.: N/A

BP West Coast Products LLC
U.S. Pipelines & Logistics

SEATTLE TERMINAL
NORTH BULKHEAD REPLACEMENT PROJECT
TITLE SHEET & DRAWING INDEX

SCALE: AS NOTED TYPE: 14 SUBTYPE: 75

DWG NO. SE-1-S-10197403 REVISION —

10197403

File: P:\6883-03 BP Bulkhead Replacement Design Project\500 CADD\520 Submittals\2014-11-20 Addendum 1 FINAL\6883-03; Plotted: 12/16/2014 8:46 PM by GREENE, CHRIS; Saved: 12/16/2014 8:26 PM by GREENE

GENERAL NOTES:

1. THESE NOTES CONTAIN GENERAL INFORMATION AND ARE NOT COMPLETE FOR CONSTRUCTION PURPOSES. CONTRACTOR SHALL VERIFY INFORMATION GIVEN HERE WITH SPECIFICATIONS AND OTHER DOCUMENTS AND BRING ANY CONFLICTS TO THE ATTENTION OF THE OWNER BEFORE BEGINNING AFFECTED WORK. THE OWNER WILL RESOLVE ANY SUCH CONFLICT.
2. IN THE EVENT OF CONFLICTING REQUIREMENTS BETWEEN THE CONTRACT DRAWINGS, GENERAL NOTES, AND SPECIFICATIONS, THE MORE STRINGENT SHALL CONTROL.
3. ALL FEDERAL, STATE AND LOCAL SAFETY REGULATIONS ARE TO BE STRICTLY FOLLOWED. METHODS OF DEMOLITION, CONSTRUCTION, AND ERECTION OF STRUCTURAL MATERIAL ARE THE CONTRACTOR'S RESPONSIBILITY.
4. THE CONTRACTOR SHALL ENSURE ALL PERMITS REQUIRED BY ANY FEDERAL, STATE, OR LOCAL DEPARTMENTS, UTILITY COMPANIES OR JURISDICTIONS AFFECTED BY THE WORK ARE OBTAINED.
5. THE CONTRACTOR SHALL ABIDE BY ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL PROTECTION STANDARDS, PERMITS, LAWS, AND REGULATIONS.
6. THE CONTRACTOR SHALL PLACE CONSTRUCTION DEBRIS CONTROL DEVICES, BOOMS, TARPAULINS, AND OTHER DEVICES AS NECESSARY TO PREVENT DEBRIS FROM ENTERING THE WATER, AND AIR BORNE MATERIALS FROM LEAVING THE IMMEDIATE VICINITY OF THE SITE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CLEANUP OF ANY MATERIALS DEPOSITED OUTSIDE THE WORK AREA.
7. ALL NON HAZARDOUS AND NON REGULATED DEBRIS SHALL BE DISPOSED OF OFF THE PROJECT SITE IN A PERMITTED LANDFILL BY CONTRACTOR.
8. COORDINATE ACCESS TO THE SITE WITH THE OWNER.
9. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND CONDITIONS FOR COMPATIBILITY BEFORE PROCEEDING. ANY DISCREPANCIES IN DIMENSIONS OR SITE CONDITIONS SHALL BE BROUGHT TO THE ATTENTION OF THE OWNER'S REPRESENTATIVE BEFORE PROCEEDING. THE CONTRACTOR SHALL NOT BEGIN CONSTRUCTION UNTIL THE DISCREPANCY HAS BEEN RESOLVED BY THE OWNER.
10. LOCATIONS OF EXISTING STRUCTURES AND UTILITIES ON THE DRAWINGS ARE APPROXIMATE. THE CONTRACTOR IS RESPONSIBLE FOR LOCATING ALL EXISTING STRUCTURES AND UTILITIES. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING DISCREPANCIES WITH THE OWNER.
11. CONTRACTOR INITIATED CHANGES SHALL BE SUBMITTED IN WRITING TO THE OWNER FOR APPROVAL PRIOR TO FABRICATION OR CONSTRUCTION. CHANGES SHOWN ON SHOP DRAWINGS ONLY WILL NOT SATISFY THIS REQUIREMENT.
12. CONTRACTOR SHALL BE RESPONSIBLE FOR ERECTION STABILITY AND TEMPORARY SUPPORT AS NECESSARY. DETAILED CONSTRUCTION PLANS SHALL BE PREPARED BY THE CONTRACTOR AND APPROVED BY THE OWNER PRIOR TO MOBILIZATION.
13. IN THE EVENT THAT EXISTING CONDITIONS DIFFER FROM THE PROJECT DRAWINGS, CONTACT THE OWNER PRIOR TO INITIATING CONSTRUCTION.
14. CONTRACTOR SHALL BE RESPONSIBLE TO PROTECT ALL EXISTING SURFACES OR STRUCTURES THAT WILL REMAIN.
15. FOR STRUCTURAL DRAWINGS OF THE EXISTING BULKHEAD WALL, CONTACT THE OWNER.
16. THE CONTRACTOR SHALL TAKE NECESSARY MEASURES TO PREVENT INTERRUPTION OF OPERATIONS AND PROTECT ALL EXISTING STRUCTURES AT THE FACILITY DURING CONSTRUCTION. DETAILS SHALL BE PRESETNED ON THE CONSTRUCTION PLANS.

STRUCTURAL NOTES:

CODES & STANDARDS

ALL WORK SHALL CONFORM TO THE MINIMUM REQUIREMENTS FOR THE FOLLOWING CODES AND STANDARDS:

1. INTERNATIONAL BUILDING CODE (IBC), 2009 EDITION, AS AMENDED AND ADOPTED BY THE CITY OF SEATTLE.
2. US ARMY CORPS OF ENGINEERS DESIGN OF SHEET PILE WALLS EM 1110-2-2504.
3. AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC), STEEL CONSTRUCTION MANUAL, 13TH EDITION.
4. ANSI/AISC 360, SPECIFICATIONS FOR STRUCTURAL STEEL BUILDINGS.
5. AMERICAN WELDING SOCIETY (AWS), STRUCTURAL WELDING CODE – STEEL, AWS D1.1 & D1.8.
6. AMERICAN INSTITUTE (ACI) 318 – BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE & COMMENTARY.
7. WSDOT STANDARD PLANS
8. WSDOT SPECIFICATIONS FOR ROAD, BRIDGE, AND MUNICIPAL CONSTRUCTION, 2012 EDITION.

DESIGN CRITERIA

1. BULKHEAD: THE BULKHEAD IS DESIGNED FOR STATIC, SEISMIC, AND LIQUEFACTION LATERAL LOADING CONDITIONS AS SPECIFIED IN THE GEOTECHNICAL REPORT BY GEOENGINEERS.
2. BULKHEAD SURCHARGE
   a. STATIC LOAD CASE = 250 PSF
   b. SEISMIC LOAD CASE = 100 PSF
   c. POST SEISMIC LOAD CASE = 0 PSF
3. BULKHEAD DESIGN IS IN ACCORDANCE WITH US ARMY CORPS OF ENGINEERS – DESIGN OF SHEET PILE WALLS (EM 1110-2-2504).

SHOP DRAWINGS

1. SHOP DRAWINGS SHALL BE SUBMITTED TO THE OWNER FOR REVIEW PRIOR TO FABRICATION. SHOP DRAWINGS SHALL BE REVIEWED AND STAMPED BY THE CONTRACTOR PRIOR TO REVIEW BY THE OWNER'S REPRESENTATIVE. REFER TO THE PROJECT SPECIFICATIONS FOR COORDINATION OF SHOP DRAWING SUBMITTALS.

CONCRETE

1. ALL CONCRETE WORK SHALL BE PERFORMED IN ACCORDANCE WITH ACI 301, UNLESS OTHERWISE NOTED.
2. ALL CONCRETE SHALL BE NORMAL WEIGHT CONCRETE (145 PCF), MIN.
3. ALL DETAILING, FABRICATION AND ERECTION OF REINFORCING STEEL SHALL CONFORM TO THE ACI MANUAL OF STANDARD PRACTICE FOR DETAILING REINFORCED CONCRETE STRUCTURES: ACI 315 AND ACI 2P-66.
4. MATERIALS SHALL CONFORM TO THE FOLLOWING UNLESS OTHERWISE NOTED.
   a. CONCRETE — 28 DAY STRENGTH
      CAST-IN-PLACE CONCRETE — 5,000 PSI
      CONTROLLED DENSITY FILL PER WSDOT STD SPECS 2-09.3 (1) E
   b. REINFORCING STEEL
      #6 AND LARGER — ASTM A706
      #5 AND SMALLER — ASTM A615, GRADE 60 OR A706
5. THE MINIMUM COVER OVER REINFORCING BARS SHALL BE 3 INCHES UNLESS OTHERWISE SHOWN ON THE DRAWINGS.
6. ALL EXPOSED CONCRETE EDGES SHALL BE CHAMFERED 1 INCH.
7. SEE SPECIFICATIONS FOR FINISHES ON ALL EXPOSED CONCRETE SURFACES.
8. ALL REINFORCING BAR SPLICES SHALL BE CLASS "B" TENSION LAP SPLICES PER ACI 318 UNLESS OTHERWISE NOTED. SPLICES SHALL OCCUR AT 1/3 POINTS OF THE SPAN PER ACI 318 CHAPTER 21. SPLICING OVER JOINTS IS NOT PERMITTED.

STEEL AND MISCELLANEOUS STEEL

1. ALL STEEL WORK SHALL BE IN ACCORDANCE WITH AISC SPECIFICATIONS FOR DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS (AISC).
2. STEEL MATERIALS SHALL CONFORM TO THE FOLLOWING, UNLESS OTHERWISE NOTED.
   a. MISC. PLATES, BARS AND SHAPES — ASTM A36
   b. MACHINE AND ANCHOR BOLTS — ASTM 1554
   c. ANCHOR RODS — ASTM A722, TYPE 2, GRADE 150
   d. ANCHOR PLATES — ASTM A572, GRADE 50
   e. SHEET PILE CONNECTORS — ASTM A572, GRADE 60
   f. PIPE — ASTM A532, GRADE B
3. STEEL SHEET PILES SHALL BE COATED IN ACCORDANCE WITH THE SPECIFICATIONS. LIMITS OF COATINGS ARE AS SHOWN ON THESE DRAWINGS.
4. ALL STEEL SHAPES, PLATES, OTHER FABRICATIONS, AND ALL HARDWARE SHALL BE HOT DIP GALVANIZED AFTER FABRICATION IN ACCORDANCE WITH THE SPECIFICATIONS. UNLESS OTHERWISE NOTED, ITEMS TO BE COMPLETELY EMBEDDED IN CONCRETE NEED NOT BE GALVANIZED.
5. ALL WELDING SHALL CONFORM TO AWS D1.1 LATEST EDITION.
6. FOR POST INSTALLED ANCHOR, SEE SPECIFICATIONS.

TIE BACK ANCHORS

1. TIE DOWNS INCLUDING STRAND, SHEATH AND HARDWARE SHALL BE DYWIDAG MULTISTRAND, DOUBLE CORROSION PROTECTED TYPE OR APPROVED EQUAL.
2. TIE DOWN ANCHOR SYSTEM AS SHOWN ON THE DRAWINGS AND METHOD OF INSTALLATION IS TO BE DESIGNED BY THE CONTRACTOR.

FILL

1. BACKFILL BEHIND THE BULKHEAD WALL SHALL CONFORM TO STRUCTURAL FILL MATERIAL AS DESCRIBED IN THE SPECIFICATIONS.
2. STRUCTURAL FILL PLACED BETWEEN EXISTING AND NEW BULKHEAD SHALL BE IMPORTED MATERIAL AND WILL NOT BE DERIVED FROM DREDGING.

INSPECTIONS

1. SPECIAL INSPECTION SHALL BE IN ACCORDANCE WITH IBC 2009, CHAPTER 17 WITH CITY OF SEATTLE AMENDMENTS. SEE BELOW FOR INSPECTION SCHEDULE:

MATERIAL	INSPECTION ITEM	CONTINUOUS	PERIODIC	REFERENCED STANDARD
CONCRETE	REINFORCING		X	
	REINFORCEMENT WELDING			AWS D1.4
	EMBEDDED BOLTS	X		
	VERIFY DESIGN MIX		X	
	STRENGTH, SLUMP, AIR, TEMPERATURE OF FRESH CONCRETE	X		
	FORMWORK		X	
PILES	VERIFY MATERIALS, SIZES, LENGTHS	X		
	VERIFY PLACEMENT, PLUMBNESS	X		
	CONCRETE FILL AT TOP OF PILES PER CONCRETE INSPECTION TABLE	X		
	CONFIRM TYPE AND SIZE OF HAMMER, RECORD NUMBER OF BLOWS PER FOOT OF PENE-TRATION, DETERMINE REQUIRED PENE-TRATIONS TO ACHIEVE DESIGN CAPACITY. RECORD TIP AND BUTT ELEVATIONS AND DOCUMENT ANY PILE DAMAGE.	X		
	CONFIRM INSTALLATION EQUIPMENT AND METHOD	X		
	LENGTH AND SIZE OF ANCHORS, LENGTH OF BOND ZONE AND GROUT VOLUME PER ANCHOR	X		
	ANCHOR TESTING	X		
ANCHORS	TEST ANCHOR PROGRAM	X		

SURVEY DATA:

HORIZONTAL DATUM

THE HORIZONTAL DATUM FOR THIS PROJECT IS NAD 83(07) WASHINGTON STATE PLANE, NORTH ZONE, BASED ON THE WASHINGTON STATE REFERENCE NETWORK, A REGIONAL COOPERATIVE OF GPS REFERENCE STATIONS AND WSDOT MONUMENTS DESIGNATED GP17099-241 AND GP17099-225.

PRIMARY BENCHMARK

VERTICAL DATUM: MLLW (MEAN LOWER LOW WATER)

BASED ON U.S. COAST AND GEODETIC SURVEY (USC&GS) TIDAL BENCH MARK DESIGNATED "944 7130 TIDAL 11", BEING A 3-1/2" BRASS DISK STAMPED "US COAST GEODETIC BENCH MARK NO. 11" IN AN N.G.S. MONUMENT CASE NEAR THE INTERSECTION OF MADISON AVENUE AND ALASKAN WAY BETWEEN THE IVAR'S FISH BAR AND FIRE STATION #5.

MLLW ELEVATION: 18.41 US FT

VERTICAL DATUM

VERTICAL DATUM FOR THIS PROJECT IS 0.00' MEAN LOWER LOW WATER (MLLW) BASED ON NOAA'S PUBLICATION SHEET FOR STATION ID 9447130, DATED 04/21/2003.

ELEVATIONS OF TIDAL DATUMS REFERRED TO MEAN LOWER LOW WATER (MLLW), IN US FEET, AT SEATTLE, PUGET SOUND, BASED ON TIDAL EPOCH 1983-2001:

HIGHEST OBSERVED WATER LEVEL (01/27/1983):	=	14.48
ORDINARY HIGH WATER (OHW)	=	13.5
MEAN HIGHER HIGH WATER (MHHW)	=	11.36
MEAN HIGH WATER (MHW)	=	10.49
MEAN TIDE LEVEL (MTL)	=	6.66
MEAN SEA LEVEL (MSL)	=	6.64
MEAN LOW WATER (MLW)	=	2.83
NORTH AMERICAN VERTICAL DATUM-1988 (NAVD 88)	=	2.35
MEAN LOWER LOW WATER (MLLW)	=	0.00
LOWEST OBSERVED WATER LEVEL (01/14/1916)	=	-5.04

GEOTECHNICAL DATA REPORT:

1. GEOENGINEERS (2011). "BP TERMINAL BULKHEAD REPLACEMENT, SEATTLE, WASHINGTON – GEOTECHNICAL ENGINEERING SERVICES", PREPARED FOR BP PIPELINES AND LOGISTICS, FILE NO. 8818-044-05, SEPTEMBER 23. THIS DOCUMENT SHALL BE AVAILABLE FROM THE OWNER.
2. GEOENGINEERS (2012). "BP TERMINAL BULKHEAD REPLACEMENT, SEATTLE, WASHINGTON – ADDENDUM REPORT, GEOTECHNICAL ENGINEERING SERVICES", FOR BP PIPELINE & LOGISTICS, FILE NO. 818-044-05, JANUARY 13, 2012. THIS DOCUMENT SHALL BE AVAILABLE FROM THE OWNER.

SHT NO.: G2

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INDEX REV

REF DWG NO	DESCRIPTION

moffatt & nichol
600 UNIVERSITY STREET
SUITE# 610
SEATTLE, WA 98101
(206) 622-0222

REV	DATE	PROJ#	R&I NO.	REVISION	CONTRACTOR	CKD	PIC
C	12/17/14	P5-0047Q		ADDENDUM 1: UPDATED WALL LENGTH	M&N	PJ	TJM
B	5/24/13	P5-0047Q		ISSUED FOR PERMITS	M&N	PJ	TJM
A	8/17/12	P5-0047Q		ISSUED FOR BID	M&N	PJ	TJM

OLD DWG. NO.: N/A

BP West Coast Products LLC
U.S. Pipelines & Logistics

SEATTLE TERMINAL
NORTH BULKHEAD REPLACEMENT PROJECT
NOTES & DESIGN CRITERIA

SCALE: AS NOTED TYPE: 14 SUBTYPE: 75

DWG NO. SE-1-S-10197404 REVISION –

10197404

File: P:\6883-03 BP Bulkhead Replacement Design Project\500 CADD\520 Submittals\2014-11-20 Addendum 1 FINAL\6883-03: Plotted: 12/16/2014 8:46 PM by GREENE, CHRIS; Saved: 12/16/2014 8:26 PM by CGREENE

ABBREVIATIONS:

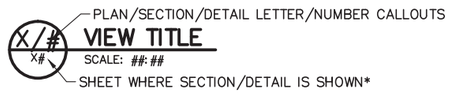
&	AND
@	AT
ACI	AMERICAN CONCRETE INSTITUTE
ACP	ASPHALT CONCRETE PAVEMENT
ALT	ALTERNATE
ASTM	AMERICAN SOCIETY OF TESTING & MATERIALS
APPROX	APPROXIMATE
AVE	AVENUE
BLDG	BUILDING
BMP'S	BEST MANAGEMENT PRACTICES
BOT	BOTTOM
CC	CENTER TO CENTER
CDF	CONTROLLED DENSITY FILL
CJ	CONSTRUCTION JOINT
℄	CENTERLINE
CLR	CLEAR
COE	CORPS OF ENGINEERS
CONC	CONCRETE
CONST	CONSTRUCTION
CONT	CONTINUOUS
CSBC	CRUSHED SURFACING BASE COURSE
D.I.	DUCTILE IRON
DIA ⌀	DIAMETER
DWG	DRAWING
(E)	EXISTING
EA	EACH
EF	EACH FACE
ELEV	ELEVATION
EQ	EQUAL
EQUIV	EQUIVALENT
FG	FINISH GRADE
FJ	FLANGE JOINT
FT	FEET
F'c	28-DAY COMPRESSIVE STRENGTH FOR CONCRETE
Fy	YIELD STRENGTH FOR STEEL
GA	GAUGE
GALV	GALVANIZED
HMA	HOT MIXED ASPHALT
HORIZ	HORIZONTAL
IE	INVERT ELEVATION
JT	JOINT
K	KIP (1000 POUNDS)
KSI	KIPS PER SQUARE INCH
MAX	MAXIMUM
MHHW	MEAN HIGHER HIGH WATER
MHW	MEAN HIGH WATER
MIN	MINIMUM
MLLW	MEAN LOWER LOW WATER
MLW	MEAN LOW WATER
MSL	MEAN SEA LEVEL

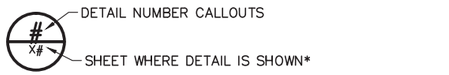
(N)	NEW
NAD83	NORTH AMERICAN DATUM OF 1983
NAVD	NORTH AMERICAN VERTICAL DATUM
NO	NUMBER
N.S.	NON-SHRINK
NTS	NOT TO SCALE
N/A	NOT APPLICABLE
OC	ON CENTER
OD	OUTSIDE DIAMETER
OG	ORIGINAL GROUND
OHW	ORDINARY HIGH WATER
℄	PLATE & PROPERTY LINE
PG	PERFORMANCE GRADE
PHOTO	PHOTOGRAPH
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PVC	POLY VINYL CHLORIDE
REINF	REINFORCEMENT
REQD	REQUIRED
SCHED	SCHEDULE
SD	STORM DRAIN
SHT	SHEET
SIM	SIMILAR
SPECS	SPECIFICATIONS
SS	STAINLESS STEEL
SST	
ST	STREET
STL	STEEL
STD	STANDARD
STRUC	STRUCTURAL
SW	SOUTHWEST
SYM	SYMMETRICAL
T&B	TOP & BOTTOM
TEMP	TEMPORARY
TOC	TOP OF CONCRETE
T.O.P.	TOP OF PIPE
TYP	TYPICAL
UON	UNLESS OTHERWISE NOTED
W/	WITH
W/O	WITHOUT
WP#	WORK POINT NUMBER
WHS	WELDED HEADED STUDS

SURVEYOR'S LEGEND

	CATCH BASIN (CB)
MW	MONITORING WELL CASE
	BOREHOLE (PAINTED) (BH)
XCC	EXTRUDED CONCRETE CURB
CONC	CONCRETE
MHW	MEAN HIGH WATER
MLW	MEAN LOW WATER
—·——·——·—	FENCE LINE (AS NOTED)
——— ℄ ———	PROPERTY LINE
— — —	ORDINARY HIGH WATER (ELEV +13.5' MLLW)

CROSS REFERENCE LEGEND





*NOTE: LETTER INDICATES SECTION; NUMBER INDICATES DETAIL.
DASH (–) INDICATES SECTION/DETAIL IS FROM SAME SHEET.

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INDEX REV	REF DWG NO	DESCRIPTION

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SEATTLE, WA 98101
(206) 622-0222

REV	DATE	PROJ#	R&I NO.	REVISION	CONTRACTOR	CKD	PIC
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A	8/17/12	P5-0047Q		ISSUED FOR BID	M&N	PJ	TJM

SHT NO.: G3

OLD DWG. NO.: N/A

BP West Coast Products LLC
U.S. Pipelines & Logistics

SEATTLE TERMINAL
NORTH BULKHEAD REPLACEMENT PROJECT
ABBREVIATIONS & LEGEND

SCALE: AS NOTED TYPE: 14 SUBTYPE: 75

DWG NO. SE-1-S-10197405 REVISION –

10197405

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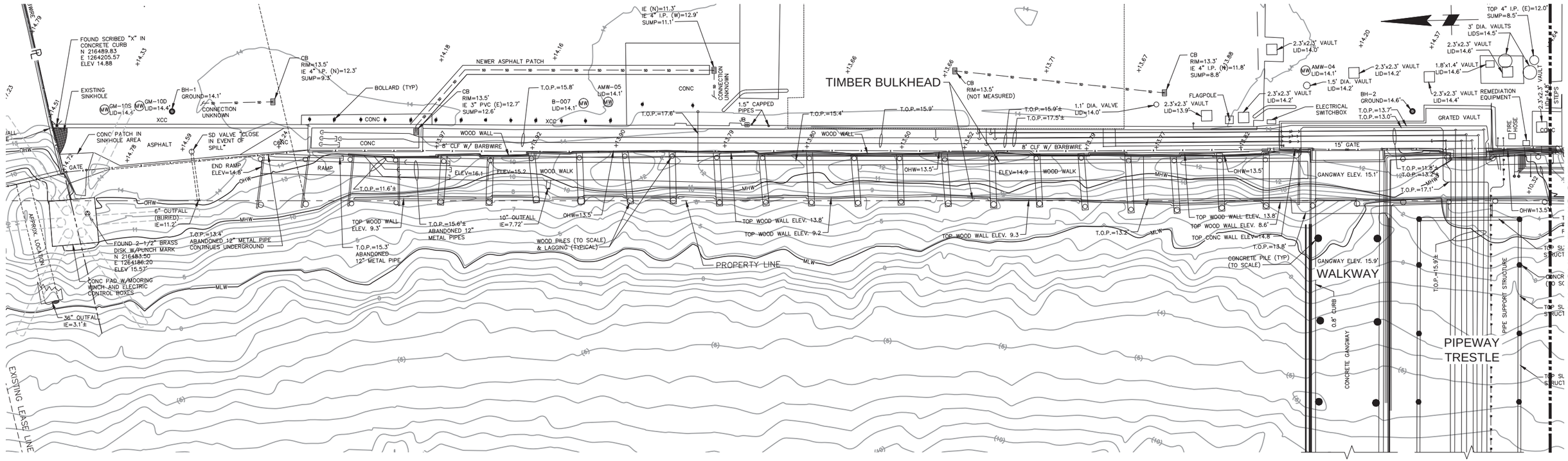

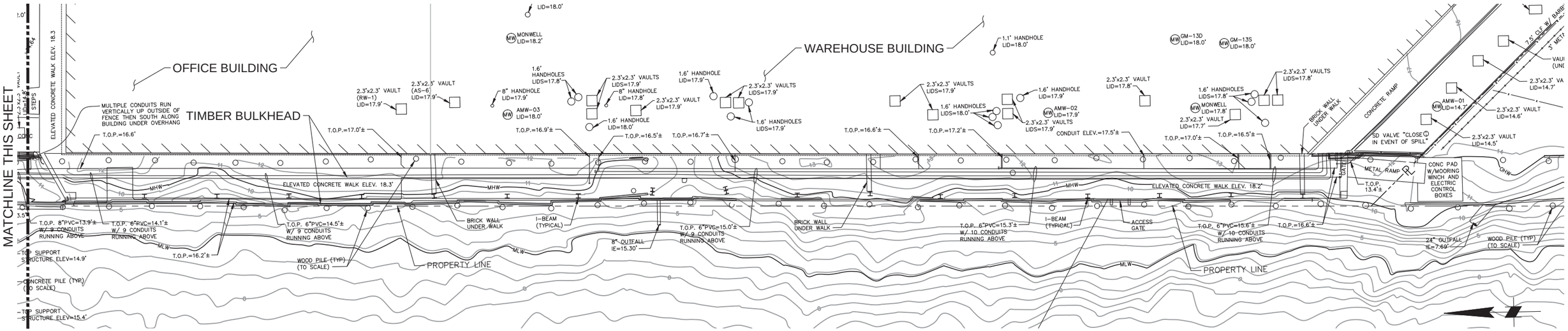

NOTE:

EXISTING SITE PLAN IS BASED ON THE TOPOGRAPHIC & BATHYMETRIC SURVEY CONDUCTED BY PACIFIC GEOMATIC SERVICES, INC. DATED 01/27/2012 (DRAWING NUMBERS SE-1-10192570 THROUGH SE-1-10192572).

EXISTING SITE PLAN

SCALE: 3/32"=1'-0"

16'-0" 0'-0" 8'-0" 16'-0"
SCALE: 3/32"=1'-0"

SHT NO.: C1

NOT TO BE USED FOR CONSTRUCTION

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OLD DWG. NO.: N/A

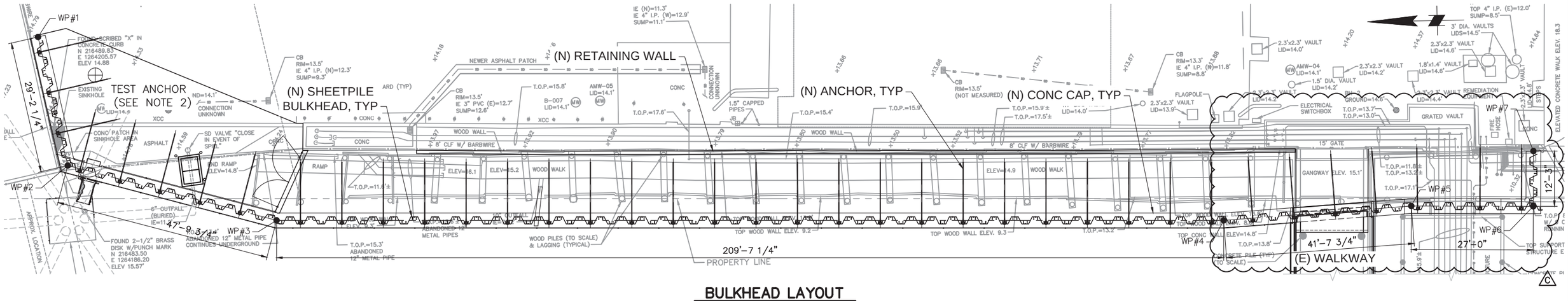
BP West Coast Products LLC
U.S. Pipelines & Logistics

SEATTLE TERMINAL
NORTH BULKHEAD REPLACEMENT PROJECT
EXISTING SITE PLAN

SCALE: AS NOTED TYPE: 14 SUBTYPE: 75

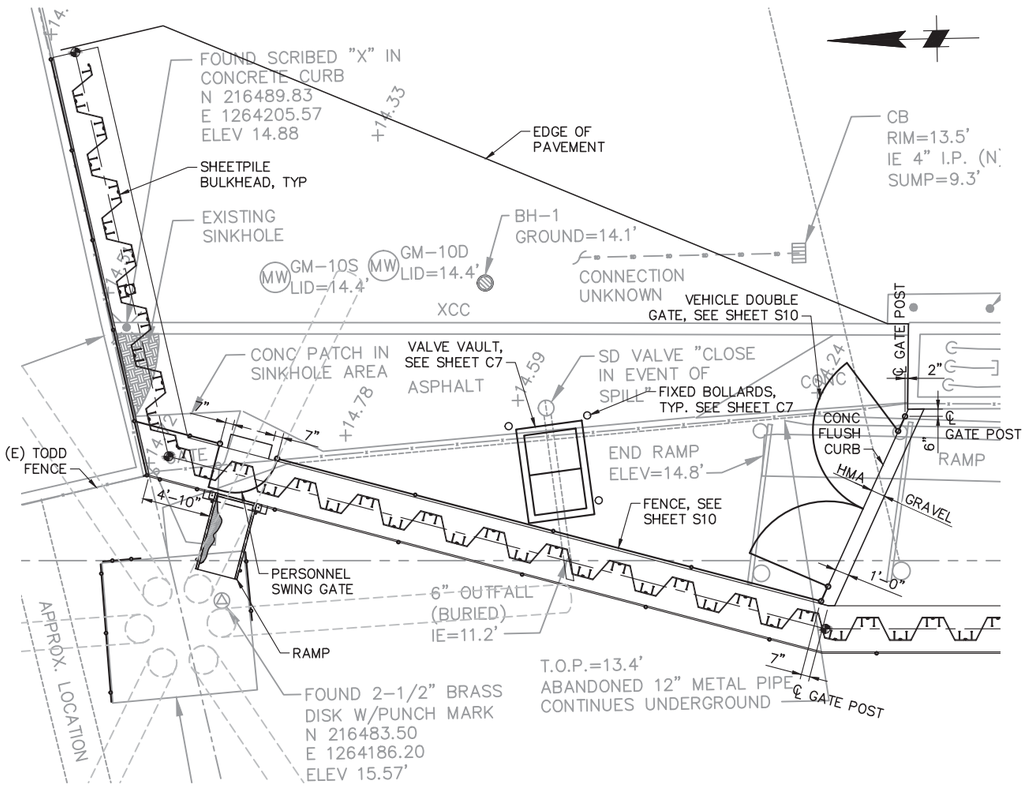
DWG NO. SE-1-S-10197406 REVISION —

10197406



BULKHEAD LAYOUT

SCALE: 3/32"=1'-0"



NORTH END LAYOUT

SCALE: 3/16"=1'-0"

(TIE-BACK ANCHORS NOT SHOWN FOR CLARITY)

SUGGESTED CONSTRUCTION SEQUENCE:

1. CONDUCT ANCHOR TESTING PROGRAM (1 LOCATION). INSTALL AND TEST.
2. RELOCATE, DEMOLISH AND/OR DISCONNECT UTILITIES AND OTHER FEATURES AS NOTED ON DRAWINGS. (SEE SHEET C4).
3. PROVIDE TEMPORARY SHORING, SAW CUT DOCK ACCESSWAY AND PROVIDE TEMPORARY FALL PREVENTION BRIDGING.
4. DEMOLISH EXISTING RETAINING WALL, SIDEWALK & CURB AT NORTH END.
5. DRIVE NEW SHEETPILES.
6. DEMOLISH (E)/RELOCATE TIMBER BULKHEAD, WALKWAY AND UTILITIES AS NOTED ON THE DRAWINGS.
7. CONSTRUCT RETAINING WALL.
8. PLACE BACKFILL BEHIND THE (N) BULKHEAD. COORDINATE UTILITY EXTENSION/CONNECTIONS WITH OWNER BEFORE BACKFILL PLACEMENT.
9. INSTALL BUT DO NOT TEST OR TENSION THE ANCHORS.
10. INSTALL PARTIAL CONCRETE CAP.
11. PRELOAD AND TEST THE ANCHORS AS DESCRIBED IN THE SPECIFICATIONS. COMPLETE THE PILE CAP.
12. INSTALL GUARDRAILS, FENCES, GATES & RAMP. REPAIR THE DOCK ACCESSWAY & ASPHALT PAVEMENT.

WORKPOINT TABLE	
WP NUMBER	NORTHING, EASTING
WP#1	N216493.05 E1264224.99
WP#2	N216487.06 E1264196.42
WP#3	N216441.07 E1264183.38
WP#4	N216231.50 E1264179.22

WORKPOINT TABLE	
WP NUMBER	NORTHING, EASTING
WP#5	N216189.92 E1264181.57
WP#6	N216162.93 E1264180.96
WP#7	N216162.65 E1264193.19

LEGEND

⊕ APPROX TEST ANCHOR LOCATION

NOTES:

1. HANDRAILS NOT SHOWN FOR CLARITY.
2. FINAL TEST ANCHOR LOCATION TO BE APPROVED BY THE OWNER.

8'-0" 0'-0" 4'-0" 8'-0"
SCALE: 3/16"=1'-0"

16'-0" 0'-0" 8'-0" 16'-0"
SCALE: 3/32"=1'-0"

SHT NO.: C2

NOT TO BE USED FOR CONSTRUCTION

INDEX REV

REF DWG NO	DESCRIPTION

moffatt & nichol
600 UNIVERSITY STREET
SUITE# 610
SEATTLE, WA 98101
(206) 622-0222

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B	5/24/13	P5-0047Q		ISSUED FOR PERMITS	M&N	PJ	TJM
A	8/17/12	P5-0047Q		ISSUED FOR BID	M&N	PJ	TJM

OLD DWG. NO.: N/A

BP West Coast Products LLC
U.S. Pipelines & Logistics

SEATTLE TERMINAL
NORTH BULKHEAD REPLACEMENT PROJECT
BULKHEAD LAYOUT & SUGGESTED CONSTRUCTION SEQUENCE

SCALE: AS NOTED TYPE: 14 SUBTYPE: 75

DWG NO. SE-1-S-10197407 REVISION –

10197407

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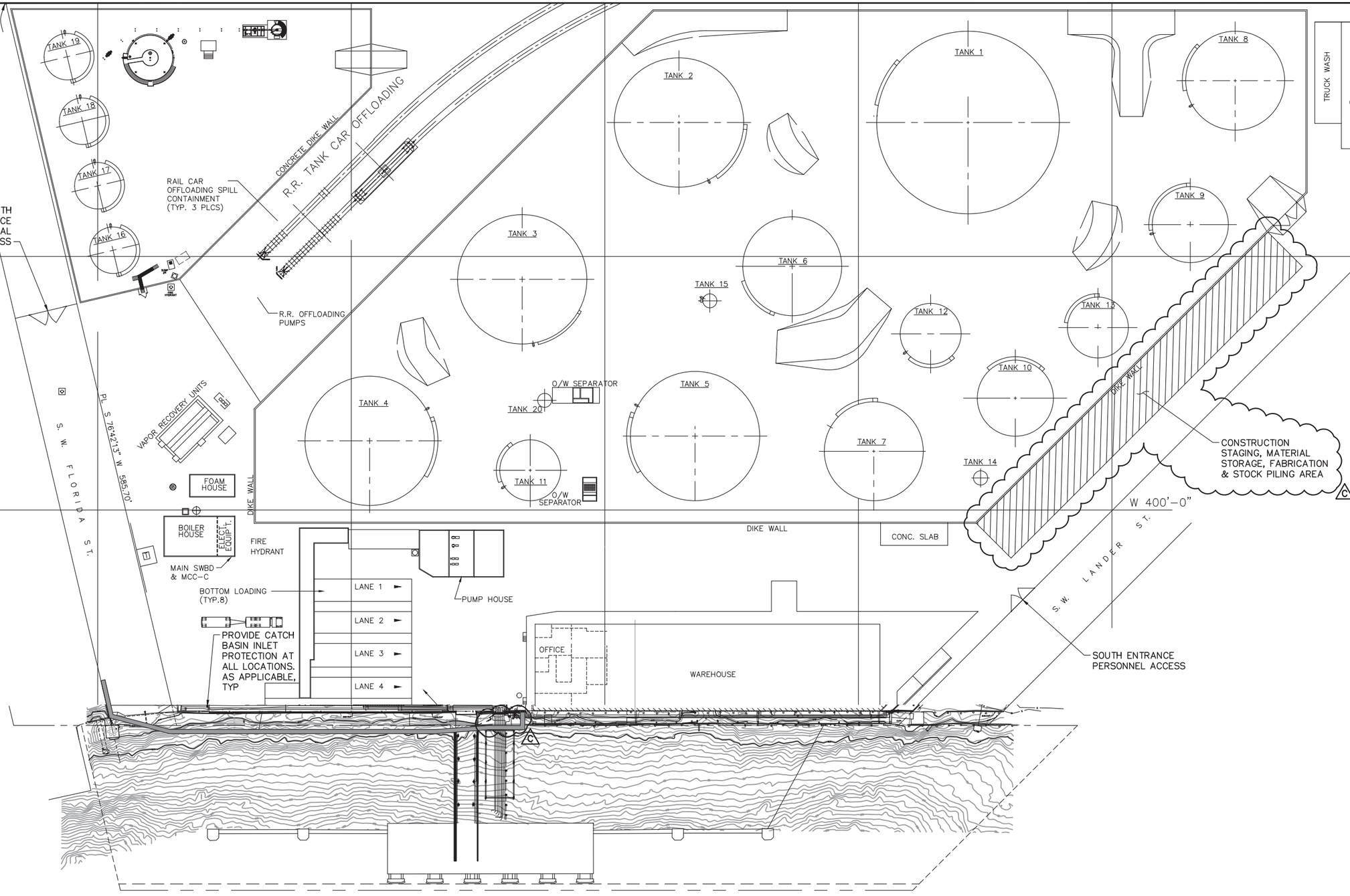

LAYDOWN AREA & CONSTRUCTION BMP's

SCALE: 1" = 40'

NOTES:

1. UPLAND SUBSURFACE CONDITIONS CONTAIN EXISTING CONTAMINATION THAT IS MANAGED AND CONTROLLED IN ACCORDANCE WITH MEASURES APPROVED BY THE WASHINGTON DEPARTMENT OF ECOLOGY. WORK MUST COMPLY WITH ALL SITE MANAGEMENT CONDITIONS.
2. EXISTING ABSORBENT BOOMS WILL BE MAINTAINED TO CAPTURE AND CONTAIN ANY SHEENS GENERATED DURING CONSTRUCTION ADJACENT TO KNOWN INLAND HYDROCARBON SMEAR ZONES.
3. SPILL RESPONSE MATERIALS (E.G., ABSORBENT PADS, BOOMS) WILL BE READILY AVAILABLE ON SITE. IN THE EVENT OF AN OIL SPILL, APPLICABLE SPILL RESPONSE MEASURES AND PROCEDURES WILL BE IMPLEMENTED PER THE FACILITY SPILL PREVENTION CONTROL AND COUNTERMEASURE PLAN AND/OR CONTRACTOR SPILL RESPONSE PLAN.
4. DESIGNATED CONTAINMENT BINS TO BE USED FOR TEMPORARY STORAGE OF DEMOLITION DEBRIS AND ALL OTHER DEBRIS MATERIALS/SPOILS PRIOR TO DISPOSAL AT AN APPROVED FACILITY OFF-SITE.
5. AN ON-SITE CONCRETE/GROUT HANDLING CONTAINMENT AREA/BIN WILL BE PROVIDED AS APPLICABLE. SUCH MEASURES SHOULD BE LOCATED IN A CONSTRUCTION STORAGE AREA OR EXISTING LAYDOWN AREA. BEST MANAGEMENT PRACTICES WILL BE IMPLEMENTED TO THE EXTENT PRACTICABLE.
6. OTHER EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICES (E.G., SILT BARRIER, SILT FENCE) MAY BE IMPLEMENTED, AS APPLICABLE, BASED ON SITE-SPECIFIC CONSTRUCTION CONDITIONS.
7. IN ADDITION TO THE ABOVE, THE CONTRACTOR SHALL COMPLY WITH ALL PERMIT CONDITIONS.

40' 0' 40' 80'
SCALE: 1"=40'

SHT NO.: C3

NOT TO BE USED FOR CONSTRUCTION

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OLD DWG. NO.: N/A

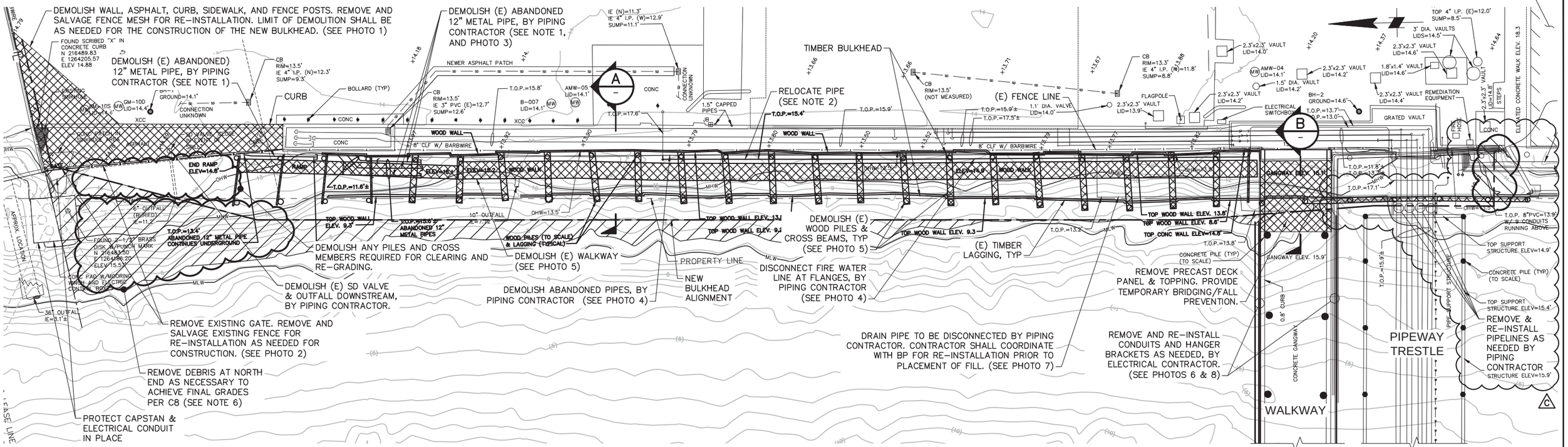
BP West Coast Products LLC
U.S. Pipelines & Logistics

SEATTLE TERMINAL
NORTH BULKHEAD REPLACEMENT PROJECT
LAYDOWN AREA & CONSTRUCTION BMP'S

SCALE: AS NOTED TYPE: 14 SUBTYPE: 75

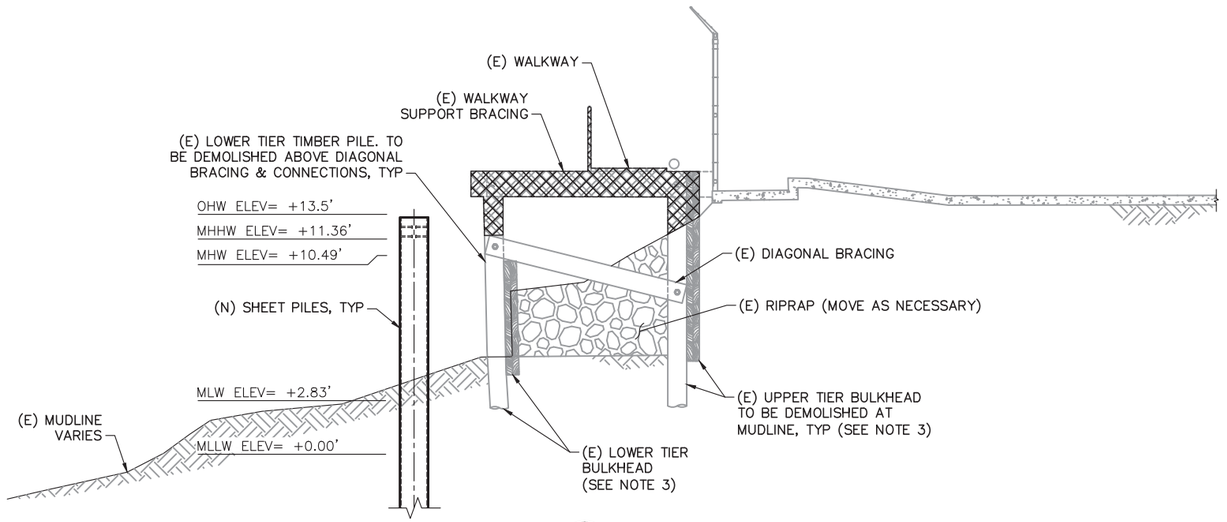
DWG NO. SE-1-S-10197408 REVISION -

10197408

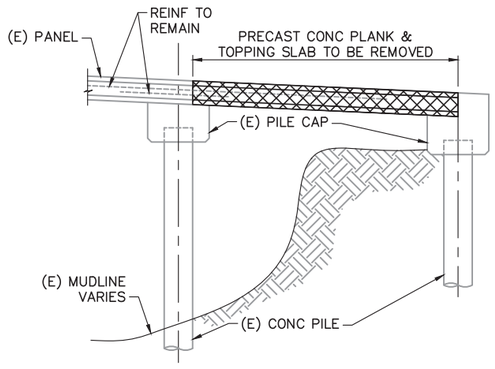


DEMOLITION PLAN

SCALE: 3/32"=1'-0"
(NEW SHEET PILES NOT SHOWN FOR CLARITY)



A — SECTION
SCALE: 1/4"=1'-0"



B — SECTION
SCALE: 1/4"=1'-0"

LEGEND

- TO BE DEMOLISHED
- REMOVE RIP-RAP (SEE C8 FOR RE-USE OF ROCK)
- DEMOLISH CAST-IN-PLACE CONCRETE AS NEEDED FOR SHEET PILE INSTALLATION. CONTRACTOR TO FIELD VERIFY DEPTH & LIMITS OF CIP CONCRETE. (C)

NOTES:

1. REMOVE BLIND FLANGE ON END OF PIPING. HAVE VACUUM TRUCK ON STAND BY TO EMPTY PIPES. CONFIRM PIPES ARE EMPTY. COLD CUT EACH PIPE AT EXISTING FENCE LINE. FILL W/ ONE YARD OF GROUT, EACH. WELD A PLATE ON END OF PIPE. (BY PIPING CONTRACTOR)
2. CONTRACTOR SHALL COORDINATE W/ OWNER FOR RELOCATION OF ANY PIPES AND UTILITIES PRIOR TO COMMENCEMENT OF WORK.
3. TIP OF TIMBER PILES IS UNKNOWN.
4. (N) SHEET PILES TO BE INSTALLED PRIOR TO DEMOLITION.
5. FOR PHOTOS, SEE SHEET C5.
6. CONTRACTOR SHALL TAKE NECESSARY MEASURES TO PROTECT THE DOLPHIN AT ALL TIMES. NO LOSS OF MATERIAL UNDER DOLPHIN PLATFORM WILL BE ALLOWED.

4'-0" 0'-0" 4'-0" 8'-0"
SCALE: 1/4"=1'-0"

16'-0" 0'-0" 8'-0" 16'-0"
SCALE: 3/32"=1'-0"

SHT NO.: C4

NOT TO BE USED FOR CONSTRUCTION

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SEATTLE, WA 98101
(206) 622-0222

INDEX REV

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OLD DWG. NO.: N/A

BP West Coast Products LLC
U.S. Pipelines & Logistics

SEATTLE TERMINAL
NORTH BULKHEAD REPLACEMENT PROJECT
DEMOLITION PLAN (1 OF 2)

SCALE: AS NOTED TYPE: 14 SUBTYPE: 75

DWG NO. SE-1-S-10197409 REVISION —

10197409

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P1 – FENCE & RETAINING WALL @ NORTH PROPERTY LINE

P3 – PHOTO – ABANDONED PIPE (ONE SHOWN)

P5 – PHOTO – (E) BULKHEAD & WALKWAY

P7 – PHOTO – DRAIN PIPE

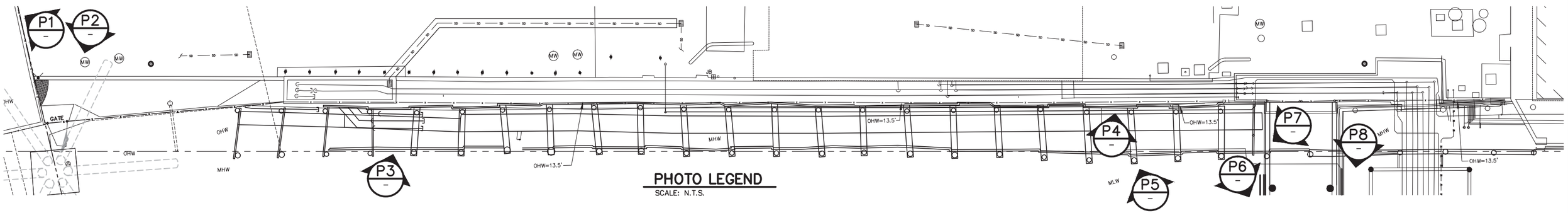

PHOTO LEGEND
SCALE: N.T.S.

P2 – PHOTO – GATE & FENCE

P4 – PHOTO – FIRE LINE, ELECTRICAL CONDUIT @ ABANDONED PIPES

P6 – PHOTO – UTILITIES & SUPPORTS @ NORTH EDGE OF DOCK WALKWAY

P8 – PHOTO – UTILITIES & SUPPORTS @ SOUTH EDGE OF DOCK WALKWAY

NOT TO BE USED FOR CONSTRUCTION

SHT NO.: C5

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SEATTLE, WA 98101
(206) 622-0222

REV	DATE	PROJ#	R&I NO.	REVISION	CONTRACTOR	CKD	PIC
C	12/17/14	P5-0047Q		ADDENDUM 1: UPDATED WALL LENGTH	M&N	PJ	TJM
B	5/24/13	P5-0047Q		ISSUED FOR PERMITS	M&N	PJ	TJM
A	8/17/12	P5-0047Q		ISSUED FOR BID	M&N	PJ	TJM

OLD DWG. NO.: N/A

BP West Coast Products LLC
U.S. Pipelines & Logistics

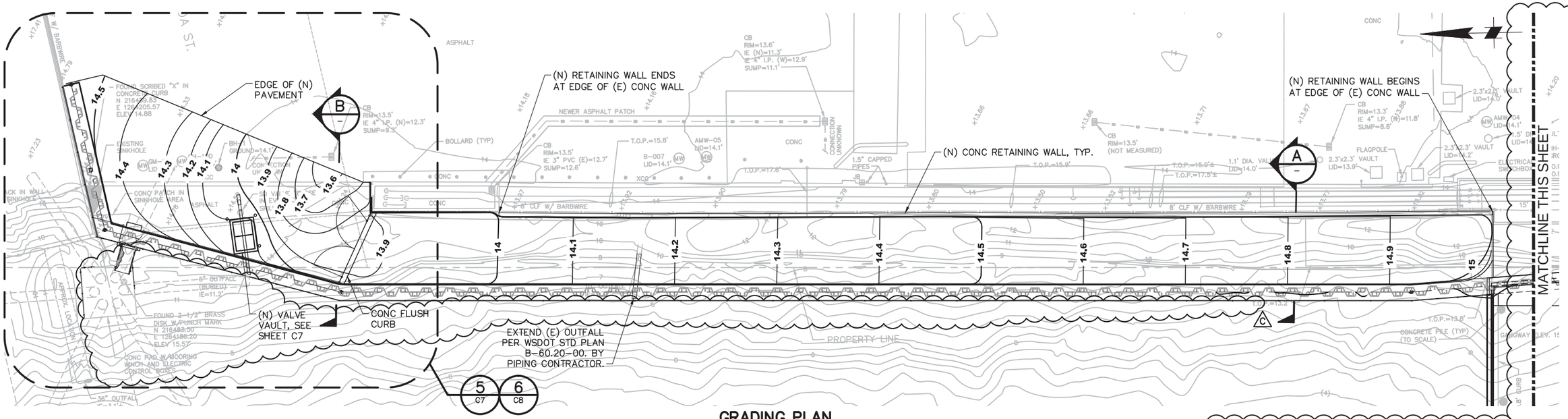
SEATTLE TERMINAL
NORTH BULKHEAD REPLACEMENT PROJECT
DEMOLITION PLAN (2 OF 2)

SCALE: AS NOTED TYPE: 14 SUBTYPE: 75

DWG NO. SE-1-S-10197410 REVISION –

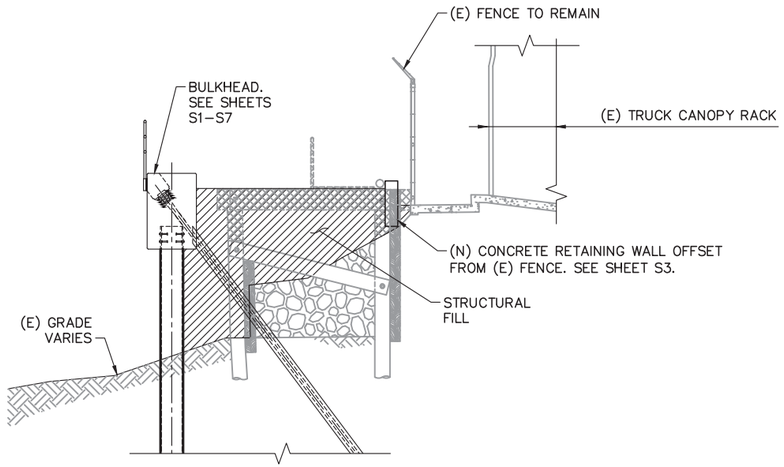
10197410

File: P:\6883-03 BP Bulkhead Replacement Design Project\500 CADD\520 Submittals\2014-11-20 Addendum 1 FINAL\6883-03; Plotted: 12/16/2014 8:50 PM by GREENE, CHRIS; Saved: 12/16/2014 8:26 PM by GREENE



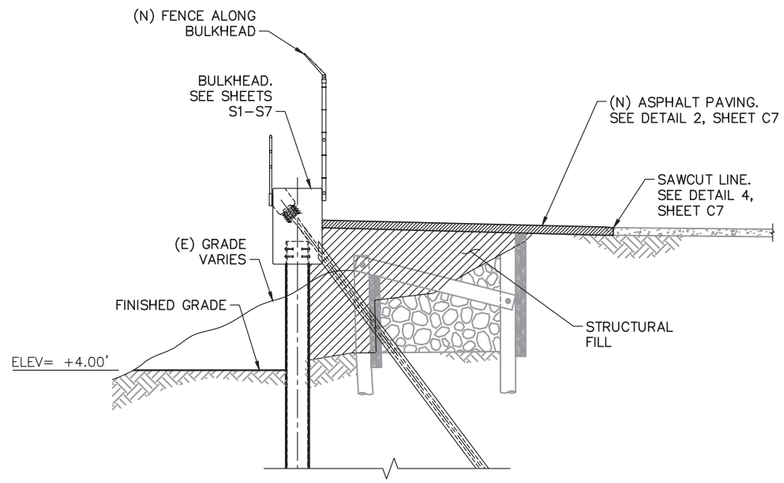
GRADING PLAN

SCALE: 1"=10'
(TIEBACKS NOT SHOWN FOR CLARITY)



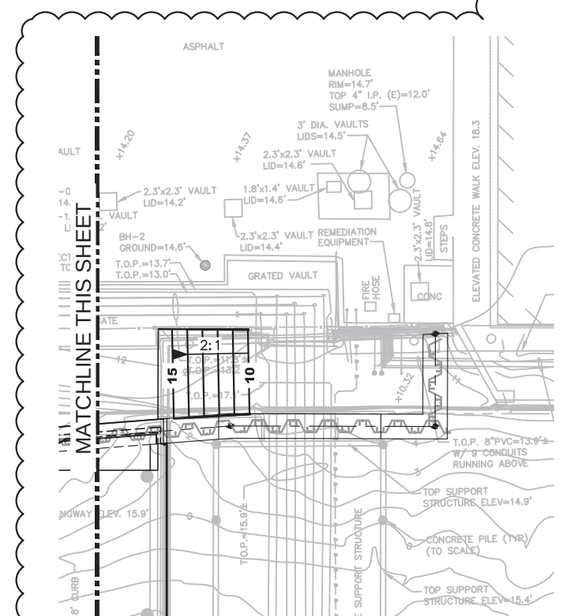
A TYPICAL SECTION @ NORTH BULKHEAD

SCALE: 1"=5'



B TYPICAL SECTION @ NORTH BULKHEAD

SCALE: 1"=5'



GRADING PLAN (CONTINUED)

SCALE: 1"=10'
(TIEBACKS NOT SHOWN FOR CLARITY)

5' 0' 5' 10'
SCALE: 1"=5'

10' 0' 10' 20'
SCALE: 1"=10'

SHT NO.: C6

NOT TO BE USED FOR CONSTRUCTION

moffatt & nichol
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SUITE# 610
SEATTLE, WA 98101
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INDEX REV	REF DWG NO	DESCRIPTION

REV	DATE	PROJ#	R&I NO.	REVISION	CONTRACTOR	CKD	PIC
C	12/17/14	P5-0047Q		ADDENDUM 1: UPDATED WALL LENGTH	M&N	PJ	TJM
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A	8/17/12	P5-0047Q		ISSUED FOR BID	M&N	PJ	TJM

OLD DWG. NO.: N/A

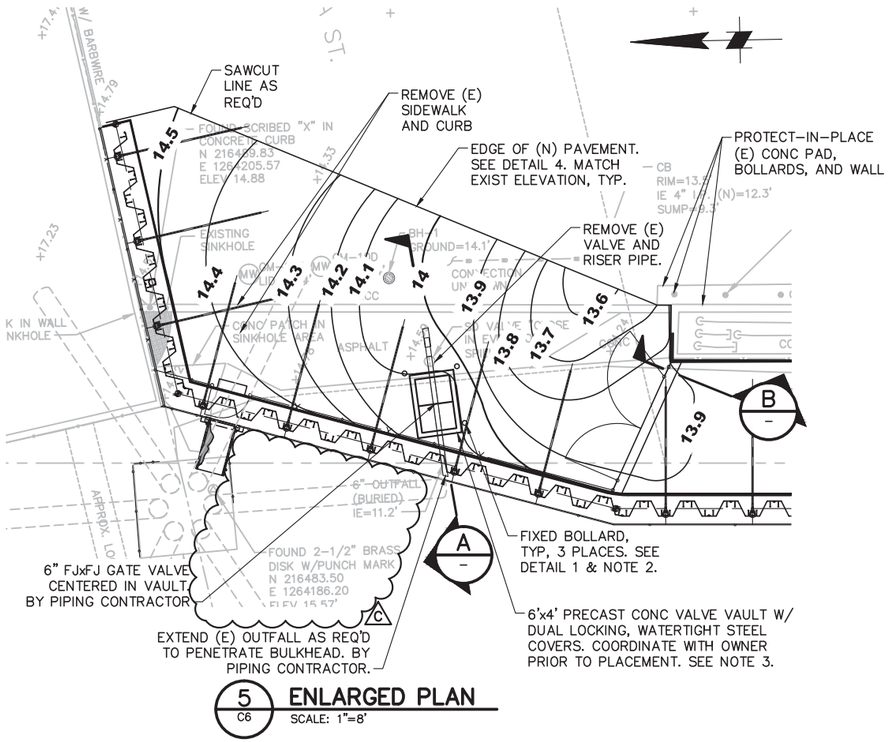
BP West Coast Products LLC
U.S. Pipelines & Logistics

SEATTLE TERMINAL
NORTH BULKHEAD REPLACEMENT PROJECT
GRADING PLAN

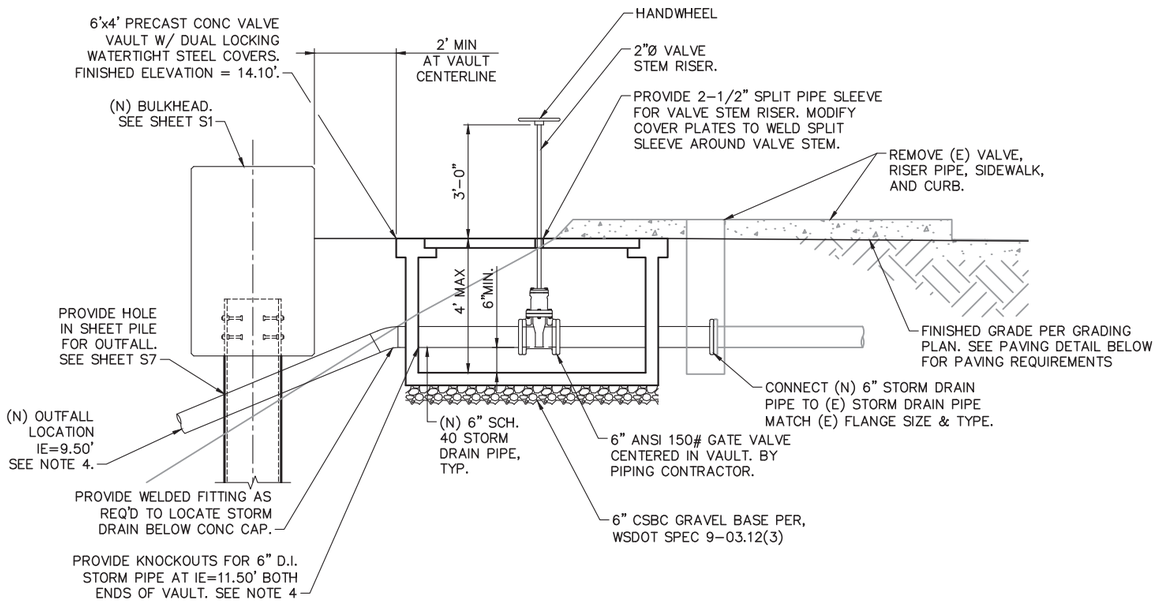
SCALE: AS NOTED TYPE: 14 SUBTYPE: 75

DWG NO. SE-1-S-10197411 REVISION —

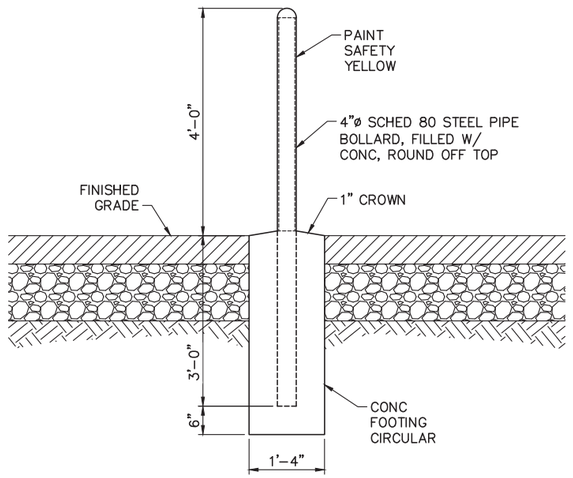
10197411



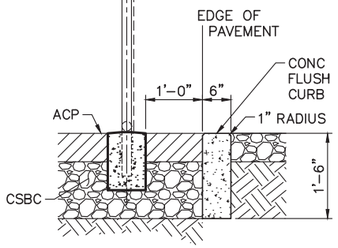
5 C6 **ENLARGED PLAN**
SCALE: 1"=8'



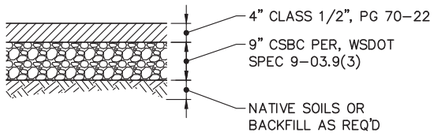
A **VALVE VAULT SECTION**
SCALE: 1/2"=1'-0"



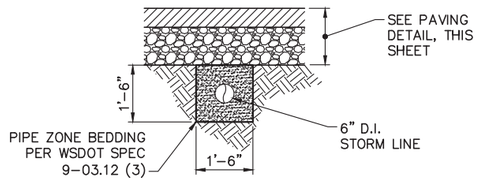
1 **FIXED BOLLARD**
SCALE: 3/4"=1'-0"



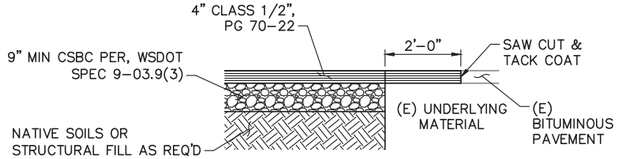
B **SECTION**
SCALE: 3/4"=1'-0"



2 **PAVING DETAIL**
SCALE: 1/2"=1'-0"



3 **PIPE TRENCH DETAIL**
SCALE: 1/2"=1'-0"



4 **JUNCTURE OF NEW AND EXIST PAVEMENT**
SCALE: 1/2"=1'-0"

NOTES:

1. PROVIDE 1 FT OF CLEAR SPACE BETWEEN VALVE VAULT WALL AND BOLLARD FOUNDATION.
2. COORDINATE WITH OWNER PRIOR TO PLACEMENT OF BOLLARDS.
3. PROVIDE 2 FT CLEARANCE BETWEEN VALVE VAULT AND TIEBACKS AT ALL LOCATIONS.
4. PIPING CONTRACTOR TO VERIFY STORM DRAIN PIPE INVERT ELEVATIONS TO PROVIDE ADEQUATE CONVEYANCE. COORDINATE WITH ENGINEER PRIOR TO FINAL PLACEMENT.

2'-0" 0'-0" 1'-0" 2'-0"
SCALE: 3/4"=1'-0"

2'-0" 0'-0" 2'-0" 4'-0"
SCALE: 1/2"=1'-0"

8' 0' 8' 16'
SCALE: 1"=8'

SHT NO.: C7

NOT TO BE USED FOR CONSTRUCTION

INDEX REV

REF DWG NO	DESCRIPTION

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600 UNIVERSITY STREET
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SEATTLE, WA 98101
(206) 622-0222

REV	DATE	PROJ#	Rdl NO.	REVISION	CONTRACTOR	CKD	PIC
C	12/17/14	P5-0047Q		ADDENDUM 1: UPDATED WALL LENGTH	M&N	PJ	TJM
B	5/24/13	P5-0047Q		ISSUED FOR PERMITS	M&N	PJ	TJM
A	8/17/12	P5-0047Q		ISSUED FOR BID	M&N	PJ	TJM

OLD DWG. NO.: N/A

BP West Coast Products LLC
U.S. Pipelines & Logistics

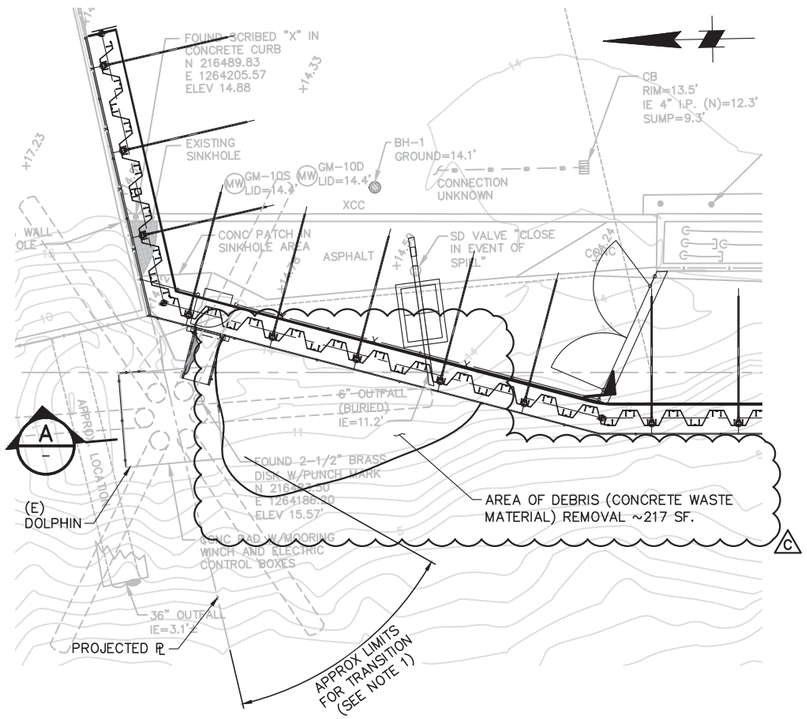
SEATTLE TERMINAL
NORTH BULKHEAD REPLACEMENT PROJECT
GRADING & ASPHALT DETAILS

SCALE: AS NOTED TYPE: 14 SUBTYPE: 75

DWG NO. SE-1-S-10197412 REVISION –

10197412

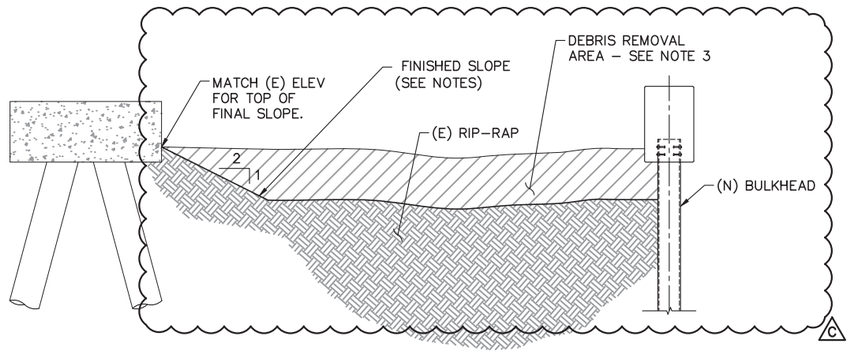
File: P:\6883-03 BP Bulkhead Replacement Design Project\500 CADD\520 Submittals\2014-11-20 Addendum 1 FINAL\6883-03; Plotted: 12/16/2014 8:50 PM by GREENE, CHRIS; Saved: 12/16/2014 8:26 PM by GREENE



6 / C6 NORTH END–PART PLAN

SCALE: 1"=8'

GRADING PLAN SHOWS TOP OF SLOPE BETWEEN ELEVATION +11.00' TO 12.00' MLLW. CONTRACTOR MAY MODIFY THE GRADING PLAN TO MATCH EXISTING TOP OF SLOPE ELEVATION. THE SLOPE SHALL NOT BE STEEPER THAN 2H:1V OUTSIDE THE LIMITS OF TRANSITION.



A – SECTION

SCALE: 1'=5'

LEGEND

EXCAVATION

NOTES:

1. CONTRACTOR SHALL PROTECT (E) AND (N) STRUCTURES.
2. RE–USE OF (E) ROCK REMOVED WILL BE ALLOWED.
3. AFTER DEBRIS REMOVAL, CONTRACTOR SHALL COORDINATE WITH OWNER FOR REQUIRED EXCAVATION AND PLACEMENT OF ROCK BEYOND FINISHED GRADES INDICATED ON DRAWINGS. TO BE APPROVED BY ENGINEER. C

5' 0' 5' 10'

SCALE: 1"=5'

8' 0' 8' 16'

SCALE: 1"=8'

SHT NO.: C8

NOT TO BE USED FOR CONSTRUCTION

INDEX REV	REF DWG NO	DESCRIPTION

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600 UNIVERSITY STREET
SUITE# 610
SEATTLE, WA 98101
(206) 622-0222

REV	DATE	PROJ#	Rdl NO.	REVISION	CONTRACTOR	CKD	PIC
C	12/17/14	P5–0047Q		ADDENDUM 1: UPDATED WALL LENGTH	M&N	PJ	TJM
B	5/24/13	P5–0047Q		ISSUED FOR PERMITS	M&N	PJ	TJM

OLD DWG. NO.: N/A

BP West Coast Products LLC
U.S. Pipelines & Logistics

SEATTLE TERMINAL
NORTH BULKHEAD REPLACEMENT PROJECT
GRADING DETAILS

SCALE: AS NOTED TYPE: 14 SUBTYPE: 75

DWG NO. SE–1–S–10197413 REVISION –

10197413

File: P:\6883-03 BP Bulkhead Replacement Design Project\500 CADD\520 Submittals\2014-11-20 Addendum 1 FINAL\6883-03; Plotted: 12/16/2014 8:50 PM by GREENE, CHRIS; Saved: 12/16/2014 8:26 PM by GREENE

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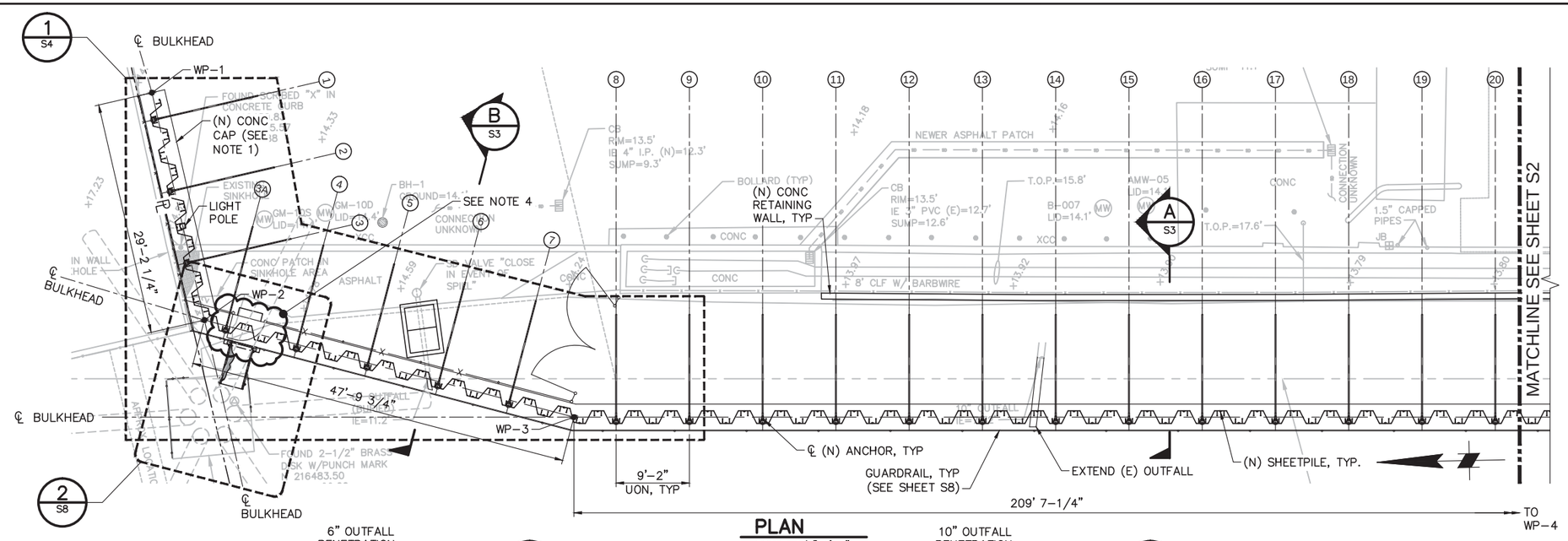
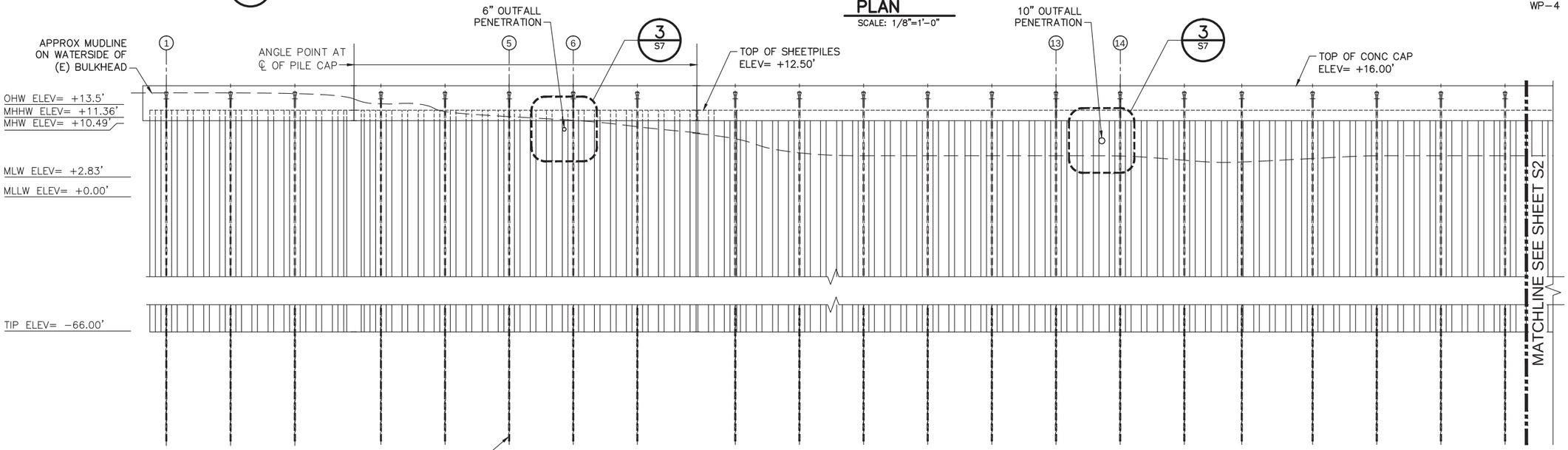


PLAN
SCALE: 1/8"=1'-0"



ELEVATION
SCALE: 1/8"=1'-0"

NOTES:

1. SEE SHEET S9 FOR TYPICAL GUARDRAIL DETAILS AND POST SPACING.
2. BULKHEAD DEVELOPED ELEVATION AS VIEWED FROM WATERSIDE.
3. SEE SHEET C2 FOR WP COORDINATES.
4. CONTRACTOR SHALL TAKE NECESSARY MEASURES TO PREVENT DAMAGE TO EXISTING PIPE PILES. UP TO 2 PAIRS OF SHEET PILES MAY BE DRIVEN TO A TIP ELEVATION HIGHER THAN -66' TO PREVENT DAMAGE TO EXISTING PIPE PILES.

8'-0" 0'-0" 8'-0" 16'-0"
SCALE: 1/8"=1'-0"

SHT NO.: S1

NOT TO BE USED FOR CONSTRUCTION

INDEX REV

REF DWG NO	DESCRIPTION

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600 UNIVERSITY STREET
SUITE# 610
SEATTLE, WA 98101
(206) 622-0222

REV	DATE	PROJ#	R&I NO.	REVISION	CONTRACTOR	CKD	PIC
C	12/17/14	P5-0047Q		ADDENDUM 1: UPDATED WALL LENGTH	M&N	PJ	TJM
B	5/24/13	P5-0047Q		ISSUED FOR PERMITS	M&N	PJ	TJM
A	8/17/12	P5-0047Q		ISSUED FOR BID	M&N	PJ	TJM

OLD DWG. NO.: N/A

BP West Coast Products LLC
U.S. Pipelines & Logistics

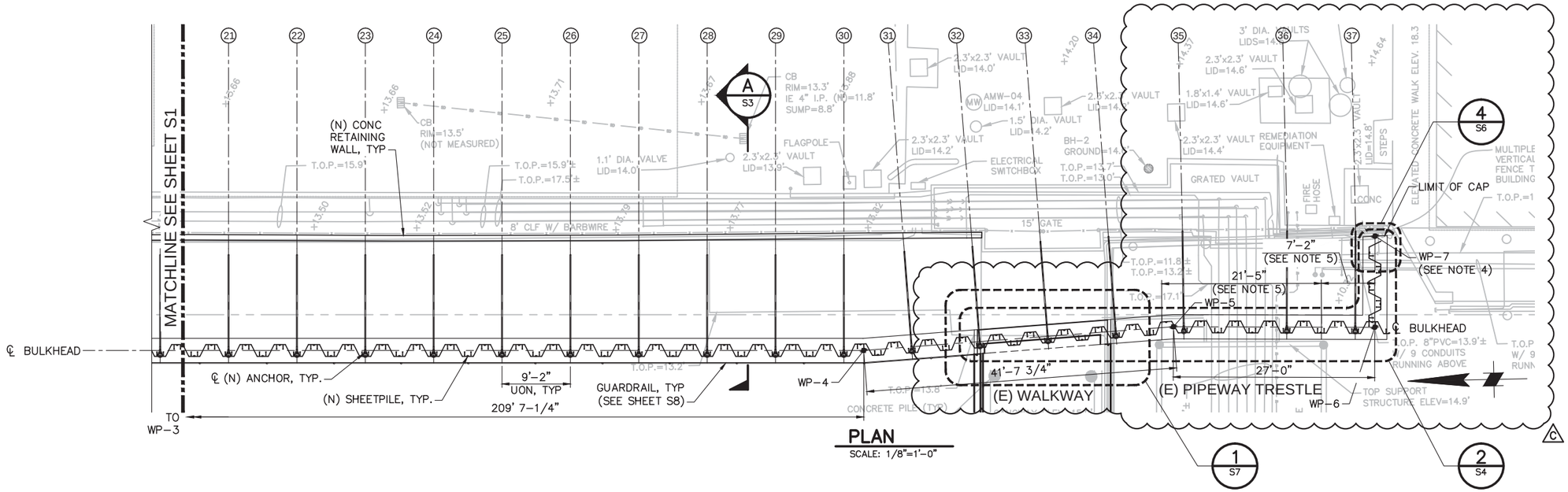
SEATTLE TERMINAL
NORTH BULKHEAD REPLACEMENT PROJECT
BULKHEAD PLAN & ELEVATION (1 OF 2)

SCALE: AS NOTED TYPE: 14 SUBTYPE: 75

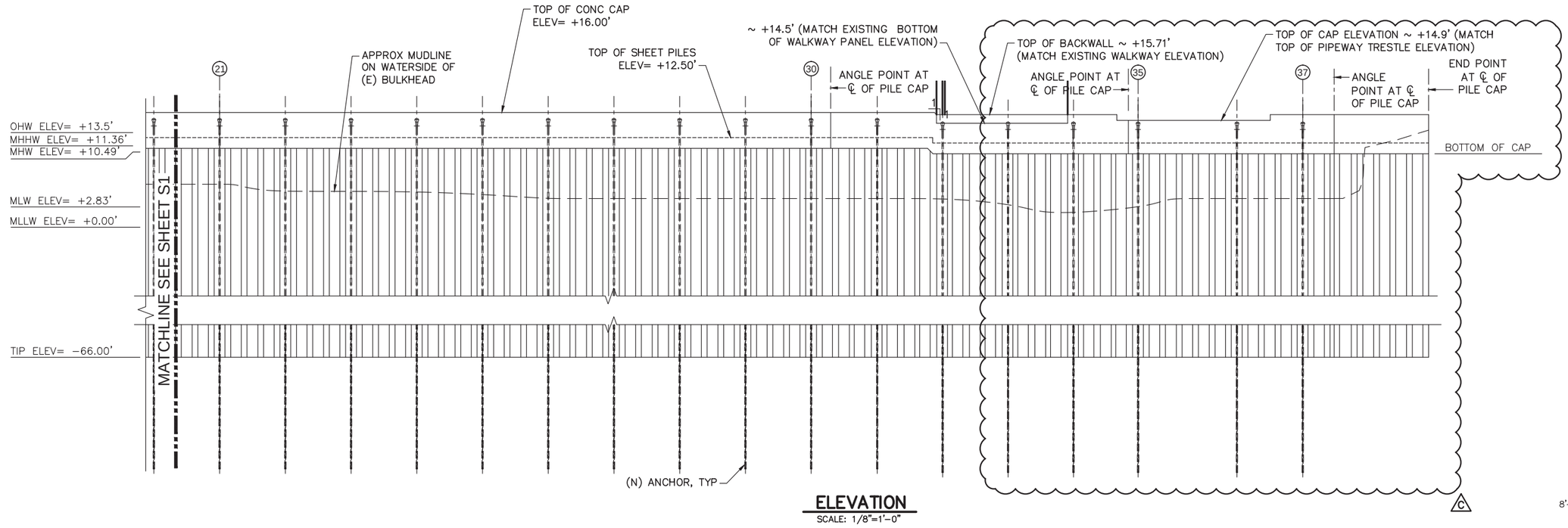
DWG NO. SE-1-S-10197414 REVISION -

10197414

File: P:\6883-03 BP Bulkhead Replacement Design Project\500 CADD\520 Submittals\2014-11-20 Addendum 1 FINAL\6883-03; Plotted: 12/16/2014 8:50 PM by GREENE, CHRIS; Saved: 12/16/2014 8:26 PM by GREENE



PLAN
SCALE: 1/8"=1'-0"



ELEVATION
SCALE: 1/8"=1'-0"

NOTES:

1. SEE SHEET S9 FOR TYPICAL GUARDRAIL DETAILS AND POST SPACING.
2. BULKHEAD DEVELOPED ELEVATION AS VIEWED FROM WATERSIDE.
3. SEE SHEET C2 FOR WP COORDINATES.
4. THE SHEET PILE @ WP-7 SHALL NOT PENETRATE THE (E) UPPER TIER TIMBER BULKHEAD.
5. CONTRACTOR TO FIELD VERIFY BASED ON LOCATION OF PIPEWAY TRESTLE.

8'-0" 0'-0" 8'-0" 16'-0"
SCALE: 1/8"=1'-0"

SHT NO.: S2

NOT TO BE USED FOR CONSTRUCTION

INDEX REV

REF DWG NO	DESCRIPTION

moffatt & nichol
600 UNIVERSITY STREET
SUITE# 610
SEATTLE, WA 98101
(206) 622-0222

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A	8/17/12	P5-0047Q		ISSUED FOR BID	M&N	PJ	TJM

OLD DWG. NO.: N/A

BP West Coast Products LLC
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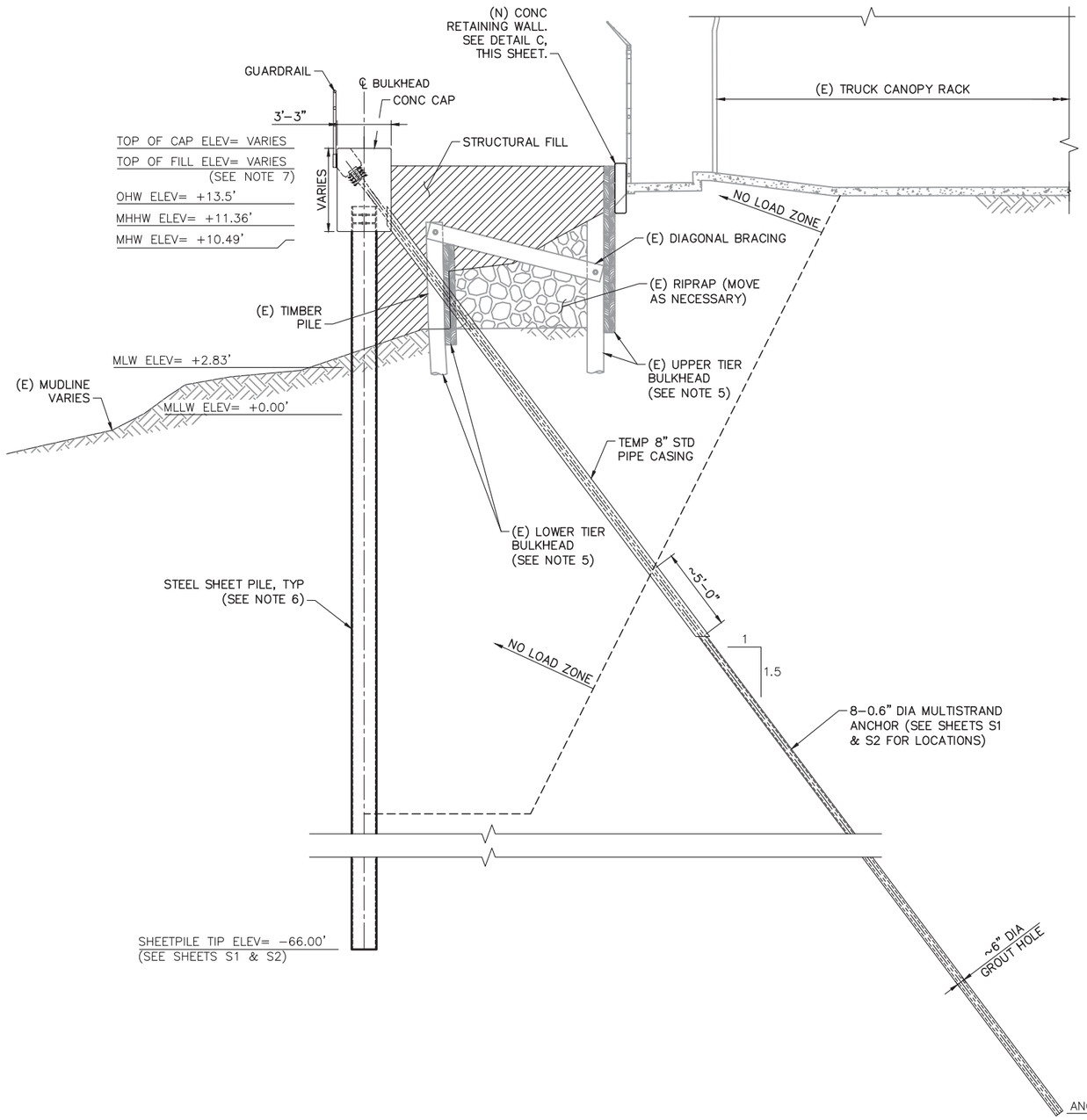
SEATTLE TERMINAL
NORTH BULKHEAD REPLACEMENT PROJECT
BULKHEAD PLAN & ELEVATION (2 OF 2)

SCALE: AS NOTED TYPE: 14 SUBTYPE: 75

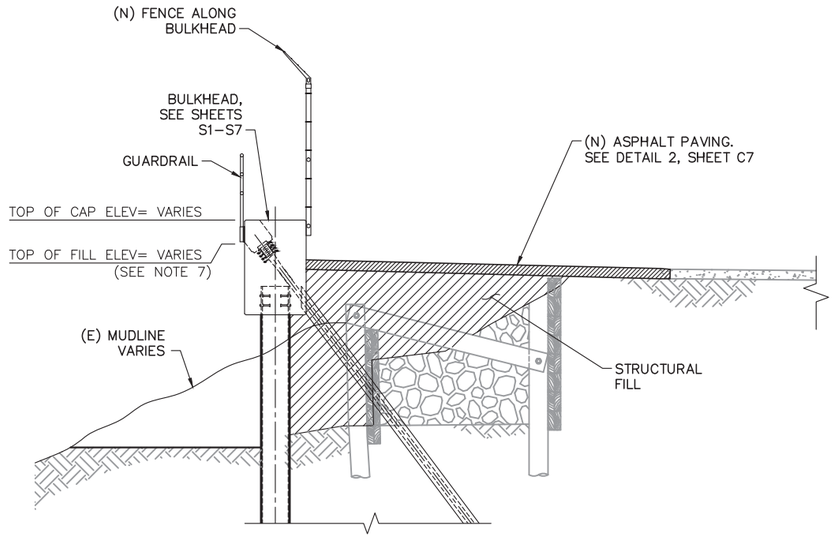
DWG NO. SE-1-S-10197415 REVISION —

10197415

File: P:\6883-03 BP Bulkhead Replacement Design Project\500 CADD\520 Submittals\2014-11-20 Addendum 1 FINAL\6883-03; Plotted: 12/16/2014 8:51 PM by GREENE, CHRIS; Saved: 12/16/2014 8:26 PM by GREENE



A / S1 & S2 **TYPICAL SECTION**
SCALE: 1/4"=1'-0"



B / S1 **TYPICAL SECTION**
SCALE: 1/4" = 1'-0"
(FOR OTHER DETAILS SEE SECTION A)

C / - **TYPICAL RETAINING WALL SECTION**
SCALE: 1" = 1'-0"

NOTES:

1. SEE ELEVATIONS ON SHEETS S1 THRU S2 FOR THE TOP OF PILE CAP ELEVATIONS, APPROX MUDLINE ELEVATIONS, & ANCHOR LOCATIONS.
2. ANCHOR TIP ELEVATION IS SUBJECT TO CHANGE BASED ON TEST ANCHOR RESULTS.
3. EXPECTED MAXIMUM ANCHOR LOAD = 240 kips
4. REFER TO SPECIFICATION FOR ANCHOR TESTING PROCEDURES.
5. TIP OF TIMBER PILES IS UNKNOWN.
6. SHEET PILES TO BE PROVIDED BY THE OWNER.
7. SEE GRADING PLAN ON SHEET C6.

1'-0" 0'-0" 1'-0" 2'-0"
SCALE: 1"=1'-0"

4'-0" 0'-0" 4'-0" 8'-0"
SCALE: 1/4"=1'-0"

SHT NO.: S3

NOT TO BE USED FOR CONSTRUCTION

OLD DWG. NO.: N/A

INDEX REV		
REF DWG NO	DESCRIPTION	

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600 UNIVERSITY STREET
SUITE# 610
SEATTLE, WA 98101
(206) 622-0222

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A	8/17/12	P5-0047Q		ISSUED FOR BID	M&N	PJ	TJM

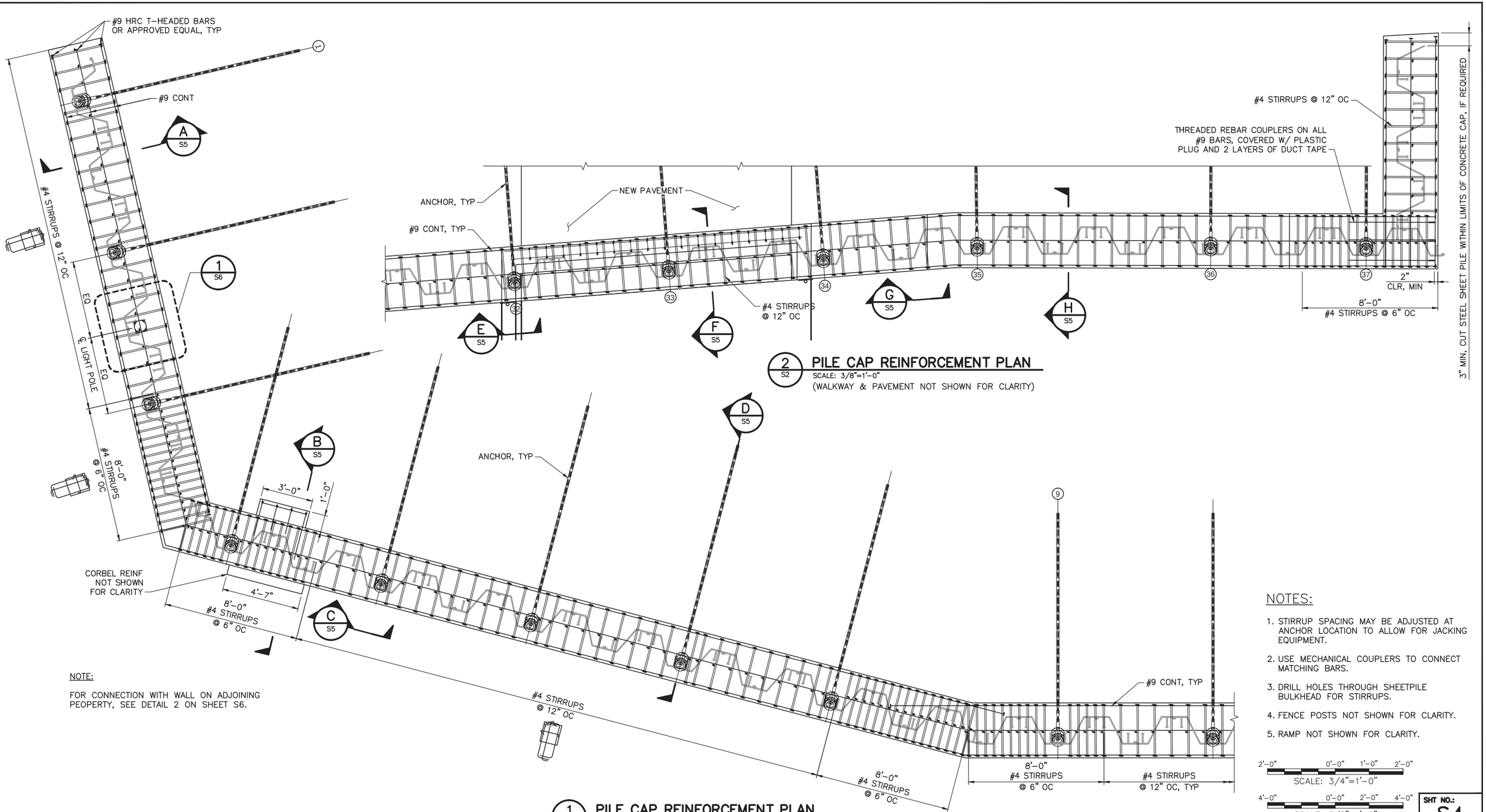
BP West Coast Products LLC
U.S. Pipelines & Logistics

SEATTLE TERMINAL
NORTH BULKHEAD REPLACEMENT PROJECT
TYPICAL SECTIONS

SCALE: AS NOTED TYPE: 14 SUBTYPE: 75

DWG NO. SE-1-S-10197416 REVISION -

10197416



NOTE:

FOR CONNECTION WITH WALL ON ADJOINING PEOPERTY, SEE DETAIL 2 ON SHEET S6.

2/S2 PILE CAP REINFORCEMENT PLAN

SCALE: 3/8"=1'-0"
(WALKWAY & PAVEMENT NOT SHOWN FOR CLARITY)

1/S1 PILE CAP REINFORCEMENT PLAN

SCALE: 3/8"=1'-0"

NOTES:

1. STIRRUP SPACING MAY BE ADJUSTED AT ANCHOR LOCATION TO ALLOW FOR JACKING EQUIPMENT.
2. USE MECHANICAL COUPLERS TO CONNECT MATCHING BARS.
3. DRILL HOLES THROUGH SHEETPILE BULKHEAD FOR STIRRUPS.
4. FENCE POSTS NOT SHOWN FOR CLARITY.
5. RAMP NOT SHOWN FOR CLARITY.

2'-0" 0'-0" 1'-0" 2'-0"
SCALE: 3/4"=1'-0"

4'-0" 0'-0" 2'-0" 4'-0"
SCALE: 3/8"=1'-0"

SHT NO.: S4

NOT TO BE USED FOR CONSTRUCTION

INDEX REV	REF DWG NO	DESCRIPTION

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A	8/17/12	P5-0047Q		ISSUED FOR BID	M&N	PJ	TJM

OLD DWG. NO.: N/A

BP West Coast Products LLC
U.S. Pipelines & Logistics

SEATTLE TERMINAL
NORTH BULKHEAD REPLACEMENT PROJECT
REINFORCEMENT DETAILS (1 OF 4)

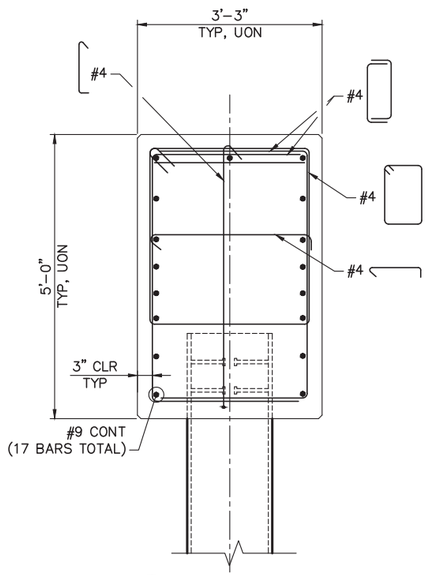
SCALE: AS NOTED TYPE: 14 SUBTYPE: 75

DWG NO. SE-1-S-10197417 REVISION —

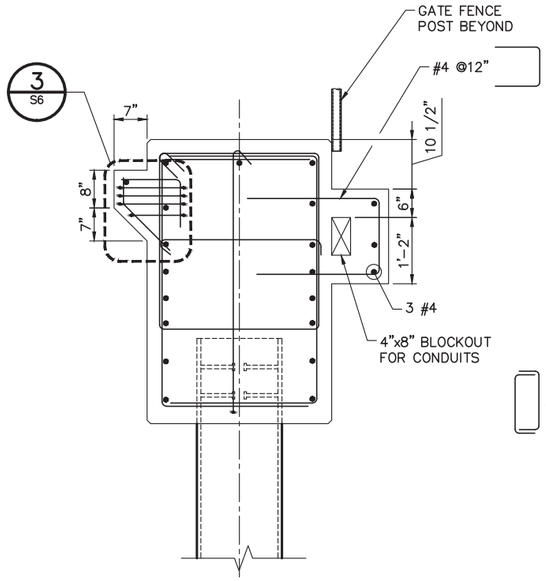
10197417

File: P:\6883-03 BP Bulkhead Replacement Design Project\500 CADD\520 Submittals\2014-11-20 Addendum 1 FINAL\6883-03; Plotted: 12/16/2014 8:51 PM by GREENE, CHRIS; Saved: 12/16/2014 8:26 PM by GREENE

File: P:\6883-03 BP Bulkhead Replacement Design Project\500 CADD\520 Submittals\2014-11-20 Addendum 1 FINAL\6883-03; Plotted: 12/16/2014 8:51 PM by GREENE, CHRIS; Saved: 12/16/2014 8:26 PM by GREENE



A S4 **SECTION**
SCALE: 3/4"=1'-0"



B S4 **SECTION**
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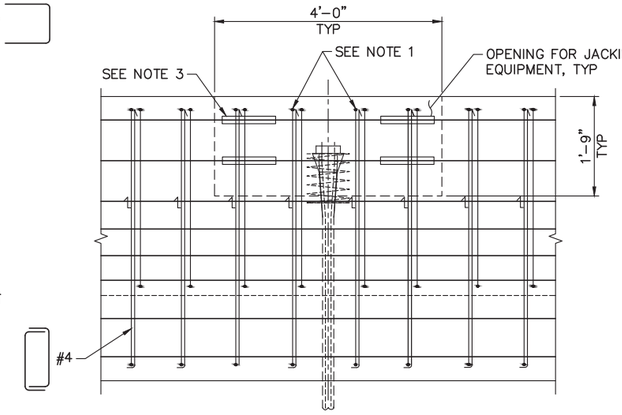
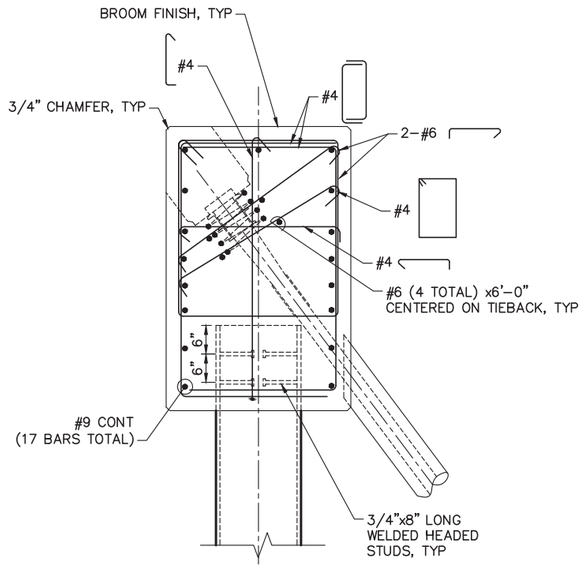
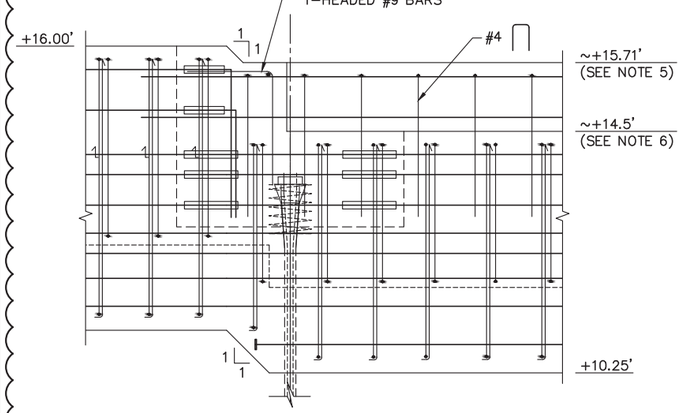


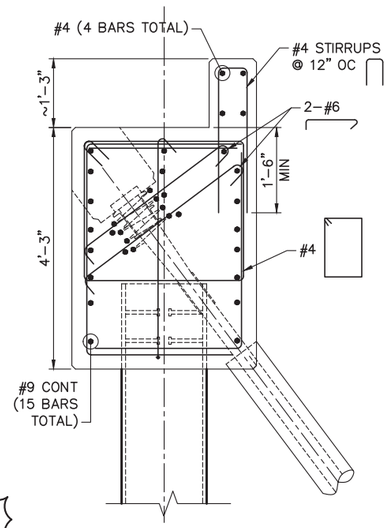
C S4 **SECTION – TYPICAL @ ANCHOR, UON**
SCALE: 3/4"=1'-0"



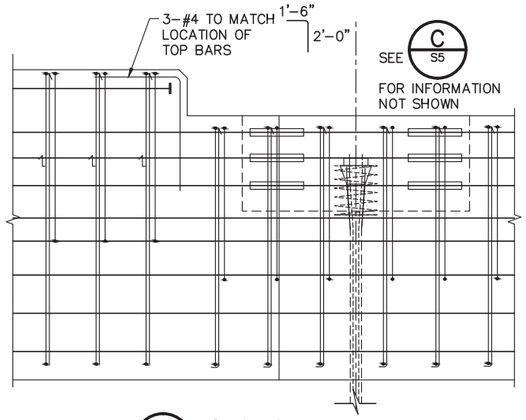
D S4 **SECTION**
SCALE: 3/4"=1'-0"



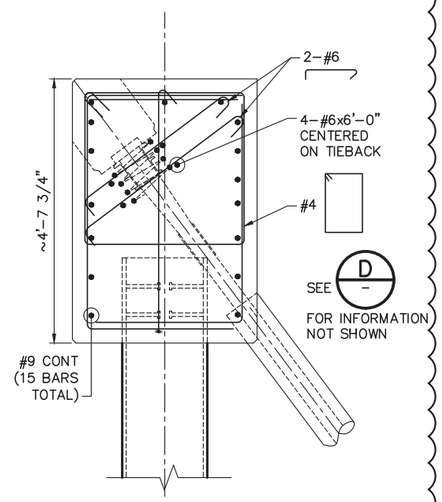
E S4 **SECTION**
SCALE: 3/4"=1'-0"



F S4 **SECTION**
SCALE: 3/4"=1'-0"



G S4 **SECTION**
SCALE: 3/4"=1'-0"



H S4 **SECTION**
SCALE: 3/4"=1'-0"

NOTES:

1. STIRRUP SPACING MAY BE ADJUSTED AT ANCHOR LOCATION TO ALLOW FOR JACKING EQUIPMENT.
2. SHEETPILE & SPLITTING STEEL NOT SHOWN FOR CLARITY.
3. USE MECHANICAL COUPLERS TO CONNECT MATCHING BARS.
4. DRILL HOLES THROUGH SHEETPILE BULKHEAD FOR STIRRUPS.
5. MATCH EXISTING WALKWAY ELEVATION. CONTRACTOR TO FIELD VERIFY.
6. MATCH EXISTING BOTTOM OF PANEL. CONTRACTOR TO FIELD VERIFY.

2'–0" 0'–0" 1'–0" 2'–0"
SCALE: 3/4"=1'–0"

SHT NO.: S5

NOT TO BE USED FOR CONSTRUCTION

INDEX REV	
REF DWG NO	DESCRIPTION

moffatt & nichol
600 UNIVERSITY STREET
SUITE# 610
SEATTLE, WA 98101
(206) 622-0222

REV	DATE	PROJ#	R&I NO.	REVISION	CONTRACTOR	CKD	PIC
C	12/17/14	P5-0047Q		ADDENDUM 1: UPDATED WALL LENGTH	M&N	PJ	TJM
B	5/24/13	P5-0047Q		ISSUED FOR PERMITS	M&N	PJ	TJM
A	8/17/12	P5-0047Q		ISSUED FOR BID	M&N	PJ	TJM

OLD DWG. NO.: N/A

BP West Coast Products LLC
U.S. Pipelines & Logistics

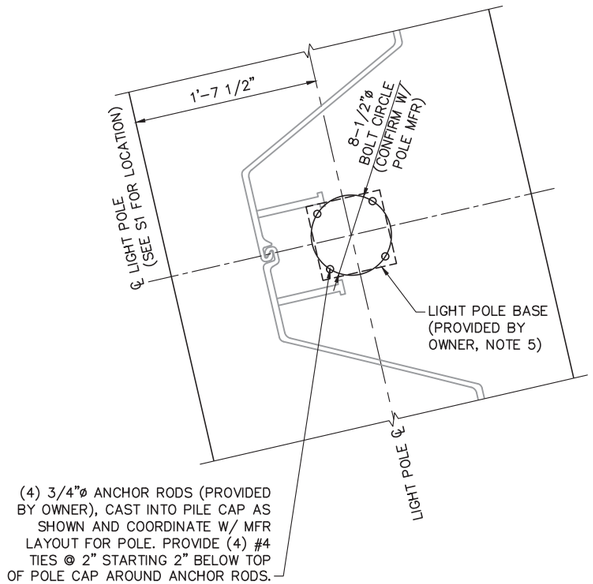
SEATTLE TERMINAL
NORTH BULKHEAD REPLACEMENT PROJECT
REINFORCEMENT DETAILS (2 OF 4)

SCALE: AS NOTED TYPE: 14 SUBTYPE: 75

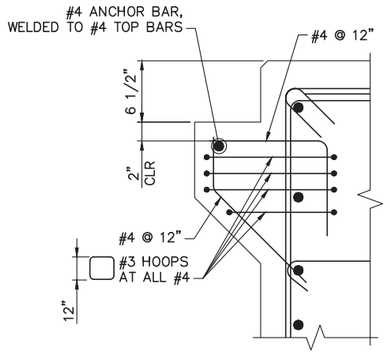
DWG NO. SE-1-S-10197418 REVISION –

10197418

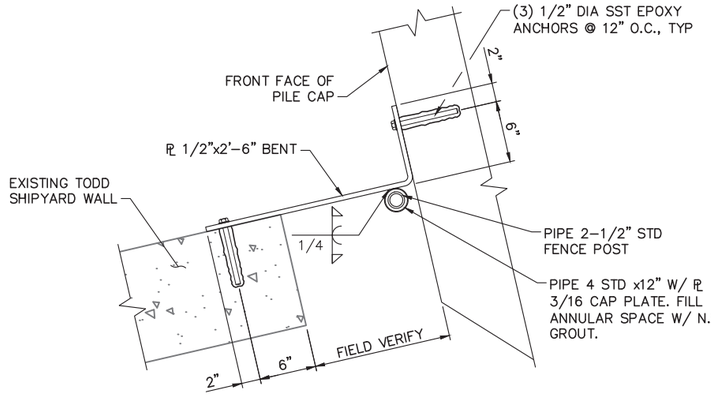
File: P:\6883-03 BP Bulkhead Replacement Design Project\500 CADD\520 Submittals\2014-11-20 Addendum 1 FINAL\6883-03; Plotted: 12/16/2014 8:51 PM by GREENE, CHRIS; Saved: 12/16/2014 8:26 PM by GREENE



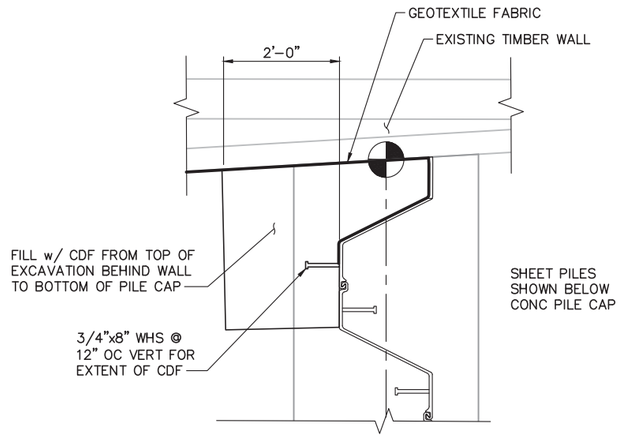
1 / S4 **DETAIL**
SCALE: 1-1/2"=1'-0"
(REINF NOT SHOWN FOR CLARITY)



3 / S5 **DETAIL**
SCALE: 1-1/2"=1'-0"



2 / S8 **DETAIL FOR CONNECTION W/ WALL & ADJOINING PROPERTY**
SCALE: 1-1/2"=1'-0"



4 / S2 **DETAIL**
SCALE: 3/4"=1'-0"

NOTES:

1. STIRRUP SPACING MAY BE ADJUSTED AT ANCHOR LOCATION TO ALLOW FOR JACKING EQUIPMENT.
2. SHEETPILE & SPLITTING STEEL NOT SHOWN FOR CLARITY.
3. USE MECHANICAL COUPLERS TO CONNECT MATCHING BARS.
4. DRILL HOLES THROUGH SHEETPILE BULKHEAD FOR STIRRUPS.
5. LIGHT POLE SHALL BE SUPPLIED BY THE OWNER. LIGHT POLE & LIGHT SHALL BE KC1400M25C R3 4C HS SCWA BY LITHOUIA LIGHTING.

1'-0" 0'-0" 6" 1'-0"
SCALE: 1 1/2"=1'-0"

2'-0" 0'-0" 1'-0" 2'-0"
SCALE: 3/4"=1'-0"

SHT NO.: S6

NOT TO BE USED FOR CONSTRUCTION

INDEX REV	REF DWG NO	DESCRIPTION

moffatt & nichol
600 UNIVERSITY STREET
SUITE# 610
SEATTLE, WA 98101
(206) 622-0222

REV	DATE	PROJ#	R&I NO.	REVISION	CONTRACTOR	CKD	PIC
C	12/17/14	P5-0047Q		ADDENDUM 1: UPDATED WALL LENGTH	M&N	PJ	TJM
B	5/24/13	P5-0047Q		ISSUED FOR PERMITS	M&N	PJ	TJM
A	8/17/12	P5-0047Q		ISSUED FOR BID	M&N	PJ	TJM

OLD DWG. NO.: N/A

BP West Coast Products LLC
U.S. Pipelines & Logistics

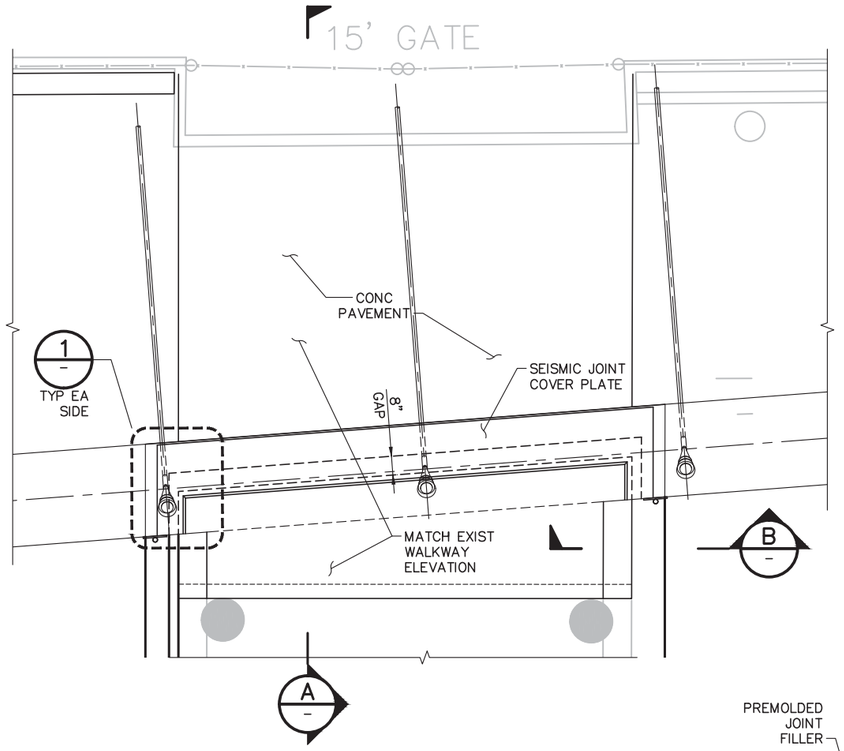
SEATTLE TERMINAL
NORTH BULKHEAD REPLACEMENT PROJECT
REINFORCEMENT DETAILS (3 OF 4)

SCALE: AS NOTED TYPE: 14 SUBTYPE: 75

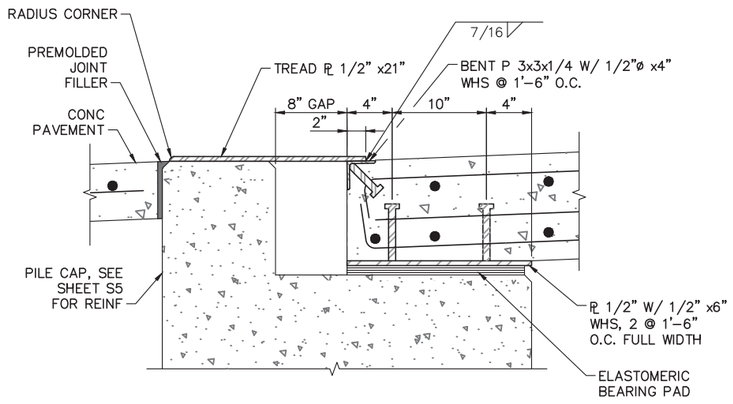
DWG NO. SE-1-S-10197419 REVISION –

10197419

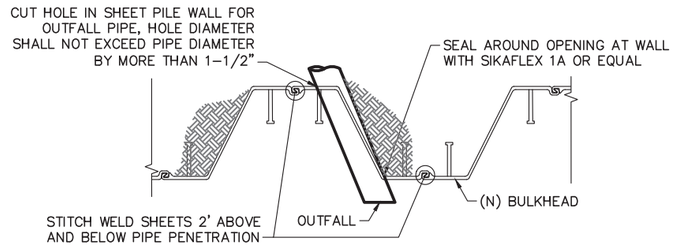
File: P:\6883-03 BP Bulkhead Replacement Design Project\500 CADD\520 Submittals\2014-11-20 Addendum 1 FINAL\6883-03; Plotted: 12/16/2014 8:51 PM by GREENE, CHRIS; Saved: 12/16/2014 8:26 PM by GREENE



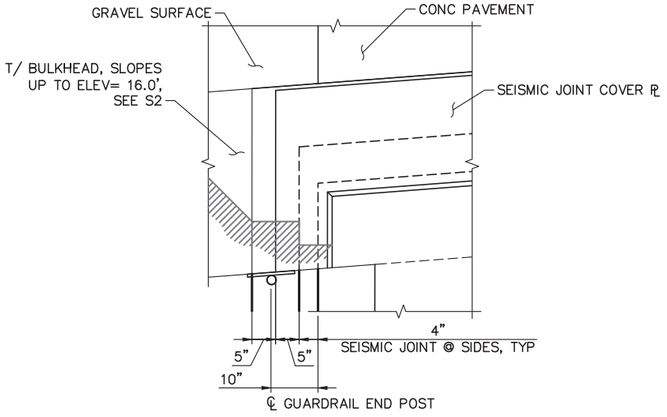
1 DETAIL
SCALE: 3/8"=1'-0"



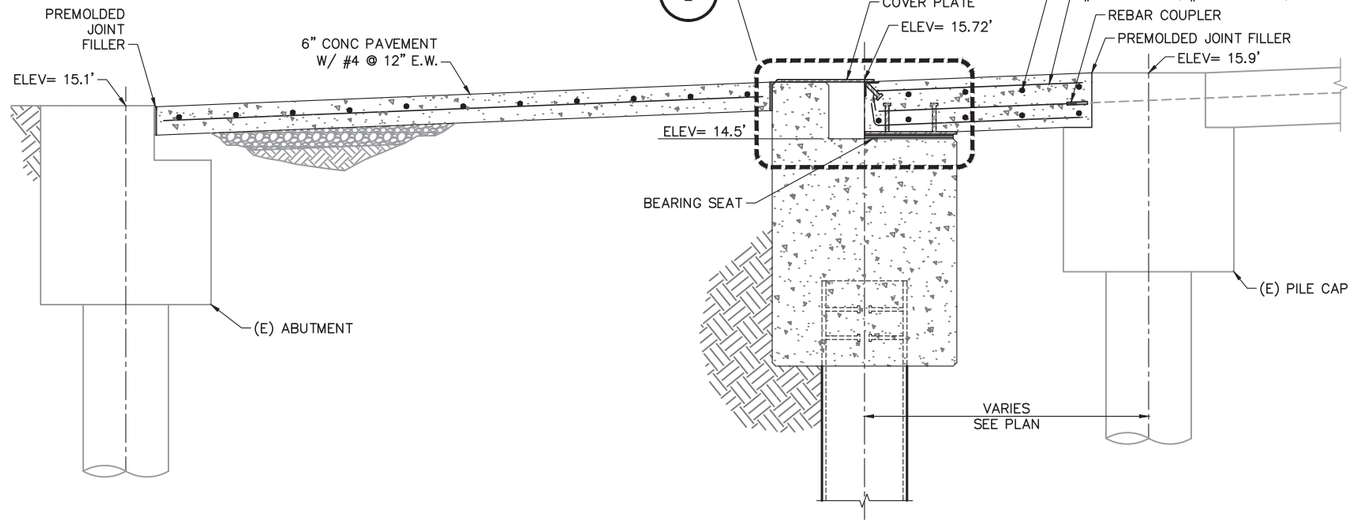
2 DETAIL
SCALE: 1-1/2"=1'-0"



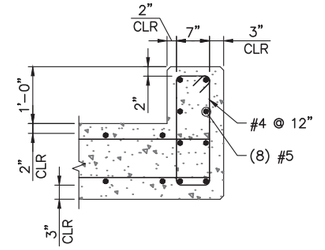
3 TYPICAL PENETRATION AT BULKHEAD WALL UPTO 8" PIPES
SCALE: 3/4"=1'-0"



1 PARTIAL PLAN
SCALE: 3/4"=1'-0"



A SECTION
SCALE: 3/4"=1'-0"



B SECTION
SCALE: 3/4"=1'-0"

1'-0" 0'-0" 6" 1'-0"
SCALE: 1 1/2"=1'-0"

2'-0" 0'-0" 1'-0" 2'-0"
SCALE: 3/4"=1'-0"

4'-0" 0'-0" 2'-0" 4'-0"
SCALE: 3/8"=1'-0"

NOT TO BE USED FOR CONSTRUCTION

INDEX REV	REF DWG NO	DESCRIPTION

moffatt & nichol
600 UNIVERSITY STREET
SUITE# 610
SEATTLE, WA 98101
(206) 622-0222

REV	DATE	PROJ#	R&I NO.	REVISION	CONTRACTOR	CKD	PIC
C	12/17/14	P5-0047Q		ADDENDUM 1: UPDATED WALL LENGTH	M&N	PJ	TJM
B	5/24/13	P5-0047Q		ISSUED FOR PERMITS	M&N	PJ	TJM
A	8/17/12	P5-0047Q		ISSUED FOR BID	M&N	PJ	TJM

SHT NO.: S7

OLD DWG. NO.: N/A

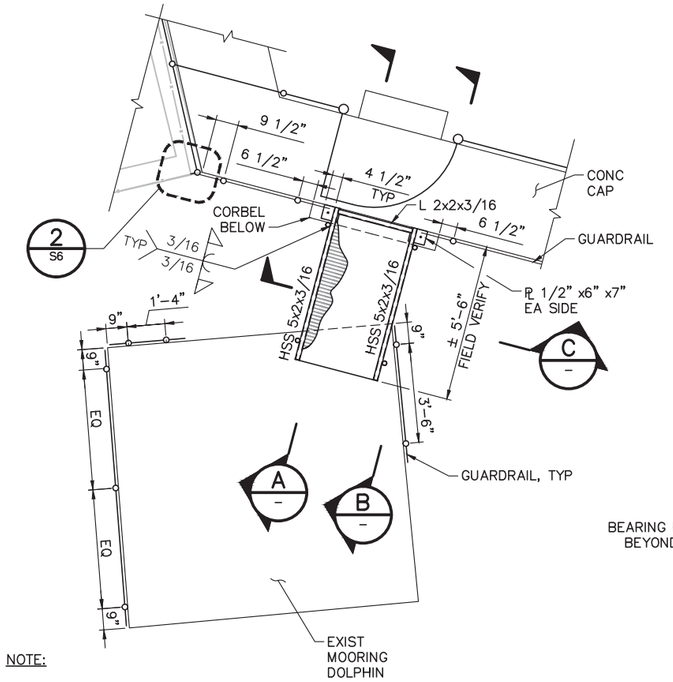
BP West Coast Products LLC
U.S. Pipelines & Logistics

SEATTLE TERMINAL
NORTH BULKHEAD REPLACEMENT PROJECT
REINFORCEMENT DETAILS (4 OF 4)

SCALE: AS NOTED TYPE: 14 SUBTYPE: 75

DWG NO. SE-1-S-10197420 REVISION —

10197420

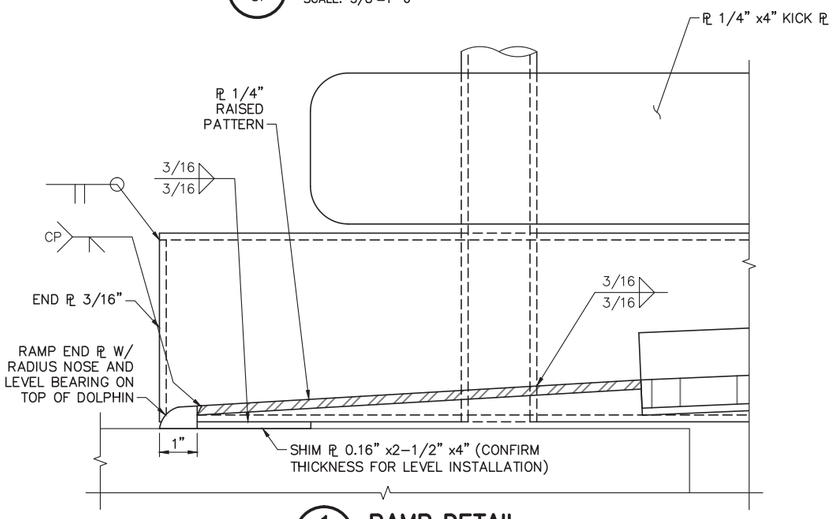


NOTE:

SEE DETAIL 5, SHEET S9 FOR TYPICAL GUARDRAIL & POST MOUNTING DETAILS.

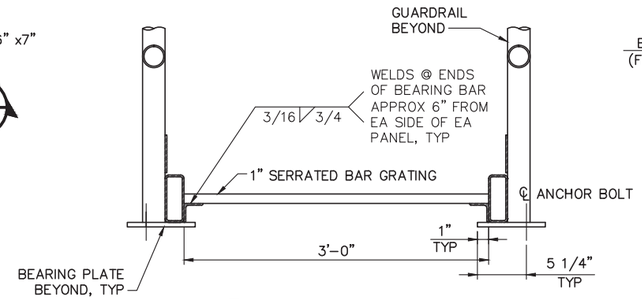
2 S1 PARTIAL PLAN @ DOLPHIN & RAMP

SCALE: 3/8"=1'-0"



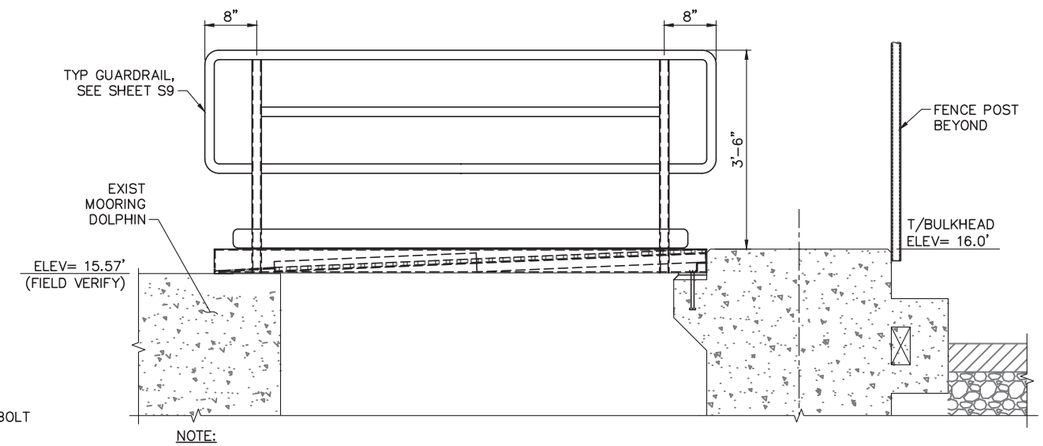
1 – RAMP DETAIL

SCALE: 6"=1'-0"



C – RAMP SECTION

SCALE: 1-1/2"=1'-0"



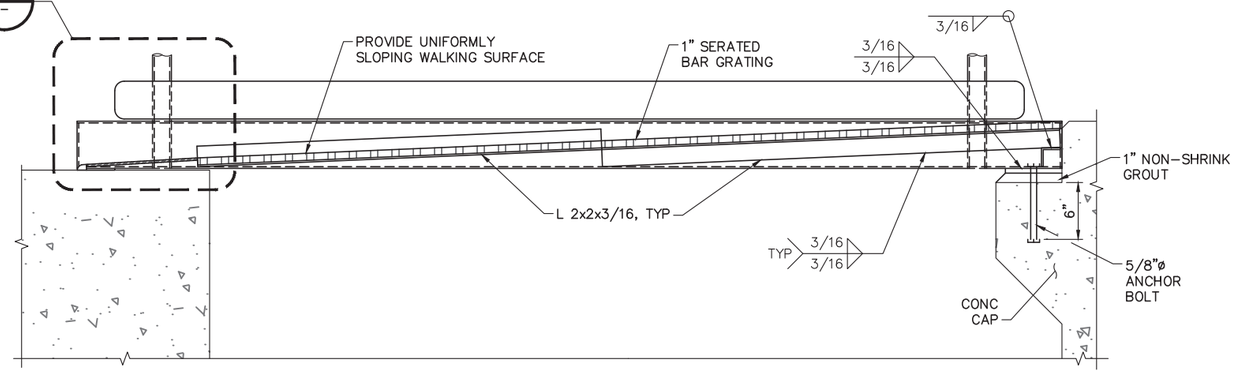
NOTE:

CONFIRM SITE CONDITIONS AND ELEVATIONS BEFORE FABRICATION.

B – RAMP SECTION

SCALE: 3/4"=1'-0"

1 –



A – RAMP SECTION

SCALE: 1-1/2"=1'-0"

2" 0'-0" 2" 4"
SCALE: 6"=1'-0"

1'-0" 0'-0" 6" 1'-0"
SCALE: 1 1/2"=1'-0"

2'-0" 0'-0" 1'-0" 2'-0"
SCALE: 3/4"=1'-0"

4'-0" 0'-0" 2'-0" 4'-0"
SCALE: 3/8"=1'-0"

NOT TO BE USED FOR CONSTRUCTION

INDEX REV	REF DWG NO	DESCRIPTION

moffatt & nichol
600 UNIVERSITY STREET
SUITE# 610
SEATTLE, WA 98101
(206) 622-0222

REV	DATE	PROJ#	R&I NO.	REVISION	CONTRACTOR	CKD	PIC
C	12/17/14	P5-0047Q		ADDENDUM 1: UPDATED WALL LENGTH	M&N	PJ	TJM
B	5/24/13	P5-0047Q		ISSUED FOR PERMITS	M&N	PJ	TJM
A	8/17/12	P5-0047Q		ISSUED FOR BID	M&N	PJ	TJM

OLD DWG. NO.: N/A

BP West Coast Products LLC
U.S. Pipelines & Logistics

SEATTLE TERMINAL
NORTH BULKHEAD REPLACEMENT PROJECT
RAMP DETAILS

SCALE: AS NOTED TYPE: 14 SUBTYPE: 75

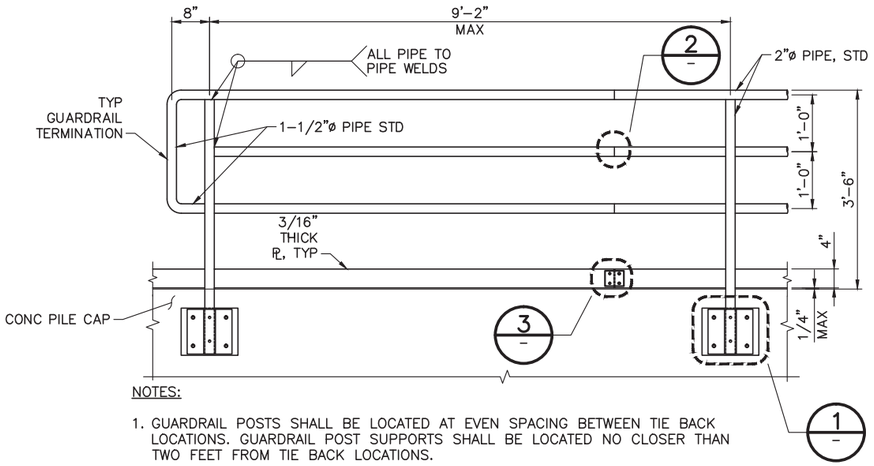
DWG NO. SE-1-S-10197421 REVISION –

SHT NO.: S8

10197421

File: P:\16883-03 BP Bulkhead Replacement Design Project\500 CADD\520 Submittals\2014-11-20 Addendum 1 FINAL\16883-03; Plotted: 12/16/2014 8:51 PM by GREENE, CHRIS; Saved: 12/16/2014 8:26 PM by GREENE

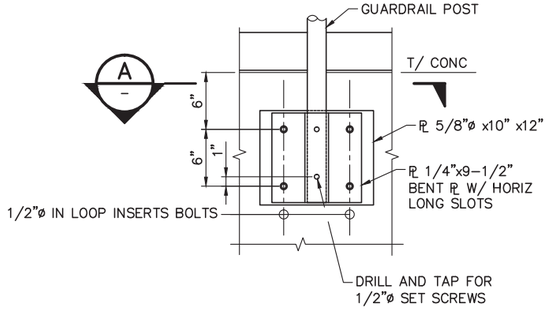
File: P:\6883-03 BP Bulkhead Replacement Design Project\500 CADD\520 Submittals\2014-11-20 Addendum 1 FINAL\6883-03; Plotted: 12/16/2014 8:52 PM by GREENE, CHRIS; Saved: 12/16/2014 8:26 PM by GREENE



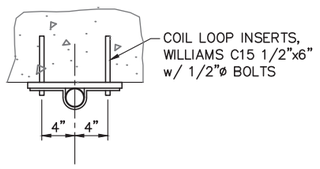
NOTES:

1. GUARDRAIL POSTS SHALL BE LOCATED AT EVEN SPACING BETWEEN TIE BACK LOCATIONS. GUARDRAIL POST SUPPORTS SHALL BE LOCATED NO CLOSER THAN TWO FEET FROM TIE BACK LOCATIONS.
2. EXPANSION JOINTS IN RAILS AND TOE BOARDS SHALL BE ALIGNED. EXPANSION JOINTS SHALL BE LOCATED AT MAXIMUM 25 FOOT SPACING.
3. PROVIDE DETAIL 4 AT EVERY FOURTH POST. DETAIL 1 AT ALL OTHER LOCATIONS.
4. GUARDRAIL SHALL BE PROVIDED ON SEAWARD FACE OF CONCRETE PILE CAP BETWEEN WP #2 AND WP #7.

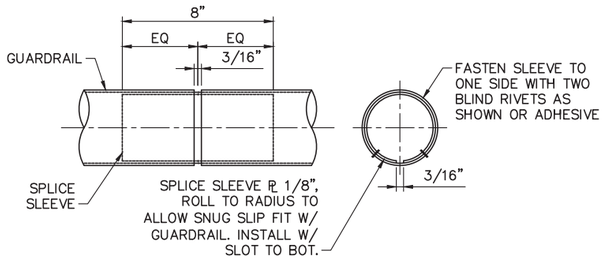
C — GUARDRAIL ELEVATION
SCALE: 3/4"=1'-0"



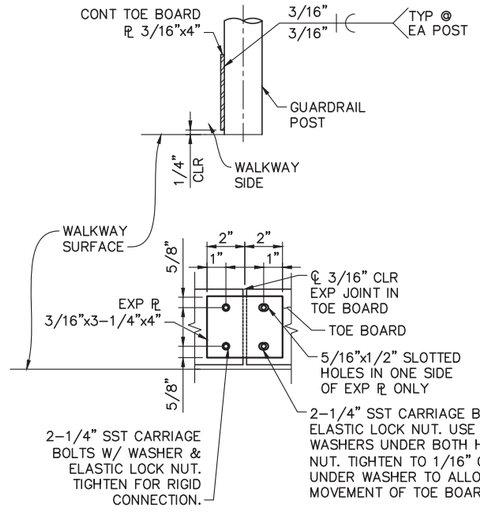
1 — DETAIL
SCALE: 1-1/2"=1'-0"



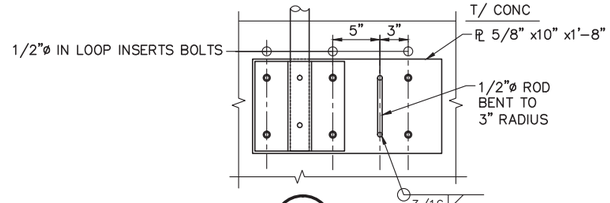
A — SECTION
SCALE: 1-1/2"=1'-0"



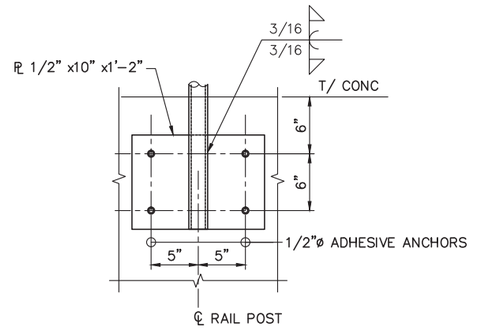
2 — EXPANSION JOINT
SCALE: 6"=1'-0"



3 — GUARDRAIL TOE BOARD & EXPANSION JOINT
SCALE: 3"=1'-0"



4 — DETAIL
SCALE: 1-1/2"=1'-0"



NOTE:

LOCATE EXIST REBAR USING NON-DESTRUCTIVE TESTING BEFORE DRILLING FOR ANCHORS. ADJUST LOCATIONS TO MISS EXIST REBARS.

5 — DETAIL @ DOLPHIN
SCALE: 1-1/2"=1'-0"
(SEE SHEET S8 FOR LOCATION)

1'-0" 0'-0" 6" 1'-0"
SCALE: 1 1/2"=1'-0"

2" 0'-0" 2" 4"
SCALE: 6"=1'-0"

6" 0'-0" 3" 6"
SCALE: 3"=1'-0"

2'-0" 0'-0" 1'-0" 2'-0"
SCALE: 3/4"=1'-0"

SHT NO.: S9

NOT TO BE USED FOR CONSTRUCTION

INDEX REV

REF DWG NO	DESCRIPTION

moffatt & nichol
600 UNIVERSITY STREET
SUITE# 610
SEATTLE, WA 98101
(206) 622-0222

REV	DATE	PROJ#	R&I NO.	REVISION	CONTRACTOR	CKD	PIC
C	12/17/14	P5-0047Q		ADDENDUM 1: UPDATED WALL LENGTH	M&N	PJ	TJM
B	5/24/13	P5-0047Q		ISSUED FOR PERMITS	M&N	PJ	TJM
A	8/17/12	P5-0047Q		ISSUED FOR BID	M&N	PJ	TJM

OLD DWG. NO.: N/A

BP West Coast Products LLC
U.S. Pipelines & Logistics

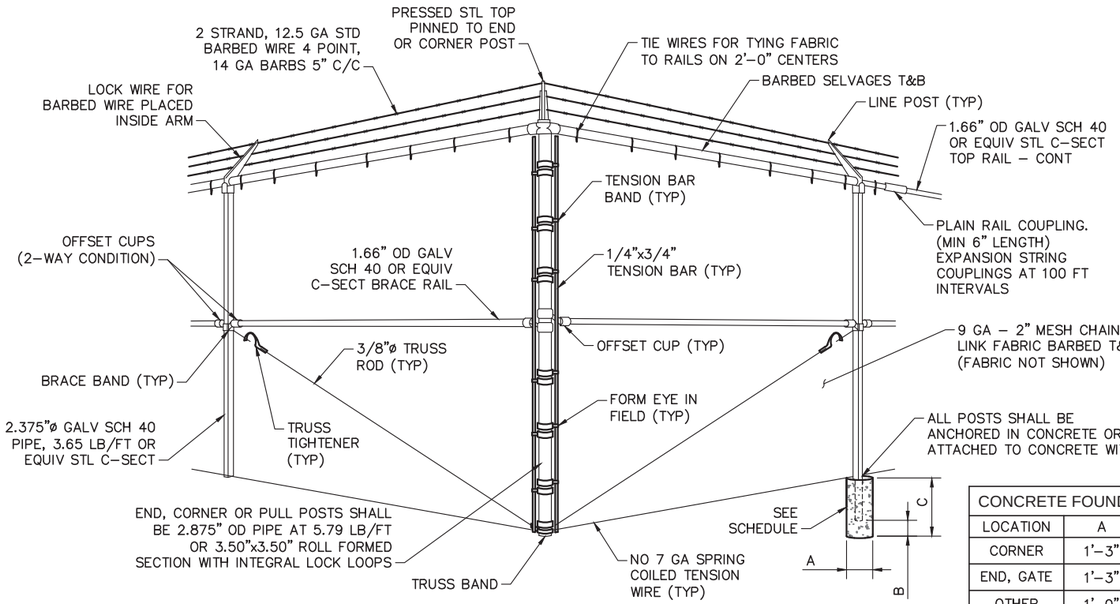
SEATTLE TERMINAL
NORTH BULKHEAD REPLACEMENT PROJECT
GUARDRAIL DETAILS

SCALE: AS NOTED TYPE: 14 SUBTYPE: 75

DWG NO. SE-1-S-10197422 REVISION —

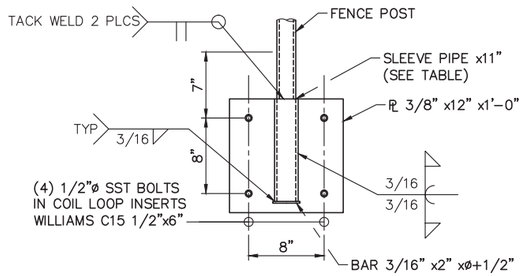
10197422

File: P:\6883-03 BP Bulkhead Replacement Design Project\500 CADD\520 Submittals\2014-11-20 Addendum 1 FINAL\6883-03; Plotted: 12/16/2014 8:52 PM by GREENE, CHRIS; Saved: 12/16/2014 8:26 PM by GREENE



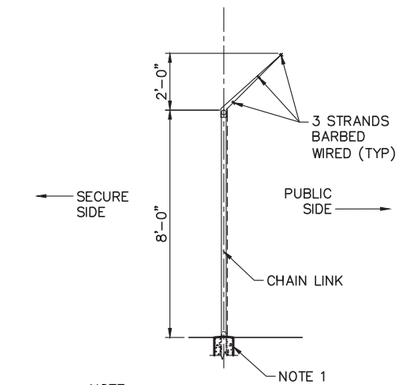
CONCRETE FOUNDATION DIMENSIONS			
LOCATION	A	B	C
CORNER	1'-3"	0'-6"	4'-6"
END, GATE	1'-3"	0'-6"	4'-6"
OTHER	1'-0"	0'-6"	4'-0"

B/- ELEVATION - TYPICAL FENCE CONFIGURATION
SCALE: N.T.S.



FENCE POST SIZE	SLEEVE PIPE SIZE
PIPE 2 STD	HSS 3.000 x0.188
PIPE 2-1/2 STD	PIPE 3 STD
PIPE 3-1/2 STD	HSS 4.500 x0.188 OR HSS 5.000 x0.375

1/- DETAIL
SCALE: 1-1/2"=1'-0"



NOTE:

1. BOTTOM OF FABRIC SHALL BE NO MORE THAN 2" ABOVE FINISH GRADE.

A/- SECTION - FENCE
SCALE: N.T.S.

NOTES:

1. SEE WSDOT STD PLANS CHAIN LINK FENCE DETAILS, L-20.10-01 TYPE 3, FOR FENCE INFORMATION NOT SHOWN.
2. SEE WSDOT STD PLANS CHAIN LINK GATE L-30.10-01 FOR GATE INFORMATION NOT SHOWN. PROVIDE BRACE RAIL AT PANELS EACH SIDE OF GATES.
3. SEE WSDOT STANDARD SPECIFICATIONS M41-10, 2012 FOR FENCE MATERIAL AND CONSTRUCTION REQUIREMENTS NOT SHOWN.
4. CHAIN LINK SHALL CONFORM TO ASTM A392. FENCE POST AND RAILS SHALL CONFORM TO ASTM A123. OTHER MISCELLANEOUS STEEL ITEMS SHALL BE GALVANIZED TO ASTM A153.

1'-0" 0'-0" 6" 1'-0"
SCALE: 1 1/2"=1'-0"

SHT NO.: S10

NOT TO BE USED FOR CONSTRUCTION

INDEX REV

REF DWG NO	DESCRIPTION

moffatt & nichol
600 UNIVERSITY STREET
SUITE# 610
SEATTLE, WA 98101
(206) 622-0222

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B	5/24/13	P5-0047Q		ISSUED FOR PERMITS	M&N	PJ	TJM
A	8/17/12	P5-0047Q		ISSUED FOR BID	M&N	PJ	TJM

OLD DWG. NO.: N/A

BP West Coast Products LLC
U.S. Pipelines & Logistics

SEATTLE TERMINAL
NORTH BULKHEAD REPLACEMENT PROJECT
FENCE & GATE DETAILS

SCALE: AS NOTED TYPE: 14 SUBTYPE: 75

DWG NO. SE-1-S-10197423 REVISION -

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