

**THIRD QUARTER 2014 PROGRESS REPORT / SECOND QUARTER 2014
GROUNDWATER PERFORMANCE MONITORING REPORT
BP WEST COAST PRODUCTS TERMINAL, HARBOR ISLAND
1652 SW LANDER STREET
SEATTLE, WASHINGTON**

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

OCTOBER 2014

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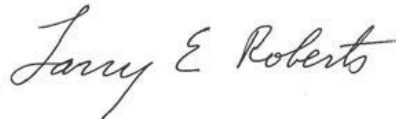
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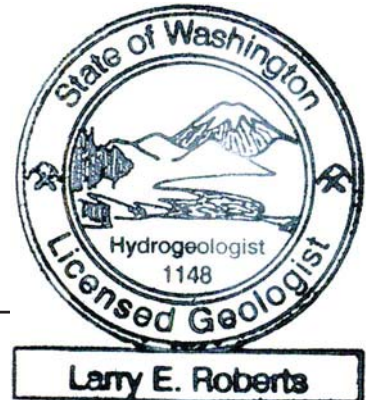


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1. Site Location Map
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1. INTRODUCTION

Atlantic Richfield Company is submitting this report prepared by TechSolve Environmental, Inc. (TechSolve) to summarize the Second Quarter 2014 Groundwater Monitoring event and operation and maintenance of waterfront and inland remediation systems through the third quarter (September) of 2014 for the BP West Coast Products Terminal (formerly known as the ARCO Terminal 21T). Groundwater monitoring and remediation system reporting periods are staggered due to the time required to receive and validate laboratory reports from groundwater monitoring events. The combination of these two summary reports was based upon the recommendation of the Washington State Department of Ecology (Ecology) project manager (Ecology, 2004a). This progress report satisfies reporting schedule submittal requirements pursuant to Ecology Consent Decree No. 00-2-05714-8SEA, entered into court March 24, 2000 (Ecology, 2000b).

2. REMEDIATION SYSTEM OPERATIONS

Waterfront and inland remediation systems were installed and completed in accordance with specifications outlined in the Engineering Design Report (EDR) (TechSolv and AG&M, 2000) and the Cleanup Action Plan (CAP) (Ecology, 1999). The remediation systems consist of a waterfront groundwater/Light Non-Aqueous Phase Liquid (LNAPL) recovery system and an inland soil vapor extraction (SVE) system. These systems were designed to remove free-phase LNAPL and dissolved petroleum hydrocarbons from the groundwater, and residual-phase petroleum hydrocarbons existing in the vadose zone at Plant 1 (Figure 1).

2.1. WATERFRONT SYSTEM OPERATIONS

Installation and startup of the final waterfront remediation system was completed in late 2002 and operational testing was conducted through early 2003. Standard system operation began once testing indicated the system operated as designed and in accordance with Consent Decree and EDR requirements. Reports were submitted to Ecology summarizing both construction and operation/maintenance of the remediation system. The Construction Completion Report (CCR) (TechSolve, 2003b) summarized construction, installation, and startup testing of the final remediation system, and documented that systems met design criteria, attained desired capture, and hydraulic control along the waterfront. The Final Operation and Maintenance (O&M) Manual (TechSolve, 2003c) contains procedures to effectively operate and maintain systems, vendor-supplied manuals for components, and health and safety practices. Ecology stated that the CCR and O&M Manual complied with the requirements of the Consent Decree, the Groundwater Compliance Monitoring Program, and the Model Toxics Control Act (WAC 173-340-400) and, as such, were approved (Ecology, 2004b). The O&M Manual is updated as practices or procedures change, or as systems are altered.

O&M activities are conducted on systems weekly to ensure they operate as designed and in accordance with applicable permits. These activities include, but are not limited to:

- Weekly checks of groundwater recovery system pumping rates.
- Weekly inspections of system components and waste storage containers for integrity per the requirements of WAC 173-303-320.

- Monthly sampling of recovered groundwater influent and effluent streams to ensure compliance with King County Department of Natural Resources and Parks (KCDNR) Discharge Permit 7592-04 for discharge A43262.
- Monthly monitoring and calculation of system LNAPL recovery.
- Monthly sampling of system flow rates and hydrocarbon concentrations.

Additional maintenance activities are conducted as needed to maintain system operational integrity and to ensure air and water discharges are within permitted ranges.

Operation of waterfront air sparging and SVE systems were discontinued in May 2008, as the bulk of available hydrocarbons had been recovered. System data collected during 5 years of operation prior to shutdown were presented in previous reports, and support system shutdown. These findings were presented to Ecology in a 5-year Review meeting, conducted October 8, 2008 and summarized in the 2008 Annual Site Report (TechSolve, 2009).

Combined recovered LNAPL (free-phase, residual, and dissolved) from the final SVE and groundwater/LNAPL recovery systems is approximately 14,530 gallons (October 2002 to September 2014) (Table 1). Interim systems, operating from 1992 through 2002, recovered an additional 15,223 gallons of LNAPL, for a combined LNAPL recovery from interim and final remediation systems of 29,754 gallons. The majority of LNAPL recovered by interim remediation systems was free-phase LNAPL. The majority of LNAPL recovered by final remediation systems was from enhanced biodegradation, calculated from SVE vapor sampling for CO₂. SVE system shutdown in 2008 was based, in part, on concentrations of CO₂ reaching atmospheric (background) levels.

Groundwater/LNAPL recovery system data in Table 1 show influent concentrations of dissolved benzene, diesel, and gasoline in recovered groundwater fluctuate slightly throughout the year but have decreased significantly over time. LNAPL recovered from the oil-water separator (OWS) is collected and recycled off-site, in accordance with Washington State's Dangerous Waste regulations. The measurements of LNAPL volume recovered by the system, shown in Table 1, are sporadic as measurements are recorded only when a sufficient quantity of LNAPL has been generated to warrant shipment off-site or when wastes containing petroleum are shipped.

Effluent discharges from the groundwater/LNAPL recovery system to sanitary were within KCDNR's permitted ranges (Table 1) and system recovery rates have been effective in preventing sheens from occurring on the adjacent Duwamish Waterway. Average monthly effluent flow rates ranged from 1.23 to 2.53 gallons per minute (gpm) in 2014, below KCDNR's maximum permitted flow of 17.5 gpm, consistent with past rates.

Reductions in dissolved hydrocarbon concentrations through the diffused air stripper (DAS) show it effectively treats recovered groundwater and meets permit requirements. DAS Influent concentrations of dissolved hydrocarbons continue to be below permitted effluent discharge levels, indicating DAS operation is not necessary to achieve permit compliance. However, the DAS continues to operate, as influent concentrations of dissolved hydrocarbons vary over time and concentrations in individual recovery wells have exceeded permitted discharge levels at times.

Maintenance and repair activities on remediation systems are conducted to maintain effective operation and system capture and hydraulic control along the waterfront. Notable activities conducted to date in 2014 include:

- Conveyance piping line snaking and flushing to remove scale and biofouling.
- Annual corrosion inspection of conveyance piping by corrosion engineer to verify integrity.
- Jetting of recovery wells' screened intervals to remove scale and biofouling.
- Well rehabilitation with acid formulations to remove scale and biofouling.
- Flowmeter maintenance and recertification

Well jetting and well rehabilitation items listed above are conducted to enhance production of recovery wells. Pumping rates from individual recovery wells are evaluated and additional well rehabilitation actions will be conducted as necessary. Testing conducted following these actions show that the system continues to operate as designed and in accordance with permit requirements.

The flowmeter utilized for calculating gallons recovered and discharged to the sanitary sewer had an electronic display malfunction in late June. The groundwater recovery system was subsequently taken offline for manufacturer performed meter calibration and servicing. The system remained offline until late July due to a manufacturer work backlog. To reduce the likelihood of similar downtime events occurring in the future, a second flowmeter was purchased to ensure that a spare functioning meter is maintained onsite and can be swapped in to use as needed. Sheen observations from the adjacent Duwamish Waterway, conducted weekly at a minimum, detected only one light sheen while the system was offline. Sheen data and trends will be included and discussed in further detail in the 2014 Annual Site Report.

2.2. INLAND SYSTEM OPERATIONS

The Inland SVE system was designed, installed, and operates to improve soil and groundwater conditions along the southern boundary of Plant 1. Historical investigations and groundwater monitoring near the southern property boundary (Figure 1) showed that petroleum hydrocarbons in soil and groundwater exceeded site cleanup levels and that the bulk of petroleum hydrocarbons in this area were located in the vadose zone (unsaturated soils and capillary fringe).

Designs for the system's subsurface piping were submitted to Ecology in 2007 (TechSolve, 2007) and Ecology subsequently granted approval to construct (Ecology, 2007). The system design is similar to the former Waterfront SVE system, approved in the Consent Decree. Installation of the Inland SVE system's subsurface components was completed in October 2007. A limited scale pilot test was then conducted to size equipment, determine capture zones, and vapor concentrations to be expected during system operation. SVE equipment and a catalytic oxidation (CATOX) vapor treatment unit were specified based on pilot testing results, and were installed in August 2008. SVE air discharges were approved under Puget Sound Clean Air Agency (PSCAA) Notice of Construction (NoC) No. 9858 in August 2008.

Since startup in August 2008, the SVE system has captured approximately 7,933 pounds (1,290 gallons) of gasoline range hydrocarbons (Table 2). As of September 2014, the system was recovering approximately 0.10 pounds (0.016 gallons) of gasoline range hydrocarbons per day, indicating that much of the recoverable hydrocarbons in the area have been captured.

In addition to direct hydrocarbon capture, induced airflow created by the Inland SVE system in the vadose zone enhances biodegradation of residual hydrocarbons. Biodegradation calculations based upon CO₂ data estimate the hydrocarbon mass reduced by enhanced natural attenuation processes. Calculations using CO₂ levels above background (atmospheric) in SVE vapors and SVE flow data estimate the hydrocarbon mass reduced by enhanced biodegradation. Through June 2014, biodegradation processes have reduced an estimated 4,355 gallons of gasoline-range hydrocarbons, for a combined (biodegradation and vapor) recovery of gasoline-range hydrocarbons of 5,645 gallons (Table 2). From 2012 to date, CO₂ levels have fallen to background levels (atmospheric), indicating biodegradation rates have decreased as the bulk of bio-available hydrocarbons in this area have been reduced or captured.

August 2014 GRO concentrations were not utilized in calculations of GRO recovery (Table 2). GRO data from August TO-15 laboratory analyses were biased high by the presence of non-target analytes, identified as siloxane compounds by the laboratory chemist. Siloxane compounds are not typically found in gasoline, are not an identified contaminant of concern at the site, and have not been detected in previous or subsequent analyses. As such, August's GRO data was excluded from hydrocarbon recovery calculations to avoid artificially elevating gasoline capture. Despite August's artificially elevated GRO concentration, discharges were still below PSCAA's permitted discharge threshold for GRO.

By January 2009, influent hydrocarbon concentrations recovered by the Inland SVE system had fallen below PSCAA's treatment threshold. Provisions of PSCAA NoC 9858 allow for discontinuation of CATOX treatment if the system operates below permitted threshold values. As such, PSCAA was petitioned in April 2009 to discontinue CATOX treatment of influent SVE vapors, which PSCAA subsequently approved (PSCAA, 2009). System revisions to direct vent recovered vapors to atmosphere were completed in June 2009.

System checks are performed weekly and monitoring is performed monthly, at a minimum, to ensure continued safe system operation. SVE system monitoring results show it operates as designed and in accordance with permits. Since startup, the system has only been shut down twice for extended periods. The system was shut down from December 2010 until June 2011 and from November 2012 until April 2013 due to abnormally high groundwater elevations that submerged the horizontal SVE well screens. Well gauging within the SVE system's capture zone was conducted while the system was offline to determine when groundwater elevations had fallen to a safe elevation to resume SVE operation, allowing subsequent system restart.

Groundwater performance monitoring measures improvements in groundwater quality along Plant 1's southern boundary from operation of the Inland SVE system. Groundwater monitoring data from the past 20 quarters, since inland SVE startup, indicate the system has improved groundwater conditions at the southern property boundary, as discussed in the following section.

3. SUMMARY OF GROUNDWATER PERFORMANCE MONITORING PROGRAM

The Second Quarter 2014 Groundwater Monitoring Event represents the 58th round of performance monitoring performed under the Consent Decree. Groundwater monitoring is conducted in accordance with Consent Decree, CAP, and Groundwater Compliance Monitoring and Contingency Program (TechSolve, 1999) requirements. The Groundwater Compliance Monitoring and Contingency Program describes the monitoring well network, sampling frequency, and analytes. Some revisions to the monitoring plan were included in the EDR, per Ecology's approval. Additional revisions have been made with Ecology's approval based on on-going monitoring results. The current groundwater monitoring schedule is summarized in Table 3. Monitoring well locations are shown on Figure 2 for Plant 1 and Figure 3 for Plant 2.

Groundwater monitoring requirements were revised in 2002, with concurrence from Ecology, to exclude sampling Plant 2 Wells MW-18-1, MW-18-2A, GM-21S, and GM-22S (Ecology, 2002). In 2004, the remaining Plant 2 Wells GM-19S, GM-19D, MW-03R, and GM-22S were also excluded (Ecology, 2004b). However, Well GM-19S continues to be monitored for benzene and gasoline, as GM-19S historically contained gasoline range hydrocarbons above cleanup levels, which previous investigations attributed to an unidentified off-site source (TechSolve, 2003a).

In November 2005, four wells (MW-1-T9, MW-2-T9, MW-3-T9, and MW-4-T9) were installed at the south end of Plant 1 (Figure 2) to evaluate trends in groundwater due to hydrocarbon detections in Monitoring Well AR-03. This represents the 35th round of sampling from these wells. Monitoring of these wells helps evaluate the effectiveness of the Inland SVE system in meeting cleanup objectives in this area, as discussed in the previous section.

Wells GM-16S and GM-17S are hydraulically upgradient from Plant 1 and were removed from most of the monitoring program with approval from Ecology in March 2000 (Ecology, 2000a) as sufficient upgradient data had been collected from these wells. Monitoring for hydrocarbons was voluntarily reinitiated in these wells in September 2007, as requested by Ecology, to monitor for petroleum hydrocarbons potentially migrating onto the property from upgradient, off-site sources.

Well GM-14S was historically used to monitor for sheens on groundwater, as discussed below. As sheens are no longer detected in GM-14S, quarterly groundwater monitoring for indicator hazardous substances (IHSs) was initiated in this well in the third quarter of 2007.

Additional revisions to the groundwater monitoring program were approved by Ecology in 2008 (Ecology, 2009). Revisions affected monitoring frequency and number of analyses from certain monitoring wells. Monitoring frequency from GM-19S, 15S, 16S, and 17S was reduced from quarterly to semiannually. The monitoring frequency from GM-19S was reduced based on consistent and stable monitoring results for benzene and gasoline. The monitoring frequency from GM-15S, 16S, and 17S was reduced due to consistent monitoring data for total petroleum hydrocarbons (TPH) and benzene below cleanup levels. In 2013, the monitoring frequency of GM-15S was voluntarily increased from semiannually back to quarterly due to benzene being detected above the site cleanup level (TechSolve 2014).

The voluntary monitoring frequency of sampling for carcinogenic polynuclear aromatic hydrocarbons (cPAHs) was set to an annual basis in waterfront wells (AMW-01 through AMW-05)

as extensive historical sampling does not indicate any significant detection trends. Ecology agreed that analysis for cPAHs from these wells is voluntary until cleanup objectives are met (Ecology, 2003). Sampling for cPAHs was last conducted in the fourth quarter of 2013 (TechSolve, 2014)

Wells monitored on a semiannual basis are sampled in the first and third quarter, which typically correlates with the groundwater seasonal high and low, respectively. Based upon these seasonal fluctuations in groundwater, Wells GM-19S, 16S, and 17s were not sampled in the second quarter of 2014.

The Second Quarter 2014 Groundwater Monitoring event was conducted June 10th and 11th, 2014. Groundwater samples were submitted to Test America Laboratories of Tacoma, Washington for laboratory analysis of IHSs identified in the CAP. The IHSs include TPH as gasoline (TPH-G), TPH as diesel (TPH-D), TPH as oil (TPH-O), and benzene.

Second quarter 2014 groundwater elevations (Table 4) were lower overall than those recorded in the first quarter of 2014. This groundwater elevation trend corresponds with historic trends, which show groundwater elevations rising to seasonal highs in the winter and spring and falling to seasonal lows in the summer and fall.

Petroleum hydrocarbon monitoring results for the Second Quarter 2014 Groundwater Monitoring Event are included in Table 5. Detections of hydrocarbons (benzene, TPH-G, TPH-D, or TPH-O) above cleanup levels were limited to gasoline in Wells GM-14S and GM-24S. These data are consistent are within historical ranges and consistent with historical trends. Additional trends in the monitoring results are being evaluated and will be presented in the 2014 Annual Site Report, in accordance with the requirements of the Consent Decree.

Three wells (GM-11S, GM-12S, and GM-13S) are examined monthly for the presence of free LNAPL and sheens. Laboratory analysis for IHSs will not be conducted on groundwater from Wells GM-11S, GM-12S, and GM-13S until they are removed from the monthly LNAPL gauging program, as required by the Groundwater Compliance Monitoring and Contingency Program. Historically, gauging for free LNAPL was conducted at five wells; however, gauging of two wells (GM-14S and MW-03R) has been discontinued with concurrence from Ecology. LNAPL monitoring of Well MW-03R at Plant 2 was discontinued in 2004 (Ecology, 2004b), as monitoring at Plant 2 has been mostly discontinued as discussed above. Monthly monitoring for LNAPL in Monitoring Well GM-14S at Plant 1 was discontinued in 2004, with concurrence from Ecology (Ecology, 2004c), and converted to a monitoring well in 2007, as it has been free of LNAPL since 1999, as previously discussed.

No sheens have been detected in these monitoring wells in 2014. The results of LNAPL monitoring for 2014 are presented in Table 6.

4. SUMMARY OF DATA VALIDATION

Laboratory analytical results were reported with associated laboratory quality assurance/quality control data (QA/QC). Analytical reports were reviewed and data were validated. During this quarter, most data did not require qualification. However, limited data were qualified with a J qualifier, indicating an estimated value, or with a UJ, indicating undetected at an approximate quantitation limit. A summary of the data qualified during validation, qualifiers assigned, and

reasons for data qualification are provided in Table 7. All laboratory reports are retained at the TechSolve office.

5. ADDITIONAL SITE ACTIVITIES

Piezometer Well B-005 (Figure 2) was decommissioned in August 2014, as it was located in an area of planned construction at Plant 1. Ecology was petitioned to decommission the piezometer, and subsequently granted approval (Ecology 2014). Well B-005 was located in the north-central portion of the Site, and was installed during the RI to measure shallow static water levels only. Well B-005 had not been used since the RI, was not part of ongoing or planned monitoring, and was not included in the Compliance Monitoring Program. Additionally, the well was located in an area of the Site with no known environmental impacts, and was not suited for environmental sampling due to the small 1-inch casing diameter. As groundwater flow pathways and seasonal groundwater fluctuations have been well documented and are consistent from year to year, replacement of this well was determined to be unwarranted.

Licensed drillers, acting in accordance with Ecology regulations, decommissioned the well. The Notice of Intent form submitted to Ecology for the decommissioning of the well is included in Appendix A.

6. SUMMARY

This progress report and groundwater monitoring report summarizes operation of remediation systems through the third quarter of 2014 (October 2014) and the Second Quarter 2014 Groundwater Monitoring Event. In accordance with the Consent Decree, the Fourth Quarter 2014 Progress Report / Third Quarter 2014 Groundwater Monitoring Report will be the next report submitted to Ecology. This report will be submitted to Ecology by January 15, 2014 and will contain information on groundwater monitoring conducted in the Third quarter of 2014 and discussions on ongoing site activities and remedial actions conducted through the fourth quarter of 2014.

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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	51	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%	NA	2,193	NA	6.8	1.7	78%	915	336	65%	NA	410	NA	0.9	0.9	NA	26	6.7	69%
2011 Averages	µg/L	3.2	0.5	80%	NA	1,714	NA	2.4	1.0	53%	439	89	69%	NA	492	NA	1.0	1.0	NA	7	3.0	29%
2012 Averages	µg/L	3.6	1.3	48%	NA	2,787	NA	1.9	1.2	37%	362	144	61%	NA	636	NA	1.0	1.0	NA	6	3.4	48%
2013 Averages	µg/L	1.0	0.5	45%	NA	1,333	NA	1.1	0.5	49%	356	124	57%	NA	433	NA	0.5	0.5	NA	2	1.0	78%
1/14/2014	µg/L	12	0.15	99%	NA	780	NA	1.9	0.15	92%	440	22	95%	NA	160	NA	2.0	0.15	93%	3.5	0.45	87%
2/11/2014	µg/L	0.33	0.15	55%	NA	1,600	NA	0.33	0.15	55%	800	150	81%	NA	230	NA	0.15	0.15	NA	1.5	0.45	70%
3/20/2014	µg/L	1.4	1.1	21%	NA	1,600	NA	0.89	0.89	NA	530	19	96%	NA	280	NA	0.89	0.89	NA	0.82	0.82	NA
4/16/2014	µg/L	2.2	0.24	89%	NA	2,400	NA	0.66	0.13	80%	1,400	470	66%	NA	260	NA	0.58	0.16	72%	1.8	0.19	89%
5/21/2014	µg/L	0.24	0.14	42%	NA	820	NA	0.27	0.13	52%	360	52	86%	NA	230	NA	0.44	0.16	64%	3.6	0.12	97%
6/19/2014	µg/L	0.43	0.16	63%	NA	510	NA	0.13	0.13	NA	290	180	38%	NA	65	NA	0.16	0.16	NA	0.33	0.12	64%
7/24/2014	µg/L	0.7	0.14	80%	NA	1,000	NA	0.65	0.1	80%	240	24	90%	NA	180	NA	0.2	0.2	NA	0.6	0.31	48%
8/13/2014	µg/L	1	0.70	30%	NA	2,700	NA	1.5	0.79	47%	1,500	310	79%	NA	360	NA	0.8	0.8	NA	4.7	2.6	45%
9/17/2014	µg/L	0.28	0.14	50%	NA	2,400	NA	0.15	0.13	12%	150	10	93%	NA	340	NA	0.16	0.16	NA	0.35	0.12	66%
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	
2014 Averages		2.1 µg/L	.32 µg/L	59%	NA	1,534 µg/L	NA	.72 µg/L	.29 µg/L	60%	634 µg/L	137 µg/L	1 µg/L	NA	234 µg/L	NA	.59 µg/L	.31 µg/L	NA	1.9 µg/L	.58 µg/L	79%

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	355	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
1/14/2014	36	1.24	64,520	0.0036	0.26	0.61	0.12	0.0008	0.0008	0.0017	0.14
2/11/2014	28	1.23	49,470	0.0025	0.26	0.49	0.08	0.0004	0.0005	0.0010	0.12
3/19/2014	36	1.75	90,820	0.0007	0.50	1.21	0.19	0.0004	0.0005	0.0009	0.28
4/16/2014	26	1.33	49,920	0.0007	0.40	0.83	0.11	0.0003	0.0003	0.0005	0.20
5/21/2014	35	1.37	69,150	0.0007	0.51	0.93	0.14	0.0003	0.0003	0.0016	0.23
6/19/2014	29	1.57	65,510	0.0002	0.18	0.36	0.08	0.0002	0.0001	0.0011	0.09
7/24/2014	5	2.53	18,220	0.0001	0.04	0.11	0.02	0.0000	0.0001	0.0001	0.03
8/13/2014	20	1.52	43,850	0.0003	0.32	0.68	0.10	0.0002	0.0004	0.0010	0.16
9/17/2014	35	1.53	77,300	0.0004	0.53	1.64	0.23	0.0003	0.0005	0.0016	0.35
2014 Totals and Averages	250	1.56	528,760	0.01	2.99	6.88	1.07	0.00	0.00	0.01	1.61
TOTALS:			27,044,244 gal	13.30	924.79	1538.54	155.47	34.79	14.71	101.19	
Maximum permitted GPM:		27.8	Gallons Gas, Diesel, & Oil Recovered:		150.37	220.42	20.38	TOTAL GALLONS RECOVERED:			390.11

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)	2,619 lbs
Total Gallons Dissolved Gas, Diesel, and Oil Recovered in Groundwater (2002-Present)*	390 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)	14,530 gal
Total Gallons Recovered by Interim Recovery Systems (1992-2002)	15,223 gal
Total Gallons of Petroleum Removed (1992-Present)	29,754 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 (3.785/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 x Q x Mg x 1.583 x 10⁻⁷
1.583 x 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. Inland SVE System Petroleum Hydrocarbon Recovery Rates
BP West Coast Products Terminal 21T, Seattle, Washington

Date	Total 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 % CO ₂ - Atmospheric concentration (0.04%)	Pounds GRO Destruction From Enhanced Biodegradation Over Period (lbs)	Cumulative GRO Destruction From Enhanced Biodegradation (gal)
2008 Averages & Totals	2,690	2,677	175	4,400	6,072	6,928	58.8	8.78	7.0	7.8	0.38	2,989	486
2009 Averages & Totals	11,245	8,555	258	59.0	551	7,479	1.55	0.11	1.1	8.9	0.23	11,748	2,396
2010 Averages & Totals	19,872	8,628	257	9.1	71	7,550	0.20	0.36	2.2	11.1	0.18	9,233	3,898
2011 Averages & Totals	23,503	3,583	247	25.5	117	7,667	0.78	0.56	1.9	13.0	0.18	2,748	4,344
2012 Averages & Totals	31,631	8,128	246	12.6	87	7,754	0.26	0.54	4.1	17.1	0.00	66	4,355
2013 Averages & Totals	37,638	6,007	257	26.6	158	7,912	0.63	0.07	0.2	17.3	0.00	0.00	4,355
1/15/2014	38,308	671	235	12.0	4.8	7,917	0.17	0.99	0.30	17.59	0.00	0.00	4,355
2/12/2014	38,979	671	267	2.3	4.5	7,922	0.16	0.017	0.32	17.91	0.00	0.00	4,355
3/20/2014	39,620	641	260	1.8	1.3	7,923	0.05	0.017	0.01	17.92	0.00	0.00	4,355
4/16/2014	40,263	643	263	1.5	1.0	7,924	0.04	0.017	0.01	17.9	0.00	0.00	4,355
5/21/2014	41,101	838	249	1.9	1.4	7,925	0.04	0.017	0.01	17.9	0.00	0.00	4,355
6/18/2014	41,771	670	251	1.9	1.2	7,927	0.04	0.017	0.01	18.0	0.00	0.00	4,355
7/25/2014	42,657	886	267.6	0.8	1.2	7,928	0.03	0.00	0.01	18.0	0.00	0.00	4,355
8/13/2014	43,113	456	252.8	NR	1.9	7,930	0.10	0.03	0.01	18.0	0.00	0.00	4,355
9/17/2014	43,953	840	241.8	7.9	3.4	7,933	0.10	0.09	0.05	18.0	0.00	0.00	4,355
Total Combined Recovery lbs (Bio+GRO): 34,716			Total lbs of Gasoline (GRO): 7,933			Total lbs Benzene: 18.02			Total lbs from Biodegradation: 26,783				
Total Combined Recovery gal (Bio+GRO): 5,645			Total gal of Gasoline (GRO): 1,290			Total gal of Benzene: 2.46			Total gal from Biodegradation: 4,355				

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 safe 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 is not present at the site. This data was excluded to avoid artificially elevating gasoline capture.

Definitions:

Avg - average
 Bio - biodegradation of petroleum hydrocarbons
 CO₂ - carbon dioxide
 gal - gallons
 GRO - gasoline range organics (gasoline range petroleum hydrocarbons)
 hr - hour
 HSVE - horizontal soil vapor extraction
 lbs - pounds
 mg/m³ - 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 CO₂ concentration (%)
 Q = Influent Flow Rate (SCFM)
 Mc = Molecular wt. of Carbon Dioxide = 44
CO₂ 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 CO₂ recovery rates were calculated by assuming that for every 3 lbs of CO₂ detected, 1 lb of TPH is metabolized, and that all CO₂ present in vapor stream above background atmospheric concentrations (0.04%) is attributable to microbial degradation of hydrocarbons in soil.

Table 3. Groundwater Performance Monitoring Schedule
 BP West Coast Products Terminal 21T, Seattle, Washington

Analyses Conducted by Quarter				
Well	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Plant 1				
MW-1-T9	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O
MW-2-T9	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O
MW-3-T9	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O
MW-4-T9	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O
GM-14S	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O
GM-15S	Benzene, TPH-G, TPH-D, TPH-O		Benzene, TPH-G, TPH-D, TPH-O	
GM-17S	Benzene, TPH-G, TPH-D, TPH-O		Benzene, TPH-G, TPH-D, TPH-O	
GM-16S	Benzene, TPH-G, TPH-D, TPH-O		Benzene, TPH-G, TPH-D, TPH-O	
GM-24S	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O
AR-03	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O
AMW-01	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O, cPAHs
AMW-02	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O, cPAHs
AMW-03	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O, cPAHs
AMW-04	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O, cPAHs
AMW-05	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O	Benzene, TPH-G, TPH-D, TPH-O, cPAHs
Plant 2				
GM-19S	Benzene, TPH-G		Benzene, TPH-G	

Notes: Field Duplicate and QA/QC samples collected from wells highlighted in bold.
 TPH-G - Gasoline Range organics utilizing NWTPH-Gx method
 TPH-D - Diesel Range Organics utilizing NWTPH-Dx
 TPH-O - Extended Range Organics (Motor Oil) utilizing NWTPH-Dx
 Benzene is analyzed for utilizing EPA 8021 or 8260B.
 cPAHs - Carcinogenic Polycyclic Aromatic Hydrocarbons utilizing EPA 8270SIM
 Field Parameters (pH, Temperature, Conductivity, Turbidity, Water Level, & Product Level) are recorded from all wells sampled

Table 4. Groundwater Performance Monitoring Groundwater Elevations
 Second Quarter 2014
 BP West Coast Products Terminal 21T , Seattle, Washington

Well	Date	TOC Elevation (ft msl)	Depth to Water (ft below TOC)	Groundwater Elevation (ft msl)
Plant 1				
GM-14S	6/11/2014	8.57	4.51	4.06
GM-15S	6/11/2014	8.92	5.31	3.61
GM-16S	6/11/2014	8.53	4.82	3.71
GM-17S	6/11/2014	9.19	4.77	4.42
GM-24S	6/11/2014	7.62	3.53	4.09
AR-03	6/10/2014	9.35	5.96	3.39
AMW-01	6/10/2014	8.88	11.86	-2.98
AMW-02	6/10/2014	12.14	14.17	-2.03
AMW-03	6/10/2014	12.07	13.41	-1.34
AMW-04	6/10/2014	8.00	9.99	-1.99
AMW-05	6/10/2014	8.14	8.74	-0.60
MW-1-T9	6/11/2014	9.07	5.71	3.36
MW-2-T9	6/11/2014	9.23	5.33	3.90
MW-3-T9	6/11/2014	8.73	5.12	3.61
MW-4-T9	6/11/2014	10.65	7.34	3.31

ft Feet

msl Mean sea level

NA Not available. Well elevations have not been surveyed.

NM Not measured. Well was not gauged or sampled due to inaccessibility caused by the Island redevelopment activities.

TOC Top of casing

Elevations measurements are calculated using NGVD29 Datum.

Table 5. Summary of Analytical Results for Groundwater - TPH-G, TPH-D, TPH-O, and Benzene
 Second Quarter 2014
 BP West Coast Products Terminal 21T , Seattle, Washington

Well	Date	TPH-G WTPH-G (µg/L)	TPH-D WTPH-DX (µg/L)	TPH-O WTPH-DX (µg/L)	Benzene (µg/L)
Plant 1					
GM-14S	6/11/2014	2,000 J	1,300	ND	1.2
GM-15S	6/11/2014	ND	ND	ND	ND
GM-24S	6/11/2014	1,000	450	ND	ND
AR-03	6/10/2014	ND UJ	2,700	ND	ND
AMW-01	6/10/2014	ND UJ	1,100	ND	7.3
AMW-02	6/10/2014	ND UJ	320	ND	12
AMW-03	6/10/2014	ND UJ	430	ND	ND
AMW-04	6/10/2014	ND UJ	400	ND	ND
AMW-05	6/10/2014	ND UJ	560	ND	ND
MW-1-T9	6/11/2014	360	5,800	940	ND
MW-2-T9	6/11/2014	380	1,000	ND	ND
MW-3-T9	6/11/2014	670	1,300	ND	14
MW-4-T9	6/11/2014	ND	480	ND	ND
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.

µg/L Micrograms per liter.

ND Constituent not detected above reporting limit.

NR Not required. Well was not tested for these analyses, as per Ecology approval. redevelopment activities.

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.

WTPH-DX Washington State Method for Analysis of Diesel in Soil and Water - Extended.

WTPH-G Washington State Method for Analysis of Gasoline in Soil and Water.

J Estimated value.

UJ Not detected at an estimated value.

R Rejected value.

Table 6. Summary of Free Product Measurement Results for Groundwater
 2014 Monitoring Data through Third Quarter
 BP West Coast Products Terminal 21T , Seattle, Washington

Well	Date	Free Product (feet)
Plant 1		
GM-11S ¹	1/15/2014	None
GM-11S ¹	2/12/2014	None
GM-11S ¹	3/20/2014	None
GM-11S ¹	4/16/2014	None
GM-11S ¹	5/21/2014	None
GM-11S ¹	6/18/2014	None
GM-11S ¹	7/25/2014	None
GM-11S ¹	8/13/2014	None
GM-11S ¹	9/17/2014	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-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
Cleanup Level		No Sheen

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

¹ Well GM-11S has been converted to a recovery well and product thickness was measured during pumping.

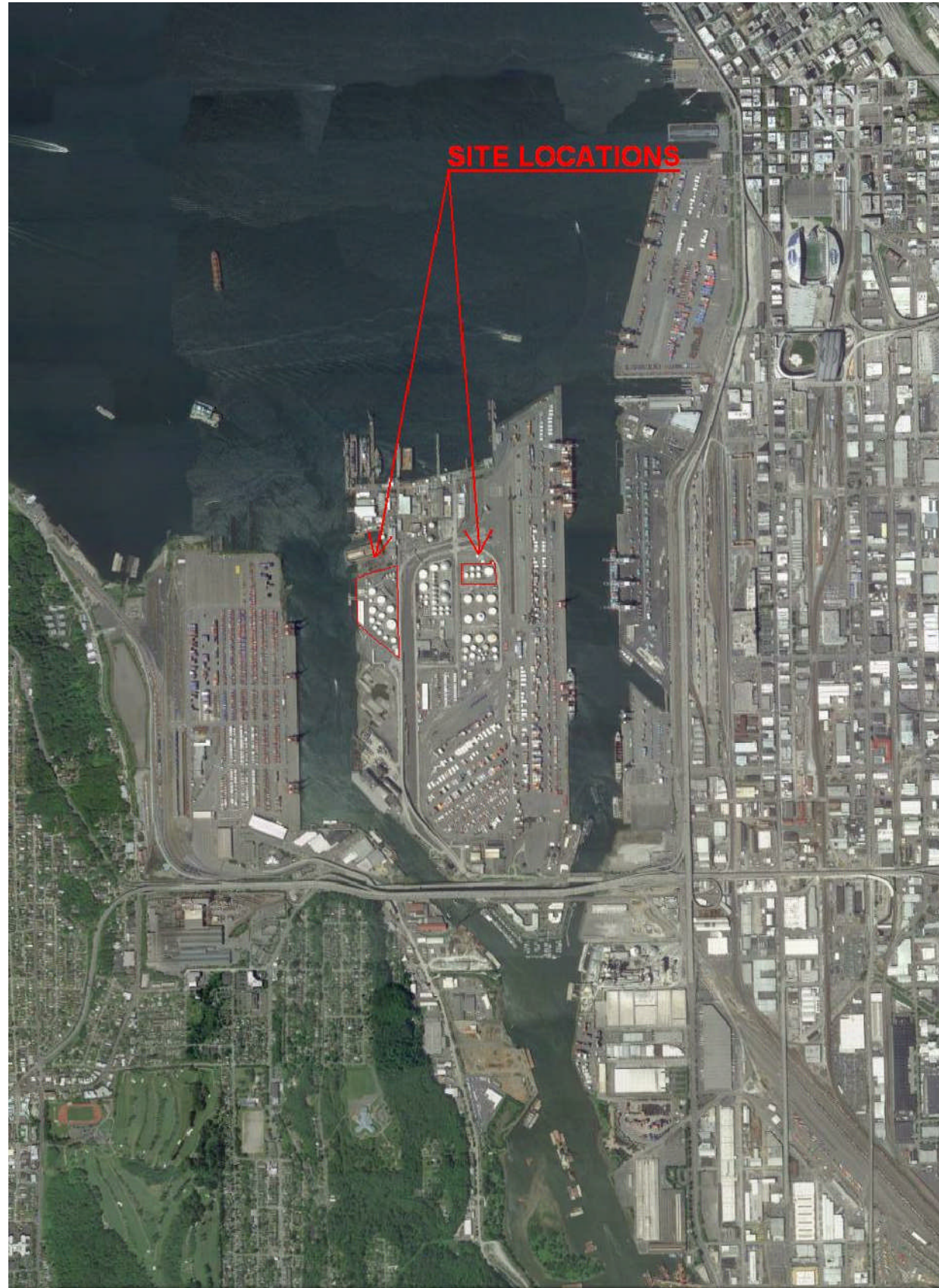
Table 7. Summary of Data Validation Results
 Groundwater Performance Monitoring
 Second Quarter 2014
 BP West Coast Products Terminal 21T , Seattle, Washington

Sample ID	Constituent	Qualifier	Reason
P1-GWAMW-01-214 P1-GWAMW-02-214 P1-GWAMW-03-214 P1-GWAMW-04-214 P1-GWAMW-05-214 P1-GWAR-03-214	Gasoline	UJ	Samples were analyzed 2 days past the recommended holding time for TPH-G. Sample results were undetected and are qualified as undetected at an approximate quantitation limit (UJ). Review of historical data indicate that TPH-G has been undetected since 2009 or earlier at all listed wells except P1-GWAR-03. At Well P1-GWAR-03, TPH-G has been undetected since March 2014 with intermittent non-detects prior to that and data exhibits a decreasing trend over time. Therefore, it is likely that these undetected results are correct and were not affected by the holding time exceedance.
P1-GWGM-14S-214	Gasoline	J	Surrogate recovery was above the control limit. The sample result is, therefore, qualified as an approximate value (J).

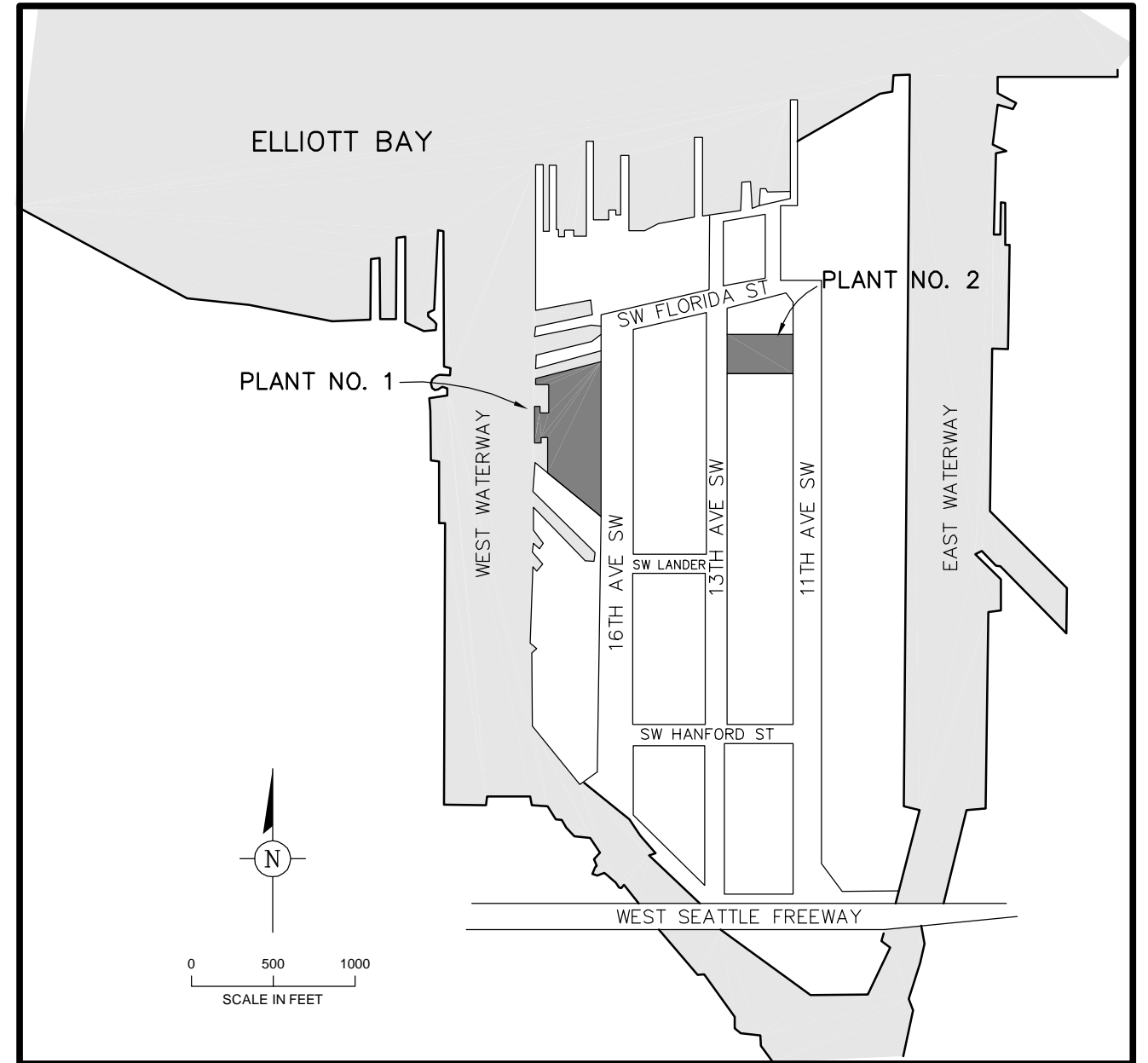
J Estimated value.

UJ Undetected at an estimated reporting limit.

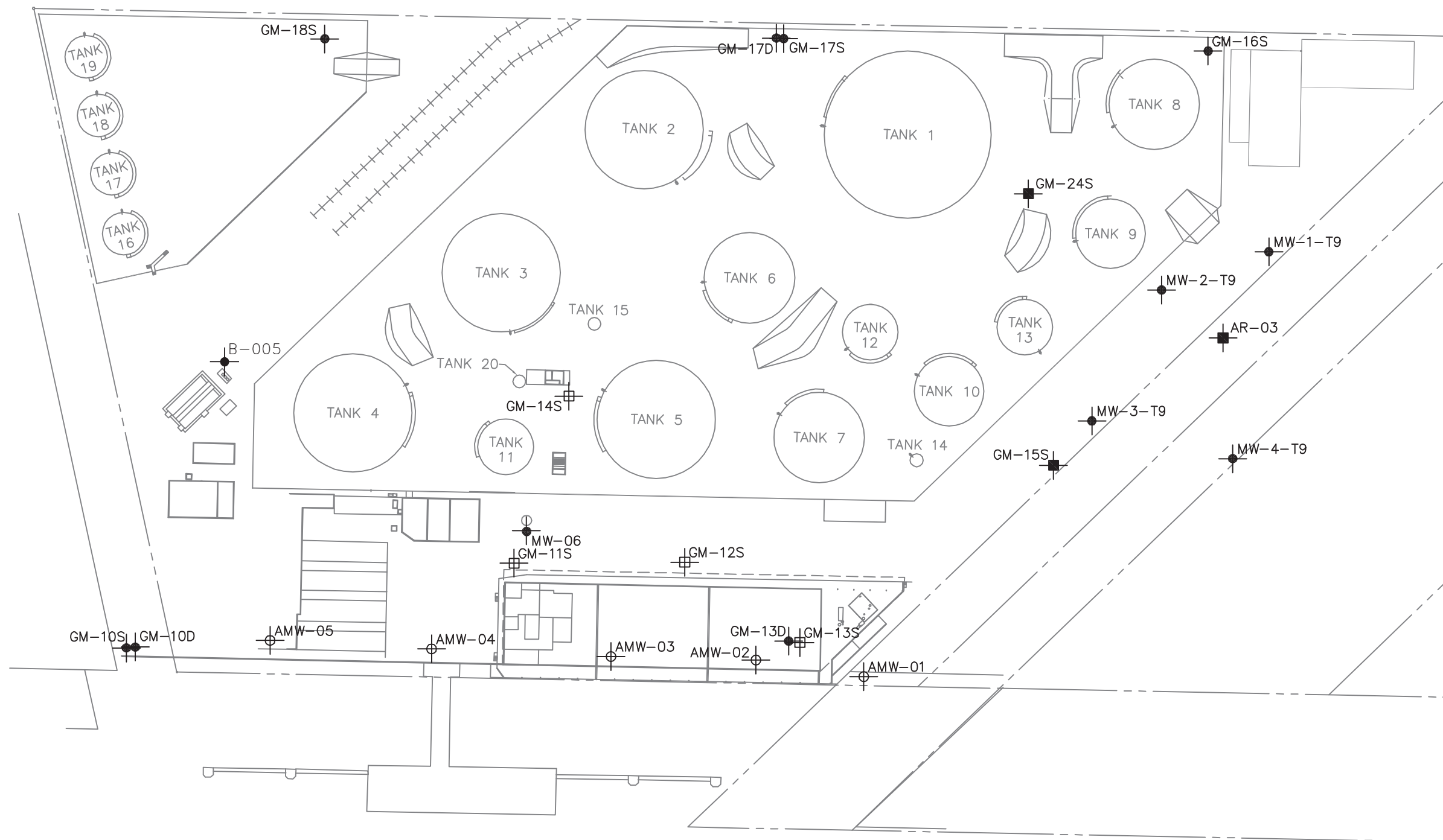
FIGURES



AREA PLAN

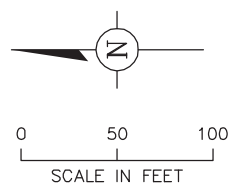


SITE PLAN



LEGEND

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



TECHSOLVE
ENVIRONMENTAL

7518 NE 169th Street, Kenmore WA 98028
(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

2

C:\DCS_PROJECTS\TechSolve\PROJECTS\BP21T\ARCO_21T\dwg\ARCO21T.dwg JAN 13 2011 12:34:56

Terminal 18

MW-T-18-1

MW-T-18-2A

GM-21D
GM-21S

MW-03R

GM-22D
GM-22S




ARCO Plant 2

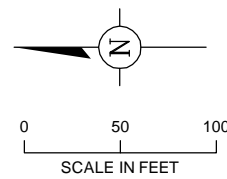
GM-23S

GM-19D
GM-19S

GM-20S

LEGEND

-  GROUNDWATER MONITORING WELL
-  PRODUCT PERFORMANCE WELL
-  PERFORMANCE WELL



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Plant 2 Monitoring Well Network

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

FIGURE

3

APPENDIX A

RESOURCE PROTECTION WELL REPORT

(SUBMIT ONE WELL REPORT PER WELL INSTALLED)

CURRENT

Notice of Intent No. AE28258

Construction/Decommission

Construction
 Decommission *ORIGINAL INSTALLATION* Notice of Intent Number _____

Type of Well

Resource Protection
 Geotechnical Soil Boring

Consulting Firm TechSolv Consultants

Property Owner BP Tank Farm
 Site Address 1652 SW Lander St
 City Seattle County King

Unique Ecology Well ID _____
 Tag No. _____

Location 1/4 NE 1/4 SE Sec 12 TWN 24N R 3E or _____ WWM

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards

Lat/Long (s,t,r still Required) Lat Deg n/a Lat Min/Sec n/a
 Long Deg n/a Long Min/Sec n/a

Materials used and the information reported above are true to my best knowledge and belief

Tax Parcel No. 766670-2900

Driller Trainee Name (Print) Frank Scott
 Driller/Trainee Signature [Signature]
 Driller/Trainee License No. 2549

Cased or Uncased Diameter 1" Static Level n/a

Work/Decommission Start Date 8-20-14

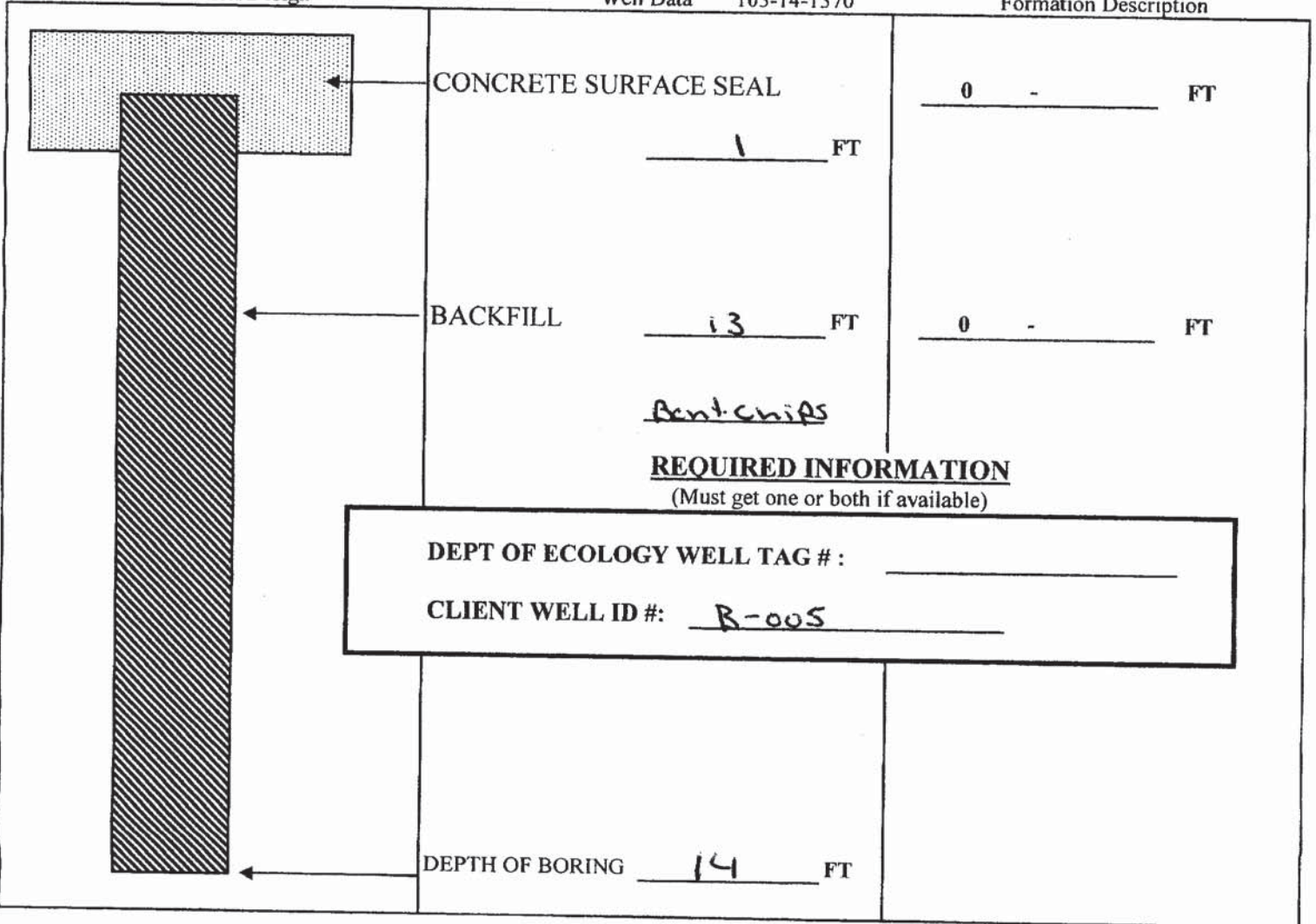
If trainee, licesned drillers' Signature and License No. _____

Work/Decommission Completed Date 8-20-14

Construction/Design

Well Data 103-14-1370

Formation Description



REQUIRED INFORMATION

(Must get one or both if available)

DEPT OF ECOLOGY WELL TAG #: _____
 CLIENT WELL ID #: B-005

Scale 1" = _____