SUPPLEMENTAL RI/FS WORKPLAN
Former Chevron Pipe Line Company Pasco Bulk Terminal
2900 Sacajawea Park Road, Pasco, WA
Facility Site ID: 55763995; Cleanup Site ID: 4867

March 31st, 2016

Prepared for:
Tesoro Logistics Operations LLC
3450 S. 344th Way #201
Auburn, WA 98001

TESORO

CEECON Testing, Inc.
434 North Canal Street, Suite Six
South San Francisco, CA 94080

March 31st, 2016

William J. Fees, P.E. and Patrick Cabbage, L.G.
Eastern Regional Office-Toxics Cleanup Program
WA Department of Ecology
4601 N. Monroe Street
Spokane, Washington 99205-1295

RE: **Supplemental RI/FS Workplan**
Former Chevron Pipe Line Company Pasco Bulk Terminal
2900 Sacajawea Park Road, Pasco, Washington 99301
Ecology Facility Site ID: 55763995; Cleanup Site ID: 4867

Dear Messrs. Fees and Cabbage:

Enclosed please find a copy of the "Supplemental Remedial Investigation/Feasibility Study Workplan" *("RI/FS Workplan") for the* Former Chevron Pipe Line Company Pasco Bulk Terminal *on Sacajawea Road in Pasco, Washington. This RI/FS Workplan is submitted on behalf of Tesoro Logistics Operations LLC in accordance with the requirements of Agreed Order No. DE 12989 issued by the Washington Department of Ecology on March 31st 2016.*

Please feel free to call me at 650/827-7474 if you have any questions.

Sincerely,
CEECON Testing, Inc.

Michael Hodges
President

cc: Jeffrey M. Baker, P.E., Tesoro
Ryan Biggs, Wil Ricard, Tesoro
Vanessa Vail, Tesoro
Michael Dunning, Perkins Coie LLP

TABLE OF CONTENTS

Page

LIST OF TABLES, FIGURES AND APPENDICES

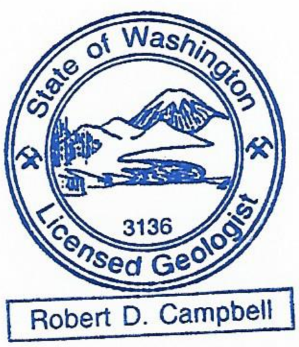
SIGNATURE PAGE

All hydrogeologic and geologic information, conclusions, and recommendations contained in this report have been prepared by a Washington-Licensed Geologist No. 3136.

Robert D. Campbell

Date: March 31st, 2016

Washington Licensed 3136



March 31st, 2016

SUPPLEMENTAL RI/FS WORKPLAN
Former Chevron Pipe Line Company Pasco Bulk Terminal
2900 Sacajawea Park Road, Pasco, Washington 99301
Ecology Facility Site ID: 55763995; Cleanup Site ID: 4867

1.0 EXECUTIVE SUMMARY

This "*Supplemental Remedial Investigation/Feasibility Study Workplan*" ("RI/FS Workplan") was prepared on behalf of Tesoro Logistics Operations LLC (Tesoro Logistics) for the Former Chevron Pipe Line Company Pasco Bulk Terminal at 2900 Sacajawea Road in Pasco, Washington ("the Site"; Figures 1 and 2). This RI/FS Workplan is submitted in accordance with the requirements of Agreed Order No. DE 12989 issued by the Washington Department of Ecology (Ecology) to Tesoro Logistics on March 31st, 2016.

This RI/FS Workplan describes proposed passive soil gas, soil, and ground-water sampling to address identified potential data gaps, assess the current extent and distribution of petroleum hydrocarbon impacts and evaluate the effectiveness of prior completed soil and ground-water remedial measures. The data collected in accordance with this RI/FS Workplan will be used to update the Conceptual Site Model (CSM) and supplement prior evaluations of planned remedial actions presented in the Ecology's "*Draft Cleanup Action Plan*" dated December 2012 ("2012 DCAP").

Historical investigation and monitoring results characterize petroleum hydrocarbon impacts to soil and ground water that appear to have originated from multiple documented events of fuel hydrocarbon releases from storage tanks, pipelines and loading racks at the Site during the period between 1972 and 2009 (URS, 2011b). The historical releases varied in estimated volumes between a few gallons and approximately 41,000 gallons per event, and remedial actions were conducted between 1987 and 2003 to address the releases. However, based on estimates of spill and recovery volumes, it is estimated that as much as approximately 40,000 gallons of fuel hydrocarbons may remain in the subsurface in the vicinity of documented hydrocarbon release events. Ground-water monitoring and grab sample data collected in 2015 show total petroleum hydrocarbons as diesel (TPHd) and motor oil (TPHmo) were reported at concentrations greater than the Model Toxics Control Act (MTCA) Method A ground-water cleanup levels. Ground-water monitoring results confirm the overall extent of petroleum hydrocarbons in ground water is delineated and the petroleum hydrocarbon plume in ground water appears to be stable. However, the presence of a significant hydrocarbon mass in Site soil would represent a potential future threat to further ground-water degradation and deterrent to meeting cleanup levels within a reasonable time frame.

Potential data gaps described in this RI/FS Workplan were identified based on review of Site historical release information, investigation data and results of remedial actions. Passive soil gas, soil, and ground-water sampling is recommended to address the identified potential data gaps, and supplemental RI sampling data are expected to provide a basis for an assessment of current and potential future impacts to ground water, as well as the information needed to update the CSM. RI/FS sampling results will be evaluated to assess whether additional investigations and remedial actions are warranted in addition to those described in the 2012 DCAP.

Recommended RI sampling includes: 1) passive soil gas sampling to characterize the extent of hydrocarbon impacts in soil and address the potential data gap represented by the apparent absence of soil investigation data at the former Chevron Pipeline Company (CPL) facility area of the Site; 2) soil and ground-water sampling to address identified potential data gaps in the vicinity of specific areas and terminal operation facilities where the extent of impacts do not appear to be fully delineated; and 3) near-surface sediment sampling to assess the potential for future impacts to Snake River surface water quality via ground-water migration toward the river.

2.0 BACKGROUND

Background information and results of investigations, monitoring and remedial actions at the Site are described in previous reports and summarized in Appendix A.

3.0 RATIONALE FOR PROPOSED RI SAMPLING

The proposed scope of work presented in this RI/FS Workplan was developed based on review of previous technical reports, including data and conclusions presented in the *Remedial Investigation/Feasibility Study Report for the NWTC Pasco Terminal* submitted to Ecology and dated September 29, 2011 ("RI/FS Report"). The RI/FS Report documented 27 events of fuel hydrocarbon release from storage tanks, pipelines and loading racks at the Site during the period between 1972 and 2009 (URS, 2011b). The historical releases varied in estimated volumes between a few gallons and approximately 41,000 gallons per event (URS, 2011b).

The RI/FS Report describes three significant documented release events that occurred between March 1976 and February 1984, resulting in estimated diesel and gasoline release volume totaling approximately 80,000 gallons at the former CPL facility storage tanks located in the central area of the Site (Figure 2). A fourth significant documented release of approximately 41,000 gallons of gasoline was reported in July 2000 from the Tidewater transfer pipeline located at the northwest area of the Site (URS, 2011b) (Figure 2). The estimated volume of hydrocarbons recovered within a short period following the discovery of these four historic releases varied between approximately 12% and 33% of the estimated volume released in the CPL release events, and approximately 85% was reportedly recovered following the Tidewater release event (URS, 2011b). Longer-term remedial actions to address the releases were conducted between 1987 and 2003, resulting in further removal of an estimated 41,500 gallons from the CPL release events (URS, 2011b). Based on estimates of spill and recovery volumes presented in the RI/FS Report, it is estimated as much as approximately 40,000 gallons of fuel hydrocarbons may remain in the subsurface in the vicinity of the documented CPL release events. Though a significant portion of the recovered hydrocarbon mass is expected to have been removed via remedial actions and attenuated through biodegradation and other natural attenuation processes, a significant mass of hydrocarbons potentially remains in the subsurface in the vicinity of the documented CPL release events.

3.1 Potential Data Gap Evaluation

Information presented in the RI/FS Report indicates 15 wells were installed by CPL between 1983 and 1989 in the vicinity of the documented CPL release events to characterize the extent and distribution fuel hydrocarbons in the subsurface. Remedial investigation results of vadose-zone soil sample laboratory analyses were not included in the RI/FS Report and do not appear to have been collected during the CPL investigations either prior to or following completion of remedial actions. Soil investigation data in the vicinity of the documented CPL release events are needed to provide information to characterize impacts to soil and assess the potential presence of hydrocarbon source areas, if any. The apparent absence of soil investigation data at the former CPL facility is identified as a potential data gap for supplemental RI sampling.

The RI/FS Report summarizes remedial soil excavation and ground-water pumping activities that were conducted in May 1987 to remove jet fuel-impacted soil and ground water along the Snake River shoreline area (Figure 2). The remedial excavation and pumping activities were conducted in response to observation of hydrocarbon sheen in surface water along the Snake River shoreline in July 1986 and subsequent discovery of a leaking underground pipeline located near the area of the sheen. No soil samples were reported to have been collected from the May 1987 excavation or from monitoring well borings installed in the area of the excavation and the river shoreline. Though the sheen reportedly abated over time after completion of the remedial activities, two monitoring wells (MW-5 and MW-9) were removed from within the excavated area and no replacement monitoring wells were installed to confirm the extent of impacts to soil and ground water adjacent to the documented pipeline release location. This information indicates the extent of soil and ground-water impacts along the Snake River shoreline area does not appear to have been fully delineated following the completion of 1987 remedial activities and therefore, is identified as a potential data gap for supplemental RI sampling.

Ground-water monitoring data collected at the former CPL facility in December 2010 and presented in the RI/FS Report shows relatively low TPHmo (up to 2,400 micrograms per liter [µg/l]) and TPHd (up to 3,100 µg/l) were the only constituents reported. More recent monitoring results from September 2015 show relatively low concentrations of TPHd (3,300 µg/l) and TPHg (733 µg/l) at well MW-3 were the only constituents reported at or above laboratory reporting limits (Table 1; Figure 3). However, there are several areas of the former CPL facility where documented releases were reported or releases may have occurred at current and historic fuel storage/handling facilities and no ground-water investigation data were collected. Additionally, TPHd (up to 3,100 µg/l) and TPHmo (up to 4,600 µg/l) were reported in grab ground-water samples collected at confirmation borings CB-1 and CB-2 in June 2015, and the constituents are not delineated in the area of the borings (Table 2; Figure 3). These areas and several additional areas of the former CPL facility where the extent of ground-water impacts is not fully delineated are identified as potential data gaps.

3.2 Potential Data Gap Summary and Recommended Supplemental RI Sampling

Remedial investigation sampling is proposed to address the following potential data gaps that were identified based on review of Site historical release information, investigation data, and results of remedial actions:

- Passive soil gas sampling is recommended on a site-wide scale to investigate for previously unidentified hydrocarbon release areas and to characterize the extent of hydrocarbon-impacted soil near documented historic release areas and fuel storage/handling facilities.

- Soil and ground-water sampling is recommended to address the potential data gap represented by the apparent absence of soil investigation data, to delineate the extent of soil and ground-water impacts, and address identified potential data gaps in the vicinity of the following areas and terminal operation facilities at the Site (Figure 4):

    - Northwest area – adjacent to confirmation borings CB-1 and CB-2;
    - West area – southwest of Tesoro well MW-3;
    - Central area – near several selected former CPL historic release areas and fuel storage/handling facilities;
    - East area – near a former unlined evaporation pond operated by CPL; and
    - Along the Snake River shoreline, including the area adjacent to the 1987 soil excavation.

- Shoreline sediment sampling is recommended to assess the potential for hydrocarbon-impacted ground-water seeps to affect Snake River surface water quality.

Passive soil gas, soil, ground-water, and shoreline sediment sampling data will provide a basis for an assessment of current and potential future impacts at the Site, as well as information needed to update the CSM and complete a FS of remedial action alternatives.

4.0 RI SAMPLING WORKPLAN

4.1 Introduction and Objectives

The following tasks are proposed to address the objectives of this RI/FS Workplan:

- Conduct passive soil gas (PSG) sampling at as many as eighty (80) locations across the Site to characterize the presence and residual levels of volatile and semivolatile hydrocarbons in subsurface soil vapor, and identify potential areas of elevated hydrocarbon concentrations in soil vapor.

- Collect soil and grab ground-water samples at approximately sixteen (16) boring locations to confirm the potential presence and extent of petroleum hydrocarbons at several areas of the Site.

- Collect sediment samples at up to six (6) locations along the shoreline of the Snake River to confirm the possible presence of petroleum hydrocarbons in shoreline sediments as a result of seepage of ground water impacted by fuel release at tanks or pipelines located in the upland area of the Site.

A PSG survey is proposed at multiple locations across the Site, including at and surrounding documented hydrocarbon release areas, hydrocarbon handling/storage facilities, and adjacent to known and suspected potential areas of hydrocarbon impacts. These data will be used to identify any potential "hot spots" of relatively high volatile hydrocarbon vapor concentrations, and to identify target areas for subsequent RI soil and ground-water sampling.

Soil and grab ground-water sampling locations presented in this RI/FS Workplan are preliminary and may be adjusted based on results of the PSG survey. Sampling is proposed at borings 1 and 2 to delineate the lateral extent of impacted ground water in the directions east and south of confirmation borings CB-1 and CB-2 (Figure 4). Sampling at boring 3 is proposed to confirm the extent of impacts in the direction southwest of Tesoro well MW-3. Proposed borings 4 through 10 will provide data to confirm the possible presence of impacts adjacent to three significant CPL release events that occurred between 1976 and 1984, in addition to other documented releases of relatively smaller quantities of fuel hydrocarbons at the central and northeast areas (Figure 4). Proposed boring 11 is located near a reported former unlined evaporation pond previously operated by CPL. Five proposed shallow borings are located along the Snake River shoreline directly downgradient (i.e., southeast) of current or former hydrocarbon-impacted ground water in the upland area of the Site (Figure 4). Two of the shallow borings are located adjacent to the 1987 soil excavation area to assess the extent of residual levels of hydrocarbons in soil and the effectiveness of the excavation remedial actions.

Sediment sampling along the Snake River shoreline is proposed at up to six (6) accessible locations that are downgradient of upland historic release areas. The shoreline will be inspected for potential ground-water seeps and the sample locations adjusted to target any observed seeps.

4.2 Passive Soil Gas Sampling

Passive soil gas (PSG) sampling is proposed at as many as eighty (80) locations with the objective to obtain a surficial representation of the presence and relative concentration distribution of subsurface volatile and semivolatile hydrocarbon vapor across the Site (Figure 4). The proposed PSG survey design includes an approximate 100-foot sampling grid, with sample locations concentrated around areas of known hydrocarbon contamination in ground water, historic documented spills, hydrocarbon handling/storage facilities that include above ground storage tanks and evaporation ponds, and along the Snake River shoreline. The number and locations of the final PSG sampling locations will be determined in the field and may be significantly altered from the proposed locations shown on Figure 4 due to restrictions posed by limited access, underground utilities, terminal facility equipment and operations, and general safety concerns.

PSG sampling devices will be installed to a depth of approximately one foot within a small-diameter hole drilled to a depth of approximately three feet below grade at each location. After the PSG sampler is emplaced, the hole will be sealed at the surface with an aluminum foil plug and covered with soil or thin concrete patch. The samplers will be left in place for approximately seven to 14 days, then retrieved for shipment to the analytical laboratory. Soil gas samples will be analyzed at the laboratory for target compounds that include TPH C4-C9, TPH C10-C19, and BTEX compounds using EPA Method 8260C.

4.3 Soil and Grab Ground-Water Sampling

Soil and grab ground-water sampling is proposed at sixteen (16) borings shown on Figure 4. The final number and locations of the borings may be altered based on results of the PSG survey, in addition to restrictions posed by limited access, underground utilities, terminal facility equipment and operations, and general safety concerns.

The borings are planned to be drilled using truck-mounted sonic or Geoprobe drilling equipment. Borings 1 through 11 in the upland area of the Site will be drilled to depths approximately 85 feet below grade to collect grab ground-water samples from the water table zone (depths comparable to the screen interval depths in nearby upland area monitoring wells). The five (5) shallow borings along the Snake River shoreline will be drilled to approximately 20 feet below grade to collect grab ground-water samples from the top of the saturated-zone interval monitored at nearby Tesoro well MW-5 (Figure 4).

Soil core samples will be collected from the borings for lithologic description and laboratory analyses using 10-foot length, continuous sonic core samplers advanced to the total depth of each boring. In the event that Geoprobe drilling equipment is utilized, soil core samples may be collected at approximately 10-foot intervals using a lined, split spoon type sampler. The soil cores from the borings will be used for lithologic description and to collect photoionization detector (PID) readings to select soil samples for laboratory analysis. The soil cores will be field screened for petroleum hydrocarbon vapor using PID equipment, and samples showing elevated readings on the PID will be selected for laboratory analysis.

Ground-water sampling equipment will be advanced in each boring to collect ground-water samples at the specified target depth interval, estimated at approximately 80- to 85-feet below grade in borings 1 through 11, and 15- to 20-feet below grade in shallow borings along the Snake River (Figure 4). The ground-water samples will be collected in a clean bailer lowered through the sonic equipment drill casing, or through temporary small-diameter PVC casing lowered into the drill rods of Geoprobe drill equipment.

Determination to install a monitoring well in one or all of the proposed borings may be made in the field at the time of borehole drilling and sampling. Decision criteria used by Tesoro and field personnel to install a monitoring well(s) include observation or field instrument detection of significant levels of hydrocarbons in soil and/or ground water while sampling the boring(s). Ecology staff will be notified by field personnel at the time of drilling in the event a monitoring well is planned to be installed in any of the sample borings.

Soil and grab ground-water samples will be analyzed at the laboratory for TPHg, TPHd and TPHmo using Northwest Method NWTPH-Gx/Dx/Rx; and BTEX compounds, fuel oxygenates, naphthalene and lead scavengers using EPA Method 8260B. After collecting the samples, the borehole will be sealed and ground surface restored using replacement materials (i.e., base gravel, asphalt or cement patch). All drilling activities will be conducted under the direction of a Washington-Licensed Geologist.

4.4 River Shoreline Sediment Sampling

Sediment sampling along the Snake River shoreline is proposed at up to six (6) accessible locations. The river shoreline is lined with large rock rip-rap fill, and preliminary approximate sampling locations are shown on Figure 4. The final number and locations of the sediment samples will be determined after inspecting the length of shoreline that extends between the underground fuel pipelines and the former unlined evaporation pond, and determining accessible areas for shoreline sediment sampling (Figure 4). The shoreline will be inspected at the approximate time of the daily low water level on the Snake River to check for potential ground-water seeps and the sediment sample locations adjusted to target any observed seeps.

The sediment samples will be collected at depths less than one foot below surface grade and field screened for petroleum hydrocarbon vapor using PID equipment. Samples showing elevated readings on the PID, if any, will be selected for laboratory analysis for TPHg, TPHd and TPHmo using Northwest Method NWTPH-Gx/Dx/Rx; and BTEX compounds, fuel oxygenates, naphthalene and lead scavengers using EPA Method 8260B.

4.5 Ground-Water Monitoring

A semi-annual ground-water monitoring program is recommended for the period until a new DCAP is implemented at the Site. The monitoring program includes monitoring and reporting on a semi-annual schedule under a well sampling frequency outlined below, effective in the 1st semi-annual period 2016:

Semi-Annual Period	**Wells Sampled**
1st Semi-annual	All available wells (MW-2, MW-3, MW-4, MW-6, MW-7, MW-8, MW-10, MW-11, MW-12, MW-14)
2nd Semi-annual	Wells MW-2, MW-3, MW-6, MW-7, MW-11, MW-12, MW-14

Semi-annual ground-water monitoring data will be used to further assess any changes in the extent, distribution and trends of petroleum hydrocarbon concentrations in ground water. The ground-water samples will be submitted to a certified laboratory and analyzed for TPHg, TPHd and TPHmo using Northwest Method NWTPH-Gx/Dx; and BTEX compounds, fuel oxygenates, naphthalene and lead scavengers using EPA Method 8021B/8260B.

4.6 Continuous Water-Level Measurement

Ground-water levels will be collected to assess ground-water flow direction and gradients on a semi-annual schedule as part of the proposed ground-water monitoring program. The ground-water monitoring program will include continuous water-level measurement at three selected monitoring wells and a surface water-level gauge station established at the Snake River for a period of at least one year using pressure transducer equipment. These data will be used to further assess short-term and seasonal ground-water levels, flow direction and gradients, and the relationship between changes in Snake River water levels and ground-water flow at the Site.

5.0 RI SAMPLING SCHEDULE AND SUPPLEMENTAL RI/FS REPORTING

The proposed RI sampling, field work, and completion of a Supplemental RI/FS report is estimated to be completed within approximately nine (9) months following receipt of Ecology's concurrence with this RI/FS Workplan. The estimated schedule for field work is based on completion of PSG, borehole drilling, and soil and grab ground-water sampling within approximately six (6) months after receipt of Ecology concurrence. The Supplemental RI/FS is estimated to be completed within approximately two (2) months following completion of RI sampling field work.

The Supplemental RI/FS report will include presentation and evaluation of the RI sampling and ground-water monitoring results, including detailed description of all field activities, summary tables and illustrations of the sampling results, updated Site data maps and CSM, borehole drilling logs, and laboratory analytical reports. Based on evaluation of RI sampling results, the FS Report will include summary of applicable cleanup goals and an assessment of the technical feasibility and cost effectiveness of corrective action alternatives. Additional RI sampling will be recommended, if warranted.

6.0 SELECTED REFERENCES

Azure Environmental and CH2MHill, 2014. 1st Semi-Annual 2014 Ground-Water Monitoring Report, Tesoro Logistics (former Chevron) Pasco Bulk Terminal, Pasco, Washington. August 20.

Azure Environmental, 2014a. Confirmation Sampling Workplan, Tesoro Logistics (former Chevron) Pasco Bulk Terminal, Pasco, Washington. November 12.

Azure Environmental, 2014b. 2nd Semi-Annual 2014 Ground-Water Monitoring Data Transmittal, Tesoro Logistics (former Chevron) Pasco Bulk Terminal, Pasco, Washington. November 24.

Azure Environmental, 2015. 1st Semi-Annual 2015 Ground-Water Monitoring and Exploratory Boring Data Transmittal, Tesoro Logistics (former Chevron) Pasco Bulk Terminal, Pasco, Washington. July 31.

Azure Environmental, 2015a. 2nd Semi-Annual 2015 Ground-Water Monitoring Data Transmittal, Tesoro Logistics (former Chevron) Pasco Bulk Terminal, Pasco, Washington. November 20.

URS and CH2MHill, 2010. RI/FS Workplan for the NWTC Pasco Terminal, Pasco, Washington. April 8.

URS and CH2MHill, 2010. Draft Preliminary Remedial Investigation Report for the NWTC Pasco Terminal, Pasco, Washington. September 22.

URS and CH2MHill, 2011a. Addendum to the Preliminary Remedial Investigation Report for the NWTC Pasco Terminal, Pasco, Washington. February 24.

URS and CH2MHill, 2011b. Remedial Investigation/Feasibility Study Report for the NWTC Pasco Terminal, Pasco, Washington. September 29.

Washington State Department of Ecology, 2011. Guidance for Remediation of Petroleum Contaminated Sites, Publication No. 10-09-057. September.

Washington State Department of Ecology, 2012. Draft Cleanup Action Plan, Chevron Pipeline Company Pasco Bulk Terminal. December.

Washington State Department of Ecology, 2016. Agreed Order No. DE 12989, Tesoro Logistics Pasco Bulk Terminal. March 31st, 2016.

TABLE 1
2015 GROUND-WATER MONITORING DATA - TESORO WELLS
Tesoro Logistics Pasco Terminal
Pasco, Washington

Sample Location	Date Sampled	TPHmo (NWTPH-Rx)	TPHd (NWTPH-Dx)	TPHg (NWTPH-Gx)	Benz-ene	Tol-uene	Ethyl-benzene	Total Xylenes	MTBE	Ethanol	1,2-DCA	Naph-thalene	Well Screen Depth Interval	TOC Elevation	DTW	Elev-ation (MSL)	Change in Elevation
		Ground-Water Sample Analysis Results (ug/l)											**Ground-Water Elevation Data** (feet)				
Tesoro Logistics (former CPL)																	
MW-1		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	73.9 - 93.9	419.40	Dry	--	--
MW-2	6/4/15	<250	140	<250	<0.50	<0.50	<0.50	<1.0	<0.50	<5.0	<0.50	<0.50	63.3 - 83.3	417.28	73.31	343.97	0.72
	9/28/15	<250	<100	<250	<0.50	<0.50	<0.50	<1.0	<0.50	--	<0.50	<0.50			74.42	342.86	-1.11
MW-3	6/4/15	<250	**3,300**	<250	<0.50	<0.50	<0.50	<1.0	<0.50	24.8	<0.50	0.51	74.95 - 94.95	423.42	79.46	343.96	0.72
	9/29/15	<250	**3,300**	733	<0.50	<0.50	<0.50	<1.0	<0.50	--	<0.50	<0.50			80.58	342.84	-1.12
MW-4	6/3/15	<250	<100	<250	<0.50	0.52	<0.50	<1.0	<0.50	<5.0	<0.50	<0.50	56.75 - 76.75	412.09	68.48	343.61	0.69
	9/28/15	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS			69.52	342.57	-1.04
MW-5	Well destroyed May 1987.																
MW-6	6/3/15	<250	<100	<250	<0.50	<0.50	<0.50	<1.0	<0.50	<5.0	<0.50	<0.50	8.5 - 23.5	358.61	16.18	342.43	0.64
	9/28/15	<250	<100	<250	<0.50	<0.50	<0.50	<1.0	<0.50	--	<0.50	<0.50			17.15	341.46	-0.97
MW-7	6/3/15	<250	<100	<250	<0.50	<0.50	<0.50	<1.0	<0.50	<5.0	<0.50	<0.50	57 - 77	411.40	67.48	343.92	0.75
	9/28/15	<250	<100	<250	<0.50	<0.50	<0.50	<1.0	<0.50	--	<0.50	<0.50			68.61	342.79	-1.13
MW-8	6/3/15	<250	<100	<250	<0.50	<0.50	<0.50	<1.0	<0.50	<5.0	<0.50	<0.50	29 - 54	383.91	40.04	343.87	0.74
	9/28/15	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS			41.13	342.78	-1.09
MW-9	Well destroyed May 1987.																
MW-10	6/3/15	<250	<100	<250	<0.50	<0.50	<0.50	<1.0	<0.50	<5.0	<0.50	<0.50	55 - 78	407.91	63.91	344.00	0.77
	9/28/15	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS			65.02	342.89	-1.11
MW-11	6/4/15	<250	<100	<250	<0.50	<0.50	<0.50	<1.0	<0.50	<5.0	<0.50	<0.50	84.5 - 74.5	423.48	79.55	343.93	0.76
	9/29/15	<250	<100	<250	<0.50	<0.50	<0.50	<1.0	<0.50	--	<0.50	<0.50			80.67	342.81	-1.12
MW-12	6/4/15	<250	<100	<250	<0.50	<0.50	<0.50	<1.0	<0.50	<5.0	<0.50	<0.50	33 - 60;	423.65	79.72	343.93	0.73
	Duplicate	<250	<100	<250	<0.50	<0.50	<0.50	<1.0	<0.50	<5.0	<0.50	<0.50	75 - 85		--	--	--
	9/29/15	<250	<100	<250	<0.50	<0.50	<0.50	<1.0	<0.50	--	<0.50	<0.50			80.83	342.82	-1.11
	Duplicate	<250	<100	<250	<0.50	<0.50	<0.50	<1.0	<0.50	--	<0.50	<0.50			--	--	--
MW-13		NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	18.5 - 47.5	--	Dry	--	--
MW-14	6/4/15	<250	<100	<250	<0.50	0.72	<0.50	<1.0	<0.50	<5.0	<0.50	<0.50	27.5 - 53;	421.97	78.04	343.93	0.76
	9/28/15	<250	<100	<250	<0.50	0.72	<0.50	<1.0	<0.50	--	<0.50	<0.50	72.5 - 82.5		79.18	342.79	-1.14
RW-1		Well buried - status unknown											64- 98	417.29	--	--	--
Ecology Criteria[1]		*500*	*500*	*1,000*	*5*	*1,000*	*700*	*1,000*	*20*	*N/A*							

TABLE 1 (cont.)

Sample Location	**Date Sampled**	**Ground-Water Sample Analysis Results** (ug/l)											**Ground-Water Elevation Data** (feet)				
		TPHmo (NWTPH-Rx)	TPHd (NWTPH-Dx)	TPHg (NWTPH-Gx)	Benz-ene	Tol-uene	Ethyl-benzene	Total Xylenes	MTBE	Ethanol	1,2-DCA	Naph-thalene	Well Screen Depth Interval	TOC Elevation	DTW	Elev-ation (MSL)	Change in Elevation
Equipment Blank:																	
EB-0615	6/4/15	<250	<100	<250	<0.50	<0.50	<0.50	<1.0	<0.50	<5.0	<0.50	<0.50					
EB-0915	9/28/15	<250	<100	<250	<0.50	<0.50	<0.50	<1.0	<0.50	--	<0.50	<0.50					

Notes:

(1) Washington Department of Ecology Method A cleanup levels as listed in Table 720-1 of the Model Toxics Control Act, revised October 12, 2007

Concentrations in **bold** exceed Ecology cleanup levels.

May 2014 change in elevations calculated using previous data collected 12/2010.

Equipment blank samples EB-0514 and EB-1014 below reporting limits for all constituents except TBA (15 and 12 ug/l, respectively)

TPHmo = Total Petroleum Hydrocarbons as Motor Oil
TPHd = Total Petroleum Hydrocarbons as Diesel
TPHg = Total Petroleum Hydrocarbons as Gasoline
TOC = Top of casing elevation in feet MSL

DTW = Depth to water
MSL = Mean sea level
NS = Not sampled
-- = Not analyzed

TABLE 2
SUMMARY OF CONFIRMATION GRAB GROUNDWATER ANALYTICAL RESULTS - JUNE 2015
Tesoro Logistics Pasco Terminal
Pasco, Washington

Sample Location	Date Sampled	**Grab Groundwater Sample Analysis Results** (ug/l)									
		TPHg	TPHd	TPHmo	Benzene	Toluene	Ethyl-benzene	Total Xylenes	Naph-thalene	Fuel Oxygenates	Lead Scavengers
MTCA Method A Groundwater Cleanup Levels:		*1,000*	*500*	*500*	*5*	*1,000*	*700*	*1,000*	*160*		
CB-1-Water	6/1/2015	<250	**2,400**	**3,900**	<0.50	<0.50	<0.50	<1.0	<0.50	ND(1)	ND
CB-2-Water	6/2/2015	<250	**3,100**	**4,600**	0.67	<0.50	<0.50	<1.0	<0.50	ND	ND
CB-2-Water2	6/2/2015	<250	**1,200**	**1,700**	0.53	<0.50	<0.50	<1.0	<0.50	ND(2)	ND

Notes:

All results in micrograms per liter (ug/l).

Two grab groundwater samples were collected in succession from boring CB-2: one prior to and one after purging water from the sonic discrete water sampler.

Concentrations in **bold** exceed Ecology cleanup levels.

(1) = 18.5 ug/l ethanol also reported

(2) = 17.3 ug/l ethanol also reported

-- = Not analyzed

ND = Not detected

MTCA = Model Toxics Control Act

TPHg = Total petroleum hydrocarbons as gasoline analyzed by Northwest Method NWTPH-Gx.

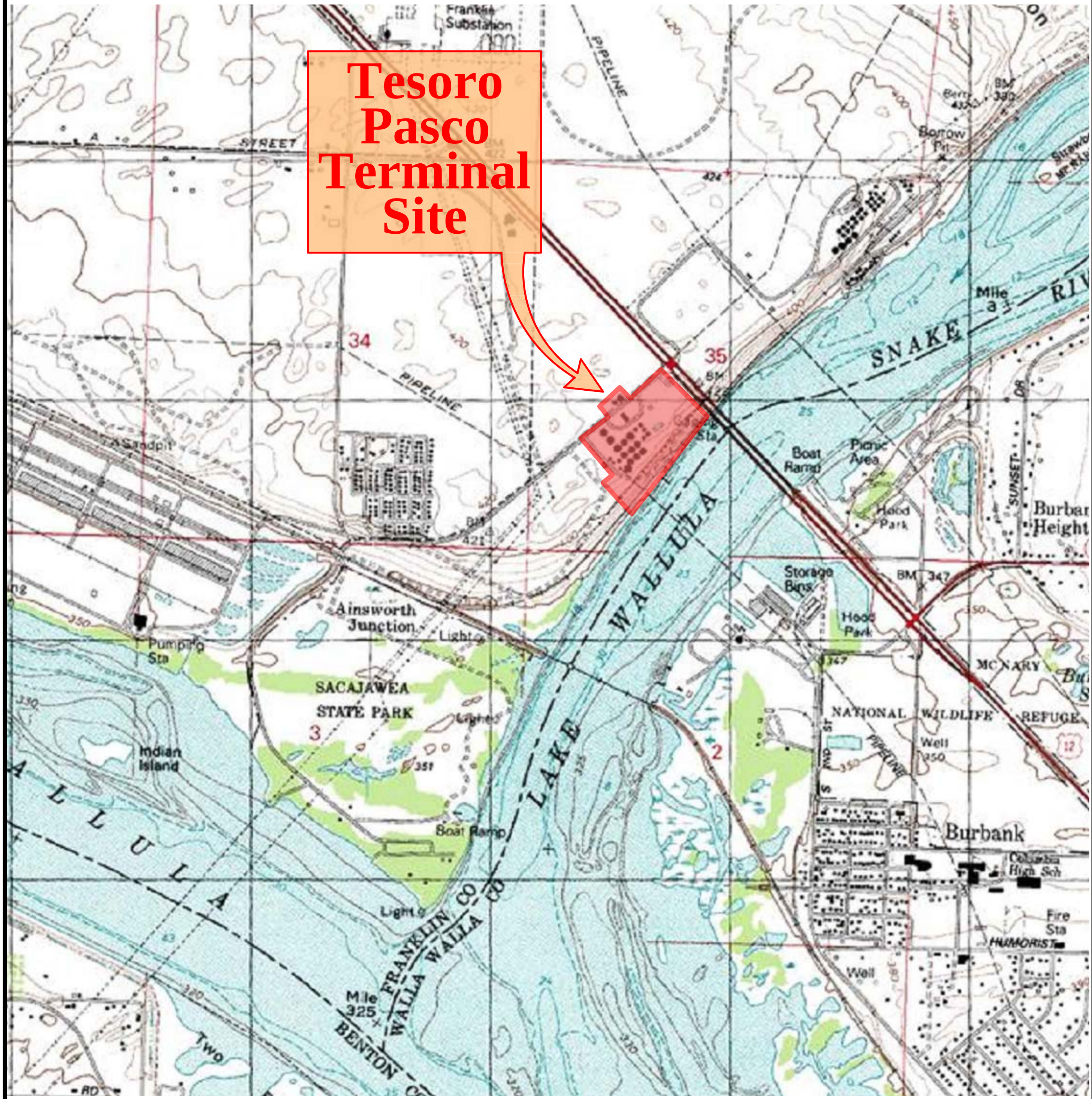
TPHd = Total petroleum hydrocarbons as diesel, analyzed by Northwest Method NWTPH-Dx with silica gel cleanup.

TPHmo = Total petroleum hydrocarbons as motor oil, analyzed by Northwest Method NWTPH-Dx with silica gel cleanup.

BTEX = Benzene, toluene, ethylbenzene, and total xylenes.

Lead Scavengers = EDB, EDC (1,2-DCA)

Fuel Oxygenates = MTBE, DIPE, ETB, TAME, TBA, Methanol, Ethanol

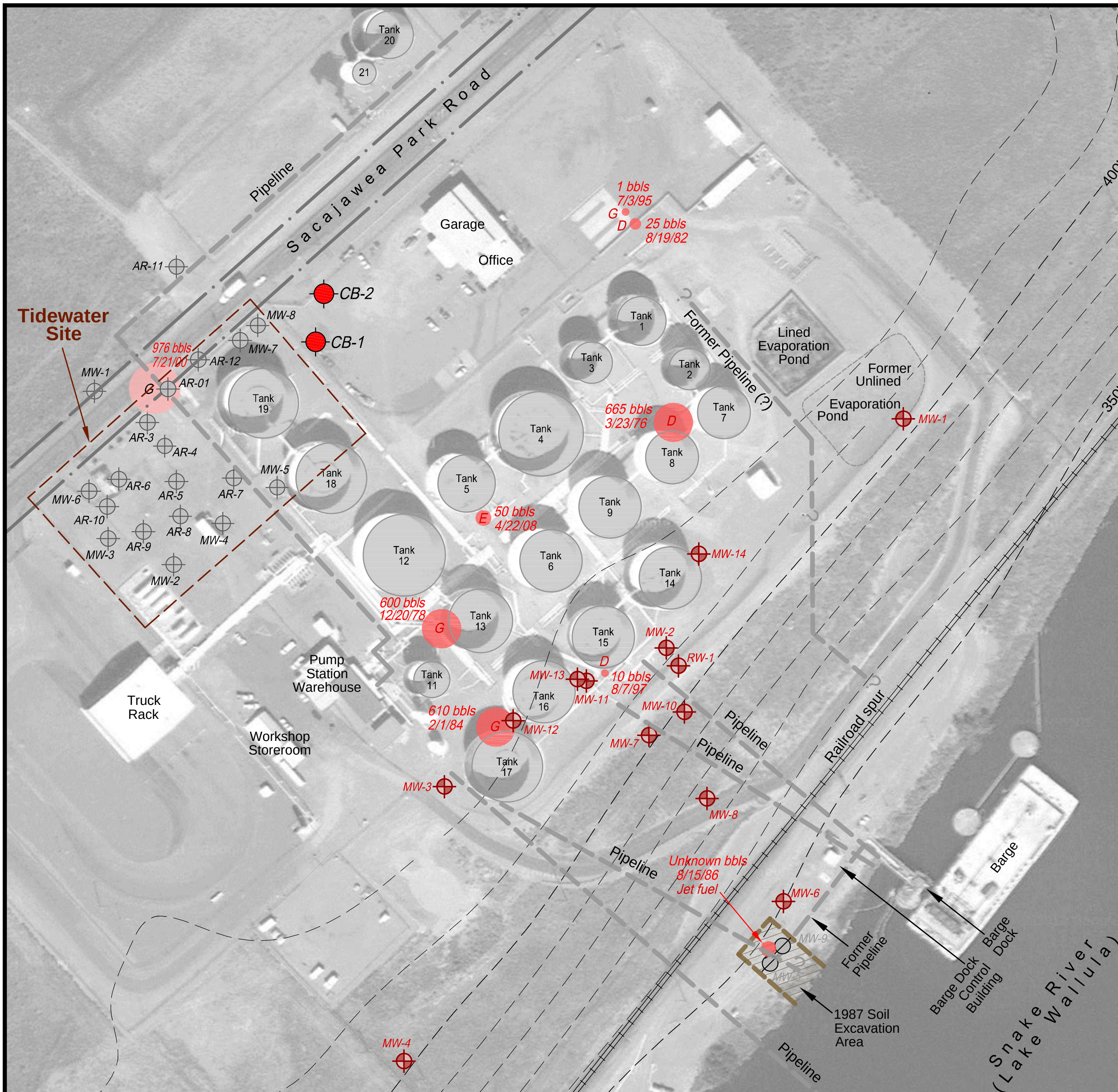


Map Source:
U.S.G.S. Pasco, Washington
1:24,000-scale series (topographic)
1992 edition

0 2,000'

N

CEECON	**SITE VICINITY MAP** Tesoro Pasco Fuel Terminal Site Pasco, Washington	**FIGURE 1** **MAR 2016**



EXPLANATION

- Tesoro well
- Tidewater well
- Former well
- Tesoro boring (6/15)

Previous spill: Number of barrels (circle relative to size of spill) — 610 bbls; Date of spill — 2/1/84; G — Fuel spilled

0 200'

N

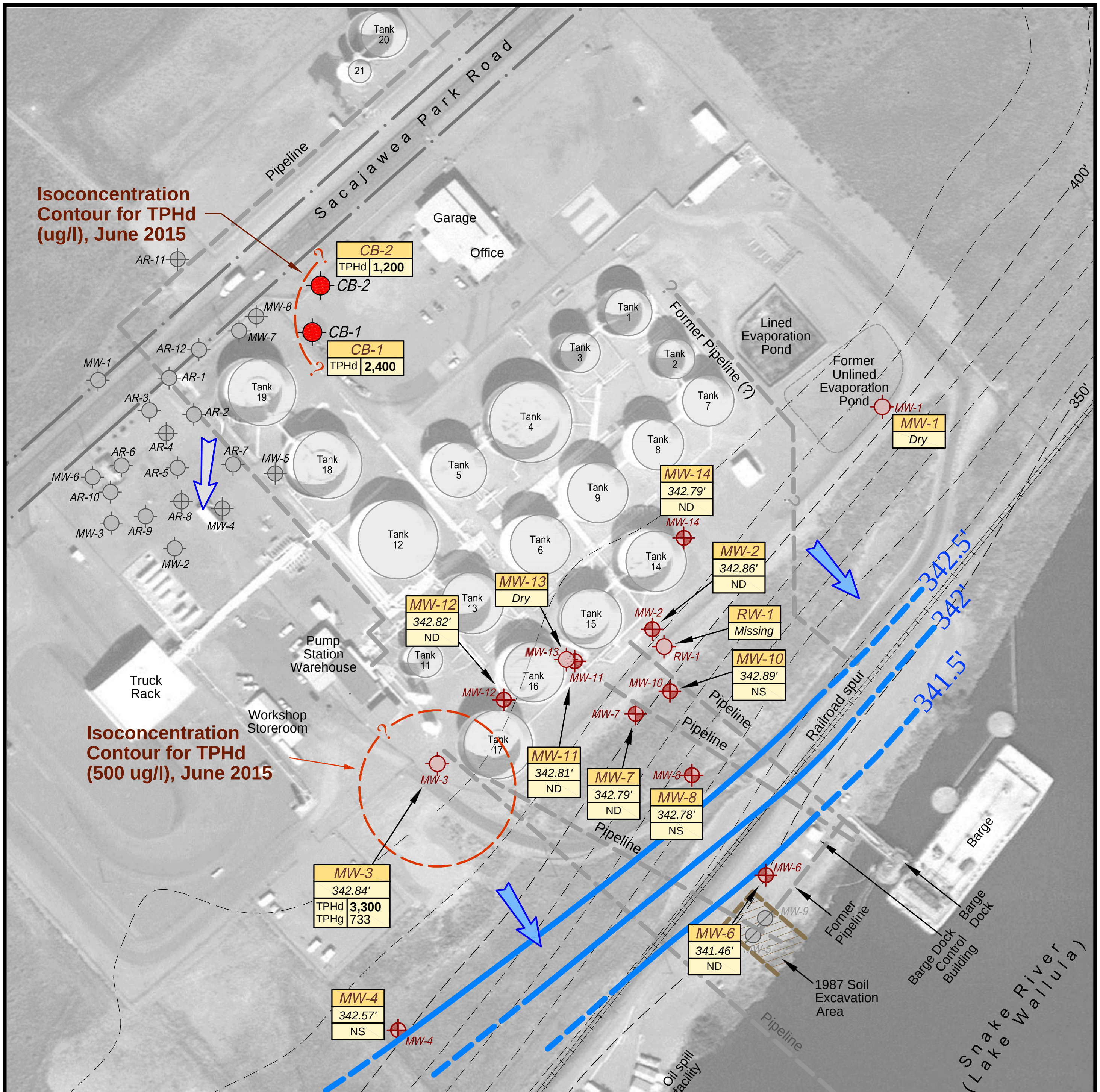
Imagery: earthexplorer.usgs.gov
Site information: URS, 2011, GeoEngineers, 1987

CEECON

AREA MAP
Tesoro Pasco Fuel Terminal Site
Pasco, Washington

FIGURE 2

MAR 2016



EXPLANATION

- Tesoro well
- Tidewater well
- Former well
- Tesoro boring (6/15)

MW-3 — Well name
342.84' — Ground-water elevation (feet MSL) on 9/28/15
TPHd 3,300 / TPHg 733 — Chemical concentration (ug/l)
ND — Non-detect for all constituents
NS — Not sampled

Ground-water flow direction inferred from historical conditions (nearly flat gradient)

Ground-water flow direction near Snake River

Concentrations in **bold** exceed Ecology cleanup levels

342' — Ground-water elevation contour (feet MSL; dashed where inferred)

0 — 200'

N

Imagery: earthexplorer.usgs.gov
Site information: URS, 2011, GeoEngineers, 1987

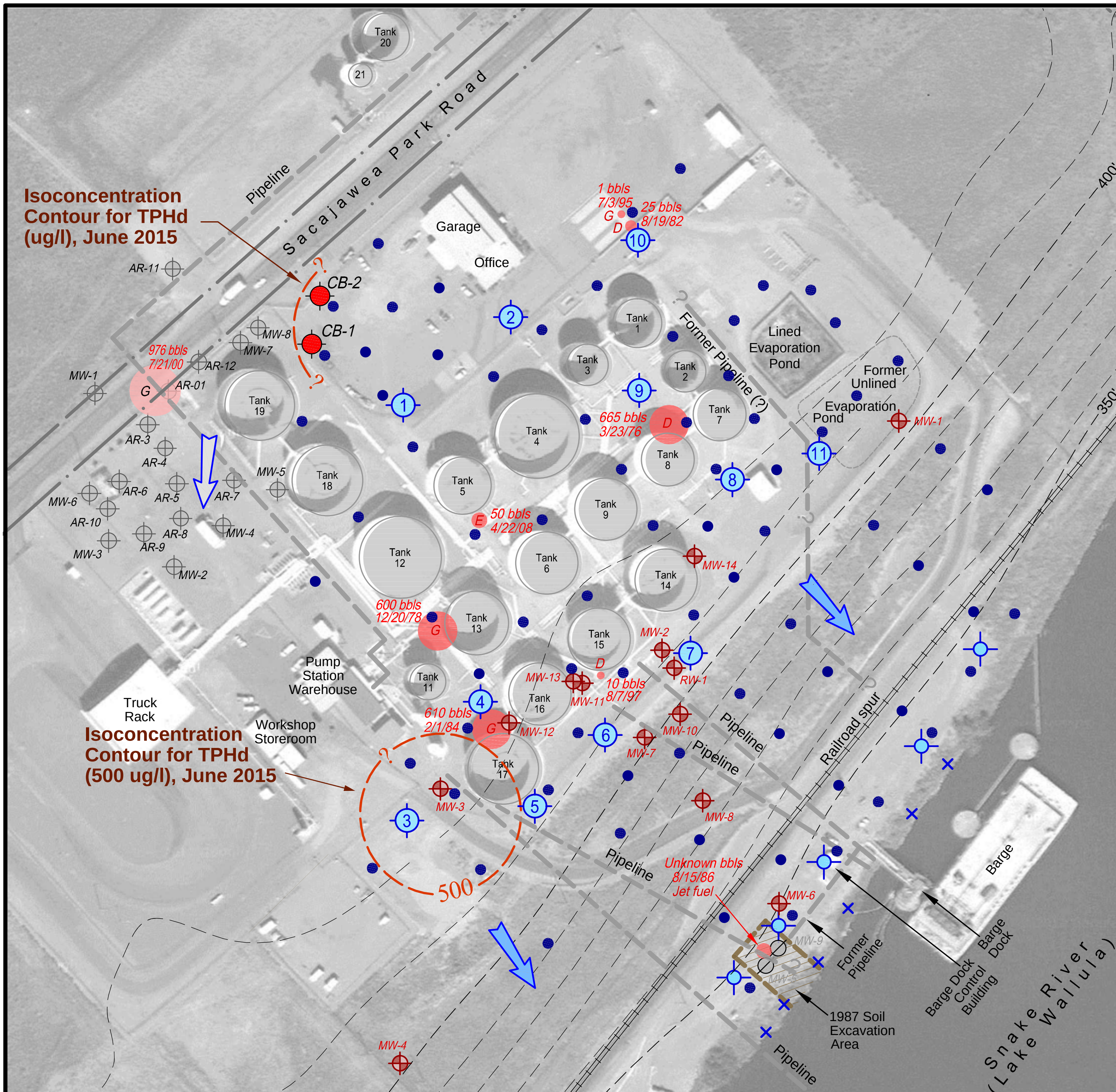
CEECON

2015 GROUNDWATER TPHg/TPHd RESULTS - TESORO WELLS

Tesoro Pasco Fuel Terminal Site
Pasco, Washington

FIGURE 3

MAR 2016



EXPLANATION

- Tesoro well
- Tidewater well
- Former well
- Tesoro boring (6/15)
- Ground-water flow direction inferred from current and historical conditions (nearly flat gradient)
- Ground-water flow direction near Snake River
- Proposed passive soil gas location
- Proposed upland area boring
- Proposed shoreline area boring
- Proposed sediment sample location

Previous spill: Number of barrels (circle relative to size of spill) — 610 bbls 2/1/84 — Date of spill — G — Fuel spilled

0 200'

N

Imagery: earthexplorer.usgs.gov
Site information: URS, 2011, GeoEngineers, 1987

CEECON

PROPOSED RI SAMPLE LOCATIONS
Tesoro Pasco Fuel Terminal Site
Pasco, Washington

FIGURE 4

MAR 2016

APPENDIX A

SITE BACKGROUND INFORMATION, HISTORICAL INVESTIGATION AND MONITORING DATA

APPENDIX A

SITE BACKGROUND INFORMATION, HISTORICAL INVESTIGATION AND MONITORING DATA

The following background and historical summary was prepared using information provided in the URS and CH2MHill document entitled *"Remedial Investigation/Feasibility Study Report"* dated September 29, 2011 ("RI/FS Report"; URS, 2011b) and the Washington State Department of Ecology document entitled *"Draft Cleanup Action Plan"* dated December 2012 ("2012 DCAP"; Ecology, 2012).

A.1 SITE DESCRIPTION AND BACKGROUND

The Site is a bulk fuel terminal facility situated on the north bank of the Snake River (Lake Wallula), with the address of 2900 Sacajawea Park Road in Pasco, Washington (Figures 1 and 2). Chevron Pipeline Company (CPL) operated the facility from 1950 until Tesoro Logistics Operations LLC (Tesoro) purchased the facility in June 2013. Tesoro has retained responsibility to manage the ongoing environmental remediation activities at the Site since the purchase from CPL. Tidewater Terminal Company, Inc. (Tidewater) owns and operates fuel pipelines located on the Site. Tidewater is responsible for managing ongoing environmental remediation activities in the area of a pipeline fuel release that occurred in July 2003 at the northwest corner of the Site.

Regulatory agency actions included placing the Site on the Washington State Hazardous Sites List in August 2000. Ecology issued Agreed Order No. DE 7294 to CPL and Tidewater effective December 4, 2009. Agreed Order No. DE 12989 was issued by Ecology to Tesoro on March 31^{st}, 2016.

The Site consists of approximately 33-acres of land used for transfer and bulk storage of refined fuels that include gasoline, diesel, and jet fuel. Nineteen aboveground bulk storage tanks that vary in storage capacity between approximately 14,000- and 60,000-barrels are present onsite, in addition to eight fuel additive tanks with capacity between 500- and 12,000-gallons. The Site also includes a 23,000-gallon capacity relief tank, underground and aboveground pipelines, rail spur, truck loading rack, barge loading dock, pumping stations, evaporation pond, and terminal office areas. Underground fuel product pipelines that cross the Site include two fuel supply pipelines that originate from Tesoro's Salt Lake City refinery. The pipelines are oriented along a northwest-southeast direction at the Site, with the south pipeline (6-inch diameter) used to transport unleaded gasoline and diesel fuel, and the north pipeline (8-inch diameter) used for jet fuel (Figure 2). Tidewater operates a fuel transfer pipeline that exits the northwest area of the Site, turning northeast along Sacajawea Park Road toward the location of the Tidewater Terminal. Additional pipelines that are no longer in operation were reportedly located at the eastern area of the Site and near the Snake River shoreline (Figure 2). A reported unlined evaporation pond was formerly located adjacent to the current lined evaporation pond at the eastern area of the Site (Figure 2).

The Site is surrounded by unimproved vacant land on three sides with limited, periodic agricultural land use. The Site has relatively flat topography with an elevation of approximately 420 feet above mean sea level (MSL) in the upland bluff area where the aboveground storage tanks and truck loading facilities are located. A relatively steep land slope is present at the southeast area of the Site that drops to a relatively flat and narrow bench area along the Snake River, where the barge loading dock is located. The Snake River (Lake Wallula) surface water elevation is approximately 350-feet MSL, with river flow and lake level controlled by dams.

A.2 HYDROCARBON RELEASE HISTORY

A total of 27 events of fuel hydrocarbon releases from storage tanks, pipelines and loading racks are documented for the Site during the period between 1972 and 2009 (URS, 2011b). The historical releases vary in estimated volumes between a few gallons and approximately 41,000 gallons per event (URS, 2011b). Many of the releases were contained and are not reported to have come in contact with surface soil.

The most significant documented releases occurred in the upland area of the Site, including the following four events: 1) 665 barrels (27,930 gallons) of diesel released from Tank 8 in March 1976; 2) 600 barrels (25,200 gallons) of gasoline released from Tank 13 in December 1978; 3) 610 barrels (25,620 gallons) of gasoline released from Tank 17 in February 1984; and 4) 976 barrels (41,000 gallons) of gasoline released from the Tidewater transfer pipeline in July 2000 (URS, 2011b). The estimated volume of hydrocarbons recovered within a short period following the discovery of these four historic releases varied between approximately 12% and 33% of the estimated volume released in the CPL events, and approximately 85% recovery within a relatively short period following the Tidewater event (URS, 2011). Longer-term remedial actions to address the historical releases were conducted between 1987 and 2003, resulting in further removal of hydrocarbons from the subsurface (see Section A.4).

A.3 REMEDIAL INVESTIGATIONS AND MONITORING DATA

CPL installed a total of fifteen monitoring wells during the period between 1983 and 1989 to investigate impacts to ground water as a result of historical releases at the Site. Ground-water sampling results collected by CPL confirmed petroleum contamination was present, including total petroleum hydrocarbons as gasoline (TPHg), diesel (TPHd), and motor oil (TPHmo); and benzene, ethylbenzene, toluene, and xylene (BTEX) compounds (URS, 2011b). Tidewater installed 20 monitoring wells in 2000 and 2001 to investigate impacts resulting from the pipeline release event discovered in July 2000. Tidewater identified extensive impacts to ground water near the pipeline release area, consisting primarily of TPHg and BTEX compounds (URS, 2011b).

Tesoro (i.e., former CPL) and Tidewater monitoring wells located at the upland area of the Site were generally installed at depths between approximately 75 to 100 feet below grade. Tesoro well MW-6 is the only remaining well located near the river shoreline and was installed to a depth of 23.5 feet. Water-level measurements collected from the upland monitoring wells between November 1986 and May 2014 show the historical depth-to-ground water measured in well MW-2 varied between a high of 71.70 feet (344.87 feet MSL) in March 1988 and low of 75.12 feet below grade (341.45 feet MSL) in September 2002 (Appendix A, Table A-1). Historical ground-water level hydrographs show relatively minor water level changes (i.e., less than approximately 3 feet at well MW-11) at the Site over the period since initial well installation in 1987 (Appendix A, Figure A-1). The water level in the adjacent Snake River is reportedly maintained between 335 and 340 feet MSL (Ecology, 2012).

Historical and most recent water-level data indicate the general direction of ground-water flow is southeast in the direction toward the Snake River in the area of the Tesoro wells. Though the historical gradient is essentially flat in the area of the Tidewater wells, the inferred ground-water flow direction based on current and historical conditions is toward the south. Data from the most recent joint monitoring event conducted on May 28, 2014 show the calculated horizontal ground-water gradient varies across the Site, with a nearly flat gradient (i.e., less than 0.0002 ft/ft) in the area of the Tidewater wells and Tesoro wells on the upland bluff above the Snake River. In the area of the Tesoro wells located on the steeply sloping land surface between the upland bluff and the Snake River, the calculated horizontal ground-water gradient is approximately 0.008 ft/ft. These data are generally consistent with historic reports of potentiometric data and interpretations of ground-water flow direction and gradients at the Site.

Geologic cross sections presented in the RI/FS Report (see Figures 6 and 7 in URS, 2011b) were constructed using lithologic data from well borings installed at the Site. These data indicate the entire interval of vadose-zone (i.e., depth interval between ground surface and approximately 75feet below grade) and saturated-zone sediments to a depth of approximately 100 feet is reported to consist of relatively coarse-grained sand and sandy gravel sediments. The relative amount of gravel is reported to generally increase with depth at the Site (URS, 2011b). These data also indicate the water table aquifer is monitored by the Site wells and is characterized by unconfined conditions.

Ground-water investigations and monitoring to assess the extent and distribution of petroleum impacts to ground water were conducted on behalf of CPL and Tidewater, and are presented in the RI/FS Report (URS, 2011b). Most recent joint ground-water monitoring data were collected on behalf of Tesoro and Tidewater in May 2014 and are presented in the Azure Environmental and CH2MHill document *"1st Semi-Annual 2014 Ground-Water Monitoring Report"* dated August 20, 2014 (Azure/CH2MHill, 2014). No soil sample or soil laboratory analytical data for the CPL well borings are presented in the RI/FS Report and do not appear to have been collected (URS, 2011b).

Semiannual ground-water monitoring was conducted by Tesoro in June and September, 2015. Additionally, soil and grab ground-water sampling data were collected by Tesoro in June 2015 to investigate whether Tidewater's TPHg plume is commingled with Tesoro's plume (primarily TPHd) in the area peripheral to Tidewater monitoring wells MW-7 and MW-8 (Figure 2).

Results of remedial investigation and ground-water monitoring completed at the Tesoro Site (i.e., former CPL) through September 2015 (Appendix A, Table A-1) include the following:

- Initial reports of petroleum hydrocarbon impacts included detection of separate-phase hydrocarbons (SPH) at well MW-2 and observation of sheen on surface water along the Snake River shoreline in July 1986.
- More than a trace amount of SPH or sheen was reported at one or more of the following wells during the period between 1986 and 2003: MW-2, MW-3, MW-6, MW-7, MW-8, MW-10, MW-11, and MW-12.
- The greatest thickness of SPH measured in a well was approximately four (4) feet recorded at MW-4 in 1991.
- Remedial activities that included soil excavation and ground-water pumping, product removal, and SVE/AS remedial system operations were completed between January 1987 and July 2000 (see Section A.4 below).
- SPH have not been reported at any well since 2003, though trace free product was reported at well MW-3 in June and December 2010.
- The highest historical concentrations of the following hydrocarbon constituents were reported during the period 1983 to 2002:

    - TPHg at 48,600 µg/l (MW-3 in March 2000)
    - TPHd at 1,165,000 µg/l (MW-3 in March 2000)
    - benzene at 430 µg/l (MW-12 in November 1990)
    - toluene at 1,050 µg/l (MW-11 in January 1989)
    - ethylbenzene at 700 µg/l (MW-11 in January 1989)
    - total xylenes at 2,900 µg/l (MW-11 in February 1991)

- The highest concentrations of the following hydrocarbon constituents were reported during the period between 2002 and 2010:

    - TPHg and BTEX were below laboratory reporting limits
    - TPHd at 3,600 µg/l (MW-2 in June 2010)
    - TPHmo at 4,200 µg/l (MW-11 in July 2005)

- Most recent September 2015 monitoring results show relatively low concentrations of TPHd (3,300 µg/l) and TPHg (733 µg/l) at well MW-3, and were the only constituents reported in ground-water samples collected from the wells.

- September 2015 ground-water monitoring data indicate the estimated extent of petroleum hydrocarbons at concentrations exceeding the MTCA Method A cleanup levels appears limited to the immediate area within approximately 150 feet of well MW-3.

- June 2015 soil sample data from confirmation borings CB-1 and CB-2 show petroleum hydrocarbons were essentially not reported at concentrations above laboratory reporting limits at both boring locations (Appendix A, Table A-3). These data confirm the absence of commingling of hydrocarbons between the Tesoro and Tidewater sites, and the lack of a potential source of hydrocarbon release in the general area of the Tesoro site where the borings are located.

- June 2015 grab ground-water sample data from borings CB-1 and CB-2 show TPHd (up to 3,100 µg/l) and TPHmo (up to 4,600 µg/l) were reported at both borings (Table 2).

- June 2015 grab ground-water sample data show TPHg results below laboratory reporting limits (i.e., <250 µg/l) at both borings (Table 2). These data confirm Tidewater's TPHg plume is not commingled with the Tesoro TPHd plume at the boring locations.

- Graphic illustration of TPHg, TPHd and TPHmo concentrations over time at wells MW-2 and MW-12 show generally overall declining and fluctuating concentration trends during the monitoring period between 1987 and 2015 (Appendix A, Figures A-2 and A-3).

- Declining hydrocarbon concentrations and natural attenuation data (i.e., electron receptors) indicate biodegradation of petroleum hydrocarbons in ground water is occurring. Petroleum hydrocarbon concentrations in ground water are also expected to decrease as a result of other natural attenuation processes (i.e., dispersion, dilution, adsorption, and volatilization).

A.4 REMEDIAL ACTION SUMMARY – TESORO (FORMER CPL) FACILITY

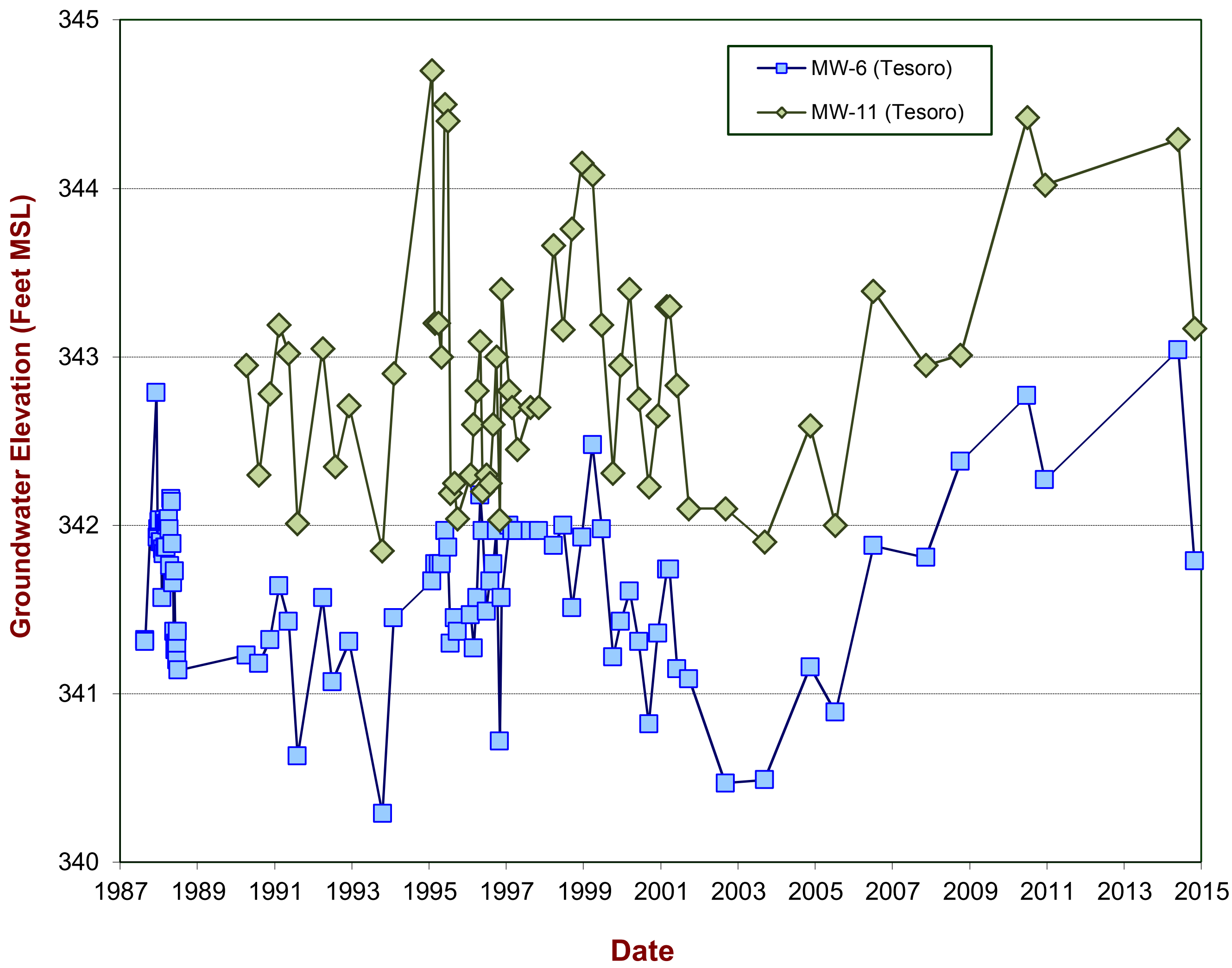
- Remedial soil excavation and ground-water pumping activities were conducted in May 1987 to remove jet fuel impacted soil and ground water along the Snake River shoreline area. The excavation and pumping activities were conducted in response to observation of a hydrocarbon sheen on surface water along the Snake River shoreline in July 1986 and subsequent discovery of a leaking underground pipeline located near the area of the sheen. Approximately 1,900 cubic yards of impacted soil were reported excavated and the excavation backfilled with clean soil; an undisclosed quantity of impacted ground water was pumped from well MW-5. A pumping system, oil/water separator, and water infiltration gallery operated from January to April, 1987.

- A product skimmer was installed in well MW-2 in December 1987, was moved to well MW-3 in September 1992 and was reportedly operated until October 1993; an undisclosed quantity of product was removed from the wells.

- An on-site ground-water supply well was removed from the site in May 1989.

- Two separate SVE systems were installed in October 1989 and operated with various well configurations until July 2000. SVE wells included MW-2, MW-3, MW-7, MW-10, MW-11, MW-12 and MW-13. SVE monitoring data show removal of an estimated 258,000 pounds (41,500 gallons) of petroleum hydrocarbons from vadose-zone soil during the period between October 1989 and approximately February 1993.

- Air sparging was conducted from September 1992 until July 2000 for varying durations at wells MW-2, MW-3, MW-11 and MW-12.



TESORO

Note:
MSL = Mean Sea Level

CEECON

UPDATED HYDROGRAPHS
Tesoro Pasco Fuel Terminal Site
Pasco, Washington

FIGURE A-1

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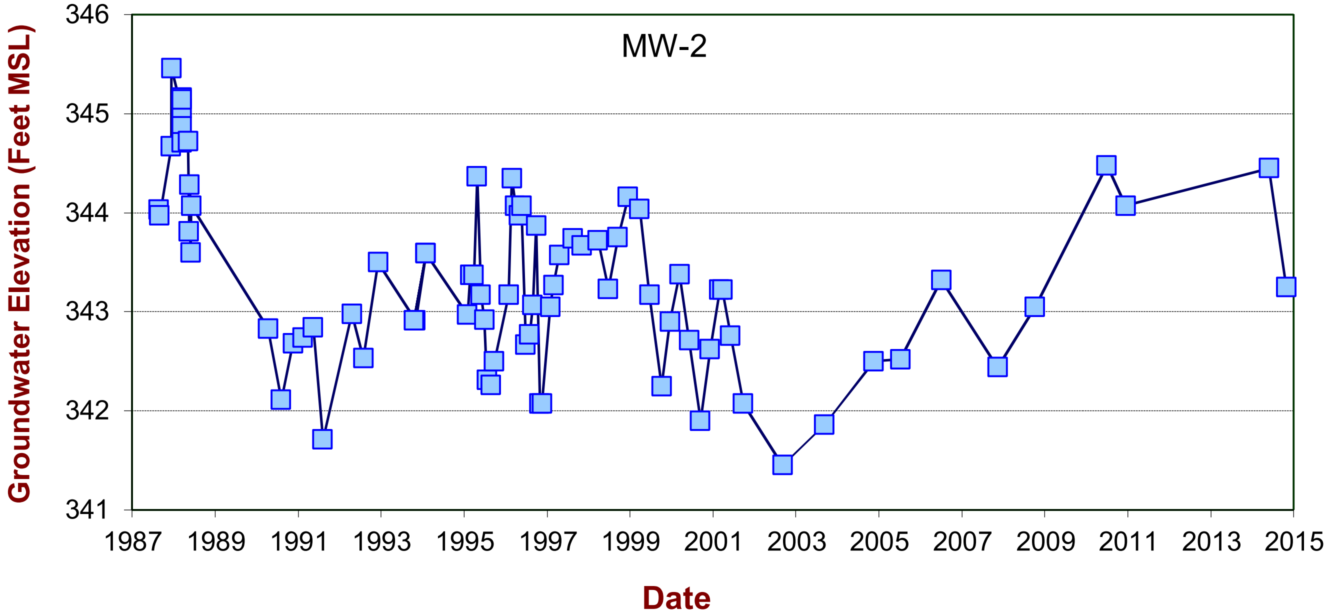

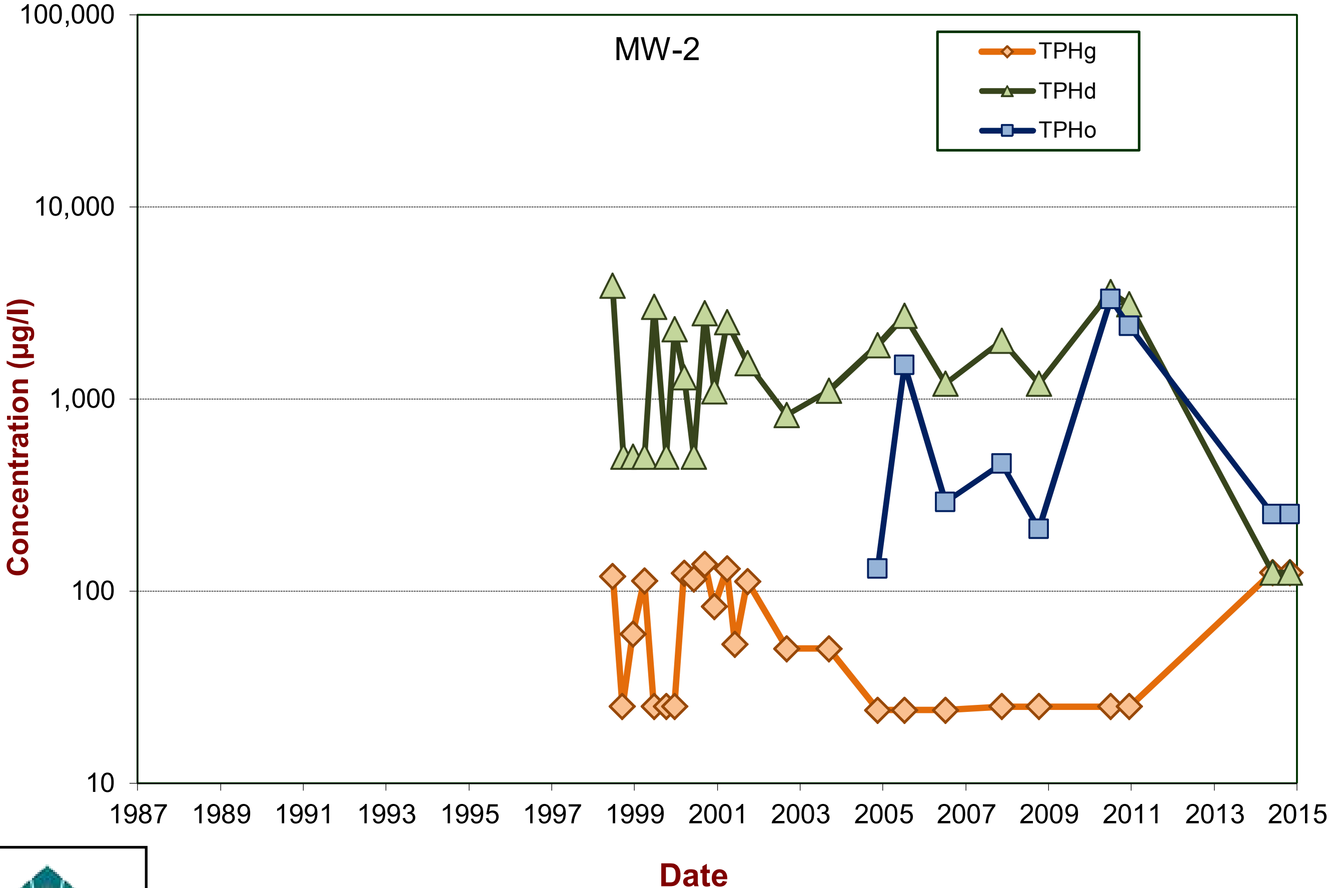

TESORO

Notes:
MSL = Mean Sea Level
µg/l = Micrograms per liter

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TPH CONCENTRATIONS vs. TIME FOR MW-2
Tesoro Pasco Fuel Terminal Site
Pasco, Washington

FIGURE A-2

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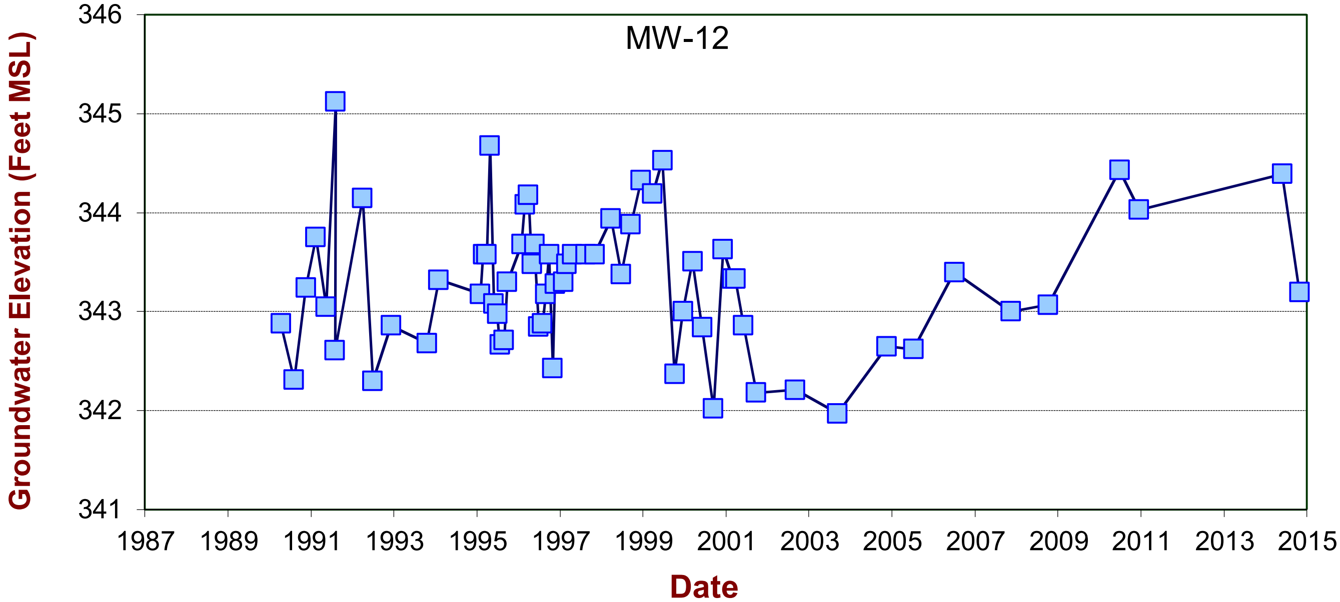

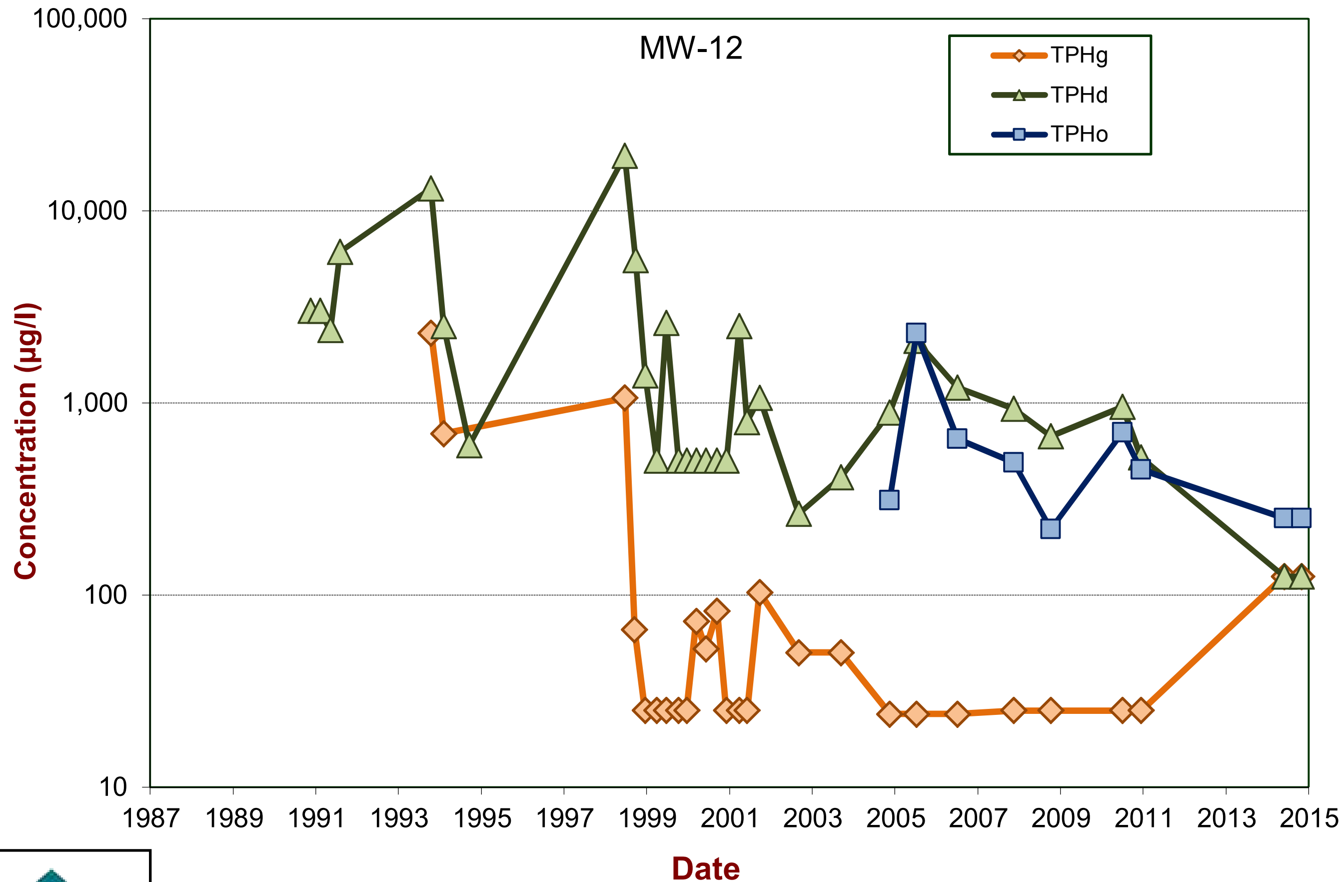

TESORO

Notes:
MSL = Mean Sea Level
µg/l = Micrograms per liter

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TPH CONCENTRATIONS vs. TIME FOR MW-12

Tesoro Pasco Fuel Terminal Site

Pasco, Washington

FIGURE A-3

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APPENDIX B

SAMPLING AND ANALYSIS PLAN

APPENDIX B
SAMPLING AND ANALYSIS PLAN

For

SUPPLEMENTAL RI/FS WORKPLAN

At

Former Chevron Pipe Line Company Pasco Bulk Terminal
2900 Sacajawea Park Road, Pasco, Washington
Facility Site ID: 55763995; Cleanup Site ID: 4867

March 31st, 2016

Prepared for:

Tesoro Logistics Operations LLC
3450 S. 344th Way #201
Auburn, WA 98001

TESORO

CEECON Testing, Inc.
434 North Canal Street, Suite Six
South San Francisco, CA 94080

APPENDIX B
SAMPLING AND ANALYSIS PLAN

B1.0 FIELD SAMPLING AND TESTING PLAN

B1.1 Passive Soil Gas Sampling

Passive soil gas (PSG) sampling is proposed at as many as eighty (80) locations with the objective to obtain a surficial representation of the presence and relative concentration distribution of subsurface volatile and semivolatile hydrocarbon vapor across the Site (Figure 4). The proposed PSG survey design includes an approximate 100-foot sampling grid, with sample locations concentrated around areas of known hydrocarbon contamination in ground water, historic documented spills, hydrocarbon handling/storage facilities, which include above-ground storage tanks and evaporation ponds, and along the Snake River shoreline. The final number and locations of the PSG sampling locations will be determined in the field and may be significantly altered from the proposed locations shown on Figure 4 due to restrictions posed by limited access, underground utilities, terminal facility equipment and operations, and general safety concerns.

A survey of underground utilities will be conducted by a private underground utility locator and utility providers will be contacted via the "One Call" utility notification service to clear the sampling locations. The PSG survey will be conducted using a BESURE Sample Collection Kit™ provided by Beacon Environmental Services, Inc. (BEACON) of Forest Hill, Maryland (www.beacon-usa.com). Each PSG sampling device, consisting of hydrophobic adsorbent cartridges attached to a retrieval wire, will be installed to a depth of approximately one-foot within a small-diameter hole drilled to a depth of approximately three feet below grade at each location. The sample drill holes will be advanced using hammer drill and/or small diameter hollow-stem auger equipment at each sample location. At locations where the ground surface consists of base rock, gravel, or asphalt/concrete materials, the PSG sampler will be installed in soil at a depth approximately one-foot below the base of those materials. Additionally, a metal sleeve will be installed to case off materials in the upper portion of the drill hole. After the PSG sampler is emplaced, the hole will be sealed at the surface with an aluminum foil plug and covered with soil or thin concrete patch. The samplers will be left in place for approximately seven to 14 days, and then retrieved for shipment to BEACON's analytical laboratory. The PSG samples will be placed in sealed shipping containers after sample collection for transport to the laboratory under chain-of-custody procedures.

Quality assurance/quality control (QA/QC) samples will not be collected during field activities, because the BESURE Sample Collection Kits cannot provide duplicate samples, and installing two BESURE Sample Collection borings next to each other may alter the field results.

The PSG samples will be analyzed at BEACON's analytical laboratory for target compounds that include TPH C4-C9, TPH C10-C19, and BTEX compounds using EPA Method 8260C.

B1.2 Soil and Grab Ground-Water Sampling

Soil and grab ground-water sampling is proposed at sixteen (16) exploratory borings shown on Figure 4. The final number and locations of the borings may be altered based on results of the PSG survey, in addition to restrictions posed by limited access, underground utilities, terminal facility equipment and operations, and general safety concerns. Boring permits will be obtained from Ecology prior to drilling. A survey of underground utilities will be conducted by a private underground utility locator and utility providers will be contacted via the "One Call" service to clear the boring locations for drilling access.

The borings are planned to be drilled using truck-mounted sonic or Geoprobe drilling equipment. Borings 1 through 11 in the upland area of the Site will be drilled to depths approximately 85-feet below grade to collect grab ground-water samples from the water table zone at depths comparable to the screen interval depths in nearby upland area monitoring wells. The five (5) shallow borings along the Snake River shoreline will be drilled to approximately 20-feet below grade to collect grab ground-water samples from the top of the saturated-zone interval monitored at nearby Tesoro well MW-5 (Figure 4).

Soil core samples for lithologic description and laboratory analysis will be collected from the borings using 10-foot length continuous sonic core samplers advanced to the total depth of each boring. In the event that Geoprobe drilling equipment is utilized, soil core samples may be collected at approximately 10-foot intervals using a lined, split spoon type sampler. The soil cores from the borings will be used for lithologic description and to collect photoionization detector (PID) readings to select soil samples for laboratory analysis. The soil cores will be field screened for petroleum hydrocarbon vapor using PID equipment and samples showing elevated readings on the PID will be selected for laboratory analysis. The samples selected for laboratory analysis will be removed from the core and placed in glass sample jars sealed by placing thin Teflon sheeting over the jar opening prior to sealing the jar with a screw-top lid. The soil sample containers will be labeled according to Ecology's Environmental Information Management (EIM) system guidelines. The sample containers will be placed in a chilled cooler immediately after sample collection for transport to the laboratory under strict chain-of-custody procedures.

Ground-water sampling equipment will be advanced in each boring to collect ground-water samples at the specified target depth interval, estimated at approximately 80- to 85-feet below grade in borings 1 through 11, and 15- to 20-feet below grade in shallow borings along the Snake River (Figure 4). The ground-water samples will be collected in a clean bailer lowered through the sonic equipment drill casing or through temporary small-diameter PVC casing lowered into the drill rods of Geoprobe drill equipment. Ground-water samples will be poured from the sample bailer into laboratory-provided sample bottles prepared with specified sample preservation, and all sample bottles will be labeled according to Ecology's EIM guidelines. The samples will be placed in a chilled cooler for transport to the analytical laboratory under strict chain-of-custody procedures. After collecting the samples, the boreholes will be sealed using hydrated bentonite chips and the ground surface restored using replacement materials (i.e., base gravel, asphalt or cement patch). All drilling activities will be conducted under the direction of a Washington-Licensed Geologist.

Soil and grab ground-water samples will be analyzed at a Washington-State certified laboratory for TPHg, TPHd and TPHmo using Northwest Method NWTPH-Gx/Dx/Rx; and BTEX compounds, fuel oxygenates, naphthalene and lead scavengers using EPA Method 8260B.

B1.3 Well Installation

Determination to install a monitoring well in one or more of the proposed exploratory borings will be made in the field at the time of borehole drilling and sampling. Decision criteria used by Tesoro and field personnel to install a monitoring well(s) include observation or field instrument detection of significant levels of hydrocarbons in soil and/or ground water while sampling the boring(s). Ecology staff will be notified by field personnel at the time of drilling in the event a monitoring well is planned to be installed in any of the exploratory borings.

Well permits will be obtained from Ecology in the event that monitoring well(s) are installed in the exploratory borings. The monitoring wells will be constructed to optimize collection of collection of ground-water samples from the top of the saturated zone (i.e., approximately 80- to 85-feet below grade). The total depth of the monitoring wells is estimated at approximately 90-feet below grade, with an approximate 15- or 20-foot length of perforated 0.020-inch diameter polyvinyl chloride (PVC) Schedule 40 well screen installed at the bottom of the well.

A sand filter pack will be placed in the annular space from the bottom of the well boring to approximately 2-feet above the well screen interval. Above the sandpack interval, an approximate 2-foot seal of bentonite will be placed, then a seal of neat cement will be placed in the annular space to within approximately two-feet of ground surface in the completed well. Stand-up stove pipe well enclosures will be installed at the wells and top-of-casing elevation and horizontal coordinates of the wells will be established by survey. Well installation activities will be conducted under the direction of a Washington-Licensed Geologist.

B1.4 Well Development

The newly-installed wells will be developed no sooner than 48 hours after completing well installation activities. The wells will be developed by pumping, bailing and/or surging the well to remove sediment from around the screened interval and enhance hydraulic communication with the surrounding formation. Ground-water parameters (pH, specific conductance, dissolved oxygen [DO] and temperature) will be recorded during well development.

B1.5 Monitoring Well Ground-Water Sampling

The wells will be sampled using low-flow sampling methods. Prior to sampling each well, ground water will be purged using a low-flow pump and dedicated polyethylene tubing to purge the wells at a flow rate of less than approximately 400 ml/minute. During well purging by low-flow pumping, prior to sampling purge water will be pumped to a flow-through cell and continuous measurements of water quality parameters (including pH, specific conductance, DO, oxidation-reduction potential [ORP] and temperature) will be monitored and recorded on field sampling data sheets. Ground-water levels in each well will be measured to the nearest 0.01 feet during low-flow pumping using an electric water-level meter and recorded on the field logs. The wells will be sampled after a minimum of three consecutive readings indicate water quality parameters and water levels have stabilized during low-flow purging. Prior to sampling, the flow-through cell will be disconnected and ground-water samples will be directed from the low-flow purge tubing into laboratory-provided sample bottles. The sample bottles will meet specified sample preservation requirements and will be labeled according to Ecology's EIM guidelines. The samples will be placed in a chilled cooler for transport to the analytical laboratory under strict chain-of-custody procedures.

Quality assurance/quality control (QA/QC) samples will be collected during field activities to assess the quality of the data from sampling. Duplicate samples will be collected immediately after the primary sample using the same equipment and procedure. Approximately ten percent of the samples for each analytical method will be duplicate samples. An equipment blank will be collected and analyzed to detect potential cross-contamination of sampling equipment used at more than one sampling location. Additionally, a trip blank and/or field blank will be collected and analyzed to evaluate the potential for introduction of contaminants between sample containers during shipping and handling of the samples. Quality assurance/quality control samples will be submitted with samples to the analytical laboratory under the same documentation and custody procedures as the original samples they will accompany.

Ground-water samples from the wells will be analyzed by a Washington-state certified analytical laboratory for TPHg, TPHd and TPHo using Northwest Method NWTPH-Gx/Dx;

and BTEX compounds, fuel oxygenates, naphthalene and lead scavengers using EPA Method 8021B/8260B.

B1.6 Water-Level Measurement

Water-level measurements will be collected from the wells prior to sampling to obtain data of ground-water flow direction and gradients at the Site. Depth to ground-water measurements from the top of well casing at each well will be collected to the nearest 0.01 feet using an electric water-level meter and recorded on field sampling data sheets.

B1.7 Drilling and Sampling Waste Management

Drilling waste soil generated during field activities will be securely stored on-site in 55-gallon drums. Results of drummed soil sample analyses will be reviewed and appropriate disposal facilities contacted to arrange for transport and disposal of the waste materials. Purge water generated during ground-water sampling will be disposed on-site at the Pasco Terminal waste water treatment system.

B1.8 River Shoreline Sediment Sampling

Sediment sampling along the Snake River shoreline is proposed at up to six (6) accessible locations. The river shoreline is lined with large rock rip-rap fill, and preliminary approximate sampling locations are shown on Figure 4. The final number and locations of the sediment samples will be determined after inspecting the length of shoreline that extends between the underground fuel pipelines and the former unlined evaporation pond and determining accessible areas for shoreline sediment sampling (Figure 4). The shoreline will be inspected at the approximate time of the daily low water level on the Snake River to check for potential ground-water seeps and the sediment sample locations adjusted to target any observed seeps.

The sediment samples will be collected at depths less than one-foot below surface grade using hand trowel and/or hand auger equipment. The samples will be field screened for petroleum hydrocarbon vapor using PID equipment. Samples showing elevated readings on the PID, if any, will be selected for laboratory analysis. The sediment samples will be placed in a chilled cooler immediately after collection for transport to the laboratory under strict chain-of-custody procedures. The samples will be analyzed at a Washington-state certified analytical laboratory within specified holding times for TPHg, TPHd and TPHmo using Northwest Method NWTPH-Gx/Dx/Rx; and BTEX compounds, fuel oxygenates, naphthalene and lead scavengers using EPA Method 8260B.

B1.9 Continuous Water-Level Measurement

Ground-water levels will be collected to assess ground-water flow direction and gradients on a semi-annual schedule as part of the proposed ground-water monitoring program. The ground-water monitoring program will include continuous water-level measurement at three selected monitoring wells and a surface water-level gauge station established at the Snake River for a period of at least one year using pressure transducer equipment. These data will be used to further assess short-term and seasonal ground-water levels, flow direction and gradients, and the relationship between changes in Snake River water levels and ground-water flow at the Site.

B1.10 Project Schedule and Organization

Implementation of RI field work will begin within 60 days after receiving Ecology's written approval of the RI/FS Workplan. The field work is estimated to be completed within approximately six (6) months after initial implementation. Field work is anticipated to begin with the PSG survey, which is estimated to be completed within approximately four weeks. After obtaining and evaluating the PSG sampling results, borehole drilling for soil and grab ground-water sampling is estimated to require approximately six weeks to complete. Shoreline sediment sampling will be completed concurrent with the borehole drilling program. A monitoring well sampling event is estimated to take approximately 2 to 4 days to complete and will be conducted following completion of the drilling program. Continuation of the ground-water monitoring program will be conducted on a semiannual schedule.

Michael Hodges of CEECON Testing, Inc. (CEECON) will be the Project Manager (PM) for all field tasks performed for the RI/FS Workplan. The PM will have overall responsibility for planning, scheduling, coordinating and implementing the activities specified in the RI/FS Workplan.

APPENDIX C

QUALITY ASSURANCE PROJECT PLAN

APPENDIX C

QUALITY ASSURANCE PROJECT PLAN

For

SUPPLEMENTAL RI/FS WORKPLAN

At

Former Chevron Pipe Line Company Pasco Bulk Terminal
2900 Sacajawea Park Road, Pasco, Washington
Facility Site ID: 55763995; Cleanup Site ID: 4867

March 31st, 2016

Prepared for:

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Table of Contents

APPENDIX C
QUALITY ASSURANCE PROJECT PLAN

C1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) has been prepared for the Supplemental Remedial Investigation – Feasibility Study (RI/FS) Workplan (Workplan) for the Former Chevron Pipe Line Company Pasco Bulk Terminal located at 2900 Sacajawea Park Road in Pasco, Washington (Site). CEECON Testing, Inc. (CEECON) will implement this QAPP in conjunction with the Workplan and Sampling and Analysis Plan (SAP) (Appendix B of the Workplan). The Workplan contains a summary of the work to be performed for evaluation of environmental conditions at the Site for RI/FS for future remediation work. The SAP contains a description of the field procedures and sampling protocols to be used in implementing the Workplan and was prepared in accordance with the Washington State Department of Ecology (Ecology) *Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies dated July 2004* (Publication No. 04-03-030 and Revision of Publication No. 01-03-003).

This QAPP outlines the policy, organization, and functional activities for the corporate Quality Control (QC) and Quality Assurance (QA) programs which have been instituted to ensure the field data are collected according to approved procedures, to detect deficiencies which may affect data quality and usability, and to provide corrective actions when appropriate. The corporate QC procedures were developed to ensure the orderly and reliable collection of reproducible field data; the orderly and consistent analyses of field data; the orderly development of conclusions, future actions, and costs based on the data analyses; and the review and input of senior staff at appropriate steps in the development of a project. The corporate QA procedures were developed to create an independent system to test, verify, and document the corporate QC procedures are being followed and a system to document and cure deviations from acceptable QC procedures.

C2.0 PROJECT ORGANIZATION AND RESPONSIBLITIES

This section contains the organizational structure, levels of authority, and lines of communication for QA/QC activities. CEECON's organization of the Site project includes the following key positions: Project Principal; Project Manager; Technical Coordinator; Field Team Leader; Corporate Health and Safety Officer (CHSO) and QA Manager. Beacon Environmental Services (BEACON) and Test America, Inc. will designate a Laboratory QC Manager. The roles and responsibilities for these individuals are presented below.

C2.1 Project Principal

The Project Principal is responsible for the overall success of the Project's objective and ensures the needs of the client are met. The Project Principal will communicate regularly with the Project Manager and the client and will provide status reports to the Executive Management Team as needed.

C2.2 Project Manager

The Project Manager is responsible for the day-to-day activities and implementing the additional characterization Workplan in accordance with the QAPP. The Project Manager will use the QAPP as the primary guidance document in maintaining the overall integrity of the QA/QC program for the additional characterization work. The Project Manager will review QA reports and implement necessary modifications to ensure compliance with the QAPP.

C2.3 Technical Coordinator

The Technical Coordinator reports to the Project Manager and ensures the individual tasks completed under the additional characterization Workplan are completed in compliance with the QAPP and support the Project objectives and contractual commitments. The Technical Coordinator provides direction and assistance to the Field Team Leader in establishing, implementing, and verifying compliance with the QAPP. The Technical Coordinator verifies overall compliance technical procedures, reviews and approves field and laboratory QA deliverables, and performs laboratory data validation to verify the validity and usability of analytical data. The position has the authority and organizational freedom to identify problems, initiate or provides solutions, verify implementation of solutions, and in coordination with the Program Manage, to stop work, if necessary.

C2.4 Field Team Leader

The Field Team Leader will be responsible for implementation of the field work under the additional site characterization Workplan. The Field Team Leader reports to the Technical Coordinator and communicates regularly with the Technical Coordinator during field activities to provide timely reports on the status of field activities and to request assistance and guidance as necessary in making field work and Workplan modifications. The Field Team

Leader will coordinate subcontractor activities at the site, the proper handling and shipment of all samples, and the schedule from pick up or delivery of samples by the laboratory.

C2.5 Corporate Health and Safety Officer

The Corporate Health and Safety Officer, in coordination with the Field Team Leader, is responsible for implementing the Project's Health and Safety Plan (HASP) and for establishing, and verifying QA/QC compliance with the HASP. If critical and acute health and safety issues are identified during the course of the additional site characterization, this position has the authority and organizational freedom to identify problems, initiate or provide solutions, verify implementation of solutions, and if necessary, to stop work.

C2.6 Quality Assurance Manager

The Quality Assurance Manager will be responsible for reviewing data deliverables (both hard copy and electronic data deliverables) to ensure their consistency with corporate data entry and analyses procedures with the Data Quality Objectives as outlines in Section 3. The QA Manager will review the analytical laboratory's QA/QC results, and may audit the analytical laboratory's QA/QC policies and procedures. The QA Manager will identify deviations from corporate QC procedures and will report them directly to the Executive Management Team with a copy to the Project Principal and Project Manager.

C2.7 Laboratory Quality Control Manager

The Laboratory QC Manager will be designated by BEACON and will be responsible for ensuring BEACON's BESURE Sample Collection Kit™ passive soil-gas analyses will implement the requirements of the QAPP. Similarly, the Laboratory QC Manager will be designated by Test America, Inc. and will be responsible for ensuring soil and groundwater analyses will implement the requirements of this QAPP.

C3.0 DATA QUALITY OBJECTIVES

Data Quality Objectives (DQOs) are qualitative and quantitative statements developed by data users to specify the quality of data required from a particular data collection activity to support specific decisions or regulatory actions. The process for developing DQOs is described in *Data Quality Objectives for Remedial Activities* (U.S. E.P.A. 1987).

Data gathered during the RI/FS activities will be used to evaluate petroleum hydrocarbon concentrations including total petroleum hydrocarbons reported as gasoline (TPHg), total petroleum hydrocarbons reported as diesel (TPHd), total petroleum hydrocarbons reported as motor oil (TPHmo), gasoline constituents benzene, toluene, ethyl benzene, total xylenes (BTEX), fuel oxygenates, and naphthalene in groundwater samples cited in the Workplan, and will also be used to determine the location of groundwater monitoring wells. Therefore, the data collected during RI/FS activities proposed in the Workplan must be scientifically sound; defensible; and of known, acceptable, and documented quality. To achieve this objective, the following procedures will be followed:

- Use standard operating procedures for the collection and analysis of soil and groundwater samples including, chain of custody, calibration, preventative maintenance, laboratory analysis, reporting, validation, internal QA/QC audits;
- Set quantitative goals and units of measure for precision and completeness for each measured parameter;
- Set quantitative goals for representative and comparable data; and
- Establish procedures for problem identification and correction.

The operating procedures to be used during this RI/FS are described in the SAP. Qualitative descriptions of precision, accuracy, representativeness, completeness, and comparability parameters are provided below. Quantitative descriptions are discussed in Section 7.3 - Statistical Assessment of Data Quality.

C3.1 Accuracy

Accuracy is the measurement of bias in a system and will be assessed through the evaluation of the percent recoveries associated with laboratory control samples and matrix spikes. Accuracy measurements are defined in Section 7.3.1.

C3.2 Precision

Precision is the measurement of the reproducibility of data under a specified set of conditions and a quantitative measure will be used to assess the variability of a data set in reference to the calculated average value. This will be assessed by the evaluation of the day-to-day variances in the laboratory control samples. Precision measurements are defined in Section 7.3.2.

C3.3 Completeness

Completeness is the measurement of the percentage of measurements evaluated and judged valid. For this project, the QA objectives for completeness are 95 percent for each analyte by matrix and analytical method, for water and soil. Completeness is described in Section 7.3.3.

C3.4 Representativeness

Representativeness is a qualitative measure used to determine the degree to which obtained data correlate to the population sampled. This parameter will be measured through the precision of the analysis of field duplicate samples. If the precision of field duplicates is high, it will be assumed that the samples collected were representative of the Site. If, however, the medium sampled is naturally heterogeneous, the precision of field duplicates may be poor, but the data may still be representative of the Site condition. When precision is poor, additional samples may need to be collected.

C3.5 Comparability

Comparability is a qualitative measure assessing the confidence with which data sets obtained for similar samples and sample conditions can be correlated. Comparability is determined by the adherence of different laboratories and different sampling teams to standard sampling protocols and analytical methods as well as by the use of traceable calibration standards and the same reporting units. Comparability can be determined by having the various laboratories participate in a performance evaluation program or through collection of split samples for testing by independent laboratories.

C4.0 SAMPLING PROCEDURES

The field activities to be conducted as a part of the RI/FS activities include the collection and analysis of passive soil-gas samples, river sediments, subsurface soil and groundwater samples; and, logging borehole lithology to evaluate the environmental impacts beneath the subject Site.

Field activities will be conducted in accordance with the SAP. Sampling locations are identified in the Workplan, and the sampling procedures and standard methods are described in the SAP. Sample handling (e.g., labeling, preservation, shipping, and chain-of-custody protocols) are also described in detail in the SAP.

Evidence of chain-of-custody for samples that are not analyzed in the field will be traceable from the time the sample is collected until the filled sample bottles are in the possession of the analytical laboratory and the requested analyses have been performed. Field personnel will complete sample analysis request/chain-of-custody forms (in triplicate) and affix Chain-of-Custody seals to each sample shipment container if custody is relinquished to a third party shipping company (e.g., Federal Express, United Parcel Service). Field personnel will not leave samples unattended and will relinquish samples only to the analytical laboratory sample custodian or an authorized shipping agent.

C5.0 ANALYTICAL AND QUALITY CONTROL PROCEDURES

Collection of representative field samples requires adherence to established procedures. The following analytical and QC procedures will be followed to ensure quality data.

C5.1 Analytical Procedures

During the RI/FS Investigation, chemical analyses and physical characteristics will be measured on-site by field personnel, and off-site by the analytical laboratory or by BESURE Sample Collection Kits™ procedure. Parameters for which the SAP has not defined procedures will be analyzed with a method that meets the objectives of the Workplan.

C5.2 Analytical Methods

Analytical procedures follow the methods set forth in the SAP, unless otherwise approved by the Project Manager or Technical Coordinator. If it is determined that an analytical method may not meet the Data Quality Objectives (e.g., detection limits may be greater than applicable or relevant and appropriate requirements), then a modified method meeting the DQOs will be developed and described in an addendum to the SAP.

C5.3 Method Detection Limits

The Method Detection Limit (MDL) is the lowest concentration at which a particular analyte can be measured and reported with a 99 percent confidence that the analyte concentration is greater than zero. The MDL should be determined by multiplying the appropriate one-sided 99 percent

T-statistic by the standard deviation obtained from at least seven analyses of a matrix spike containing the analyte of interest at a concentration of 3 to 5 times the estimated MDL. MDLs for each target analyte will be determined by the analytical laboratory using the applicable SW-846 protocol or the method specified in 40 Code of Federal Regulations, Part 136, Appendix B. The laboratory will then develop individual Method Reporting Limits (MRL) that represent concentrations that can be consistently obtained by the method and are generally 2 to 5 times the respective MDL.

C5.4 Practical Quantitation Limits

As specified in SW-846, Practical Quantitation Limits (PQL), also referred to as the Estimated Quantitation Limits ("EQL"), are defined as the lowest level of quantitation can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions. The PQL or EQL is generally 5 to 10 times the MDL, but may be nominally selected within these guidelines to simplify data reporting.

C5.5 Method Calibration

At least once daily, or if the instrument exceeds calibration limits, calibration for each target analyte will be performed, to ensure that the analytical instrumentation is functioning within the established sensitivity range. All analytes specified in the SAP must be present in the initial and continuing calibrations, and these calibrations must meet the acceptance criteria specified by the respective method. The laboratories must demonstrate that PQLs are routinely and reliably achieved by analyzing a calibration standard that is below the PQL for each analyte. Calibration standards and solutions will be of known concentration and purity to achieve the criteria necessary for validation of the analytical results. Inorganic standards must conform to the National Institute of Standards and Technology Central QA Laboratory.

Organic standards must conform to materials certified by the Cooperative Research and Development Agreement, National Institute of Standards and Technology Central QA Laboratory, or Contract Laboratory Program Standard Reference Material. Standards used in this program will be prepared and maintained under the normal laboratory standards tracking system, which ensures preparation, checking, documentation, storage, and disposal of standards according to method specified procedures and schedules.

C6.0 CALIBRATION PROCEDURES AND FREQUENCY

Calibration procedures establish the relationship between calibration standards and the measurement of each standard by an instrument or analytical procedure. All field equipment will be calibrated according to the manufacturer's instructions prior to use in the field.

Calibration checks will be performed in the middle and at the end of each field day. During the calibration checks, if a parameter is greater than ±10% of the actual value, that parameter will be recalibrated. Calibrations will follow the manufacturer's instructions for equipment calibration and maintenance. A record of the instrument calibration will be maintained in the Project Files.

C6.1 Preventive Maintenance

A preventive maintenance plan allows for periodic instrument checks for problems that occur frequently. The objective of a preventive maintenance plan is to rectify equipment problems before they interfere with the Site Investigation. Preventive maintenance also brings attention to those areas of the instrument susceptible to degradation from aging, toxic/corrosive effects, and clogging due to environmental factors.

Procedures for preventive maintenance are contained in each instrument's manual under the maintenance/troubleshooting sections. Each piece of equipment will have an associated standard operating procedure detailing the calibration/maintenance instructions and equipment failing calibration specifications will be identified with a red warning label and will not be used for sample analysis.

Equipment requiring calibration will have an assigned record number that is permanently affixed to the instrument. A label will be affixed to each instrument containing the following information:

- Description
- Manufacturer
- Model number
- Serial number
- Date of last calibration or maintenance
- Name of person who performed calibration or maintenance
- Date of next servicing

Should the selected contracted analytical laboratory have a more stringent preventive maintenance plan for their equipment, then the Project Manager may approve the analytical laboratory’s plan.

C6.2 Internal Quality Control Checks and Frequency

Field and laboratory QC data are necessary to determine precision and accuracy of the analyses. At least 10 percent of each data set generated will be composed of field and laboratory QC data. Field QC samples for this project will consist of trip blanks; equipment rinse blanks; duplicate; and laboratory QC samples. Laboratory QC samples will consist of method blanks, standards, laboratory control samples, Matrix Spikes (MS), Matrix Spike Duplicates (MSD), and/or surrogate spikes.

C6.2.1 Field Quality Control Samples

QC samples are collected or prepared in order to provide data verifying that the sampling and analytical systems used in support of project activities are in control limits and to verify the quality of the data generated from these activities. Field QC samples for this project will consist of duplicate samples.

- One **field duplicate** will be collected for every 10 water or soil samples collected, or one during each sampling event if less than 20 samples are obtained at a time. For soil samples, field duplicates are two samples taken from the same soil medium. Field duplicate Relative Percent Differences (RPDs) will be calculated as detailed in Section 7.3.2. Field duplicate RPD goals are defined as within 25 percent for detections of chemicals in both samples at concentrations greater than the lowest standard used to define the laboratory calibration curve. The lowest standard on the laboratory calibration curve shall be run at the MDL.

- No field duplicate samples will be collected during passive soil-gas testing using the BESURE Sample Collection Kits™ because duplicate sample locations may alter the field kit results at BEACON's laboratory.

C6.2.2 Field Measurements

Numerous field measurements will be performed during the remedial actions conducting in accordance to the Workplan. These field measurements and associated QC checks are listed below.

- Organic vapor monitor - 20 percent will be measured in duplicate

C6.2.3 Laboratory QC

Laboratory QC samples will consist of method blanks, standards, laboratory control samples, matrix spikes, matrix spike duplicates, and surrogate spikes.

- **Method Blanks** are used to detect laboratory-related contamination and are used to identify and minimize interferences caused by solvents, reagents, glassware, or other equipment used in the laboratory's sample preparation and analytical measurement process. A method blank consists of a volume of deionized or distilled laboratory water for organic water samples and inorganic soil samples or a purified solid matrix for organic soil/sediment samples, which is carried through the entire analytical process. The method blank volume or weight must be approximately equal to that of the samples being processed. Method blanks will be analyzed at a minimum frequency of one per batch and the concentration of target compounds in the blank must be less than the PQL. If the blank exceeds the above criteria, then the source of the contamination must be identified and appropriate corrective action taken, including reanalysis of the sample group.

- **Laboratory Control Samples** (LCSs) consist of blank spikes, which are used to determine the accuracy of the analytical procedure by measuring a known concentration of an analyte of interest. LCSs will be analyzed at a minimum frequency of one per batch.

- **Surrogate Spike Analyses** are used to determine the efficiency of analyte recovery in organic sample preparation and analyses and surrogate standard determinations will be performed for all organic standards, samples, and blanks. Each organic standard, sample, matrix spike, matrix spike duplicate, LCS, and blank is spiked with surrogate compounds prior to purging or extraction. The surrogate spiking compounds are used to fortify the sample with the proper concentrations. Surrogate spike recoveries must fall within the limits established by the laboratory QA plan and the analytical method and if a surrogate spike recovery is outside of acceptable ranges, then a corrective action must be taken.

- **MS/MSD** analyses are conducted to evaluate the matrix effect of the sample on the analytical method and consist of a pair of samples with a known amount of analyte added in the laboratory. The MS/MSD analyses must be performed at a minimum frequency of one per each group of 20 samples of the same matrix and, as a result, it is necessary to collect triplicate sample volumes in the field for one sample out of every 20. Two volumes of the sample will be spiked with a standard solution containing all the target analytes, and the third sample volume will be analyzed normally, without spiking. The samples are analyzed and the concentrations found in the spiked samples are used to determine the precision as measured by the percent difference. If the relative percent difference is greater than 20 percent, then the appropriate corrective action should be taken including reanalysis, if necessary. Accuracy also is measured by determining the percent recovery of the spiked compound compared to the actual level that was spiked and the percent recovery must fall within the range established by the laboratory.

C6.3 Data Reduction and Reporting

In order to ensure proper data management activities and to provide an accurate and controlled flow of data, it is important that data is handled and reported in a concise and useable format. Data management procedures are applicable to field- and laboratory generated data. The Project Manager is responsible for ensuring that data reduction produces accurate, controlled, validated, and comparable data.

C6.3.1 Field Data Reduction

Data generated in the field will be recorded in a task-specific Field Notebook or on company Field Data Sheets. If Field Data Sheets are used, the sheets must be attached to the Field Notebook. All calculations performed in the field must be clearly recorded in the Field Notebook. The Project Manager is responsible for the review of all field documentation to ensure completeness and legibility.

The following field data parameters will be reported in the units referenced below:

- Organic Vapor Data - reported to the closest 5.0 parts per million by volume (ppmv).

C6.3.2 Laboratory Data Reduction

The analytical data are initially collected, converted to standard reporting units, and recorded in standard formats by the laboratory's project analysts. The project analysts conduct preliminary data analysis using a variety of methods and procedures. Since many analytical instruments are microprocessor controlled, many of the requisite analyses can be performed directly in the instrument's operating or outputting mode. Those instruments interfaced to stand-alone computers or microprocessors often permit data analysis programs to be written and modified to produce data formats specifically suited to end user requirements. Data requiring manual recording, integration, and analysis may be converted to a more appropriate format prior to subsequent analyses. Through all stages and aspects of data processing, the data are double-checked for translation or transcription errors and are initialed by both the recorder and the checker. The Laboratory QC Manager (or other individual designated by the laboratory not directly involved with the analysis) will review the data for acceptability.

Data reduction frequently includes computation of analytical results from raw instrument data and summary statistics, including standard errors, confidence intervals, test of hypothesis relative to the parameters, and model validation. Data reduction procedures used by the laboratory will address the reliability of computations and the overall correctness of the data reduction. The numerical transformation algorithms used for data reduction will be verified against a known problem set to ensure that the reduction methods are correct.

The equations and the typical calculation sequence followed to reduce the data to the acceptable format are instrument- and method- specific. Where standard methods are modified, data reduction techniques will be described in a report accompanying the data. Auxiliary data produced for internal records and not reported as part of the analytical data include the following: laboratory worksheets, laboratory notebooks, sample tracking system forms, instrument logs, standard records, maintenance records, calibration records, and associated QC records. These sources will document data reduction and will be available for inspection during audits and to determine the validity of data.

Data *outliers* will be identified according to laboratory control charts, and the rationale used for data acceptance or rejection will be described and documented. All sample and primary QA/QC data will be supplied to the Project Manager in suitable hard copy and electronic data formats.

C6.3.3 Field Data Reporting

Field data will be reported in the appropriate formats including field logbooks, sample tags, analysis request/chain-of-custody forms, and field data sheets. As a general guideline the following minimum standards shall be maintained:

- Documentation will be recorded in permanent ink
- Entries will be legible
- Errors will be corrected by crossing out with a single line, dating, and initialing
- Final field data will be reviewed by the Project Manager before database entry

C6.3.4 Laboratory Data Reporting

Analytical results will be reported in the laboratory's approved format in both hard copy and as standard Electronic Data Deliverable (EDD) if available. In addition to the reported data, the laboratory data report will, at a minimum, include a narrative that will discuss any problems or discrepancies and sufficient calibration and QC information to determine that the method was performing correctly at the time that the samples were analyzed.

Laboratory data will be reported in the appropriate unit of concentration depending upon the matrix and type of analysis. Generally, soil-gas sample concentrations will be reported in micrograms per cubic meter ($\mu g/m^3$), soil sample concentrations will be reported in milligrams per kilogram (mg/Kg) or micrograms per kilogram (µg/Kg). Groundwater sample concentrations will be reported in micrograms per liter (µg/l) or milligrams per liter (mg/l). Premature rounding of intermediate results can significantly affect the final result. Therefore, the reported results will be rounded to the correct number of significant figures only after all calculations and manipulations are completed. As many significant figures as are warranted by the analytical method will be used in pre-reporting calculations. Before being released by the laboratory, all analytical data and QC data generated by the laboratory will be reviewed by the laboratory's analyst. The data will be checked for the following: transcription errors, calculation accuracy and dilution factors, and compliance with QC requirements. Failure to meet method performance QC criteria will result in the reanalysis of the sample or lot. After the data have been reviewed, they are assembled into a data package. The final laboratory data package will be reviewed by the Laboratory QC Manager before delivery and by the Project Manager upon receipt.

C7.0 DATA QUALITY MANAGEMENT

C7.1 Data Management Plan

The Project Data Management Plan adopted for this QAPP conforms to the guidelines set for the QAPP data management as indicated in U.S. EPA's *Guidance for Conducting RI/FS under CERLCA* (U.S. EPA 1988). Specific aspects of the data management scheme are discussed below.

C7.2 Data Validation

The data validation process is used to screen data and accept, reject, or qualify data based on sound criteria. Data will be validated, as appropriate, based on holding times, initial calibration, continuing calibration, blank results, and other QC sample results. The Project Manager will be responsible for verifying the laboratory data meet the QA/QC requirements of the QAPP.

C7.2.1 Field Data Validation

To ensure the validity of data gathered in conjunction with the site field activities, all aspects of the Project need to be monitored. Periodic audits will be conducted to monitor adherence to the SAP, QC protocols, and general program policies and protocols. Factors affecting out-of-control conditions can usually be traced to sampling or laboratory activities. The following sections are examples of specific conditions that result in out-of-control situations and corrective action requirements are discussed in Section 8.2.

Areas in which out-of-control situations have the potential to occur include:

- Improper sampling techniques
- Inappropriate sample identification
- Improper sample storage and preservation
- Nonconformance to appropriate Chain-of-Custody protocols

C7.2.2 Data Quality Management

Data validation is the process of reviewing data and accepting, qualifying, or rejecting data on the basis of sound criteria using established U.S. EPA guidelines. An analyst at the laboratory, other than the original data processor, will be responsible for reviewing all steps of data processing and all input parameters, calibrations, calculations, and transcriptions will be carefully checked prior to the laboratory reporting the results. The analyst's supervisor at the laboratory will check a minimum of 10 percent of all calculations from the raw to final data prior to releasing the analytical report.

The QC sample results (laboratory control standards, surrogates, initial calibration standards, and continuing calibration standards) will be compared against project-specific accuracy and precision criteria. The QC data must meet acceptance levels prior to processing the analytical data. If QC standards are not met, then the cause must be ascertained and appropriate corrective action must be taken, but if the noncompliant situation can be rectified without affecting the integrity of the data, then data processing will proceed. Furthermore, if resolution of the problem will jeopardize the integrity of the data, then the sample in question must be reanalyzed, and if reanalysis fails to correct the problem, then the data will be flagged to indicate that the data are out of control limits. The internal review checks will be documented in the batch report and data review form in each data package.

A minimum of 25 percent of the data generated during the investigation will be validated by the Project Manager. The data validation approach will consist of a systematic review of the analytical results, associated QC methods and results, and all of the supporting data. Best professional judgment in any area not specifically addressed by U.S. EPA guidelines will be used as necessary.

The following items may be reviewed by the Analytical QA Manager and Technical Coordinator to validate the data:

- Sample holding times
- Documentation that the analytical results are in control and within the certified range
- Documentation that data and calculations were checked by a reviewer who was not involved in the performance of sampling, analysis or data reduction
- Calibration of methods and instruments
- Routine instrument checks (calibration, control samples)
- Documentation on traceability of instrument standards, samples, and data
- Documentation on analytical methodology and QC methodology
- The potential presence of interferences in analytical methods (check of reference blanks and spike recoveries)
- Documentation of routine maintenance activity to ensure analytical reliability
- Documentation of sample preservation and transport

All data generated will be assessed for accuracy, precision, and completeness. Data assessment techniques will include routine QC checks and system audits. Precision will be assessed from analysis of duplicates and/or replicates of the same parameter at different times. Control charts will be maintained to provide a timely assessment of precision for measurement function. Accuracy will be assessed from analysis of samples spiked with known concentrations of reference materials and will be independent of the routine calibration process (reference materials will be obtained from independent sources and will be prepared independently).

If an analyte is detected above the PQL in a method blank, then that analyte will be flagged with a "B" for every sample in that batch. The batch will then be assessed to determine if that analyte data is usable or not, taking into consideration the type of contaminant (known lab contaminant), and its level. The tables in SW-846, ASTM, and U.S. EPA methods will be used to validate the definitive data and professional judgment will be applied in accordance with these guidelines. A data validation summary that describes all validated data will be prepared and submitted to the Project Manager for each set of validated analytical data.

C7.3 Statistical Assessment of Data Quality

The routine procedures used to assess data are precision, accuracy, and completeness. Specific formulas used to quantitatively define these parameters, are presented in the following Sections. In addition, statistical analysis methods (analysis of variance or ANOVA) will be used to compare data sets for different sampling areas (soil and hydrologic regimes).

C7.3.1 Accuracy Percent Recovery

Accuracy is a measurement of the bias in a system, and the accuracy of sampling data for this Project will be determined through the use of laboratory control samples. Accuracy is generally expressed as percent recovery (%R), which is defined as:

$$\%R = 100\% \times \frac{s - U}{C_{sa}}$$

where, s = measured concentration of spiked aliquot
U = measured concentration of unspiked aliquot
C_{sa} = actual concentration of spike added

If a Standard Reference Material (“SRM”) is used instead of or in addition to laboratory control samples, accuracy is defined as:

$$\%R = 100\% \times \frac{C_m}{C_{srm}}$$

where, C_m = measured concentration of SRM in the spiked sample
C_{srm} = actual concentration of SRM

The degree of accuracy and the recovery of the analyte are dependent on the matrix, method of analysis, and compound being measured. The objective for accuracy is to equal or exceed the accuracy demonstrated for the analytical method for samples of similar matrix and contaminant concentration. Control charts will be maintained for all surrogates. Also, all analytes of interest will be charted for each method for percent recovery and RSD and the charts shall be used to help show any adverse trends or drifts in the QC data, so corrections can be made.

C7.3.2 Precision (RPD/RSD)

Precision is a measurement of the reproducibility of data under a specified set of conditions. For this Project, precision will be evaluated in conjunction with accuracy for the LCS samples. Precision will be determined for matrix effects using the MS/MSD samples and will be expressed as Relative Percent Difference (RPD).

RPD is defined as:

$$RPD = \frac{(C_1 - C_2) \times 100\ \%}{(C_1 + C_2)/2}$$

where, C_1 and C_2 are the larger and smaller of the two duplicate values, respectively

Precision will be measured as the Relative Standard Deviation (RSD) for sample and MS/MSD values.

RSD is defined as:

$$RSD = \frac{s}{y_{mean}} \times 100\%$$

where, s = standard deviation
y_{mean} = mean of replicate analyses

For field duplicates and replicates, both RPDs and RSDs will be used to evaluate precision. Acceptable levels of precision vary with the sample matrix, analytical method, and sample concentration. U.S. EPA precision data will be used as a basis for developing acceptance criteria for assessing precision; however, laboratory control charts must be developed and used to determine acceptance criteria for the LCS samples.

C7.3.3 Completeness

Data completeness represents the percentage of measurements evaluated and judged to be valid measurements. In order to meet the completeness objective for this project, valid results will be defined as all results not qualified with an "R" flag. Data completeness is expressed as percent completeness (%C) and is defined as:

$$\%C = 100\% \times \frac{V}{n}$$

where V = number of measurements judged valid
n = total number of measurements

The QA objective for completeness is 95 percent for water and 90 percent for soil analyses.

C8.0 QUALITY ASSURANCE OVERSIGHT

Audits are tools used to evaluate the effectiveness of the QC program with respect to the QC requirements of the sampling and analysis activities. Two types of audits may be performed: 1) performance audits and 2) system audits. If deficiencies are encountered during an audit, corrective action procedures will be implemented.

C8.1 Performance and System Audits

Performance audits are normally conducted after the data production systems are operational and generating data. These audits consist of the collection of measurement data, by using performance evaluation samples to determine the accuracy of the total measurement system or portions thereof.

C8.1.1 Laboratory Audits

All laboratories participating in this Project may be audited by the QA Manager or a designated representative. Additionally, the Laboratory QC Manager will be responsible for verifying standards, procedures, records, and charts are properly maintained and that QC records are adequately filed and maintained in a retrievable fashion.

System audits are on-site qualitative inspections and reviews of the QC system, and encompass all aspects of the Project. These audits are concerned with evaluations of all components of the applicable measurement systems to determine if they have been properly selected and implemented. System audits typically consist of on-site reviews of both field and laboratory systems and facilities for sampling, calibration, and measurement protocols.

The QA Manager or designated personnel may audit the laboratory regularly. In addition to the laboratory's internal auditing and auditing by the Laboratory QC Manager, audits may be performed by the Project Manager, QA Manager, or applicable governmental and private agencies. These audits are performed to verify the following conditions:

- Standards, procedures, records, charts, software, have been properly maintained
- QC records have been adequately filed and maintained, and documents are protected and retrievable
- Results of QC sample analyses have been assessed

Formal audit reports will be distributed to the Project Manager and the Executive Management Team, if warranted. The results of the audit will be documented in a bound logbook, or permanently attached and maintained as part of the QA documentation.

C8.1.2 Field Audits

The Field Team Leader may conduct internal field audits during field activities, in conjunction with field sampling events at the site. The objectives are to ensure that the Site Investigation Work Plan is followed, that QC measures have been implemented and maintained, and that sample integrity has not been compromised.

Upon completion of the field audit, a report and briefing documenting the findings will be provided to the Project Manager. Deficiencies encountered will be listed in the report and a corrective action will be initiated, as appropriate.

C8.2 Corrective Action Procedures

A corrective action will be initiated through the development and implementation of routine internal QA/AC checks, and the requirements for a corrective action will be implemented in response to deficiencies encountered during system audits or failure to adhere to the QAPP. To enhance the timeliness of corrective action and thereby reduce the generation of unacceptable measurement data, the problems identified by the assessment procedures will be resolved by the laboratory at the lowest possible management level. All problems requiring corrective action will be documented on a corrective action documentation form and will be included in the appropriate data package. The Field Team Leader will be immediately notified of any major collective problems, such as the need to resample. Otherwise, progress reports to the Project Manager will detail all problems and subsequent resolutions.

Steps comprising a closed-loop corrective action system include:

- Defining the problem;
- Assigning responsibility for problem investigation
- Investigating and determining the cause of the problem
- Assigning responsibility for problem resolution
- Verifying that the resolution has corrected the problem

It is the responsibility of the Field Team Leader to notify the Project Manager of procedural deviations encountered in the field and the corrective actions taken; and any conditions which may require a modification of the procedures set forth in the QAPP.

C9.0 REFERENCES

ASTM 2003. American Society for Testing and Materials (ASTM), 2003. *Standard Guide for Soil Gas Monitoring in the Vadose Zone, ASTM Standard D 5314-92," January 1993; Reapproved 2001; website http://www.astm.org 01/28/2003 – 22.*

U.S. EPA 1983. U.S. Environmental Protection Agency. *Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans, 1983.*

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U.S. EPA 1987. U.S. Environmental Protection Agency. D*ata Quality Objectives for Remedial Activities*. EPA/540/G-87/004.

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U.S. EPA 1993b. U.S. Environmental Protection Agency. *EPA Presumptive Remedy for CERCLA Municipal Landfill Sites.* Directive No. 9355.0-49FS, 1993b.\

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U.S. EPA 2002. U.S. Environmental Protection Agency. *U.S. EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review*. EPA 540-R-01-008, 2002.

Washington State Department of Ecology (Ecology) *Guidelines for Preparing Quality Assurance Project Plans for Environmental Studies dated July 2004* (Publication No. 04-03-030 and Revision of Publication No. 01-03-003).

APPENDIX D

SITE HEALTH AND SAFETY PLAN

SITE HEALTH AND SAFETY PLAN
FOR

Soil and Groundwater Sampling, Air Knife, Borehole Drilling and SVE Pilot Testing
Tesoro Pasco Fuel Terminal
2900 Sacajawea Park Road
Pasco, Washington

TESORO

Prepared by:
CEECON Testing, Inc.
434 North Canal Street, Suite Six
South San Francisco, CA 94080

March 2016

1.0 SITE BACKGROUND

The Site is a bulk fuel storage terminal at 2900 Sacajawea Park Road in Pasco, WA. There are 18 aboveground fuel storage tanks on the 33-acre site. Fuels are transferred at the facility by pipeline, barge and truck. Chevron Pipeline Company (CPL) operated the facility until it was purchased by Tesoro Logistics Operations, LLC (Tesoro) in June 2013.

Approximately 120,000 gallons of gasoline and diesel fuel were reportedly released at various locations on the Site between approximately 1978 and 2000. Cleanup actions conducted by CPL reportedly recovered approximately 80,000 gallons of the released petroleum product during several cleanup action conducted between 1983 and 2008. Soil and ground water sampling results confirmed petroleum contamination was present, including total petroleum hydrocarbons as gasoline (TPHg) and diesel (TPHd); and benzene, ethylbenzene, toluene and xylene (BTEX) compounds.

2.0 OBJECTIVE

This document defines the Health and Safety considerations for the possible management of hazardous substances by CEECON Testing, Inc. (CEECON) personnel and subcontractors. This document is required by CEECON policies and procedures and may be required by OSHA 29 CFR 1910.120.

By addendum, this document includes all safety standards outlined in the Tesoro document titled "CONTRACTOR MINIMUM SAFETY STANDARDS" (sent separately).

3.0 PROJECT STAFFING

	TITLE
Name Michael Hodges ____________________	(Project Manager)
Name Michael Hodges ____________________	(Site Safety Officer 1)
Name Michael Hodges ____________________	(Emergency Coordinator)
Name____________________________________	(Site Safety Officer 2)
Name __________________________________	______________________________
Name __________________________________	______________________________

4.0 SCOPE OF WORK

Check off appropriate categories:

o	TANK EXCAVATION	**X**	SOIL SAMPLING
o	SOIL EXCAVATION	o	CONSTRUCTION
o	POND CLEANUP	o	DEMOLITION
o	MONITORING WELL INSTALLATION	**X**	VAPOR SAMPLING
o	ON-SITE TREATMENT OF SOIL	**X**	OTHER: SVE PILOT TESTING
X	GROUND-WATER SAMPLING		
o	ON-SITE TREATMENT OF GROUND WATER		

Below is a brief description of this work:

- Underground and overhead utility checks using One-Call and private utility locator
- Air-knife eleven (11) boring locations
- Drill sample borings using sonic drilling equipment (Environmental West Exploration)
- Collect soil samples and grab groundwater samples from the borings
- Collect groundwater samples from all existing monitoring wells using low flow sampling pumps and/or bailers
- Complete SVE pilot testing of selected wells using portable internal combustion engine (ICE) and vapor sampling equipment
- Temporary storage of drilling waste soil and purge water in drums, prior to load and transport to offsite disposal facility

5.0 HAZARD EVALUATION

List physical hazards (trenches, equipment, utilities, terrain, etc.):

Underground and overhead utilities and structures______________
Gasoline storage on site presents potential flammable hazard ___
Traffic (light) ____________
Tesoro underground fuel pipelines (2)___________
Heavy equipment such as drill rig, pumps, compressor, internal combustion engine

List chemical contaminants and concentrations that may be encountered during Site work:

CHEMICAL	CONC. (in groundwater)	TLV/PEL	ACTION LEVEL	MSDS	HAZARD TO PERSONNEL
TPHg	**<50 µg/l**	**None**	**NA**	**No**	**None**
Benzene	**<2 µg/l**	**1 ppm**	**500 ppm**	**No**	**minimal**
Toluene	**<1 µg/l**	**200 ppm**	**500 ppm**	**No**	**None**
TPHd/o	**<3,600 µg/l**	**None**	**NA**	**No**	**None**
Ethylbenzene	**<1 µg/l**	**100 ppm**	**800 ppm**	**No**	**None**
Total Xylenes	**<2 µg/l**	**100 ppm**	**900 ppm**	**No**	**None**

TLV = Threshold Limit Value
PEL = Permissible Exposure Limit
MSDS = Material Safety Data Sheet
µg/l = Micrograms per liter
ppm = Parts per million

CARCINOGENS? X YES o NO

If yes, list: Benzene____

____

List task-specific hazards:

TASK: **Air Knife, Drilling, Soil Sampling**

1. underground utilities and fuel pipelines
2. overhead utilities – required minimum 20’ clearance
3. traffic control
4. heavy equipment
5. heat stress
6. ____

TASK**:** **Groundwater Sampling**

1. <u>traffic control</u>
2. <u>sampling equipment</u>
3. <u>heat stress</u>
4. ____

TASK: **Soil Vapor Extraction (SVE) Pilot Testing**

1. <u>traffic control</u>
2. <u>sampling equipment</u>
3. <u>heat stress</u>
4. ____

6.0 REPORTING AND RECORD KEEPING

Record keeping shall be consistent with OSHA regulations in all respects. The following records will be maintained in the CEECON office and at the Site:

- **The Health and Safety Log** - The log documents the Site Safety officer's daily activities pertaining to site health and safety compliance.

- **Exposure/Air monitoring Records –** Record air monitoring results using Lower Explosive Level (LEL) meter during hot work; record on the hot work permit prior to beginning work, at 1-hour intervals thereafter, and whenever site conditions warrant additional monitoring.

- **OSHA 200 Log and Summary of Occupational Injuries and Illnesses** - Current within 72 hours. Will be maintained in the CEECON office.

- **Respirator Fit Test Records**

- **Training and Medical Certificates**

- **Tailgate Safety Meeting Records –** field personnel are required to hold daily safety meetings and document attendees and topics discussed in safety meetings.

7.0 ENVIRONMENTAL SAMPLING

SAMPLING REQUIRED? X YES o NO

Air Monitoring Equipment Used: **PID or FID**
Methodology measure volatile hydrocarbons in sample container (Ziploc) head space
Calibration gas calibration

Soil Sampling Equipment Used: **Continuous coring/glass jars**
Methodology manually load sample containers with minimal head space
Calibration NA

Water/Liquid Sampling Equipment Used: **Low flow/submersible pump and tubing**
Methodology lower pump into well, water flow through tubing to surface
Calibration measure flow rate during pumping

Vapor Sampling Equipment Used: **Vacuum blower/internal comb. engine (ICE)**
Methodology induce vacuum on well to extract vapor; vapor treatment using ICE
Calibration NA

8.0 TRAINING

All personnel, including subcontractors, working on-site in the hazard zone must have completed 40 hours of health and safety training and the appropriate refresher courses. Safety briefings will be held in the field by the CEECON Health and Safety Coordinator or the Project Manager prior to the initiation of work.

9.0 MEDICAL REQUIREMENTS

CEECON field personnel received a baseline physical at the start of employment and bi-annual physical examinations thereafter. Copies of medical records are maintained in CEECON's files.

10.0 CONTAMINATION CONTROL

The job site is partitioned into three distinct zones: the clean zone; the contamination reduction zone; and the exclusion zone. Workers may only enter and exit from the exclusion zone via the contamination reduction zone. Only authorized personnel are allowed to enter the exclusion or the contamination reduction zone. The definition and marking of the zones can be completed on the first working day, prior to initiating work. Section 15.0 describes the personnel and equipment decontamination procedures to be conducted in the contamination reduction area prior to personnel entering the clean zone.

11.0 WORKER PROTECTION

11.1 Personal Protective Equipment

(A separate description of personal protective equipment must be included for each work task)

1. WORK TASKS: Soil and groundwater sampling, SVE pilot testing

2. LEVEL o A o B o C X D

3. RESPIRATORY PROTECTION

   AIR PURIFYING
   o Half Mask
   o Full Mask
   X Dust Mask
   X Respirator
   Cartridge Type: organic vapor ______________________________

   SUPPLIED AIR
   o SBCA
   o Airline
   o Escape Bottle
   o Other ______________________________

4. PROTECTIVE CLOTHING

   X Hard Hat

   EYE PROTECTION
   X Safety Glasses with side shields
   o Chemical Resistant Goggles
   X Face Shield
   o Other ______________________________

   BODY PROTECTION
   X Nomex (FRC) - o Hooded

o Polytyvek - o Hooded
o Saranex - o Hooded
o PVC
o Neoprene
o Raingear
X Reflective Safety Vest
o Other ____

GLOVES

X Latex	o Leather
o Surgical Rubber	o Cotton
o Viton	o Silvershield
o PVC	o Other
o Neoprene	
o Neoprene (milled)	

BOOTS
X Leather - Steel Toed
o PVC - Steel Toed
o Neoprene - Steel Toed
X Boot Covers
o Other __________________________

HEARING PROTECTION
o Ear Muffs
X Ear Plugs
o Other __________________________

11.2 General Safety Equipment

CHECK SAFETY EQUIPMENT TO BE USED:
o SAFETY SHOWER
o LIFELINE/HARNESS
o EYEWASH
o EXTRACTION DEVICE
X BARRIERS
o AIR HORNS
o WARNING SIGNS
X BARRIER TAPE
X WATER/GATORADE
X DECON BARRELS
o LIGHTING ______________________________________
X FIRE EXTINGUISHERS at least 1-20 pound, Class ABC

o OTHER ______________________________

DESCRIPTION OF COMMUNICATION SYSTEMS

NA

____

____

12.0 PERSONNEL VAPOR MONITORING PLAN

Initial Air Monitoring Required X YES o NO

Explain Strategy: Record air monitoring results using LEL meter prior to beginning work, during hot work, at 1-hour intervals thereafter, and whenever site conditions warrant additional monitoring to assess conformance with screening criteria and threshold action levels.

SAMPLING EQUIPMENT

X Combustible Gas/Oxygen Meter
o Draeger Tubes
X Photoionization Detector (PID)
X Flame Ionization Detector (FID)
o Infrared Detector
o Aerosol Monitor
o Sampling Pumps
o AND Media ______________________________
Other ______________________________

Describe Routine Monitoring Procedures (location, frequency, etc.):
Record air monitoring results using LEL meter prior to beginning work, during hot work and at 1-hour intervals thereafter at breathing zone at point of operations and site perimeter.

____

Describe Calibration Procedures:
Refer to the PID manufacturer's instructions for proper instrument calibration procedures

____

Describe Sampling Methods:

Hold instrument at breathing zone level for greater than one minute, note reading

____

____

ADDITIONAL MONITORING

Noise: o YES X NO

Describe Monitoring: ____

____

Heat Stress o YES X NO

Describe Monitoring ____

____

Other? o YES X NO

Describe ____

____

Location of Monitoring Records:

CEECON office____

13.0 SITE SAFETY OFFICER RESPONSIBILITIES

The Site Safety Officer (SSO) or Designee will enter before any work begins and will verify that the established zones are identified and escape routes are clear.

The daily site entry procedure will include the following:

- Determine the wind direction and stay appraised of it throughout the stay. Identify the direction during the tailgate safety meeting or informally with each affected employee.

- Confirm the proper placement of emergency information and operational status of equipment and the decontamination facility.

- Monitor the air as necessary for conditions that may cause injury or exposure and record all data.

- Visually observe for signs of actual or potential life- or health-threatening hazards.

- Note physical conditions of the site. Determine potential exposure pathways.

- Use survey tape or markers to identify new boundaries of the zones.

- Document site activities in a daily log. Record observations related to field conditions and the site.

14.0 GENERAL SAFE WORK PRACTICES

General safe work practices include the following:

- All accidents and incidents must be reported to the Project Manager immediately.

- All defects/malfunctions which appear during the course of the work shift must be reported to the Project Manager.

- No eating, drinking, smoking, chewing tobacco or gum is allowed in the exclusion or contamination reduction zones.

- **Cell phones must be powered off while anywhere on site.**

- **No cameras are allowed.**

- Employees shall inform their supervisors of any prescription medications they are using while at work that can affect their abilities.

- Employees shall not remove or disturb any covering, guards, or safety devices placed on vehicles, gears, or other moving equipment or machinery, except to perform maintenance or repairs. Work on the equipment shall not commence until the equipment has been deactivated, sources of energy are removed, and controls are locked and tagged out.

- Before starting any vehicle or machinery, or turning on electricity, gas, steam, or air, employees will check the entire area to ensure that it is safe to proceed with the work.

- Employees shall maintain good housekeeping of the facilities and remove or dispose of all unnecessary materials.

- Trenching or excavations must be shored or sloped or appropriately prepared as required by OSHA standards. Trench plates and borehole covers must be appropriately sized and installed to withstand vehicular traffic. A description of the techniques to be used is included as an appendix, if appropriate.

- Traffic control measures will be conducted in accordance with applicable permit requirements.

15.0 DECONTAMINATION PROCEDURES

Describe Personnel Decontamination Procedures:

Wash hands after completing work.

____

____

Describe Equipment Decontamination Procedures:

All downhole equipment will be steam cleaned between holes.
Sampling equipment will be washed in non-phosphate solution followed by two clean-water rinses.

____

How is contaminated equipment disposed?

Contaminated equipment will be contained in drums
Rinseate water will be contained on site in drums pending removal and transport to an off-site disposal facility.

____

16.0 CEECON INTERNAL CALL LIST

In the event of injury, fire, explosion, spill, release, or other non-routine events, immediately contact one of the following people, in the order listed:

	Name	Business Number	Cell Number
1.	Michael Hodges	650-827-7474	415-359-6453
2.			
3.			

17.0 HAZARDOUS WASTE OPERATIONS CONTINGENCY PLAN IN CASE OF EMERGENCY

SITE OWNER/CLIENT'S NAME: Tesoro Logistics

WORK LOCATION: 2900 Sacajawea Road, Pasco, WA

SITE CONTACT: Michael Hodges 415-359-6453
Name Phone Number

CEECON PROJECT MANAGER: Michael Hodges

EMERGENCY PHONE NUMBERS:

POLICE: 911 from land line
FIRE: 911 from land line
HOSPITAL:
NAME: Lourdes Medical Center - ER
ADDRESS: 520 4th North Ave., Pasco, WA
ROUTE: See Description and Figure attached

HOSPITAL CONTACT: 509-547-7704
AMBULANCE: 911 from land line

EVACUATION ALARM DESCRIPTION: ______

EVACUATION ROUTE DESCRIPTION: See Hospital Maps (Figures 1 through 4)

ASSEMBLY AREA DESCRIPTION: ______

LIST OF CONTAMINANTS PRESENT AND SYMPTOMS OF EXPOSURE AND POSSIBLE MEDICAL EVALUATION/TREATMENT:
Benzene - dizziness, headache
Toluene - dizziness, headache
Ethylbenzene - dizziness, headache
Total Xylenes - dizziness, headache
TPHg, TPHd/o - dizziness, headache

SPILL/RELEASE PROCEDURE:
Contain with rags and absorbent, dispose in drum.

REQUIRED SPILL/RELEASE EQUIPMENT:
Rags, absorbent

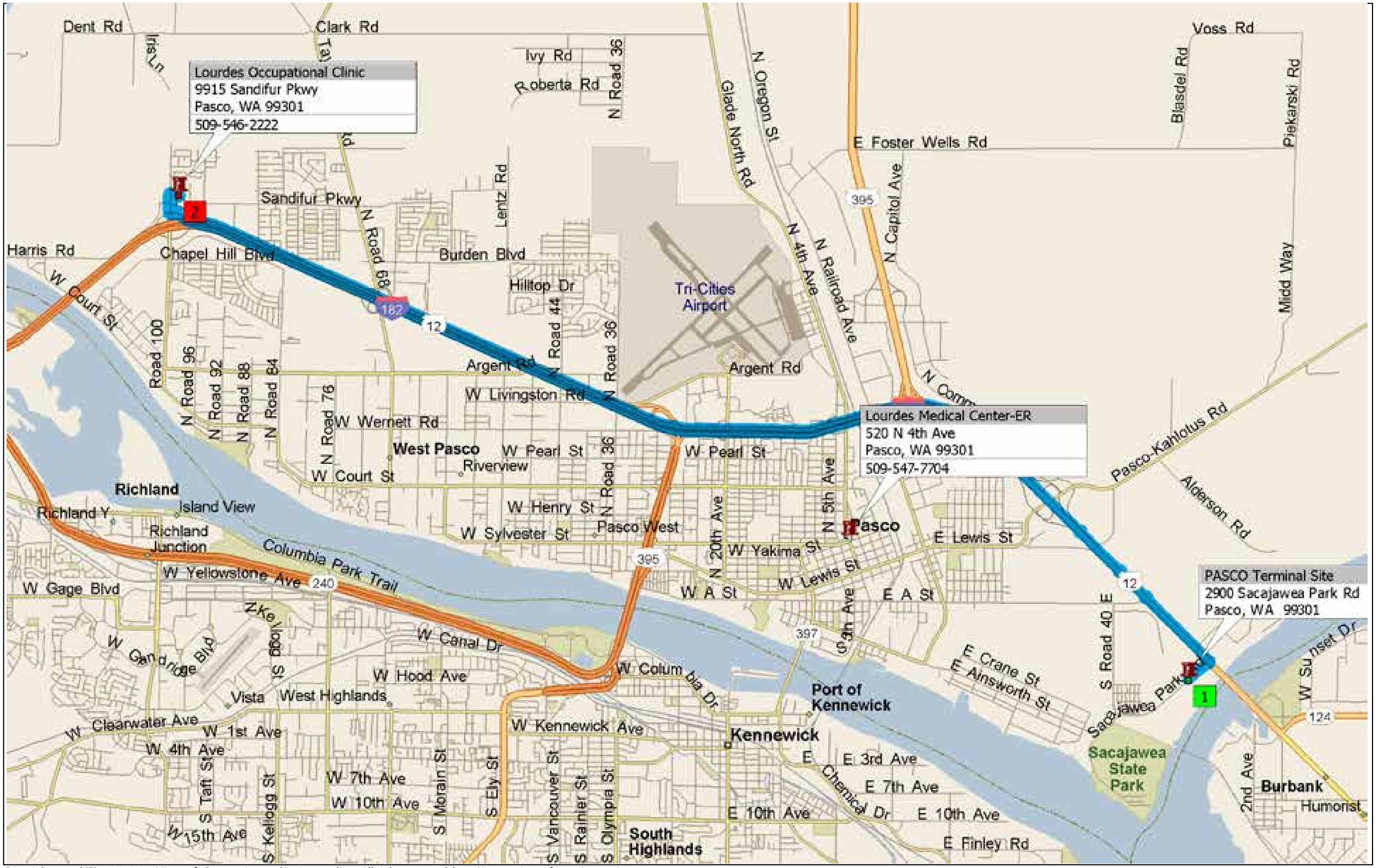
18.0 SIGNATURES

Signatures below indicate that employees and subcontractors working on-site in the exclusion zone have reviewed this Health and Safety Plan, Tesoro's "Contractor Safety Minimum Standards" document, and/or participated in a tailgate session(s) discussing the key aspects of the Plan.

PRINT NAME	SIGNATURE

Tesoro Pasco Fuel Terminal Site to Lourdes Occupational Clinic

11.1 miles; 12 minutes



0 mi 1 2 3 4

CEECON

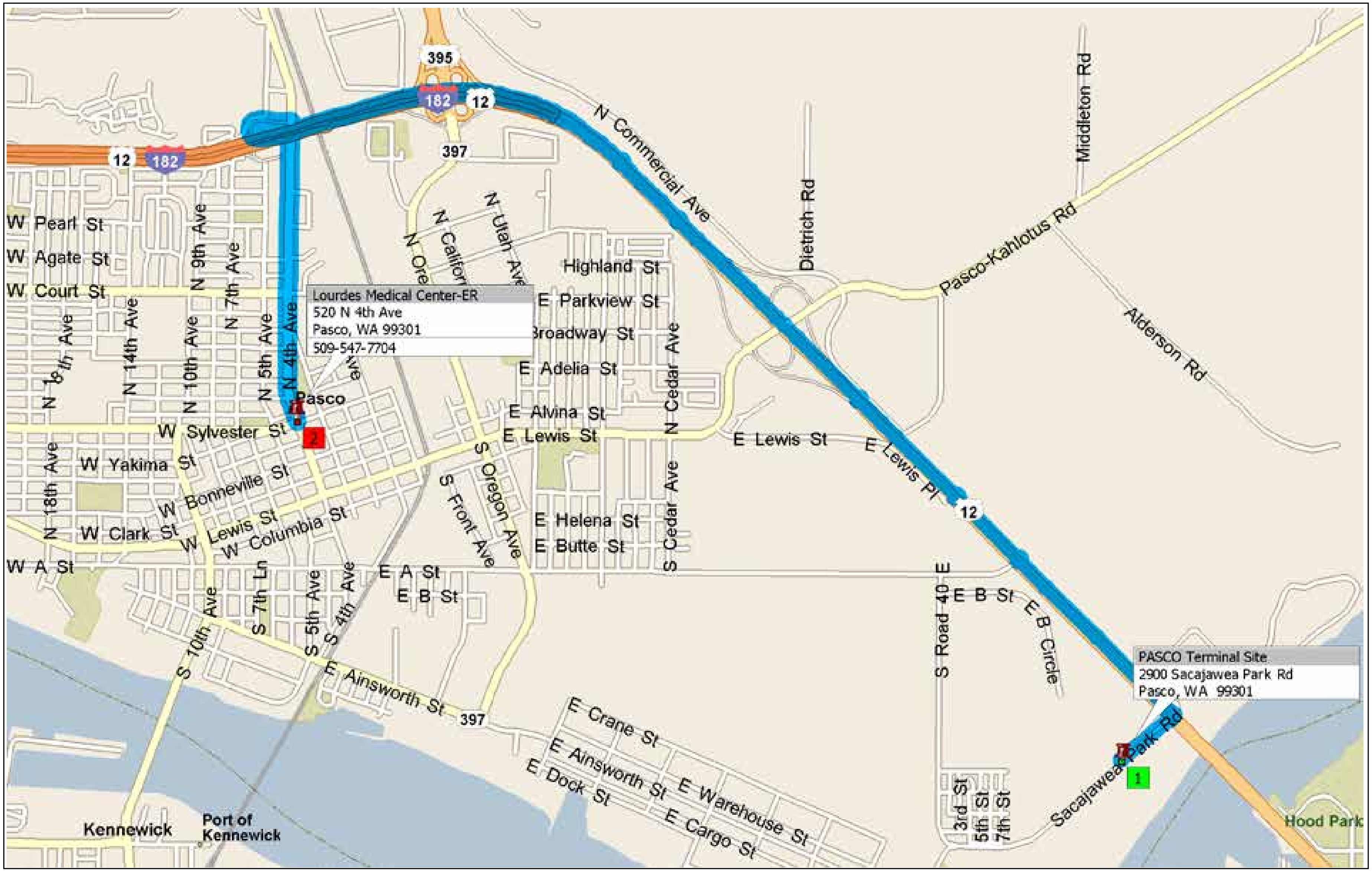
Hospital Maps
Tesoro Pasco Fuel Terminal Site
Pasco, Washington

MAR 2016

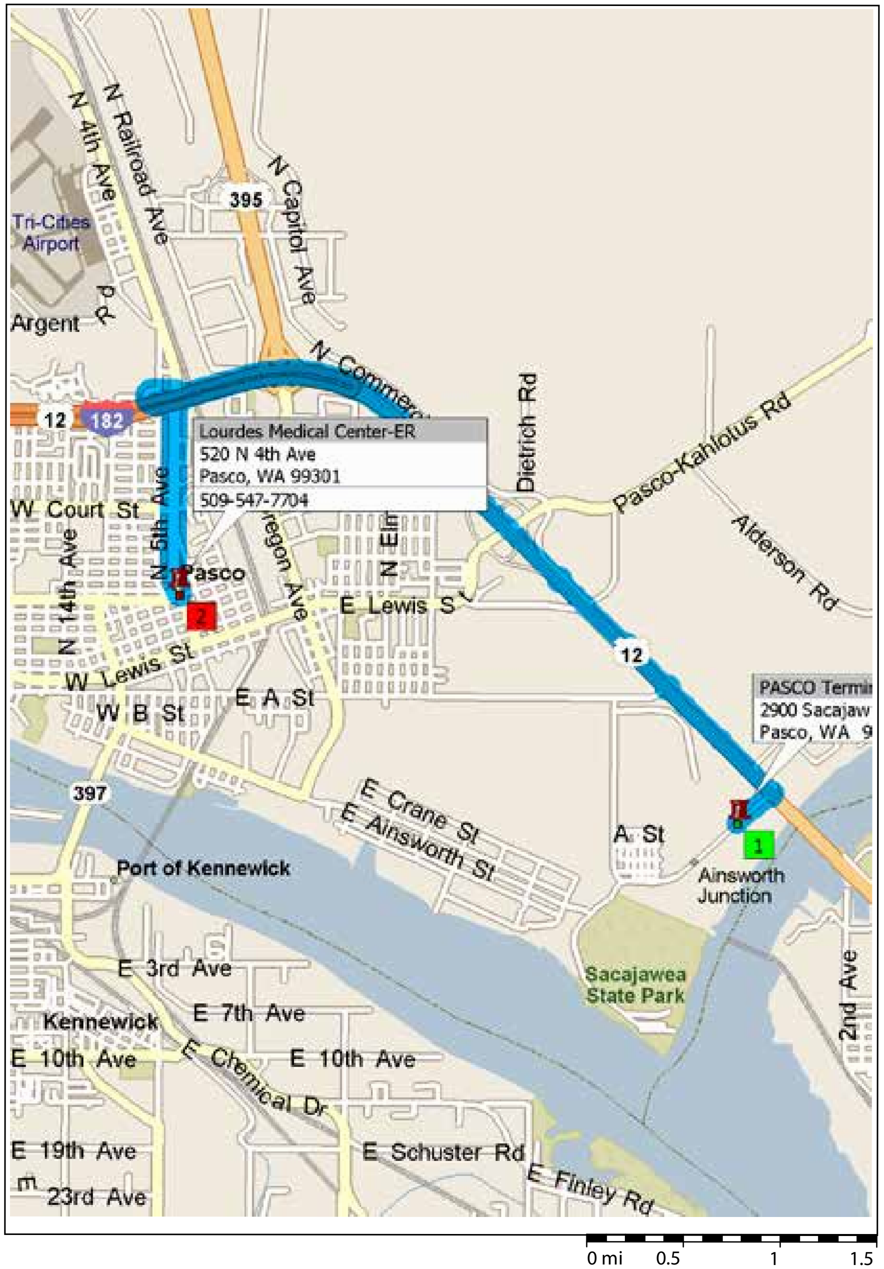
9:00 AM	0.0 mi	1 Depart PASCO Terminal Site on Sacajawea Park Rd (East) for 0.2 mi
9:00 AM	0.2 mi	Turn LEFT (North-West) onto US-12 for 2.9 mi
9:03 AM	3.1 mi	Road name changes to I-182 [US-12] for 7.4 mi
9:10 AM	10.6 mi	At exit 7, turn RIGHT onto Ramp for 0.4 mi towards Broadmoor Blvd
9:11 AM	10.9 mi	Turn RIGHT (North) onto Broadmoor Blvd for 0.2 mi
9:11 AM	11.1 mi	Turn RIGHT (East) onto Sandifur Pkwy for 120 yds
9:12 AM	11.1 mi	2 Arrive Lourdes Occupational Clinic [9915 Sandifur Pkwy, Pasco, WA 99301]

Tesoro Pasco Fuel Terminal Site to Lourdes Medical Center-ER

5.9 miles; 8 minutes



0 mi 0.5 1 1.5 2



9:00 AM	0.0 mi	1 Depart PASCO Terminal Site on Sacajawea Park Rd (East) for 0.2 mi
9:00 AM	0.2 mi	Turn LEFT (North-West) onto US-12 for 2.9 mi
9:03 AM	3.1 mi	Road name changes to I-182 [US-12] for 1.4 mi
9:05 AM	4.5 mi	At exit 13, turn RIGHT onto Ramp for 0.3 mi towards N 4th Ave / City Center
9:05 AM	4.8 mi	Turn RIGHT (South) onto N 4th Ave for 1.1 mi
9:08 AM	5.9 mi	2 Arrive Lourdes Medical Center-ER [520 N 4th Ave, Pasco, WA 99301]