AECOM

Environment

Prepared for
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Submitted to
Washington Department of Ecology

Submitted by
AECOM
888 SW Fifth Avenue, Suite 600
Portland, OR 97204

60650612
September 2021

Final Supplemental Remedial Investigation/Feasibility Study

Tesoro Pasco Bulk Fuel Terminal

2900 Sacajawea Park Road
Pasco, Washington
Ecology Cleanup Site ID: 4867
Ecology Facility Site ID: 55763995

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September 30, 2021

Christer Loftenius
Hydrogeologist
Washington State Department of Ecology
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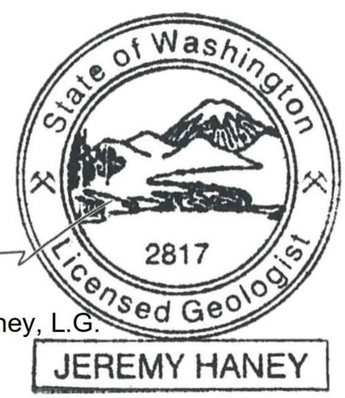
Re: Final Supplemental Remedial Investigation/Feasibility Study
Tesoro Pasco Bulk Fuel Terminal
2900 Sacajawea Park Road
Pasco, Washington
Ecology Cleanup Site ID: 4867

Dear Mr. Loftenius:

The attached report has been prepared by AECOM on behalf of Tesoro Logistics Operations, LLC. If you have any questions or require additional information, please contact Nicky Moody at (971) 323-6324.

Sincerely,

AECOM



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Acronyms

2011 RI/FS	2011 Remedial Investigation and Feasibility Study
2020 BA	2020 Biodegradation Assessment
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
AC	activated carbon
ARARs	applicable or relevant and appropriate requirements
ASTs	aboveground storage tanks
bgs	below ground surface
BNSF	Burlington Northern Santa Fe
BTEX	benzene, toluene, ethylbenzene, and xylenes
CFR	Code of Federal Regulations
cfs	cubic feet per second
COCs	constituents of concern
COPECs	constituents of potential ecological concern
CPL	Chevron Pipeline Company
CSM	conceptual site model
CUL	MTCA Method A cleanup level, as established in Tables 720-1 and 745-1 of WAC 173-340-900, revised November 2007
dba	doing business as
Ecology	Washington Department of Ecology
EDB	1,2-dibromoethane
FS	Feasibility Study
ft/d	feet per day
ft/yr	feet per year
in	inch
IC	institutional controls
ISB	in-situ bioremediation
ITRC	Interstate Technical and Regulatory Council
LNAPL	light non-aqueous phase liquid
MDC	maximum detected concentrations
mg/kg	milligrams per kilogram
mi/yr	miles per year
MNA	monitored natural attenuation
MPC	Marathon Petroleum Corporation
MTBE	methyl tert-butyl ether
MTCA	Model Toxics Control Act
NAPL	non-aqueous phase liquid
NGVD	National Geodetic Vertical Datum
NPV	net present value
NSZD	natural source zone depletion
NTUs	nephelometric turbidity units
O&M	operation and maintenance
PID	photoionization detector
POC	point of compliance
ppm	parts per million
PVC	polyvinyl chloride
RAAs	remedial action alternatives
RAO	remedial action objectives

RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
SGC	silica gel cleanup extraction
Scarlet Red	OilScreenSoil™ (Scarlet Red)®
Site	Portion of the terminal addressed in this Supplemental RI/FS
SMS	Sediment Management Standards
Supplemental RI/FS	Supplemental Remedial Investigation/Feasibility Study
SVE	soil vapor extraction
TEE	Terrestrial Ecological Evaluation
terminal	Tesoro Pasco Bulk Fuel Terminal
Tesoro	Tesoro Logistics Operations, LLC, a wholly-owned subsidiary of MPC
Tidewater	Tidewater Terminal Company, Inc.
TPH	total petroleum hydrocarbons
TPH-d	diesel-range total petroleum hydrocarbons
TPH-g	gasoline-range total petroleum hydrocarbons
TPH-o	motor oil-range total petroleum hydrocarbon
URS	URS Corporation
USC	United States Code
USEPA	United States Environmental Protection Agency
USGS	U.S. Geological Survey
VOC	volatile organic carbon
WAC	Washington Administrative Code

Executive Summary

AECOM has prepared this *Final Supplemental Remedial Investigation and Feasibility Study* (Supplemental RI/FS) on behalf of Tesoro Logistics Operations, LLC (Tesoro) at the Tesoro Pasco Bulk Fuel Terminal located at 2900 Sacajawea Park Road, Pasco, Washington (herein referred to as the terminal; the portion of the terminal addressed by this Supplemental RI/FS is herein referred to as the Site). The primary objective of this report is to present results of soil, groundwater, and soil vapor investigations conducted at the Site after 2011 and the subsequent evaluations performed to identify cleanup action alternatives.

The terminal comprises approximately 33 acres in size and has been an active fuel terminal since 1950 and will remain an active fuel terminal for the foreseeable future. Chevron Pipeline Company operated the terminal from 1950 until Tesoro purchased the terminal in June 2013. Most of the terminal is located on a bluff and is zoned as I-1 (light industrial district) and I-2 (medium industrial district). In this upland portion of the Site, a total of 19 aboveground storage tanks (ASTs) are used to store diesel, gasoline, jet fuel, and ethanol. Additional infrastructure in the upland portion includes a truck rack and pump station, and a lined evaporation pond is located in the northwest portion of the terminal. Tidewater Terminal Company, Inc. (Tidewater) owns and operates fuel pipelines within a three-acre easement crossing the terminal. Tidewater is responsible for managing ongoing environmental activities associated with a pipeline fuel release in this area under a separate Agreed Order; this area is not included in the Site.

Occasional releases of petroleum products from ASTs, pipelines and other facilities have been documented over time at the Site, which includes the Northern and Southern Tank Area, the North Area, the Riverbank, and the sloped area between the Riverbank Area and the upland area. An overwater dock for unloading fuel from barges is located in the Riverbank Area, on the north bank of the impounded Snake River (the Lake Wallula segment), approximately 1.25 miles upstream from its confluence with the Columbia River. The Site will remain an active fuel terminal for the foreseeable future.

A Remedial Investigation/Feasibility Study (RI/FS) was first submitted by URS Corporation in September 2011 (2011 RI/FS) under Agreed Order 7294, which was entered into on December 4, 2009, by Ecology, CPL, and Tidewater. Ecology issued a Draft Cleanup Action Plan in December 2012, which selected monitored natural attenuation (MNA) coupled with passive bioventing, a restriction on groundwater use, and groundwater monitoring (Ecology, 2012). On March 23, 2016, Tesoro entered into Agreed Order DE 12989 with the Washington Department of Ecology (Ecology) (Ecology, 2016a). Agreed Order DE 12989 required Tesoro to conduct a supplemental RI for the Site and produce a Supplemental RI/FS in accordance with Washington State Model Toxics Control Act (MTCA) regulations described in Washington Administrative Code (WAC) 173-340, especially WAC 173-340-350. This Supplemental RI/FS serves as a submittal to Ecology under Agreed Order DE 12989.

Remedial Investigations Activities

The supplemental RI sampling program consisted of soil vapor, subsurface soil, surface riverbank soil, and groundwater sampling. Sampling conducted prior to 2011 are described in the 2011 RI/FS. Investigations conducted after 2011 include:

- A passive soil gas survey conducted in 2016
- Well headspace soil vapor sampling, using active soil vapor sampling methods, conducted in 2014 and 2018
- In-field measurements of biodegradation parameters in soil vapor, using active soil vapor sampling methods, in 2020
- Riverbank surface soil sampling at nine locations on the riverbank in 2016
- A Site-wide assessment of subsurface soil in 2015, 2018, and 2019, including 97 samples from 19 locations at depths ranging from 5 feet below ground surface (bgs) to 86 feet bgs
- Site-wide groundwater monitoring conducted semi-annually beginning in 2014 at up to 22 monitoring wells per monitoring event

- A biodegradation assessment conducted in 2019 and 2020, including soil and groundwater sampling, installation and assessment of in-situ BioTrap® samplers in a monitoring well, bacteria and archaea sequencing, and bench-scale treatability studies

Supplemental RI sample results were compared to the MTCA Method A cleanup levels, as established in Tables 720-1 and 745-1 of WAC 173-340-900, revised November 2007 (CULs). Sample data indicates that petroleum impacts are present in the following areas:

- In the southern end of the tank farm (Southern Tank Area), the constituents of concern (COCs) are gasoline-range total petroleum hydrocarbons (TPH-g), diesel-range total petroleum hydrocarbons (TPH-d), and motor oil-range total petroleum hydrocarbons (TPH-o) in groundwater and subsurface soil (from 80 feet bgs to 84 feet bgs, which is at the water table).
- In the northern end of the tank farm (Northern Tank Area), the COCs are TPH-d and TPH-o in groundwater.
- West of the lined evaporation pond (North Area), the COCs are TPH-g, benzene, toluene, ethylbenzene, total xylenes, and naphthalene in groundwater and subsurface soil (from 83 feet bgs to 90 feet bgs, which is at the water table).
- Light non-aqueous phase liquid was not noted during the supplemental RI.

Precipitation infiltrates rapidly through the Site's high-infiltration sand and gravel fill, which covers much of the terminal. Petroleum hydrocarbons infiltrated through the vadose zone to the underlying groundwater. Residual petroleum hydrocarbons are present in soil at the groundwater table. Dissolved phase petroleum hydrocarbons are present in groundwater and are transported southeast via groundwater flow. Dissolved phase impacts in groundwater is limited to three areas within the upland area, including the Southern Tank Area, the Northern Tank Area, and the North Area. Biodegradation by native microbial populations attenuates total petroleum hydrocarbons (TPH) and volatile organic compounds (VOC) in soil and groundwater to concentrations below laboratory detection limits before reaching wells downgradient of the source areas.

On sites where the cleanup action is routine or involves relatively few hazardous substances, MTCA allows for use of MTCA Method A cleanup levels, as listed in Tables 720-1 and 745-1 of WAC 173-340-900. Because impacts at the Site are limited to groundwater in upland portions of the Site and soil at the groundwater capillary fringe (80 feet bgs), this Site qualifies for assessment under Method A. The Terrestrial Ecological Evaluation conducted for this Site under WAC 173-340-749(2)(b) and WAC 173-340-7492(2)(c) confirmed that no further terrestrial ecological receptor evaluation is warranted at the Site.

The proposed point of compliance (POC) for groundwater at the Site is the unconfined groundwater within the sand and gravel deposits beneath the upland portion of the Site (WAC 173-340-720 [8]). The Site's network of monitoring wells provides an adequate assessment of the groundwater and COCs at the standard POC. The proposed soil cleanup level is protection of groundwater. Therefore, with Ecology's approval, an empirical demonstration will be made using Site groundwater data to show soil contaminant concentrations are protective of groundwater, following procedures described in WAC 173-340-747 (9). Compliance will be demonstrated by directly comparing groundwater concentrations at the Site following source area remediation to the proposed groundwater CULs. If groundwater at the Site meets the CULs, this pathway will be empirically demonstrated to have met soil CULs and will be in compliance.

Development and Evaluation of Cleanup Action Alternatives

The Site has undergone several aggressive, interim remedial actions, resulting in the effective removal of most of the petroleum hydrocarbon impacts. Three localized remaining source areas with COCs greater than CULs have been identified as the Southern Tank Area, Northern Tank Area, and North Area. The following Remedial Action Objectives (RAOs) have been developed for the Site to address these areas:

- Protection of human health and the environment
- Comply with cleanup standards
- Comply with applicable local, state, and federal laws
- Establish compliance monitoring to evaluate the effectiveness of the selected remedy

Remedial technologies were screened for applicability at the Site and potential for achieving RAOs. Screened-in technologies were assembled into remedial alternatives for evaluation following WAC 173-340-360. The screened technologies, and screening results are as follows:

- Institutional Controls (ICs) – *Screened-In*
- Soil Vapor Extraction – *Screened-Out (Rejected)*
- Monitored Natural Attenuation (MNA) – *Screened-In*
- Natural Source Zone Depletion (NSZD) – *Screened-In*
- Bioventing – *Screened-Out (Rejected)*
- Pump and Treat – *Screened-Out (Rejected)*
- Enhance In-Situ Bioremediation (Oxygen-Releasing Compounds) – *Screened-In*
- Bio-Sparging – *Screened-In*
- Activated Carbon Based In-Situ Treatment – *Screened-In*

In addition to a No Action Alternative to serve as a baseline for comparison, the following four remedial alternatives were assembled, based on screened-in technologies, and evaluated following WAC threshold criteria and disproportionate cost analysis (DCA), and sustainability:

- Alternative 1 – ICs, MNA, and NSZD Monitoring
- Alternative 2 – ICs, MNA, NSZD Monitoring, and Oxygen-Releasing Compounds
- Alternative 3 – ICs, MNA, NSZD Monitoring, Oxygen-Releasing Compounds, and Bio-Sparging
- Alternative 4 – ICs, MNA, NSZD Monitoring, Oxygen-Releasing Compounds, Bio-Sparging, and Activated Carbon Based In-Situ Treatment

Selection of Preferred Cleanup Action Alternative

Alternative 2 (ICs, MNA, NSZD Monitoring, and Oxygen-Releasing Compounds) is the preferred cleanup action alternative.

Alternative 1 relies only on natural processes, with no enhancement, for degradation of COCs to meet Site RAOs. Alternative 2 includes enhancement of natural processes using oxygen-releasing compounds, thereby resulting in a shorter restoration time frame compared to Alternative 1.

Alternative 2 ranks the best based on DCA ranking criteria. The restoration time frame for this alternative is up to fifteen years. A performance monitoring program would be used throughout implementation of this alternative, including alternative initiation, and the restoration time frame would be re-evaluated. The current low-range value for the Alternative 2 restoration time frame is five years.

Though the high-range restoration time frame values for Alternatives 3 and 4 are shorter than for Alternative 2, ten years and five years, respectively, sustainability assessments of Alternatives 3 and 4 revealed high economic, environmental, and social (the three stainability pillars) impacts compared to Alternatives 1 and 2.

1 Introduction

AECOM has prepared this *Final Supplemental Remedial Investigation and Feasibility Study* (Supplemental RI/FS) on behalf of Tesoro Logistics Operations, LLC (Tesoro) at the Tesoro Pasco Bulk Fuel Terminal located at 2900 Sacajawea Park Road, Pasco, Washington (herein referred to as the terminal; the portion of the terminal addressed by this Supplemental RI/FS is herein referred to as the Site). The primary objective of this report is to present results of soil, groundwater, and soil vapor investigations conducted at the Site and the subsequent evaluations performed to identify cleanup action alternatives. The original RI/FS was submitted by URS Corporation (URS) in September 2011 (2011 RI/FS; URS and CH2M HILL, 2011).

This Supplemental RI/FS was conducted in accordance with Agreed Order DE 12989 between the Washington Department of Ecology (Ecology) and Tesoro, following Model Toxic Control Act (MTCA) regulations described in Washington Administrative Code (WAC) 173-340, especially WAC 173-340-350.

1.1 Site Summary

Site Name:	Tesoro Pasco Bulk Fuel Terminal
Site Owner:	Tesoro Logistics Operations, LLC (a subsidiary of Marathon Petroleum Corporation [MPC])

Site Location Information:

Site Address:	2900 Sacajawea Park Rd, Pasco, WA 99301
Latitude/Longitude:	46.21654, -119.03147
Township and Range:	9N 30E 35

Identification Numbers:

Ecology Cleanup Site ID:	4867
Ecology Facility Site ID:	55763995
Franklin County Parcel ID:	112580011

Contact Information for Project Coordinators:

AECOM Project Manager:	Nicky Moody (971-323-6324; nicky.moody@aecom.com)
Tesoro Project Manager:	Kyle Waldron (253-896-8731; kawaldron@marathonpetroleum.com)
Ecology Site Manager:	Christer Loftenius (509-329-3543; clof461@ecy.wa.gov)

The 33-acre terminal is adjacent to the Lake Wallula segment of the Snake River and surrounded by unimproved land to the southwest, north, and northeast (Figure 1). The elevation at the Site ranges from approximately 356 feet National Geodetic Vertical Datum (NGVD) along the Snake River to approximately 425 feet NGVD in the upland portion of the Site, where the aboveground storage tanks (ASTs) are located (URS and CH2M HILL, 2011).

The Site is developed with ASTs, a truck loading rack, a pumping station, underground and aboveground pipelines, a barge loading dock, a lined evaporation pond, a maintenance garage, and offices. In addition, a Burlington Northern Santa Fe (BNSF) railroad line runs through the Site along the Snake River (Figure 2).

The terminal has been active since September 1950, receiving fuel products through underground pipelines and by barge. Prior to 1950, the property was undeveloped, except for the BNSF railroad line. A total of 19 ASTs varying in storage capacity between approximately 588,000 and 2,520,000,000 gallons and eight fuel additive ASTs with capacities between 500 gallons and 12,000 gallons are present at the Site. Additionally, one 23,000-

gallon relief AST is present at the Site (CEECON, 2016). The ASTs are used to store diesel, gasoline, jet fuel, and ethanol (URS and CH2M HILL, 2011).

Chevron Pipeline Company (CPL) operated the terminal from 1950 until Tesoro purchased the terminal in June 2013 (MPC acquired Tesoro in 2018). Refer to Sections 2.1 and 2.2 for more detail.

Tidewater Terminal Company, Inc. (Tidewater) owns and operates fuel pipelines within a three-acre easement crossing the terminal. The area within the western corner of the terminal, labeled on Figure 2 as the Tidewater site, includes the area of a pipeline fuel release which occurred in July 2000. Tidewater is responsible for managing ongoing environmental activities associated with this release under a separate Agreed Order.

1.2 Regulatory Setting

Terminal-wide investigations previously occurred under Agreed Order 7294, which was entered into on December 4, 2009, by Ecology, CPL, and Tidewater. Agreed Order 7294 directed CPL and Tidewater to conduct the terminal-wide 2011 RI/FS, which included the Site and the adjacent Tidewater site. In October 2011, CPL and Tidewater finalized the 2011 RI/FS. In December 2012, Ecology issued a Draft Cleanup Action Plan and selected Alternative 1 (monitored natural attenuation [MNA] coupled with passive bioventing), as the cleanup action for the Site (Ecology, 2012). Alternative 1 also included a restriction on groundwater use and also required groundwater monitoring to confirm natural attenuation is reducing the contamination to below the cleanup levels for a minimum of four consecutive sampling events.

To facilitate cleanup and additional investigation, in July 2015, Ecology separated the terminal into two distinct and unique areas: the Site, addressed in this Supplemental RI/FS, and the adjacent Tidewater site (Figure 2). Supplemental environmental remediation activities at the Site following submittal of the 2011 RI/FS were performed pursuant to Agreed Order DE 12989, which was signed by Ecology and Tesoro on March 23, 2016. Agreed Order DE 12989 required Tesoro to conduct a supplemental remedial investigation (RI) for the Site and produce a Supplemental RI/FS in accordance with MTCA regulations described in WAC 173-340, especially WAC 173-340-350.

1.3 Report Organization

The RI sections of this document are organized as follows:

- **Section 2 – Site History and Physical Characteristics.** Describes the Site and its setting, including land use and ownership, site history and future site use, geology, hydrogeology, and hydrology.
- **Section 3 – Investigations and Cleanup Actions.** Summarizes investigations and cleanup actions conducted prior to publication of the 2011 RI/FS and describes sample collection methods for the current investigation.
- **Section 4 – Remedial Investigation Results.** Provides analytical results of this Supplemental RI.
- **Section 5 – Conceptual Site Model.** Describes source areas and constituents of concern (COCs), exposure pathways and potential receptors and provides a graphical conceptual site model (CSM).
- **Section 6 – Terrestrial Ecological Evaluation.** Evaluates risk to ecological receptors at the Site.
- **Section 7 – Cleanup Standard Development.** Assesses applicable or relevant and appropriate requirements (ARARs) for the Site, provides proposed cleanup levels and point of compliance.

The FS sections of this document are organized as follows:

- **Section 8 – Remedial Action Objectives, Remedial Technologies, and Development of Alternatives.** Describes the remedial objectives and the remedial alternatives developed for evaluation based on a remedial technology screening.
- **Section 9 – Evaluation of Alternatives.** Provides a detailed evaluation of remedial alternatives for the Site to identify the recommended alternative.

- **Section 10 – Recommended Remedial Action Alternative.** Provides detail regarding the remedial action alternative recommended for achieving Remedial Action Objectives (RAO).

The following sections provide information for both the RI and FS portions of this document:

- **Section 11 – Limitations.** Describes the limitations of this Supplemental RI/FS.
- **Section 12 – References.** Includes a list of references included in this Supplemental RI/FS.

2 Site History and Physical Characteristics

This section provides a description of the terminal's history, Site use, and environmental setting.

2.1 Land Use and Ownership

CPL operated the terminal from 1950 until Tesoro purchased the Site in June 2013. In 2018, Tesoro Corporation was acquired by MPC but Tesoro Logistics Operations, LLC (a wholly-owned subsidiary of MPC) continues to own and operate the terminal. Tesoro also owns many of the surrounding tax parcels. Following the 2011 RI/FS, to facilitate cleanup and additional investigation, in July 2015, Ecology separated the terminal into two distinct and unique areas, the Site, addressed in this Supplemental RI/FS, and the adjacent Tidewater site (Figure 2). This Supplemental RI/FS focuses on the CPL area (the Site), which changed ownership to Tesoro on June 19, 2013 (Ecology, 2016a).

The terminal is approximately 33 acres and has been active since September 1950. The Site will remain an active fuel terminal for the foreseeable future. The Site is zoned as I-1 (light industrial district) and I-2 (medium industrial district). A total of 19 ASTs varying in storage capacity between approximately 588,000- and 2,520,000-gallons and eight fuel additive ASTs with capacities between 500- and 12,000-gallons are present at the Site (Northern and Southern Tank Areas). Additionally, one 23,000-gallon relief AST is present at the Site (CEECON, 2016). The ASTs are used to store petroleum products (diesel, gasoline, jet fuel, and ethanol) (URS and CH2M HILL, 2011). A truck rack and pump station for loading fuel trucks is in the southeast portion of the Site. A lined evaporation pond is in the northern portion of the Site (North Area) and an overwater dock for unloading fuel from barges is located on the western boundary of the Site (Riverbank Area). A reported unlined evaporation pond was formerly located in the North Area, east of the current lined evaporation pond. A BNSF railroad line runs through the Site parallel to the Snake River.

Tidewater owns and operates the area within the western corner of the terminal; the Tidewater site boundary is labeled on Figures 1 and 2. This area contains a fuel transfer pipeline that exits the northwest area of the terminal and turns northeast along Sacajawea Park Road toward the Tidewater Terminal. A pipeline fuel release occurred in this area in July 2000, as described in Appendix A. Tidewater is responsible for managing ongoing environmental activities in this portion of the terminal under a separate Agreed Order.

2.2 Site History

The Site has operated as a bulk fuel terminal since circa 1950. Prior to 1950, this property was largely undeveloped. Available historical U.S. Geological Survey (USGS) topographic maps and U.S. Army Corps of Engineers aerial photograph, scaled to show the area around the Site, are provided in Appendix B. The 1917 topographic map shows that the BNSF railroad line and Sacajawea Park Road (both shown on Figure 2) were constructed prior to 1917. The topographic maps and aerial photograph between 1917 and 1951 indicate no change in features on or adjacent to the Site. The 1953 topographic map labels the Site as "Oil" (Appendix B).

During operations as a bulk fuel terminal, occasional releases of petroleum products from ASTs, pipelines and other infrastructure were documented. A timeline of documented historical releases, response actions undertaken, and subsequent investigations and remediation actions, are summarized chronologically in Tables 1 and 2 of the 2011 RI/FS (Appendix A).

The smaller spills were typically addressed immediately, resulting in little to no residual petroleum remaining in the subsurface. For example, a three-barrel diesel spill occurred on May 18, 1984, which was quickly remedied by the excavation and disposal of the diesel-impacted soil. The locations of minor spills previously remediated, and other releases contained within the wastewater system and recovered in oil/water separator, are not illustrated on Figure 2.

Documented releases where petroleum was not completely recovered are depicted on Figure 2. Spills with a potential to impact subsurface soil and groundwater are summarized as follows:

- On March 23, 1976, Tank No. 8 (Northern Tank Area) was overfilled, resulting in a release of 665 barrels of diesel. An emergency response action was undertaken and resulted in recovery of approximately 80 barrels.
- On December 20, 1978 approximately 600 barrels of gasoline were released when Tank No. 13, located in the Southern Tank Area, was overfilled. Approximately 200 barrels were recovered during the subsequent emergency response action.
- On February 1, 1984, CPL reported a gasoline release of 610 barrels from Tank No. 17, located in the Southern Tank Area, when an internal roof drain line froze and cracked, which allowed gasoline to escape. An emergency response action was initiated, and approximately 100 barrels of gasoline were recovered.
- In August 1986, a leak in a jet fuel line was found in the Riverbank Area and an unspecified volume of impacted soil was removed. A cleanup action was completed in 1987, consisting of excavation of approximately 1,900 cubic yards of additional soil from the shoreline area (Figure 2). Subsequently, all buried pipelines at the terminal were replaced with aboveground pipelines wherever physically possible.

CPL and Tidewater have previously conducted soil and groundwater investigations and performed remedial activities to address their respective historical releases (Appendix A).

2.3 Future Site Use

Since its construction and initial startup in September 1950, the terminal has operated as a bulk fuel storage facility, primarily for the storage and distribution of refined petroleum products and, recently ethanol. There are no current plans to change or alter the facility operations, and therefore, the terminal will continue to operate as a bulk fuel storage facility into the foreseeable future.

2.4 Site Geology

The Site is regionally located within the southeast portion of the Pasco Basin (Figure 3). The stratigraphy of the Pasco Basin consists of unconsolidated, sedimentary deposits underlain by a thick sequence of Miocene-age basalt known as the Columbia River Basalt Group. These unconsolidated deposits, from the deepest to the shallowest, include the Pliocene Ringold Formation, the Cold Creek sediments, and the Pleistocene Hanford Formation (Martin, 2011). At the Site, Hanford sediments were identified to the maximum depth of exploration of approximately 100 feet below ground surface (bgs), based on the interpretation of information provided in Site boring logs (Appendix C).

The “Hanford Formation” is the informal name given to Pleistocene-age cataclysmic flood deposits in the Pasco Basin. Sources for the floodwaters included Glacial Lake Missoula, pluvial Lake Bonneville, and ice-margin lakes that formed around the margins of the Columbia Plateau (Baker et al., 1991). These floods periodically covered the Pasco Basin during the Pleistocene, often eroding existing sediments (e.g. the Ringold Formation and Cold Creek unit). As the floodwaters encountered restricted flow through the Wallula Gap, located south of the Snake River confluence (Figure 3), both coarse- and fine-grained sediments carried in the floodwaters were deposited within the Pasco Basin. Deposition and erosion of the sediments occurred several times, leaving behind lenses of sand and silt surrounded by sand and gravel. The Site is located within the southeast portion of the Pasco Basin, where flood currents were stronger and coarse-grained sediments are more common. Fine-grained sediments are primarily found near the margins of the Pasco Basin.

Borings advanced at the Site indicate the Site geology is generally composed of two lithologies; sand and gravel of the Hanford Formation. In some areas, thin layers of overbank silt and silty sand deposits are present with thicker layers observed at the bottom of borings along the Snake River. Available monitoring well and vapor extraction well logs are included in Appendix C.

A cross-section plan map is included as Figure 4. Three cross-sections, prepared without and with analytical data, are presented as Figures 5 (A-A’), 6 (B-B’) and 7 (C-C’). Available well construction and boring logs from the prior 2011 RI/FS and from the recent supplemental RI efforts are included in Appendix C. Table 1 provides an updated summary of monitoring well construction details and survey data. The well construction logs which were not available are indicated on Table 1.

Lithological descriptions of the sand and gravel facies from the Site are presented below:

- The sand is generally described as brown to gray, fine to medium-grained, loose, and well sorted. The average thickness across the Site is approximately 80 feet; however, it is locally thicker in some locations (e.g. AB-7/MW-3 where it is 95 feet thick). Borings along the Snake River were terminated at a depth as shallow as 20 feet, therefore the full thickness of sand in these locations is not known. As previously discussed, layers of silt and silty sand are locally interbedded within the sand unit as are thin layers of gravel. One exception to the thin gravel lenses is shown at RW-1 on cross section A-A' (Figure 5) where gravelly sand extends near the surface from a depth of approximately 7 feet bgs to 40 feet bgs. This relatively recent feature is likely a drainage gully cut into the surrounding sand as surface water drained towards the Snake River. At the base of the sand unit at many of the locations 1 to 7 feet of sandy gravel overlay the lower gravel deposit.
- The gravel is described as gray to brown to red, dense, and fine to coarse-grained. The gravel is commonly basalt and is typically ¾ to 1½ inches in diameter, with some pieces ranging up to 2 inches in diameter. At several locations trace amounts of sand is observed in addition to cobbles and boulders. Groundwater is typically encountered at or slightly above the sand/gravel interface. Figure 8 presents the projected gravel surface based on depth to gravel information from the boring and monitoring well logs. The gravel surface appears to dip to the north, south and east with a steeper gradient to the south.

The base of the gravel unit was not encountered during installation of the Site borings or monitoring wells. The maximum gravel thickness penetrated on Site was 23 feet at CPL recovery well RW-1. In a water well installed at Hood Park located approximately 3,500 feet southeast of the Site, basalt was encountered at a depth of 57 feet bgs with approximately 34 feet of gravel and 16 feet of broken basalt overlying competent basalt.

2.5 Site Hydrogeology

Regional groundwater flow within the Pasco Basin is generally to the southwest, towards the major surface water bodies (the Columbia and Snake Rivers). Figure 9 provides groundwater elevation contours developed as part of the USGS Pasco Basin regional groundwater model (Heywood et al., 2016). The unconsolidated aquifer at the Site is unconfined and groundwater is typically encountered at a depth of approximately 80 feet bgs. Groundwater elevations are generally stable throughout the year. Groundwater on Site flows towards the Snake River to the southeast (Figures 10 and 11). The magnitude of the hydraulic gradient varies with distance from the Snake River. In the upland portion of the Site, where the ASTs are located, the hydraulic gradient is relatively flat and ranged from approximately 0.00007 to 0.008 foot per foot between June 2019 and June 2020. Closer to the Snake River, the hydraulic gradient steepens and ranged from approximately 0.006 to 0.01 foot per foot.

Representative hydrographs for wells MW-6, MW-8, MW-7, and MW-11 located at increasing distances from the riverbank, respectively, are presented in Figure 12. The lowest groundwater elevations occur in the wells closest to the Snake River (e.g. MW-6). Table 2 provides a cumulative summary of groundwater elevations.

Hydraulic conductivity values for the Hanford Formation at the nearby Hanford Site ranged from 20 feet per day (ft/d) for the fine sand to 66,240 ft/d for the coarse gravel and cobbles (Martin, 2011). The USGS hydraulic conductivity values for the Hanford Formation in a Pasco Basin regional groundwater model ranged from 12 ft/d to 4,245 ft/d (Heywood et al., 2016). Using the minimum and maximum hydraulic gradient from the upland portion of the Site, hydraulic conductivity values and the average effective porosities of 35 percent (%) and 25% for the sand and gravel, respectively, determined at the Hanford Site results in a groundwater Darcy velocity range of approximately 0.5 feet per year (ft/yr) to 193,000 ft/yr (37 miles per year [mi/yr]) for the fine and coarse deposits, respectively, and a groundwater seepage velocity range of approximately 1.5 ft/yr to 773,700 ft/yr (150 mi/yr) for the fine and coarse deposits, respectively.

2.6 Site Hydrology

The Site is located on the north bank of the impounded Snake River (the Lake Wallula segment), approximately 1.25 miles upstream from its confluence with the Columbia River and approximately 42 miles upstream of McNary Dam. Surface water flow varies seasonally through the year, with peak flows generally in May to June from snow melt and winter rains, and low stages in August to October. Figure 13 presents the daily surface water elevation over the past 10 years.

Lake Wallula lies directly behind the McNary Dam, which extends up the Snake River to Ice Harbor Lock and Dam, approximately 42 miles, and also extends 64 miles upstream on the Columbia River. Water elevation is controlled at McNary Dam for navigational and hydroelectric purposes. The normal operating pool of Lake Wallula ranges between 335 and 340 feet NGVD[1]. River discharge commonly ranges from 20,000 cubic feet per second (cfs) to 200,000 cfs. Flood discharges can be substantially larger than 200,000 cfs.

2.7 Sensitive Receptors

Sensitive receptors are located more than one-third of a mile from the Site and include water wells, state parks, and a wildlife refuge (Figure 14). Day care facilities, schools, and hospitals are located more than a mile from the Site. Groundwater at the Site flows directly to the adjacent Snake River. Sensitive receptors are located cross-gradient or upgradient of the Site and are not affected by on-Site impacts. The nearest sensitive receptors are described below.

- ***Water Wells*** – Ecology's Well Report Viewer was used to identify water wells used for irrigation or domestic use near the Site (Ecology, 2021). Forty-one water wells were identified within approximately 1 mile of the Site and on the west side of the Snake River. The nearest seven wells, which were all more than 1,500 feet from the Site, are highlighted below (with their Ecology Well Report IDs). All 41 well logs are included in Appendix B; land surface elevation is generally similar to upland portions of the terminal (Figure 14).
    - Two municipal wells (173850 and 173851) and one unspecified-use well (169706) are located approximately 1,500 feet west of the Site at the Lakeview Mobile Home Park. The two municipal wells were installed in 1967, and the third well was installed in 1972. These wells are screened from 83 to 96 feet bgs.
    - An irrigation well (164797), located approximately 2,000 feet northwest of the Site, was installed by the Columbia East Land Company in 1972. It is screened from 79 to 115 feet bgs.
    - A water well (unspecified use) (173449), located approximately 2,500 feet northeast of the Site, was installed at the Tidewater Terminal in 1952. This well is screened from 115 to 120 feet bgs.
    - Two domestic water wells (164892 and 164893) were mapped to the Sacajawea Historical State Park, which is located south of the Site. These wells were installed in 1923 and 1928, which was prior to the property's use as a state park. The location of these two wells is within the northeast quadrant of Section 3, but no specific address was included. The distance from the Site to the nearest boundary of this quadrant is approximately 2,000 feet to the southwest. The two logs do not include well construction details.
- ***Parks and Wildlife Refuges*** – Google maps was used to identify parks and wildlife refuges in the Site vicinity. Those found within approximately one-half mile of the Site are highlighted below. Administrative agency websites, cited below, were used to determine services offered by each location.
    - Sacajawea Historical State Park is located approximately 2,000 feet southwest of the Site.[2] This is a day use park with hiking, picnic and cooking areas, interpretive signs, and restrooms. According to the City of Pasco Public Works Department, the state park is not connected to the

[1] https://www.nwd-wc.usace.army.mil/dd/common/projects/www/mcn.html
[2] https://parks.state.wa.us/575/Sacajawea

City of Pasco municipal water supply (City of Pasco, 2021b). Therefore, it is feasible that the two domestic water wells (164892 and 164893) listed above are used for park services.

- Hood Park is located on the opposite bank of the Snake River, approximately 2,000 feet northeast of the Site. It features camping, a boat launch, hiking, picnicking and restrooms.[3]
- The McNary National Wildlife Refuge is located approximately 2,500 east-southeast of the Site, across the Snake River in Burbank, Washington.[4] It features wildlife viewing, hiking, and kayaking. It was established to provide habitat for waterfowl, shorebirds, and songbirds.

- **Daycares, Schools, and Hospitals** – Google Maps was used to identify daycares, schools, and hospitals in the Site vicinity. All identified facilities were located more than one mile from the Site.
  - The nearest identified daycare, Benton Franklin Head Start, is located more than one mile northwest of the site at 205 S Wehe Avenue in Pasco.[5]
  - Robinson Elementary School is located adjacent to the Benton Franklin Head Start and is the nearest school to the Site. It serves approximately 800 students.[6]
  - The nearest hospital to the Site is Lourdes Medical Center, located approximately 3 miles to the northwest at 520 N Fourth Avenue, Pasco.[7]

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[3] https://www.recreation.gov/camping/campgrounds/233514
[4] https://www.fws.gov/refuge/mcnary/
[5] https://bfhs.net/
[6] https://www.psd1.org/robinsones
[7] https://www.yourlourdes.com/

3 Investigations and Cleanup Actions

This section summarizes the investigations and evaluations conducted at the Site.

3.1 Investigations and Cleanup Actions Prior to 2010

Investigations and groundwater monitoring conducted at the terminal prior to 2010 were previously described in the 2011 RI/FS and are summarized below. A list of source documents and further description are available in Sections 3 and 4 of the 2011 RI/FS. Following the 2011 RI/FS, Ecology separated the 2011 RI/FS area into two separate areas: the Tidewater site and the Site. This Supplemental RI/FS focuses on the Site, which changed ownership from CPL to Tesoro on June 19, 2013 (Ecology, 2016a).

3.1.1 Soil Excavations and Other Remediation Activities

Soil excavations and cleanup actions prior to 2010 are described in detail in the 2011 RI/FS and summarized below:

On July 14, 1986, a sheen was observed along the riverbank during routine measurement of groundwater levels. An absorbent boom was deployed to contain the suspected hydrocarbon. The sheen was caused by the terminal pipeline that was leaking jet fuel. The area surrounding the leaking pipeline was excavated in 1986 to identify the source of the sheen. A cleanup action, consisting of excavation of 1,900 cubic yards of soil from the shoreline was performed in May 1987. Of this, 500 cubic yards were identified as petroleum-affected and replaced with clean fill.

In July 1986, light non-aqueous phase liquid (LNAPL) was noted in MW-2, in the Southern Tank Area. A skimmer system was installed in MW-2 in December 1987. A forensic analysis of the LNAPL in MW-2 determined that the source was unleaded gasoline and therefore, was not the source of the sheen observed on the riverbank in 1986 (as described above). LNAPL thicknesses of 1 foot or less continued to be observed in MW-2 in 1987 and 1988. Remediation in the vicinity of MW-2 varied between 1987 and 2000 and included use of a skimmer, a dual-phase LNAPL recovery system, and a soil vapor extraction (SVE) system, and air sparging.

In November 1993, the SVE and air sparge system was expanded to include MW-3. By May 1996, only MW-3 contained measurable LNAPL; forensic analysis of the LNAPL in MW-3 was not performed. The source of this LNAPL is potentially gasoline releases near and upgradient of MW-3 (Figure 2). The SVE and air sparge system was discontinued in July 2000. By this time, LNAPL was occasionally observed in MW-3 and was not observed in other wells. A hydrocarbon-absorbing sock was installed in MW-3 in approximately June 2000. By 2003, LNAPL was no longer detected in monitoring wells in the vicinity of MW-2.

3.1.2 Groundwater Monitoring

Monitoring well installation dates are summarized in Table 1. Quarterly groundwater monitoring was conducted from June 1998 through September 2001. From 2002 through 2008, groundwater monitoring was performed annually. Samples from each well on Site were analyzed for gasoline-range total petroleum hydrocarbons (TPH-g), diesel-range total petroleum hydrocarbons (TPH-d), and motor oil-range total petroleum hydrocarbons (TPH-o), and benzene, toluene, ethylbenzene, and xylenes (BTEX). Methyl tert-butyl ether (MTBE) was added to the analytical suite in 2005. Analytical results are provided in Table 2.

Elevated concentrations of BTEX, TPH-g, and TPH-d were reported in monitoring wells located near the Southern Tank Area (MW-2, MW-3, MW-11, and MW-12). Concentrations steadily decreased over time during operation of the SVE and air sparge system. For screening purposes, groundwater analytical results are compared to the MTCA Method A cleanup levels, as established in Tables 720-1 and 745-1 of WAC 173-340-900, revised November 2007 (CULs). By October 2008, concentrations of most analytes were non-detect or less than the relevant CULs. TPH-d concentrations exceeded the CUL in wells MW-2 and MW-12.

3.2 2011 Remediation Investigation/Feasibility Study

A terminal-wide RI was conducted jointly by CPL and Tidewater in 2010, which included groundwater monitoring in June and December 2010 (URS and CH2M HILL, 2011). Results confirmed LNAPL was no longer present in wells in the vicinity of MW-2 or MW-3 (Southern Tank Area). However, residual concentrations of TPH-d and TPH-o in the Southern Tank Area continued to exceed the CULs.

The selected remedial action in the terminal-wide FS was institutional controls and MNA (URS and CH2M HILL, 2011). Specified performance monitoring included measurements of groundwater elevation, general water quality parameters, and COC concentrations at selected performance monitoring wells (MW-1 through MW-4, MW-6 through MW-8, MW-10 through MW-14, and RW-1). Institutional controls included physical barriers to terminal access, signage, and limitations on land use (URS and CH2M HILL, 2011).

3.3 Supplemental RI/FS Data Gap Investigations (2011 through 2020)

Following submittal of the 2011 RI/FS, Tesoro conducted additional investigations to assess data gaps identified in the 2011 RI/FS, including assessments of upland soil, riverbank surface soil, soil vapor, and groundwater. Results of these investigations are summarized in Section 4.

Investigations and sampling schedules are summarized in Table 3, and sample locations are provided in Figure 2. The investigations were completed in accordance with the *Compliance Monitoring Plan for the CLP Pasco Terminal* (2012 workplan; URS, 2012), *Confirmation Sampling Workplan* (2014 workplan; Azure, 2014), 2016 *Supplemental RI/FS Workplan (*2016 workplan; CEECON, 2016) and subsequent addendums. Appendix D provides the citations for the workplans and other investigation and groundwater monitoring reports. Data quality review reviews were performed in accordance with MTCA guidance and are provided in the Site investigation, groundwater monitoring, and soil vapor reports listed in Appendix D.

3.3.1 Soil Vapor Investigations

This subsection describes collection of soil vapor samples collected in 2014, 2016, and 2018, in accordance with the 2014 workplan (Azure, 2014), 2016 workplan (CEECON, 2016), and subsequent addendums (listed in Appendix D). The soil vapor sample locations are listed on Table 3 and shown on Figures 2 and 15.

Passive Soil Gas Survey: A passive soil gas survey was performed at the Site in November 21 through December 1, 2016 using methods described in the 2016 workplan (CEECON, 2016). Passive soil gas sample probes were placed at 77 locations at 3-feet bgs. Adsorbent cartridges were analyzed for C4-C9 range petroleum hydrocarbons (equivalent to TPH-g), C10-C15 range petroleum hydrocarbons (equivalent to TPH-d), and BTEX (CEECON, 2017a).

Well Headspace Active Soil Vapor Sampling: Active soil vapor sampling occurred in December 2014 and in September 2018, as described below:

- In December 2014, monitoring well headspace soil vapor samples were collected from 10 monitoring wells in accordance with the 2014 workplan. Prior to collecting a soil vapor sample, a vacuum was applied, and soil vapor was purged for 30 minutes to 1 hour at an unknown flow rate. Soil vapor samples were collected in Tedlar® bags and submitted for laboratory analysis for TPH-g and select volatile organic carbons (VOCs). Atmospheric gases were also analyzed in samples collected from two wells (MW-11 and MW-14) (Azure, 2015a).
- Four vapor extraction wells (VE-1 through VE-4) were installed in September 2018 (AECOM, 2019a) using methods described in Section 3.3.3. Monitoring well headspace soil vapor samples were collected from 16 monitoring wells and the 4 vapor extraction wells in December 2018 (CEECON, 2019). Monitoring well headspace was purged at an unknown flow rate (under vacuum of up to five inches of water column) for approximately 20 minutes using an internal combustion engine. Soil vapor samples were collected in Tedlar® bags and analyzed for TPH-g, BTEX, and fuel oxygenates.

The soil vapor sample collection methods used are effective as a preliminary assessment of distribution of VOCs in the subsurface. Soil vapor sample results from 2014, as described in Section 4.1, were used to determine locations for further monitoring well installation and soil sampling, as described in Sections 3.3.3 and 3.3.4. Soil and groundwater data were then used for developing the Site's CSM. Soil vapor sample results from 2018 were used to assess potential implementation of soil vapor extraction at the site.

Biodegradation Assessment Sampling: In January 2020, in support of the biodegradation assessment (described in Section 3.3.5), headspace soil vapor samples were collected from 10 monitoring wells and four vapor extraction wells. Soil vapor samples were collected from narrow-diameter tubing inserted into the vadose zone headspace. Well seals were used to allow for samples representative of the vadose zone. Tubing was purged at a standard rate of 200 mL/min before in-field analysis of soil vapor for compounds indicative of biodegradation (oxygen, carbon dioxide, and methane) and total VOCs using a Landtec GEM™ 2000 gas analyzer and a photoionization detector (PID) with a 10.6eV lamp (AECOM, 2020a). The samples were collected in accordance with the 2019 *Data Gap Assessment Work Plan* (AECOM, 2019b).

3.3.2 Riverbank Soil Investigation

This subsection describes riverbank surface soil samples collected in 2016, in accordance with the 2016 workplan (CEECON, 2016). The riverbank soil sample locations are listed on Table 3 and shown on Figure 2.

The riverbank samples were collected along an approximately 650-foot-long length of shoreline. Samples were collected at depths less than 1-foot bgs, approximately 1-foot above the estimated daily/seasonal low water table. Six riverbank samples (RB-1 through RB-6) were collected in September 2016 and analyzed for TPH-g, TPH-d, TPH-o, and select VOCs. After TPH-o was detected in RB-6, three additional riverbank samples (RB-7 through RB-9) were collected in the vicinity of RB-6 and analyzed for the same constituents to delineate total petroleum hydrocarbons (TPH) in riverbank soil. (CEECON, 2017b).

3.3.3 Soil Investigations and Well Installation

This subsection describes the soil boring drilling, well installation, and subsurface soil sampling activities conducted in 2015 through 2019, using methods described below in accordance with the 2016 workplan (CEECON, 2016) and subsequent addendums (listed in Appendix D). Well and boring locations are shown on Figure 2. Subsurface soil sample locations are listed on Table 3.

In June 2015, soil borings CB-1 and CB-2 were advanced. Subsurface soil samples were collected from 10 to 79 feet bgs in soil borings CB-1 and CB-2. The samples were analyzed for TPH-g, TPH-d, TPH-o, and select VOCs (Azure, 2015b).

In September and October 2018, soil borings were advanced at locations AB-1, AB-2, AB-3, AB-5, AB-6, MW-15[8], MW-16 through MW-19, and VE-1 through VE-4. These sample locations were determined based on the results of the 2016 passive vapor screening (CEECON, 2017a). From these borings, subsurface soil samples were collected from depths ranging from 5 to 83 feet bgs in AB-1, AB-2, AB-3, AB-5, AB-6, MW-15 through MW-19, VE-3, and VE-4. The samples were analyzed for TPH-g, TPH-d, TPH-o, and select VOCs (AECOM, 2019a). Borings MW-15 through MW-19 were completed as monitoring wells, and VE-1 through VE-4 were completed as vapor extraction wells.

In November 2019, soil borings were advanced at locations AB-7/MW-3, AB-8/MW-19, and MW-20 through MW-23. Subsurface soil samples were collected from 32 to 90 feet bgs in soil borings AB-7/MW-3, AB-8/MW-19, MW-20, MW-22, and MW-23. The samples were analyzed for TPH-g, TPH-d, TPH-o, select VOCs, and general chemistry parameters (AECOM, 2020b). Borings MW-20 through MW-23 were completed as monitoring wells. In addition to standard soil logging, a field dye test using OilScreenSoil™ (Scarlet Red)® (Scarlet Red) was performed on soil collected from AB-7/MW-3 and AB-8/MW-19 to test for the presence of petroleum at various depths.

- The Scarlet Red dye test is a non-mutagenic red dye-based, non-quantitative field shake test for presence of petroleum. It uses a solvent-soluble dye infused in a sugar cube and a small container. The dye has an affiliation for the presence of non-aqueous phase liquids. An aliquot of soil is added to the

[8] Also identified as AB-4

container with water and shaken. When petroleum is present in an aliquot of soil, the Scarlet Red dye will sorb to the oil particles and the soil will appear red. The more petroleum present in an aliquot, the stronger the red color.

Borings completed in 2015 through 2019 were initially advanced to a depth of approximately 6 feet using hand clearance or air-knifing methods to minimize impacts to unknown or abandoned buried utilities. Drilling was complete using a hollow-stem auger drill rig and sonic drill rig in 2015 and 2019, respectively. The soil cores were inspected and classified using the Unified Soil Classification System (ASTM, 2011). Soil core color, odor, and presence of sheen were noted, and cores were field-screened for VOCs using a PID probe.

Monitoring wells and vapor extraction wells were installed upon completion of the borings. Well screen intervals and other well construction information is provided in Table 1 and included:

- Two-inch diameter, schedule 40 polyvinyl chloride (PVC) well casing,
- 0.010-inch slotted PVC well screen,
- 10/20 clean Colorado silica sand filter pack from the bottom of the boring to two feet above the screen,
- Bentonite chip seal placed above the filter pack to approximately 1 ft bgs and hydrated with clean water,
- A lockable expansion plug, and
- A protective well monument or flush-mount protective casing set in concrete to complete each monitoring well's surface features.

The well construction details are included on the boring/well logs presented in Appendix C and summarized in Table 1.

After monitoring well seals cured for at least 24 hours, new monitoring wells were developed by a combination of surging and pumping using a decontaminated downhole centrifugal pump or equivalent. Surging was completed using the drilling tooling or using surge block devices. Development continued until at least three well volumes had been removed, turbidity was less than 50 nephelometric turbidity units (NTUs) and groundwater parameters (temperature, pH, specific conductivity, and turbidity) had stabilized. Vapor extraction wells were completed above groundwater elevation table and were not developed.

3.3.4 Groundwater Investigations

This subsection describes collection of groundwater monitoring samples collected in May 2014 through June 2020 and grab groundwater samples collected in June 2015.

Groundwater monitoring samples were collected from monitoring wells as summarized in Table 3, using standard low-flow methods in accordance with the 2016 workplan (CEECON, 2016) and subsequent addendums (listed in Appendix D). Prior to purging and sampling, depth-to-groundwater and LNAPL thickness was measured in Site wells and two Tidewater wells (AR-11 and MW-5) using an electronic product level meter.

Grab groundwater samples were collected from borings during subsurface sampling events in June 2015 (CB-1 and CB-2) and in September and October 2018 (AB-1, AB-2, AB-3, AB-5, and AB-6), as described in Section 3.3.3.

3.3.5 Biodegradation Assessment

A biodegradation assessment was performed in November 2019 through May 2020, consisting of an in-situ microcosm test to evaluate electron donor/acceptor relationships and assessment of limiting factors for hydrocarbon degradation, an ex-situ bench-scale treatability assessment, and profiling of archaea and bacteria residing in the vadose zone and aquifer at the Site. A full summary of sample methods and analyses is summarized in the 2020 *Biodegradation Assessment* (2020 BA; AECOM, 2020b).

In addition, December 2019 groundwater split samples were collected from select monitoring wells and analyzed for TPH-d and TPH-o after a silica gel cleanup (SGC) extraction. SGC data are used in Section 8 to assess contaminant degradation.

3.4 Applicable Site Screening Levels

Current RI/FS screening levels are the CULs, specifically MTCA Method A Cleanup Levels for Groundwater (WAC 173-340-900, Table 720-1) and MTCA Method A Soil Cleanup Levels for Industrial Properties (WAC 173-340-900, Table 745-1).

4 Remedial Investigation Results

Section 4 summarizes the results of the supplemental RI, including soil vapor, riverbank soil, subsurface soil, and groundwater data. A list of site investigation, soil vapor, and groundwater monitoring reports is provided in Appendix D.

4.1 Soil Vapor

This subsection summarizes the results of the supplemental RI active and passive soil vapor analytical sample results. Soil vapor data are summarized in Table 4. Further soil vapor information is provided in the original soil vapor reports, which are summarized in Appendix D.

- **2014 Active Monitoring Well Headspace Sampling** – An initial assessment of headspace in monitoring wells was performed in December 2014. For general review, this data is provided in Table 4 and summarized in Appendix E. As described in Section 3.3.1, this data was used to provide a preliminary assessment of distribution of VOCs in the subsurface and to determine locations for further monitoring well installation and soil sampling, as described in Sections 3.3.3 and 3.3.4. This data was not considered further in development of the CSM.
- **2016 Passive Soil Gas Survey** – A subsequent passive soil gas survey was performed in 2016. Passive soil gas surveys are an effective screening procedure to identify areas where VOCs are present and focus subsequent investigations. The quantity of VOCs collected by passive sorbent samplers is proportional to the concentration gradients of the compounds near the passive sorbent sampler. Results of the 2016 passive soil gas survey are described in Figures 15 through 17 and Table 4. Elevated benzene, C4-C9 range hydrocarbons (equivalent to TPH-g), and C10-C15 range hydrocarbons (equivalent to TPH-d) masses are interpreted in individual locations in the northern portion of the tank farm (near Tank 8), near the southern end of the railroad spur, near then northern end of the railroad spur, and on the riverbank near the pier entrance. Results of the passive soil gas survey were used to determine locations for soil borings and monitoring well installations (Section 4.3).
- **2018 Active Well Headspace Sampling** – After installation of four vapor extraction wells (VE-1 through VE-4) in September 2018 (Section 3.3.3; AECOM, 2019a), additional monitoring well headspace soil vapor samples were collected from 16 monitoring wells and the 4 vapor extraction wells in December 2018 (CEECON, 2019). As described in Section 3.3.1, this data was used to provide a preliminary assessment of soil vapor extraction. For general review, this data is provided in Table 4 and summarized in Appendix E. This data was not considered further in development of the CSM.
- **2020 Biodegradation Assessment Sampling** – In January 2020, in support of the biodegradation assessment, headspace soil vapor samples were collected from 10 monitoring wells and 4 vapor extraction wells. In-field analysis of oxygen, carbon dioxide, methane, and total VOCs are provided in the *2020 Soil Vapor Screening* report (AECOM, 2020a) and discussed as a line of evidence in the 2020 BA. Soil vapor results of the 2020 biodegradation assessment are described in Figures 15 through 17 and Table 4.

4.2 Riverbank Soil

Surface soil samples were collected from the Riverbank Area in 2016; sample locations are provided in Figure 18. Concentrations of TPH-g, TPH-d, TPH-o, and VOCs were non-detect in most riverbank samples (Table 5).

TPH-o was detected in sample RB-6 at 640 milligrams per kilogram (mg/kg), located near the northern end of the barge dock. Although this concentration is less than the CUL, three additional riverbank samples (RB-7, RB-8, and RB-9) were collected in the vicinity of RB-6 to delineate TPH-o. TPH-o concentrations were 180 mg/kg and 240 mg/kg in RB-8 and RB-9, respectively. TPH-d was measured in RB-9 at a concentration of 23 mg/kg, less than the CUL. TPH-o and TPH-d were not detected in RB-7, the northernmost sample.

RB-6, RB-8, and RB-9, which contained TPH-o at concentrations greater than the laboratory detection limit, were located at the base of a tree on the riverbank (Figure 18). Based on the location of TPH-o, current and historical land use in the immediate vicinity, and limited lateral extent, these hydrocarbons are likely due to biological material associated with the adjacent tree rather than a petroleum source. No known petroleum sources are present in the vicinity of these samples, no operations occur or formerly occurred in this area or in upstream portions of the Site, and there were no known releases in this area (Figure 2). In addition, groundwater transport is unlikely to be the source of TPH-o; in upgradient monitoring wells MW-14, MW-15, and MW-16, TPH-o was less than the laboratory detection limit.

4.3 Subsurface Soil

Soil boring advancement and monitoring well installations were performed in 2015 through 2019. Table 5 summarizes sample locations and analytical results. Soil boring locations and sample results that exceed the CULs are provided in Figure 19, vertical distribution is conceptualized in cross sections, provided in Appendix E. Topographic surveys for borings and monitoring wells are provided in Appendix F.

A total of 97 soil samples were collected from depths ranging from 5 to 90 feet bgs. Of these, five soil samples collected from four borings contained sampled analytes at concentrations exceeding their respective CULs, as summarized below.

- ***Southern Tank Area*** (AB-7/MW-3) – TPH-g and TPH-d concentrations exceeded their respective CULs at depths ranging from 80 to 84 feet bgs, the depth to groundwater. A Scarlet Red dye test also indicated the presence of petroleum at approximately 81 feet bgs.
- ***North Area*** (AB-8/MW-19 and MW-20) – At AB-8/MW-19, located slightly west of the lined pond, TPH-g, BTEX, and naphthalene concentrations exceeded their respective CULs at 83 to 85 feet bgs, the depth to groundwater. A Scarlet Red dye test confirmed the presence of petroleum at 85 feet bgs and, to a lesser extent, at 80 feet bgs and 95 feet bgs. At MW-20, located further west of the lined pond, the TPH-g concentration slightly exceeded the CUL at 86-90 feet bgs.
- ***Riverbank Area*** (MW-15) – 1,2-Dibromoethane (EDB) was present in soil collected at 23.5 to 24.8 feet bgs at location MW-15 at an estimated concentration of 5.3 micrograms per kilogram (µg/kg), which slightly exceeds the CUL of 5.0 µg/kg, but is less than the laboratory reporting limit. This concentration is considered anomalous because EDB was not present in any other soil samples and because the concentration was estimated[9].

4.4 Groundwater

Groundwater monitoring events were conducted in May 2014 through June 2020. Table 2 provides groundwater monitoring data for each monitoring well, including groundwater elevations, presence of LNAPL, and concentrations of constituents of interest. Table 6 provides data for additional groundwater quality parameters.

Groundwater elevations are generally stable throughout the year, and groundwater flow is to the southeast (Figures 10 and 11). Figures 20 and 21 provide groundwater analytical data for the most recent groundwater monitoring events (June and December 2020).

LNAPL was not present in Site wells during the December 2019, June 2020, and December 2020 sampling events. Since 2014, the following constituents of interest have been measured at concentrations exceeding their respective CULs:

- **Southern Tank Area** –
  - MW-3 is adjacent to and downgradient from several gasoline releases (Figure 2). In December 1999 through June 2001, prior to the supplemental RI, TPH-g concentrations in MW-3 ranged

[9] The laboratory reported an EDB concentration 5.3 (J) µg/kg because the analyte was detected at a concentration above the method detection limit of 4.6 µg/kg but less than the laboratory reporting limit of 24 µg/kg. A result that are less than the laboratory reporting limit but greater than or equal to the method detection limit is identified as an approximate value by the laboratory.

from 1,820 micrograms per liter (µg/L) to 48,600 µg/L. By May 2014, when groundwater monitoring was re-initiated during the supplemental RI, concentrations were generally non-detect or less than the CUL. TPH-g concentrations last exceeded the CUL in August 2016.

TPH-d and TPH-o was analyzed in MW-3 beginning in May 2014. The greatest TPH-d concentration was reported in October 2014 (18,000 µg/L). Since 2014, TPH-d concentrations have generally decreased over time while TPH-o concentrations intermittently exceed the CUL.

– MW-2 and MW-11 are located adjacent to a diesel release (Figure 2). TPH-g was not detected during the supplemental RI in both MW-2 and MW-11 and concentrations have been less than the CULs for at least two decades. TPH-d and TPH-o was analyzed in MW-2 and MW-11 beginning in November 2004. From 2004 to 2020, TPH-d and TPH-o concentrations intermittently exceeded their respective CULs in MW-2 and in MW-11. TPH-d and TPH-o was not analyzed prior to November 2004. The TPH-d and TPH-o concentrations in MW-2 have deceased from the maximum concentrations detected in June 2010 (3,600 µg/L and 3,300 µg/L, respectively) to less than their respective CULs in December 2020. In MW-11, TPH-d and TPH-o concentrations in MW-11 have generally deceased from the maximum concentrations detected in July 2005, except for an anomalous increase in June 2020.

- ***Northern Tank Area*** – In MW-17, located near a 1976 diesel spill (Figure 2), TPH-d and TPH-o concentrations are generally detected at concentrations approximately 1.5 to 2 times their respective CULs. In the most recent sampling event (December 2020), TPH-d was detected but below the CUL, and TPH-o was not detected.
- ***North Area*** – In MW-19, located slightly west of the lined pond, TPH-g, TPH-d, ethylbenzene, naphthalene, and MTBE concentrations exceeded their respective CULs in one or two sampling events. Benzene concentrations have generally exceeded the CUL but show a persistently decreasing trend. In the most recent sampling event (December 2020), benzene was not detected.

5 Conceptual Site Model

MTCA regulations described in *WAC 173-340-357* refer to a "quantitative risk assessment of cleanup action alternatives," which includes description of exposure parameters, including the soil to groundwater pathway, and refers to *burden of proof*, *new science,* and *quality of information*. Burden of proof is an obligation to show sufficient lines of supporting evidence has been collected to demonstrate the Site has been properly characterized, and a risk assessment can be made. The characterization used a weight of evidence approach discussed in this document. To convey findings, AECOM has developed a CSM.

The CSM presented in this document is both a written and graphical presentation of the physical, chemical and biological processes that control the transport, migration and actual/potential impacts of contamination (in soil, ground water, and surface water) to human and ecological receptors. Development and refinement of the CSM helped support the remedial decision-making process in this Supplemental RI/FS. The CSM is an important tool used to identify and depict sources, receptors and pathways associated with the area of concern and/or Site. The CSM supports scientific and technical decisions for the Site. The CSM also serves as an illustrative tool to communicate effectively with interested parties about critical issues and processes, if identified, at the Site, and support the remedial decision-making process. This CSM was developed using guidance provided by Ecology (Ecology, 2016b; NJDEP, 2019)

This section presents a conceptual understanding of the Site, identifies the types and concentrations of COCs by media type, and details exposure pathways and receptors. A summary of the CSM is provided in Section 5.4 and illustrated in Figure 22. An exposure model is provided in Figure 23.

5.1 Source Areas and Constituents of Concern

Historical grades and releases of refined petroleum products stored at the Site include diesel, gasoline, and jet fuel. Identified source areas and the respective estimated extent of petroleum impacts are depicted on Figures 20 and 21. COC drivers present at the Site include TPH-g, TPH-d, TPH-o, BTEX, and naphthalene. Selection of these COCs is based on recent groundwater data (June 2019 through present) and soil data (Figures 19 through 21).

Petroleum impacts are present in the following remaining three source areas:

- ***Southern Tank Area*** – In the southern end of the tank farm, the COCs are TPH-g, TPH-d, and TPH-o in subsurface soil and groundwater. This area includes wells MW-2, MW-3, and MW-11.
- ***Northern Tank Area*** – In the northern end of the tank farm, the COCs are TPH-d and TPH-o in groundwater. This area includes well MW-17.
- ***North Area*** – West of the lined evaporation pond, the COCs are TPH-g, BTEX, and naphthalene in subsurface soil and groundwater. This area includes well MW-19.

5.2 Constituent Fate and Transport

The Site CSM is illustrated in Figure 22, and the Site transport pathways are described in Figure 23.

TPH and VOCs are present in subsurface soil and groundwater due to former leaks and spills to ground surface in the upland portions of the Site. Petroleum hydrocarbons migrated through the vadose zone to groundwater by infiltration and percolation. As shown in Figure 19 and in cross sections provided in Appendix E, elevated concentrations of Site COCs are limited to depths between 80 and 90 feet bgs, within the groundwater capillary fringe. The capillary fringe beneath the Site is within sands with low sorption capacity and large pore size. Therefore, petroleum hydrocarbons migrate readily to groundwater. The low sorption capacity of Site soil allowed unrecovered portions of petroleum releases to be transported vertically to groundwater through physical transport or infiltration of rainwater.

Dissolved phase TPH and VOCs groundwater transport is toward the southeast via groundwater flow. Groundwater sampling data indicate the dissolved phase plume horizontal extent is limited to the tank farm area.

Biodegradation by native microbial populations attenuates TPH and VOCs concentrations in soil and in groundwater to below detection limits before reaching wells downgradient of the groundwater sources areas (as defined in Section 5.1).

TPH-g and VOCs in soil and groundwater may also volatilize to air within the soil matrix and migrate upwards to ground surface. In the upland areas of the Site, where occupational workers may be present, elevated COC concentrations are greater than 80 feet bgs and attenuate before reaching ground surface.

Additional discussion on COC migration is presented in Section 5.4.

5.3 Exposure Pathways and Potential Receptors

The Site CSM is illustrated in Figure 22, and the Site exposure pathways and potential receptors are described in Figure 23. The Terrestrial Ecological Evaluation (TEE) is provided in Appendix G and summarized in Section 6.0.

Potential receptors on Site are current occupational workers and potential future construction and excavation workers in upland portions of the Site. The Site is currently developed as a bulk fuel storage facility. There are no current plans to change or alter the facility operations, but future construction modifying terminal infrastructure is possible (Section 2.3). Indoor areas on the Site include a garage and adjoining office, a pump station, warehouse, workshop, and storeroom (Figure 2). Potential receptors at the adjacent Snake River (Lake Wallula) include recreational users and ecological receptors.

- ***Upland Soil*** – As shown in Figure 23 and described in further detail below, there are no complete exposure pathways for on-Site receptors from Site soils.
  - Surface soil is not an exposure pathway. Site data confirms residual petroleum in soil is limited to deep soil (80 to 90 feet bgs) and are not present in surface soil (Section 4.3).
  - Ingestion or dermal contact with subsurface soil is not a complete exposure pathway. Residual petroleum in soil is are limited to deep soil (80 to 90 feet bgs) and is not accessible to current or future on-Site receptors.
  - Inhalation of volatized petroleum (indoor air or outdoor air) is not a complete exposure pathway. As defined in Ecology Implementation Memorandum Number 14, a complete exposure pathway for vapor intrusion is present if receptors are within 100 feet laterally of the impacted soil and within 6 or 15 feet vertically[10] (Ecology, 2016c; Personal communication with Christer Loftenius, April 2021). As a conservative estimate, these extents were also applied to outdoor air. For areas within 30 feet of the current source areas (defined in Section 5.1), residual petroleum in soil is limited to deep soil (80 to 90 feet bgs) and are outside the vertical screening distance.
- ***Site Groundwater*** – As shown in Figure 23 and described in further detail below, there are no complete exposure pathways for on-Site or off-Site receptors from Site groundwater.
  - Ingestion of Site groundwater is retained as a potential exposure route but is an unlikely exposure route for future occupational workers. No potable water supply wells are known to be present in the immediate vicinity of the Site (Section 2.7). Future use of groundwater for drinking water is unlikely because drinking water is supplied to the Site and surrounding area by the City of Pasco’s municipal water supply. This pathway is retained as a potential exposure route because MTCA regulations require that drinking water be retained as a beneficial use for groundwater.
  - Inhalation of volatized petroleum (indoor air or outdoor air) is not a complete exposure pathway. Groundwater is typically encountered at a depth of approximately 80 feet bgs (Section 2.5). As described above, for areas within 100 feet of the current source areas (defined in Section 5.1), depths to petroleum in groundwater are greater than the vertical screening distance (Ecology, 2016c).
  - There is no exposure pathway from groundwater to off-Site receptors. Groundwater flows directly from the Site to the adjacent Snake River (Section 2.5). Sensitive receptors are located

[10] Depth dependent on concentrations of benzene, unweathered gasoline, weathered gasoline, or diesel.

upgradient of the Site, at least 1/3-mile away (Section 2.7). Therefore, off-Site receptors are not expo sed to petroleum impacts in groundwater.

- ***Surface Water*** – The nature and extent of groundwater contamination at the Site is an unlikely exposure pathway to surface water or shore sediments but may potentially be complete in the future. Therefore, the groundwater-to-surface water and groundwater-to-sediment pathways are considered potential but unlikely; ingestion or dermal contact with petroleum in surface water is a potential, but unlikely, exposure pathway.
  - Concentrations of petroleum constituents decrease to non-detect in monitoring wells downgradient of the identified source areas (Section 5.1). Natural attenuation reduces concentrations of dissolved-phase hydrocarbons in groundwater to below detection limits before reaching monitoring wells downgradient of the groundwater sources areas (Section 5.2).
  - As described in the 2011 RI/FS, MTCA Method A Cleanup Levels (the Site CULs) are protective of drinking water and may be used to establish surface water cleanup levels at routine sites and sites with relatively few hazardous substances (URS, 2011). At MW-6 and MW-15, which are the monitoring wells closest to the shoreline, concentrations of petroleum constituents in groundwater have been less than the CULs since monitoring began in 1990 and 2018, respectively. Likewise, concentrations of COCs in groundwater are less than CULs at the nearest upgradient monitoring wells. At MW-4, concentrations of COCs have been less than CULs since 2007, while COC concentrations at MW-8 and MW-16 have been less than CULs since monitoring began in 2001 and 2018, respectively (Table 2).
  - Continued monitoring of wells downgradient from the source areas will confirm this exposure pathway remains incomplete until concentrations in source areas have attenuated.

5.4 Graphical Illustrative Conceptual Site Model

A graphic illustrative CSM is presented as Figure 22. This figure serves as a two-dimensional cross-sectional view of the eastern portion of the Site and incorporates a geological view originating from MW-20, trending generally southward through boring AB-8/MW-19, through the lined and former unlined evaporation ponds, and down the embankment to wells MW-16 and MW-15, terminating into the Snake River. This location was selected for a graphical CSM visualization due to the amount of Site investigation data acquired in this area, including a weight of evidence supporting degradation of petroleum hydrocarbons. The CSM visualization provides a presentation of stratigraphy, groundwater biogeochemistry (which includes both the electron donor-acceptor understanding and microbiological footprint of the shallow Hanford aquifer), COC footprint, and fate and transport mechanisms. The illustrative CSM is punctuated with 13 key components depicted on the graphic.

The primary components of the CSM are:

(1) Pasco, Washington receives approximately 8 inches (in) of rainfall per year with the highest amount of precipitation (3.78 in) occurring during the months of December through February (City of Pasco, 2021a). Additionally, another 4 inches of precipitation is sequestered as snowfall. This compares to a national annual average of approximately 38 inches of rainfall (U.S. Climate Data, 2020). Precipitation infiltrates unpaved areas of the Site and percolates into the permeable soils below. In grass vegetated portions of the Site, peripheral to ASTs and terminal operations, transpiration of rainfall also occurs, limiting recharge into the underlying groundwater.

(2) A permeable high-infiltration sand and gravel fill, containing stone aggregate, covers much of the Site. This is fill material of anthropogenic origin. Vertical infiltration of rainwater or snowmelt is rapid into the underlying native sediments.

(3) Localized, discontinuous silty and gravelly deposits are found within a thicker, predominantly sandy, flood deposit.

(4) Sorption capacity of sands and gravels is low. When historical releases of petroleum products occurred, low sorption capacity allowed most of the released petroleum to be transported vertically to groundwater through physical transport or infiltration of rainwater.

(5) The vadose zone is approximately 80-feet thick in the Site's upland area and becomes progressively thinner near the Snake River. The sandy sediments correspond to low-energy, slack-water flood deposits of the Hanford Formation.

(6) Discontinuous silty sand horizons are found within the Hanford flood facies. These localized low-permeability sedimentary zones may impede and store precipitation infiltration.

(7) Vertical profiling of TPH concentrations in soil in vicinity of AB-8/MW-19 indicates a general increase in TPH concentration with depth. The highest TPH concentrations are within the phreatic zone (below water table).

(8) Dissolved-phase petroleum hydrocarbons are present in groundwater in sources areas identified in Section 5.1, including TPH-g, TPH-d, and TPH-o, BTEX, and naphthalene. Active microbial degradation of dissolved petroleum hydrocarbons is occurring in source areas, as evidenced by:

a) Reducing conditions in source areas (negative ORP, and observed methane, greater ratio of reduced manganese to oxidized manganese and reduced iron to oxidized iron, compared to wells outside of source areas), [11]

b) As in the Southern Tank Area, TPH-g attenuation has occurred. TPH-d and TPH-o concentrations after SGC were several orders of magnitude less than without SGC, indicating that much of the diesel and oil-range hydrocarbons in groundwater at MW-17 are degradation by-products and are not petroleum products,

c) Presence of several genera of petroleum-degradation bacteria in the vadose-zone and in the phreatic zone at MW-19, and

d) Elevated degradation rates during in-situ and ex-situ microcosm testing.

(9) The plume attenuates before reaching wells downgradient from sources areas. By the time groundwater reaches downgradient wells, petroleum hydrocarbon concentrations are not detected. Site COCs are no longer present, causing slower oxygen consumption by native microbial communities, thus allowing oxidizing conditions in groundwater.

(10) Groundwater flow is to the southeast.

(11) Seasonal groundwater fluctuation is approximately 0.5-foot.

(12) The Snake River fluctuates on the range of 2.5 feet during the course of the year. During high water levels, water from the Snake River may infiltrate toward the terminal (losing conditions). This interaction is not well understood.

(13) Groundwater also discharges from the Site to the Snake River. Aquatic biota includes aquatic organisms such as fishes. Site COCs are not bioaccumulative, and monitoring near the riverbank indicates dissolved COCs are not discharging to the Snake River.

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[11] Although there is a potential for arsenic mobilization at the four upgradient, historically impacted, wells (MW-2, MW-3, MW-11, and MW-17), arsenic transport beyond the current area of attenuation is low. The average background concentration of naturally-occurring arsenic in eastern Washington is 3.90 mg/kg (Ecology, 1994). Naturally occurring arsenic in saturated soils may dissolve and become mobilized in significantly low, reducing, oxidation-reduction (ORP) environments. ORP in the four upgradient, historically impacted, monitoring wells (MW-2, MW-3, MW-11, and MW-17) typically ranges from -100 to 100 millivolts (mV); the -100 to 0 mV sub-range is moderately reducing. ORP in monitoring wells downgradient of these historically impacted wells (MW-6, MW-15, and MW-16) is oxidizing, not reducing (typically 80 to 108 mV). Therefore, any potential arsenic mobilization would stop prior to these locations.

6 Terrestrial Ecological Evaluation

The purpose of the TEE process is to determine if a release of hazardous chemicals may cause adverse effects to terrestrial ecological receptors. Following the tiered approach outlined in WAC 173-340-7490 through 173-340-7494, the first step in the TEE process is to evaluate if the Site qualifies for a primary exclusion under WAC 173-340-7941. If a primary exclusion is not met, the next step determines whether the Site qualifies for a simplified evaluation under WAC 173-340-7942. If the Site does not qualify for a simplified evaluation, then a site-specific evaluation under WAC 173-240-7943 is required.

Section 5 presents the Site's CSM and identifies the incomplete and potentially complete exposure pathways. This TEE focuses on potentially complete pathways for terrestrial ecological receptors, i.e., exposure to soil within the upper 15 feet (ft) of soil. Given the depth to groundwater (≥15 ft bgs) and lack of upland surface water bodies at the Site, surface water and groundwater exposure pathways are considered incomplete for terrestrial ecological receptors (Figure 23).

Although the adjacent Snake River (Lake Wallula) provides aquatic habitat, there is no evidence COCs in groundwater are a risk to the Snake River. As described in Section 5.3, the concentrations of analytes in monitoring wells downgradient of source areas have been below CULs since prior to the 2011 RI/FS (Table 2). Therefore, the groundwater-to-surface water and groundwater-to-sediment pathways are conservatively considered potentially complete but insignificant (Section 5 and Figure 23).

6.1 Terrestrial Ecological Evaluation Analysis

This section presents the narrative analysis in support of the TEE for the Site. The TEE Form is enclosed as Appendix G. AECOM reviewed on-Site and nearby ecological habitat conditions to determine whether terrestrial ecological receptors were likely to be present and reviewed upland and riverbank soil analytical data to determine whether constituents of potential ecological concern (COPECs) were present at depths allowing potentially complete ecological exposure.

The Site is located adjacent to the Lake Wallula segment of the Snake River and is surrounded by unimproved land to the southwest, north, and northeast (Figure 2). In preparing this TEE, current Site conditions and anticipated future use, Site soil data, and prior investigations at the Site were reviewed. There are no upland surface water bodies at the Site.

As described in Sections 1.1 and 2.1, the approximately 33-acre terminal is zoned light-to-medium industrial, has been an active fuel terminal since September 1950, and will remain so for the foreseeable future. The majority of the terminal (approximately 26 acres) is developed with ASTs, loading racks, pumping stations, underground and aboveground pipelines, a barge loading dock, a lined evaporation pond, terminal offices, and gravel surface. Approximately 7 acres of the terminal consists of discontinuous, undeveloped desert scrub, most of which is located east and southeast of the developed facility and steeply slopes down toward the Snake River (Figures 6, 7, and 24).

The Site history and past releases are described in Section 2.2, and prior investigations are detailed in Section 3. Upland and riverbank soil sample results are presented in Table 5. As discussed in Section 2.2, petroleum hydrocarbon-affected surface soils on the developed portion of the Site (i.e., the upland fuel terminal) were excavated at the time of the historical releases. The developed portion of the property is underlain by sand; therefore, any residual subsurface soil impacts would have been rapidly transported downward. This is supported by soil sample analytical results indicating the highest concentrations of COCs in upland soil occur at depths between 80 to 90 feet bgs at the upland groundwater water table (Tables 2 and 5).

As an active fuel terminal covered with structures and gravel, the presence of terrestrial wildlife at the developed portion of the Site is unlikely because terrestrial wildlife would likely preferentially use the large, continuous undeveloped terrestrial habitat outside the Site boundary (Figures 2 and 24). However, given the proximity of off-Site undeveloped habitats, it is possible that terrestrial wildlife may be present and use (i.e., forage) the on-Site smaller, discontinuous undeveloped areas and may occasionally be present at the developed portion of the Site (i.e., transient).

6.1.1 Exclusion

It is anticipated that the property will remain light-to-medium industrial and will continue to be used as a fuel terminal in the foreseeable future, with current institutional controls (i.e., gravel surface of the developed portion of the Site will be maintained). However, the Site does not meet the conditions for exclusion because:

- Surface soil contamination is present above natural background along the riverbank, which is not covered by physical barriers. Therefore, the Site does not qualify under *Point of Compliance, WAC 173-340-7491(1)(a), Barriers to Exposure, WAC 173-340-7491(1)(b), or Natural Background Concentrations, WAC 173-340-7491(1)(d)*.
- There is greater than 1.5 acres of contiguous, undeveloped land on or within 500 feet of the Site (Figure 24). Therefore, the Site does not qualify under *Undeveloped Land: WAC 173-340-7491(1)(c)*.

6.1.2 Simplified Evaluation

This section presents a discussion on the three analyses under the simplified TEE evaluation (Part B, Step 5 in the TEE Form provided as Appendix G).

Exposure Analysis: WAC 173-340-7492(2)(a) – The Site does not qualify for no further evaluation under Exposure Analysis. The approximate Site-related area of contamination is greater than 350 square feet. Although current and anticipated future land use of the Site makes wildlife exposure at the developed portion of the Site unlikely, the simplified TEE cannot be ended under WAC 173-340-7492 (2)(a)(ii) based on the evaluation of MTCA Table 749-1 (Table 7). The Site-related contaminated area is within 500 feet of ≥ 4 acres of contiguous undeveloped land that is likely to attract wildlife.

Pathway Analysis: WAC 173-340-7492(2)(b) – The Site qualifies for no further evaluation under Pathway Analysis for terrestrial ecological receptors. The Site is located within an industrially zoned, active fuel terminal; therefore, only potential exposure pathways to wildlife (e.g., small mammals and birds) needs to be considered. Only exposure pathways for priority chemicals of ecological concern listed in Table 749-2 at or above the concentrations provided must be considered in the Pathways Analysis.

Of the COPECs detected in soil, TPH-g and TPH-d are listed as priority contaminants in MTCA Table 749-2. A total of 22 upland soil samples from 14 locations and nine riverbank soil samples from nine locations were collected within the upper 15 feet of soil. Since the Site is zoned light-to-medium industrial, the maximum detected concentrations (MDCs) of TPH-d and TPH-g in upland and riverbank soil within the upper 15 feet of soil were compared to the industrial/commercial soil concentrations listed in MTCA Table 749-2, presented below (Table A):

Table A. MTCA Table 749-2 Compared to Site MDC in Soil

COPEC	Table 749-2 Values Industrial or Commercial Site (mg/kg)	MDC in Soil 0 to 15 ft bgs (mg/kg)	MDC > Table 749-2 Value?
TPH-g	12,000	78	No
TPH-d	15,000	23	No

Table Notes:
> = greater than
bgs = below ground surface
COPEC = constituents of potential ecological concern
ft = feet
MDC = maximum detected concentrations
mg/kg = milligrams per kilogram
TPH-d = total petroleum hydrocarbon of diesel
TPH-g = total petroleum hydrocarbon of gasoline

Neither TPH-g nor TPH-d have MDCs that exceed the industrial/commercial screening values listed in Table 749-2. In fact, the MDCs of TPH-g and TPH-d in soil down to 15 ft bgs are also below the Table 749-2 residential screening values (200 mg/kg and 460 mg/kg, respectively). Additionally, United States Environmental Protection Agency (USEPA) guidance regarding statistical methodology to be used in exposure point concentration estimation (USEPA 2002) indicates that the lower of the 95% upper confidence limit and MDC represents the reasonable maximum exposure to which mobile receptors (i.e., mammals and birds) are likely to be exposed. Therefore, the assessment above using the MDCs conservatively estimates the potential exposure point concentrations to wildlife at the Site. Based on the MDC analysis presented above, there are no potential exposure pathways from soil contamination to ecological receptors (i.e., wildlife) and the TEE may be ended.

Contaminant Analysis: WAC 173-340-7492(2)(c) – The Site qualifies for no further evaluation under Contaminant Analysis for terrestrial ecological receptors. As presented under Pathway Analysis, above, none of the detected COPECs listed in Table 749-2 are present in soil at concentrations that exceed the values listed in Table 749-2 for industrial/commercial properties.

6.1.3 Additional Riverbank Sample Evaluation

In addition, the riverbank surface soil samples (RB-6 through RB-9) were compared to the freshwater Sediment Management Standards (SMS) [WAC 173-204-563]. All riverbank TPH-d sample results (detection at 23 mg/kg, non-detect reporting limits ranging from 20 mg/kg to 23 mg/kg) were less than the TPH-d Sediment Cleanup Objective (340 mg/kg) and Sediment Screening Level (510 mg/kg). All riverbank TPH-o sample results (detections ranging from 180 to 640 mg/kg, and non-detect reporting limit of 48 mg/kg) were less than the TPH-residual Sediment Cleanup Objective (3,600 mg/kg) and Sediment Screening Level (4,400 mg/kg). Based on this comparison, the shoreline TPH concentrations are below sediment standards protective of the benthic and freshwater sediment.

6.2 TEE Conclusions

Based on the simplified evaluation, under WAC 173-340-749(2)(b) and WAC 173-340-7492(2)(c), no further terrestrial ecological receptor evaluation is warranted at the Site. In addition, the riverbank soil samples (RB-6 through RB-9) are below the freshwater SMS under WAC 173-204-563.

7 Cleanup Standard Development

7.1 Applicable or Relevant and Appropriate Requirements

As required in WAC 173-340-350 and 173-340-710, cleanup actions at the site shall comply with the ARARs. Legally applicable requirements include *those cleanup standards, standards of control, and other environmental protection requirements, criteria, or limitations adopted under state or federal law that specifically address a hazardous substance, cleanup action, location or other circumstances at the site* (WAC 173-340-710 [3]). As specified in WAC 173-340-710 (9), remedial actions conducted under a consent decree, order, or agreed order are exempt from the procedural requirements of certain laws. However, remedial actions must still comply with the substantive requirements of these laws, and this exemption does not preclude obtaining federal permits nor the costs for any of permits normally required. The ARARs for the Site include:

- Clean Water Act (CWA §304, 40 Code of Federal Regulations [CFR] part 131)
- Safe Drinking Water Act (42 United States Code [USC] Section 300f)
- National Primary Drinking Water Regulation (40 CFR part 141)
- Resource Conservation and Recovery Act (RCRA)
- MTCA (WAC 173-340)
- State Environmental Policy Act (43.21C RCW; WAC 197-11)
- Water Resources Act (Chapter 90.54 RCW)
- Washington State Maximum Contaminant Level (246-290 WAC)

Numerical ARARs are summarized in Table 8.

7.2 Proposed Cleanup Levels

The selected cleanup levels for Site soil are the MTCA Method A Cleanup Level for Industrial Properties (Table 745-1 of WAC 173-340-900). The selected cleanup levels for groundwater are the MTCA Method A Cleanup Levels for Groundwater (Table 720-1 of WAC 173-340-900). These CULs are summarized in Table B on the following page. Rationale for this selection includes:

- On sites where the cleanup action is routine or involves relatively few hazardous substances, MTCA allows for use of MTCA Method A cleanup levels, as listed in Tables 720-1 and 745-1 of WAC 173-340-900. Because impacts at the Site are limited to deep soil (80 feet bgs) and groundwater in upland portions of the Site, this Site qualifies for assessment under Method A.
- The TEE conducted for this Site under WAC 173-340-749(2)(b) and WAC 173-340-7492(2)(c), confirmed that no further terrestrial ecological receptor evaluation is warranted at the Site (as described in Section 6). None of the detected COPECs listed in Table 749-2 are present in soil at concentrations exceeding the values listed in Table 749-2 for industrial/commercial properties. Furthermore, the MTCA Method A values are more conservative (i.e., lower) than the applicable ecological screening values listed in Table 749-2; therefore, the MTCA Method A values are ecologically protective for the Site.
- As defined in WAC 173-340-700 (8)(b)(i) and 173-340-704, Method A may be used to establish cleanup goals for TPH and associated hazardous substances at qualifying Sites. Method A cleanup levels have been determined for common petroleum mixtures and hazardous substances associated with petroleum.
- Although groundwater is hydraulically connected to the Snake River, soil and groundwater analytical data support the determination that dissolved phase groundwater transport to the river is not occurring and is unlikely to occur in the future. COCs are not detected in monitoring wells downgradient of the source areas. Therefore, the surface water exposure pathway is not currently complete and is unlikely to be complete in the future. The Site has sufficient biodegradation potential to attenuate COCs concentrations in groundwater to below laboratory detection limits before groundwater discharges to the Snake River (as

described in Section 5). Sources of COCs in soil are not present outside of the upland area. Therefore, ARARs protective of surface water are not applicable to this Site.

Table B. Summary of Proposed Cleanup Standards

Analyte	**Proposed Cleanup Level for Site COCs in Groundwater** [1] (µg/L)
TPH-g, Benzene Present	800
TPH-g, No Benzene Present	1,000
TPH-d	500
TPH-o	500
Benzene	5.0
Toluene	1,000
Ethylbenzene	700
Total Xylenes	1,000
Naphthalene	160

Table Notes:
(1) MTCA Method A Cleanup Levels for Groundwater, Table 720-1 of WAC 173-340-900.

Table Acronyms:
µg/L = microgram per liter
TPH-d =diesel-range total petroleum hydrocarbons
TPH-g = gasoline-range total petroleum hydrocarbons
TPH-o = motor oil-range total petroleum hydrocarbons
MTCA = Washington State Model Toxics Control Act

7.3 Proposed Point of Compliance

The point of compliance (POC) is the location within a particular media where cleanup levels must be attained (WAC 173-340-200).

Groundwater: For groundwater, the POC is the point where the groundwater cleanup levels must be attained for a site to be in compliance with the cleanup standards (WAC 173-340-720 [8]). Groundwater cleanup levels are attained in all groundwaters from the point of compliance to the outer boundary of the hazardous substance plume. A standard POC is established throughout the site from the uppermost level of the saturated zone extending vertically to the lowest-most depth that could potentially be affected by the site.

At the Site, the proposed groundwater POC is the standard POC for groundwater; the unconfined groundwater located in the sand and gravel deposits beneath the upland portion of the Site. Many of the existing monitoring wells are in source areas where COCs are present at concentrations exceeding the CULs in soil and groundwater. The Site's current network of monitoring wells provides an adequate assessment of the groundwater and COCs at the standard POC.

Soil: For soil, the POC is the point or points where the soil cleanup levels must be attained. As described in WAC 173-340-740 (6) (b), the standard soil POC is soils throughout the site. However, MTCA recognizes that the cleanup action may be determined to comply with cleanup standards, as long as provisions detailed in WAC 173-340-740 (6) (f) are met.

Exposure to COCs in soil at this Site is based on leaching from soil to groundwater and the proposed soil cleanup level is protective of groundwater. Concentrations of COCs in soil greater than the CULs were only encountered at depths near the groundwater table (approximately 80 to 90 feet bgs). Because of the low sorption rate of the coarse-grained materials on Site, compliance with Site groundwater CULs provides evidence of Site soils' compliance with soil CULs.

Therefore, an empirical demonstration will be made using Site groundwater data to show soil contaminant concentrations are protective of groundwater, following procedures described in WAC 173-340-747 (9). Compliance will be demonstrated by directly comparing groundwater concentrations at the Site to the proposed groundwater CULs. If groundwater at the Site meets the CULs, this pathway will be empirically demonstrated to have met soil CULs and will be in compliance.

8 Remedial Action Objectives, Remedial Technologies, and Development of Alternatives

The Site has undergone several aggressive, interim remedial actions, resulting in the effective removal of most of the petroleum hydrocarbon impacts. Given the extent and success of past interim remedial actions, the Site is considered an appropriate candidate for use of natural attenuation, potentially enhanced, as the final cleanup action alternative leading to final closure. This section presents the RAOs, a focused discussion and screening of remedial technologies, and development of remedial alternatives for the remaining sources areas.

8.1 Remedial Action Objectives

This section defines RAOs for the remaining source areas identified in the CSM discussed in Section 5. RAOs are used in the screening evaluation to retain remedial alternatives for further consideration in the FS. The following RAOs were developed to identify goals in order to meet the minimum requirements of MTCA (WAC 173-340):

- Protect human health and the environment by remediating COCs in subsurface soil and groundwater.
- Reduce, to the extent practicable, concentrations of COCs in subsurface soil that are sources of groundwater contamination.
- Comply with applicable local, state, and federal laws and Site-specific cleanup standards. ARARs specific to the cleanup are more specifically described in Section 7.1 and are limited to applicable federal and state laws and those that Ecology determines are relevant and appropriate.
- Establish compliance monitoring to evaluate the effectiveness of the selected remedy. Proposed CULs and POCs are described in Sections 7.2 and 7.3, respectively.

8.2 Source Areas Identified for Remediation

This section and Table C below describe the three source areas (originally included in Section 5.1) that have been identified for remediation (Figures 20 and 21):

Table C. Source Areas Identified for Remediation

Source Area	Description
Southern Tank Area	TPH-g, TPH-d, and TPH-o are present in groundwater at concentrations greater than CULs. Concentration trends indicate TPH-g attenuation and potential TPH-d and TPH-o desorption. TPH-d and TPH-o concentrations after SGC are one to two orders of magnitude lower than concentrations in split samples without SGC, indicating that much of the diesel-range and oil-range hydrocarbons in groundwater are microbial biomass or other degradation by-products and are not petroleum products.
Northern Tank Area	TPH-d and TPH-o is present in groundwater at a concentration greater than the CUL. Concentration trends indicate potential TPH-d and TPH-o desorption. TPH-d and TPH-o concentrations after SGC indicate that much of the diesel-range and oil-range hydrocarbons in groundwater are microbial biomass or other degradation by-products and are not petroleum products.
North Area	Benzene is present in groundwater at a concentration slightly greater than the CUL. TPH-g and TPH-d concentrations are less than CULs and have rapidly decreased since late 2018, when MW-19 was installed.

8.2.1 Southern Tank Area

TPH-g, TPH-d, and TPH-o are present in groundwater at concentrations greater than CULs in the Southern Tank Area. For TPH-d, some groundwater samples were split for analysis both with and without an SGC step. As petroleum degrades through microbial and chemical reactions, some petroleum components will be transformed to intermediary degradation by-products that are polar organics. This can result in an unknown amount of product loss during SGC. These intermediary by-products are considered part of the petroleum mixture since they are typically not otherwise considered in a petroleum risk evaluation (Ecology, 2016b). Observations at MW-3, MW-11, and MW-2, the southernmost well to the northernmost well in the area, respectively, are as follows:

- TPH-g, TPH-d, and TPH-o concentration trends for MW-3 are shown on Figure 25 and described in detail in Section 4.4. TPH-g concentrations have been declining since March 2000 and remain less than the CUL. In December 2019, concentrations of TPH-d and TPH-o after SGC (190 µg/L and non-detect, respectively) were much lower than total concentrations without SGC (2,700 µg/L and 830 µg/L, respectively). Low proportions of TPH-d and TPH-o after SGC indicates that much of the diesel and oil-range hydrocarbons in groundwater at MW-3 are microbial biomass or other degradation by-products and are not petroleum products.
- TPH-d and TPH-o concentration trends for MW-2 are shown on Figure 26 and described in detail in Section 4.4. Similar concentrations trends are present in MW-11 (Figure 27). In December 2019, TPH-d and TPH-o concentrations in MW-2 after SGC (67 µg/L and non-detect, respectively) were much lower than without SGC (1,600 µg/L and 1,100 µg/L, respectively), indicating that much of the diesel and oil-range hydrocarbons in groundwater at MW-2 and MW-11 are microbial biomass or other degradation by-products and are not petroleum products.

Data from MW-3, MW-2, and MW-11 suggest TPH-g attenuation and longer-chain TPH-d and TPH-o desorption from saturated soils in the Southern Tank Area. TPH-d results for MW-3 and MW-2 both with and without SGC indicate that much of the diesel and oil-range hydrocarbons in groundwater are degradation by-products rather than dissolved-phase petroleum products.

8.2.2 Northern Tank Area

As of 2020, TPH-d in MW-17 generally exceeded the CUL and TPH-o intermittently exceeded the CUL, as shown on Figure 28 and summarized in Section 4.4. However, TPH-d and TPH-o concentrations after SGC (non-detect) were much lower than without SGC (960 µg/L and 800 µg/L, respectively), indicating that much of the diesel and oil-range hydrocarbons in groundwater at MW-17 are microbial biomass or other degradation by-products and are not petroleum products.

8.2.3 North Area

As of 2020, TPH concentrations at MW-19 were less than their respective CULs and benzene concentrations ranged from non-detect to slightly greater than the CUL. TPH and benzene concentrations have been decreasing since installation of MW-19 in late 2018, as shown on Figure 29 and summarized in Section 4.4. This attenuation is likely occurring naturally as no active remediation has occurred during this timeframe.

8.3 Identification and Screening of Remedial Action Alternatives

In addition to institutional controls (ICs), a total of eight remedial technologies were screened for applicability at the Site and their potential for achieving RAOs. Based on the screening, five technologies were retained and assembled into three remedial alternatives for evaluation in Section 10. Preliminary design quantities for retained technologies were developed to support cost, sustainability, and restoration timeframe comparisons. Remedial technology screening results are discussed in detail below and are summarized on Table 9. Preliminary design quantities are presented in Table 10.

8.3.1 Institutional Controls

An IC is an administrative action taken to limit exposure to hazardous substances, including land use restrictions, environmental monitoring requirements, Site access and security measures, or deed restrictions and advisories to notify current and prospective future users about potential impacts to soil or groundwater. ICs cannot be used as a substitute for cleanup actions that would otherwise be technically possible [WAC 73-340-440(2)]. However, ICs are required if (1) cleanup action results in residual concentrations that exceed CULs, (2) conditional POCs have been established, or (3) Ecology makes a determination that such controls are required [WAC 173-340-440(1)].

Common controls include fencing or other physical barriers that restrict site access, signage, and zoning, as well as deed notices that place limits on land use. Environmental monitoring is used to ensure that potential risks to human health and the environment are controlled while the remedy is being implemented. ICs are readily implemented, and their cost can be significantly lower relative to other technologies. This mechanism can be especially effective at sites where there is limited exposure potential. ICs are last on MTCA's priority of preferred remedial measures.

ICs are already in place at the Site, including physical barriers to access (as described in Section 3.2). The facility also adheres to a strict Permit-To-Work policy, which requires issuance of a Safe Work Permit whenever work is performed. Each Safe Work Permit describes the specific tasks to be performed, and safety precautions to be taken. Facility employees and subcontractors who perform work in or around excavations, including excavation of hydrocarbon-impacted soils, are trained in the hazards associated with this work.

8.3.2 Unsaturated Zone Technology

8.3.2.1 Soil Vapor Extraction

Soil vapor extraction (SVE) is a common technology for remediating unsaturated vadose zone soils impacted with petroleum hydrocarbons. Vacuum is applied to SVE wells and soil vapor with VOCs are extracted and treated using aboveground equipment before discharge to atmosphere. Construction and routine operation and maintenance of a semi-permanent aboveground vapor extraction and treatment system would be required.

SVE is not appropriate for the Site primarily due to the affected site media. As described in the CSM (Section 5), Site impacts are present in groundwater and in soil at the water table and are not present in the unsaturated zone. In addition, TPH-d, one of the primary COCs targeted for cleanup in the remaining source areas, has low volatility and is, therefore, not readily extracted by SVE. SVE is screened out (rejected); it is not retained for further evaluation.

8.3.3 Unsaturated and Saturated Zone Technologies

8.3.3.1 Monitored Natural Attenuation

A large body of literature has been generated to demonstrate the technical viability and applicability of MNA at a number of petroleum hydrocarbon sites nationwide. In recognition of this option, Ecology has issued *Guidance on Remediation of Petroleum-Contaminated Groundwater by Natural Attenuation* (Ecology, 2005). This document describes criteria to be considered when determining the applicability of this technology. Specifically, MNA is best used to address residual groundwater contamination either: (1) after other, more active, remedial actions have removed the majority of the contamination, (2) in conjunction with other active cleanup action components, or (3) as follow-up to active cleanup alternatives that have already been implemented. Based on the 2020 BA, biodegradation is one component of natural attenuation occurring at the Site. Therefore, MNA is retained for further evaluation. Preliminary design quantities for MNA, including number of monitoring wells, monitoring frequency, and total duration are presented on Table 10. These preliminary quantities include the following:

- At a minimum, 16 pre-existing monitoring wells (MW-2, MW-3, MW-6, MW-7, MW-8, MW-11, MW-12, MW-14, MW-15, MW-16, MW-17, MW-19, MW-20, MW-21, MW-22, and MW-23) will be monitored semi-annually for the first 2 years.
- The quantity will decrease to eight monitoring wells monitored semi-annually for the next eight years.
- The frequency of monitoring the eight monitoring wells will then drop to annually.

At a minimum, the MNA program will initially include evaluation of the following groundwater analytes and additional parameters:

- TPH-g, TPH-d, TPH-o, BTEX, naphthalene
- pH, conductivity, dissolved oxygen, temperature, oxidation-reduction potential, and turbidity
- Ferrous iron, nitrate, sulfate, alkalinity, dissolved manganese, and methane

Additional details including the final MNA program will be presented in the Groundwater Monitoring Plan after issuance of the Cleanup Action Plan by Ecology for the Site.

8.3.3.2 Natural Source Zone Depletion

Natural source zone depletion (NSZD) is described in the Interstate Technical and Regulatory Council (ITRC) technical guidance document *LNAPL Site Management: Evolution, Decision Process, and Remedial Technologies* (ITRC, 2018) as the combination of natural processes that decrease the mass of LNAPL in the subsurface over time. The mechanisms responsible for LNAPL depletion include volatilization, dissolution, and biodegradation. The significance of these mechanisms is related to the LNAPL composition (e.g. the volatility, solubility, and biodegradability of LNAPL constituents), and the site setting. The site setting considerations are related to geochemistry, microbial ecology, and the subsurface characteristics that control movement of soil gas and groundwater into and out of the source zone. NSZD is a synergy approach commonly integrated with MNA. Key monitoring parameters include soil gas screening and temperature profiling.

The approach is typically performed at LNAPL sites, but NSZD can also be applied to historical sites with weathered petroleum hydrocarbon signatures. When appropriately evaluated, NSZD can serve as an objective benchmark by which to compare the relative effectiveness of different remedial alternatives. NSZD is, therefore, retained for further evaluation. Preliminary design quantities for NSZD, including number of NSZD points, monitoring frequency, and total duration are presented on Table 10. These preliminary quantities include the following:

- Up to eight new NSZD monitoring points will be installed.
- The new points will be monitored semi-annually for up to 10 years followed by annually for the next five years (if needed).

The parameters to be monitored include soil gas composition and biogenic heat. Additional NSZD details will be presented in the NSZD Work Plan after issuance of the Cleanup Action Plan by Ecology for the Site.

8.3.3.3 Bioventing

Bioventing is an in-situ remediation technology that relies on indigenous microorganisms to biodegrade organic constituents in soil. Bioventing enhances the activity of the indigenous bacteria by inducing air (or oxygen) into the unsaturated zone using extraction or injection wells. Bioventing systems are designed to promote in-situ biodegradation of COCs and minimize volatilization by using low flow rates. Construction and routine operation and maintenance of a semi-permanent bioventing system would be required.

Results of a soil vapor screening conducted at the Site in January 2020 (AECOM, 2020a) indicated oxygen levels in the unsaturated zone ranged from 20.5 to 21.8 percent by volume which is within the range of atmospheric oxygen levels. Based on these results, introduction of additional oxygen to the unsaturated zone, above the water table, is not needed; any additional benefit would be negligibly small. Therefore, bioventing is not appropriate for the Site and is screened out (rejected); it is not retained for further evaluation.

8.3.4 Ex-Situ Groundwater Treatment Technology

8.3.4.1 Pump and Treat

Pump and treat can be used for cleanup of groundwater impacted by dissolved-phase petroleum hydrocarbons. Groundwater is pumped from groundwater extraction wells to an aboveground treatment system that removes COCs. Pump and treat systems also are used to contain COC plumes. Groundwater pumping was implemented as part of interim remedial actions at the Site (Section 3.1.1). Pumping tests conducted in 1989 during previous CPL investigations and remedial activities indicate that successful implementation of a pump and treat system would be adversely affected by the high transmissivity of the sand and gravel aquifer and the large volume of groundwater that would need to be withdrawn to provide any substantial groundwater capture (URS and CH2M HILL, 2011). CH2M HILL also evaluated this technology to address the Tidewater release in 2000 but considered it to be infeasible due to high groundwater production rates required, and associated disposal issues (URS and CH2MHILL, 2011). Moreover, pump and treat would require removal and treatment of a large volume of groundwater exceeding the capabilities of the existing wastewater treatment system at the Site. Additionally, hydraulic control is not required at the Site `based on observed dissolved-phase plume degradation. This approach would not be expected to improve cleanup or decrease the restoration time frame. Therefore, pump and treat technology is screened out (rejected); it is not retained for further evaluation.

8.3.5 In-Situ Groundwater Treatment Technologies

8.3.5.1 Enhanced In-Situ Bioremediation (Oxygen-Releasing Compounds)

Enhanced in-situ bioremediation (ISB) involves the addition of amendments into the subsurface to enhance natural biodegradation processes. Based on the results of the 2020 BA, biodegradation of dissolved-phase petroleum hydrocarbons is occurring at the Site and the aerobic biodegradation rate is increased with the addition of electron acceptor amendments.

Three electron acceptors were evaluated during the 2020 BA; oxygen, nitrate, and sulfate. Biodegradation rates increased the most after Oxygen amendment, followed by nitrate amendment, and then sulfate amendment.

Nitrate amendments to Site groundwater are not recommended due to relatively high background nitrate concentrations at the Site; additional nitrate would provide no additional benefit. Sulfate amendments to Site groundwater are also not recommended based on its poor performance relative to oxygen and potential incompatibility with the naturally aerobic aquifer. Oxygen delivery amendments for introduction to the aquifer in relatively large quantities are commercially available as oxidizers; however, mobilization of oxidizers to the Site is not recommended given the large quantities of flammable petroleum products stored aboveground. Non-oxidizer, permeable fabric sleeves filled with oxygen-releasing compounds are available for placement in existing wells to increase the rate of naturally occurring aerobic biodegradation in the well vicinity (localized in-well treatment). The use of oxygen-releasing compounds has potential application in the saturated zone at the Site and is therefore, retained for further evaluation. Preliminary design quantities for amendment with oxygen-releasing compounds, including number of existing wells for placement, fabric sleeve replacement frequency, and total duration are presented on Table 10.

8.3.5.2 Bio-Sparging

Bio-sparging involves the injection of oxygen at low pressure into wells installed in the saturated zone. Bio-sparging is not intended to strip the dissolved VOCs from groundwater like air sparging, but rather to enhance aerobic biodegradation as the means to reduce dissolved-phase petroleum hydrocarbons. Bio-sparging has previously been implemented at the Site, and it has potential for further application. Therefore, the application of this technology is retained for further evaluation. Preliminary design quantities for bio-sparging, including bio-sparging well spacing, quantity of bio-sparge wells, and total duration of bio-sparging, are presented on Table 10.

8.3.5.3 Activated Carbon Based In-Situ Treatment

Activated carbon (AC)-based in-situ treatment involves the emplacement of granular or powdered activated carbon in the saturated zone through injection, usually by direct push technology. Injection depths at the Site are relatively deep for this technology; each direct-push injection would be conducted within a pre-drilled soil boring filled with bentonite and resulting soil cuttings would be temporarily stored pending disposal. The injected material can include electron acceptor amendments and supplemental bacteria for bioaugmentation. The combination of carbon and amendments creates a synergy between adsorption and biodegradation for treatment of petroleum hydrocarbons in-situ. This technology has potential application in the saturated zone at the Site and is, therefore, retained for further evaluation. Preliminary design quantities for this technology, including injection point spacing, injection point quantity, and soil cutting waste, are presented on Table 10.

8.3.6 Remedial Alternatives

The technologies that were retained for further considering were combined into remedial alternatives and carried forward for more detailed evaluation consistent with MTCA requirements for identifying and evaluating cleanup actions (WAC 173-340-360). Three remedial alternatives were evaluated using MTCA criteria. Evaluation results are detailed below and summarized on Table 9.

8.3.6.1 No Action Alternative

The No action Alternative provides a baseline for comparison with other alternatives and is conducted under MTCA WAC 173-340.

8.3.6.2 Alternative 1 – ICs, MNA, and NSZD Monitoring

Alternative 1 is composed of Site management under current conditions, routine groundwater monitoring using the existing well network, and addition of monitoring points for soil gas and temperature measurements associated with NSZD. Alternative 1 includes existing ICs, such as physical barriers to site access, signage, and limitations on land use. The primary mechanism of remedial action would be continued natural attenuation processes that have provided significant remedial progress since discontinuation of active remedial activities in December 2002.

8.3.6.3 Alternative 2 – ICs, MNA, NSZD Monitoring, and Oxygen-Releasing Compounds

Alternative 2 is composed of Site management under current conditions, utilization of existing wells for placement of oxygen-releasing compounds, routine groundwater monitoring using the existing well network, and addition of monitoring points for soil gas and temperature measurements associated with NSZD. Alternative 2 includes existing ICs, such as physical barriers to site access, signage, and limitations on land use. The primary mechanism of remedial action would be continued natural attenuation processes that have provided significant remedial progress since discontinuation of active remedial activities in December 2002, enhanced by additional oxygen.

Additional oxygen would be provided via deployment of ORC® Filter Socks (herein referred to as ORC socks or socks) in select existing monitoring wells on a pulsed schedule. The pulsed schedule will ensure enough time elapses between ORC sock removal from monitoring wells and groundwater sample collection so that samples are representative of aquifer conditions. For preliminary design purposes, the pulsed schedule in the selected monitoring wells is assumed to be:

- Six months of continuous deployment followed by sock removal and
- Six months of no deployment.

The final ORC sock schedule will be based on Site-specific seepage velocity and hydraulic conductivity data and will be presented in the Groundwater Monitoring Plan after issuance of the Cleanup Action Plan by Ecology for the Site.

Progress assessment toward the cleanup standards would be accomplished through a performance monitoring program. Alternative 2 technologies would be applied to the specific source areas as follows:

- Southern Tank Area: ICs, NSZD Monitoring, and Oxygen-Releasing Compounds
- Northern Tank Area: ICs, NSZD Monitoring, and Oxygen-Releasing Compounds
- North Area: ICs and MNA

8.3.6.4 Alternative 3 – ICs, MNA, NSZD Monitoring, Oxygen-Releasing Compounds, and Bio-Sparging

Alternative 3 includes all the same technologies as Alternative 2, but with bio-sparging as an additional active remedial component. Compared to the Alternative 2, bio-sparging would introduce more oxygen into the aquifer for enhancement of natural attenuation, thereby shortening the restoration timeframe. As with Alternative 2, progress assessment toward the cleanup standards would be accomplished through a performance monitoring program. Alternative 3 technologies would be applied to the specific source areas as follows:

- Southern Tank Area: ICs, NSZD Monitoring, and Bio-Sparging
- Northern Tank Area: ICs, NSZD Monitoring, and Oxygen-Releasing Compounds
- North Area: ICs and MNA

8.3.6.5 Alternative 4 – ICs, MNA, NSZD Monitoring, Oxygen-Releasing Compounds, Bio-Sparging, and AC-Based In-Situ Treatment

Alternative 4 includes all the same technologies as Alternative 3, but with AC-based in-situ treatment as an additional active remedial component. Subsurface emplacement of activated carbon would accelerate the restoration timeframe via adsorption and degradation of COCs. As with the Alternatives 2 and 3, progress assessment toward the cleanup standards would be accomplished through a performance monitoring program. Alternative 4 technologies would be applied to the specific source areas as follows:

- Southern Tank Area: ICs, NSZD Monitoring, Bio-Sparging, and AC-Based In-Situ Treatment
- Northern Tank Area: ICs, NSZD Monitoring, and Oxygen-Releasing Compounds
- North Area: ICs and MNA

9 Evaluation of Alternatives

This section evaluates each of the remedial alternatives developed in Section 8. The results of the evaluation are also presented on Table 11. A summary of the costs for each remedial alternative is presented on Table 12, and the installation costs and operations and maintenance (O&M) costs are provided as Tables 13 and 14, respectively.

9.1 Evaluation Criteria

WAC 173-340-360 establishes minimum requirements and procedures for selecting cleanup actions. The alternatives considered in Section 9 meet the following four threshold requirements and the three other requirements for establishing remedial alternatives (173-340-360[2]), which include:

- Threshold requirements:
  - Protect human health and the environment
  - Comply with cleanup standards
  - Comply with applicable state and federal laws
  - Provide for compliance monitoring
- Other requirements:
  - Use permanent solutions to the maximum extent practicable
  - Provide for a reasonable restoration time frame
  - Consider public concerns

Each of the three selected alternatives are assessed following the disproportionate cost analysis ranking criteria [WAC 173-340-360(3)(e)]. The alternatives were each evaluated for use of permanent solutions the maximum extent possible, as stated in WAC 173-340-360(2)(b).

Public participation and consideration of public concerns are an integral part of the Site cleanup process under MTCA. A draft of the Supplemental RI/FS report will be issued for public comment, and the comments will be considered prior to finalizing this report. A similar process for the draft Cleanup Action Plan (to be prepared by Ecology), prior to selection of the final cleanup action, as specified in WAC 173-340-380. The evaluated alternatives were ranked from most to least permanent, and the most practicable permanent solution was selected as the baseline. The criteria used to rank the evaluated alternatives in terms of permanence comply with WAC 173-340-360(3)(f), and include:

- ***Protectiveness*** of human health and the environment, including reduction of risk, time required to reduce risk, and risks resulting from implementation of the alternative.
- ***Permanence*** of reduction in toxicity, mobility, or volume of hazardous substances, including the adequacy of the alternative in destroying hazardous substances, the reduction of hazardous substance releases and sources, the degree of irreversibility of the treatment, and the characteristics and quantity of treatment residuals generated.
- ***Cost*** to implement the alternative, including cost of construction, net present value of long-term costs, developed at a conceptual level for the alternatives.
- ***Effectiveness over the long term*** includes the certainty that the alternative will be successful; its reliability during cleanup; the magnitude of residual risk with the alternative in place; and the effectiveness of controls required to manage treatment residues or remaining wastes.
- ***Management of short-term risks*** addresses the risk to human health and the environment during construction and implementation, and the effectiveness of measures that will be taken to manage such risks.
- ***Technical and administrative implementability*** considers whether the alternative is technically possible; whether off-site facilities, services, and materials are available; administrative and regulatory requirements; scheduling; size; complexity; monitoring requirements; access for construction

operations and monitoring; integration with existing facility operations; and other current or potential remedial actions.

- ***Consideration of public concerns*** addresses the extent to which the alternative addresses any concerns the community may have regarding the alternative. This includes concerns from individuals, community groups, local governments, tribes, federal and state agencies, or any other organization that may have an interest in or knowledge of the Site.

9.1.1 Reasonable Restoration Time Frame

The determination of whether each alternative provides for a reasonable restoration time frame was made according to the factors described in WAC 173-340-360(4)(b), including:

- Potential risks posed by the Site to human health and the environment;
- Practicability of achieving a shorter restoration time frame;
- Current use of the Site, surrounding areas, and associated resources that are, or may be, affected by releases from the Site;
- Potential future use of the Site, surrounding areas, and associated resources that are, or may be, affected by releases from the Site;
- Availability of alternative water supplies;
- Likely effectiveness and reliability of institutional controls;
- Ability to control and monitor migration of hazardous substances from the Site;
- Toxicity of the hazardous substances at the Site; and
- Natural processes that reduce concentrations of hazardous substances that have been documented to occur at the Site or under similar site conditions.

The FS considered these restoration time frame factors as part of the evaluation of the cleanup action alternatives.

9.1.2 Sustainability Assessment

In addition to the criteria mentioned above, a detailed remedial alternatives sustainability assessment was performed using the SiteWise™ environmental footprint tool and the AECOM Qualitative Sustainable Remediation Tool (AqSRT). Included in this assessment is an evaluation of the relative total consumption of energy, resources, and environmental impact including greenhouse gases and other air pollutants. A brief summary of results regarding each alternative is included under the remedial alternatives comparison section for each remedial alternative below. A detailed sustainability assessment memo outlining the analysis process and results is provided in Appendix H.

9.2 Remedial Alternatives Comparison

The following is a discussion of each of the proposed cleanup action alternatives with respect to the threshold criteria, disproportionate cost analysis, and reasonable restoration time frame. All three proposed alternatives will result in permanent, irreversible reduction in the toxicity, volume, and sources from historical releases. Therefore, the disproportional cost analysis focuses on the comparative costs and benefits of each alternative.

There is no evidence of imminent or unacceptable risk posed by current conditions at the Site to human health and the environment. The lateral extent of impacted groundwater has been delineated, and monitoring shows that COC concentrations within the original groundwater plumes have decreased and continue to decrease. At the few wells where COC concentrations exceed the selected CULs, COC concentrations do not pose a likely risk to current or future receptors (Section 5). Moreover, continued use of the Site as an operating bulk fuel storage terminal precludes potential conflicts with future uses of the Site.

9.2.1 No Action Alternative

A No Action Alternative does not meet cleanup criteria and is not considered for further evaluation.

9.2.2 Alternative 1 – ICs, MNA, and NSZD Monitoring

9.2.2.1 Threshold Criteria

- ***Protects human health and the environment*** – Existing containment, through successful, historical source removal and ICs, prevents exposure to Site COCs and migration of COCs outside Site boundaries.
- ***Complies with cleanup standards and ARARs*** – Current groundwater COC concentrations exceed CULs at the POC. However, groundwater monitoring has demonstrated that natural attenuation is responsible for decreases in groundwater COC concentrations to levels below CULs in downgradient wells.

  Provides for compliance monitoring – The existing groundwater monitoring network includes wells used to evaluate the effectiveness of prior interim remedial actions and is currently being used to evaluate ongoing natural attenuation and risk to surface water. A modified network, with fewer wells and reduced monitoring frequency over time is assumed for this alternative. Also, soil gas and/or temperature profiles in the subsurface would be evaluated to monitor NSZD rates.

9.2.2.2 Disproportionate Cost Analysis

- ***Protectiveness*** – Alternative 1 does not reduce any existing risk to human health or the environment, as existing risk is already sufficiently low. Also, Alternative 1 implementation does not incur additional on-Site or off-Site risks. The time required until cleanup achieved by this alternative may be ten to fifteen years or more, based on historical reductions in groundwater concentrations and biodegradation rates at other petroleum hydrocarbon release sites.
- ***Permanence*** – Alternative 1 may reduce concentrations of Site COCs to concentrations less than the CUL without forming toxic by-products. This alternative does not change the mobility of COCs.
- ***Cost*** – The Net Present Value (NPV) cost of Alternative 1, assuming a 6 percent discount rate, is $689,600 with an FS-level accuracy of -30 to +50 percent. Tables detailing capital and operations and maintenance (O&M) costs for this alternative are provided as Tables 12 through 14.
- ***Effectiveness over the long term*** – Natural biodegradation processes are well documented to be capable of producing significant decreases in groundwater concentrations at petroleum hydrocarbon release sites.
- ***Management of short-term risks*** – Alternative 1 incurs short-term risks, including potential injury to workers, associated with new monitoring point construction. Sufficient management of these risks is achieved through development and implementation of a site-specific health and safety plan.
- ***Technical and administrative implementability*** – Alternative 1 has been demonstrated to be technically and administratively implementable at similar petroleum release sites and represents a minor modification of existing practices.
- ***Consider public concerns –*** Any public concerns will be addressed and incorporated into final planning documentation after the public review and comment period has ended.

9.2.2.3 Reasonable Restoration Time Frame

Alternative 1 relies on natural processes that occur gradually to achieve cleanup. In downgradient former free product wells, CULs have been achieved within four years after completion and cessation of interim remedial actions. It is anticipated that continued biodegradation will further reduce groundwater concentrations. However, CULs may not be reached for more than fifteen years based on historical monitoring results.

9.2.2.4 Sustainability Assessment

Alternative 1 is identified as the most sustainable option in the remedial alternative's sustainability assessment. Alternative 1 has the lowest environmental impact in terms of creating emissions, and consumption of resources. It also has the lowest amount of waste generation. Since Alternative 1 mainly relies on natural degradation processes as described above there is no long-term operational component, and therefore an overall lower environmental impact. Alternative 1 also is the most economical treatment option and scores well in the social sustainability assessment performed in the AqSRT tool.

9.2.3 Alternative 2 – ICs, MNA, NSZD Monitoring, and Oxygen-Releasing Compounds

9.2.3.1 Threshold Criteria

- ***Protects human health and the environment*** – Existing containment, through successful, historical source removal and ICs, prevents exposure to Site COCs and migration of COCs outside Site boundaries.
- ***Complies with cleanup standards and ARARs*** – Current groundwater COC concentrations exceed CULs at the POC. However, groundwater monitoring has demonstrated that natural attenuation is responsible for decreases in groundwater COC concentrations to levels below CULs in downgradient wells. Also, the 2020 BA demonstrated that the addition of oxygen has the potential to accelerate attenuation rates in remaining high concentration areas. ORC socks are proposed for placement in up to four pre-existing monitoring wells, as indicated on Table 10. The four monitoring wells with ORC socks (which will be deployed on a pulsed schedule as described in Section 8.3.6.3) and 12 additional monitoring wells will be sampled following an MNA program to be presented in the Groundwater Monitoring Plan for the Site. A preliminary MNA program is presented in Section 8.3.3.1.
- ***Provides for compliance monitoring*** – The existing groundwater monitoring network includes wells used to evaluate the effectiveness of prior interim remedial actions and is currently being used to evaluate ongoing natural attenuation and risk to surface water. A modified network, with fewer wells and reduced monitoring frequency over time, would be considered adequate for this alternative. Also, soil gas and/or temperature profiles in the subsurface would be evaluated to monitor NSZD rates.

9.2.3.2 Disproportionate Cost Analysis

- ***Protectiveness*** – Alternative 2 does not reduce any existing risk to human health or the environment, as existing risk is already sufficiently low. Also, Alternative 2 implementation does not incur additional on-Site or off-Site risks. The time required until cleanup achieved by this alternative is considered to be five to fifteen years, based on historical reductions in groundwater concentrations and biodegradation rates at other petroleum hydrocarbon release sites.
- ***Permanence*** – Alternative 2 permanently reduces concentrations of Site COCs to concentrations less than the CUL without forming toxic by-products. Also, this alternative does not change the mobility of COCs.
- ***Cost*** – The Net Present Value (NPV) cost of Alternative 2, assuming a 6 percent discount rate, is $786,400 with an FS-level accuracy of -30 to +50 percent. Tables detailing capital and operations and maintenance (O&M) costs for this alternative are provided as Tables 12 through 14.
- ***Effectiveness over the long term*** – Natural biodegradation processes are well documented to be capable of producing significant decreases in groundwater concentrations at petroleum hydrocarbon release sites. Addition of oxygen-releasing compounds will increase the rates of these processes as demonstrated by the 2020 BA.

- ***Management of short-term risks*** – Alternative 2 incurs short-term risks, including potential injury to workers, associated with new monitoring point construction and replacement of oxygen-releasing compound units in wells. Sufficient management of these risks is achieved through development and implementation of a site-specific health and safety plan.
- ***Technical and administrative implementability*** – Alternative 2 has been demonstrated to be technically and administratively implementable at similar petroleum release sites and represents a minor modification of existing practices.
- ***Consider public concerns –*** Any public concerns will be addressed and incorporated into final planning documentation after the public review and comment period has ended.

9.2.3.3 Reasonable Restoration Time Frame

Alternative 2 relies on natural processes, with enhancement by oxygen-releasing compounds, that occur gradually to achieve cleanup. In downgradient former free product wells, CULs have been achieved within four years after completion and cessation of interim remedial actions. The relatively low groundwater gradient across the Site reduces the cleanup time frame for this alternative. It is anticipated that continued biodegradation will further reduce groundwater concentrations, potentially reaching CULs for all COCs in a five- to fifteen-year time frame, based on historical monitoring results and results using similar remedial technologies at similar petroleum release sites.

9.2.3.4 Sustainability Assessment

Alternative 2 is similar to Alternative 1 in both environmental impact and overall sustainability scoring. The addition of the use of oxygen-releasing compounds causes an increased environmental footprint compared to Alternative 1 but provides a slightly lower cleanup timeframe. Though, overall, the environmental footprint is still relatively low compared to all of the alternatives.

9.2.4 Alternative 3 – ICs, MNA, NSZD Monitoring, Oxygen-Releasing Compounds, and Bio-Sparging

9.2.4.1 Threshold Criteria

- ***Protects human health and the environment*** – Alternative 3 includes all the protections discussed in Alternative 2.
- ***Complies with cleanup standards and ARARs*** – Alternative 3 represents a similar ability to comply with the cleanup standards as Alternative 2 with significant potential for reaching standards sooner, as the bio-sparging component represents a significant increase in oxygen delivery compared to oxygen-releasing compounds.
- ***Provides for compliance monitoring*** – Alternative 3 has the same provisions for compliance monitoring as Alternative 2.

9.2.4.2 Disproportionate Cost Analysis

- ***Protectiveness*** – Alternative 3 would provide the same protectiveness as Alternative 2. The application of bio-sparging will reduce the overall time required for cleanup.
- ***Permanence*** – As with Alternative 2, Alternative 3 permanently reduces concentrations of Site COCs from historical releases and does not change COC mobility.
- ***Cost*** – The NPV cost of Alternative 3, assuming a 6 percent discount rate, is $1,350,400 with an FS-level accuracy of -30 to +50 percent. Tables detailing capital and O&M costs for this alternative are provided as Tables 12 through 14.

- ***Effectiveness over the long term*** – Alternative 3 is considered to be more effective over a shorter period of time compared to Alternative 2. As with Alternative 2, Alternative 3 relies on biodegradation processes for cleanup. However, the bio-sparging component of Alternative 3 is a significantly more effective oxygen delivery technology compared to placement of oxygen-releasing compound units in wells.
- ***Management of short-term risks*** – Alternative 3 incurs short-term risks associated with construction, including potential injury to workers. Sufficient management of risks is achieved through development and implementation of a site-specific health and safety plan.
- ***Technical and administrative implementability*** – Alternative 3 has been demonstrated to be technically and administratively implementable at the Site, as air sparging has previously been implemented at the Site with success. Bio-sparging system construction and operation is nearly identical to those of air sparging, but at lower pressures and air flow rates.
- ***Consider public concerns –*** Any public concerns will be addressed and incorporated into final planning documentation after the public review and comment period has ended.

9.2.4.3 Reasonable Restoration Time Frame

Alternative 3 relies primarily on the same natural processes to achieve cleanup as Alternative 2. However, compared to placement of oxygen-releasing compound units in wells, bio-sparging is significantly more efficient at delivering oxygen to the saturated zone with greater lateral distribution. As a result, Alternative 3 in-situ biodegradation rates are expected to be greater than those of Alternative 2. It is anticipated that continued biodegradation, accelerated by active bio-sparging, will further reduce groundwater concentrations. CULs could be reached in a five- to ten-year time frame based on historical monitoring results and bio-sparging system performance at similar petroleum release sites.

9.2.4.4 Sustainability Assessment

Alternative 3 has the highest environmental impact for greenhouse gas emissions, water consumption and electricity use and the second highest impact for total energy use, waste generation. The need for ongoing operation of the bio-sparging system, estimated at 10 years, requires an increased energy demand and associated water use for electricity generation. However, the active treatment components of this alternative do provide a shorter estimated treatment timeframe when compared to Alternatives 1 and 2. Alternative 3 has mid-level comparative costs and social sustainability scoring.

9.2.5 Alternative 4 – ICs, MNA, NSZD Monitoring, Oxygen Release Compounds, Bio-Sparging, and AC-Based In-Situ Treatment

9.2.5.1 Threshold Criteria

- ***Protects human health and the environment*** – Alternative 4 includes all the protections discussed in Alternative 2.
- ***Complies with cleanup standards and ARARs*** – Alternative 4 represents the similar ability to comply with the cleanup standards as Alternative 2 with significant potential for reaching standards sooner. The AC emplacement component introduces adsorption as an additional mechanism for accelerating biodegradation of COCs.
- ***Provides for compliance monitoring*** – Alternative 4 has the same provisions for compliance monitoring as Alternative 2.

9.2.5.2 Disproportionate Cost Analysis

- ***Protectiveness*** – Alternative 4 would provide the same degree of protectiveness as Alternative 2. The emplacement of AC in the saturated zone will reduce the overall time required for cleanup.
- ***Permanence*** – As with Alternative 2, Alternative 4 permanently reduces concentrations of Site COCs from historical releases and does not change COC mobility.
- ***Cost*** – The NPV cost of Alternative 4, assuming a 6 percent discount rate, is $1,425,300 with an FS-level accuracy of -30 to +50 percent. Tables detailing capital and O&M costs for this alternative are provided as Tables 12 through 14.
- ***Effectiveness over the long term*** – Alternative 4 is considered to be more effective over a shorter period of time compared to both Alternatives 2 and 3. As with Alternative 2, Alternative 4 relies on biodegradation processes for cleanup. However, the AC emplacement component immobilizes dissolved-phase petroleum hydrocarbons by adsorption and facilitates accelerated biodegradation of the adsorbed TPHs.
- ***Management of short-term risks*** – Alternative 4 incurs short-term risks associated with construction and implementation, including potential injury to workers. Specific hazards include injection pressures potentially exceeding 500 pounds per square inch for AC emplacement which may represent risk of damage to Site equipment and tankage if not implemented safely. Sufficient management of risks is achieved through development of a robust site-specific health and safety plan incorporating safety procedures developed by the AC emplacement subcontractor.
- ***Technical and administrative implementability*** – Alternative 4 has been demonstrated to be technically and administratively implementable at similar petroleum release sites. However, there are technical challenges associated with AC emplacement using direct-push injection at the Site due to the relatively deep target interval (greater than 80 feet bgs), and aboveground storage tanks and tank farm infrastructure in close proximity to the treatment areas.
- ***Consider public concerns –*** Any public concerns will be addressed and incorporated into final planning documentation after the public review and comment period has ended.

9.2.5.3 Reasonable Restoration Time Frame

Alternative 4 relies on the same natural processes, primarily biodegradation, to achieve cleanup as Alternative 2. However, AC emplacement introduces an adsorption component to immobilize COCs which facilitates increased biodegradation rates compared to the other two alternatives. It is anticipated that continued biodegradation, accelerated by AC emplacement, will further reduce groundwater concentrations. CULs could be reached in a two- to five-year time frame based on historical monitoring results and AC-based in-situ treatment performance at similar petroleum release sites.

9.2.5.4 Sustainability Assessment

Alternative 4 has the highest environmental impact for total energy use, waste generation and second highest environmental impact for greenhouse gas emissions, water consumption and electricity. It is also the most costly of the alternatives and least socially sustainable treatment option. However, Alternative 4 does have the lowest estimated treatment timeframe.

10 Recommended Remedial Action Alternative

Alternative 2 (ICs, MNA, NSZD Monitoring, and Oxygen-Releasing Compounds) is the recommended cleanup action for the Site. Alternative 2 is recommended for the following reasons:

- It meets all threshold criteria;
- It has demonstrated reduction of toxicity, mobility, and volume of hazardous substances;
- Source removal has been addressed through interim remedial actions, the most recent of which (soil vapor extraction and air sparging) was discontinued in 2000. Natural attenuation processes have been the primary remedial mechanisms continuing to reduce concentrations since then. Concentrations from the most recent monitoring event conducted in December 2020 are less than cleanup levels with the exception of TPH-d in monitoring well MW-3;
- The restoration time frame is reasonable compared to the other alternatives;
- It provides a factor of protection that is comparable to or better than other remedial alternatives; and
- It is readily implementable.

Each remedial alternative has sustainability benefits and drawbacks. The SiteWise™ assessment has highlighted that each of the active stages of remediation has an environmental impact in terms of energy, resource usage and environmental emissions. Overall, Alternative 1 has the lowest impact across all metrics, while Alternatives 3 and 4 each have the highest impact for several metrics. The environmental impact for Alternative 2 is only slightly higher than Alternative 1 for most sustainability metrics. The AqSRT assessment identifies Alternative 1 as the most sustainable alternative for all three pillars of sustainability – economic, environmental, and social. However, Alternative 1 would have the longest restoration timeframe of all the alternatives which is estimated to be approximately 15 years.

Tesoro priority metrics for environmental sustainability include greenhouse gas emissions, total energy and resource consumption, and air pollution. For these metrics, Alternative 3 has the highest impacts for greenhouse gas emissions, water consumption, and electricity usage and the second highest impacts for total energy use and waste generation. Alternative 4 has the highest impacts for total energy and waste generation and the second highest impacts for greenhouse gas emissions, water consumption, and electricity. Alternative 4 also has the highest impacts for on-site criteria pollutants and accident risk. Along with environmental impact, other important factors such as cleanup timeframe and project cost are sustainability considerations that were taken into account for remedy selection. When considering sustainability on a holistic basis, Alternative 2 is recommended because it is low cost and has lower overall environmental impact compared to Alternatives 3 and 4 and has a potentially shorter restoration time frame than Alternative 1.

11 Limitations

The findings and conclusions documented in this report have been prepared for specific application to this project and have been developed in a manner consistent with the level of care and skill normally exercised by members of the environmental science profession currently practicing under similar conditions in the area and in general accordance with the terms and conditions set forth in our Agreement. No warranty or other conditions express or implied should be understood.

The findings presented in this report are based on conditions observed at specific site locations and sampling intervals at the time of the assessment. Because conditions between the monitoring well locations or borings may vary over distance and time, the potential always remains for the presence of unknown, unidentified, unforeseen, or changed surface and subsurface contamination. Conclusions in this report are based on comparison of chemical analytical results to current regulatory standards.

This report is for the exclusive use of Tesoro and its representatives. No third party shall have the right to rely on AECOM’s opinions rendered in connection with the services or in this report without our written consent, and the second party’s agreement to be bound to the same conditions and limitations as Tesoro.

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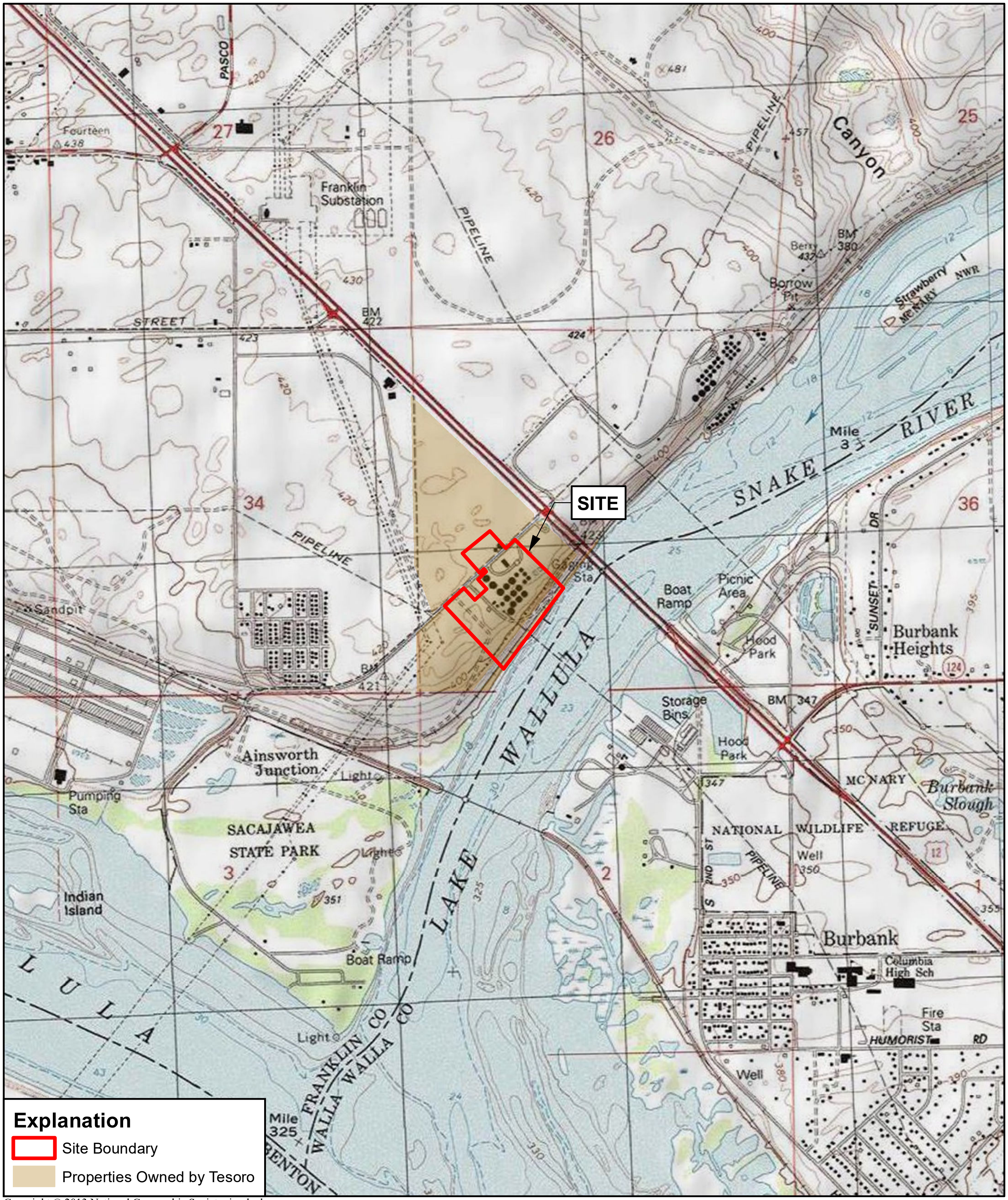
Figures



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SCALE IN FEET

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SITE VICINITY MAP

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FIGURE 1

K:\Tesoro_Pasco\MXD\RI\Fig 1 Site Viciniy Map.mxd

Imagery Source: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

K:\Tesoro_Pasco\MXD\RI\Fig 2 Site Plan.mxd

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SITE PLAN

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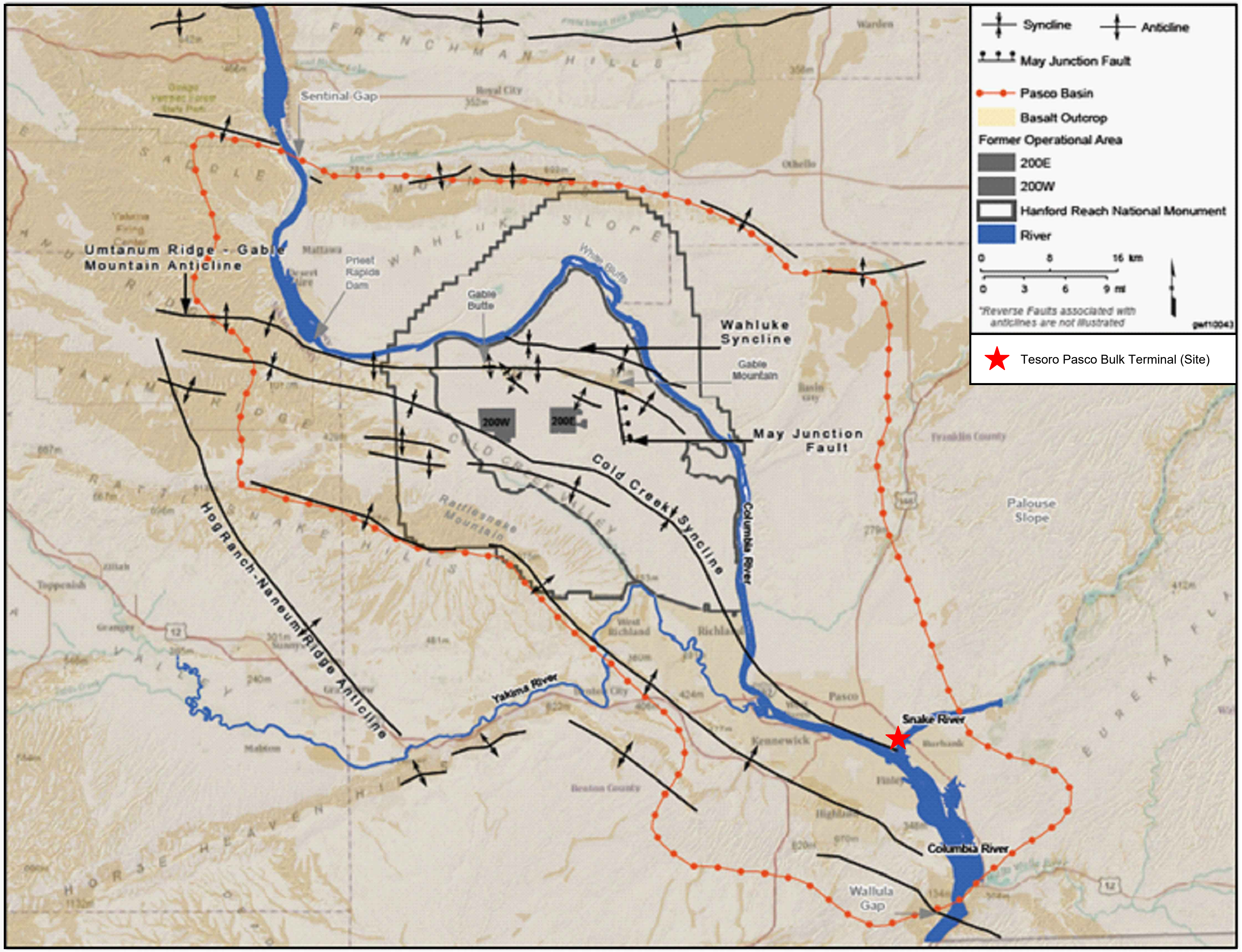
FIGURE 2



Taken From Martin, 2011.

REGIONAL DEPOSITION SETTING

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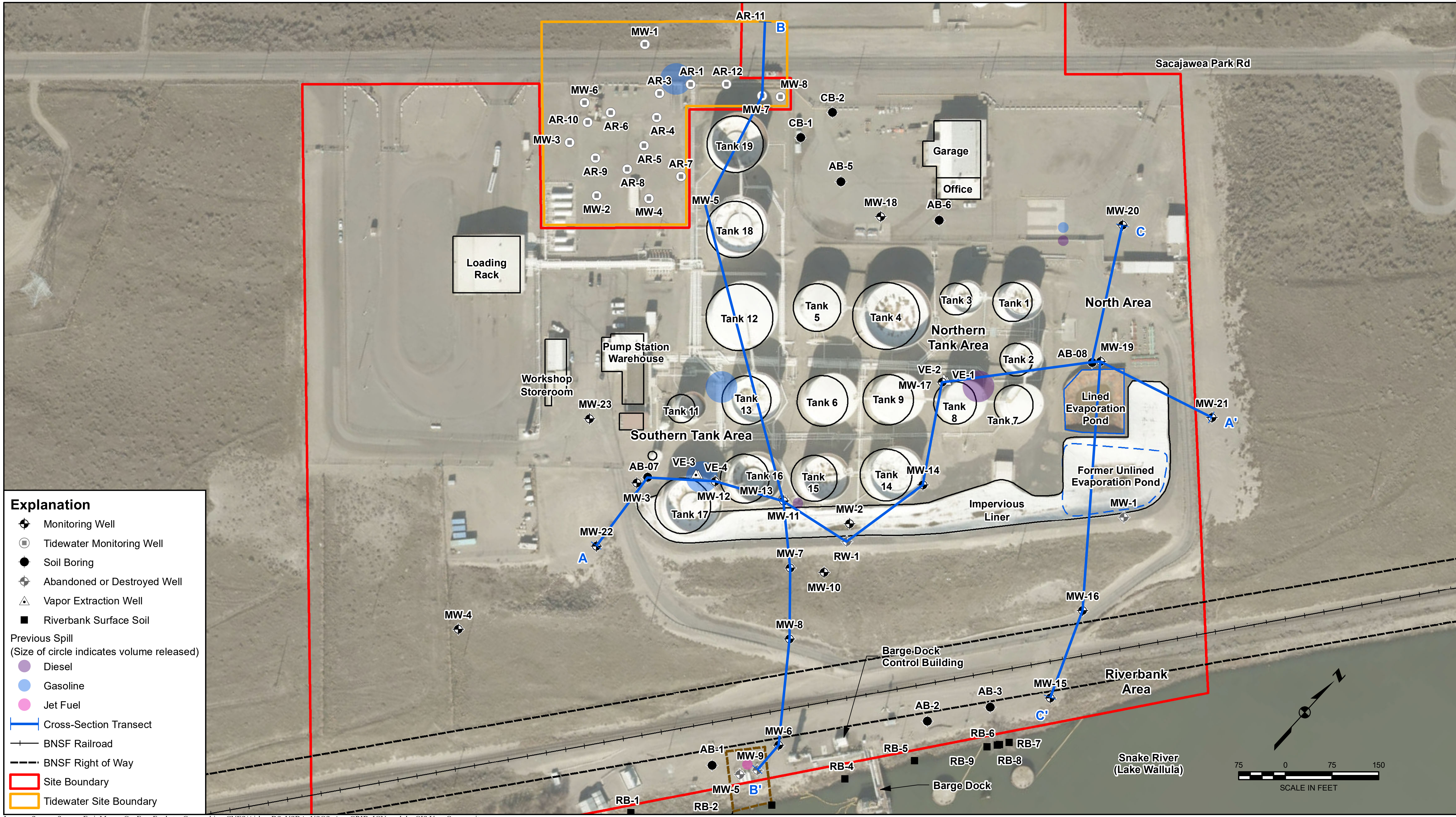
FIGURE 3



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K:\Tesoro_Pasco\MXD\RI\Fig 4 Cross-Section Location Map.mxd

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CROSS-SECTION LOCATION MAP

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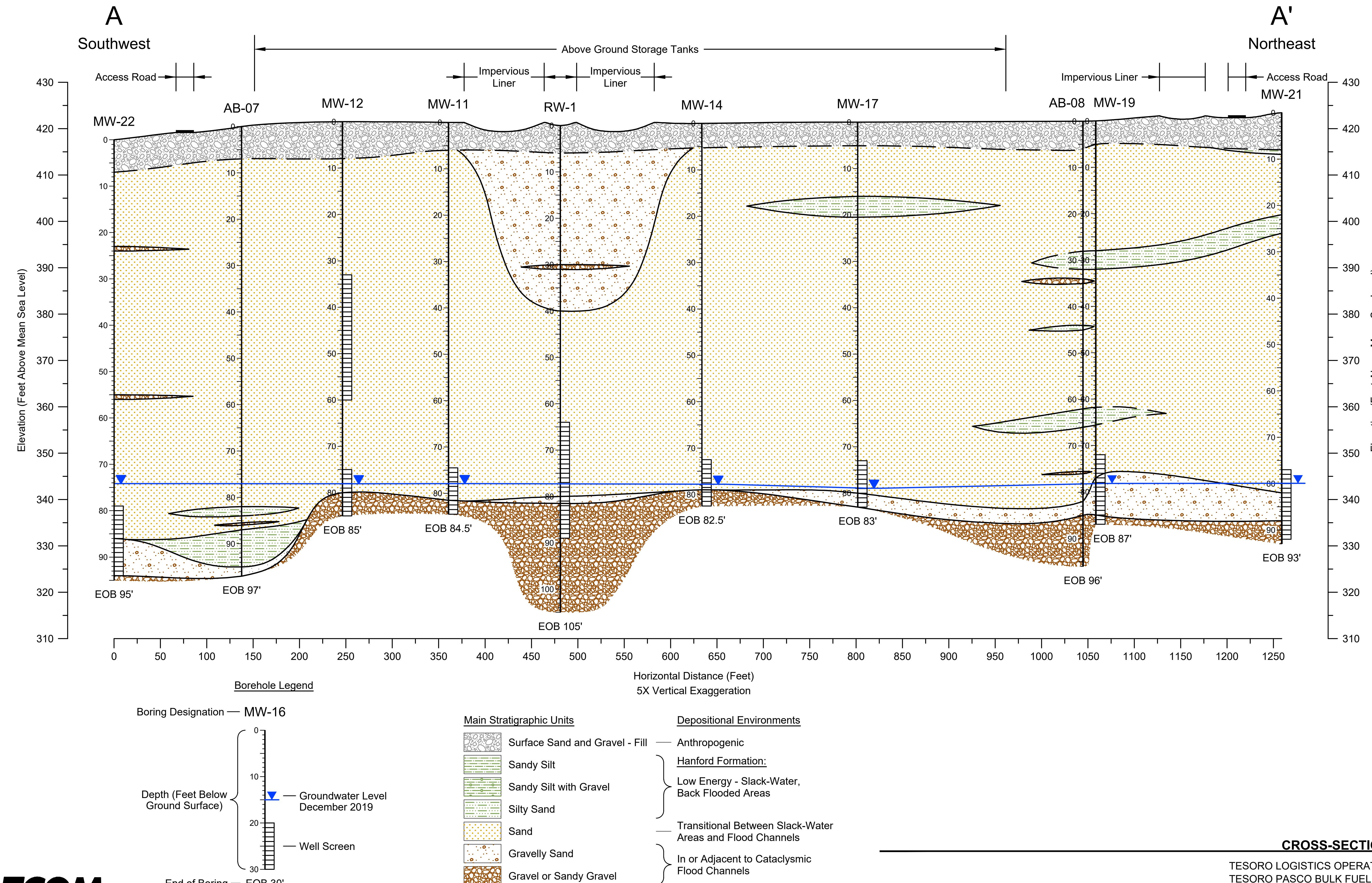
FIGURE 4



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CROSS-SECTION A - A'

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FIGURE 5

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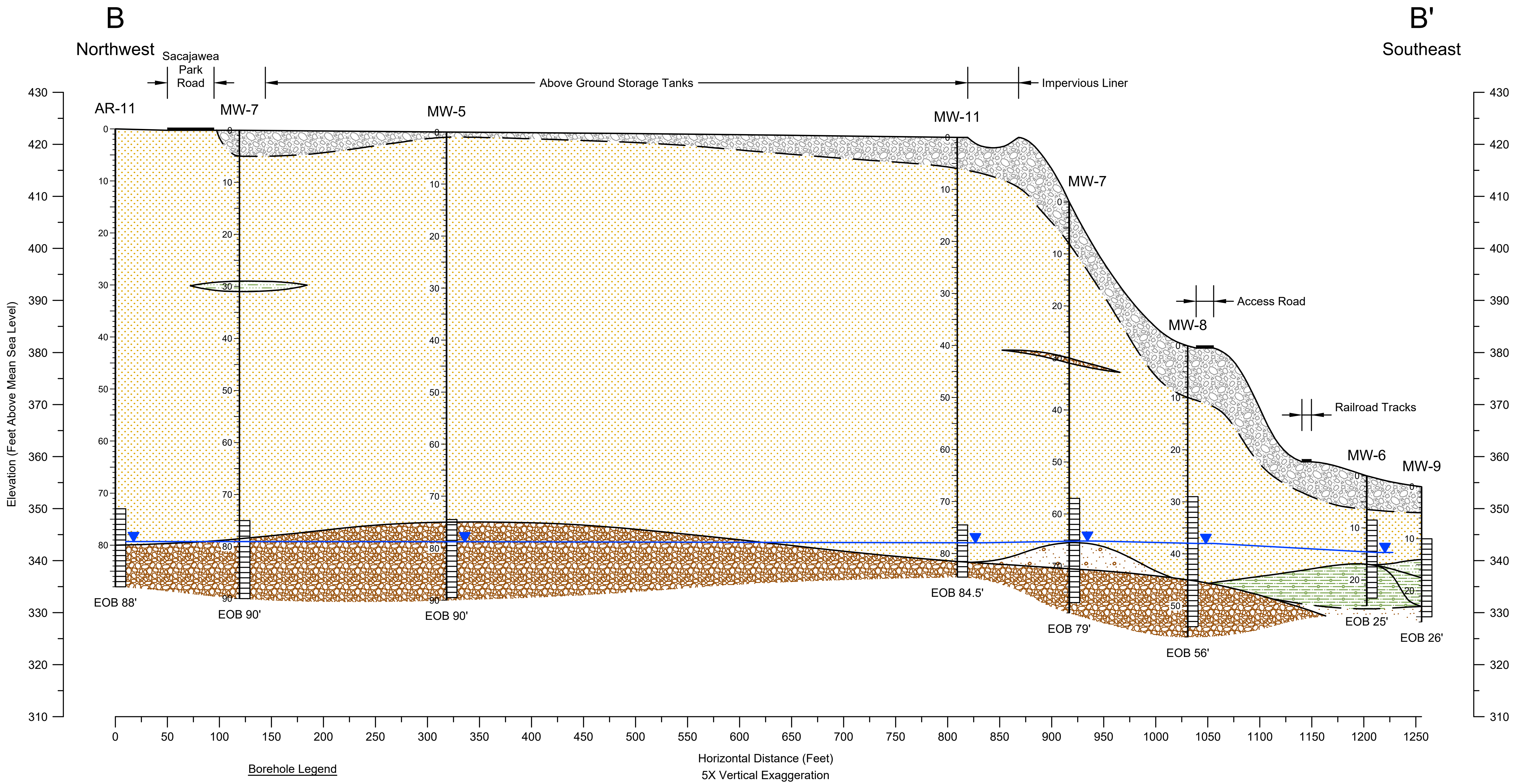

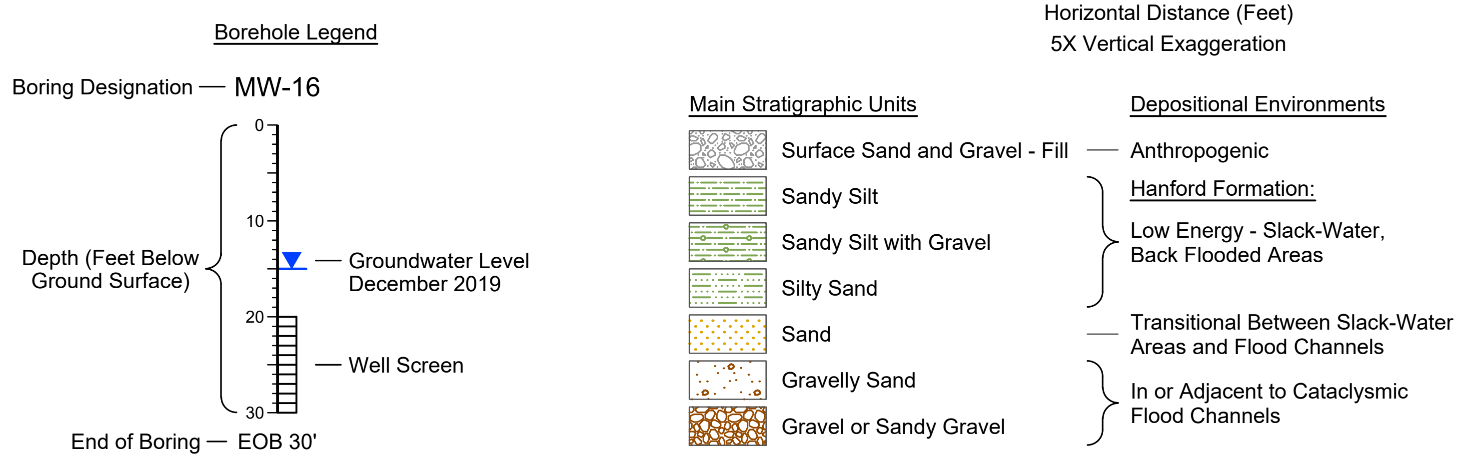

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CROSS-SECTION B - B'

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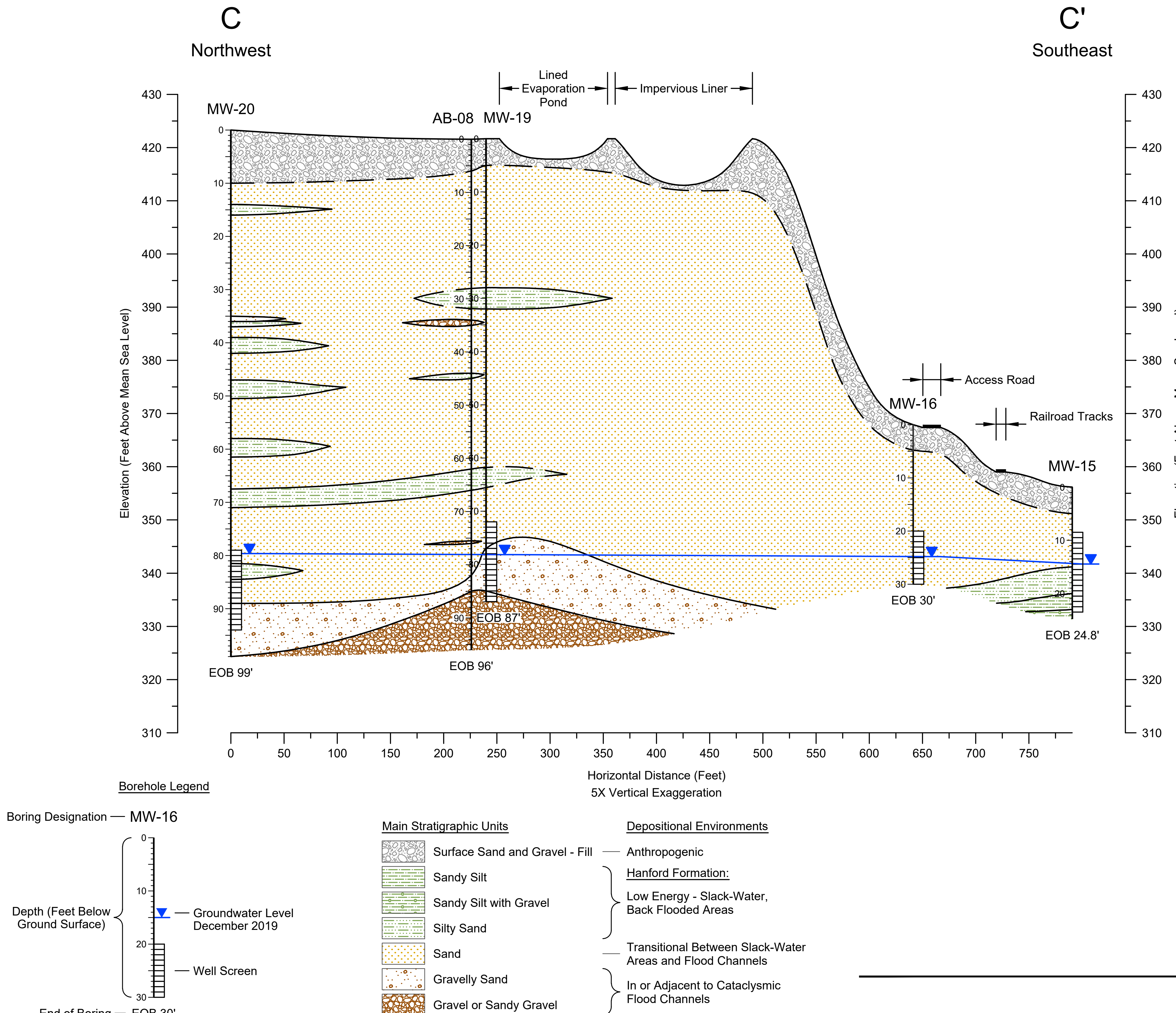
FIGURE 6



CROSS-SECTION C - C'

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FIGURE 7

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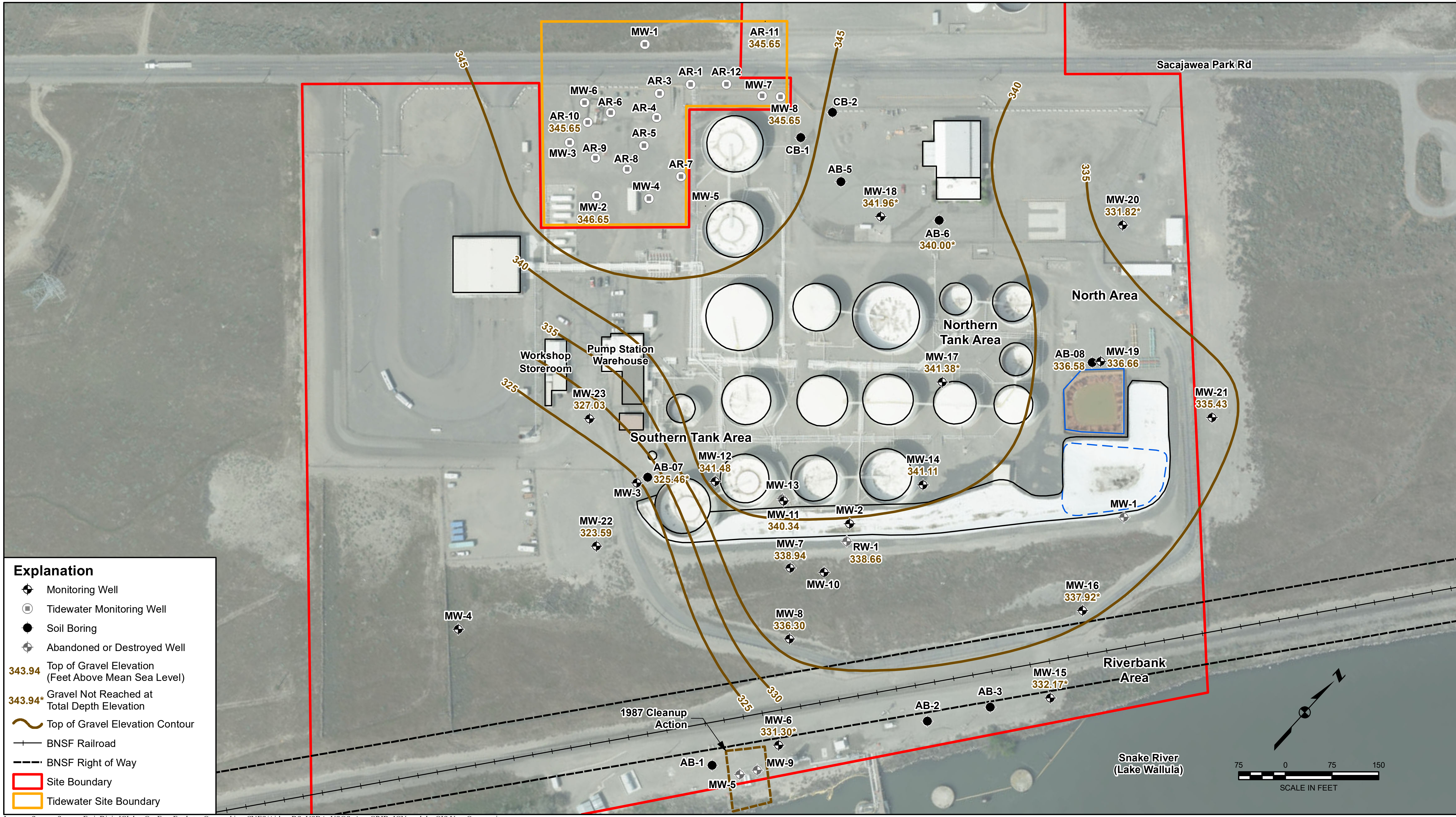

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TOP OF GRAVEL ELEVATION MAP

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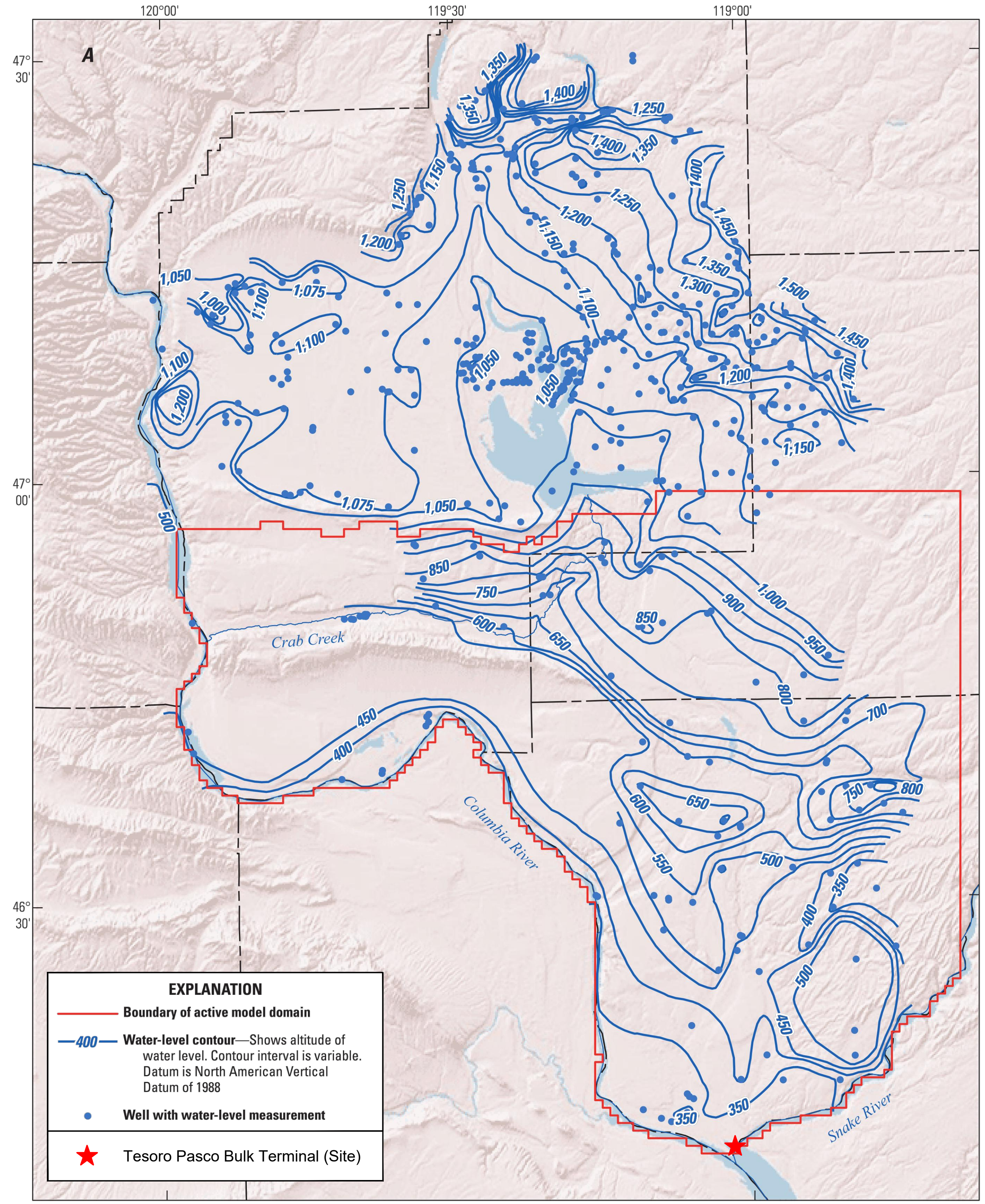
FIGURE 8



Elevation data from the National Elevation Dataset.
Washington State Plane South, FIPS zone 4602, units in feet.
Horizontal datum is North American Datum of 1983.

0 10 20 MILES
0 10 20 KILOMETERS

N

REGIONAL GROUNDWATER FLOW

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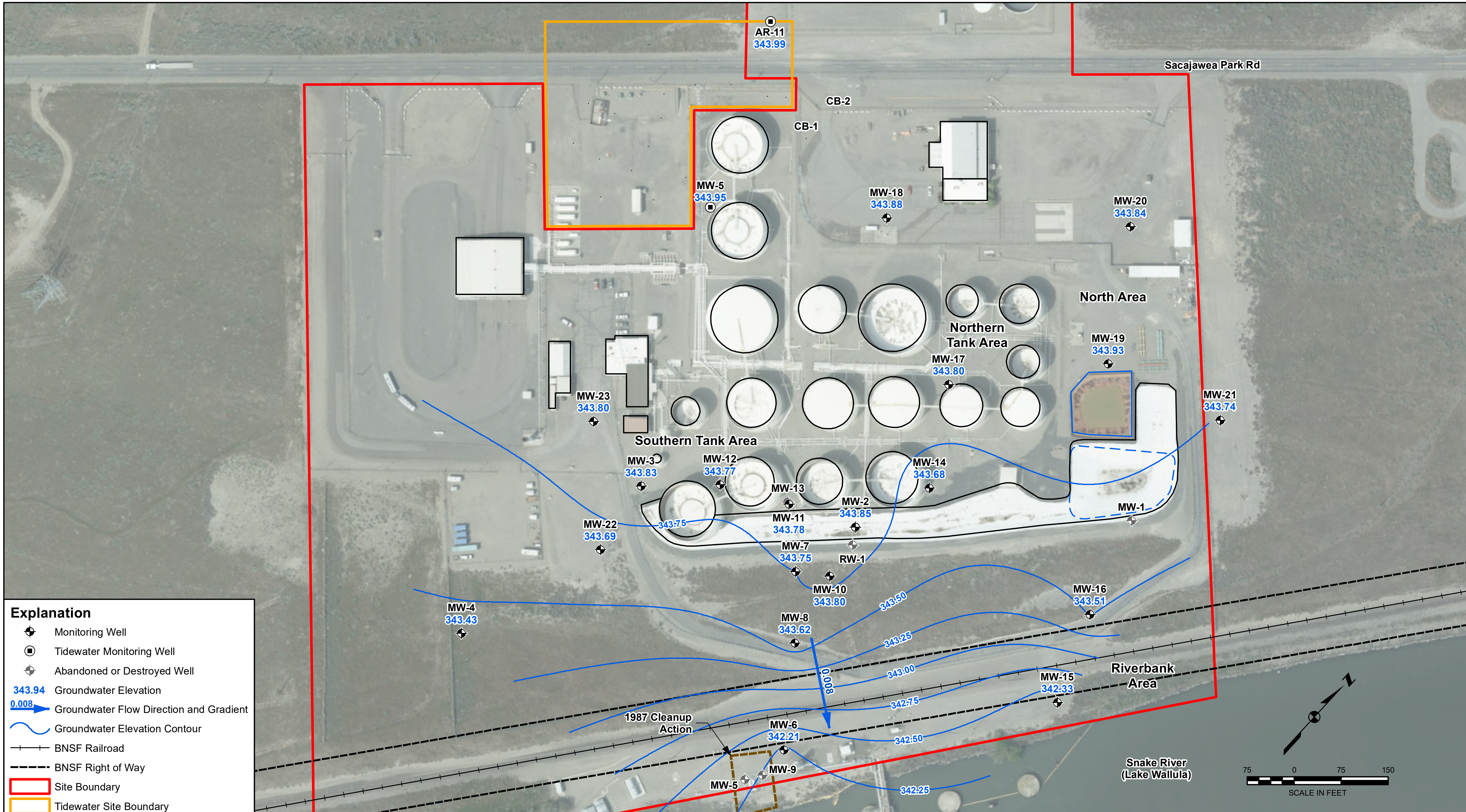
FIGURE 9

Taken From Heywood, *et al*, 2016, Figure 8.



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GROUNDWATER ELEVATION CONTOUR MAP – JUNE 2020

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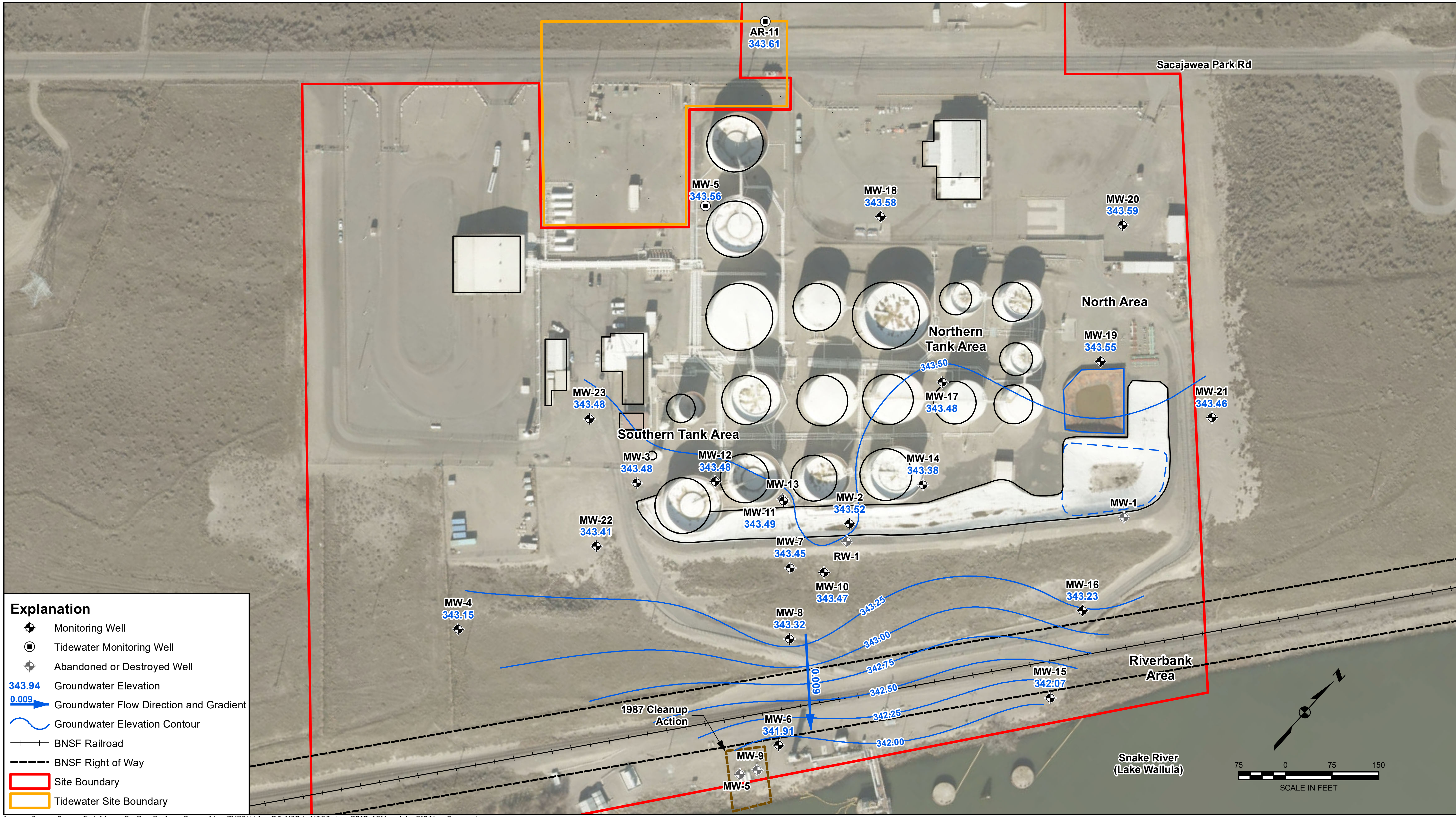
FIGURE 10

K:\Tesoro_Pasco\MXD\RI\Fig 10 Groundwater Elevation Contour Map - June 2020.mxd



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GROUNDWATER ELEVATION CONTOUR MAP – DECEMBER 2020

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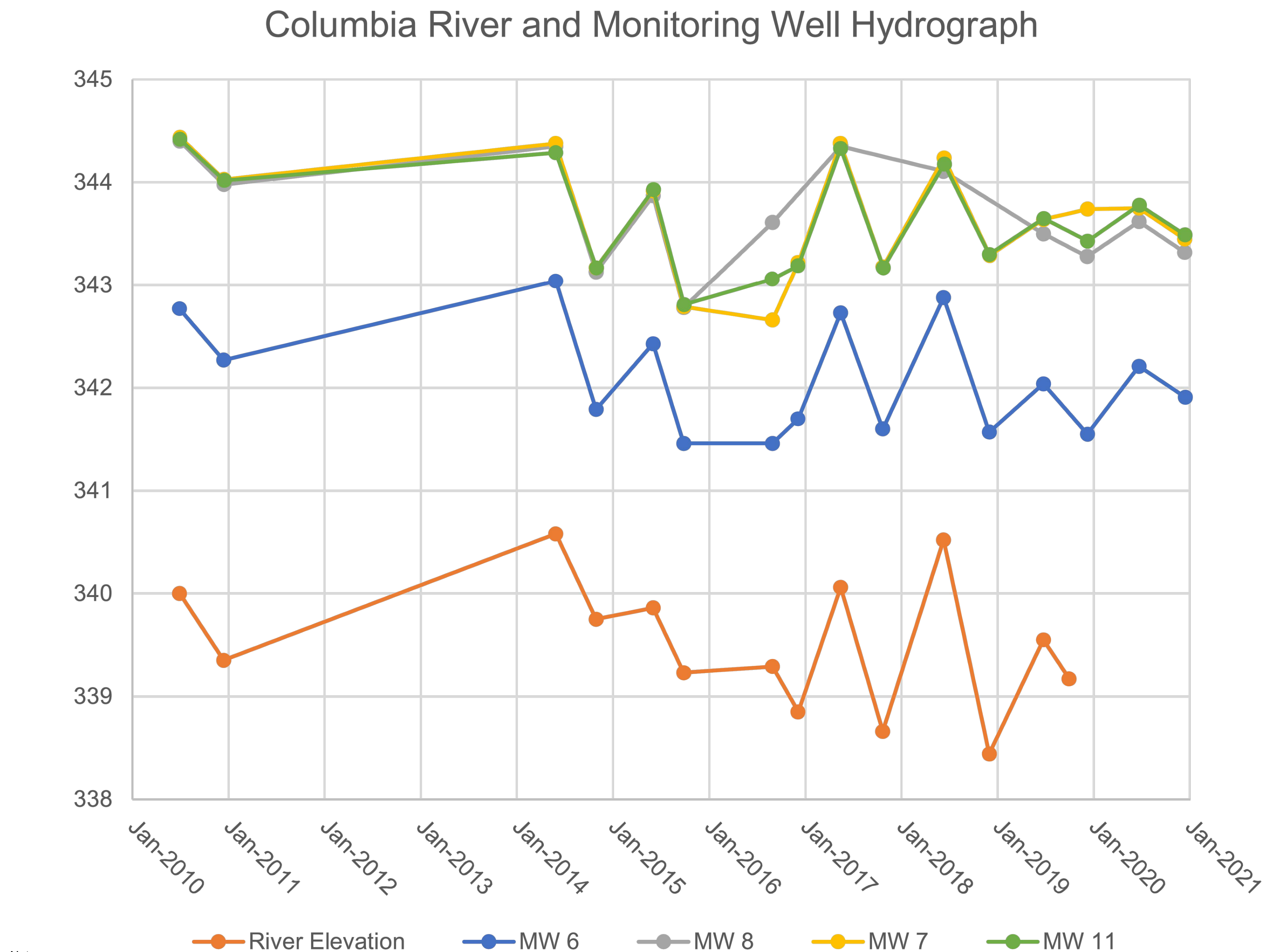
FIGURE 11

K:\Tesoro_Pasco\MXD\RI\Fig 11 Groundwater Elevation Contour Map - December 2020.mxd



Notes:
1. Data not available after Sept. 30, 2019. The elevation record at this location was discontinued due to a lapse in funding.
2. River elevation, as measured at USGS Station #12514500, Columbia River on Clover Island at Kennewick, WA.
3. Columbia River elevation measured in feet above National Geodetic Vertical Datum of 1929, monitoring well elevation measured in North American Vertical Datum of 1929.

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COLUMBIA RIVER AND MONITORING WELL HYDROGRAPH

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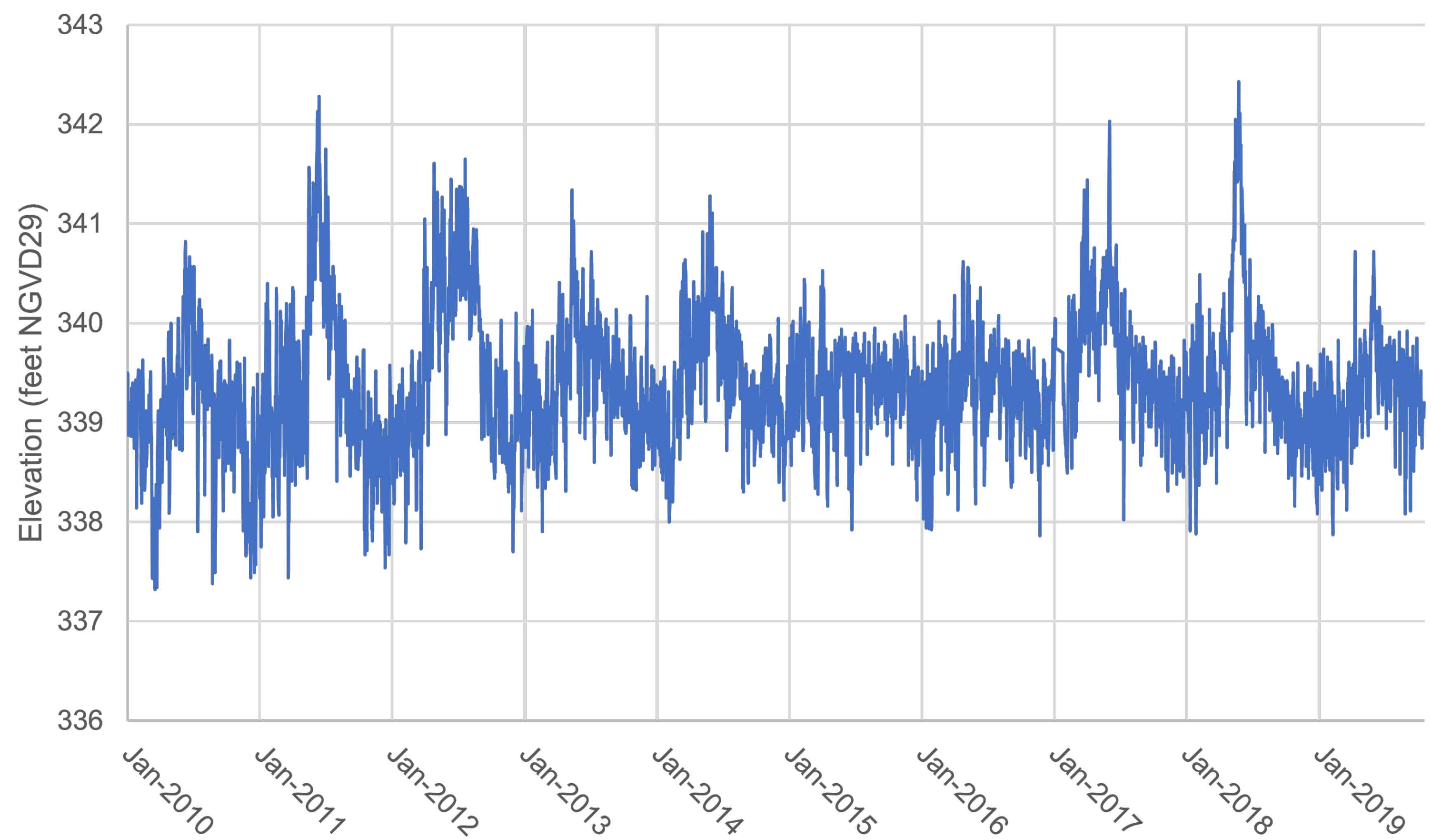
FIGURE 12



Notes:
1. Data not available after Sept. 30, 2019. The elevation record at this location was discontinued due to a lapse in funding.
2. Data River elevation, as measured at USGS Station #12514500, Columbia River on Clover Island at Kennewick, WA.
Columbia River elevation measured in feet above National Geodetic Vertical Datum of 1929.

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COLUMBIA RIVER HYDROGRAPH

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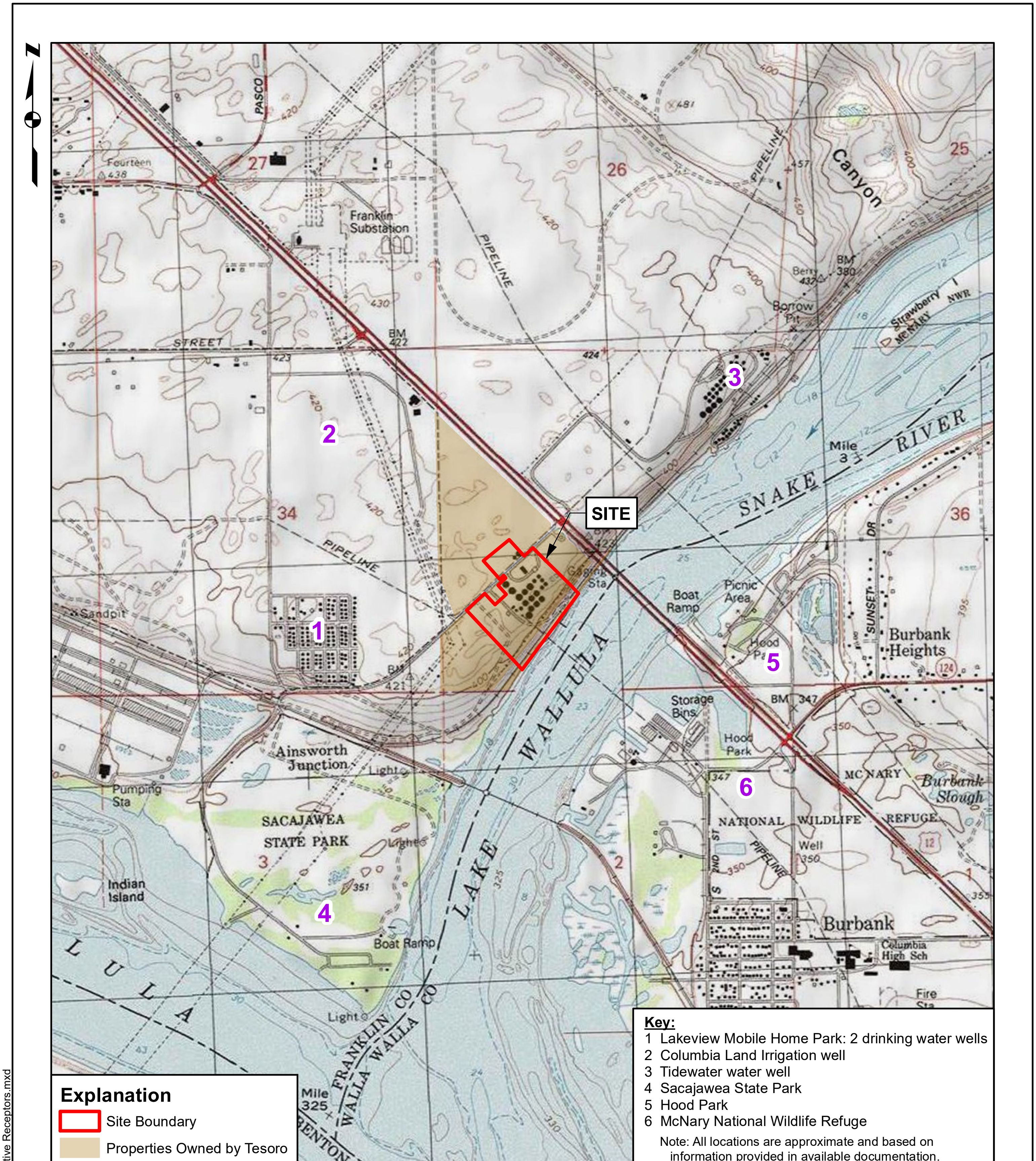
FIGURE 13



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SENSITIVE RECEPTORS

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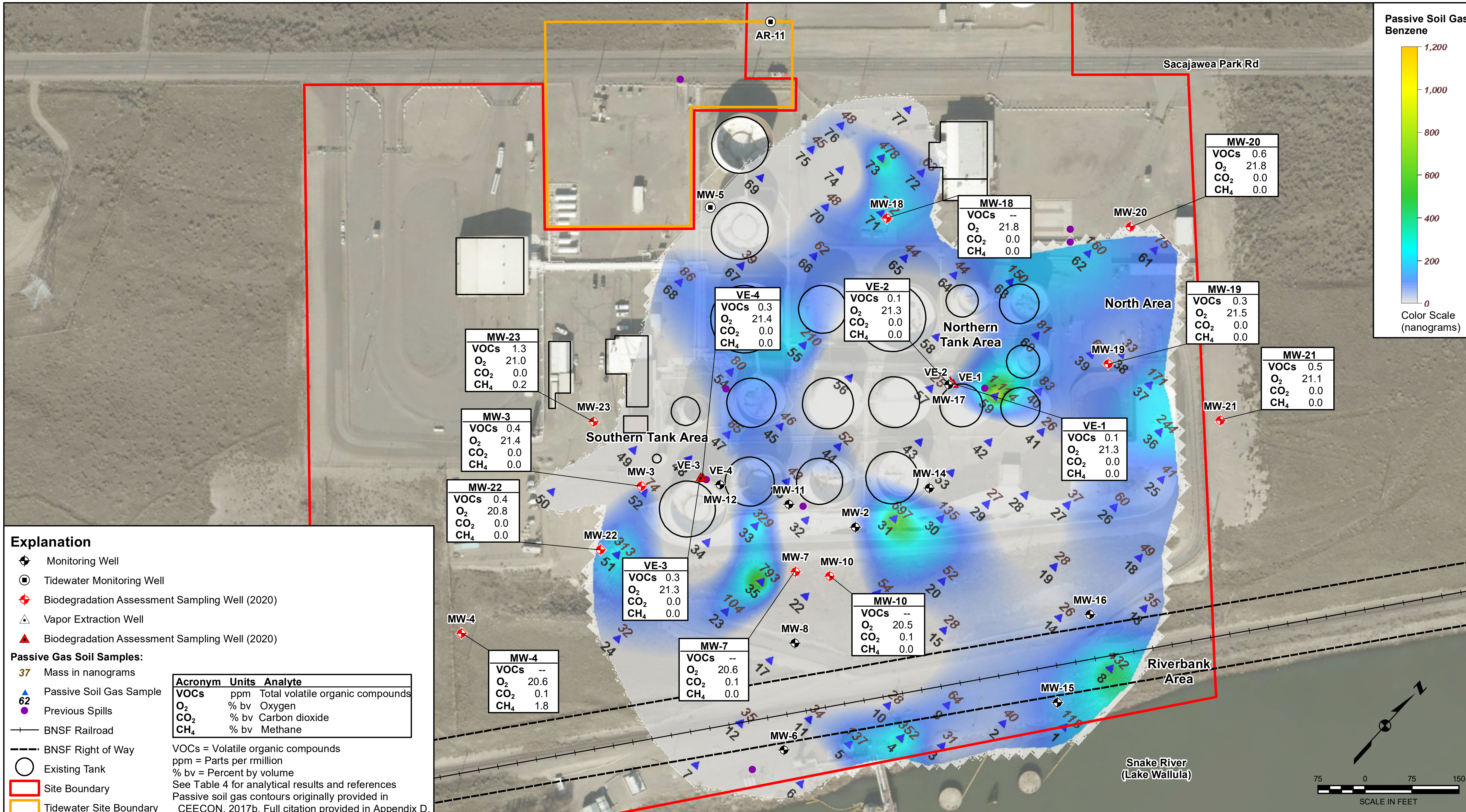
FIGURE 14



Imagery Source: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

PASSIVE SOIL GAS DISTRIBUTION – BENZENE AND 2020 BIODEGRADATION ASSESSMENT

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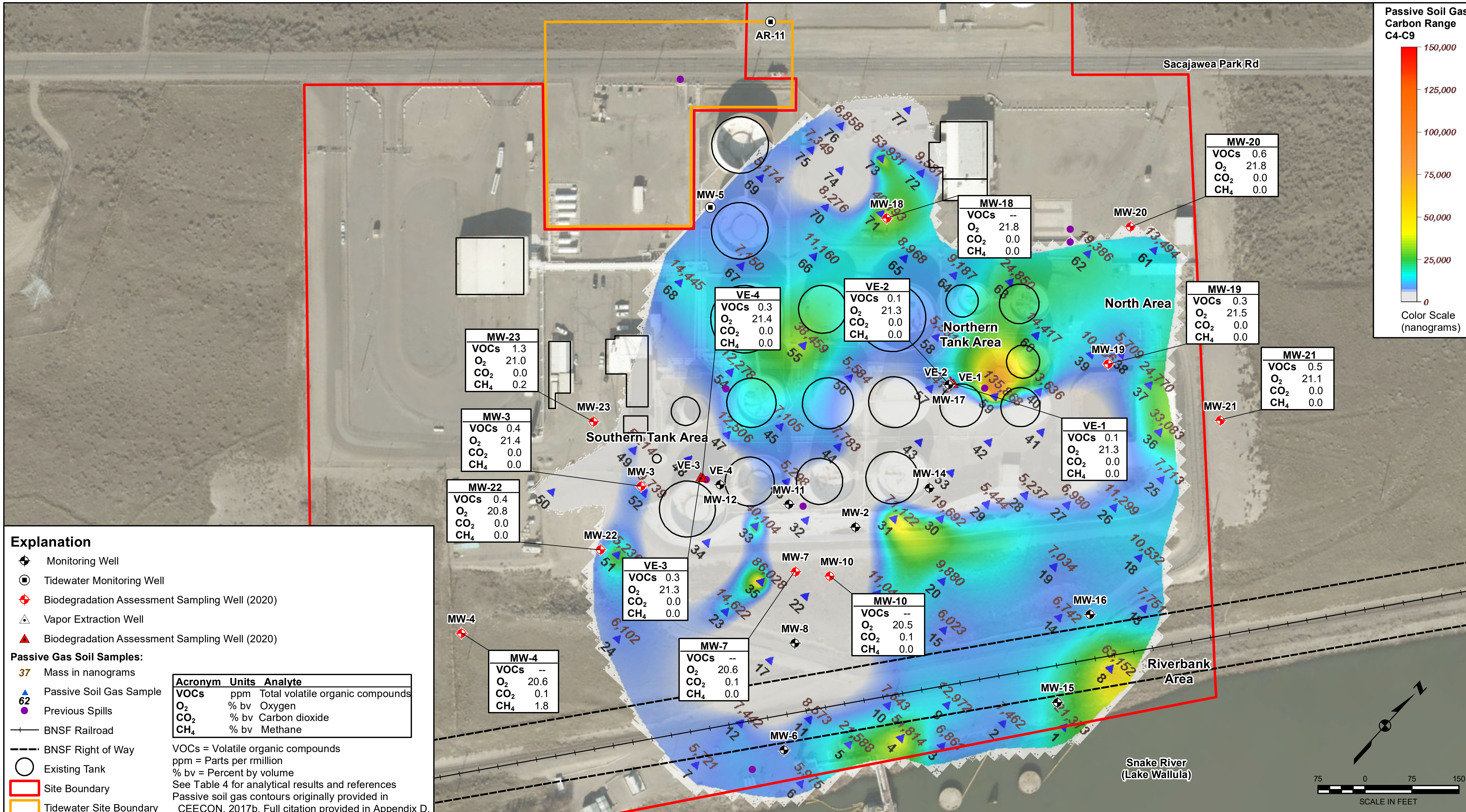
FIGURE 15

K:\Tesoro_Pasco\MXD\RI\Fig 15 Passive Soil Gas Distribution- Benzene.mxd



Imagery Source: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

PASSIVE SOIL GAS DISTRIBUTION – PETROLEUM HYDROCARBON RANGE C4-C9

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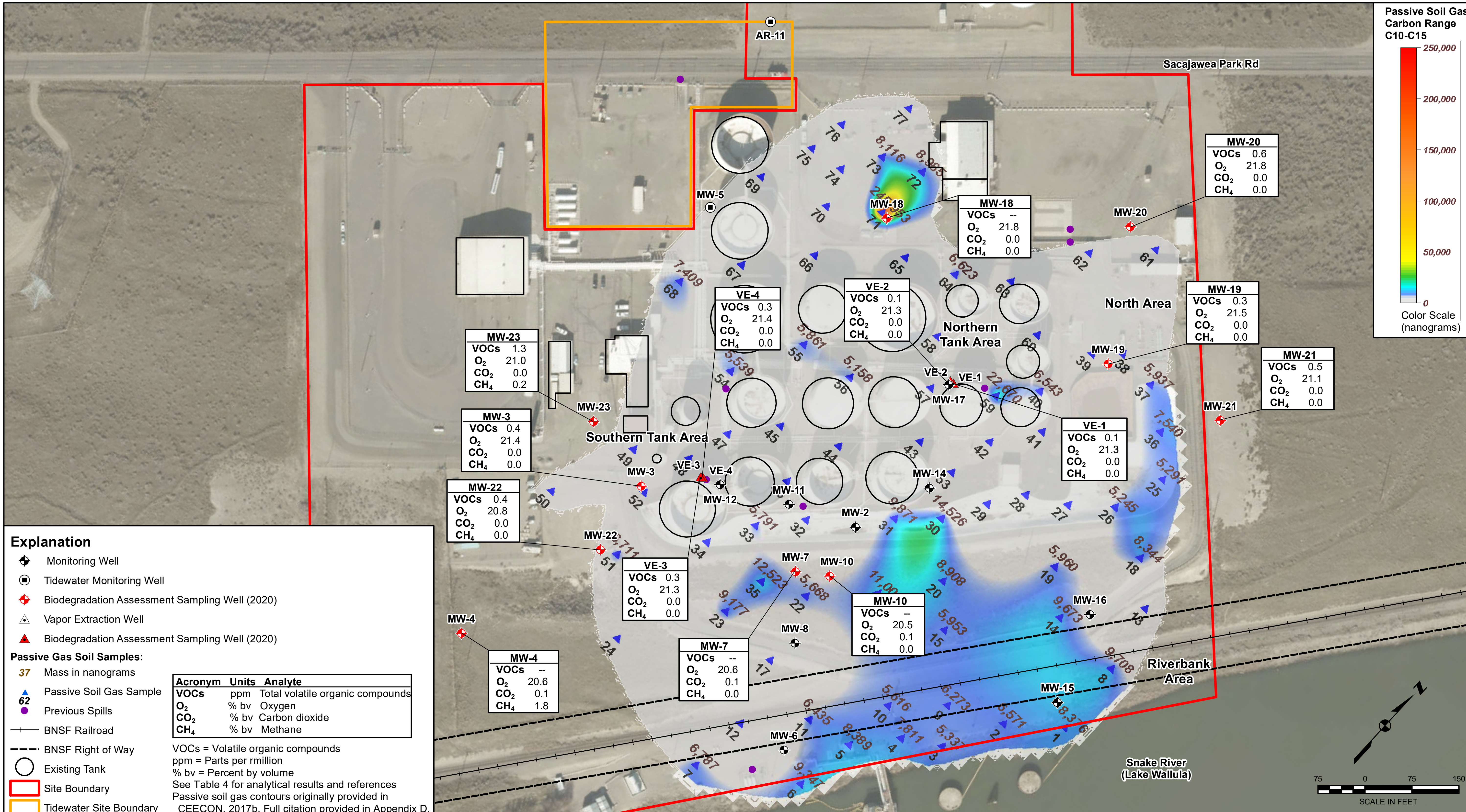
FIGURE 16

K:\Tesoro_Pasco\MXD\R\Fig 16 Passive Soil Gas Distribution- Carbon Range C4-C9.mxd



Imagery Source: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

PASSIVE SOIL GAS DISTRIBUTION – PETROLEUM HYDROCARBON RANGE C10-C15

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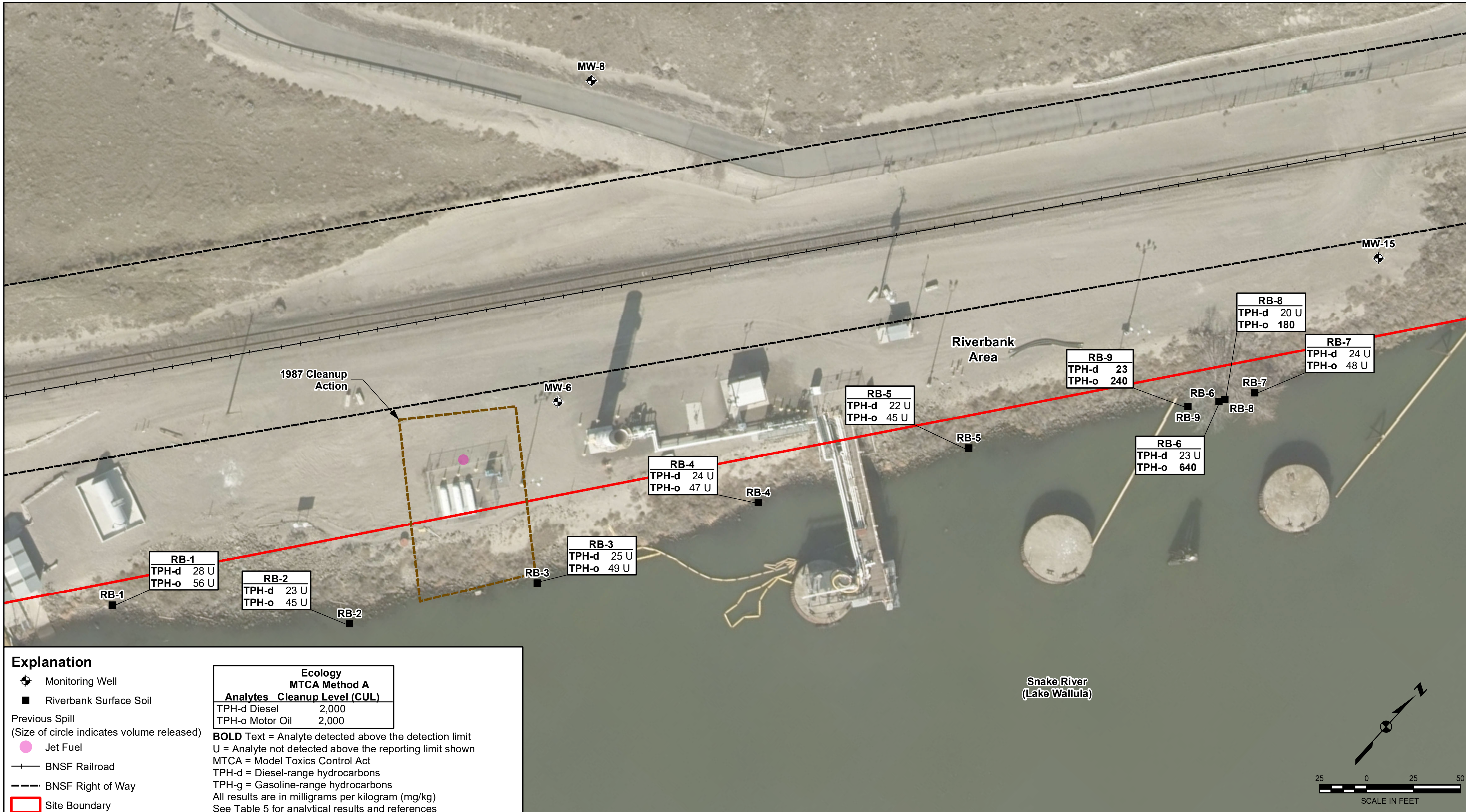
FIGURE 17

K:\Tesoro_Pasco\MXD\R\Fig 17 Passive Soil Gas Distribution-Carbon Range C10-C15.mxd



Imagery Source: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

CONSTITUENTS EXCEEDING CLEANUP LEVEL IN RIVERBANK SURFACE SOIL - 2016

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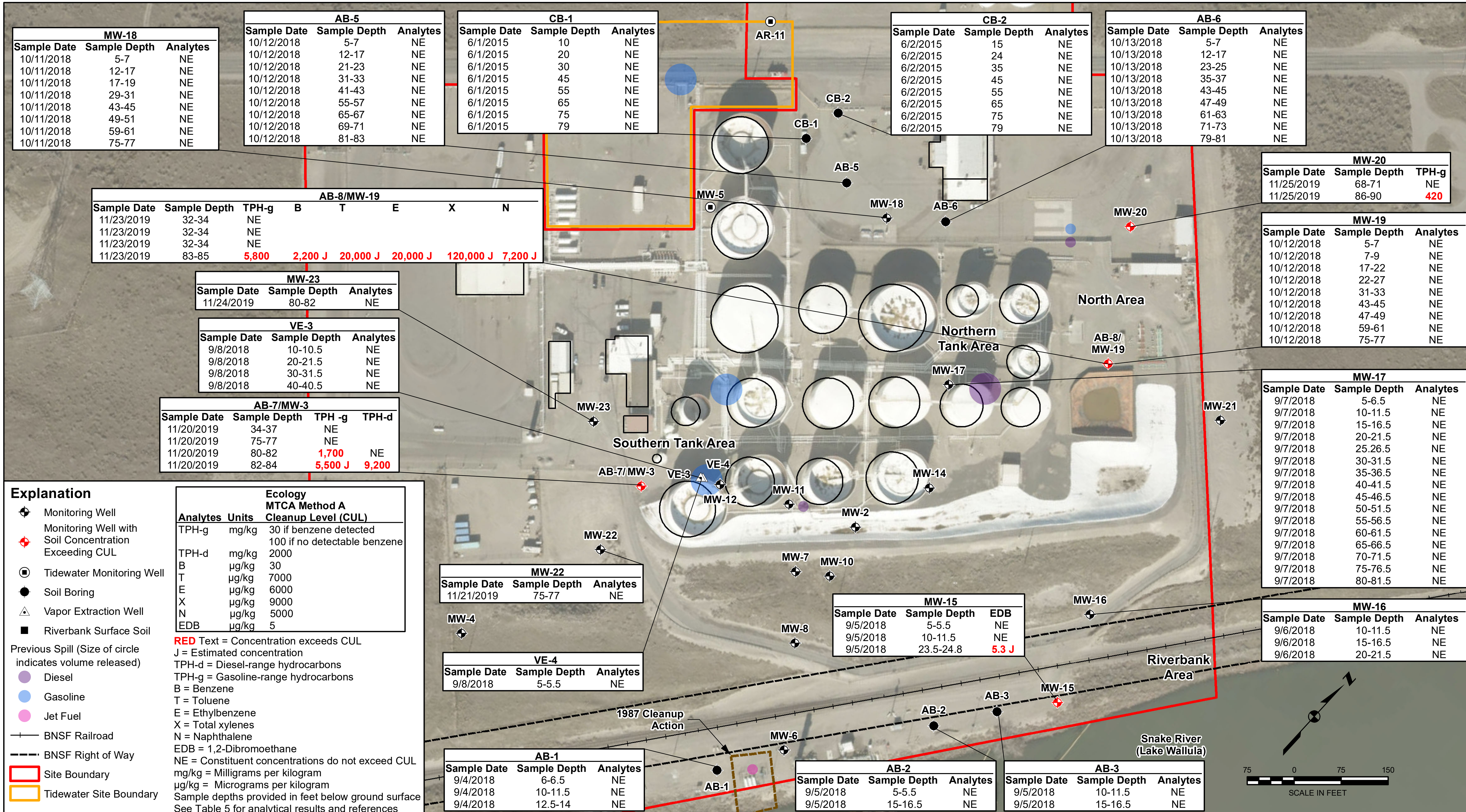
FIGURE 18

K:\Tesoro_Pasco\MXD\RI\Fig 18 Riverbank Samples.mxd



MW-18

Sample Date	Sample Depth	Analytes
10/11/2018	5-7	NE
10/11/2018	12-17	NE
10/11/2018	17-19	NE
10/11/2018	29-31	NE
10/11/2018	43-45	NE
10/11/2018	49-51	NE
10/11/2018	59-61	NE
10/11/2018	75-77	NE

AB-5

Sample Date	Sample Depth	Analytes
10/12/2018	5-7	NE
10/12/2018	12-17	NE
10/12/2018	21-23	NE
10/12/2018	31-33	NE
10/12/2018	41-43	NE
10/12/2018	55-57	NE
10/12/2018	65-67	NE
10/12/2018	69-71	NE
10/12/2018	81-83	NE

CB-1

Sample Date	Sample Depth	Analytes
6/1/2015	10	NE
6/1/2015	20	NE
6/1/2015	30	NE
6/1/2015	45	NE
6/1/2015	55	NE
6/1/2015	65	NE
6/1/2015	75	NE
6/1/2015	79	NE

CB-2

Sample Date	Sample Depth	Analytes
6/2/2015	15	NE
6/2/2015	24	NE
6/2/2015	35	NE
6/2/2015	45	NE
6/2/2015	55	NE
6/2/2015	65	NE
6/2/2015	75	NE
6/2/2015	79	NE

AB-6

Sample Date	Sample Depth	Analytes
10/13/2018	5-7	NE
10/13/2018	12-17	NE
10/13/2018	23-25	NE
10/13/2018	35-37	NE
10/13/2018	43-45	NE
10/13/2018	47-49	NE
10/13/2018	61-63	NE
10/13/2018	71-73	NE
10/13/2018	79-81	NE

MW-20

Sample Date	Sample Depth	TPH-g
11/25/2019	68-71	NE
11/25/2019	86-90	420

AB-8/MW-19

Sample Date	Sample Depth	TPH-g	B	T	E	X	N
11/23/2019	32-34	NE					
11/23/2019	32-34	NE					
11/23/2019	32-34	NE					
11/23/2019	83-85	5,800	2,200 J	20,000 J	20,000 J	120,000 J	7,200 J

MW-19

Sample Date	Sample Depth	Analytes
10/12/2018	5-7	NE
10/12/2018	7-9	NE
10/12/2018	17-22	NE
10/12/2018	22-27	NE
10/12/2018	31-33	NE
10/12/2018	43-45	NE
10/12/2018	47-49	NE
10/12/2018	59-61	NE
10/12/2018	75-77	NE

MW-23

Sample Date	Sample Depth	Analytes
11/24/2019	80-82	NE

VE-3

Sample Date	Sample Depth	Analytes
9/8/2018	10-10.5	NE
9/8/2018	20-21.5	NE
9/8/2018	30-31.5	NE
9/8/2018	40-40.5	NE

AB-7/MW-3

Sample Date	Sample Depth	TPH -g	TPH-d
11/20/2019	34-37	NE	
11/20/2019	75-77	NE	
11/20/2019	80-82	1,700	NE
11/20/2019	82-84	5,500 J	9,200

MW-17

Sample Date	Sample Depth	Analytes
9/7/2018	5-6.5	NE
9/7/2018	10-11.5	NE
9/7/2018	15-16.5	NE
9/7/2018	20-21.5	NE
9/7/2018	25.26.5	NE
9/7/2018	30-31.5	NE
9/7/2018	35-36.5	NE
9/7/2018	40-41.5	NE
9/7/2018	45-46.5	NE
9/7/2018	50-51.5	NE
9/7/2018	55-56.5	NE
9/7/2018	60-61.5	NE
9/7/2018	65-66.5	NE
9/7/2018	70-71.5	NE
9/7/2018	75-76.5	NE
9/7/2018	80-81.5	NE

MW-22

Sample Date	Sample Depth	Analytes
11/21/2019	75-77	NE

MW-15

Sample Date	Sample Depth	EDB
9/5/2018	5-5.5	NE
9/5/2018	10-11.5	NE
9/5/2018	23.5-24.8	5.3 J

MW-16

Sample Date	Sample Depth	Analytes
9/6/2018	10-11.5	NE
9/6/2018	15-16.5	NE
9/6/2018	20-21.5	NE

VE-4

Sample Date	Sample Depth	Analytes
9/8/2018	5-5.5	NE

AB-1

Sample Date	Sample Depth	Analytes
9/4/2018	6-6.5	NE
9/4/2018	10-11.5	NE
9/4/2018	12.5-14	NE

AB-2

Sample Date	Sample Depth	Analytes
9/5/2018	5-5.5	NE
9/5/2018	15-16.5	NE

AB-3

Sample Date	Sample Depth	Analytes
9/5/2018	10-11.5	NE
9/5/2018	15-16.5	NE

Explanation

- Monitoring Well
- Monitoring Well with Soil Concentration Exceeding CUL
- Tidewater Monitoring Well
- Soil Boring
- Vapor Extraction Well
- Riverbank Surface Soil

Previous Spill (Size of circle indicates volume released)

- Diesel
- Gasoline
- Jet Fuel
- BNSF Railroad
- BNSF Right of Way
- Site Boundary
- Tidewater Site Boundary

Analytes	Units	Ecology MTCA Method A Cleanup Level (CUL)
TPH-g	mg/kg	30 if benzene detected 100 if no detectable benzene
TPH-d	mg/kg	2000
B	µg/kg	30
T	µg/kg	7000
E	µg/kg	6000
X	µg/kg	9000
N	µg/kg	5000
EDB	µg/kg	5

RED Text = Concentration exceeds CUL
J = Estimated concentration
TPH-d = Diesel-range hydrocarbons
TPH-g = Gasoline-range hydrocarbons
B = Benzene
T = Toluene
E = Ethylbenzene
X = Total xylenes
N = Naphthalene
EDB = 1,2-Dibromoethane
NE = Constituent concentrations do not exceed CUL
mg/kg = Milligrams per kilogram
µg/kg = Micrograms per kilogram
Sample depths provided in feet below ground surface
See Table 5 for analytical results and references

Imagery Source: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

CONSTITUENTS EXCEEDING CLEANUP LEVEL IN SOIL

TESORO LOGISTICS OPERATIONS, LLC
TESORO PASCO BULK FUEL TERMINAL
PASCO, WASHINGTON

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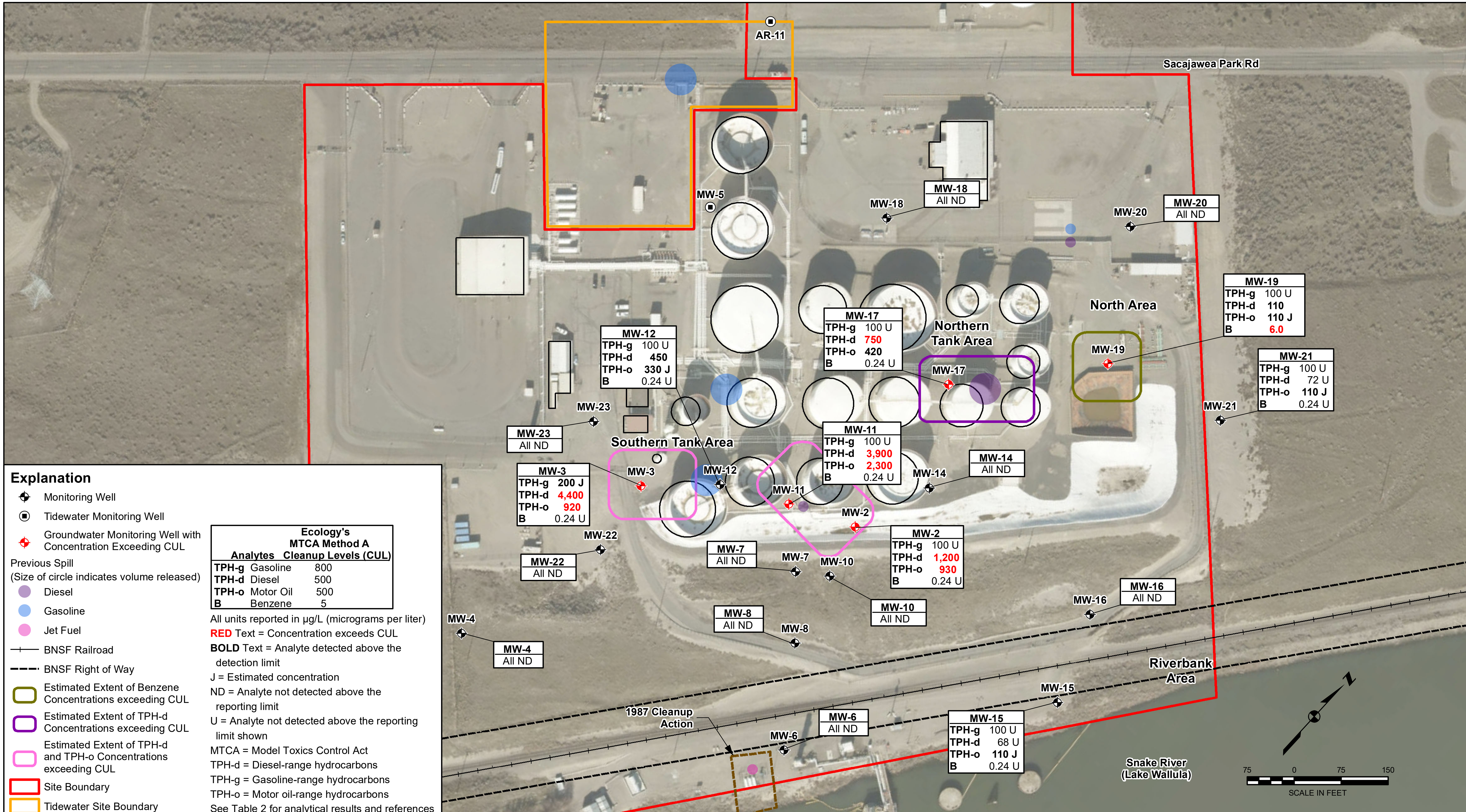
FIGURE 19

K:\Tesoro_Pasco\MXD\RI\Fig 19 Constituents Exceeding Cleanup Level in Soil.mxd



Imagery Source: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

CONSTITUENT ISOCONTOURS IN GROUNDWATER – JUNE 2020

TESORO LOGISTICS OPERATIONS, LLC
TESORO PASCO BULK FUEL TERMINAL
PASCO, WASHINGTON

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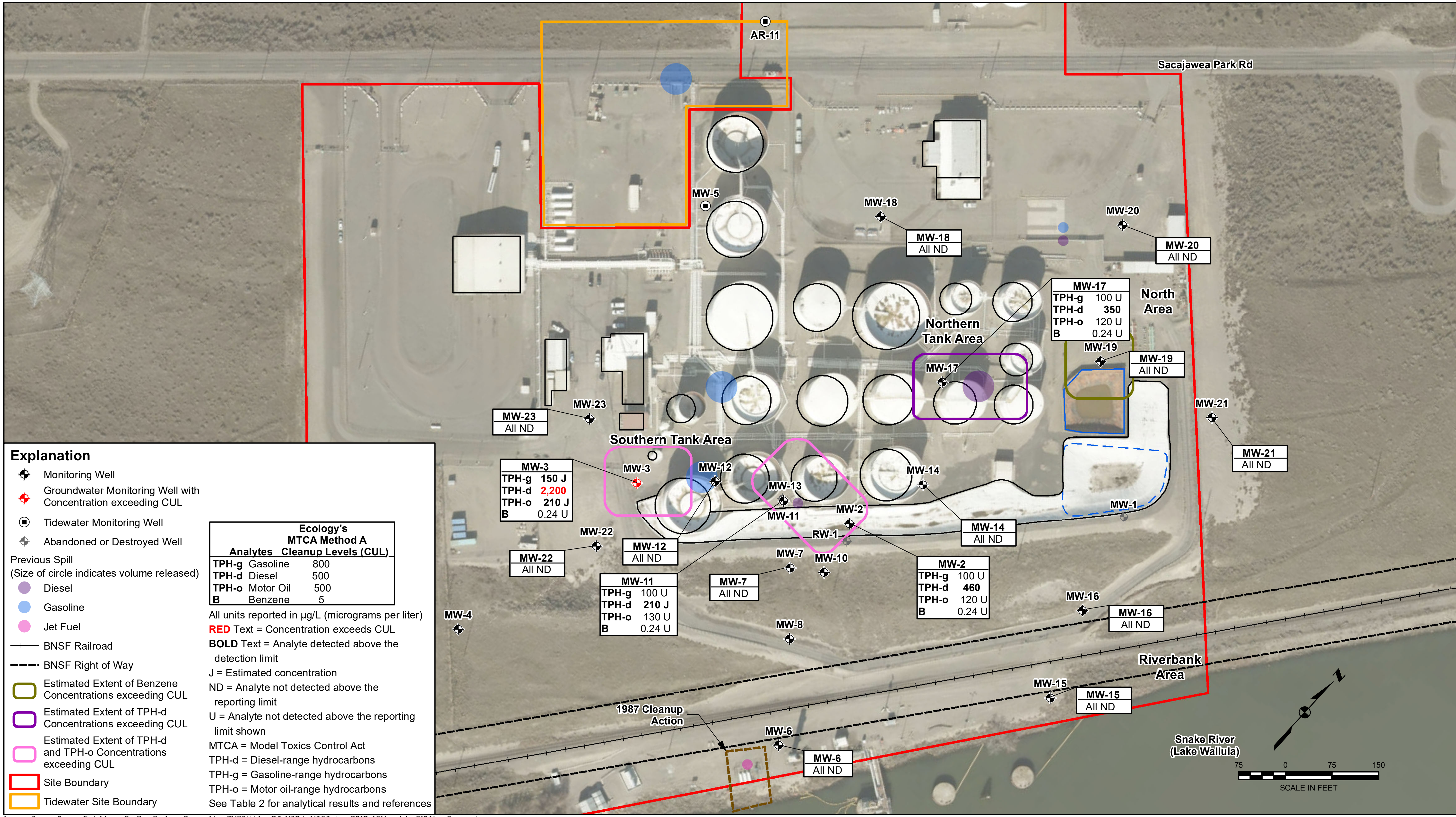
FIGURE 20

K:\Tesoro_Pasco\MXD\RI\Fig 20 Constituent Isocontours in Groundwater - June 2020.mxd



Imagery Source: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

K:\Tesoro_Pasco\MXD\RI\Fig 21 Groundwater Analytical Data Summary Map - December 2020.mxd

CONSTITUENT ISOCONTOURS IN GROUNDWATER – DECEMBER 2020

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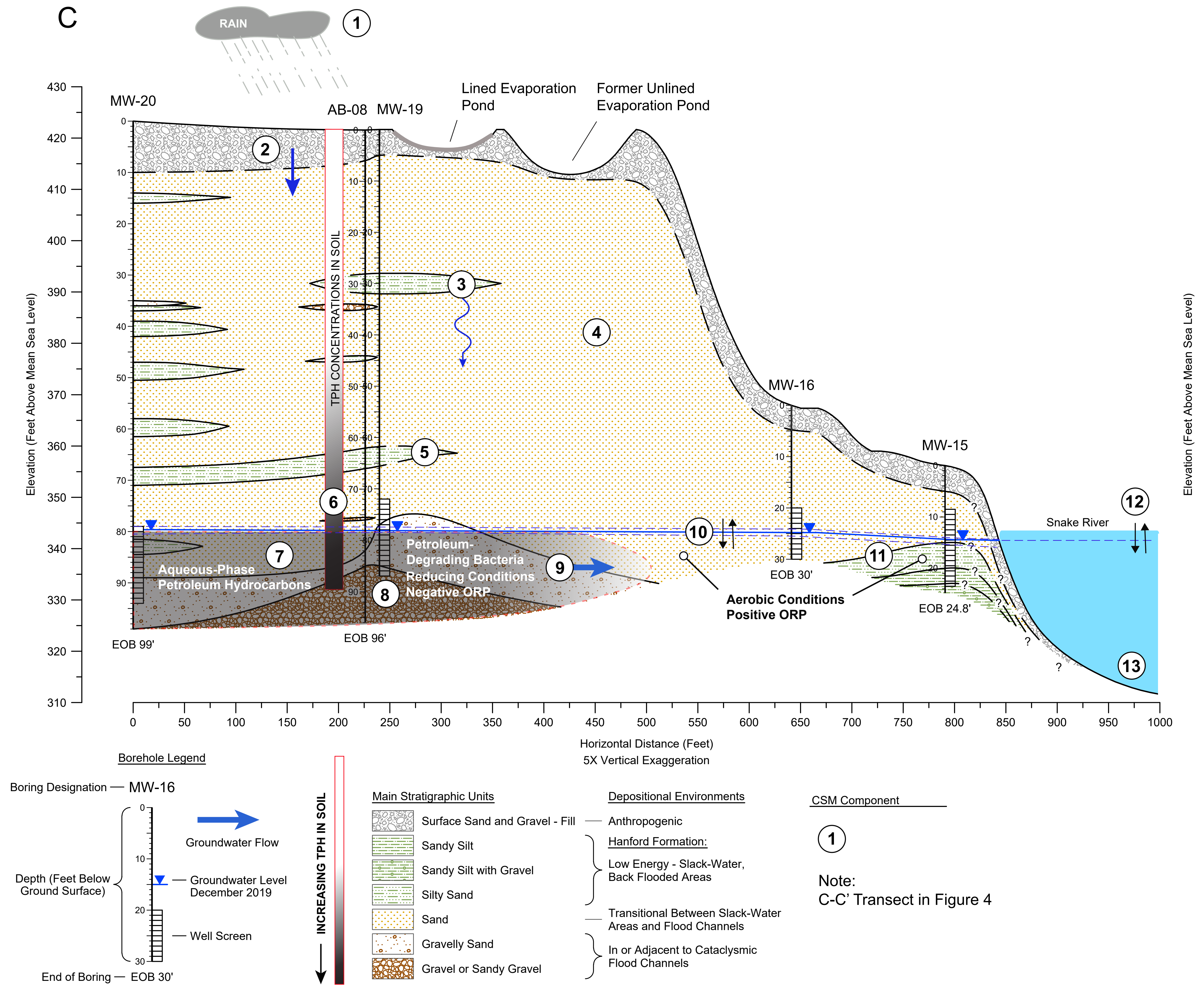
TESORO PASCO BULK FUEL TERMINAL
PASCO, WASHINGTON

FIGURE 21



CONCEPTUAL SITE MODEL COMPONENTS

(1) Precipitation inftrates unpaved areas.
(2) Vertical infiltration is rapid through Site's cover of sand and gravel fill.
(3) The thick predominantly sandy flood deposits contain localized discontinuous silty and gravelly deposits.
(4) Low sorption capacity of site sands and gravels allowed vertical transport of historical petroeum releases to groundwater through physical transport or rainwater infiltration.
(5) The vadose zone is approximately 80-feet thick in the Site's upland area and becomes progressively thinner near the Snake River.
(6) Discontinuous silty sand horizons are found within the vadose zone.
(7) General increase in petroleum concentration with depth; highest concentrations are within the phreatic zone.
(8) Dissolved-phase petroleum hydrocarbons are present in groundwater in source areas identified in Section 5.1 of the text. Active microbial degradation of dissolved petroleum hydrocarbons is occurring in source areas, as evidenced by:
- a) reducing conditions in the source areas,
- b) significantly lower diesel- and heavy oil-range hydrocarbons in groundwater samples after silica gel treatment,
- c) presence of several genera of petroleum-degrading bacteria in the vadose zone and in the phreatic zone at MW-19, and
- d) elevated degradation rates during in-situ and ex-situ microcosm testing.

(9) Dissolved-phase petroleum hydrocarbons attenuate before reaching wells downgradient from source areas. Petroleum hydrocarbon concentrations have decreased to non-detect. Site COCs are no longer present, causing slower oxygen consumption by native microbial communities and oxidizing conditions in groundwater.
(10) Groundwater flow is to the southeast.
(11) Seasonal groundwater fluctuation is approximately 0.5-foot.
(12) The Snake River fluctuates on the range of 2.5-feet during the course of the year.
(13) Dissolved-phase petroleum hydrocarbons have attenuated before groundwater discharges to the Snake River.

Note:
C-C' Transect in Figure 4

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GRAPHICAL CONCEPTUAL SITE MODEL

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PASCO, WASHINGTON
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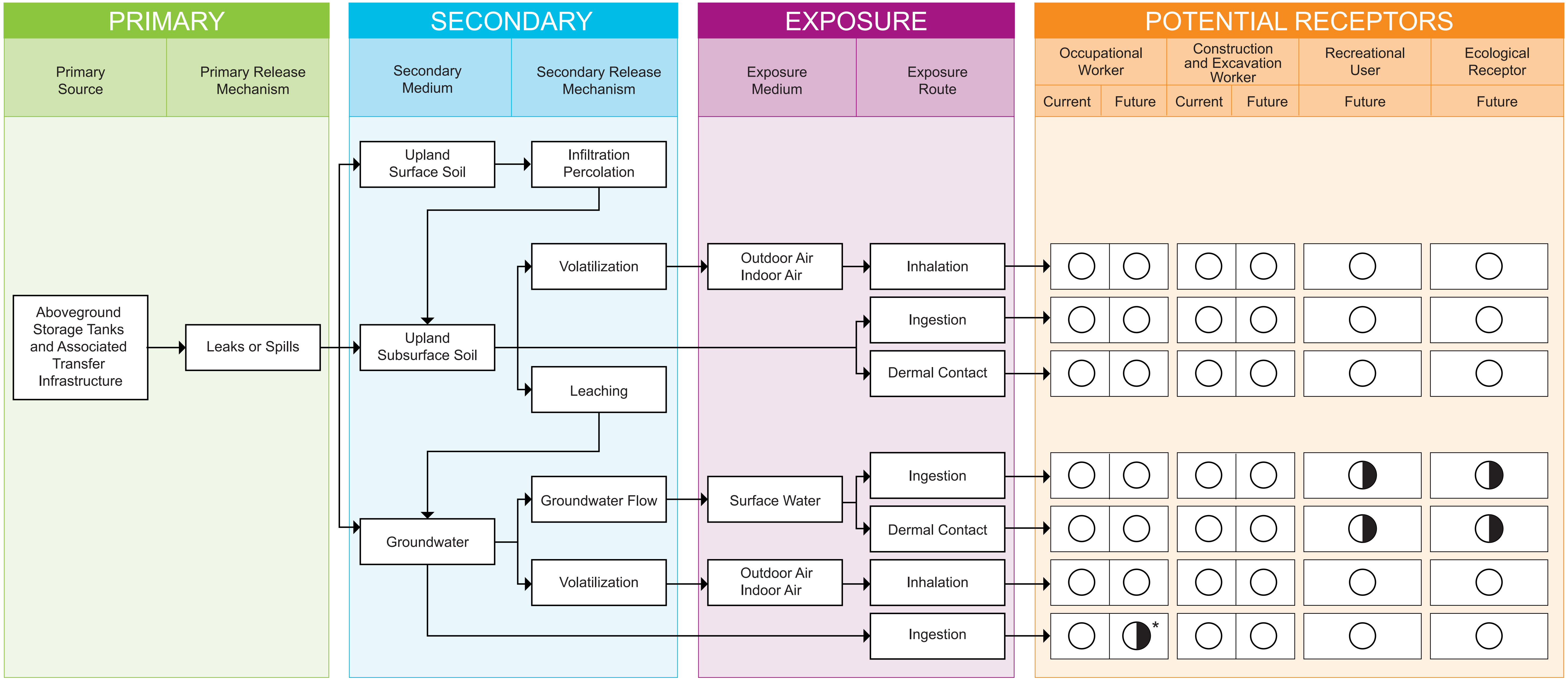
FIGURE 22



Explanation

- ● This route is a primary source of exposure
- ○ There is no exposure via this route
- ◐ Potential exposure via this route, but unlikely
- * Under MTCA requirements, it is presumed that all groundwater is fit for human consumption unless specific criteria are met

EXPOSURE PATHWAY MODEL

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TESORO PASCO BULK FUEL TERMINAL
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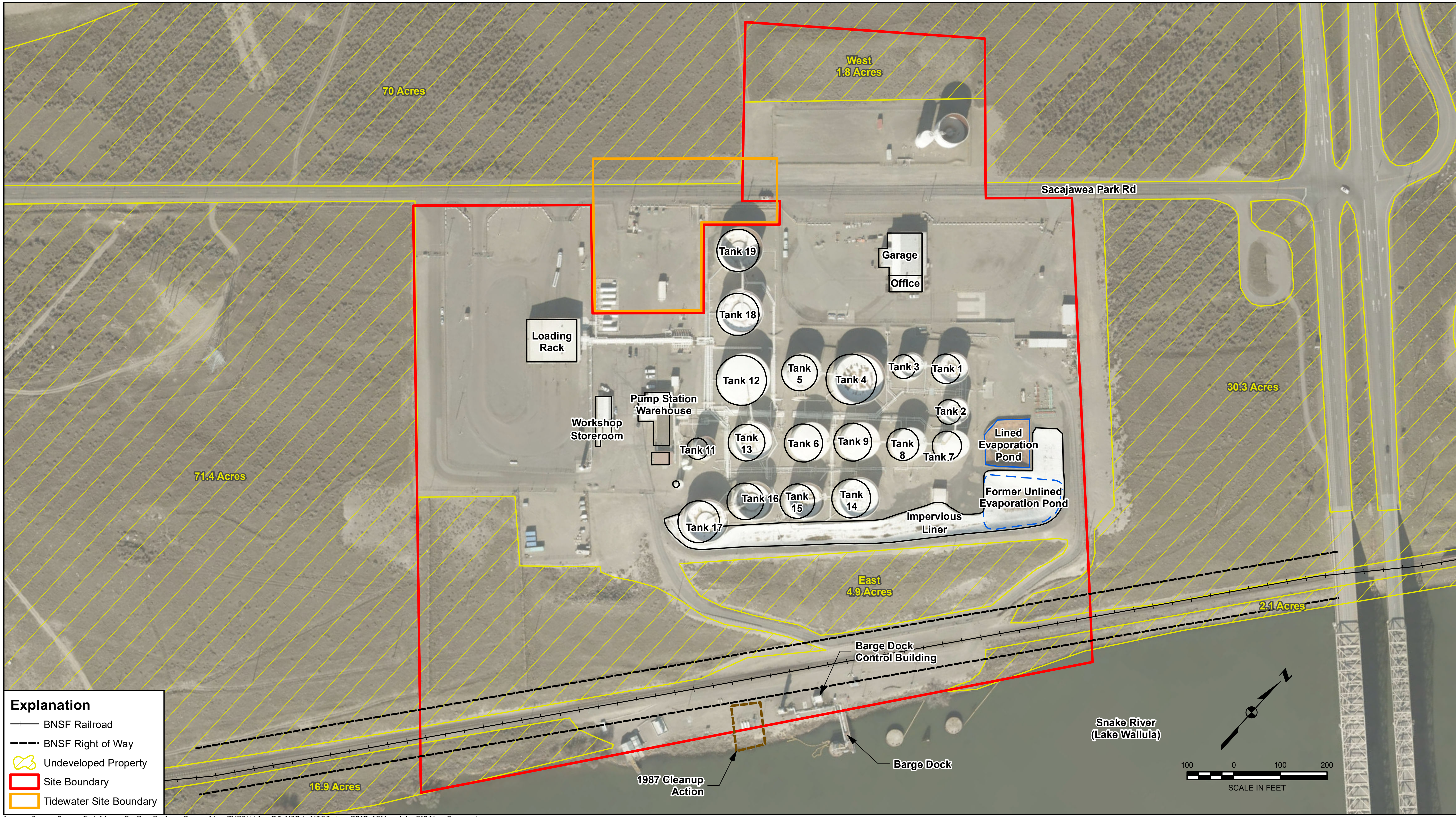
FIGURE 23



Imagery Source: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

K:\Tesoro_Pasco\MXD\RI\Fig 24 TEE Site Evaluation.mxd

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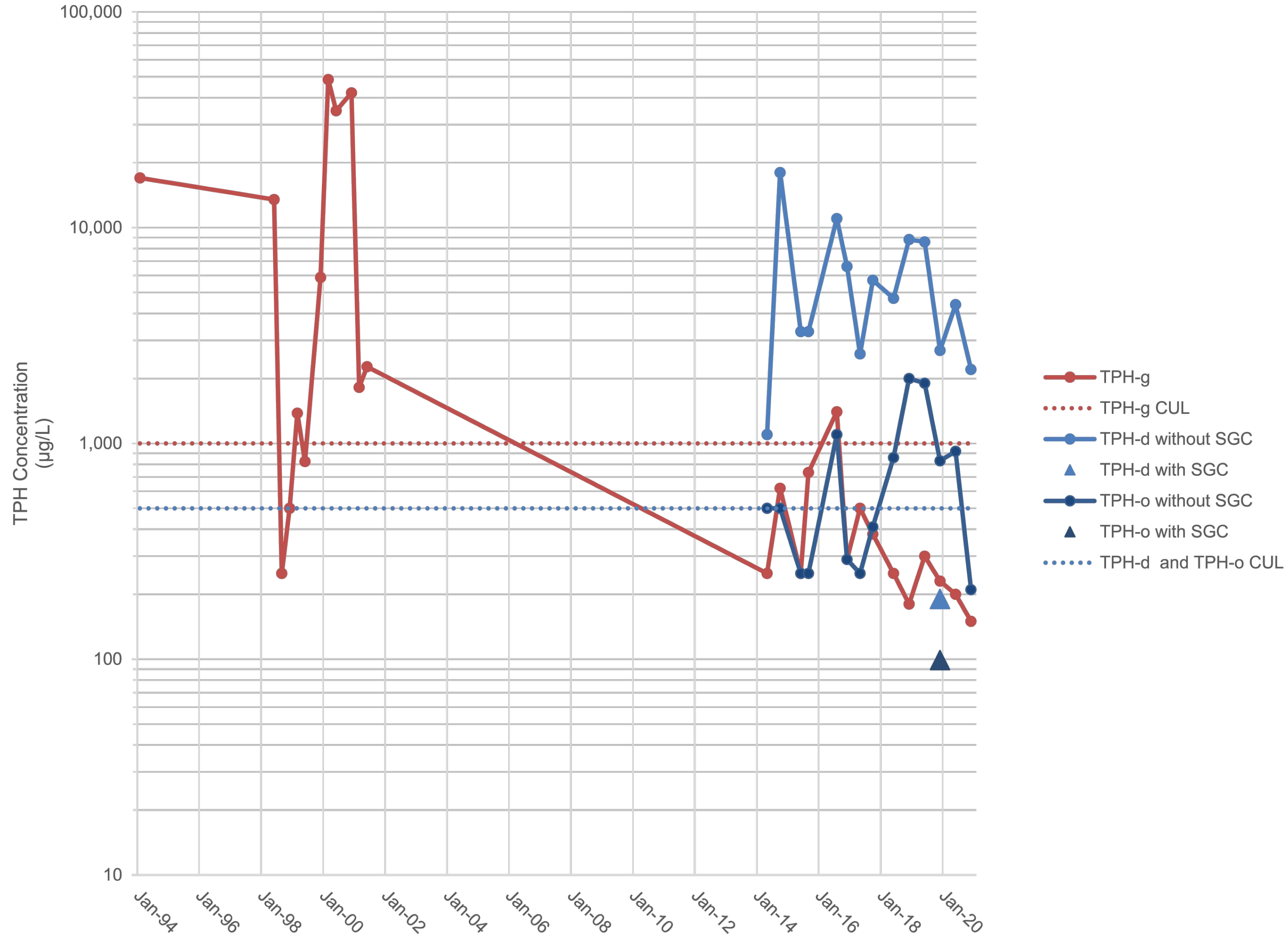
TEE SITE EVALUATION

TESORO LOGISTICS OPERATIONS, LLC
TESORO PASCO BULK FUEL TERMINAL
PASCO, WASHINGTON

FIGURE 24



Explanation:
µg/L = Micrograms per liter
CUL = Ecology MTCA Method A cleanup levels for Groundwater (Washington Administrative Code 173-340-900 Table 720-1)
SGC = Silica gel cleanup extraction
MTCA = Model Toxics Control Act
TPH-d = Diesel-range hydrocarbons
TPH-g = Gasoline-range hydrocarbons
TPH-o = Motor oil-range hydrocarbons
See Table 2 for analytical results and references

MW-3 TOTAL PETROLEUM HYDROCARBONS

TESORO LOGISTICS OPERATIONS, LLC
TESORO PASCO BULK FUEL TERMINAL
PASCO, WASHINGTON

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FIGURE 25

Last saved by: SETH.BERGESON(2021-05-11) Last Plotted: 2021-05-11
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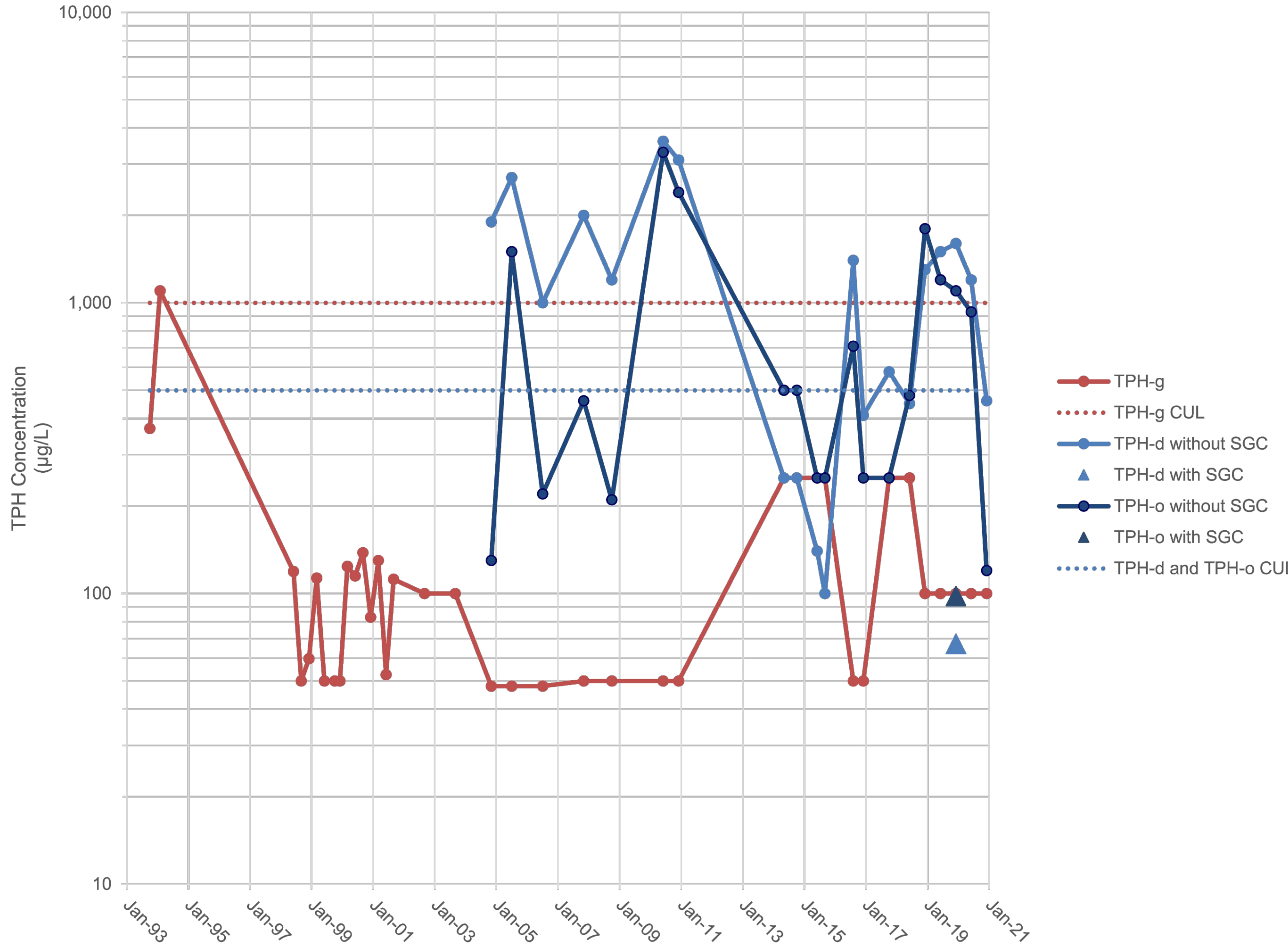

Explanation:
µg/L = Micrograms per liter
CUL = Ecology MTCA Method A cleanup levels for Groundwater (Washington Administrative Code 173-340-900 Table 720-1)
SGC = Silica gel cleanup extraction
MTCA = Model Toxics Control Act
TPH-d = Diesel-range hydrocarbons
TPH-g = Gasoline-range hydrocarbons
TPH-o = Motor oil-range hydrocarbons
See Table 2 for analytical results and references

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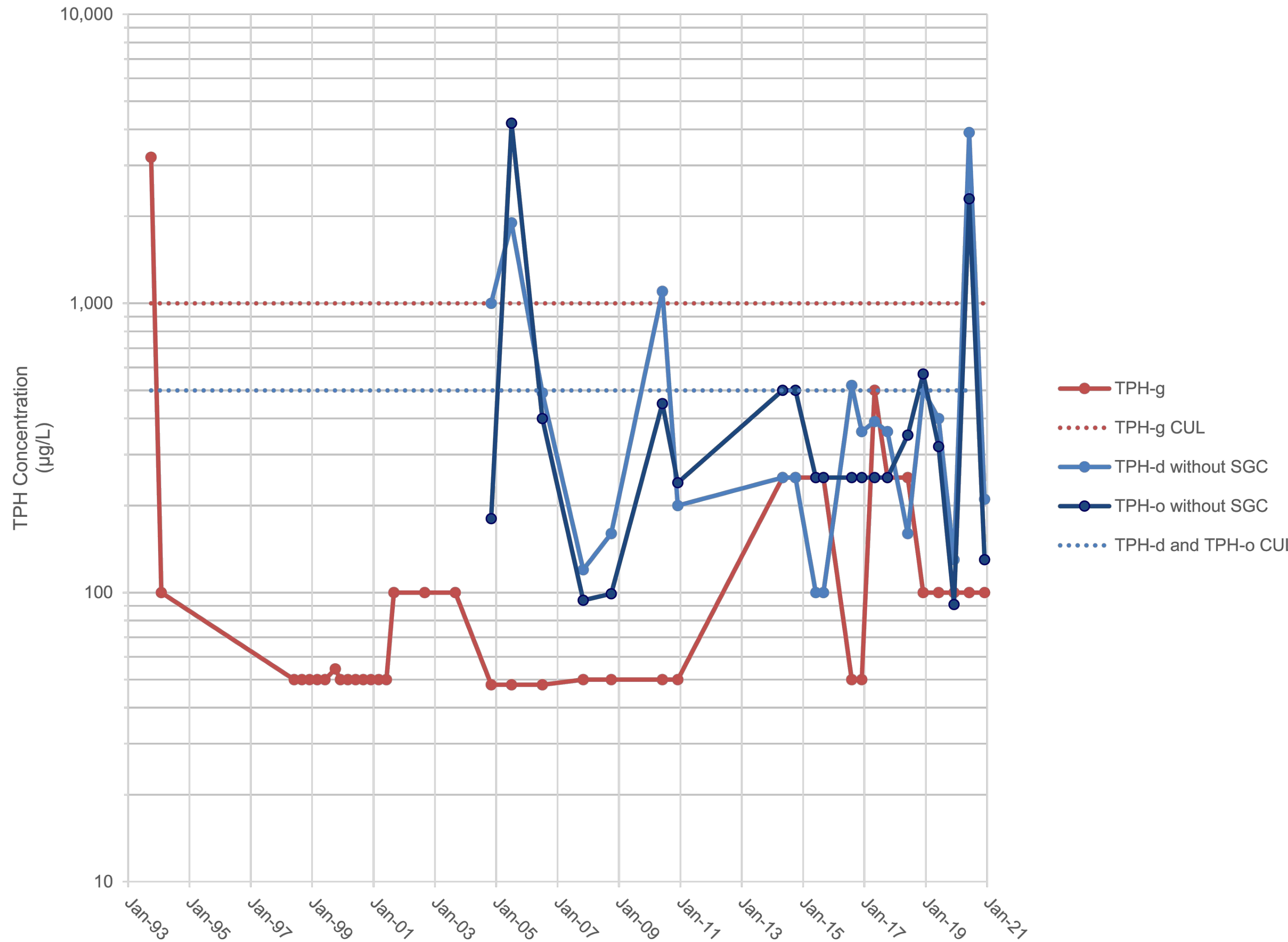
MW-2 TOTAL PETROLEUM HYDROCARBONS

TESORO LOGISTICS OPERATIONS, LLC
TESORO PASCO BULK FUEL TERMINAL
PASCO, WASHINGTON

FIGURE 26



Explanation:
µg/L = Micrograms per liter
CUL = Ecology MTCA Method A cleanup levels for Groundwater (Washington Administrative Code 173-340-900 Table 720-1)
SGC = Silica gel cleanup extraction
MTCA = Model Toxics Control Act
TPH-d = Diesel-range hydrocarbons
TPH-g = Gasoline-range hydrocarbons
TPH-o = Motor oil-range hydrocarbons
See Table 2 for analytical results and references

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MW-11 TOTAL PETROLEUM HYDROCARBONS

TESORO LOGISTICS OPERATIONS, LLC
TESORO PASCO BULK FUEL TERMINAL
PASCO, WASHINGTON

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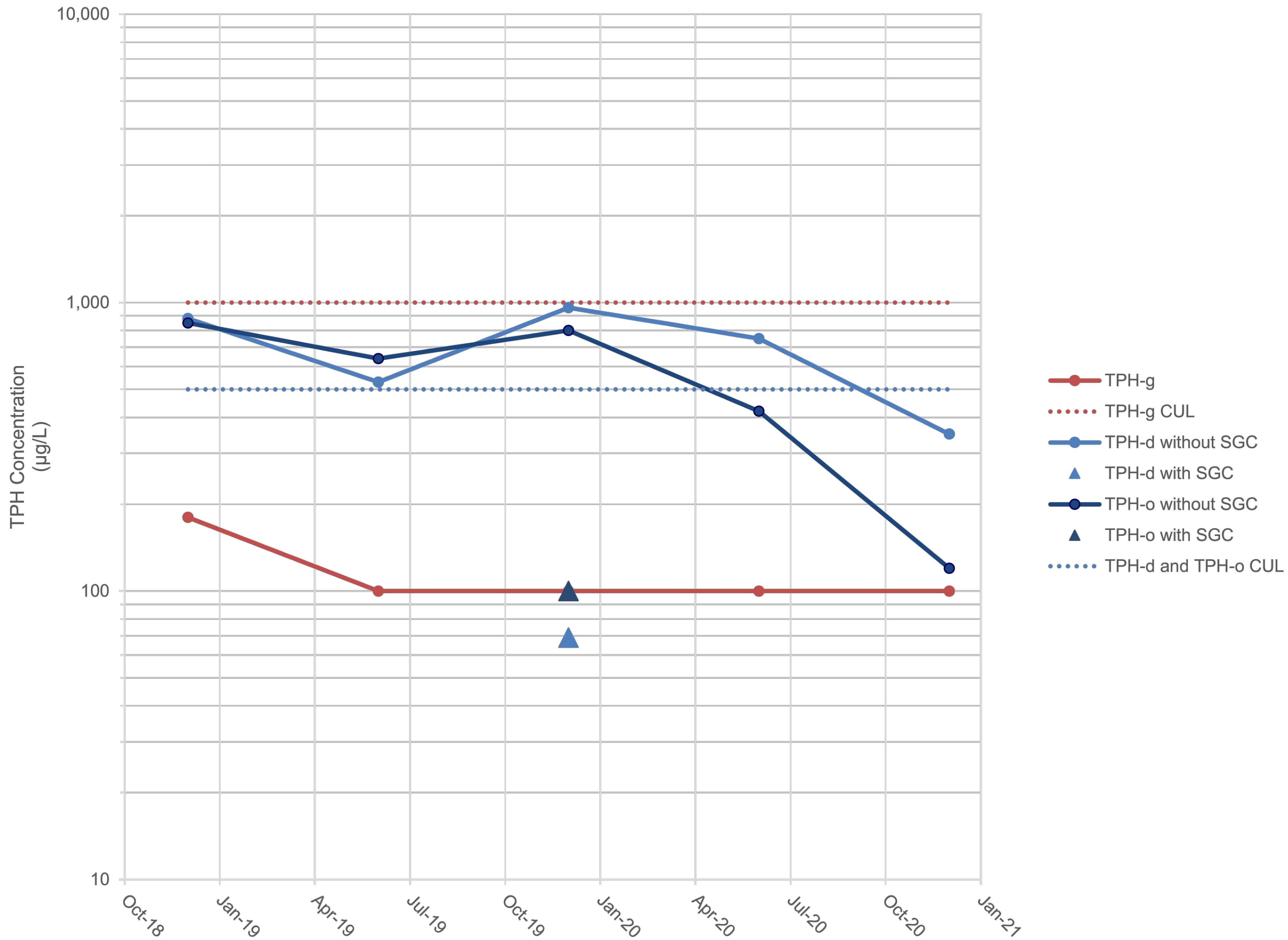
FIGURE 27



Explanation:
µg/L = Micrograms per liter
CUL = Ecology MTCA Method A cleanup levels for Groundwater (Washington Administrative Code 173-340-900 Table 720-1)
SGC = Silica gel cleanup extraction
MTCA = Model Toxics Control Act
TPH-d = Diesel-range hydrocarbons
TPH-g = Gasoline-range hydrocarbons
TPH-o = Motor oil-range hydrocarbons
See Table 2 for analytical results and references

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MW-17 TOTAL PETROLEUM HYDROCARBONS

TESORO LOGISTICS OPERATIONS, LLC
TESORO PASCO BULK FUEL TERMINAL
PASCO, WASHINGTON

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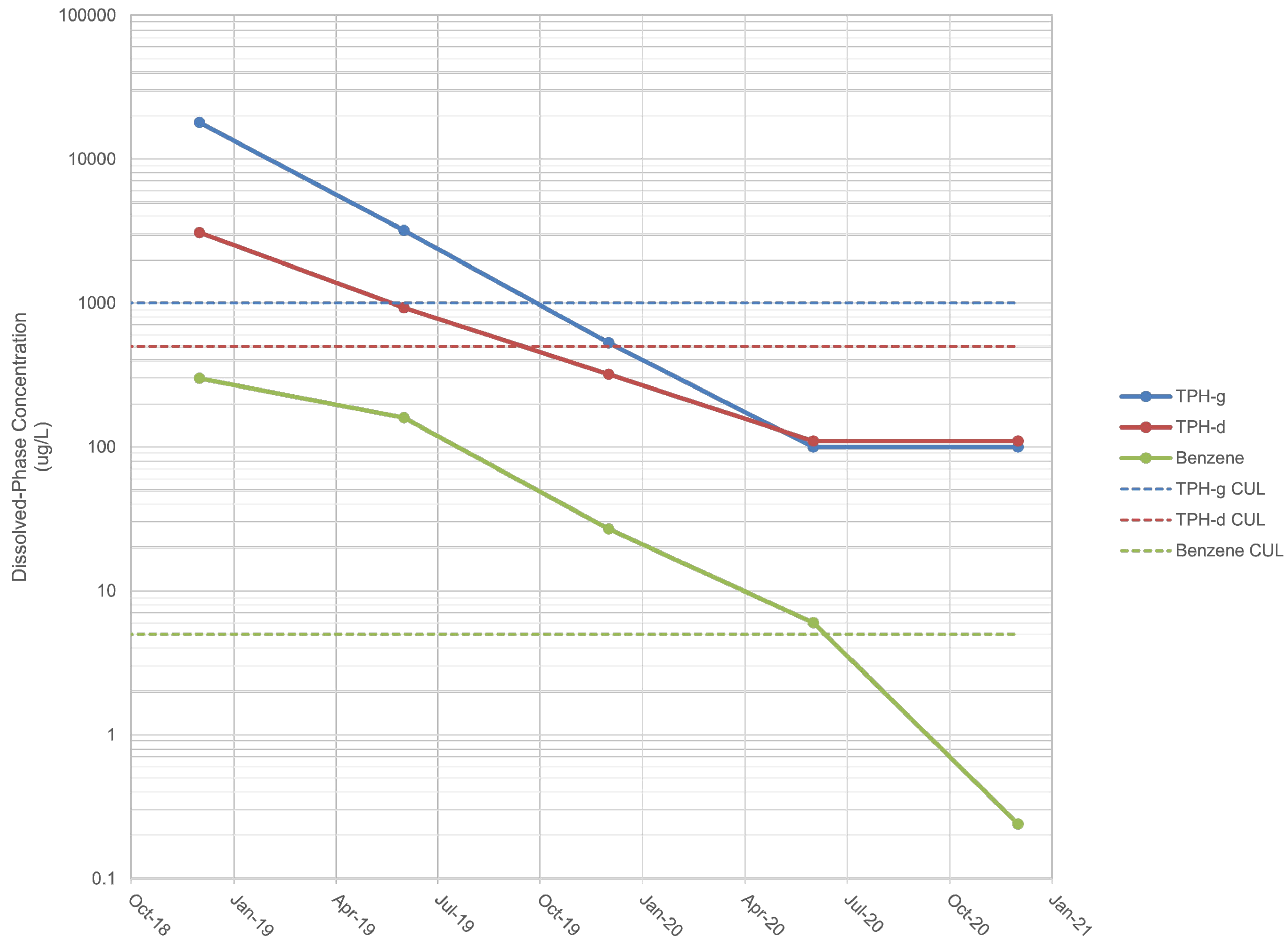
FIGURE 28

Last saved by: SETH.BERGESON(2021-05-11) Last Plotted: 2021-05-11
Filename: K:\TESORO_PASCO\MXD\RI\FIGURES.DWG



Explanation:
μg/L = Micrograms per liter
CUL = Ecology MTCA Method A cleanup levels for Groundwater (Washington Administrative Code 173-340-900 Table 720-1)
MTCA = Model Toxics Control Act
TPH-d = Diesel-range hydrocarbons
TPH-g = Gasoline-range hydrocarbons
See Table 2 for analytical results and references

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MW-19 TOTAL PETROLEUM HYDROCARBONS AND BENZENE

TESORO LOGISTICS OPERATIONS, LLC
TESORO PASCO BULK FUEL TERMINAL
PASCO, WASHINGTON

60650612

FIGURE 29

Tables

Table 1. Monitoring Well Construction Log
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

Well Type	Well ID	Installation Date	Abandonment Date	Surface Completion	Drilling Method	Northing	Easting	Ground Surface Elevation[(2)]	TOC Elevation	Total Boring Depth	Total Well Depth[(3)]	Well Stickup Height[(4)]	Well Diameter	Well Casing Interval		Well Screen Interval		Screen Slot Size	Sand Filter Pack Interval	
					Units:	*NAD83 (91)*	*NAD83 (91)*	*ft NAVD29*	*ft NAVD29*	*ft bgs*	*ft btoc*	*ft*	*inches*	*ft bgs*	*ft bgs*	*ft bgs*	*ft btoc*	*inches*	*ft bgs*	*ft btoc*
Monitoring Wells	MW-1[(1)]	11/1983	10/2018	--	CT	325380.52	2013255.52	419.3	419.4	93.9	--	--	4	0 - 73.9	--	73.9 - 93.9	--	--	--	--
	MW-2[(1)]	11/1983	--	SU	CT	325074.904	2012937.74	414.49	417.23	83.3	85.7	2.4	4	-2 - 63.3	0 - 65.7	63.3 - 83.3	65.7 - 85.7	--	--	--
	MW-3[(1)]	11/1983	--	SU	CT	324891.488	2012641.75	421.02	423.4	94.95	97.35	2.4	4	-2 - 75	0 - 77.4	75 - 95	77.4 - 97.4	--	--	--
	MW-4[(1)]	11/1983	--	SU	CT	324524.487	2012589.19	409.64	412.05	76.75	79.15	2.4	4	-2 - 56.8	0 - 59.2	56.8 - 76.8	59.2 - 79.2	--	--	--
	MW-5[(1)]	1986	5/1987	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	MW-6	11/17/1986	--	SU	HAS	324734.994	2013094.56	356.3	358.52	25	25.8	2.3	2	-2 - 8.5	0 - 10.8	8.5 - 23.5	10.8 - 25.8	0.020	7 - 25	9.3 - 27
	MW-7	11/18/1986	--	SU	HSA	324957.838	2012915.42	408.94	411.32	79	79.4	2.4	2	-2 - 57	0 - 59.4	57 - 77	59.4 - 79.4	0.020	51 - 79	53 - 81
	MW-8	11/25/1986	--	SU	HSA	324873.003	2012992.060	381.3	383.76	56	56.5	2.5	2	-3 - 29	0 - 31.5	29 - 54	31.5 - 56.5	0.020	26 - 56	29 - 59
	MW-9	11/20/1986	5/1987	--	HSA	--	--	--	--	26	--	5.2	2	-5 - 10	0 - 15.2	10 - 25	15.2 - 30.2	0.020	7 - 26	12 - 31
	MW-10	1/6/1989	--	SU	AR	324989.314	2012960.53	404.97	407.83	78.25	78.6	2.6	4	-3 - 55	0 - 57.6	55 - 76	57.6 - 78.6	0.020	51 - 76	54 - 79
	MW-11	1/16/1989	--	SU	HSA	325029.784	2012834.91	421.34	423.44	84.5	86.6	2.1	2	-2 - 74.5	0 - 76.6	74.5 - 84.5	76.6 - 86.6	0.020	18 - 84.5	20 - 87
	MW-12	1/17/1989	--	SU	HSA	324978.468	2012732.61	421.48	423.62	85	86.7	2.2	2	-2 - 33	0 - 35.2	33 - 60	35.2 - 62.2	0.010	18 - 85	20 - 87
											0			60 - 75	62 - 77.2	75 - 84.5	77.2 - 86.7			
	MW-13	1/17/1989	--	SU	HSA	325031.365	2012831.13	421.94	424.05	48	--	--	2	0 - 18.5	--	18.5 - 47.5	--	--	18 - 48	--
	MW-14	1/17/1989	--	SU	HSA	325200.637	2012982.34	421.11	421.84	82.5	82.9	0.9	2	-1 - 27.5	0 - 28.4	27.5 - 53	28.4 - 53.9	0.010	18 - 82.5	19 - 83
											0			53 - 72.5	54 - 73.4	72.5 - 82	73.4 - 82.9			
	MW-15	9/5/2018	--	SU	HSA	325086.624	2013364.51	356.17	358.5	23.5	25.8	2.3	2	-2 - 8.5	0 - 10.8	8.5 - 23.5	10.8 - 25.8	0.010	7 - 23.5	8.8 - 26
	MW-16	9/6/2018	--	SU	HSA	325224.955	2013308.09	367.92	370.92	30	33	3	2	-3 - 20	0 - 23	20 - 30	23 - 33	0.010	18 - 30	21 - 33
	MW-17	9/8/2018	--	SU	HSA	325342.855	2012893.52	421.38	424.28	83	85.9	2.9	2	-3 - 73	0 - 75.9	73 - 83	75.9 - 85.9	0.010	71 - 83	74 - 86
	MW-18	10/11/2018	--	Flush	Sonic	325471.936	2012640.73	423.96	423.69	87	86.7	-0.3	2	0.3 - 72	0 - 71.7	72 - 87	71.7 - 86.7	0.010	70 - 87	70 - 87
	MW-19	10/12/2018	--	SU	Sonic	325539.662	2013058.63	421.66	424.2	87	89.5	2.5	2	-3 - 72	0 - 74.5	72 - 87	74.5 - 89.5	0.010	70 - 87	73 - 90
	MW-20	11/25/2019	--	SU	Sonic	325725.096	2012936.73	423.32	426.52	99	97.7	3.2	2	-3 - 79	0 - 82.2	79 - 94	82.2 - 97.2	0.010	77 - 94.5	80 - 98
	MW-21	11/19/2019	--	SU	Sonic	325594.049	2013251.36	423.43	426.16	93	95.2	2.7	2	-3 - 77	0 - 79.7	77 - 92	79.7 - 94.7	0.010	75 - 92.5	78 - 95
	MW-22	11/22/2019	--	SU	Sonic	324772.561	2012662.28	417.59	420.45	95	97.4	2.9	2	-3 - 79	0 - 81.9	79 - 94	81.9 - 96.9	0.010	77 - 94.5	80 - 97
	MW-23	11/24/2019	--	Flush	Sonic	324916.047	2012515.71	422.03	421.74	96	95.2	-0.3	2	0.3 - 80	0 - 79.7	80 - 95	79.7 - 94.7	0.010	78 - 95.5	78 - 95
Recovery Well	RW-1	1/4/1989	10/2018	--	AR	--	--	420.66	417.29	105	--	-2.5	8	2.5 - 64	0 - 61.5	64 - 98	61.5 - 95.5	0.020	62 - 103	60 - 100
Vapor Extraction Wells	VE-1	9/6/2018	--	SU	HSA	325349.604	2012897.49	--	424.15	25	28	3	2	-3 - 15	0 - 18	15 - 25	18 - 28	0.010	13 - 25	16 - 28
	VE-2	9/6/2018	--	SU	HSA	325349.623	2012891.05	--	423.25	40	43	3	2	-3 - 30	0 - 33	30 - 40	33 - 43	0.010	28 - 40	31 - 43
	VE-3	9/8/2018	--	SU	HSA	324968.768	2012704.53	--	423.64	40	43	3	2	-3 - 30	0 - 33	30 - 40	33 - 43	0.010	28 - 40	31 - 43
	VE-4	9/9/2018	--	SU	HSA	324966.751	2012701.47	--	423.7	25	28	3	2	-3 - 15	0 - 18	15 - 25	18 - 28	0.010	13 - 25	16 - 28
Tidewater Wells	AR-11	8/10/2000	--	SU	AR	325577.52	2012292.09	422.97	422.62	88	88	0	2	0 - 73	0 - 73	73 - 88	73 - 88	0.020	71 - 88	71 - 88
	MW-5	3/7/2001	--	SU	AR	325294.11	2012422.17	422.38	425.02	90	90.4	0.4	2	-0 - 74.5	0 - 74.9	74.5 - 89.5	74.9 - 89.9	0.020	72 - 89	72 - 89

Notes:
= well abandoned
[(1)] Boring logs not available. Data obtained from Table 3 of September 2011 Remedial Investigation/Feasibility Study.
[(2)] Ground surface elevations for MW-1 through MW-14 obtained from 2010 survey, ground surface elevations for MW-14 to MW-16 were calculated from stick up heights measured by AECOM in June 2019, ground surface elevations for MW-18 to MW-23 obtained from 2019 survey.
[(3)] Measured by AECOM in 2019.
[(4)] Measured by AECOM in 2019 or obtained from boring logs

Acronyms:
-- = Data not available or not applicable
AR = air rotary
bgs = below ground surface
btoc = below top of casing
CT = cable tool
ft = feet
HSA = hollow stem auger
ID = identification
NAVD29 = North American Vertical Datum of 1929
NAVD83 (91) = North American Datum of 1983, as modified in 1991
SU = stick up
TOC = top of casing

Table 2. Groundwater Elevations and Analytical Results
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

Well ID	Sample Date	TOC Elevation	Depth to GW	Product Thickness	GW Elevation	Change in GW Elevation	Total Petroleum Hydrocarbons: TPH [1]	TPH-g	TPH-d	TPH-d (SGC)	TPH-o	TPH-o (SGC)	VOCs and Lead Scavengers: Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	EDB [2]	EDC	Fuel Oxygenates: DIPE	ETBE	MTBE	TBA	TAME	Ethanol	Methanol
						MTCA Method A Cleanup Levels [3] [4]	*NE*	*800/1,000*	*500*	*500*	*500*	*500*	*5*	*1,000*	*700*	*1,000*	*160*	*0.01*	*5*	*NE*	*NE*	*20*	*NE*	*NE*	*NE*	*NE*
	Units:	*ft NAVD29* [5]	*ft btoc*	*ft*	*ft NAVD29* [6]	*ft*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*mg/L*	*mg/L*
Groundwater Grab Samples																										
AB1	9/4/2018	--	15.0	--	--	--	--	70 U	**280**	--	**220 J**	--	0.20 U	0.17 U	0.19 U	0.58 U	0.21 U	0.21 U	0.20 U	0.17 U	0.21 U	0.17 U	3.9 U	0.17 U	--	--
AB2	9/5/2018	--	15.0	--	--	--	--	70 U	**97 J**	--	**130 J**	--	0.20 U	0.17 U	0.19 U	0.58 U	0.21 U	0.21 U	0.20 U	0.17 U	0.21 U	0.17 U	3.9 U	0.17 U	--	--
AB3	9/5/2018	--	15.0	--	--	--	--	70 U	69 U	--	100 U	--	0.20 U	0.17 U	0.19 U	0.58 U	0.21 U	0.21 U	0.20 U	0.17 U	0.21 U	0.17 U	3.9 U	0.17 U	--	--
AB5	10/13/2018	--	77.0	--	--	--	--	100 U	**200**	--	**270 J**	--	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.40 U	0.53 U	0.35 U	0.91 U	0.44 U	24 U	1.5 U	--	--
AB6	10/13/2018	--	77.0	--	--	--	--	100 U	**72 J**	--	100 U	--	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.40 U	0.53 U	0.35 U	0.91 U	0.44 U	24 U	1.5 U	--	--
CB-1	6/1/2015	--	85.0	--	--	--	--	250 U	**2,400**	--	**3,900**	--	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	**18.5**	50.0 U
CB-2	6/2/2015	--	85.0	--	--	--	--	250 U	**3,100**	--	**4,600**	--	**0.67**	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	**17.3**	50.0 U
Site Monitoring Wells																										
MW-1	1983	419.45	82.00	0	337.45	--	--	--	--	--	--	--	**5.7**	1.0 U	--	**24**	--	--	--	--	--	--	--	--	--	--
	8/26/1987	419.45	76.77	0	342.68	-5.23	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/11/1987	419.45	76.03	0	343.42	-0.74	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/5/1988	419.45	75.96	0	343.49	-0.07	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/3/1988	419.45	76.01	0	343.44	0.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/1/1988	419.45	75.93	0	343.52	-0.08	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/5/1988	419.45	75.83	0	343.62	-0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/3/1988	419.45	75.92	0	343.53	0.09	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/7/1988	419.45	76.61	0	342.84	0.69	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/5/1988	419.45	77.03	0	342.42	0.42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/12/1990	419.45	76.64	0	342.81	-0.39	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/6/1990	419.45	77.26	0	342.19	0.62	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/19/1990	419.45	76.82	0	342.63	-0.44	ND	--	--	--	--	--	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--
	2/14/1991	419.45	76.35	0	343.10	-0.47	ND	--	--	--	--	--	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--
	5/15/1991	419.45	76.57	0	342.88	0.22	**500**	--	--	--	--	--	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--
	8/8/1991	419.45	77.56	0	341.89	0.99	ND	--	--	--	--	--	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--
	4/1/1992	419.45	76.38	0	343.07	-1.18	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/1/1992	419.45	77.21	0	342.24	0.83	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/1/1992	419.45	76.75	0	342.70	-0.46	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/1/1993	419.45	77.25	0	342.20	0.50	1,000 U	--	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	2/1/1994	419.45	76.40	0	343.05	-0.85	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/31/1995	419.45	76.50	0	342.95	0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/27/1995	419.45	77.70	0	341.75	1.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/31/1995	419.45	77.60	0	341.85	-0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/28/1995	419.45	76.30	0	343.15	-1.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/31/1995	419.45	76.60	0	342.85	0.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/30/1995	419.45	76.75	0	342.70	0.15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/24/1995	419.45	77.30	0	342.15	0.55	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/29/1995	419.45	77.20	0	342.25	-0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/27/1995	419.45	77.32	0	342.13	0.12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/31/1996	419.45	77.00	0	342.45	-0.32	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/29/1996	419.45	76.90	0	342.55	-0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/29/1996	419.45	76.70	0	342.75	-0.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/29/1996	419.45	76.90	0	342.55	0.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/22/1996	419.45	76.50	0	342.95	-0.40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/28/1996	419.45	76.20	0	343.25	-0.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/31/1996	419.45	76.00	0	343.45	-0.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 2. Groundwater Elevations and Analytical Results
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

							Total Petroleum Hydrocarbons						VOCs and Lead Scavengers							Fuel Oxygenates						
Well ID	Sample Date	TOC Elevation	Depth to GW	Product Thickness	GW Elevation	Change in GW Elevation	TPH [1]	TPH-g	TPH-d	TPH-d (SGC)	TPH-o	TPH-o (SGC)	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	EDB [2]	EDC	DIPE	ETBE	MTBE	TBA	TAME	Ethanol	Methanol
						MTCA Method A Cleanup Levels [3] [4]	*NE*	*800/1,000*	*500*	*500*	*500*	*500*	*5*	*1,000*	*700*	*1,000*	*160*	*0.01*	*5*	*NE*	*NE*	*20*	*NE*	*NE*	*NE*	*NE*
	Units:	*ft NAVD29* [5]	*ft btoc*	*ft*	*ft NAVD29* [6]	*ft*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*mg/L*	*mg/L*
MW-1	8/30/1996	419.45	75.90	0	343.55	-0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Continued	9/30/1996	419.45	75.70	0	343.75	-0.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/31/1996	419.45	77.40	0	342.05	1.70	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/19/1996	419.45	76.60	0	342.85	-0.80	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/30/1997	419.45	76.68	0	342.77	0.08	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/28/1997	419.45	76.00	0	343.45	-0.68	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/19/1997	419.45	76.00	0	343.45	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/20/1997	419.45	75.92	0	343.53	-0.08	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/2/1997	419.45	76.00	0	343.45	0.08	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/26/1998	419.45	78.04	0	341.41	2.04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/25/1998	419.45	76.21	0	343.24	-1.83	1,000 U	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	9/17/1998	419.45	75.62	0	343.83	-0.59	1,000 U	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	12/18/1998	419.45	75.23	0	344.22	-0.39	**1,030**	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	3/29/1999	419.45	75.46	0	343.99	0.23	2,000 U	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	6/24/1999	419.45	76.33	0	343.12	0.87	**1,740**	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	10/8/1999	419.45	77.14	0	342.31	0.81	**1,620**	**1,740**	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	12/20/1999	419.45	76.52	0	342.93	-0.62	**1,000**	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	3/14/2000	419.45	76.02	0	343.43	-0.50	**6,970**	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	6/8/2000	419.45	74.72	0	344.73	-1.30	1,000 U	**52.1**	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	9/13/2000	419.45	DRY	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/6/2000	419.45	DRY	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/26/2001	419.45	DRY	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/5/2001	419.45	76.71	0	342.74	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/25/2001	419.45	DRY	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/5/2002	419.45	DRY	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/11/2003	419.45	DRY	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/17/2004	419.45	DRY	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/11/2005	419.45	DRY	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/7/2006	419.45	DRY	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/15/2007	419.24	DRY	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/8/2008	419.24	DRY	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/30/2010	419.40	74.99	0	344.41	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/14/2010	419.40	DRY	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	Well abandoned September 2018																									

Table 2. Groundwater Elevations and Analytical Results
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

							Total Petroleum Hydrocarbons						VOCs and Lead Scavengers							Fuel Oxygenates						
Well ID	Sample Date	TOC Elevation	Depth to GW	Product Thickness	GW Elevation	Change in GW Elevation	TPH (1)	TPH-g	TPH-d	TPH-d (SGC)	TPH-o	TPH-o (SGC)	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	EDB (2)	EDC	DIPE	ETBE	MTBE	TBA	TAME	Ethanol	Methanol
						MTCA Method A Cleanup Levels (3) (4)	*NE*	*800/1,000*	*500*	*500*	*500*	*500*	*5*	*1,000*	*700*	*1,000*	*160*	*0.01*	*5*	*NE*	*NE*	*20*	*NE*	*NE*	*NE*	*NE*
	Units:	*ft NAVD29* (5)	*ft btoc*	*ft*	*ft NAVD29* (6)	*ft*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*mg/L*	*mg/L*
MW-2	1983	416.57	78.00	0	338.57	--	--	--	--	--	--	--	**1.4**	1 U	--	1 U	--	--	--	--	--	--	--	--	--	--
	11/17/1986	416.57	--	0.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/15/1986	416.57	--	0.06	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/8/1987	416.57	--	0.17	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/16/1987	416.57	--	0.08	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/26/1987	416.57	73.90	1.70	342.67	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/2/1987	416.57	73.94	1.67	342.63	0.04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/11/1987	416.57	72.17	0.34	344.40	-1.77	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/16/1988	416.57	71.86	0	344.71	-0.31	--	--	--	--	--	--	**29**	**43**	**5**	**236**	--	--	--	--	--	--	--	--	--	--
	5/10/1988	416.57	71.95	0.13	344.62	--	--	--	--	--	--	--	**0.5**	**12**	**0.5**	**0.5**	--	--	--	--	--	--	--	--	--	--
	6/1/1988	416.57	--	--	--	--	--	--	--	--	--	--	1.0 U	1.0 U	1.0 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	8/24/1988	416.57	--	2.04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/17/1989	416.57	--	1.97	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/12/1990	416.57	73.74	0	342.83	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/6/1990	416.57	74.58	0.15	341.99	0.84	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/31/1990	416.57	--	0.01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/19/1990	416.57	73.97	0.10	342.60	--	--	--	--	--	--	--	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--
	12/16/1990	416.57	--	0.74	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/13/1991	416.57	--	1.18	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/5/1991	416.57	--	0.40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/14/1991	416.57	74.14	0.39	342.43	--	**6,000**	--	--	--	--	--	**40**	**95**	**29**	**1,300**	--	--	--	--	--	--	--	--	--	--
	3/28/1991	416.57	--	0.59	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/15/1991	416.57	74.18	0.56	342.39	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/1/1991	416.57	--	1.18	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/20/1991	416.57	--	3.33	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/8/1991	416.57	77.54	3.35	339.03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/27/1991	416.57	--	0.23	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/171991	416.57	--	0.45	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/27/1991	416.57	--	0.80	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/18/1992	416.57	--	0.32	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/17/1992	416.57	--	0.28	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/8/1992	416.57	--	0.28	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/4/1992	416.57	--	0.28	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/2/1992	416.57	--	0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/28/1992	416.57	--	0.40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/30/1992	416.57	74.35	0.39	342.22	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/16/1992	416.57	--	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/8/1992	416.57	73.07	0	343.50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/2/1993	416.57	--	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/15/1993	416.57	--	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/18/1993	416.57	--	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/1/1993	416.57	73.66	0	342.91	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/1/1993	416.57	72.98	0	343.59	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/28/1993	416.57	--	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/18/1993	416.57	73.66	0	342.91	--	**7,700**	**370**	--	--	--	--	**0.8**	**0.5**	**5.0**	**4.4**	--	--	--	--	--	--	--	--	--	--
	2/1/1994	416.57	72.98	0	343.59	-0.68	**13,000**	**1,100**	--	--	--	--	**1.8**	0.5 U	**4.8**	**27.0**	--	--	--	--	--	--	--	--	--	--

Table 2. Groundwater Elevations and Analytical Results
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

Well ID	Sample Date	TOC Elevation	Depth to GW	Product Thickness	GW Elevation	Change in GW Elevation	Total Petroleum Hydrocarbons: TPH [1]	TPH-g	TPH-d	TPH-d (SGC)	TPH-o	TPH-o (SGC)	VOCs and Lead Scavengers: Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	EDB [2]	EDC	Fuel Oxygenates: DIPE	ETBE	MTBE	TBA	TAME	Ethanol	Methanol
						MTCA Method A Cleanup Levels [3] [4]	*NE*	*800/1,000*	*500*	*500*	*500*	*500*	*5*	*1,000*	*700*	*1,000*	*160*	*0.01*	*5*	*NE*	*NE*	*20*	*NE*	*NE*	*NE*	*NE*
	Units:	*ft NAVD29 [5]*	*ft btoc*	*ft*	*ft NAVD29 [6]*	*ft*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*mg/L*	*mg/L*
MW-2	9/19/1994	416.57	--	0	--	--	**1,300**	--	--	--	--	--	1.0 U	5.0 U	5.0 U	15 U	--	--	--	--	--	--	--	--	--	--
Continued	1/31/1995	416.57	73.60	0.13	342.97	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/27/1995	416.57	73.20	0.13	343.37	-0.40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/31/1995	416.57	73.20	0.13	343.37	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/28/1995	416.57	72.20	0.13	344.37	-1.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/31/1995	416.57	73.40	0.13	343.17	1.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/30/1995	416.57	73.65	0.13	342.92	0.25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/24/1995	416.57	74.26	Trace	342.31	0.61	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/29/1995	416.57	74.31	Trace	342.26	0.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/27/1995	416.57	74.07	Trace	342.50	-0.24	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/31/1996	416.57	73.40	Trace	343.17	-0.67	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/29/1996	416.57	72.22	0	344.35	-1.18	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/29/1996	416.57	72.50	0	344.07	0.28	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/29/1996	416.57	72.60	0	343.97	0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/22/1996	416.57	72.50	0	344.07	-0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/28/1996	416.57	73.90	0	342.67	1.40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/31/1996	416.57	73.80	0	342.77	-0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/30/1996	416.57	73.50	0	343.07	-0.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/30/1996	416.57	72.70	0	343.87	-0.80	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/31/1996	416.57	74.50	0	342.07	1.80	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/19/1996	416.57	74.50	0	342.07	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/30/1997	416.57	73.52	0	343.05	-0.98	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/28/1997	416.57	73.30	0	343.27	-0.22	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/19/1997	416.57	73.00	0	343.57	-0.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/20/1997	416.57	72.83	0	343.74	-0.17	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/2/1997	416.57	72.90	0	343.67	0.07	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/26/1998	416.57	72.85	0	343.72	-0.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/25/1998	416.57	73.34	0	343.23	0.49	**3,870**	**119**	--	--	--	--	0.5 U	**0.715**	**0.636**	**1.46**	--	--	--	--	--	--	--	--	--	--
	9/17/1998	416.57	72.82	0	343.75	-0.52	1,000 U	50 U	--	--	--	--	0.5 U	0.5	**1.03**	**1.95**	--	--	--	--	--	--	--	--	--	--
	12/18/1998	416.57	72.41	0	344.16	-0.41	1,000 U	**59.7**	--	--	--	--	0.5 U	0.5 U	**0.501**	1.0 U	--	--	--	--	--	--	--	--	--	--
	3/29/1999	416.57	72.53	0	344.04	0.12	1,000 U	**113**	--	--	--	--	**0.52**	0.5 U	0.5 U	**1.05**	--	--	--	--	--	--	--	--	--	--
	6/24/1999	416.57	73.40	0	343.17	0.87	**3,010**	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	10/8/1999	416.57	74.32	0	342.25	0.92	1,000 U	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	12/20/1999	416.57	73.67	0	342.90	-0.65	**2,300**	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	3/14/2000	416.57	73.19	0	343.38	-0.48	**1,290**	**124**	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	6/8/2000	416.57	73.86	0	342.71	0.67	1,000 U	**115**	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	9/13/2000	416.57	74.67	0	341.90	0.81	**2,790**	**138**	--	--	--	--	0.5 U	**0.55**	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	12/6/2000	416.57	73.95	0	342.62	-0.72	**1,090**	**82.8**	--	--	--	--	0.5 U	0.5	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	3/26/2001	416.57	73.35	0	343.22	-0.60	5,000 U	**130**	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	6/5/2001	416.57	73.81	0	342.76	0.46	--	**52.6**	--	--	--	--	0.5 U	**0.77**	0.5 U	**2.15**	--	--	--	--	--	--	--	--	--	--
	9/25/2001	416.57	74.50	0	342.07	0.69	**1,530**	**112**	--	--	--	--	0.5 U	1.0 U	1.0 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	9/6/2002	416.57	75.12	0	341.45	0.62	**820**	100 U	--	--	--	--	1.0 U	1.0 U	1.0 U	3.0 U	--	--	--	--	--	--	--	--	--	--
	9/11/2003	416.57	74.71	0	341.86	-0.41	**1,100**	100 U	--	--	--	--	1.0 U	1.0 U	1.0 U	3.0 U	--	--	--	--	--	--	--	--	--	--
	11/17/2004	416.57	74.07	0	342.50	-0.64	--	48 U	**1,900**	--	**130**	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	--	--	--	--	--
	7/11/2005	416.57	74.05	0	342.52	-0.02	--	48 U	**2,700**	--	**1,500**	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	0.3 U	--	--	--	--
	7/7/2006	416.57	73.25	0	343.32	-0.80	--	48 U	**1,000**	--	**220**	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	0.3 U	--	--	--	--

Table 2. Groundwater Elevations and Analytical Results
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

							Total Petroleum Hydrocarbons						VOCs and Lead Scavengers							Fuel Oxygenates						
Well ID	Sample Date	TOC Elevation	Depth to GW	Product Thickness	GW Elevation	Change in GW Elevation	TPH [1]	TPH-g	TPH-d	TPH-d (SGC)	TPH-o	TPH-o (SGC)	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	EDB [2]	EDC	DIPE	ETBE	MTBE	TBA	TAME	Ethanol	Methanol
MTCA Method A Cleanup Levels [3] [4]							*NE*	*800/1,000*	*500*	*500*	*500*	*500*	*5*	*1,000*	*700*	*1,000*	*160*	*0.01*	*5*	*NE*	*NE*	*20*	*NE*	*NE*	*NE*	*NE*
Units:		*ft NAVD29* [5]	*ft btoc*	*ft*	*ft NAVD29* [6]	*ft*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*mg/L*	*mg/L*
MW-2	11/15/2007	416.49	74.05	0	342.44	0.88	--	50 U	**2,000**	--	**460**	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	0.3 U	--	--	--	--
Continued	10/8/2008	416.49	73.44	0	343.05	-0.61	--	50 U	**1,200**	--	**210**	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	0.3 U	--	--	0.2 U	--
	6/30/2010	417.28	72.80	0	344.48	-1.43	--	50 U	**3,600**	--	**3,300**	--	1.0 U	1.0 U	1.0 U	2.0 U	--	--	--	--	--	--	--	--	10 U	--
	12/15/2010	417.28	73.21	0	344.07	0.41	--	50 U	**3,100**	--	**2,400**	--	1.0 U	1.0 U	1.0 U	2.0 U	--	--	--	--	--	--	--	--	10 U	--
	5/29/2014	417.28	72.83	--	344.45	-0.38	--	250 U	250 U	--	500 U	--	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	5.0 U	50.0 U
	10/29/2014	417.28	74.03	--	343.25	1.20	--	250 U	250 U	--	500 U	--	0.50 U	**0.68**	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	5.0 U	50.0 U
	6/4/2015	417.28	73.31	--	343.97	-0.72	--	250 U	**140**	--	250 U	--	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	5.0 U	50.0 U
	9/28/2015	417.28	74.42	--	342.86	1.11	--	250 U	100 U	--	250 U	--	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	--	--
	8/29/2016	417.28	74.52	--	342.76	0.10	--	50 U	**1,400**	--	**710**	--	2.0 U	2.0 U	3.0 U	3.0 U	2.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	25 U	5.0 U	10 U	10 U
	12/5/2016	417.28	74.02	--	343.26	-0.50	--	50 U	**410**	--	250 U	--	2.0 U	2.0 U	3.0 U	3.0 U	2.0 U	2.0 U	2.0 U	2.0 U	6.0 U	2.0 U	100 U	6.0 U	10 U	10 U
	5/17/2017	417.28	72.86	--	344.42	-1.16	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/24/2017	417.28	74.12	--	343.16	1.26	--	250 U	**580**	--	250 U	--	2.0 U	2.0 U	3.0 U	3.0 U	2.0 U	2.0 U	2.0 U	2.0 U	6.0 U	2.0 U	100 U	6.0 U	10 U	10 U
	6/14/2018	417.28	72.89	--	344.39	-1.23	--	250 U	**450**	--	**480**	--	3.0 U	2.0 U	3.0 U	3.0 U	4.0 U	2.0 U	2.0 U	2.0 U	6.0 U	2.0 U	100 U	6.0 U	10 U	10 U
	12/2/2018	417.23	73.93	--	343.30	1.09	--	100 U	**1,300**	--	**1,800**	--	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.40 U	0.53 U	0.35 U	0.91 U	0.44 U	24 U	1.5 U	4.0 U	4.0 U
	6/26/2019	417.23	73.49	--	343.74	-0.44	--	100 U	**1,500**	--	**1,200**	--	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.0020 U	0.53 U	0.35 U	0.91 U	0.44 U	24 U	1.5 U	4.0 U	4.0 U
	12/11/2019	417.23	73.75	0.00	343.48	0.26	--	100 U	**1,600**	67 J	**1,100**	98 U	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.0020 U	0.53 U	0.35 UJ	0.91 U	0.44 U	24 UJ	1.5 U	0.150 UJ	0.220 UJ
	6/24/2020	417.23	73.38	0.00	343.85	-0.37	--	100 U	**1,200**	--	**930**	--	0.24 U	0.39 U	0.50 U	0.39 U	0.93 U	0.0020 U	0.42 U	0.35 U	0.91 U	0.44 U	9.8 U	0.58 U	0.150 U	0.220 U
	12/15/2020	417.23	73.71	0.00	343.52	0.33	--	100 U	**460**	--	120 U	--	0.24 U	0.39 U	0.50 U	3.0 U	4.0 U	0.0020 U	0.42 U	0.35 U	0.91 U	0.44 U	9.8 U	0.58 U	0.150 U	0.220 U

Table 2. Groundwater Elevations and Analytical Results
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

							Total Petroleum Hydrocarbons						VOCs and Lead Scavengers							Fuel Oxygenates							
Well ID	Sample Date	TOC Elevation	Depth to GW	Product Thickness	GW Elevation	Change in GW Elevation	TPH (1)	TPH-g	TPH-d	TPH-d (SGC)	TPH-o	TPH-o (SGC)	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	EDB (2)	EDC	DIPE	ETBE	MTBE	TBA	TAME	Ethanol	Methanol
MTCA Method A Cleanup Levels (3) (4)							*NE*	*800/1,000*	*500*	*500*	*500*	*500*	*5*	*1,000*	*700*	*1,000*	*160*	*0.01*	*5*	*NE*	*NE*	*20*	*NE*	*NE*	*NE*	*NE*
	Units:	*ft NAVD29 (5)*	*ft btoc*	*ft*	*ft NAVD29 (6)*	*ft*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*mg/L*	*mg/L*
MW-3	1983	423.30	83.20	0	340.10	--	--	--	--	--	--	--	**19**	1.0 U	--	**1.2**	--	--	--	--	--	--	--	--	--	--
	8/26/1987	423.30	78.68	0	344.62	-4.52	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/11/1987	423.30	77.92	0	345.38	-0.76	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/5/1988	423.30	77.86	0	345.44	-0.06	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/3/1988	423.30	77.91	0	345.39	0.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/1/1988	423.30	77.90	0	345.40	-0.01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/5/1988	423.30	77.74	0	345.56	-0.16	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/3/1988	423.30	77.84	0	345.46	0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/12/1990	423.30	78.52	0	344.78	0.68	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/6/1988	423.30	79.19	0	344.11	0.67	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/31/1990	423.30	--	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/19/1990	423.30	78.72	0	344.58	--	ND	--	--	--	--	--	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--
	12/16/1990	423.30	--	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/13/1991	423.30	--	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/13/1991	423.30	78.27	0	345.03	--	ND	--	--	--	--	--	ND	**3.9**	**7.3**	**80**	--	--	--	--	--	--	--	--	--	--
	3/28/1991	423.30	--	0.52	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/15/1991	423.30	79.03	0.71	344.27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/1/1991	423.30	--	0.61	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/20/1991	423.30	--	0.75	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/4/1991	423.30	--	1.19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/27/1991	423.30	--	0.98	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/17/1991	423.30	--	0.59	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/27/1991	423.30	--	1.03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/18/1992	423.30	--	0.25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/17/1992	423.30	--	0.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/8/1992	423.30	--	0.15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/21/1992	423.30	78.68	0.45	344.62	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/28/1992	423.30	--	1.21	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/28/1992	423.30	--	2.02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/28/1992	423.30	--	1.16	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/30/1992	423.30	80.05	1.16	343.25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/16/1992	423.30	--	0.09	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/8/1992	423.30	78.61	0.00	344.69	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/2/1993	423.30	--	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/15/1993	423.30	--	1.26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/18/1993	423.30	--	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/5/1993	423.30	--	1.31	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/28/1993	423.30	--	0.09	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/1/1994	423.30	80.26	0	343.04	--	**360,000**	**17,000**	--	--	--	--	**0.01**	**0.01**	**0.05**	**0.26**	--	--	--	--	--	--	--	--	--	--
	9/19/1994	423.30	--	0	--	--	**1.2E+06**	--	--	--	--	--	**4.6**	**21**	**136**	**187**	--	--	--	--	--	--	--	--	--	--
	1/31/1995	423.30	80.20	0.12	343.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/27/1995	423.30	80.30	0.12	343.00	0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/31/1995	423.30	80.40	0.12	342.90	0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/28/1995	423.30	79.10	0.12	344.20	-1.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/31/1995	423.30	80.60	0.1	342.70	1.50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/30/1995	423.30	79.85	0.1	343.45	-0.75	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 2. Groundwater Elevations and Analytical Results
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

Well ID	Sample Date	TOC Elevation	Depth to GW	Product Thickness	GW Elevation	Change in GW Elevation	Total Petroleum Hydrocarbons: TPH [1]	TPH-g	TPH-d	TPH-d (SGC)	TPH-o	TPH-o (SGC)	VOCs and Lead Scavengers: Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	EDB [2]	EDC	Fuel Oxygenates: DIPE	ETBE	MTBE	TBA	TAME	Ethanol	Methanol
MTCA Method A Cleanup Levels [3] [4]							*NE*	*800/1,000*	*500*	*500*	*500*	*500*	*5*	*1,000*	*700*	*1,000*	*160*	*0.01*	*5*	*NE*	*NE*	*20*	*NE*	*NE*	*NE*	*NE*
	Units:	*ft NAVD29* [5]	*ft btoc*	*ft*	*ft NAVD29* [6]	*ft*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*mg/L*	*mg/L*
MW-3	7/24/1995	423.30	80.73	0.13	342.57	0.88	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Continued	8/29/1995	423.30	80.60	0.10	342.70	-0.13	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/27/1995	423.30	80.28	0.07	343.02	-0.32	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/31/1996	423.30	80.40	0.05	342.90	0.12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/29/1996	423.30	80.50	0.20	342.80	0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/29/1996	423.30	80.30	0.47	343.00	-0.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/29/1996	423.30	79.65	0.65	343.65	-0.65	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/22/1996	423.30	80.10	0.78	343.20	0.45	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/28/1996	423.30	80.00	0.17	343.30	-0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/31/1996	423.30	79.95	0.22	343.35	-0.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/30/1996	423.30	79.80	0.30	343.50	-0.15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/30/1996	423.30	78.70	1.13	344.60	-1.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/31/1996	423.30	82.26	0.90	341.04	3.56	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/19/1996	423.30	80.77	0.17	342.53	-1.49	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/30/1997	423.30	80.10	Trace	343.20	-0.67	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/28/1997	423.30	79.80	0.10	343.50	-0.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/19/1997	423.30	79.50	Trace	343.80	-0.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/20/1997	423.30	79.50	Trace	343.80	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/2/1997	423.30	79.50	Trace	343.80	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/26/1998	423.30	79.58	Trace	343.72	0.08	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/24/1998	423.30	80.00	0	343.30	0.42	**136,000**	**13,500**	--	--	--	--	10 U	10 U	10 U	20 U	--	--	--	--	--	--	--	--	--	--
	9/17/1998	423.30	79.46	0	343.84	-0.54	**31,700**	250 U	--	--	--	--	**4.93**	**4.93**	**6.74**	**17.4**	--	--	--	--	--	--	--	--	--	--
	12/18/1998	423.30	79.07	0	344.23	-0.39	**11,900**	500 U	--	--	--	--	5.0	5.0 U	5.0 U	10 U	--	--	--	--	--	--	--	--	--	--
	3/29/1999	423.30	79.21	0	344.09	0.14	**119,000**	**1,380**	--	--	--	--	2.5 U	2.5 U	2.5 U	5.0 U	--	--	--	--	--	--	--	--	--	--
	6/24/1999	423.30	79.50	0.01	343.80	0.29	**59,400**	**823**	--	--	--	--	**2.98**	2.5 U	2.5 U	5.0 U	--	--	--	--	--	--	--	--	--	--
	10/8/1999	423.30	81.59	0.77	341.71	2.09	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/20/1999	423.30	80.23	0	343.07	-1.36	**51,500**	**5,880**	--	--	--	--	1.3 U	1.1 U	4.1 U	**21.1**	--	--	--	--	--	--	--	--	--	--
	3/14/2000	423.30	79.77	0	343.53	-0.46	**4,440**	**48,600**	--	--	--	--	**25**	25 U	**30.6**	**125**	--	--	--	--	--	--	--	--	--	--
	6/8/2000	423.30	80.17	0	343.13	0.40	**18,200**	**34,800**	--	--	--	--	**12.9**	2.5 U	**14.3**	**92.2**	--	--	--	--	--	--	--	--	--	--
	9/13/2000	423.30	82.11	0.75	341.19	1.94	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/6/2000	423.30	80.65	0	342.65	-1.46	**653,000**	**42,100**	--	--	--	--	**2.93**	0.5 U	**10.0**	**27.4**	--	--	--	--	--	--	--	--	--	--
	3/27/2001	423.30	79.50	0	343.80	-1.15	**24,800**	**1,820**	--	--	--	--	1.25 U	1.25 U	1.25 U	3 U	--	--	--	--	--	--	--	--	--	--
	6/5/2001	423.30	80.45	Trace	342.85	0.95	**119,003**	**2,270**	--	--	--	--	**1.23**	1.25 U	**1.06**	**2.54**	--	--	--	--	--	--	--	--	--	--
	9/25/2001	423.30	81.90	0.20	341.40	1.45	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/5/2002	423.30	DRY	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/11/2003	423.30	82.57	0.42	340.73	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/17/2004	423.30	DRY	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/11/2005	423.30	DRY	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7//07/06	423.30	DRY	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/15/2007	424.45	DRY	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/8/2008	424.45	DRY	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/30/2010	423.42	78.97	Trace	344.45	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/14/2010	423.42	79.38	0	344.04	0.41	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/28/2014	423.42	78.85	--	344.57	-0.53	--	250 U	**1,100**	--	500 U	--	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	5.0 U	50.0 U
	10/30/2014	423.42	80.18	--	343.24	1.33	--	**620**	**18,000**	--	500 U	--	0.50 U	**1.4**	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	5.0 U	50.0 U
	6/4/2015	423.42	79.46	--	343.96	-0.72	--	250 U	**3,300**	--	250 U	--	0.50 U	0.50 U	0.50 U	1.0 U	**0.51**	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	**24.8**	**93.2**

Table 2. Groundwater Elevations and Analytical Results
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

							Total Petroleum Hydrocarbons						VOCs and Lead Scavengers							Fuel Oxygenates							
Well ID	Sample Date	TOC Elevation	Depth to GW	Product Thickness	GW Elevation	Change in GW Elevation	TPH [1]	TPH-g	TPH-d	TPH-d (SGC)	TPH-o	TPH-o (SGC)	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	EDB [2]	EDC	DIPE	ETBE	MTBE	TBA	TAME	Ethanol	Methanol
					MTCA Method A Cleanup Levels [3] [4]		*NE*	*800/1,000*	*500*	*500*	*500*	*500*	*5*	*1,000*	*700*	*1,000*	*160*	*0.01*	*5*	*NE*	*NE*	*20*	*NE*	*NE*	*NE*	*NE*
	Units:	*ft NAVD29* [5]	*ft btoc*	*ft*	*ft NAVD29* [6]	*ft*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*mg/L*	*mg/L*
MW-3	9/29/2015	423.42	80.58	--	342.84	1.12	--	**733**	**3,300**	--	250 U	--	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	--	--
Continued	8/30/2016	423.42	80.60	--	342.82	0.02	--	**1,400**	**11,000**	--	**1,100**	--	2.0 U	2.0 U	3.0 U	3.0 U	**2.5**	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	25 U	5.0 U	10 U	10 U
	12/6/2016	423.42	80.17	--	343.25	-0.43	--	**290**	**6,600**	--	**290**	--	2.0 U	2.0 U	3.0 U	3.0 U	2.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	25 U	5.0 U	10 U	10 U
	5/16/2017	423.42	79.04	--	344.38	-1.13	--	500 U	**2,600**	--	250 U	--	2.0 U	2.0 U	3.0 U	3.0 U	2.0 U	2.0 U	2.0 U	2.0 U	6.0 U	2.0 U	100 U	6.0 U	10 U	10 U
	10/25/2017	423.42	80.23	--	343.19	1.19	--	**380**	**5,700**	--	**410**	--	2.0 U	2.0 U	3.0 U	3.0 U	2.0 U	2.0 U	2.0 U	2.0 U	6.0 U	2.0 U	100 U	6.0 U	10 U	10 U
	6/14/2018	423.42	79.20	--	344.22	-1.03	--	250 U	**4,700**	--	**860**	--	3.0 U	2.0 U	3.0 U	3.0 U	4.0 U	2.0 U	2.0 U	2.0 U	6.0 U	2.0 U	100 U	6.0 U	10 U	10 U
	12/4/2018	423.40	80.00	--	343.40	0.82	--	**180 J**	**8,800**	--	**2,000**	--	0.53 U	0.39 U	0.50 U	3.0 U	0.93 U	0.40 U	0.53 U	0.35 U	0.91 U	0.44 U	24 U	1.5 U	4.0 U	4.0 U
	6/26/2019	423.40	79.64	--	343.76	-0.36	--	**300**	**8,600**	--	**1,900**	--	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.0020 U	0.53 U	0.35 U	0.91 U	0.44 U	24 U	1.5 U	4.0 U	4.0 U
	12/11/2019	423.40	79.93	0.00	343.47	-0.07	--	**230 J**	**2,700 J**	**190**	**830 J**	99 U	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.0020 U	0.53 U	0.35 UJ	0.91 U	0.44 U	24 UJ	1.5 U	0.150 UJ	0.220 UJ
	6/24/2020	423.40	79.57	0.00	343.83	-0.36	--	**200 J**	**4,400 J**	--	**920 J**	--	0.24 U	0.39 U	0.50 U	0.39 U	0.93 U	0.0020 U	0.42 U	0.35 U	0.91 U	0.44 U	9.8 U	0.58 U	0.150 U	0.220 U
	12/16/2020	423.40	79.92	0.00	343.48	0.35	--	**150 J**	**2,200**	--	**210 J**	--	0.24 U	0.39 U	0.50 U	0.39 U	0.93 U	0.0020 U	0.42 U	0.35 U	0.91 U	0.44 U	9.8 U	0.58 U	0.150 U	0.220 U

Well ID	Sample Date	TOC Elevation	Depth to GW	Product Thickness	GW Elevation	Change in GW Elevation	Total Petroleum Hydrocarbons						VOCs and Lead Scavengers							Fuel Oxygenates						
							TPH [1]	TPH-g	TPH-d	TPH-d (SGC)	TPH-o	TPH-o (SGC)	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	EDB [2]	EDC	DIPE	ETBE	MTBE	TBA	TAME	Ethanol	Methanol
				MTCA Method A Cleanup Levels [3] [4]			*NE*	*800/1,000*	*500*	*500*	*500*	*500*	*5*	*1,000*	*700*	*1,000*	*160*	*0.01*	*5*	*NE*	*NE*	*20*	*NE*	*NE*	*NE*	*NE*
	Units:	*ft NAVD29* [5]	*ft btoc*	*ft*	*ft NAVD29* [6]	*ft*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*mg/L*	*mg/L*
MW-4	1983	410.12	74.30	0	335.82	--	--	--	--	--	--	--	1.0 U	1.0 U	--	1.0 U	--	--	--	--	--	--	--	--	--	--
	8/26/1987	410.12	68.41	0	341.71	-5.89	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/11/1987	410.12	67.71	0	342.41	-0.70	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/5/1988	410.12	67.64	0	342.48	-0.07	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/3/1988	410.12	67.72	0	342.40	0.08	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/1/1988	410.12	67.61	0	342.51	-0.11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/5/1988	410.12	67.53	0	342.59	-0.08	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/3/1988	410.12	67.58	0	342.54	0.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/7/1988	410.12	68.26	0	341.86	0.68	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/5/1988	410.12	68.66	0	341.46	0.40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/12/1990	410.12	68.25	0	341.87	-0.41	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/6/1990	410.12	68.87	0	341.25	0.62	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/19/1990	410.12	68.42	0	341.70	-0.45	ND	--	--	--	--	--	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--
	2/14/1991	410.12	68.00	0	342.12	-0.42	**2,000**	--	--	--	--	--	0.5 U	**39**	**7.3**	**80**	--	--	--	--	--	--	--	--	--	--
	5/15/1991	410.12	68.18	0	341.94	0.18	**600**	--	--	--	--	--	0.5 U	0.5 U	0.5 U	0.5 U	--	--	--	--	--	--	--	--	--	--
	8/8/1991	410.12	69.13	0	340.99	0.95	--	--	--	--	--	--	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--
	4/1/1992	410.12	68.05	0	342.07	-1.08	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/1/1992	410.12	68.80	0	341.32	0.75	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/8/1992	410.12	68.37	0	341.75	-0.43	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/1/1993	410.12	--	0	--	--	ND	--	--	--	--	--	0.5 U	0.5 U	0.5 U	0.5 U	--	--	--	--	--	--	--	--	--	--
	11/1/1993	410.12	68.90	0	341.22	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/1/1994	410.12	68.04	0	342.08	-0.86	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/31/1995	410.12	68.30	Trace	341.82	0.26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/27/1995	410.12	68.00	Trace	342.12	-0.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/31/1995	410.12	68.20	Trace	341.92	0.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/28/1995	410.12	68.00	Trace	342.12	-0.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/31/1995	410.12	68.20	Trace	341.92	0.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/30/1995	410.12	68.43	Trace	341.70	0.23	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/24/1995	410.12	68.73	Trace	341.39	0.31	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/29/1995	410.12	68.61	Trace	341.51	-0.12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/27/1995	410.12	68.10	Trace	342.02	-0.51	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/31/1996	410.12	68.40	Trace	341.72	0.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/29/1996	410.12	68.30	Trace	341.82	-0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/29/1996	410.12	68.40	0	341.72	0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/29/1996	410.12	68.10	0	342.02	-0.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/22/1996	410.12	68.00	0	342.12	-0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/28/1996	410.12	68.42	0	341.70	0.42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/31/1996	410.12	65.50	0	344.62	-2.92	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/30/1996	410.12	68.60	0	341.52	3.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/30/1996	410.12	68.60	0	341.52	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/31/1996	410.12	68.90	0	341.22	0.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/19/1996	410.12	68.30	0	341.82	-0.60	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/30/1997	410.12	62.40	0	347.72	-5.90	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/28/1997	410.12	62.10	0	348.02	-0.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/19/1997	410.12	62.00	0	348.12	-0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/20/1997	410.12	62.00	0	348.12	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 2. Groundwater Elevations and Analytical Results
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

Well ID	Sample Date	TOC Elevation	Depth to GW	Product Thickness	GW Elevation	Change in GW Elevation	Total Petroleum Hydrocarbons: TPH (1)	TPH-g	TPH-d	TPH-d (SGC)	TPH-o	TPH-o (SGC)	VOCs and Lead Scavengers: Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	EDB (2)	EDC	Fuel Oxygenates: DIPE	ETBE	MTBE	TBA	TAME	Ethanol	Methanol
					MTCA Method A Cleanup Levels (3) (4)		*NE*	*800/1,000*	*500*	*500*	*500*	*500*	*5*	*1,000*	*700*	*1,000*	*160*	*0.01*	*5*	*NE*	*NE*	*20*	*NE*	*NE*	*NE*	*NE*
	Units:	*ft NAVD29* (5)	*ft btoc*	*ft*	*ft NAVD29* (6)	*ft*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*mg/L*	*mg/L*
MW-4	11/2/1997	410.12	62.00	0	348.12	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Continued	3/26/1998	410.12	67.40	0	342.72	5.40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/26/1998	410.12	65.90	--	344.22	-1.50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/17/1998	410.12	75.28	0	334.84	9.38	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/18/1998	410.12	66.86	0	343.26	-8.42	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/29/1999	410.12	67.15	0	342.97	0.29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/24/1999	410.12	67.92	0	342.20	0.77	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/8/1999	410.12	68.73	0	341.39	0.81	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/20/1999	410.12	68.13	0	341.99	-0.60	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/14/2000	410.12	67.70	0	342.42	-0.43	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/8/2000	410.12	68.31	0	341.81	0.61	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/13/2000	410.12	69.07	0	341.05	0.76	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/6/2000	410.12	68.37	0	341.75	-0.70	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/1/2001	410.12	67.80	0	342.32	-0.57	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/26/2001	410.12	67.80	0	342.32	0.00	5,000 U	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	6/5/2001	410.12	68.11	0	342.01	0.31	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/25/2001	410.12	DRY	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/6/2002	410.12	--	--	--	--	690 U	100 U	--	--	--	--	1.0 U	1.0 U	1.0 U	3.0 U	--	--	--	--	--	--	--	--	--	--
	9/11/2003	410.12	--	--	--	--	410 U	100 U	--	--	--	--	1.0 U	1.0 U	1.0 U	3.0 U	--	--	--	--	--	--	--	--	--	--
	11/17/2004	410.12	68.50	0	341.62	--	--	48 U	78 U	--	97 U	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	--	--	--	--	--
	7/11/2005	410.12	68.52	0	341.60	0.02	--	48 U	**200**	--	**520**	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	0.3 U	--	--	--	--
	7/7/2006	410.12	67.72	0	342.40	-0.80	--	48 U	**400**	--	**540**	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	0.3 U	--	--	--	--
	11/14/2007	410.59	68.04	0	342.55	-0.15	--	50 U	77 U	--	96 U	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	0.3 U	--	--	--	--
	10/8/2008	410.59	67.91	0	342.68	-0.13	--	50 U	**260**	--	97 U	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	0.3 U	--	--	0.2 U	--
	6/29/2010	412.09	68.01	0	344.08	-1.40	--	50 U	120 U	--	240 U	--	1.00 U	1.00 U	1.00 U	2.0 U	--	--	--	--	--	--	--	--	10 U	--
	12/15/2010	412.09	68.43	0	343.66	0.42	--	50 U	120 U	--	240 U	--	1.0 U	1.0 U	1.0 U	2.0 U	--	--	--	--	--	--	--	--	10 U	--
	5/28/2014	412.09	67.98	--	344.11	-0.45	--	250 U	250 U	--	500 U	--	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	5.0 U	50.0 U
	10/28/2014	412.09	69.17	--	342.92	1.19	--	250 U	250 U	--	500 U	--	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	5.0 U	50.0 U
	6/3/2015	412.09	68.48	--	343.61	-0.69	--	250 U	100 U	--	250 U	--	0.50 U	**0.52**	0.5 U	1.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	5.0 U	50.0 U
	9/28/2015	412.09	69.52	--	342.57	1.04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/30/2016	412.09	69.66	--	342.43	0.14	--	50 U	110 U	--	250 U	--	2.0 U	2.0 U	3.0 U	3.0 U	2.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	25 U	5.0 U	10 U	10 U
	12/5/2016	412.09	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/15/2017	412.09	68.02	--	344.07	--	--	500 U	100 U	--	250 U	--	2.0 U	2.0 U	3.0 U	3.0 U	2.0 U	2.0 U	2.0 U	2.0 U	6.0 U	2.0 U	100 U	6.0 U	10 U	10 U
	6/13/2018	412.05	68.15	--	343.90	0.17	--	250 U	110 U	--	350 U	--	3.0 U	2.0 U	3.0 U	3.0 U	4.0 U	2.0 U	2.0 U	2.0 U	6.0 U	2.0 U	100 U	6.0 U	10 U	10 U
	6/26/2019	412.05	68.68	--	343.37	0.53	--	100 U	69 U	--	100 U	--	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.0020 U	0.53 U	0.35 U	0.91 U	0.44 U	24 U	1.5 U	4.0 U	4.0 U
	12/9/2019	412.05	68.98	0.00	343.07	0.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/23/2020	412.05	68.62	0.00	343.43	-0.36	--	100 U	69 U	--	100 U	--	0.24 U	0.39 U	0.50 U	0.39 U	0.93 U	0.0020 U	0.42 U	0.35 U	0.91 U	0.44 U	9.8 U	0.58 U	0.150 U	0.220 U
	12/14/2020	412.05	68.90	0.00	343.15	0.28	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-5	11/19/1990	--	17.74	0	--	--	ND	--	--	--	--	--	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--
(48" dia.	2/1/1994	--	17.82	0	--	--	ND	--	--	--	--	--	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--
culvert)	**Well destroyed in May 1989**																									

Table 2. Groundwater Elevations and Analytical Results
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

							Total Petroleum Hydrocarbons						VOCs and Lead Scavengers							Fuel Oxygenates						
Well ID	Sample Date	TOC Elevation	Depth to GW	Product Thickness	GW Elevation	Change in GW Elevation	TPH [1]	TPH-g	TPH-d	TPH-d (SGC)	TPH-o	TPH-o (SGC)	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	EDB [2]	EDC	DIPE	ETBE	MTBE	TBA	TAME	Ethanol	Methanol
					***MTCA Method A Cleanup Levels* [3] [4]**		*NE*	*800/1,000*	*500*	*500*	*500*	*500*	*5*	*1,000*	*700*	*1,000*	*160*	*0.01*	*5*	*NE*	*NE*	*20*	*NE*	*NE*	*NE*	*NE*
	Units:	*ft NAVD29* [5]	*ft btoc*	*ft*	*ft NAVD29* [6]	*ft*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*mg/L*	*mg/L*
MW-6	8/26/1987	358.07	16.75	0	341.32	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/11/1987	358.07	15.28	0	342.79	-1.47	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/5/1988	358.07	16.05	0	342.02	0.77	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/3/1988	358.07	16.50	0	341.57	0.45	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/1/1988	358.07	16.20	0	341.87	-0.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/5/1988	358.07	16.03	0	342.04	-0.17	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/3/1988	358.07	15.93	0	342.14	-0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/7/1988	358.07	16.81	0	341.26	0.88	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/5/1988	358.07	16.93	0	341.14	0.12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/12/1990	358.07	16.84	0	341.23	-0.09	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/6/1990	358.07	16.89	0	341.18	0.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/19/1990	358.07	16.75	0	341.32	-0.14	ND	--	--	--	--	--	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--
	2/14/1991	358.07	16.43	0	341.64	-0.32	--	--	--	--	--	--	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--
	5/14/1991	358.07	16.64	0	341.43	0.21	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/8/1991	358.07	17.44	0	340.63	0.80	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/1/1992	358.07	16.50	0	341.57	-0.94	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/1/1992	358.07	17.00	0	341.07	0.50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/8/1992	358.07	16.76	0	341.31	-0.24	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/19/1993	358.07	17.78	0	340.29	1.02	1,000 U	100 U	--	--	--	--	0.5 U	0.5 U	0.5 U	5 U	--	--	--	--	--	--	--	--	--	--
	2/1/1994	358.07	16.62	0	341.45	-1.16	1,000 U	100 U	--	--	--	--	0.5 U	0.5 U	0.5 U	5 U	--	--	--	--	--	--	--	--	--	--
	1/31/1995	358.07	16.40	Trace	341.67	-0.22	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/27/1995	358.07	16.30	Trace	341.77	-0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/31/1995	358.07	16.30	Trace	341.77	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/28/1995	358.07	16.30	Trace	341.77	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/31/1995	358.07	16.10	Trace	341.97	-0.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/30/1995	358.07	16.20	Trace	341.87	0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/24/1995	358.07	16.77	0.01	341.30	0.57	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/29/1995	358.07	16.62	0.01	341.45	-0.15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/27/1995	358.07	16.70	0.01	341.37	0.08	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/31/1996	358.07	16.60	0.01	341.47	-0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/29/1996	358.07	16.80	0.01	341.27	0.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/29/1996	358.07	16.50	0	341.57	-0.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/29/1996	358.07	15.89	0	342.18	-0.61	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/22/1996	358.07	16.10	0	341.97	0.21	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/28/1996	358.07	16.58	0	341.49	0.48	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/31/1996	358.07	16.40	0	341.67	-0.18	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/30/1996	358.07	16.30	0	341.77	-0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/30/1996	358.07	16.10	0	341.97	-0.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/31/1996	358.07	17.35	0	340.72	1.25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/19/1996	358.07	16.50	0	341.57	-0.85	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/30/1997	358.07	16.07	0	342.00	-0.43	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/28/1997	358.07	16.10	0	341.97	0.03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/19/1997	358.07	16.10	0	341.97	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/20/1997	358.07	16.10	0	341.97	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/2/1997	358.07	16.10	0	341.97	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/26/1998	358.07	16.19	0	341.88	0.09	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Well ID	Sample Date	TOC Elevation	Depth to GW	Product Thickness	GW Elevation	Change in GW Elevation	Total Petroleum Hydrocarbons: TPH [1]	TPH-g	TPH-d	TPH-d (SGC)	TPH-o	TPH-o (SGC)	VOCs and Lead Scavengers: Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	EDB [2]	EDC	Fuel Oxygenates: DIPE	ETBE	MTBE	TBA	TAME	Ethanol	Methanol
						MTCA Method A Cleanup Levels [3] [4]	*NE*	*800/1,000*	*500*	*500*	*500*	*500*	*5*	*1,000*	*700*	*1,000*	*160*	*0.01*	*5*	*NE*	*NE*	*20*	*NE*	*NE*	*NE*	*NE*
	Units:	*ft NAVD29* [5]	*ft btoc*	*ft*	*ft NAVD29* [6]	*ft*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*mg/L*	*mg/L*
MW-6	6/24/1998	358.07	16.07	0	342.00	-0.12	1,000 U	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
Continued	9/17/1998	358.07	16.56	0	341.51	0.49	1,000 U	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	**1.18**	--	--	--	--	--	--	--	--	--	--
	12/18/1998	358.07	16.14	0	341.93	-0.42	1,000 U	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	3/29/1999	358.07	15.59	0	342.48	-0.55	1,000 U	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	6/24/1999	358.07	16.09	0	341.98	0.50	1,000 U	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	10/8/1999	358.07	16.85	0	341.22	0.76	1,000 U	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	12/20/1999	358.07	16.64	0	341.43	-0.21	1,000 U	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	3/14/2000	358.07	16.46	0	341.61	-0.18	1,000 U	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	6/8/2000	358.07	16.76	0	341.31	0.30	1,000 U	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	9/13/2000	358.07	17.25	0	340.82	0.49	1,000 U	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	12/6/2000	358.07	16.71	0	341.36	-0.54	1,000 U	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	3/1/2001	358.07	16.33	0	341.74	-0.38	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/26/2001	358.07	16.33	0	341.74	0.00	5,000 U	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	6/5/2001	358.07	16.92	0	341.15	0.59	250 U	**52.6**	--	--	--	--	0.5 U	**0.77**	0.5 U	**2.15**	--	--	--	--	--	--	--	--	--	--
	9/25/2001	358.07	16.98	0	341.09	0.06	250 U	50 U	--	--	--	--	0.5 U	1.0 U	1.0 U	1.5 U	--	--	--	--	--	--	--	--	--	--
	9/5/2002	358.07	17.60	0	340.47	0.62	500 U	100 U	--	--	--	--	1.0 U	1.0 U	1.0 U	3.0 U	--	--	--	--	--	--	--	--	--	--
	9/11/2003	358.07	17.58	0	340.49	-0.02	410 U	100 U	--	--	--	--	1.0 U	1.0 U	1.0 U	3.0 U	--	--	--	--	--	--	--	--	--	--
	11/17/2004	358.07	16.91	0	341.16	-0.67	--	48 U	78 U	--	98 U	--	0.2 U	0.2 U	0.2 U	1 U	--	--	--	--	--	--	--	--	--	--
	7/11/2005	358.07	17.18	0	340.89	0.27	--	48 U	76 U	--	**130**	--	0.2 U	0.2 U	0.2 U	1 U	--	--	--	--	--	0.3 U	--	--	--	--
	7/7/2006	358.07	16.19	0	341.88	-0.99	--	48 U	76 U	--	95 U	--	0.2 U	0.2 U	0.2 U	1 U	--	--	--	--	--	0.3 U	--	--	--	--
	11/15/2007	358.77	16.96	0	341.81	0.07	--	50 U	76 U	--	95 U	--	0.2 U	0.2 U	0.2 U	1 U	--	--	--	--	--	0.3 U	--	--	--	--
	10/8/2008	358.77	16.39	0	342.38	-0.57	--	50 U	76 U	--	95 U	--	0.2 U	0.2 U	0.2 U	1 U	--	--	--	--	--	0.3 U	--	--	0.2 U	--
	6/29/2010	358.61	15.84	0	342.77	-0.39	--	50 U	120 U	--	240 U	--	1.0 U	1.0 U	1.0 U	2.0 U	--	--	--	--	--	--	--	--	10 U	--
	12/14/2010	358.61	16.34	--	342.27	0.50	--	50 U	120 U	--	240 U	--	1.0 U	1.0 U	1.0 U	2.0 U	--	--	--	--	--	--	--	--	10 U	--
	5/29/2014	358.61	15.57	--	343.04	-0.77	--	250 U	250 U	--	500 U	--	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	5.0 U	50.0 U
	10/29/2014	358.61	16.82	--	341.79	1.25	--	250 U	250 U	--	500 U	--	0.50 U	**4.9**	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	5.0 U	50.0 U
	6/3/2015	358.61	16.18	--	342.43	-0.64	--	250 U	100 U	--	250 U	--	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	5.0 U	50.0 U
	9/28/2015	358.61	17.15	--	341.46	0.97	--	250 U	100 U	--	250 U	--	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	--	--
	8/30/2016	358.61	17.15	--	341.46	0.00	--	50 U	110 U	--	250 U	--	2.0 U	2.0 U	3.0 U	3.0 U	2.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	25 U	5.0 U	10 U	10 U
	12/5/2016	358.61	16.91	--	341.70	-0.24	--	50 U	110 U	--	250 U	--	2.0 U	2.0 U	3.0 U	3.0 U	2.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	25 U	5.0 U	10 U	10 U
	5/16/2017	358.61	15.88	--	342.73	-1.03	--	500 U	100 U	--	250 U	--	2.0 U	2.0 U	3.0 U	3.0 U	2.0 U	2.0 U	2.0 U	2.0 U	6.0 U	2.0 U	100 U	6.0 U	10 U	10 U
	10/23/2017	358.61	17.01	--	341.60	1.13	--	250 U	100 U	--	250 U	--	2.0 U	2.0 U	3.0 U	3.0 U	2.0 U	2.0 U	2.0 U	2.0 U	6.0 U	2.0 U	100 U	6.0 U	10 U	10 U
	6/11/2018	358.61	15.73	--	342.88	-1.28	--	250 U	**180**	--	**460**	--	3.0 U	2.0 U	3.0 U	3.0 U	4.0 U	2.0 U	2.0 U	2.0 U	6.0 U	2.0 U	100 U	6.0 U	10 U	10 U
	12/2/2018	358.52	16.95	--	341.57	1.31	--	100 U	**71 J**	--	350 U	--	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.40 U	0.53 U	0.35 U	0.91 U	0.44 U	24 U	1.5 U	4.0 U	4.0 U
	6/26/2019	358.52	16.48	--	342.04	-0.47	--	100 U	71 U	--	110 U	--	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.0020 U	0.53 U	0.35 U	0.91 U	0.44 U	24 U	1.5 U	4.0 U	4.0 U
	12/10/2019	358.52	16.97	0.00	341.55	0.49	--	100 U	62 U	--	92 U	--	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.0020 U	0.53 U	0.35 UJ	0.91 U	0.44 U	24 UJ	1.5 U	0.150 UJ	0.220 UJ
	6/23/2020	358.52	16.31	0.00	342.21	-0.66	--	100 U	69 U	--	100 U	--	0.24 U	0.39 U	0.50 U	0.39 U	0.93 U	0.0020 U	0.42 U	0.35 U	0.91 U	0.44 U	9.8 U	0.58 U	0.150 U	0.220 U
	12/16/2020	358.52	16.61	0.00	341.91	0.30	--	100 U	110 U	--	120 U	--	0.24 U	0.39 U	0.50 U	0.39 U	0.93 U	0.0020 U	0.42 U	0.35 U	0.91 U	0.44 U	9.8 U	0.58 U	0.150 U	0.220 U

Table 2. Groundwater Elevations and Analytical Results
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

							Total Petroleum Hydrocarbons						VOCs and Lead Scavengers							Fuel Oxygenates						
Well ID	Sample Date	TOC Elevation	Depth to GW	Product Thickness	GW Elevation	Change in GW Elevation	TPH [1]	TPH-g	TPH-d	TPH-d (SGC)	TPH-o	TPH-o (SGC)	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	EDB [2]	EDC	DIPE	ETBE	MTBE	TBA	TAME	Ethanol	Methanol
MTCA Method A Cleanup Levels [3] [4]							*NE*	*800/1,000*	*500*	*500*	*500*	*500*	*5*	*1,000*	*700*	*1,000*	*160*	*0.01*	*5*	*NE*	*NE*	*20*	*NE*	*NE*	*NE*	*NE*
	Units:	*ft NAVD29* [5]	*ft btoc*	*ft*	*ft NAVD29* [6]	*ft*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*mg/L*	*mg/L*
MW-7	8/26/1987	410.12	67.52	0	342.60	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/11/1987	410.12	66.85	0	343.27	-0.67	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/5/1988	410.12	66.68	0	343.44	-0.17	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/3/1988	410.12	66.66	0	343.46	-0.02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/1/1988	410.12	66.66	0	343.46	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/5/1988	410.12	66.58	0	343.54	-0.08	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/3/1988	410.12	66.67	0	343.45	0.09	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/7/1988	410.12	67.35	0	342.77	0.68	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/5/1988	410.12	67.79	0	342.33	0.44	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/12/1990	410.12	67.34	0	342.78	-0.45	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/6/1990	410.12	68.01	0	342.11	0.67	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/18/1990	410.12	65.55	0	344.57	-2.46	ND	--	--	--	--	--	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--
	2/14/1991	410.12	67.09	0	343.03	1.54	--	--	--	--	--	--	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--
	5/15/1991	410.12	67.29	0	342.83	0.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/8/1991	410.12	68.28	0	341.84	0.99	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/1/1992	410.12	67.12	0	343.00	-1.16	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/1/1992	410.12	67.93	0	342.19	0.81	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/8/1992	410.12	67.47	0	342.65	-0.46	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/1/1993	410.12	67.95	0	342.17	0.48	ND	--	--	--	--	--	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--
	2/1/1994	410.12	67.08	0	343.04	-0.87	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/31/1995	410.12	67.40	0.38	342.72	0.32	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/27/1995	410.12	67.00	0.38	343.12	-0.40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/31/1995	410.12	67.10	0.38	343.02	0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/28/1995	410.12	67.20	0.25	342.92	0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/31/1995	410.12	67.30	0.13	342.82	0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/30/1995	410.12	67.30	0.13	342.82	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/24/1995	410.12	65.13	0.01	344.99	-2.17	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/29/1995	410.12	65.20	0.01	344.92	0.07	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/27/1995	410.12	65.40	0.01	344.72	0.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/31/1996	410.12	67.30	0.01	342.82	1.90	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/29/1996	410.12	66.80	0.01	343.32	-0.50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/29/1996	410.12	66.80	0	343.32	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/29/1996	410.12	66.85	0	343.27	0.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/22/1996	410.12	66.60	0	343.52	-0.25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/28/1996	410.12	67.64	0	342.48	1.04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/31/1996	410.12	67.50	0	342.62	-0.14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/30/1996	410.12	67.70	0	342.42	0.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/30/1996	410.12	68.00	0	342.12	0.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/31/1996	410.12	68.05	0	342.07	0.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/19/1996	410.12	67.60	0	342.52	-0.45	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/30/1997	410.12	67.05	0	343.07	-0.55	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/28/1997	410.12	66.90	0	343.22	-0.15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/19/1997	410.12	66.80	0	343.32	-0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/20/1997	410.12	67.64	0	342.48	0.84	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/2/1997	410.12	67.20	0	342.92	-0.44	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/26/1998	410.12	66.40	0	343.72	-0.80	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 2. Groundwater Elevations and Analytical Results
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

							Total Petroleum Hydrocarbons						VOCs and Lead Scavengers							Fuel Oxygenates							
Well ID	Sample Date	TOC Elevation	Depth to GW	Product Thickness	GW Elevation	Change in GW Elevation	TPH [1]	TPH-g	TPH-d	TPH-d (SGC)	TPH-o	TPH-o (SGC)	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	EDB [2]	EDC	DIPE	ETBE	MTBE	TBA	TAME	Ethanol	Methanol
						MTCA Method A Cleanup Levels [3] [4]	*NE*	*800/1,000*	*500*	*500*	*500*	*500*	*5*	*1,000*	*700*	*1,000*	*160*	*0.01*	*5*	*NE*	*NE*	*20*	*NE*	*NE*	*NE*	*NE*
	Units:	*ft NAVD29* [5]	*ft btoc*	*ft*	*ft NAVD29* [6]	*ft*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*mg/L*	*mg/L*
MW-7	6/24/1998	410.12	66.90	--	343.22	0.50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Continued	9/17/1998	410.12	66.36	0	343.76	-0.54	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/18/1998	410.12	65.98	0	344.14	-0.38	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/29/1999	410.12	66.16	0	343.96	0.18	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/24/1999	410.12	67.04	0	343.08	0.88	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/8/1999	410.12	68.87	0	341.25	1.83	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/20/1999	410.12	67.19	0	342.93	-1.68	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/14/2000	410.12	66.72	0	343.40	-0.47	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/8/2000	410.12	67.45	0	342.67	0.73	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/13/2000	410.12	68.25	0	341.87	0.80	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/6/2000	410.12	67.50	0	342.62	-0.75	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/27/2001	410.12	--	--	--	--	--	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1 U	--	--	--	--	--	--	--	--	--	--
	3/1/2001	410.12	66.85	0	343.27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/27/2001	410.12	66.85	0	343.27	0.00	5,000 U	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1 U	--	--	--	--	--	--	--	--	--	--
	6/5/2001	410.12	67.37	0	342.75	0.52	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/25/2001	410.12	68.05	0	342.07	0.68	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/5/2002	410.12	68.07	0	342.05	0.02	530 U	100 U	--	--	--	--	1.0 U	1.0 U	1.0 U	3.0 U	--	--	--	--	--	--	--	--	--	--
	9/11/2003	410.12	68.25	0	341.87	0.18	410 U	100 U	--	--	--	--	1.0 U	1.0 U	1.0 U	3.0 U	--	--	--	--	--	--	--	--	--	--
	11/17/2004	410.12	67.58	0	342.54	-0.67	--	48 U	76 U	--	95 U	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	--	--	--	--	--
	7/11/2005	410.12	67.60	0	342.52	0.02	--	48 U	**690**	--	**570**	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	0.3 U	--	--	--	--
	7/7/2006	410.12	66.80	0	343.32	-0.80	--	48 U	76 U	--	95 U	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	0.3 U	--	--	--	--
	11/15/2007	410.01	67.05	0	342.96	0.36	--	50 U	76 U	--	95 U	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	0.3 U	--	--	--	--
	10/8/2008	410.01	66.97	0	343.04	-0.08	--	50 U	77 U	--	96 U	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	0.3 U	--	--	0.2 U	--
	6/30/2010	411.4	66.96	0	344.44	-1.40	--	50 U	120 U	--	240 U	--	1.0 U	1.0 U	1.0 U	2.0 U	--	--	--	--	--	--	--	--	10 U	--
	12/15/2010	411.40	67.37	--	344.03	0.41	--	50 U	120 U	--	240 U	--	1.0 U	1.0 U	1.0 U	2.0 U	--	--	--	--	--	--	--	--	10 U	--
	5/28/2014	411.40	67.02	--	344.38	-0.35	--	250 U	250 U	--	500 U	--	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	5.0 U	50.0 U
	10/29/2014	411.40	68.23	--	343.17	1.21	--	250 U	250 U	--	500 U	--	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	5.0 U	50.0 U
	6/3/2015	411.40	67.48	--	343.92	-0.75	--	250 U	100 U	--	250 U	--	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	5.0 U	50.0 U
	9/28/2015	411.40	68.61	--	342.79	1.13	--	250 U	100 U	--	250 U	--	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	--	--
	8/30/2016	411.40	68.74	--	342.66	0.13	--	50 U	110 U	--	250 U	--	2.0 U	2.0 U	3.0 U	3.0 U	2.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	25 U	5.0 U	10 U	10 U
	12/5/2016	411.40	68.18	--	343.22	-0.56	--	50 U	110 U	--	250 U	--	2.0 U	2.0 U	3.0 U	3.0 U	2.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	25 U	5.0 U	10 U	10 U
	5/15/2017	411.40	67.02	--	344.38	-1.16	--	500 U	100 U	--	250 U	--	2.0 U	2.0 U	3.0 U	3.0 U	2.0 U	2.0 U	2.0 U	2.0 U	6.0 U	2.0 U	100 U	6.0 U	10 U	10 U
	10/24/2017	411.40	68.22	--	343.18	1.20	--	250 U	100 U	--	250 U	--	2.0 U	2.0 U	3.0 U	3.0 U	2.0 U	2.0 U	2.0 U		6.0 U	2.0 U	100 U	6.0 U	10 U	10 U
	6/13/2018	411.40	67.16	--	344.24	-1.06	--	250 U	110 U	--	350 U	--	3.0 U	2.0 U	3.0 U	3.0 U	4.0 U	2.0 U	2.0 U	2.0 U	6.0 U	2.0 U	100 U	6.0 U	10 U	10 U
	12/4/2018	411.32	68.03	--	343.29	0.95	--	100 U	**86 J**	--	97 U	--	0.53 U	0.39 U	**0.60 J**	3.0 U	0.93 U	0.40 U	0.53 U	0.35 U	0.91 U	0.44 U	24 U	1.5 U	4.0 U	4.0 U
	6/26/2019	411.32	67.68	--	343.64	-0.35	--	100 U	**110**	--	98 U	--	0.53 U	0.39 U	0.50 U	0.75 **U**	0.93 U	0.0020 U	0.53 U	0.35 U	0.91 U	0.44 U	24 U	1.5 U	4.0 U	4.0 U
	12/11/2019	411.32	67.58	0.00	343.74	-0.10	--	100 U	**67 J**	--	99 U	--	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.0020 U	0.53 U	0.35 UJ	0.91 U	0.44 U	24 UJ	1.5 U	0.150 UJ	0.220 UJ
	6/23/2020	411.32	67.57	0.00	343.75	-0.01	--	100 U	66 U	--	98 U	--	0.24 U	0.39 U	0.50 U	0.39 U	0.93 U	0.0020 U	0.42 U	0.35 U	0.91 U	0.44 U	9.8 U	0.58 U	0.150 U	0.220 U
	12/14/2020	411.32	67.87	0.00	343.45	0.30	--	100 U	110 U	--	120 U	--	0.24 U	0.39 U	0.50 U	3.0 U	4.0 U	0.0020 U	0.42 U	0.35 U	0.91 U	0.44 U	9.8 U	0.58 U	0.150 U	0.220 U

Table 2. Groundwater Elevations and Analytical Results
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

							Total Petroleum Hydrocarbons						VOCs and Lead Scavengers							Fuel Oxygenates						
Well ID	Sample Date	TOC Elevation	Depth to GW	Product Thickness	GW Elevation	Change in GW Elevation	TPH [1]	TPH-g	TPH-d	TPH-d (SGC)	TPH-o	TPH-o (SGC)	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	EDB [2]	EDC	DIPE	ETBE	MTBE	TBA	TAME	Ethanol	Methanol
						MTCA Method A Cleanup Levels [3] [4]	*NE*	*800/1,000*	*500*	*500*	*500*	*500*	*5*	*1,000*	*700*	*1,000*	*160*	*0.01*	*5*	*NE*	*NE*	*20*	*NE*	*NE*	*NE*	*NE*
	Units:	*ft NAVD29* [5]	*ft btoc*	*ft*	*ft NAVD29* [6]	*ft*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*mg/L*	*mg/L*
MW-8	8/26/1987	384.58	41.95	0	342.63	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/11/1987	384.58	41.21	0	343.37	-0.74	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/5/1988	384.58	41.12	0	343.46	-0.09	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/3/1988	384.58	41.17	0	343.41	0.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/1/1988	384.58	41.06	0	343.52	-0.11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/5/1988	384.58	41.00	0	343.58	-0.06	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/3/1988	384.58	41.09	0	343.49	0.09	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/7/1988	384.58	41.77	0	342.81	0.68	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/5/1988	384.58	42.21	0	342.37	0.44	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/12/1990	384.58	41.77	0	342.81	-0.44	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/6/1990	384.58	42.44	0	342.14	0.67	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/18/1990	384.58	41.96	0	342.62	-0.48	ND	--	--	--	--	--	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--
	2/14/1991	384.58	41.50	0	343.08	-0.46	--	--	--	--	--	--	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--
	5/14/1991	384.58	41.71	0	342.87	0.21	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/8/1991	384.58	42.70	0	341.88	0.99	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/1/1992	384.58	41.54	0	343.04	-1.16	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/1/1992	384.58	42.36	0	342.22	0.82	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/8/1992	384.58	41.89	o	342.69	-0.47	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/1/1993	384.58	42.40	0	342.18	0.51	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/1/1994	384.58	41.51	0	343.07	-0.89	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/31/1995	384.58	41.70	0.25	342.88	0.19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/27/1995	384.58	41.40	0.25	343.18	-0.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/31/1995	384.58	41.40	0.25	343.18	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/28/1995	384.58	41.40	0.13	343.18	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/31/1995	384.58	41.70	0.13	342.88	0.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/30/1995	384.58	41.80	Trace	342.78	0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/24/1995	384.58	42.28	Trace	342.30	0.48	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/29/1995	384.58	42.31	Trace	342.27	0.03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/27/1995	384.58	42.47	Trace	342.11	0.16	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/31/1996	384.58	42.50	Trace	342.08	0.03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/29/1996	384.58	42.40	Trace	342.18	-0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/29/1996	384.58	42.40	Trace	342.18	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/29/1996	384.58	41.10	Trace	343.48	-1.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/22/1996	384.58	41.20	Trace	343.38	0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/28/1996	384.58	41.03	0	343.55	-0.17	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/31/1996	384.58	40.90	0	343.68	-0.13	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/30/1996	384.58	40.80	0	343.78	-0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/30/1996	384.58	40.50	0	344.08	-0.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/31/1996	384.58	41.60	0	342.98	1.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/19/1996	384.58	40.70	0	343.88	-0.90	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/30/1997	384.58	40.80	0	343.78	0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/28/1997	384.58	48.50	0	336.08	7.70	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/19/1997	384.58	46.50	0	338.08	-2.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/20/1997	384.58	41.83	0	342.75	-4.67	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/2/1997	384.58	41.70	0	342.88	-0.13	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/26/1998	384.58	40.85	0	343.73	-0.85	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 2. Groundwater Elevations and Analytical Results

Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

Well ID	Sample Date	TOC Elevation	Depth to GW	Product Thickness	GW Elevation	Change in GW Elevation	Total Petroleum Hydrocarbons						VOCs and Lead Scavengers							Fuel Oxygenates						
							TPH (1)	TPH-g	TPH-d	TPH-d (SGC)	TPH-o	TPH-o (SGC)	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	EDB (2)	EDC	DIPE	ETBE	MTBE	TBA	TAME	Ethanol	Methanol
MTCA Method A Cleanup Levels (3) (4)							*NE*	*800/1,000*	*500*	*500*	*500*	*500*	*5*	*1,000*	*700*	*1,000*	*160*	*0.01*	*5*	*NE*	*NE*	*20*	*NE*	*NE*	*NE*	*NE*
	Units:	*ft NAVD29 (5)*	*ft btoc*	*ft*	*ft NAVD29 (6)*	*ft*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*mg/L*	*mg/L*
MW-8	6/24/1998	384.58	41.32	--	343.26	0.47	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Continued	9/17/1998	384.58	41.78	0	342.80	0.46	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/18/1998	384.58	41.28	0	343.30	-0.50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/29/1999	384.58	40.60	0	343.98	-0.68	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/24/1999	384.58	41.45	0	343.13	0.85	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/8/1999	384.58	42.30	0	342.28	0.85	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/20/1999	384.58	41.61	0	342.97	-0.69	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/14/2000	384.58	41.15	0	343.43	-0.46	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/8/2000	384.58	41.90	0	342.68	0.75	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/13/2000	384.58	42.63	0	341.95	0.73	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/6/2000	384.58	41.85	0	342.73	-0.78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/26/2001	384.58	41.23	0	343.35	-0.62	5,000 U	50 U	--	--	--	--	0.5 U	0.5 U	0.5	1 U	--	--	--	--	--	--	--	--	--	--
	6/5/2001	384.58	41.81	0	342.77	0.58	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/25/2001	384.58	42.39	0	342.19	0.58	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/5/2002	384.58	42.48	0	342.10	0.09	530 U	100 U	--	--	--	--	1.0 U	1.0 U	1.0 U	3.0 U	--	--	--	--	--	--	--	--	--	--
	9/11/2003	384.58	40.41	0	344.17	-2.07	410 U	100 U	--	--	--	--	1.0 U	1.0 U	1.0 U	3.0 U	--	--	--	--	--	--	--	--	--	--
	11/17/2004	384.58	39.72	0	344.86	-0.69	--	48 U	76 U	--	96 U	--	0.2 U	0.2 U	0.2 U	1 U	--	--	--	--	--	--	--	--	--	--
	7/11/2005	384.58	39.74	0	344.84	0.02	--	48 U	**78**	--	**230**	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	0.3 U	--	--	--	--
	7/7/2006	384.58	38.91	0	345.67	-0.83	--	48 U	76 U	--	96 U	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	0.3 U	--	--	--	--
	11/15/2007	384.27	39.19	0	345.08	0.59	--	50 U	75 U	--	94 U	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	0.3 U	--	--	--	--
	10/8/2008	384.27	39.11	0	345.16	-0.08	--	50 U	78 U	--	97 U	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	0.3 U	--	--	0.2 U	--
	6/30/2010	383.91	39.51	0	344.40	0.76	--	50 U	120 U	--	240 U	--	1.0 U	1.0 U	1.0 U	2.0 U	--	--	--	--	--	--	--	--	10 U	--
	12/15/2010	383.91	39.93	--	343.98	0.42	--	50 U	120 U	--	240 U	--	1.0 U	1.0 U	1.0 U	2.0 U	--		--			--			10 U	--
	5/28/2014	383.91	39.56	--	344.35	-0.37	--	250 U	250 U	--	500 U	--	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	5.0 U	50.0 U
	10/29/2014	383.91	40.78	--	343.13	1.22	--	250 U	250 U	--	500 U	--	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	5.0 U	50.0 U
	6/3/2015	383.91	40.04	--	343.87	-0.74	--	250 U	100 U	--	250 U	--	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	5.0 U	**55.6**
	9/28/2015	383.91	41.13	--	342.78	1.09	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/30/2016	383.91	40.30	--	343.61	-0.83	--	50 U	110 U	--	250 U	--	2.0 U	2.0 U	3.0 U	3.0 U	2.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	25 U	5.0 U	10 U	10 U
	12/5/2016	383.91	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/17/2017	383.91	39.56	--	344.35	--	--	500 U	100 U	--	250 U	--	2.0 U	2.0 U	3.0 U	3.0 U	2.0 U	2.0 U	2.0 U	2.0 U	6.0 U	2.0 U	100 U	6.0 U	10 U	10 U
	6/11/2018	383.76	39.65	--	344.11	0.240	--	250 U	110 U	--	350 U	--	3.0 U	2.0 U	3.0 U	3.0 U	4.0 U	2.0 U	2.0 U	2.0 U	6.0 U	2.0 U	100 U	6.0 U	10 U	10 U
	6/26/2019	383.76	40.26	--	343.50	0.610	--	100 U	71 U	--	100 U	--	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.0020 U	0.53 U	0.35 U	0.91 U	0.44 U	24 U	1.5 U	4.0 U	4.0 U
	12/9/2019	383.76	40.48	0.00	343.28	0.22	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/23/2020	383.76	40.14	0.00	343.62	-0.340	--	100 U	68 U	--	100 U	--	0.24 U	0.39 U	0.50 U	0.39 U	0.93 U	0.0020 U	0.42 U	0.35 U	0.91 U	0.44 U	9.8 U	0.58 U	0.150 U	0.220 U
	12/14/2020	383.76	40.44	0.00	343.32	0.300	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-9	**Well destroyed in May 1987**																									

Table 2. Groundwater Elevations and Analytical Results
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

Well ID	Sample Date	TOC Elevation	Depth to GW	Product Thickness	GW Elevation	Change in GW Elevation	Total Petroleum Hydrocarbons: TPH [1]	TPH-g	TPH-d	TPH-d (SGC)	TPH-o	TPH-o (SGC)	VOCs and Lead Scavengers: Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	EDB [2]	EDC	Fuel Oxygenates: DIPE	ETBE	MTBE	TBA	TAME	Ethanol	Methanol
						MTCA Method A Cleanup Levels [3] [4]	*NE*	*800/1,000*	*500*	*500*	*500*	*500*	*5*	*1,000*	*700*	*1,000*	*160*	*0.01*	*5*	*NE*	*NE*	*20*	*NE*	*NE*	*NE*	*NE*
	Units:	*ft NAVD29* [5]	*ft btoc*	*ft*	*ft NAVD29* [6]	*ft*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*mg/L*	*mg/L*
MW-10	4/12/1990	407.40	64.60	0	342.80	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/6/1990	407.40	65.27	0	342.13	0.67	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/19/1990	407.40	64.80	0	342.60	-0.47	ND	--	--	--	--	--	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--
	2/14/1991	407.40	64.31	0	343.09	-0.49	**4,000**	--	--	--	--	--	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--
	5/15/1991	407.40	64.52	0	342.88	0.21	ND	--	--	--	--	--	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--
	8/8/1991	407.40	65.52	0	341.88	1.00	ND	--	--	--	--	--	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--
	4/1/1992	407.40	64.37	0.27	343.03	-1.15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/1/1992	407.40	65.17	0	342.23	0.80	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/8/1992	407.40	64.72	0	342.68	-0.45	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/18/1993	407.40	--	--	--	--	ND	--	--	--	--	--	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--
	11/1/1993	407.40	65.22	0	342.18	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/1/1994	407.40	64.36	0	343.04	-0.86	ND	--	--	--	--	--	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--
	1/31/1995	407.40	64.40	Trace	343.00	0.04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/27/1995	407.40	64.30	Trace	343.10	-0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/31/1995	407.40	64.30	Trace	343.10	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/28/1995	407.40	64.50	Trace	342.90	0.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/31/1995	407.40	64.70	Trace	342.70	0.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/30/1995	407.40	64.60	Trace	342.80	-0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/24/1995	407.40	67.89	Trace	339.51	3.29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/29/1995	407.40	67.77	Trace	339.63	-0.12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/27/1995	407.40	67.50	Trace	339.90	-0.27	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/31/1996	407.40	65.60	Trace	341.80	-1.90	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/29/1996	407.40	65.30	0	342.10	-0.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/29/1996	407.40	65.40	0	342.00	0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/29/1996	407.40	64.70	0	342.70	-0.70	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/22/1996	407.40	64.50	0	342.90	-0.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/28/1996	407.40	64.84	0	342.56	0.34	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/31/1996	407.40	64.70	0	342.70	-0.14	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/30/1996	407.40	64.70	0	342.70	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/30/1996	407.40	64.30	0	343.10	-0.40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/31/1996	407.40	65.35	0	342.05	1.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/19/1996	407.40	64.80	0	342.60	-0.55	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/30/1997	407.40	64.32	0	343.08	-0.48	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/28/1997	407.40	64.10	0	343.30	-0.22	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/19/1997	407.40	64.00	0	343.40	-0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/20/1997	407.40	64.65	0	342.75	0.65	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/2/1997	407.40	64.60	0	342.80	-0.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/26/1998	407.40	63.63	0	343.77	-0.97	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/24/1998	407.40	64.18	--	343.22	0.55	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/17/1998	407.40	63.60	0	343.80	-0.58	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/18/1998	407.40	63.12	0	344.28	-0.48	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/29/1999	407.40	63.42	0	343.98	0.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/24/1999	407.40	64.29	0	343.11	0.87	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/8/1999	407.40	65.12	0	342.28	0.83	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/20/1999	407.40	64.45	0	342.95	-0.67	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/14/2000	407.40	63.97	0	343.43	-0.48	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

							Total Petroleum Hydrocarbons						VOCs and Lead Scavengers							Fuel Oxygenates						
Well ID	Sample Date	TOC Elevation	Depth to GW	Product Thickness	GW Elevation	Change in GW Elevation	TPH [1]	TPH-g	TPH-d	TPH-d (SGC)	TPH-o	TPH-o (SGC)	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	EDB [2]	EDC	DIPE	ETBE	MTBE	TBA	TAME	Ethanol	Methanol
					MTCA Method A Cleanup Levels [3] [4]		*NE*	*800/1,000*	*500*	*500*	*500*	*500*	*5*	*1,000*	*700*	*1,000*	*160*	*0.01*	*5*	*NE*	*NE*	*20*	*NE*	*NE*	*NE*	*NE*
	Units:	*ft NAVD29* [5]	*ft btoc*	*ft*	*ft NAVD29* [6]	*ft*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*mg/L*	*mg/L*
MW-10	6/8/2000	407.40	64.65	0	342.75	0.68	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Continued	9/13/2000	407.40	65.45	0	341.95	0.80	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/6/2000	407.40	64.73	0	342.67	-0.72	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/1/2001	407.40	64.10	0	343.30	-0.63	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/27/2001	407.40	64.10	0	343.30	0.00	5,000 U	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	6/5/2001	407.40	64.62	0	342.78	0.52	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/25/2001	407.40	65.30	0	342.10	0.68	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/6/2002	407.40	65.34	0	342.06	0.04	510 U	100 U	--	--	--	--	1.0 U	1.0 U	1.0 U	3.0 U	--	--	--	--	--	4 U	--	--	--	--
	9/11/2003	407.40	65.55	0	341.85	0.21	420 U	100 U	--	--	--	--	1.0 U	1.0 U	1.0 U	3.0 U	--	--	--	--	--	--	--	--	--	--
	11/17/2004	407.40	64.84	0	342.56	-0.71	--	48 U	84 U	--	110 U	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	--	--	--	--	--
	7/11/2005	407.40	64.84	0	342.56	0.00	--	48 U	**310**	--	260 U	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	0.3 U	--	--	--	--
	7/7/2006	407.40	64.04	0	343.36	-0.80	--	48 U	**79**	--	96 U	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	0.3 U	--	--	--	--
	11/15/2007	407.27	64.28	0	342.99	0.37	--	50 U	75 U	--	94 U	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	0.3 U	--	--	--	--
	10/8/2008	407.27	64.22	0	343.05	-0.06	--	50 U	76 U	--	96 U	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	0.3 U	--	--	0.2 U	--
	6/30/2010	407.91	63.42	0	344.49	-1.44	--	50 U	120 U	--	240 U	--	1.0 U	1.0 U	1.0 U	2.0 U	--	--	--	--	--	--	--	--	10 U	--
	12/15/2010	407.91	63.84	--	344.07	0.42	--	50 U	120 U	--	240 U	--	1.0 U	1.0 U	1.0 U	2.0 U	--	--	--	--	--	--	--	--	10 U	--
	5/28/2014	407.91	63.46	--	344.45	-0.38	--	250 U	250 U	--	500 U	--	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	5.0 U	50.0 U
	10/29/2014	407.91	64.68	--	343.23	1.22	--	250 U	250 U	--	500 U	--	0.50 U	**1.1**	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	5.0 U	50.0 U
	6/3/2015	407.91	63.91	--	344.00	-0.77	--	250 U	100 U	--	250 U	--	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	5.0 U	**63.7**
	9/28/2015	407.91	65.02	--	342.89	1.11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/30/2016	407.91	65.22	--	342.69	0.20	--	50 U	110 U	--	250 U	--	2.0 U	2.0 U	3.0 U	3.0 U	2.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	25 U	5.0 U	10 U	10 U
	12/5/2016	407.91	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/15/2017	407.91	63.50	--	344.41	--	--	500 U	100 U	--	250 U	--	2.0 U	2.0 U	3.0 U	3.0 U	2.0 U	2.0 U	2.0 U	2.0 U	6.0 U	2.0 U	100 U	6.0 U	10 U	10 U
	6/13/2018	407.83	63.58	--	344.25	0.16	--	250 U	110 U	--	350 U	--	3.0 U	2.0 U	3.0 U	3.0 U	4.0 U	2.0 U	2.0 U	2.0 U	6.0 U	2.0 U	100 U	6.0 U	10 U	10 U
	6/26/2019	407.83	64.15	--	343.68	0.57	--	100 U	**88 J**	--	**110 J**	--	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.0020 U	0.53 U	0.35 U	0.91 U	0.44 U	24 U	1.5 U	4.0 U	4.0 U
	12/9/2019	407.83	64.37	0.00	343.46	0.22	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/23/2020	407.83	64.03	0.00	343.80	-0.34	--	100 U	66 U	--	98 U	--	0.24 U	0.39 U	0.50 U	0.39 U	0.93 U	0.0020 U	0.42 U	0.35 U	0.91 U	0.44 U	9.8 U	0.58 U	0.150 U	0.220 U
	12/14/2020	407.83	64.36	0.00	343.47	0.33	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 2. Groundwater Elevations and Analytical Results
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

Well ID	Sample Date	TOC Elevation	Depth to GW	Product Thickness	GW Elevation	Change in GW Elevation	Total Petroleum Hydrocarbons: TPH [1]	TPH-g	TPH-d	TPH-d (SGC)	TPH-o	TPH-o (SGC)	VOCs and Lead Scavengers: Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	EDB [2]	EDC	Fuel Oxygenates: DIPE	ETBE	MTBE	TBA	TAME	Ethanol	Methanol
						MTCA Method A Cleanup Levels [3] [4]	*NE*	*800/1,000*	*500*	*500*	*500*	*500*	*5*	*1,000*	*700*	*1,000*	*160*	*0.01*	*5*	*NE*	*NE*	*20*	*NE*	*NE*	*NE*	*NE*
	Units:	*ft NAVD29* [5]	*ft btoc*	*ft*	*ft NAVD29* [6]	*ft*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*mg/L*	*mg/L*
MW-11	1/23/1989	423.70	--	0	--	--	--	--	--	--	--	--	**350**	**1050**	**700**	**2120**	--	--	--	--	--	--	--	--	--	--
	4/12/1990	423.70	80.75	0	342.95	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/6/1990	423.70	81.40	0	342.30	0.65	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/31/1990	423.70	--	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--		--
	11/19/1990	423.70	80.92	0	342.78	--	**2,000**	--	--	--	--	--	**56**	**99**	**140**	**90**	--	--	--	--	--	--	--	--	--	--
	12/16/1990	423.70	--	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/13/1991	423.70	--	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/5/1991	423.70	--	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/14/1991	423.70	80.51	0	343.19	--	**3,000**	--	--	--	--	--	**110**	**8**	**130**	**25**	--	--	--	--	--	--	--	--	--	--
	3/28/1991	423.70	--	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/6/1991	423.70	--	0.09	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/15/1991	423.70	80.90	0.27	342.80	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/1/1991	423.70	--	0.24	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/20/1991	423.70	--	0.54	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/4/1991	423.70	--	0.85	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/8/1991	423.70	82.25	0.70	341.45	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/27/1991	423.70	--	0.21	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/17/1991	423.70	--	0.23	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/27/1991	423.70	--	0.26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/18/1992	423.70	--	0.02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/31/1992	423.70	--	0.02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/17/1992	423.70	--	0.04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/181992	423.70	--	0.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/4/1992	423.70	--	0.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/21/1992	423.70	--	0.19	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/1/1992	423.70	80.65	0	343.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/2/1992	423.70	--	0.38	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/28/1992	423.70	--	0.96	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/28/1992	423.70	--	1.36	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/26/1992	423.70	--	1.66	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/30/1992	423.70	82.71	1.70	340.99	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/16/1992	423.70	--	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/8/1992	423.70	80.99	0	342.71	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/2/1993	423.70	--	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/15/1993	423.70	--	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/18/1993	423.70	81.85	0	341.85	--	**3,300**	**3,200**	--	--	--	--	0.5 U	**0.8**	**1.8**	**4.1**	--	--	--	--	--	--	--	--	--	--
	11/5/1993	423.70	--	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/28/1993	423.70	--	0	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/7/1994	423.70	80.80	0	342.90	--	**1,700**	100 U	--	--	--	--	0.5 U	0.5 U	0.5 U	0.5 U	--	--	--	--	--	--	--	--	--	--
	1/31/1995	423.70	79.00	0	344.70	-1.80	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/27/1995	423.70	80.50	0	343.20	1.50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/31/1995	423.70	80.50	0	343.20	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/1/1995	423.70	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/28/1995	423.70	80.70	0	343.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/31/1995	423.70	79.20	0	344.50	-1.50	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/30/1995	423.70	79.30	Trace	344.40	0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 2. Groundwater Elevations and Analytical Results
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

Well ID	Sample Date	TOC Elevation	Depth to GW	Product Thickness	GW Elevation	Change in GW Elevation	Total Petroleum Hydrocarbons: TPH [1]	TPH-g	TPH-d	TPH-d (SGC)	TPH-o	TPH-o (SGC)	VOCs and Lead Scavengers: Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	EDB [2]	EDC	Fuel Oxygenates: DIPE	ETBE	MTBE	TBA	TAME	Ethanol	Methanol
						***MTCA Method A Cleanup Levels* [3] [4]**	*NE*	*800/1,000*	*500*	*500*	*500*	*500*	*5*	*1,000*	*700*	*1,000*	*160*	*0.01*	*5*	*NE*	*NE*	*20*	*NE*	*NE*	*NE*	*NE*
	Units:	*ft NAVD29* [5]	*ft btoc*	*ft*	*ft NAVD29* [6]	*ft*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*mg/L*	*mg/L*
MW-11	7/24/1995	423.70	81.51	Trace	342.19	2.21	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Continued	8/29/1995	423.70	81.45	Trace	342.25	-0.06	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/27/1995	423.70	81.66	Trace	342.04	0.21	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/31/1996	423.70	81.40	Trace	342.30	-0.26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/29/1996	423.70	81.10	Trace	342.60	-0.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/29/1996	423.70	80.90	0	342.80	-0.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/29/1996	423.70	80.61	0	343.09	-0.29	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/22/1996	423.70	81.50	0	342.20	0.89	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/28/1996	423.70	81.40	0	342.30	-0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/31/1996	423.70	81.45	0	342.25	0.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/30/1996	423.70	81.10	0	342.60	-0.35	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/30/1996	423.70	80.70	0	343.00	-0.40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/31/1996	423.70	81.67	0	342.03	0.97	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/19/1996	423.70	80.30	0	343.40	-1.37	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/30/1997	423.70	80.90	0	342.80	0.60	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/28/1997	423.70	81.00	0	342.70	0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/19/1997	423.70	81.25	0	342.45	0.25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/20/1997	423.70	81.00	0	342.70	-0.25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/2/1997	423.70	81.00	0	342.70	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/26/1998	423.70	80.04	0	343.66	-0.96	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/25/1998	423.70	80.54	0	343.16	0.50	**1,100**	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	9/17/1998	423.70	79.94	0	343.76	-0.60	**8,710**	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	12/18/1998	423.70	79.55	0	344.15	--	1,000 U	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	3/29/1999	423.70	79.62	0	344.08	0.07	1,000 U	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	6/24/1999	423.70	80.51	0	343.19	0.89	**2,060**	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	10/8/1999	423.70	81.39	0	342.31	0.88	1,000 U	**54.5**	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	12/20/1999	423.70	80.75	0	342.95	-0.64	1,000 U	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	3/14/2000	423.70	80.30	0	343.40	-0.45	1,000 U	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	6/8/2000	423.70	80.95	0	342.75	0.65	1,000 U	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	9/13/2000	423.70	81.47	0	342.23	0.52	**4,530**	50 U	--	--	--	--	0.5 U	**0.54**	0.5 U	0.5 U	--	--	--	--	--	--	--	--	--	--
	12/6/2000	423.70	81.05	0	342.65	-0.42	**1,740**	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	3/3/2001	423.70	80.40	0	343.30	-0.65	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/27/2001	423.70	80.40	0	343.30	0.00	5,000 U	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	6/5/2001	423.70	80.87	0	342.83	0.47	--	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	9/25/2001	423.70	81.60	0	342.10	0.73	**1,510**	100 U	--	--	--	--	0.5 U	1.0 U	1.0 U	**2.47**	--	--	--	--	--	--	--	--	--	--
	9/6/2002	423.70	81.60	0	342.10	0.00	530 U	100 U	--	--	--	--	1.0 U	1.0 U	1.0 U	3.0 U	--	--	--	--	--	--	--	--	--	--
	9/11/2003	423.70	81.80	0	341.90	0.20	**410**	100 U	--	--	--	--	1.0 U	1.0 U	1.0 U	3.0 U	--	--	--	--	--	--	--	--	--	--
	11/17/2004	423.70	81.11	0	342.59	-0.69	--	48 U	**1,000**	--	**180**	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	--	--	--	--	--
	7/11/2005	423.70	81.70	0	342.00	0.59	--	48 U	**1,900**	--	**4,200**	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	0.3 U	--	--	--	--
	7/7/2006	423.70	80.31	0	343.39	-1.39	--	48 U	**490**	--	**400**	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	0.3 U	--	--	--	--
	11/14/2007	423.52	80.57	0	342.95	0.44	--	50 U	**120**	--	**94**	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	0.3 U	--	--	--	--
	10/8/2008	423.52	80.51	0	343.01	-0.06	--	50 U	**160**	--	**99**	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	0.3 U	--	--	0.2 U	--
	6/30/2010	423.48	79.06	0	344.42	-1.41	--	50 U	**1,100**	--	**450**	--	1.0 U	1.0 U	1.0 U	3.0 U	--	--	--	--	--	--	--	--	10 U	--
	12/16/2010	423.48	79.46	--	344.02	0.40	--	50 U	**200**	--	240 U	--	1.0 U	1.0 U	1.0 U	2.0 U	--	--	--	--	--	--	--	--	10 U	--
	5/29/2014	423.48	79.19	--	344.29	-0.27	--	250 U	250 U	--	500 U	--	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	5.0 U	50.0 U
	10/30/2014	423.48	80.31	--	343.17	1.12	--	250 U	250 U	--	500 U	--	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	5.0 U	50.0 U

Table 2. Groundwater Elevations and Analytical Results
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

Well ID	Sample Date	TOC Elevation	Depth to GW	Product Thickness	GW Elevation	Change in GW Elevation	Total Petroleum Hydrocarbons						VOCs and Lead Scavengers							Fuel Oxygenates						
							TPH [1]	TPH-g	TPH-d	TPH-d (SGC)	TPH-o	TPH-o (SGC)	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	EDB [2]	EDC	DIPE	ETBE	MTBE	TBA	TAME	Ethanol	Methanol
MTCA Method A Cleanup Levels [3] [4]							*NE*	*800/1,000*	*500*	*500*	*500*	*500*	*5*	*1,000*	*700*	*1,000*	*160*	*0.01*	*5*	*NE*	*NE*	*20*	*NE*	*NE*	*NE*	*NE*
Units:		*ft NAVD29 [5]*	*ft btoc*	*ft*	*ft NAVD29 [6]*	*ft*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*mg/L*	*mg/L*
MW-11	6/4/2015	423.48	79.55	--	343.93	-0.76	--	250 U	100 U	--	250 U	--	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	5.0 U	**52.6**
Continued	9/29/2015	423.48	80.67	--	342.81	1.12	--	250 U	100 U	--	250 U	--	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	--	--
	8/29/2016	423.48	80.42	--	343.06	-0.25	--	50 U	**520**	--	250 U	--	2.0 U	2.0 U	3.0 U	3.0 U	2.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	25 U	5.0 U	10 U	10 U
	12/5/2016	423.48	80.29	--	343.19	-0.13	--	50 U	**360**	--	250 U	--	2.0 U	2.0 U	3.0 U	3.0 U	2.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	25 U	5.0 U	10 U	10 U
	5/16/2017	423.48	79.15	--	344.33	-1.14	--	500 U	**390**	--	250 U	--	2.0 U	2.0 U	3.0 U	3.0 U	2.0 U	2.0 U	2.0 U	2.0 U	6.0 U	2.0 U	100 U	6.0 U	10 U	10 U
	10/25/2017	423.48	80.31	--	343.17	1.16	--	250 U	**360**	--	250 U	--	2.0 U	2.0 U	3.0 U	3.0 U	2.0 U	2.0 U	2.0 U	2.0 U	6.0 U	2.0 U	100 U	6.0 U	10 U	10 U
	6/14/2018	423.48	79.30	--	344.18	-1.01	--	250 U	**160**	--	350 U	--	3.0 U	2.0 U	3.0 U	3.0 U	4.0 U	2.0 U	2.0 U	2.0 U	6.0 U	2.0 U	100 U	6.0 U	10 U	10 U
	12/2/2018	423.44	80.14	--	343.30	0.88	--	100 U	**500**	--	**570 J**	--	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.40 U	0.53 U	0.35 U	0.91 U	0.44 U	24 U	1.5 U	4.0 U	4.0 U
	6/27/2019	423.44	79.79	--	343.65	-0.35	--	100 U	**400**	--	**320 J**	--	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.0020 U	0.53 U	0.35 U	0.91 U	0.44 U	24 U	1.5 U	4.0 U	4.0 U
	12/11/2019	423.44	80.01	0.00	343.43	0.22	--	100 U	**130**	--	91 U	--	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.0020 U	0.53 U	0.35 UJ	0.91 U	0.44 U	24 UJ	1.5 U	0.150 UJ	0.220 UJ
	6/24/2020	423.44	79.66	0.00	343.78	-0.35	--	100 U	**3,900**	--	**2,300**	--	0.24 U	0.39 U	0.50 U	0.39 U	0.93 U	0.0020 U	0.42 U	0.35 U	0.91 U	0.44 U	9.8 U	0.58 U	0.150 U	0.220 U
	12/15/2020	423.44	79.95	0.00	343.49	0.29	--	100 U	**210 J**	--	130 U	--	0.24 U	0.39 U	0.50 U	3.0 U	4.0 U	0.0020 U	0.42 U	0.35 U	0.91 U	0.44 U	9.8 U	0.58 U	0.150 U	0.220 U

Table 2. Groundwater Elevations and Analytical Results
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

Well ID	Sample Date	TOC Elevation	Depth to GW	Product Thickness	GW Elevation	Change in GW Elevation	Total Petroleum Hydrocarbons: TPH [1]	TPH-g	TPH-d	TPH-d (SGC)	TPH-o	TPH-o (SGC)	VOCs and Lead Scavengers: Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	EDB [2]	EDC	Fuel Oxygenates: DIPE	ETBE	MTBE	TBA	TAME	Ethanol	Methanol
					MTCA Method A Cleanup Levels [3] [4]		*NE*	*800/1,000*	*500*	*500*	*500*	*500*	*5*	*1,000*	*700*	*1,000*	*160*	*0.01*	*5*	*NE*	*NE*	*20*	*NE*	*NE*	*NE*	*NE*
	Units:	*ft NAVD29* [5]	*ft btoc*	*ft*	*ft NAVD29* [6]	*ft*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*mg/L*	*mg/L*
MW-12	1/23/1989	424.58	--	0	--	--	--	--	--	--	--	--	**340**	**73**	**160**	**79**	--	--	--	--	--	--	--	--	--	--
	4/12/1990	424.58	81.70	0	342.88	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/6/1990	424.58	82.27	0	342.31	0.57	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/19/1990	424.58	81.34	0	343.24	-0.93	**3,000**	--	--	--	--	--	**430**	**210**	**430**	**2,800**	--	--	--	--	--	--	--	--	--	--
	2/14/1991	424.58	80.83	0	343.75	-0.51	**3,000**	--	--	--	--	--	**270**	**240**	**380**	**2,900**	--	--	--	--	--	--	--	--	--	--
	5/14/1991	424.58	81.53	0	343.05	0.70	**2,400**	--	--	--	--	--	**11**	**45**	**200**	**1,300**	--	--	--	--	--	--	--	--	--	--
	8/8/1991	424.58	79.46	0	345.12	-2.07	**6,100**	--	--	--	--	--	**75**	**68**	**22**	**560**	--	--	--	--	--	--	--	--	--	--
	8/1/1991	424.58	81.97	--	342.61	2.51	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--		--	--		--
	4/1/1992	424.58	80.43	0	344.15	-1.54	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/1/1992	424.58	82.28	0	342.30	1.85	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/8/1992	424.58	81.72	0	342.86	-0.56	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/18/1993	424.58	81.90	0	342.68	0.18	**13,000**	**2300**	--	--	--	--	**23**	**2.7**	**17**	**61**	--	--	--	--	--	--	--	--	--	--
	2/7/1994	424.58	81.26	0	343.32	-0.64	**2,500**	**690**	--	--	--	--	**4.1**	**0.6**	**2.7**	**14**	--	--	--	--	--	--	--	--	--	--
	9/19/1994	424.58	--	0	--	--	**600**	--	--	--	--	--	**7.0**	5.0 U	5.0 U	**16**	--	--	--	--	--	--	--	--	--	--
	1/31/1995	424.58	81.40	0.25	343.18	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/27/1995	424.58	81.00	0.25	343.58	-0.40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/31/1995	424.58	81.00	0.25	343.58	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/10/1995	424.58	--	0	--	--	--	--	--	--	--	--	**75**	5.0 U	**90**	**300**	--	--	--	--	--	--	--	--	--	--
	4/28/1995	424.58	79.90	0.25	344.68	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/31/1995	424.58	81.50	0.13	343.08	1.60	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/30/1995	424.58	81.60	0.06	342.98	0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/24/1995	424.58	81.91	Trace	342.67	0.31	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/29/1995	424.58	81.87	Trace	342.71	-0.04	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/27/1995	424.58	81.28	Trace	343.30	-0.59	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/31/1996	424.58	80.90	Trace	343.68	-0.38	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/29/1996	424.58	80.50	0	344.08	-0.40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/29/1996	424.58	80.40	0	344.18	-0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/29/1996	424.58	81.10	0	343.48	0.70	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/22/1996	424.58	80.90	0	343.68	-0.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/28/1996	424.58	81.73	0	342.85	0.83	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/31/1996	424.58	81.70	0	342.88	-0.03	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/30/1996	424.58	81.40	0	343.18	-0.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/30/1996	424.58	81.00	0	343.58	-0.40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/31/1996	424.58	82.15	0	342.43	1.15	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/19/1996	424.58	81.30	0	343.28	-0.85	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/30/1997	424.58	81.28	--	343.30	-0.02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/28/1997	424.58	81.10	--	343.48	-0.18	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/19/1997	424.58	81.00	0	343.58	-0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/20/1997	424.58	81.00	0	343.58	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/2/1997	424.58	81.00	0	343.58	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/26/1998	424.58	80.64	0	343.94	-0.36	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/24/1998	424.58	81.20	0	343.38	0.56	**19,300**	**1,060**	--	--	--	--	**1.67**	1.2 U	0.5 U	1.2 U	--	--	--	--	--	--	--	--	--	--
	9/17/1998	424.58	80.70	0	343.88	-0.50	**5,540**	**65.8**	--	--	--	--	0.5	0.5 U	0.5	**2.02**	--	--	--	--	--	--	--	--	--	--
	12/18/1998	424.58	80.25	0	344.33	--	**1,390**	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	3/29/1999	424.58	80.39	0	344.19	0.14	1,000 U	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	**1.12**	--	--	--	--	--	--	--	--	--	--
	6/24/1999	424.58	80.05	0	344.53	-0.34	**2,610**	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--

Table 2. Groundwater Elevations and Analytical Results
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

							Total Petroleum Hydrocarbons						VOCs and Lead Scavengers							Fuel Oxygenates						
Well ID	Sample Date	TOC Elevation	Depth to GW	Product Thickness	GW Elevation	Change in GW Elevation	TPH (1)	TPH-g	TPH-d	TPH-d (SGC)	TPH-o	TPH-o (SGC)	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	EDB (2)	EDC	DIPE	ETBE	MTBE	TBA	TAME	Ethanol	Methanol
					MTCA Method A Cleanup Levels (3) (4)		*NE*	*800/1,000*	*500*	*500*	*500*	*500*	*5*	*1,000*	*700*	*1,000*	*160*	*0.01*	*5*	*NE*	*NE*	*20*	*NE*	*NE*	*NE*	*NE*
	Units:	*ft NAVD29 (5)*	*ft btoc*	*ft*	*ft NAVD29 (6)*	*ft*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*mg/L*	*mg/L*
MW-12	10/8/1999	424.58	82.21	0	342.37	2.16	1,000 U	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
Continued	12/20/1999	424.58	81.58	0	343.00	-0.63	1,000 U	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	3/14/2000	424.58	81.07	0	343.51	-0.51	1,000 U	**72.8**	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	6/8/2000	424.58	81.74	0	342.84	0.67	1,000 U	**52.3**	--	--	--	--	**1.74**	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	9/13/2000	424.58	82.56	0	342.02	0.82	1,000 U	**82.3**	--	--	--	--	0.5 U	**0.67**	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	12/6/2000	424.58	80.95	0	343.63	-1.61	1,000 U	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	3/1/2001	424.58	81.25	0	343.33	0.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/27/2001	424.58	81.25	0	343.33	0.00	5,000 U	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	6/5/2001	424.58	81.72	0	342.86	0.47	**793**	**50**	--	--	--	--	**1.23**	0.5 U	0.5 U	1.0 U	--	--	--	--	--	--	--	--	--	--
	9/25/2001	424.58	82.40	0	342.18	0.68	**1,060**	**103**	--	--	--	--	0.5 U	1.0 U	1.0 U	1.5 U	--	--	--	--	--	--	--	--	--	--
	9/6/2002	424.58	82.37	0	342.21	-0.03	530 U	100 U	--	--	--	--	1.0 U	1.0 U	1.0 U	3.0 U	--	--	--	--	--	--	--	--	--	--
	9/11/2003	424.58	82.61	0	341.97	0.24	**410**	100 U	--	--	--	--	1.0 U	1.0 U	1.0 U	3.0 U	--	--	--	--	--	--	--	--	--	--
	11/17/2004	424.58	81.93	0	342.65	-0.68	--	48 U	**890**	--	**310**	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	--	--	--	--	--
	7/11/2005	424.58	81.96	0	342.62	0.03	--	48 U	**2,100**	--	**2,300**	--	**0.3**	0.2 U	0.2 U	0.6 U	--	--	--	--	--	0.3 U	--	--	--	--
	7/7/2006	424.58	81.18	0	343.40	-0.78	--	48 U	**1,200**	--	**650**	--	**0.4**	0.2 U	0.2 U	0.6 U	--	--	--	--	--	0.3 U	--	--	--	--
	11/14/2007	424.40	81.40	0	343.00	0.40	--	50 U	**930**	--	**490**	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	0.3 U	--	--	--	--
	10/8/2008	424.40	81.33	0	343.07	-0.07	--	50 U	**670**	--	**220**	--	**0.3**	0.2 U	0.2 U	0.6 U	--	--	--	--	--	0.3 U	--	--	0.2 U	--
	6/30/2010	423.65	79.22	0	344.43	-1.36	--	50 U	**950**	--	**700**	--	**1.1**	1.0 U	1.0 U	2.0 U	--	--	--	--	--	--	--	--	10 U	--
	12/16/2010	423.65	79.62	--	344.03	0.40	--	50 U	**490**	--	**430**	--	1.0 U	1.0 U	1.0 U	2.0 U	--	--	--	--	--	--	--	--	10 U	--
	5/29/2014	423.65	79.26	--	344.39	-0.36	--	250 U	250 U	--	500 U	--	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	5.0 U	50.0 U
	10/30/2014	423.65	80.45	--	343.20	1.19	--	250 U	250 U	--	500 U	--	0.50 U	**0.66**	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	5.0 U	50.0 U
	6/4/2015	423.65	79.72	--	343.93	-0.73	--	250 U	100 U	--	250 U	--	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	5.0 U	**53.3**
	9/29/2015	423.65	80.83	--	342.82	1.11	--	250 U	100 U	--	250 U	--	0.50 U	0.50 U	0.50 U	1.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	--	--
	12/6/2016	423.65	80.48	--	343.17	-0.35	--	50 U	110 U	--	250 U	--	**6.0**	2.0 U	3.0 U	3.0 U	2.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	25 U	5.0 U	10 U	10 U
	5/16/2017	423.65	79.30	--	344.35	-1.18	--	500 U	100 U	--	250 U	--	2.0 U	2.0 U	3.0 U	3.0 U	2.0 U	2.0 U	2.0 U	2.0 U	6.0 U	2.0 U	100 U	6.0 U	10 U	10 U
	10/24/2017	423.65	80.45	--	343.20	1.15	--	250 U	**160**	--	250 U	--	2.0 U	2.0 U	3.0 U	3.0 U	2.0 U	2.0 U	2.0 U	2.0 U	6.0 U	2.0 U	100 U	6.0 U	10 U	10 U
	6/14/2018	423.65	79.30	--	344.35	-1.15	--	250 U	**160**	--	350 U	--	3.0 U	2.0 U	3.0 U	3.0 U	4.0 U	2.0 U	2.0 U	2.0 U	6.0 U	2.0 U	100 U	6.0 U	10 U	10 U
	12/3/2018	423.62	80.22	--	343.40	0.95	--	100 U	**270**	--	**240 J**	--	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.40 U	0.53 U	0.35 U	0.91 U	0.44 U	24 U	1.5 U	4.0 U	4.0 U
	6/27/2019	423.62	79.97	--	343.65	-0.25	--	100 U	**270**	--	**300 J**	--	**0.63 J**	0.39 U	0.50 U	0.75 U	0.93 U	0.0020 U	0.53 U	0.35 U	0.91 U	0.44 U	24 U	1.5 U	4.0 U	4.0 U
	12/11/2019	423.62	80.20	0.00	343.42	0.23	--	100 U	**170**	--	91 U	--	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.0020 U	0.53 U	0.35 UJ	0.91 U	0.44 U	24 UJ	1.5 U	0.150 UJ	0.220 UJ
	6/24/2020	423.62	79.85	0.00	343.77	-0.35	--	100 U	**450**	--	**330 J**	--	0.24 U	0.39 U	0.50 U	0.39 U	0.93 U	0.0020 U	0.42 U	0.35 U	0.91 U	0.44 U	9.8 U	0.58 U	0.150 UJ	0.220 U
	12/16/2020	423.62	80.14	0.00	343.48	0.29	--	100 U	110 U	--	120 U	--	0.24 U	0.39 U	0.50 U	0.39 U	0.93 U	0.0020 U	0.42 U	0.35 U	0.91 U	0.44 U	9.8 U	0.58 U	0.150 UJ	0.220 U
MW-13	**Well installed above the groundwater table (always dry)**																									

Table 2. Groundwater Elevations and Analytical Results
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

Well ID	Sample Date	TOC Elevation	Depth to GW	Product Thickness	GW Elevation	Change in GW Elevation	Total Petroleum Hydrocarbons: TPH [1]	TPH-g	TPH-d	TPH-d (SGC)	TPH-o	TPH-o (SGC)	VOCs and Lead Scavengers: Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	EDB [2]	EDC	Fuel Oxygenates: DIPE	ETBE	MTBE	TBA	TAME	Ethanol	Methanol
					MTCA Method A Cleanup Levels [3] [4]		*NE*	*800/1,000*	*500*	*500*	*500*	*500*	*5*	*1,000*	*700*	*1,000*	*160*	*0.01*	*5*	*NE*	*NE*	*20*	*NE*	*NE*	*NE*	*NE*
	Units:	*ft NAVD29* [5]	*ft btoc*	*ft*	*ft NAVD29* [6]	*ft*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*mg/L*	*mg/L*
MW-14	1/23/1989	420.61	--	0	--	--	--	--	--	--	--	--	10 U	10 U	10 U	10 U	--	--	--	--	--	--	--	--	--	--
	8/6/1990	420.61	79.18	0	341.43	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/19/1990	420.61	78.72	0	341.89	-0.46	ND	--	--	--	--	--	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--
	2/14/1991	420.61	78.25	0	342.36	-0.47	--	--	--	--	--	--	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--
	5/15/1991	420.61	78.48	0	342.13	0.23	ND	--	--	--	--	--	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--
	8/8/1991	420.61	79.46	0	341.15	0.98	ND	--	--	--	--	--	ND	ND	ND	ND	--	--	--	--	--	--	--	--	--	--
	4/1/1992	420.61	78.30	0	342.31	-1.16	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/1/1992	420.61	79.12	0	341.49	0.82	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/8/1992	420.61	78.65	0	341.96	-0.47	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/1/1993	420.61	80.51	0	340.10	1.86	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/1/1994	420.61	79.65	0	340.96	-0.86	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/31/1995	420.61	79.70	Trace	340.91	0.05	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/27/1995	420.61	79.10	Trace	341.51	-0.60	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/31/1995	420.61	79.20	Trace	341.41	0.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/28/1995	420.61	79.60	Trace	341.01	0.40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/31/1995	420.61	79.90	Trace	340.71	0.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/30/1995	420.61	80.15	0	340.46	0.25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/24/1995	420.61	80.58	Trace	340.03	0.43	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/29/1995	420.61	80.45	Trace	340.16	-0.13	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/27/1995	420.61	80.58	Trace	340.03	0.13	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/31/1996	420.61	80.30	Trace	340.31	-0.28	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/29/1996	420.61	79.36	Trace	341.25	-0.94	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/29/1996	420.61	78.70	Trace	341.91	-0.66	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/29/1996	420.61	79.80	Trace	340.81	1.10	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/22/1996	420.61	80.10	Trace	340.51	0.30	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/28/1996	420.61	80.11	0	340.50	0.01	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	7/31/1996	420.61	80.00	0	340.61	-0.11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/30/1996	420.61	79.80	0	340.81	-0.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/30/1996	420.61	79.40	0	341.21	-0.40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/31/1996	420.61	80.63	0	339.98	1.23	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/19/1996	420.61	79.80	0	340.81	-0.83	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	1/30/1997	420.61	79.60	--	341.01	-0.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	2/28/1997	420.61	79.80	--	340.81	0.20	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	4/19/1997	420.61	79.80	0	340.81	0.00	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/20/1997	420.61	79.78	0	340.83	-0.02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	11/2/1997	420.61	79.80	0	340.81	0.02	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/26/1998	420.61	78.98	0	341.63	-0.82	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/24/1998	420.61	76.09	0	344.52	-2.89	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/17/1998	420.61	77.56	0	343.05	1.47	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/18/1998	420.61	77.16	0	343.45	-0.40	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/29/1999	420.61	77.34	0	343.27	0.18	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/24/1999	420.61	76.41	0	344.20	-0.93	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	10/8/1999	420.61	79.05	0	341.56	2.64	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/20/1999	420.61	78.37	0	342.24	-0.68	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/14/2000	420.61	77.88	0	342.73	-0.49	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/8/2000	420.61	78.57	0	342.04	0.69	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 2. Groundwater Elevations and Analytical Results
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

Well ID	Sample Date	TOC Elevation	Depth to GW	Product Thickness	GW Elevation	Change in GW Elevation	Total Petroleum Hydrocarbons: TPH [1]	TPH-g	TPH-d	TPH-d (SGC)	TPH-o	TPH-o (SGC)	VOCs and Lead Scavengers: Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	EDB [2]	EDC	Fuel Oxygenates: DIPE	ETBE	MTBE	TBA	TAME	Ethanol	Methanol
						MTCA Method A Cleanup Levels [3] [4]	*NE*	*800/1,000*	*500*	*500*	*500*	*500*	*5*	*1,000*	*700*	*1,000*	*160*	*0.01*	*5*	*NE*	*NE*	*20*	*NE*	*NE*	*NE*	*NE*
	Units:	*ft NAVD29* [5]	*ft btoc*	*ft*	*ft NAVD29* [6]	*ft*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*mg/L*	*mg/L*
MW-14	9/13/2000	420.61	79.41	0	341.20	0.84	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Continued	12/6/2000	420.61	78.70	0	341.91	-0.71	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	3/26/2001	420.61	78.40	0	342.21	-0.30	5,000 U	50 U	--	--	--	--	0.5 U	0.5 U	0.5 U	1 U	--	--	--	--	--	--	--	--	--	--
	6/5/2001	420.61	79.93	0	340.68	1.53	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/25/2001	420.61	79.25	0	341.36	-0.68	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	9/6/2002	420.61	80.69	0	339.92	1.44	600 U	100 U	--	--	--	--	1 U	1 U	1 U	3 U	--	--	--	--	--	--	--	--	--	--
	9/11/2003	420.61	79.52	0	341.09	-1.17	400 U	100 U	--	--	--	--	1 U	1 U	1 U	3 U	--	--	--	--	--	--	--	--	--	--
	11/17/2004	420.61	78.77	0	341.84	-0.75	--	48 U	320 U	--	400 U	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	--	--	--	--	--
	7/11/2005	420.61	78.60	0	342.01	-0.17	--	48 U	**550**	--	390 U	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	0.3 U	--	--	--	--
	7/7/2006	420.61	78.98	0	341.63	0.38	--	48 U	**90**	--	95 U	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	0.3 U	--	--	--	--
	11/15/2007	418.35	78.24	0	340.11	1.52	--	50 U	76 U	--	95 U	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	0.3 U	--	--	--	--
	10/8/2008	418.35	78.16	0	340.19	-0.08	--	50 U	77 U	--	96 U	--	0.2 U	0.2 U	0.2 U	0.6 U	--	--	--	--	--	0.3 U	--	--	0.2 U	--
	6/29/2010	421.97	77.52	0	344.45	-4.26	--	50 U	160 U	--	240 U	--	1 U	1 U	1 U	2 U	--	--	--	--	--	--	--	--	10 U	--
	12/15/2010	421.97	77.94	--	344.03	0.42	--	50 U	120 U	--	240 U	--	1.0 U	1.0 U	1.0 U	2.0 U	--	--	--	--	--	--	--	--	10 U	--
	5/29/2014	421.97	77.58	--	344.39	-0.36	--	250 U	250 U	--	500 U	--	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	5.0 U	50.0 U
	10/29/2014	421.97	78.80	--	343.17	1.22	--	250 U	250 U	--	500 U	--	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	5.0 U	50.0 U
	6/4/2015	421.97	78.04	--	343.93	-0.76	--	250 U	100 U	--	250 U	--	0.50 U	**0.72**	0.50 U	1.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	5.0 U	50.0 U
	9/28/2015	421.97	79.18	--	342.79	1.14	--	250 U	100 U	--	250 U	--	0.50 U	**0.72**	0.50 U	1.0 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	0.50 U	5.0 U	0.50 U	--	--
	8/29/2016	421.97	79.32	--	342.65	0.14	--	50 U	**120**	--	250 U	--	2.0 U	2.0 U	3.0 U	3.0 U	2.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	25 U	5.0 U	10 U	10 U
	12/5/2016	421.97	78.75	--	343.22	-0.57	--	50 U	110 U	--	250 U	--	2.0 U	2.0 U	3.0 U	3.0 U	2.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	25 U	5.0 U	10 U	10 U
	5/17/2017	421.97	77.55	--	344.42	-1.20	--	500 U	100 U	--	250 U	--	2.0 U	2.0 U	3.0 U	3.0 U	2.0 U	2.0 U	2.0 U	2.0 U	6.0 U	2.0 U	100 U	6.0 U	10 U	10 U
	10/24/2017	421.97	78.78	--	343.19	1.23	--	250 U	100 U	--	250 U	--	2.0 U	2.0 U	3.0 U	3.0 U	2.0 U	2.0 U	2.0 U	2.0 U	6.0 U	2.0 U	100 U	6.0 U	10 U	10 U
	6/13/2018	421.97	77.74	--	344.23	-1.04	--	250 U	**110**	--	350 U	--	3.0 U	2.0 U	3.0 U	3.0 U	4.0 U	2.0 U	2.0 U	2.0 U	6.0 U	2.0 U	100 U	6.0 U	10 U	10 U
	12/2/2018	421.84	78.53	--	343.31	0.92	--	100 U	**170**	--	350 U	--	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.40 U	0.53 U	0.35 U	0.91 U	0.44 U	24 U	1.5 U	4.0 U	4.0 U
	6/27/2019	421.84	78.28	--	343.56	-0.25	--	100 U	**80 J**	--	**120 J**	--	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.0020 U	0.53 U	0.35 U	0.91 U	0.44 U	24 U	1.5 U	4.0 U	4.0 U
	12/11/2019	421.84	78.52	0.00	343.32	0.24	--	100 U	67 U	--	99 U	--	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.0020 U	0.53 U	0.35 U	0.91 U	0.44 U	24 UJ	1.5 U	0.150 UJ	0.220 UJ
	6/24/2020	421.84	78.16	0.00	343.68	-0.36	--	100 U	73 U	--	110 U	--	0.24 U	0.39 U	0.50 U	0.39 U	**1.0 J**	0.0020 U	0.42 U	0.35 U	0.91 U	0.44 U	9.8 U	0.58 U	0.150 U	0.220 U
	12/15/2020	421.84	78.46	0.00	343.38	0.30	--	100 U	110 U	--	120 U	--	0.24 U	0.39 U	0.50 U	3.0 U	4.0 U	0.0020 U	0.42 U	0.35 U	0.91 U	0.44 U	9.8 U	0.58 U	0.150 U	0.220 U

Table 2. Groundwater Elevations and Analytical Results
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

Well ID	Sample Date	TOC Elevation	Depth to GW	Product Thickness	GW Elevation	Change in GW Elevation	Total Petroleum Hydrocarbons: TPH [1]	TPH-g	TPH-d	TPH-d (SGC)	TPH-o	TPH-o (SGC)	VOCs and Lead Scavengers: Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	EDB [2]	EDC	Fuel Oxygenates: DIPE	ETBE	MTBE	TBA	TAME	Ethanol	Methanol
MTCA Method A Cleanup Levels [3] [4]							*NE*	*800/1,000*	*500*	*500*	*500*	*500*	*5*	*1,000*	*700*	*1,000*	*160*	*0.01*	*5*	*NE*	*NE*	*20*	*NE*	*NE*	*NE*	*NE*
Units:		*ft NAVD29* [5]	*ft btoc*	*ft*	*ft NAVD29* [6]	*ft*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*mg/L*	*mg/L*
MW-15	12/3/2018	358.50	16.69	--	341.81	--	--	100 U	**70 J**	--	97 U	--	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.40 U	0.53 U	0.35 U	0.91 U	0.44 U	24 U	1.5 U	4.0 U	4.0 U
	6/26/2019	358.50	16.41	--	342.09	-0.28	--	100 U	66 U	--	98 U	--	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.0020 U	0.53 U	0.35 U	0.91 U	0.44 U	24 U	1.5 U	4.0 U	4.0 U
	12/10/2019	358.50	16.78	0.00	341.72	0.37	--	100 U	64 U	--	95 U	--	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.0020 U	0.53 U	0.35 UJ	0.91 U	0.44 U	24 UJ	1.5 U	0.150 UJ	0.220 UJ
	6/23/2020	358.50	16.17	0.00	342.33	-0.61	--	100 U	68 U	--	**110 J**	--	0.24 U	0.39 U	0.50 U	0.39 U	0.93 U	0.0020 U	0.42 U	0.35 U	0.91 U	0.44 U	9.8 U	0.58 U	0.150 U	0.220 U
	12/14/2020	358.50	16.43	0.00	342.07	0.26	--	100 U	110 U	--	120 U	--	0.24 U	0.39 U	0.50 U	3.0 U	4.0 U	0.0020 U	0.42 U	0.35 U	0.91 U	0.44 U	9.8 U	0.58 U	0.150 U	0.220 U
MW-16	12/3/2018	370.92	27.95	--	342.97	--	--	100 U	**82 J**	--	96 U	--	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.40 U	0.53 U	0.35 U	0.91 U	0.44 U	24 U	1.5 U	4.0 U	4.0 U
	6/26/2019	370.92	27.60	--	343.32	-0.35	--	100 U	**77 J**	--	100 U	--	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.0020 U	0.53 U	0.35 U	0.91 U	0.44 U	24 U	1.5 U	4.0 U	4.0 U
	12/10/2019	370.92	27.79	0.00	343.13	0.19	--	100 U	62 U	--	91 U	--	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.0020 U	0.53 U	0.35 UJ	0.91 U	0.44 U	24 UJ	1.5 U	0.150 UJ	0.220 UJ
	6/22/2020	370.92	27.41	0.00	343.51	-0.38	--	100 U	71 U	--	100 U	--	0.24 U	0.39 U	0.50 U	0.39 U	0.93 U	0.0020 U	0.42 U	0.35 U	0.91 U	0.44 U	9.8 U	0.58 U	0.150 U	0.220 U
	12/16/2020	370.92	27.69	0.00	343.23	0.28	--	100 U	120 U	--	130 U	--	0.24 U	0.39 U	0.50 U	0.39 U	0.93 U	0.0020 U	0.42 U	0.35 U	0.91 U	0.44 U	9.8 U	0.58 U	0.150 U	0.220 U
MW-17	12/3/2018	424.28	81.00	--	343.28	--	--	**180 J**	**880**	--	**850**	--	**2.9 J**	**1.9 J**	**8.6 J**	**38 J**	**4.7 J**	0.40 U	0.53 U	0.35 UJ	0.91 U	0.44 U	24 U	1.5 U	4.0 U	4.0 U
	6/27/2019	424.28	80.62	--	343.66	-0.38	--	100 U	**530**	--	**640**	--	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.0020 U	0.53 U	0.35 U	0.91 U	0.44 U	24 U	1.5 U	4.0 U	4.0 U
	12/11/2019	424.28	81.84	0.00	342.44	1.22	--	100 U	**960**	69 U	**800**	100 U	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.0020 U	0.53 U	0.35 U	0.91 U	0.44 U	24 UJ	1.5 U	0.150 UJ	0.220 UJ
	6/24/2020	424.28	80.48	0.00	343.80	-1.36	--	100 U	**750**	--	**420**	--	0.24 U	0.39 U	0.50 U	0.39 U	0.93 U	0.0020 U	0.42 U	0.35 U	0.91 U	0.44 U	9.8 U	0.58 U	0.150 U	0.220 U
	12/15/2020	424.28	80.80	0.00	343.48	0.32	--	100 U	**350**	--	120 U	--	0.24 U	0.39 U	0.50 U	3.0 U	4.0 U	0.0020 U	0.42 U	0.35 U	0.91 U	0.44 U	9.8 U	0.58 U	0.150 U	0.220 U
MW-18	12/4/2018	423.66	--	--	--	--	--	**280**	65 U	--	96 U	--	**1.4 J**	**0.83 J**	**3.2**	**15**	**1.7 J**	0.40 U	0.53 U	0.35 UJ	0.91 U	0.44 U	24 U	1.5 U	4.0 U	4.0 U
	6/26/2019	423.69	80.01	--	343.68	--	--	100 U	**68 J**	--	100 U	--	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.0020 U	0.53 U	0.35 U	0.91 U	0.44 U	24 U	1.5 U	4.0 U	4.0 U
	12/12/2019	423.69	80.12	0.00	343.57	0.11	--	100 U	62 U	--	91 U	--	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.0020 U	0.53 U	0.35 U	0.91 U	0.44 U	24 UJ	1.5 U	0.150 UJ	0.220 UJ
	6/22/2020	423.69	79.81	0.00	343.88	-0.31	--	100 U	68 U	--	100 U	--	0.24 U	0.39 U	0.50 U	0.39 U	0.93 U	0.0020 U	0.42 U	0.35 U	0.91 U	0.44 U	9.8 U	0.58 U	0.150 U	0.220 U
	12/15/2020	423.69	80.11	0.00	343.58	0.30	--	100 U	110 U	--	120 U	--	0.24 U	0.39 U	0.50 U	3.0 U	4.0 U	0.0020 U	0.42 U	0.35 U	0.91 U	0.44 U	9.8 U	0.58 U	0.150 U	0.220 U
MW-19	12/3/2018	424.20	80.80	--	343.40	--	--	**18,000 J**	**3,100**	--	**110 J**	--	**300**	**160**	**740**	**630**	**390**	0.40 U	0.53 U	0.35 UJ	0.91 U	**21**	24 U	1.5 U	4.0 U	4.0 U
	6/27/2019	424.20	80.50	--	343.70	-0.30	--	**3,200**	**930**	--	98 U	--	**160**	**23**	**180**	**260**	**110 J**	**0.0024 J**	0.53 U	0.35 U	0.91 U	**3.7**	24 U	1.5 U	4.0 U	4.0 U
	12/10/2019	424.20	80.72	0.00	343.48	0.22	--	**530**	**320**	**120**	93 U	95 U	**27**	4.1 U	**14**	**56**	**18**	0.0020 U	0.53 U	0.35 UJ	0.91 U	0.44 U	24 UJ	1.5 U	0.150 UJ	0.220 UJ
	6/24/2020	424.20	80.27	0.00	343.93	-0.45	--	100 U	**110**	--	**110 J**	--	**6.0**	0.39 U	**0.57 J**	**2.9 J**	**4.6 J**	0.0020 U	0.42 U	0.35 U	0.91 U	0.44 U	9.8 U	0.58 U	0.150 U	0.220 U
	12/16/2020	424.20	80.65	0.00	343.55	0.38	--	100 U	110 U	--	120 U	--	0.24 U	0.39 U	0.50 U	0.39 U	0.93 U	0.0020 U	0.42 U	0.35 U	0.91 U	0.44 U	9.8 U	0.58 U	0.150 U	0.220 U
MW-20	12/12/2019	426.52	82.84	0.00	343.68	--	--	100 U	**77 J**	67 U	99 U	99 U	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.0020 U	0.53 U	0.35 U	0.91 U	0.44 U	24 UJ	1.5 U	--	--
	6/22/2020	426.52	82.68	0.00	343.84	-0.16	--	100 U	70 U	--	100 U	--	0.24 U	0.39 U	0.50 U	0.39 U	0.93 U	0.0020 U	0.42 U	0.35 U	0.91 U	0.44 U	9.8 U	0.58 U	0.150 U	0.220 U
	12/16/2020	426.52	82.93	0.00	343.59	0.25	--	100 U	120 U	--	130 U	--	0.24 U	0.39 U	0.50 U	0.39 U	0.93 U	0.0020 U	0.42 U	0.35 U	0.91 U	0.44 U	9.8 U	0.58 U	0.150 U	0.220 U
MW-21	12/12/2019	426.16	82.65	0.00	343.51	--	--	100 U	67 U	72 U	99 U	110 U	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.0020 U	0.53 U	0.35 U	0.91 U	0.44 U	24 UJ	1.5 U	--	--
	6/22/2020	426.16	82.42	0.00	343.74	-0.23	--	100 U	72 U	--	**110 J**	--	0.24 U	0.39 U	0.50 U	0.39 U	0.93 U	0.0020 U	0.42 U	0.35 U	0.91 U	0.44 U	9.8 U	0.58 U	0.150 U	0.220 U
	12/15/2020	426.16	82.70	0.00	343.46	0.28	--	100 U	120 U	--	130 U	--	0.24 U	0.39 U	0.50 U	3.0 U	0.93 U	0.0020 U	0.42 U	0.35 U	0.91 U	0.44 U	9.8 U	0.58 U	0.150 U	0.220 U
MW-22	12/11/2019	420.45	77.00	0.00	343.45	--	--	100 U	64 U	64 U	94 U	94 U	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.0020 U	0.53 U	0.35 U	0.91 U	0.44 U	24 UJ	1.5 U	--	--
	6/23/2020	420.45	76.76	0.00	343.69	-0.24	--	100 U	66 U	--	97 U	--	0.24 U	0.39 U	0.50 U	0.39 U	0.93 U	0.0020 U	0.42 U	0.35 U	0.91 U	0.44 U	9.8 U	0.58 U	0.150 U	0.220 U
	12/15/2020	420.45	77.04	0.00	343.41	0.28	--	100 U	120 U	--	130 U	--	0.24 U	0.39 U	0.50 U	3.0 U	0.93 U	0.0020 U	0.42 U	0.35 U	0.91 U	0.44 U	9.8 U	0.58 U	0.150 U	0.220 U
MW-23	12/11/2019	421.74	78.30	0.00	343.44	--	--	100 U	61 U	62 U	90 U	92 U	0.53 U	0.39 U	0.50 U	0.75 U	0.93 U	0.0020 U	0.53 U	0.35 U	0.91 U	0.44 U	24 UJ	1.5 U	--	--
	6/23/2020	421.74	77.94	0.00	343.80	-0.36	--	100 U	71 U	--	100 U	--	0.24 U	0.39 U	0.50 U	0.39 U	0.93 U	0.0020 U	0.42 U	0.35 U	0.91 U	0.44 U	9.8 U	0.58 U	0.150 U	0.220 U
	12/15/2020	421.74	78.26	0.00	343.48	0.32	--	100 U	110 U	--	120 U	--	0.24 U	0.39 U	0.50 U	3.0 U	4.0 U	0.0020 U	0.42 U	0.35 U	0.91 U	0.44 U	9.8 U	0.58 U	0.150 U	0.220 U
RW-1	6/29/2010	417.29	72.89	--	344.40	--	--	50 U	120 U	--	240 U	--	1.0 U	1.0 U	1.0 U	2.0 U	--	--	--	--	--	--	--	--	10 U	--
	12/16/2010	417.29	73.28	--	344.01	0.39	--	50 U	120 U	--	240 U	--	1.0 U	1.0 U	1.0 U	2.0 U	--	--	--	--	--	--	--	--	10 U	--
	Well abandoned September 2018																									

Table 2. Groundwater Elevations and Analytical Results
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

Well ID	Sample Date	TOC Elevation	Depth to GW	Product Thickness	GW Elevation	Change in GW Elevation	Total Petroleum Hydrocarbons						VOCs and Lead Scavengers							Fuel Oxygenates						
							TPH (1)	TPH-g	TPH-d	TPH-d (SGC)	TPH-o	TPH-o (SGC)	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	EDB (2)	EDC	DIPE	ETBE	MTBE	TBA	TAME	Ethanol	Methanol
MTCA Method A Cleanup Levels (3) (4)							*NE*	*800/1,000*	*500*	*500*	*500*	*500*	*5*	*1,000*	*700*	*1,000*	*160*	*0.01*	*5*	*NE*	*NE*	*20*	*NE*	*NE*	*NE*	*NE*
Units:		*ft NAVD29 (5)*	*ft btoc*	*ft*	*ft NAVD29 (6)*	*ft*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*ug/L*	*mg/L*	*mg/L*
Tidewater Wells																										
AR-11	6/25/2019	422.62	78.84	--	343.78	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/9/2019	422.62	78.96	0.00	343.66	0.12	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/22/2020	422.62	78.63	0.00	343.99	-0.33	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/15/2020	422.62	79.01	0.00	343.61	0.38	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MW-5	6/25/2019	425.02	81.29	--	343.73	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/9/2019	425.02	81.40	0.00	343.62	0.11	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/22/2020	425.02	81.07	0.00	343.95	-0.33	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	12/15/2020	425.02	81.46	0.00	343.56	0.39	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Notes:
Values in **bold** were detected above the limit
= value exceeds the Ecology MTCA Cleanup Level
= reporting limit exceeds the Ecology MTCA Cleanup Level
(1) TPH concentrations measured prior to June 2001 are by EPA Method 418.1.
(4) As of first semiannual 2019 monitoring event, EDB was run via US Environmental Protection Agency (EPA) Method 8011 to achieve lower detection limits.
(3) MTCA Method A Cleanup Levels for Groundwater (Washington Administrative Code 173-340-900 Table 720-1)
(4) TPH-g MTCA Method A Cleanup Levels for Groundwater has two levels. If benzene is present in groundwater, the level is 800 ug/L; if no detectable benzene in groundwater, the level is 1,000 ug/L.
(5) On February 7, 2019, the wells were resurveyed by Stratton Surveying and Mapping, P.C. MW-20 through MW-23 were surveyed on December 10, 2019. Horizontal datum = Washington State Plane South Zone North American Datum 1983(1991). Vertical datum = North American Vertical Datum 29.
(6) When measurable product was present, the equivalent groundwater elevation was calculated by assuming a specific gravity of 0.8 for the product..

Acronyms:
-- = not sampled or not submitted for this analyte
µg/L = microgram per liter
btoc = below top of casing
DIPE = di-isopropyl ether
EDB = 1,2-dibromoethane
EDC = 1,2-dichloroethane
ETBE = ethyl tertiary-butyl ether
ft = feet
GW = groundwater
J = estimated concentration
mg/L = milligram per liter
MTBE = methyl tertiary-butyl ether
MTCA = Model Toxics Control Act
NAVD29 = North American Vertical Datum of 1929
NE = not established
SGC = samples analyzed with silica gel cleanup
TAME = tertiary-amyl methyl ether
TBA = tertiary-butanol
TOC = top of casing
TPH = total petroleum hydrocarbon
TPH-g = gasoline range hydrocarbons (as analyzed by Northwest Method NWPTH-Gx)
TPH-d = diesel range hydrocarbons (as analyzed by Northwest Method NWTPH-Dx)
TPH-o = motor oil range hydrocarbons (as analyzed by Northwest Method NWTPH-Dx)
U = analyte not detected above limit shown. Starting with data collected since September 2018, the limit shown is the method detection limit.
VOC = volatile organic compound

Table 3. Remediation Investigation Sampling Program
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

Data Collection Event	Sample Dates	Report Reference[1]	Sample Type	Depth (feet bgs)	Number of Primary Samples	Locations	Analytes [2]
2015 Subsurface Soil Sampling	June 1-4, 2015	Azure, 2015b	Subsurface soil	10-79	16	CB-1, CB-2	TPH-g, TPH-d, TPH-o, VOCs
			Grab groundwater	--	2		
2016 Riverbank Sampling	September 18, 2016	CEECON, 2017c	Riverbank soil	0-1	6	RB-1 to RB-6	TPH-g, TPH-d, TPH-o, VOCs
	December 8, 2016				3	RB-7 to RB-9	
2018 Subsurface Soil Sampling	September 4-October 15, 2018	AECOM, 2019c	Subsurface soil	5-83	69	AB-1 to AB-6, MW-16 to MW-19, VE-1 to VE-4	TPH-g, TPH-d, TPH-o, VOCs
			Grab groundwater	--	5	AB-1 to AB-3, AB-5, AB-6	
2019 Subsurface Soil Sampling	November 18 & 26, 2019	AECOM, 2020b	Subsurface soil	32-90	11	AB-7, AB-8, MW-20, MW-22, MW-23	TPH-g, TPH-d, TPH-o, VOCs, physical & chemical parameters
2020 Biodegradation Assessment	November 20, 2019-February 13, 2020	AECOM, 2020c	Soil	32-97	14	AB-7, AB-8	rRNA Sequencing
			Groundwater BioTrap	80-87	3	MW-19	In-situ biodegradation assessment
			Soil	82-86	3	AB-08	Bench-scale treatability study
			Low-flow groundwater	--	2	MW-19	Bench-scale treatability study
Soil Vapor Screening	December 17-18, 2014	Azure, 2015a	Monitoring well headspace	--	10	MW-2, MW-3, MW-6 to MW-8, MW-10 to MW-14	TPH-G, VOCs, fixed gases
Passive Soil Gas Survey	November 21-December 1, 2016	CEECON, 2017b	Passive soil gas adsorbent cartridges	3	77	1 to 77	BTEX and carbon ranges (TPH C4-C9 and TPH C10-C15)
Soil Vapor Screening	December 17-18, 2018	CEECON, 2019	Monitoring well headspace	--	20	MW-2 to MW-4, MW-6 to MW-8, MW-10 to MW-19, VE-1 to VE-4	TPH-G, VOCs, fixed gases
Soil Vapor Screening	January 22-23, 2020	AECOM, 2020a	Monitoring well headspace	--	14	MW-3, MW-4, MW-7, MW-10, MW-18 to MW-23, VE-1 to VE-4	Total VOCs, fixed gases
Groundwater Monitoring	May 28-29, 2014	Azure, 2014b	Low-flow groundwater	--	Groundwater monitoring program varies over time		TPH-g, TPH-d, TPH-o, VOCs, water quality parameters
	October 28-30, 2014	Azure, 2014c					
	June 3-4 2015	Azure, 2015c					
	September 28-29, 2015	Azure, 2015d					
	August 29-30, 2016	CEECON, 2016c					
	December 5-6, 2016	CEECON, 2017d					
	May 15-17, 2017	CEECON 2017e					
	October 23-25, 2017	CEECON, 2017f					
	June 11-14, 2018	AECOM, 2018					
	December 2-4, 2018	AECOM, 2019d					
	June 26-27, 2018	AECOM, 2019e					
	December 10-12, 2019	AECOM, 2019f					
	June 22-24, 2020	AECOM, 2020d					
	December 14-16, 2020	AECOM, 2021					

Notes:
(1) See Appendix C for full citation
(2) VOC analytical list varies over time, but always includes BTEX and usually includes fuel oxygenates.

Acronyms:
bgs = below ground surface
BTEX = benzene, toluene, ethylbenzene, xylenes
rRNA = ribosomal ribonucleic acid
TPH-d =diesel-range total petroleum hydrocarbons
TPH-g = gasoline-range total petroleum hydrocarbons
TPH-o = motor oil-range total petroleum hydrocarbons
VOC = volatile organic compound

Table 4. Soil Vapor Analytical Results
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

Well ID or Sample Location	Sample Date	Laboratory Analytical: Total Petroleum Hydrocarbons: TPH-g	TPH-d	VOCs: Benzene	Toluene	Ethylbenzene	Total Xylenes	m&p Xylenes	o-Xylenes	Fuel Oxygenates	Field Instrument: Total VOCs	Oxygen	Carbon Dioxide	Methane
Monitoring Well Headspace														
	Units:	*mg/m^3*	*mg/m^3*	*mg/m^3*	*mg/m^3*	*mg/m^3*	*mg/m^3*	*mg/m^3*	*mg/m^3*	*mg/m^3*	*ppm*	*% by Volume*	*% by Volume*	*% by Volume*
MW-2	12/18/2014	20 U	--	0.20 U	0.20 U	0.25 U	0.20 U	--	--	ND	--	--	--	--
	12/19/2018	2.5 U	--	0.01 U	0.02	0.01 U	0.01	--	--	0.01 U	--	--	--	--
MW-3	12/17/2014	20 U	--	0.20 U	0.20 U	0.25 U	0.20 U	--	--	ND	--	--	--	--
	12/19/2018	4.9	--	0.01 U	0.04	0.01 U	0.01	--	--	0.01 U	--	--	--	--
	1/23/2020	--	--	--	--	--	--	--	--	--	0.4	21.4	0.0	0.0
MW-4	12/19/2018	2.5 U	--	0.01 U	0.03	0.01 U	0.01	--	--	0.01 U	--	--	--	--
	1/22/2020	--	--	--	--	--	--	--	--	--	--	20.6	0.1	1.8
MW-6	12/18/2014	20 U	--	0.20 U	0.20 U	0.25 U	0.20 U	--	--	ND	--	--	--	--
	12/17/2018	2.5 U	--	0.01 U	0.01	0.01 U	0.01	--	--	0.01 U	--	--	--	--
MW-7	12/18/2014	20 U	--	0.20 U	0.20 U	0.25 U	0.20 U	--	--	ND	--	--	--	--
	12/19/2018	2.5 U	--	0.01 U	0.03	0.01 U	0.01	--	--	0.01 U	--	--	--	--
	1/22/2020	--	--	--	--	--	--	--	--	--	--	20.6	0.1	0.0
MW-8	12/18/2014	20 U	--	0.20 U	0.20 U	0.25 U	0.20 U	--	--	ND	--	--	--	--
	12/17/2018	2.5 U	--	0.01 U	0.01	0.01 U	0.01	--	--	0.01 U	--	--	--	--
MW-10	12/18/2014	20 U	--	0.20 U	0.20 U	0.25 U	0.20 U	--	--	ND	--	--	--	--
	12/19/2018	2.5 U	--	0.01 U	0.02	0.01 U	0.01	--	--	0.01 U	--	--	--	--
	1/22/2020	--	--	--	--	--	--	--	--	--	--	20.5	0.1	0.0
MW-11	12/18/2014	6.8	--	0.020 U	0.0228	0.020 U	0.040 U	--	--	ND	--	--	--	--
	12/19/2018	2.5 U	--	0.01 U	0.03	0.01 U	0.01	--	--	0.01 U	--	--	--	--
MW-12	12/17/2014	20 U	--	0.20 U	0.20 U	0.25 U	0.20 U	--	--	ND	--	--	--	--
	12/19/2018	2.5 U	--	0.01 U	0.02	0.01 U	0.01	--	--	0.01 U	--	--	--	--
MW-13	12/18/2014	20 U	--	0.20 U	0.20 U	0.25 U	0.20 U	--	--	ND	--	--	--	--
	12/19/2018	2.5 U	--	0.01 U	0.03	0.01 U	0.01	--	--	0.01 U	--	--	--	--
MW-14	12/18/2014	20 U	--	0.20 U	0.20 U	0.25 U	0.20 U	--	--	ND	--	--	--	--
	12/18/2018	2.5 U	--	0.01 U	0.03	0.01	0.01	--	--	0.01 U	--	--	--	--
MW-15	12/17/2018	2.5 U	--	0.01 U	0.01	0.01 U	0.01	--	--	0.01 U	--	--	--	--
MW-16	12/18/2014	2.5 U	--	0.01 U	0.01	0.01 U	0.01	--	--	0.01 U	--	--	--	--
MW-17	12/18/2018	2.5 U	--	0.01 U	0.06	0.01	0.01	--	--	0.01 U	--	--	--	--
MW-18	12/17/2018	70	--	0.12	0.06	0.73	1.53	--	--	0.04 U	--	--	--	--
	1/22/2020	--	--	--	--	--	--	--	--	--	--	21.8	0.0	0.0
MW-19	12/17/2018	250	--	0.05 U	0.66	1.80	4.03	--	--	0.38	--	--	--	--
	1/22/2020	--	--	--	--	--	--	--	--	--	0.3	21.5	0.0	0.0
MW-20	1/22/2020	--	--	--	--	--	--	--	--	--	0.6	21.8	0.0	0.0
MW-21	1/23/2020	--	--	--	--	--	--	--	--	--	0.5	21.1	0.0	0.0
MW-22	1/22/2020	--	--	--	--	--	--	--	--	--	0.4	20.8	0.0	0.0
MW-23	1/22/2020	--	--	--	--	--	--	--	--	--	1.3	21.0	0.0	0.2
VE-1	12/18/2018	2.5 U	--	0.01 U	0.03	0.01	0.01	--	--	0.01 U	--	--	--	--
	1/23/2020	--	--	--	--	--	--	--	--	--	0.1	21.3	0.0	0.0
VE-2	12/18/2018	2.5 U	--	0.01 U	0.03	0.01	0.01	--	--	0.01 U	--	--	--	--
	1/23/2020	--	--	--	--	--	--	--	--	--	0.1	21.5	0.0	0.0
VE-3	12/18/2018	10 U	--	0.02 U	0.03	0.02 U	0.02	--	--	0.04 U	--	--	--	--
	1/23/2020	--	--	--	--	--	--	--	--	--	0.3	21.3	0.0	0.0
VE-4	12/18/2018	6.4	--	0.01 U	0.03	0.09	0.19	--	--	0.01 U	--	--	--	--
	1/23/2020	--	--	--	--	--	--	--	--	--	0.3	21.4	0.0	0.0

Table 4. Soil Vapor Analytical Results
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

Well ID or Sample Location	Sample Date	Laboratory Analytical									Field Instrument			
		Total Petroleum Hydrocarbons		VOCs										
		TPH-g	TPH-d	Benzene	Toluene	Ethylbenzene	Total Xylenes	m&p Xylenes	o-Xylenes	Fuel Oxygenates	Total VOCs	Oxygen	Carbon Dioxide	Methane
Passive Soil Gas Survey														
	Units:	*ng*	*ng*	*ng*	*ng*	*ng*	*ng*	*ng*	*ng*	*ng*	*ng*	*ng*	*ng*	*ng*
1	12/6/2016	21,373	8,376	118	302	703	--	655	213	--	--	--	--	--
2	12/6/2016	7,462	6,571	40	90	569	--	481	152	--	--	--	--	--
3	12/6/2016	6,861	5,337	31	53	370	--	322	102	--	--	--	--	--
4	12/6/2016	51,814	7,811	352	1,007	557	--	693	237	--	--	--	--	--
5	12/6/2016	21,588	8,389	137	309	628	--	569	185	--	--	--	--	--
6	12/6/2016	5,975	9,347	25 U	58	662	--	787	241	--	--	--	--	--
7	12/6/2016	5,721	6,787	25 U	40	453	--	368	119	--	--	--	--	--
8	12/6/2016	63,152	9,708	432	1,263	468	--	698	259	--	--	--	--	--
9	12/6/2016	12,972	6,273	64	162	361	--	333	115	--	--	--	--	--
10	12/6/2016	7,643	5,616	28	60	400	--	341	111	--	--	--	--	--
11	12/6/2016	8,573	6,435	34	46	719	--	579	180	--	--	--	--	--
12	12/6/2016	7,442	5,000 U	35	51	480	--	397	124	--	--	--	--	--
13	12/6/2016	7,751	5,000 U	35	96	87	--	394	170	--	--	--	--	--
14	12/6/2016	6,742	9,673	26	62	129	--	635	321	--	--	--	--	--
15	12/6/2016	6,023	5,953	28	57	171	--	176	83	--	--	--	--	--
16	12/6/2016	6,216	6,150	25 U	57	262	--	251	114	--	--	--	--	--
17	12/6/2016	5,000 U	5,000 U	25 U	25 U	57	--	278	131	--	--	--	--	--
18	12/6/2016	10,532	8,344	49	81	878	--	710	245	--	--	--	--	--
19	12/6/2016	7,034	5,960	28	45	469	--	388	129	--	--	--	--	--
20	12/6/2016	9,880	8,908	52	102	700	--	606	220	--	--	--	--	--
21	12/6/2016	11,049	11,003	54	76	1,265	--	993	347	--	--	--	--	--
22	12/6/2016	5,000 U	5,668	25 U	32	78	--	381	192	--	--	--	--	--
23	12/6/2016	14,622	9,177	104	199	132	--	630	317	--	--	--	--	--
24	12/6/2016	6,102	5,000 U	32	73	30	--	52	25 U	--	--	--	--	--
25	12/6/2016	7,713	5,291	41	88	361	--	322	111	--	--	--	--	--
26	12/6/2016	11,299	5,245	60	122	262	--	261	94	--	--	--	--	--
27	12/6/2016	6,980	5,000 U	37	84	238	--	217	77	--	--	--	--	--
28	12/6/2016	5,237	5,000 U	25 U	38	163	--	141	50	--	--	--	--	--
29	12/6/2016	5,444	5,000 U	27	45	75	--	84	35	--	--	--	--	--
30	12/6/2016	19,692	14,526	135	303	146	--	228	84	--	--	--	--	--
31	12/6/2016	71,122	9,871	697	2,001	409	--	860	323	--	--	--	--	--
32	12/6/2016	5,000 U	5,000 U	25 U	52	49	--	64	27	--	--	--	--	--
33	12/6/2016	40,104	5,791	329	827	203	--	378	140	--	--	--	--	--
34	12/6/2016	5,000 U	5,000 U	25 U	35	141	--	129	45	--	--	--	--	--
35	12/6/2016	86,028	12,523	793	1,923	562	--	909	361	--	--	--	--	--
36	12/6/2016	33,083	7,540	244	523	332	--	450	160	--	--	--	--	--
37	12/6/2016	24,770	5,937	171	345	231	--	309	112	--	--	--	--	--
38	12/6/2016	5,709	5,000 U	33	64	27	--	47	25 U	--	--	--	--	--
39	12/6/2016	10,556	5,000 U	67	145	28	--	79	32	--	--	--	--	--
40	12/6/2016	13,636	6,543	83	201	38	--	107	41	--	--	--	--	--
41	12/6/2016	5,000 U	5,000 U	26	52	25 U	--	35	25 U	--	--	--	--	--
42	12/6/2016	5,000 U	5,000 U	25 U	37	43	--	191	86	--	--	--	--	--
43	12/6/2016	5,000 U	5,000 U	25 U	37	25 U	--	28	25 U	--	--	--	--	--
44	12/6/2016	7,783	5,000 U	52	119	28	--	115	51	--	--	--	--	--
45	12/6/2016	7,105	5,000 U	46	88	39	--	65	28	--	--	--	--	--
46	12/6/2016	5,298	5,000 U	43	102	37	--	62	26	--	--	--	--	--
47	12/6/2016	12,506	5,000 U	85	166	38	--	99	38	--	--	--	--	--
48	12/6/2016	5,000 U	5,000 U	25 U	46	25 U	--	98	47	--	--	--	--	--
49	12/6/2016	5,214	5,000 U	25 U	39	25 U	--	31	25 U	--	--	--	--	--

Table 4. Soil Vapor Analytical Results
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

Well ID or Sample Location	Sample Date	Laboratory Analytical									Field Instrument			
		Total Petroleum Hydrocarbons		VOCs										
		TPH-g	TPH-d	Benzene	Toluene	Ethylbenzene	Total Xylenes	m&p Xylenes	o-Xylenes	Fuel Oxygenates	Total VOCs	Oxygen	Carbon Dioxide	Methane
	Units:	*ng*	*ng*	*ng*	*ng*	*ng*	*ng*	*ng*	*ng*	*ng*	*ng*	*ng*	*ng*	*ng*
50	12/6/2016	5,000 U	5,000 U	25 U	35	25 U	--	25 U	25 U	--	--	--	--	--
51	12/6/2016	35,236	6,711	313	782	126	--	500	214	--	--	--	--	--
52	12/6/2016	9,739	5,000 U	74	165	46	--	96	40	--	--	--	--	--
53	12/6/2016	5,000 U	5,000 U	25 U	38	25 U	--	33	25 U	--	--	--	--	--
54	12/6/2016	12,278	5,539	80	163	190	--	215	76	--	--	--	--	--
55	12/6/2016	38,459	5,861	210	736	272	--	422	155	--	--	--	--	--
56	12/6/2016	5,584	5,158	25 U	65	169	--	156	56	--	--	--	--	--
57	12/6/2016	6,413	5,000 U	25	62	25 U	--	35	25 U	--	--	--	--	--
58	12/6/2016	5,581	5,000 U	25 U	50	25 U	--	50	25 U	--	--	--	--	--
59	12/6/2016	135,868	22,670	1,114	3,823	343	--	1,138	500	--	--	--	--	--
60	12/6/2016	14,417	5,000 U	81	241	36	--	108	43	--	--	--	--	--
61	12/6/2016	13,494	5,000 U	75	190	42	--	170	80	--	--	--	--	--
62	12/6/2016	19,386	5,000 U	160	514	72	--	279	120	--	--	--	--	--
63	12/6/2016	24,850	5,000 U	150	463	71	--	207	85	--	--	--	--	--
64	12/6/2016	9,187	6,623	44	96	157	--	179	84	--	--	--	--	--
65	12/6/2016	8,968	5,000 U	44	100	25 U	--	60	25 U	--	--	--	--	--
66	12/6/2016	11,160	5,000 U	62	170	66	--	101	38	--	--	--	--	--
67	12/6/2016	7,150	5,000 U	39	103	25 U	--	87	39	--	--	--	--	--
68	12/6/2016	14,445	7,409	86	260	243	--	263	95	--	--	--	--	--
69	12/6/2016	5,174	5,000 U	25 U	49	76	--	78	28	--	--	--	--	--
70	12/6/2016	8,276	5,000 U	48	96	33	--	138	62	--	--	--	--	--
71	12/6/2016	40,193	245,953	212	551	66	--	226	163	--	--	--	--	--
72	12/6/2016	9,581	8,985	63	158	89	--	117	43	--	--	--	--	--
73	12/6/2016	53,931	8,116	478	1,371	207	--	514	198	--	--	--	--	--
74	12/6/2016	5,000 U	5,000 U	25 U	40	51	--	55	25 U	--	--	--	--	--
75	12/6/2016	7,349	5,000 U	45	113	101	--	114	43	--	--	--	--	--
76	12/6/2016	6,858	5,000 U	48	97	165	--	163	58	--	--	--	--	--
77	12/6/2016	5,000 U	5,000 U	25 U	29	118	--	103	40	--	--	--	--	--

Notes:
Passive soil gas adsorbent cartridges were deployed on November 21 through 25, 2016 and retrieved on November 30 through December 1, 2016.
Fuel oxygenates include MTBE, DIPE, ETBE, TAME, Tert-Butanol

Acronyms:
% = percent
DIPE = di-isopropyl ether
ETBE = ethyl tertiary-butyl ether
mg/m^3 = milligram per cubic meter
MTBE = methyl tertiary-butyl ether
ND = analytes not detected
ng = nanograms
ppm = parts per million
TAME = tertiary-amyl methyl ether
TPH = total petroleum range hydrocarbons
TPH-d = diesel range hydrocarbons; reported as C10-C15 range TPHs for passive soil gas survey
TPH-g = gasoline range hydrocarbons; reported as C4-C9 range TPHs for passive soil gas survey
U = analyte not detected above limit shown
VOC = volatile organic compounds

Table 5. Soil Analytical Results
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

Sample Location	Sample ID	Sample Date	Sample Depth	TPH-g	TPH-d	TPH-d (SGC)	TPH-o	TPH-o (SGC)	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	EDB	EDC	DIPE	ETBE	MTBE	TBA	TAME	Ethanol	Methanol
				Total Petroleum Hydrocarbons					VOCs and Lead Scavengers							Fuel Oxygenates						
MTCA Method A Cleanup Levels (1) (2)				*30/100*	*2,000*	*2,000*	*2,000*	*2,000*	*30*	*7,000*	*6,000*	*9,000*	*5,000*	*5*	*NE*	*NE*	*NE*	*100*	*NE*	*NE*	*NE*	*1.60E+08*
			Units: *ft bgs*	*mg/kg*	*mg/kg*	*mg/kg*	*mg/kg*	*mg/kg*	*µg/kg*	*µg/kg*	*µg/kg*	*µg/kg*	*µg/kg*	*µg/kg*	*µg/kg*	*µg/kg*	*µg/kg*	*µg/kg*	*µg/kg*	*µg/kg*	*µg/kg*	*µg/kg*
Subsurface Soil Samples																						
CB-1	CB-1-soil 10'	6/1/2015	10	247 U	0.99 U	--	9.9 U	--	5.0 U	5.0 U	5.0 U	99 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	--	--
	CB-1-soil 20'	6/1/2015	20	250 U	**2.2**	--	10 U	--	5.0 U	5.0 U	5.0 U	99 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	--	--
	CB-1-soil 30'	6/1/2015	30	248 U	0.99 U	--	9.9 U	--	4.9 U	4.9 U	4.9 U	98 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	--	--
	CB-1-soil 45'	6/1/2015	45	245 U	**1.2**	--	9.9 U	--	5.0 U	5.0 U	5.0 U	10 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	--	--
	CB-1-soil 55'	6/1/2015	55	247 U	0.99 U	--	9.9 U	--	5.0 U	5.0 U	5.0 U	99 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	--	--
	CB-1-soil 65'	6/1/2015	65	249 U	0.98 U	--	9.8 U	--	5.0 U	5.0 U	5.0 U	10 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	--	--
	CB-1-soil 75'	6/1/2015	75	248 U	0.98 U	--	9.8 U	--	5.0 U	5.0 U	5.0 U	99 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	--	--
	CB-1-soil 79'	6/1/2015	79	249 U	0.98 U	--	9.8 U	--	5.0 U	5.0 U	5.0 U	99 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	--	--
CB-2	CB-2-soil 15'	6/2/2015	15	246 U	0.99 U	--	9.9 U	--	5.0 U	5.0 U	5.0 U	10 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	--	--
	CB-2-soil 24'	6/2/2015	24	246 U	0.99 U	--	9.9 U	--	5.0 U	5.0 U	5.0 U	99 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	--	--
	CB-2-soil 35'	6/2/2015	35	246 U	0.98 U	--	9.8 U	--	5.0 U	5.0 U	5.0 U	10 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	--	--
	CB-2-soil 45'	6/2/2015	45	247 U	1.0 U	--	10 U	--	4.9 U	4.9 U	4.9 U	97 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	--	--
	CB-2-soil 55'	6/2/2015	55	250 U	0.99 U	--	9.9 U	--	4.9 U	4.9 U	4.9 U	98 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	--	--
	CB-2-soil 65'	6/2/2015	65	249 U	0.99 U	--	9.9 U	--	4.9 U	4.9 U	4.9 U	98 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	4.9 U	--	--
	CB-2-soil 75'	6/2/2015	75	247 U	0.99 U	--	9.9 U	--	5.0 U	5.0 U	5.0 U	99 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	--	--
	CB-2-soil 79'	6/2/2015	79	245 U	0.99 U	--	9.9 U	--	5.0 U	5.0 U	5.0 U	10 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U	--	--
AB-1	AB1-180904-(6-6.5)	9/4/2018	6-6.5	3.4 U	14 U	--	**28 J**	--	11 U	20 UJ	59 U	22 U	42 U	5.6 U	8.1 U	23 U	14 U	8.8 U	910 U	14 U	--	--
	AB1-180904-(10-11.5)	9/4/2018	10-11.5	2.5 U	11 U	--	**19 J**	--	8.2 U	15 UJ	43 U	16 U	30 U	4.1 U	5.9 U	17 U	10 U	6.5 U	660 U	9.9 U	--	--
	AB1-180904-(12.5-14)	9/4/2018	12.5-14	2.7 U	15 U	--	**40 J**	--	9.0 U	16 UJ	47 U	18 U	33 U	4.5 U	6.5 U	18 U	11 U	7.1 U	730 U	11 U	--	--
AB-2	AB2-180905-(5-5.5)	9/5/2018	5-5.5	2.5 U	12 U	--	17 U	--	8.2 U	15 UJ	43 U	16 U	31 U	4.1 U	6.0 U	17 U	11 U	6.5 U	670 U	10 U	--	--
	AB2-180905-(15-16.5)	9/5/2018	15-16.5	2.7 U	14 U	--	20 U	--	8.9 U	16 UJ	47 U	17 U	33 U	4.4 U	6.4 U	18 U	11 U	7.0 U	720 U	11 U	--	--
AB-3	AB3-180905-(10-11.5)	9/5/2018	10-11.5	2.5 U	13 U	--	19 U	--	8.4 U	15 UJ	44 U	16 U	31 U	4.2 U	6.1 U	17 U	11 U	6.6 U	680 U	10 U	--	--
	AB3-180905-(15-16.5)	9/5/2018	15-16.5	2.2 U	14 U	--	**33 J**	--	7.4 U	13 UJ	39 U	14 U	27 U	3.7 U	5.3 U	15 U	9.4 U	5.8 U	600 U	8.9 U	--	--
AB-5	AB5-181012-(5-7)	10/12/2018	5-7	2.6 U	11 U	--	**24 J**	--	8.5 U	15 U	10 U	17 U	32 UJ	4.2 U	6.1 U	17 U	11 U	6.7 U	690 U	10 U	--	--
	AB5-181012-(12-17)	10/12/2018	12-17	2.6 U	12 U	--	17 U	--	8.5 U	15 U	10 U	17 U	32 UJ	4.3 U	6.2 U	17 U	11 U	6.7 U	690 U	10 U	--	--
	AB5-181012-(21-23)	10/12/2018	21-23	2.4 U	12 U	--	17 U	--	7.9 U	14 U	9.4 U	15 U	29 UJ	3.9 U	5.7 U	16 U	10 U	6.2 U	640 U	9.5 U	--	--
	AB5-181012-(31-33)	10/12/2018	31-33	2.5 UJ	13 U	--	18 U	--	8.4 U	15 U	10 U	16 U	31 UJ	4.2 U	6.1 U	17 U	11 U	6.6 U	680 U	10 U	--	--
	AB5-181012-(41-43)	10/12/2018	41-43	2.8 UJ	14 U	--	20 U	--	9.1 U	16 U	11 U	18 U	34 UJ	4.5 U	6.6 U	19 U	12 U	7.2 U	740 U	11 U	--	--
	AB5-181013-(55-57)	10/13/2018	55-57	2.7 UJ	13 U	--	52 U	--	8.8 UJ	16 UJ	11 UJ	17 UJ	33 UJ	4.4 UJ	6.4 UJ	18 UJ	11 UJ	6.9 UJ	710 UJ	11 UJ	--	--
	AB5-181013-(65-67)	10/13/2018	65-67	2.5 UJ	13 U	--	51 U	--	8.3 UJ	15 U	9.9 U	16 U	31 U	4.2 U	6.0 U	17 U	11 U	6.6 U	670 UJ	10 U	--	--
	AB5-181013-(69-71)	10/13/2018	69-71	3.0 UJ	16 U	--	**70 J**	--	9.9 U	17 U	12 U	19 U	37 UJ	4.9 U	7.1 U	20 U	13 U	7.8 U	800 U	12 U	--	--
	AB5-181013-(81-83)	10/13/2018	81-83	2.3 U	13 U	--	54 U	--	7.6 U	14 U	9.1 U	15 U	28 UJ	3.8 U	5.5 U	16 U	9.7 U	6.0 U	620 U	9.2 U	--	--
AB-6	AB6-181013-(5-7)	10/13/2018	5-7	2.7 UJ	13 U	--	53 U	--	9.0 UJ	16 U	11 U	18 U	34 U	4.5 U	6.5 U	18 U	12 U	7.1 U	730 UJ	11 U	--	--
	AB6-181013-(12-17)	10/13/2018	12-17	2.4 UJ	12 U	--	51 U	--	7.8 UJ	14 U	9.4 U	15 U	29 U	3.9 U	5.7 U	16 U	10 U	6.2 U	640 UJ	9.5 U	--	--
	AB6-181013-(23-25)	10/13/2018	23-25	2.5 UJ	13 U	--	51 U	--	8.4 U	15 U	10 U	16 U	31 U	4.2 U	6.1 U	17 U	11 U	6.6 U	680 U	10 U	--	--
	AB6-181013-(35-37)	10/13/2018	35-37	2.8 UJ	**13 J**	--	**180**	--	9.2 UJ	16 U	11 U	18 U	34 UJ	4.6 U	6.7 U	19 U	12 U	7.3 U	750 UJ	11 U	--	--
	AB6-181013-(43-45)	10/13/2018	43-45	2.7 UJ	13 U	--	51 U	--	9.0 UJ	16 UJ	11 UJ	18 UJ	33 UJ	4.5 UJ	6.5 UJ	18 UJ	11 UJ	7.1 UJ	R	11 UJ	--	--
	AB6-181013-(47-49)	10/13/2018	47-49	3.6 UJ	16 U	--	66 U	--	12 U	21 U	14 U	24 U	45 UJ	6.0 U	8.7 U	25 U	15 U	9.5 U	980 U	15 U	--	--
	AB6-181013-(61-63)	10/13/2018	61-63	3.2 UJ	15 U	--	60 U	--	11 UJ	19 U	13 U	21 U	40 U	5.3 U	7.7 U	22 U	14 U	8.4 U	860 UJ	13 U	--	--
	AB6-181013-(71-73)	10/13/2018	71-73	2.6 UJ	13 U	--	53 U	--	8.5 UJ	15 U	10 U	17 U	31 U	4.2 U	6.1 U	17 U	11 U	6.7 U	690 UJ	10 U	--	--
	AB6-181013-(79-81)	10/13/2018	79-81	3.0 UJ	15 U	--	59 U	--	9.8 U	17 U	12 U	19 U	36 UJ	4.9 U	7.1 U	20 U	12 U	7.7 U	790 U	12 U	--	--

Table 5. Soil Analytical Results
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

Sample Location	Sample ID	Sample Date	Sample Depth	Total Petroleum Hydrocarbons					VOCs and Lead Scavengers							Fuel Oxygenates						
				TPH-g	TPH-d	TPH-d (SGC)	TPH-o	TPH-o (SGC)	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	EDB	EDC	DIPE	ETBE	MTBE	TBA	TAME	Ethanol	Methanol
MTCA Method A Cleanup Levels [(1) (2)]				*30/100*	*2,000*	*2,000*	*2,000*	*2,000*	*30*	*7,000*	*6,000*	*9,000*	*5,000*	*5*	*NE*	*NE*	*NE*	*100*	*NE*	*NE*	*NE*	*1.60E+08*
		Units:	*ft bgs*	*mg/kg*	*mg/kg*	*mg/kg*	*mg/kg*	*mg/kg*	*µg/kg*	*µg/kg*	*µg/kg*	*µg/kg*	*µg/kg*	*µg/kg*	*µg/kg*	*µg/kg*	*µg/kg*	*µg/kg*	*µg/kg*	*µg/kg*	*µg/kg*	*µg/kg*
MW-15	AB4-180905-(5-5.5)	9/5/2018	5-5.5	2.5 U	13 U	--	18 U	--	9.9 UJ	18 U	12 UJ	19 UJ	37 U	5.0 U	7.2 U	20 U	13 U	7.8 U	810 U	12 U	--	--
	AB4-180905-(10-11.5)	9/5/2018	10-11.5	2.4 U	12 U	--	**18 J**	--	9.4 UJ	17 U	11 UJ	18 UJ	35 U	4.7 U	6.8 U	19 U	12 U	7.4 U	760 U	11 U	--	--
	AB4-180905-(23.5-24.8)	9/5/2018	23.5-24.8	2.5 U	14 U	--	**43 J**	--	9.2 UJ	16 U	11 UJ	18 UJ	**63 J**	**5.3 J**	6.6 U	19 U	12 U	7.2 U	740 U	11 U	--	--
MW-16	MW-16-180906-(10-11.5)	9/6/2018	10-11.5	2.5 U	12 U	--	18 U	--	8.2 UJ	15 U	9.8 UJ	16 UJ	30 U	4.1 U	5.9 U	17 U	10 U	6.4 U	660 U	9.9 U	--	--
	MW-16-180906-(15-16.5)	9/6/2018	15-16.5	**25**	**38 J**	--	**85**	--	8.4 U	15 UJ	44 U	16 U	**470**	4.2 U	6.1 U	17 U	11 U	6.6 U	680 U	10 U	--	--
	MW-16-180906-(20-21.5)	9/6/2018	20-21.5	**3.4 J**	13 U	--	18 U	--	8.4 UJ	15 U	10 UJ	16 UJ	31 U	4.2 U	6.1 U	17 U	11 U	6.6 U	680 U	10 U	--	--
MW-17	MW17-180907-(5-6.5)	9/7/2018	5-6.5	**2.4 J**	12 U	--	**34 J**	--	7.8 U	14 UJ	41 U	15 U	29 U	3.9 U	5.6 U	16 U	9.9 U	6.1 U	630 U	9.4 U	--	--
	MW17-180907-(10-11.5)	9/7/2018	10-11.5	**78 J**	13 U	--	**19 J**	--	9.5 UJ	17 U	11 UJ	19 UJ	35 U	4.7 U	6.8 U	19 U	12 U	7.5 U	770 U	11 U	--	--
	MW17-180907-(15-16.5)	9/7/2018	15-16.5	3.4 U	14 U	--	20 U	--	11 U	20 UJ	59 U	22 U	42 U	5.6 U	8.1 U	23 U	14 U	8.8 U	910 U	14 U	--	--
	MW17-180907-(20-21.5)	9/7/2018	20-21.5	**63 J**	13 U	--	19 U	--	10 UJ	18 U	12 UJ	20 UJ	37 U	5.0 U	7.2 U	20 U	13 U	7.9 U	810 U	12 U	--	--
	MW17-180907-(25-26.5)	9/7/2018	25-26.5	**4.3 J**	**33 J**	--	**48 J**	--	9.3 U	17 UJ	49 U	18 U	35 U	4.7 U	6.7 U	19 U	12 U	7.4 U	760 U	11 U	--	--
	MW17-180907-(30-31.5)	9/7/2018	30-31.5	2.8 U	13 U	--	18 U	--	9.2 UJ	16 U	11 UJ	18 UJ	34 U	4.6 U	6.6 U	19 U	12 U	7.2 U	740 U	11 U	--	--
	MW17-180907-(35-36.5)	9/7/2018	35-36.5	**5.0 J**	13 U	--	18 U	--	9.1 UJ	16 U	11 UJ	18 UJ	34 U	4.5 U	6.6 U	19 U	12 U	7.2 U	740 U	11 U	--	--
	MW17-180907-(40-41.5)	9/7/2018	40-41.5	--	13 U	--	18 U	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	MW17-180907-(45-46.5)	9/7/2018	45-46.5	2.8 U	13 U	--	18 U	--	9.1 UJ	16 UJ	13 UJ	18 UJ	34 UJ	4.5 UJ	6.6 UJ	19 UJ	12 UJ	7.2 UJ	740 UJ	11 UJ	--	--
	MW17-180907-(50-51.5)	9/7/2018	50-51.5	2.7 U	13 U	--	**21 J**	--	9.0 U	16 UJ	47 U	18 U	34 U	4.5 U	6.5 U	18 U	11 U	7.1 U	730 U	11 U	--	--
	MW17-180907-(55-56.5)	9/7/2018	55-56.5	2.8 U	12 U	--	**21 J**	--	9.4 U	17 UJ	49 U	18 U	35 U	4.7 U	6.8 U	19 U	12 U	7.4 U	760 U	11 U	--	--
	MW17-180907-(60-61.5)	9/7/2018	60-61.5	**3.2 J**	12 U	--	**18 J**	--	9.3 UJ	17 U	11 UJ	18 UJ	35 U	4.7 U	6.7 U	19 U	12 U	7.4 U	760 U	11 U	--	--
	MW17-180907-(65-66.5)	9/7/2018	65-66.5	**28 J**	12 U	--	**23 J**	--	8.6 U	15 UJ	45 U	17 U	32 U	4.3 U	6.2 U	18 U	11 U	6.8 U	700 U	10 U	--	--
	MW17-180907-(70-71.5)	9/7/2018	70-71.5	**11**	13 U	--	**24 J**	--	8.3 UJ	15 U	10 UJ	16 UJ	31 U	4.2 U	6.0 U	17 U	11 U	6.6 U	680 U	10 U	--	--
	MW17-180907-(75-76.5)	9/7/2018	75-76.5	2.6 U	12 U	--	17 U	--	8.6 UJ	15 U	10 UJ	17 UJ	32 U	4.3 U	6.2 U	18 U	11 U	6.8 U	700 U	10 U	--	--
	MW17-180907-(80-81.5)	9/7/2018	80-81.5	**3.7 J**	13 U	--	**29 J**	--	8.0 U	14 UJ	42 U	16 U	30 U	4.0 U	5.8 U	16 U	10 U	6.3 U	650 U	9.7 U	--	--
MW-18	MW18-181011-(5-7)	10/11/2018	5-7	2.7 U	13 U	--	18 U	--	8.8 UJ	16 U	11 U	17 U	33 U	4.4 U	6.4 U	18 U	11 U	6.9 U	710 U	11 U	--	--
	MW18-181011-(12-17)	10/11/2018	12-17	2.8 U	15 U	--	**28 J**	--	9.4 UJ	17 U	11 U	18 U	35 U	4.7 U	6.8 U	19 U	12 U	7.4 U	760 U	11 U	--	--
	MW18-181011-(17-19)	10/11/2018	17-19	2.4 U	12 U	--	**31 J**	--	7.9 UJ	14 U	9.4 U	15 U	29 U	3.9 U	5.7 U	16 U	10 U	6.2 U	640 U	9.5 U	--	--
	MW18-181011-(29-31)	10/11/2018	29-31	2.5 U	13 U	--	18 U	--	8.1 UJ	14 UJ	9.7 UJ	16 UJ	30 UJ	4.1 UJ	5.9 UJ	17 UJ	10 UJ	6.4 UJ	660 UJ	9.8 UJ	--	--
	MW18-181011-(43-45)	10/11/2018	43-45	3.0 U	12 U	--	18 U	--	9.9 UJ	18 U	12 U	19 U	37 U	5.0 U	7.2 U	20 U	13 U	7.8 U	800 U	12 U	--	--
	MW18-181011-(49-51)	10/11/2018	49-51	2.8 U	14 U	--	20 U	--	9.2 UJ	16 U	11 U	18 U	34 U	4.6 U	6.7 U	19 U	12 U	7.3 U	750 U	11 U	--	--
	MW18-181011-(59-61)	10/11/2018	59-61	3.7 U	15 U	--	**39 J**	--	12 UJ	22 U	15 U	24 U	45 U	6.1 U	8.8 U	25 U	16 U	9.6 U	990 U	15 U	--	--
	MW18-181011-(75-77)	10/11/2018	75-77	3.0 U	14 U	--	**23 J**	--	10 UJ	18 U	12 U	20 U	37 U	5.0 U	7.3 U	20 U	13 U	7.9 U	810 U	12 U	--	--
MW-19	MW19-181012-(5-7)	10/12/2018	5-7	2.5 UJ	12 U	--	**55 J**	--	8.3 U	15 U	9.9 U	16 U	31 UJ	4.1 U	6.0 U	17 U	11 U	6.5 U	670 U	10 U	--	--
	MW19-181012-(7-9)	10/12/2018	7-9	2.6 U	14 U	--	**25 J**	--	8.6 U	15 U	10 U	17 U	32 UJ	4.3 U	6.3 U	18 U	11 U	6.8 U	700 U	10 U	--	--
	MW19-181012-(17-22)	10/12/2018	17-22	2.7 U	12 U	--	**30 J**	--	8.9 U	16 U	11 U	17 U	33 UJ	4.4 U	6.4 U	18 U	11 U	7.0 U	720 U	11 U	--	--
	MW19-181012-(22-27)	10/12/2018	22-27	2.4 UJ	12 U	--	51 U	--	7.9 U	14 U	9.4 U	15 U	29 UJ	3.9 U	5.7 U	16 U	10 U	6.2 U	640 U	9.5 U	--	--
	MW19-181012-(31-33)	10/12/2018	31-33	2.5 UJ	13 U	--	51 U	--	8.2 U	15 U	9.8 U	16 U	30 UJ	4.1 U	5.9 U	17 U	10 U	6.5 U	660 U	9.9 U	--	--
	MW19-181012-(43-45)	10/12/2018	43-45	3.0 U	13 U	--	19 U	--	9.9 U	18 U	12 U	19 U	37 UJ	4.9 U	7.2 U	20 U	13 U	7.8 U	800 U	12 U	--	--
	MW19-181012-(47-49)	10/12/2018	47-49	3.0 UJ	14 U	--	58 U	--	10 U	18 U	12 U	20 U	37 UJ	5.0 U	7.2 U	20 U	13 U	7.9 U	810 U	12 U	--	--
	MW19-181012-(59-61)	10/12/2018	59-61	2.6 U	14 U	--	**30 J**	--	8.4 U	15 U	10 U	17 U	31 UJ	4.2 U	6.1 U	17 U	11 U	6.7 U	690 U	10 U	--	--
	MW19-181012-(75-77)	10/12/2018	75-77	2.4 U	12 U	--	17 U	--	7.9 U	14 U	9.5 U	**19 J**	**110 J**	4.0 U	5.7 U	16 U	10 U	6.3 U	640 U	9.6 U	--	--
VE-3	VE3-180908-(10-11.5)	9/8/2018	10-10.5	2.7 U	13 U	--	**20 J**	--	8.8 UJ	16 U	11 U	17 U	33 U	4.4 U	6.4 U	18 U	11 U	7.0 U	720 U	11 U	--	--
	VE3-180908-(20-21.5)	9/8/2018	20-21.5	2.6 U	12 U	--	17 U	--	8.6 UJ	15 U	10 UJ	17 UJ	32 U	4.3 U	6.2 U	18 U	11 U	6.8 U	700 U	10 U	--	--
	VE3-180908-(30-31.5)	9/8/2018	30-31.5	5.7 U	13 UJ	--	18 UJ	--	19 UJ	34 U	23 UJ	37 UJ	71 U	9.5 U	14 U	39 U	24 U	15 U	1,500 U	23 U	--	--
	VE3-180908-(40-41.5)	9/8/2018	40-40.5	3.0 U	13 U	--	**19 J**	--	9.8 U	17 U	12 U	19 U	36 U	4.9 U	7.1 U	20 U	12 U	7.7 U	790 U	12 U	--	--
VE-4	VE4-180908-(5-5.5)	9/8/2018	5-5.5	2.8 U	13 U	--	18 U	--	9.4 UJ	17 U	11 UJ	18 UJ	35 U	4.7 U	6.8 U	19 U	12 U	7.4 U	760 U	11 U	--	--

Table 5. Soil Analytical Results
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

Sample Location	Sample ID	Sample Date	Sample Depth	Total Petroleum Hydrocarbons TPH-g	TPH-d	TPH-d (SGC)	TPH-o	TPH-o (SGC)	VOCs and Lead Scavengers Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	EDB	EDC	Fuel Oxygenates DIPE	ETBE	MTBE	TBA	TAME	Ethanol	Methanol
MTCA Method A Cleanup Levels (1) (2)				*30/100*	*2,000*	*2,000*	*2,000*	*2,000*	*30*	*7,000*	*6,000*	*9,000*	*5,000*	*5*	*NE*	*NE*	*NE*	*100*	*NE*	*NE*	*NE*	*1.60E+08*
			Units: *ft bgs*	*mg/kg*	*mg/kg*	*mg/kg*	*mg/kg*	*mg/kg*	*µg/kg*	*µg/kg*	*µg/kg*	*µg/kg*	*µg/kg*	*µg/kg*	*µg/kg*	*µg/kg*	*µg/kg*	*µg/kg*	*µg/kg*	*µg/kg*	*µg/kg*	*µg/kg*
AB-7 (MW-3)	AB7-191120-(34-37)	11/20/2019	34-37	5.2 U	12 U	--	18 U	--	8.5 U	30 U	20 U	33 U	64 UJ	8.5 U	12 U	35 U	22 U	13 U	570 U	21 U	150 U	**650 J**
	AB7-191120-(75-77)	11/20/2019	75-77	4.4 U	13 U	--	19 U	--	7.2 U	26 U	17 U	28 U	54 UJ	7.2 U	10 U	29 U	18 U	11 U	480 U	17 U	150 U	250 U
	AB7-191120-(80-82)	11/20/2019	80-82	**1,700**	**400**	--	19 U	--	6.9 U	25 U	17 U	27 U	**940 J**	6.9 U	10 U	28 U	18 U	11 U	460 U	17 U	140 U	**410 J**
	AB7-191120-(82-84)	11/20/2019	82-84	**5,500 J**	**9,200**	--	**47 J**	--	7.0 U	25 U	17 U	28 U	**4,800 J**	7.0 U	10 U	29 U	18 U	11 U	470 U	17 U	160 U	**1,500**
AB-8 (MW-19)	AB8-191123-(32-34)	11/23/2019	32-34	6.0 U	12 U	--	17 U	--	9.9 U	**120 J**	**77 J**	**270 J**	74 UJ	9.9 U	14 U	40 U	25 U	16 U	660 U	24 U	130 U	**14,000**
	AB8-191123-(64-66)	11/23/2019	64-66	5.1 U	13 U	--	18 U	--	8.4 U	30 U	20 U	33 U	63 UJ	8.4 U	12 U	34 U	21 U	13 U	560 U	20 U	140 U	**660 J**
	AB8-191123-(82)	11/23/2019	82	**98**	**37 J**	--	19 U	--	7.8 U	28 U	**97**	**380 J**	**230 J**	7.8 U	11 U	32 U	20 U	**17 J**	520 U	19 U	150 U	**890 J**
	AB8-191123-(83-85)	11/23/2019	83-85	**5,800**	**670**	--	18 U	--	**2,200 J**	**20,000 J**	**20,000**	**120,000**	**7,200 J**	6.2 U	8.9 U	25 U	16 U	9.8 U	410 U	15 U	140 U	**940 J**
MW-20	MW20-191125-(68-71)	11/25/2019	68-71	4.8 U	13 U	13 U	19 U	19 U	7.9 U	28 U	19 U	31 U	59 UJ	0.013 UJ	11 U	32 U	20 U	13 U	530 U	19 U	140 U	**780 J**
	MW20-191125-(86-90)	11/25/2019	86-90	**420**	**850**	**900**	**18 J**	**18 J**	6.9 U	24 U	**2,200**	**6,400**	**1,000 J**	0.013 UJ	9.9 U	28 U	18 U	11 U	460 U	17 U	150 U	**9,500**
MW-22	MW22-191121-(75-77)	11/21/2019	75-77	4.4 U	14 U	--	20 U	--	7.3 U	26 U	17 U	**30 J**	**98 J**	7.3 U	11 U	30 U	19 U	12 U	490 U	18 U	150 U	**410 J**
MW-23	MW23-191124-(80-82)	11/24/2019	80-82	4.3 U	13 U	--	18 U	--	7.1 U	25 U	**35 J**	**88 J**	53 UJ	7.1 U	10 U	29 U	18 U	11 U	470 U	17 U	160 U	**7,000**
Riverbank Surface Soil Samples																						
RB-1	RB-1	9/18/2016	0	5.9 U	28 U	--	56 U	--	24 U	59 U	59 U	300 U	59 U	24 U	24 U	59 U	59 U	59 U	2,200 U	59 U	--	--
RB-2	RB-2	9/18/2016	0	4.2 U	23 U	--	45 U	--	17 U	42 U	42 U	210 U	42 U	17 U	17 U	42 U	42 U	42 U	1,600 U	42 U	--	--
RB-3	RB-3	9/18/2016	0	4.1 U	25 U	--	49 U	--	16 U	41 U	41 U	200 U	41 U	16 U	16 U	41 U	41 U	41 U	1,500 U	41 U	--	--
RB-4	RB-4	9/18/2016	0	4.3 U	24 U	--	47 U	--	17 U	43 U	43 U	220 U	43 U	17 U	17 U	43 U	43 U	43 U	1,600 U	43 U	--	--
RB-5	RB-5	9/18/2016	0	4.7 U	22 U	--	45 U	--	19 U	47 U	47 U	230 U	47 U	19 U	19 U	47 U	47 U	47 U	1,700 U	47 U	--	--
RB-6	RB-6	9/18/2016	0	4.2 U	23 U	--	**640**	--	17 U	42 U	42 U	210 U	42 U	17 U	17 U	42 U	42 U	42 U	1,600 U	42 U	--	--
RB-7	RB-7	12/8/2016	0	4.4 U	24 U	--	48 U	--	17 U	43 U	43 U	210 U	43 U	17 U	17 U	43 U	43 U	43 U	1,600 U	43 U	--	--
RB-8	RB-8	12/8/2016	0	4.1 U	20 U	--	**180**	--	18 U	46 U	46 U	230 U	46 U	18 U	18 U	46 U	46 U	46 U	1,700 U	46 U	--	--
RB-9	RB-9	12/8/2016	0	4.9 U	**23**	--	**240**	--	21 U	52 U	52 U	260 U	52 U	21 U	21 U	52 U	52 U	52 U	2,000 U	52 U	--	--

Notes:
Values in **bold** were detected above the limit
= Yellow shaded detections exceed Ecology's MTCA Method A Cleanup Level for Soil
= Grey shaded values are limits that exceed Ecology's MTCA Method A Cleanup Level for Soil.
(1) MTCA Method A Soil Cleanup Levels for Industrial Properties (Washington Administrative Code 173-340-900 Table 745-1)
(2) TPH-g MTCA Method A Soil Cleanup Level for Industrial Properties has two levels. If benzene is present in soil, the level is 30 mg/kg; if no detectable benzene, the level is 100 mg/kg.

Acronyms:
-- = not sampled or not submitted for this analyte
µg/kg = microgram per kilogram
DIPE = di-isopropyl ether
EDB = 1,2-dibromoethane
EDC = 1,2-dichloroethane
ETBE = ethyl tertiary-butyl ether
ft bgs = feet below ground surface
J = estimated concentration
mg/kg = milligram per kilogram
MTBE = methyl tertiary-butyl ether
MTCA = Model Toxics Control Act
NE = MTCA Method A screening levels have not been established.
SGC = samples analyzed with silica gel cleanup
TAME = tertiary-amyl methyl ether
TBA = tertiary-butanol or t-butyl alcohol
TPH = total petroleum hydrocarbon
TPH-g = gasoline range hydrocarbons (as analyzed by Northwest Method NWPTH-Gx)
TPH-d = diesel range hydrocarbons (as analyzed by Northwest Method NWTPH-Dx)
TPH-o = motor oil range hydrocarbons (as analyzed by Northwest Method NWTPH-Dx)
U = analyte not detected above limit shown; starting with data collected since September 2018, the limit shown is the method detection limit.
VOC = volatile organic compounds

Table 6. Groundwater Quality Parameters
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

Well ID	Sample Date	Field Parameters								Laboratory Analytical						
		pH	Conductivity	Dissolved Oxygen	Temperature	ORP	Turbidity	Ferrous Iron	Nitrate	Sulfate	Alkalinity	Manganese (Dissolved)	Methane	Iron (Total)	Manganese (Total)	Total Organic Carbon
	Units:	*S.U.*	*mS/cm*	*mg/L*	*°C*	*mV*	*NTU*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*
MW-2	6/30/2010	6.96	1.61	0.16	21.49	48	7.0	**0.45**	**25**	**100**	**550**	**0.085**	0.026 U	--	--	--
	12/15/2010	7.11	0.928	2.4	20.50	15	1.0	**0.41**	**46**	**120**	**650**	**0.11**	0.026 U	--	--	--
	5/29/2014	7.16	1.215	2.49	17.58	146.3	--	**1.16**	**13.8**	**100**	**537**	0.0050 U	0.001 U	--	--	--
	10/29/2014	6.85	1.578	1.07	17.51	91.6	--	**1.33**	**2.6**	**140**	**730**	**0.011**	0.001 U	--	--	--
	6/4/2015	6.84	1.018	2.21	17.97	-66.6	--	**0.53**	**0.1**	**107**	**558**	0.0050 U	0.001 U	--	--	--
	9/28/2015	6.91	1.467	1.77	17.60	-7.0	--	--	**1.7**	**167**	**711**	0.0050 U	**0.0242**	--	--	--
	8/29/2016	7.38	1.40	1.74	19.89	94	--	--	--	**110**	--	0.02 U	0.0050 U	--	--	--
	12/5/2016	6.63	1.05	6.16	15.80	282	--	--	--	**89**	**400**	--	0.0050 U	--	--	--
	10/24/2017	7.34	1.27	8.93	17.58	112	--	0.01 U	**9.70**	**110**	**350**	0.02 U	**0.01**	--	--	--
	6/14/2018	6.84	1.16	3.40	22.39	178	--	**0.96**	**11.0**	**110**	**400**	0.020 U	0.0050 U	--	--	--
	12/2/2018	7.54	1.68	4.81	13.55	206	--	**0.15**	**10.8**	**92**	**680**	0.0017 U	**0.022**	--	--	--
	6/26/2019	6.93	1.4	IE	17.80	115	--	**0.12**	**17.9**	**120**	**560**	**0.0066 J**	**0.002** U	--	--	--
	12/11/2019	7.00	1.54	1.55	13.57	120	2.5	0	**16.8**	**110**	**530**	0.0017 U	0.00050 U	0.18 U	**0.055**	--
	6/24/2020	6.91	1.42	2.27	29.34	97	0.0	**0.02**	**12.7**	**110**	**560**	0.0017 U	0.00050 U	--	--	--
	12/15/2020	7.72	1.319	2.37	15.25	109.4	74.9	**0.82**	**5.4**	**100**	**540**	**0.0022 J**	0.005 U	--	--	--
MW-3	5/28/2014	7.15	1.053	--	18.12	-105.6	--	--	--	--	--	--	--	--	--	--
	10/30/2014	6.91	1.136	0.84	17.28	-144.7	--	--	--	--	--	--	--	--	--	--
	6/4/2015	6.82	1.353	0.95	18.61	-154.0	--	--	--	--	--	--	--	--	--	--
	9/29/2015	6.82	1.174	1.01	17.51	-174.4	--	--	--	--	--	--	--	--	--	--
	8/30/2016	7.13	1.190	2.42	18.13	-153.0	--	--	--	--	--	--	--	--	--	--
	12/2/2016	6.86	0.963	3.24	16.06	36	--	--	--	--	--	--	--	--	--	--
	5/16/2017	7.27	0.996	0.82	17.01	-37	--	--	--	--	--	--	--	--	--	--
	10/25/2017	7.41	1.20	4.01	17.58	-105	--	--	--	--	--	--	--	--	--	--
	6/14/2018	6.70	1.03	2.75	19.46	42	--	--	--	--	--	--	--	--	--	--
	12/4/2018	7.56	1.28	8.82	16.31	-65	--	--	--	**29**	**520**	**0.96**	**1.7**	--	--	--
	6/26/2019	6.99	1.03	IE	18.20	-120	--	**1.71**	**2.7**	**32**	**470**	**0.80**	**2.1**	--	--	--
	12/11/2019	7.22	1.31	0.83	14.47	-192	8.1	**1.28**	**1.3**	**63**	**450 J**	**0.81**	**0.50**	**3.9**	**0.79**	**19**
	6/24/2020	7.02	1.22	0.96	22.25	-100	0.0	**1.9**	**1.9**	**61**	**450**	**0.66**	**0.063**	--	--	--
	12/16/2020	7.60	1.274	1.30	16.10	-94.2	769	**1.11**	0.0	**49**	**500**	**0.77**	**1.1**	--	--	--
MW-4	6/29/2010	7.62	0.88	6.28	22.88	117	11.5	**0.24**	**49**	**110**	**180**	0.020 U	0.026 U	--	--	--
	12/15/2010	7.73	0.52	6.76	18.64	87	0.0	0	**26**	**110**	**170**	0.020 U	0.026 U	--	--	--
	5/28/2014	7.68	0.728	--	17.78	82.2	--	--	--	--	--	--	--	--	--	--
	10/28/2014	7.38	0.741	7.75	16.90	36.0	--	--	--	--	--	--	--	--	--	--
	6/3/2015	7.40	0.751	8.28	17.76	-23.6	--	--	--	--	--	--	--	--	--	--
	9/28/2015	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/30/2016	8.36	0.813	7.34	18.32	59	--	--	--	--	--	--	--	--	--	--
	12/5/2016	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/15/2017	7.99	0.861	7.78	17.9	-27	--	--	--	--	--	--	--	--	--	--
	6/13/2018	7.49	0.813	7.56	20.99	161	--	--	--	--	--	--	--	--	--	--
	6/26/2019	7.40	0.962	6.62	19.15	150	0.0									
	12/11/2019	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/23/2020	7.57	1.05	9.28	19.38	84	0.00	--	--	--	--	--	**0.00099 J**	--	--	--
	6/23/2020	7.57	1.05	9.28	19.38	84	0.00	--	--	--	--	--	**0.00099 J**	--	--	--

Table 6. Groundwater Quality Parameters
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

		Field Parameters								Laboratory Analytical						
Well ID	Sample Date	pH	Conductivity	Dissolved Oxygen	Temperature	ORP	Turbidity	Ferrous Iron	Nitrate	Sulfate	Alkalinity	Manganese (Dissolved)	Methane	Iron (Total)	Manganese (Total)	Total Organic Carbon
	Units:	*S.U.*	*mS/cm*	*mg/L*	*°C*	*mV*	*NTU*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*
MW-6	6/29/2010	7.52	0.91	7.56	17.78	161	56.2	**0.37**	**38**	**110**	**170**	**0.026**	0.026 U	--	--	--
	12/15/2010	7.64	0.51	7.06	17.95	94	0.7	0	**26**	**110**	**170**	0.020 U	0.026 U	--	--	--
	5/29/2014	7.93	0.095	8.78	15.40	127.1	--	0	**18.5**	**110**	**252**	0.0050 U	0.0010 U	--	--	--
	10/29/2014	7.43	0.817	6.79	19.45	84.7	--	**0.40**	0	**100**	**185**	0.0050 U	0.0010 U	--	--	--
	6/3/2015	7.53	0.744	8.59	17.18	-44.8	--	0	0	**107**	**169**	0.0050 U	**0.00168**	--	--	--
	9/28/2015	7.53	0.812	6.76	19.23	-8.5	--	--	**15.7**	**108**	**189**	0.0050 U	0.0010 U	--	--	--
	8/30/2016	8.30	0.836	7.39	18.88	110	--	--	--	**100**	--	0.020 U	0.0050 U	--	--	--
	12/5/2016	6.83	0.851	6.84	14.54	207	--	--	--	**93**	**170**	0.020 U	0.0050 U	--	--	--
	5/16/2017	8.06	0.824	7.89	14.65	66	--	--	--	**96**	**150**	0.020 U	**0.0085**	--	--	--
	10/23/2017	7.61	0.863	9.32	19.68	186	--	0.01 U	**0.04**	**98**	**180**	0.020 U	0.0050 U	--	--	--
	6/11/2018	7.38	0.828	8.38	20.69	156	--	0.01 U	**8.09**	**96 J**	**150**	0.020 U	0.0050 U	--	--	--
	12/2/2018	7.98	0.963	7.86	18.65	241	--	0.01 U	**66.5**	**100**	**170**	**0.0021 J**	0.0017 U	--	--	--
	6/26/2019	7.54	0.831	IE	17.70	121	--	0.00 U	**14.7**	**100**	**140**	0.0050 U	0.0017 U	--	--	--
	12/10/2019	7.69	1.07	9.47	14.60	10	0.0	**0.01**	**9.2**	**110**	**160**	0.0017 U	0.0010 U	0.18 U	0.0023 U	--
	6/23/2020	7.55	1.08	9.05	19.09	103	0.0	**0.11**	**8.1**	**110**	**160**	0.0017 U	0.00050 U	--	--	--
	12/16/2020	7.88	2.036	8.38	16.20	92	68	0.00	**17.4**	**110**	**150**	0.0017 U	0.0005 U	--	--	--
MW-7	6/30/2010	7.46	0.92	5.03	19.65	88	84.5	**0.53**	**44**	**110**	**190**	**0.071**	0.026 U	--	--	--
	12/15/2010	7.59	0.52	6.96	17.69	89	6.2	0	**27**	**110**	**170**	0.020 U	0.026 U	--	--	--
	5/28/2014	7.63	0.775	--	18.48	101.7	--	--	--	--	--	--	--	--	--	--
	10/29/2014	7.48	0.773	7.43	16.81	84.1	--	--	--	--	--	--	--	--	--	--
	6/3/2015	7.10	0.843	6.78	18.03	-1.8	--	--	--	--	--	--	--	--	--	--
	9/28/2015	7.10	0.798	7.40	17.31	-6.4	--	--	**6.0**	**103**	**203**	**0.0086**	0.0010 U	--	--	--
	8/30/2016	7.96	0.964	6.92	19.01	94	--	--	--	--	--	--	--	--	--	--
	12/5/2016	7.06	0.839	7.90	15.85	165	--	--	--	--	--	--	--	--	--	--
	5/15/2017	7.62	0.863	6.10	17.30	35	--	--	--	--	--	--	--	--	--	--
	10/24/2017	7.83	0.918	7.73	17.67	145	--	--	--	--	--	--	--	--	--	--
	6/13/2018	7.25	0.837	6.58	22.15	182	--	--	--	--	--	--	--	--	--	--
	12/4/2018	8.02	0.976	8.26	13.19	173	--	--	--	--	--	--	--	--	--	--
	6/26/2019	7.42	1.19	4.35	21.12	166	0.0	--	--	--	--	--	--	--	--	--
	12/11/2019	7.36	1.05	5.38	14.10	107	0.8	--	--	--	--	--	--	--	--	--
	6/23/2020	7.31	1.03	8.37	21.48	94	21.0	--	--	--	--	--	--	--	--	--
	12/14/2020	7.66	0.979	8.02	15.20	132	66	--	--	--	--	--	--	--	--	--
MW-8	6/30/2010	7.54	0.93	5.11	17.57	99	0.0	**0.01**	**45**	**110**	**180**	0.020 U	0.026 U	--	--	--
	12/15/2010	7.52	0.53	6.94	16.94	94	0.0	0	**27**	**110**	**170**	0.020 U	0.026 U	--	--	--
	5/28/2014	7.70	0.755	--	17.50	89.5	--	**0.59**	**16.8**	**110**	**242**	0.0050 U	0.0010 U	--	--	--
	10/29/2014	7.37	0.774	7.05	17.34	75.3	--	0	**18.4**	**100**	**190**	0.0072 U	0.0010 U	--	--	--
	6/3/2015	7.39	0.778	7.38	17.90	-42.7	--	0	**16.7**	**108**	**185**	0.0050 U	0.0010 U	--	--	--
	9/28/2015	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/30/2016	7.72	0.843	5.29	19.46	143	--	--	--	**100**	--	0.020 U	0.0050 U	--	--	--
	12/5/2016	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/17/2017	7.88	0.869	5.68	17.96	28	--	--	--	**100**	**170**	0.020 U	0.0050 U	--	--	--
	6/11/2018	7.28	0.866	7.46	19.77	175	--	0.01 U	**42.9**	**120**	**180**	0.020 U	0.0050 U	--	--	--
	6/26/2019	7.58	0.848	IE	18.29	116	--	--	--	--	--	--	--	--	--	--
	12/11/2019	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/23/2020	7.46	0.925	5.11	25.04	107	0.00	0.0	**15.9**	**130**	**180**	0.0017 U	0.00062 J	--	--	--

Table 6. Groundwater Quality Parameters
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

Well ID	Sample Date	Field Parameters								Laboratory Analytical						
		pH	Conductivity	Dissolved Oxygen	Temperature	ORP	Turbidity	Ferrous Iron	Nitrate	Sulfate	Alkalinity	Manganese (Dissolved)	Methane	Iron (Total)	Manganese (Total)	Total Organic Carbon
	Units:	*S.U.*	*mS/cm*	*mg/L*	*°C*	*mV*	*NTU*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*
MW-10	6/30/2010	7.56	0.93	5.53	18.12	80	0.0	0	**48**	**110**	**180**	0.020 U	0.026 U	--	--	--
	12/15/2010	7.68	0.52	6.30	18.19	99	0.0	0	**27**	**110**	**170**	0.020 U	0.026 U	--	--	--
	5/28/2014	7.65	0.764	--	17.91	137.6	--	--	--	--	--	--	--	--	--	--
	10/29/2014	7.40	0.769	7.45	17.02	80.6	--	--	--	--	--	--	--	--	--	--
	6/3/2015	7.29	0.78	7.32	17.90	-34.4	--	--	--	--	--	--	--	--	--	--
	9/28/2015	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	8/30/2016	8.28	0.831	5.40	18.26	100	--	--	--	--	--	--	--	--	--	--
	12/5/2016	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	5/15/2017	7.39	0.888	6.24	17.41	29	--	--	--	--	--	--	--	--	--	--
	6/13/2018	7.35	0.730	4.96	28.26	178	--	--	--	--	--	--	--	--	--	--
	6/26/2019	7.60	1.01	6.38	18.25	155	8.0	--	--	--	--	--	--	--	--	--
	12/11/2019	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
	6/23/2020	7.40	1.04	7.45	20.04	91	0.00	--	--	--	--	--	--	--	--	--
MW-11	6/30/2010	7.20	1.10	2.08	18.86	83	0.0	**0.05**	**35**	**88**	**310**	**0.079**	0.026 U	--	--	--
	12/16/2010	7.04	0.57	6.22	18.49	84	0.0	0	**23**	**100**	**230**	**0.14**	0.026 U	--	--	--
	5/29/2014	7.20	0.889	1.08	19.27	102.7	--	--	--	--	--	--	--	--	--	--
	10/30/2014	6.96	0.932	1.12	18.47	89.0	--	--	--	--	--	--	--	--	--	--
	6/4/2015	6.89	0.916	0.94	18.97	-49.8	--	--	--	--	--	--	--	--	--	--
	9/29/2015	6.89	0.914	0.89	18.40	-15.4	--	--	--	--	--	--	--	--	--	--
	8/29/2016	7.32	0.952	2.67	19.99	148	--	--	--	--	--	--	--	--	--	--
	12/5/2016	6.70	0.933	1.73	17.14	204	--	--	--	--	--	--	--	--	--	--
	5/16/2017	7.44	0.949	4.79	17.41	46	--	--	--	--	--	--	--	--	--	--
	10/25/2017	7.37	1.040	7.49	18.57	154	--	--	--	--	--	--	--	--	--	--
	6/14/2018	6.71	0.956	3.35	21.77	198	--	--	--	--	--	--	--	--	--	--
	12/2/2018	7.48	1.14	5.47	15.49	231	--	--	--	--	--	--	--	--	--	--
	6/27/2019	6.98	1.29	1.70	17.37	213	0.0	--	--	--	--	--	--	--	--	--
	12/11/2019	7.21	1.10	2.97	15.90	34	1	--	--	--	--	--	--	--	--	--
	6/24/2020	6.95	1.38	0.00	20.84	83	0	--	--	--	--	--	--	--	--	--
	12/15/2020	7.43	1.154	2.73	15.93	133.1	78.3	--	--	--	--	--	--	--	--	--
MW-12	6/30/2010	7.19	1.23	0.32	18.87	-74	2.3	**1.09**	**32**	**120**	**320**	**0.49**	**0.0861**	--	--	--
	12/16/2010	7.22	0.62	3.86	19.50	-30	0.0	**0.50**	**18**	**120**	**290**	**0.49**	**0.0609**	--	--	--
	5/29/2014	7.22	0.993	1.81	19.82	-27.5	--	--	**9.2**	**110**	**309**	**0.270**	**0.0142**	--	--	--
	10/30/2014	6.82	1.135	2.55	16.73	-50.6	--	**4.68**	0	**110**	**350**	**0.280**	**0.0870**	--	--	--
	6/4/2015	6.82	1.017	2.17	18.40	-74.5	--	**0.34**	**10.4**	**113**	**312**	**0.201**	0.0010 U	--	--	--
	9/29/2015	6.82	1.124	1.15	16.49	-63.7	--	--	**7.0**	**107**	**367**	**0.252**	**0.0362**	--	--	--
	8/29/2016	7.45	1.290	1.10	19.42	-10	--	--	--	**83**	--	**0.25**	**0.760**	--	--	--
	12/6/2016	6.80	0.993	3.22	14.52	121	--	--	--	--	**270**	**0.19**	**0.063**	--	--	--
	5/16/2017	7.96	0.965	3.93	15.97	36	--	--	--	**100**	**240**	**0.16**	**0.012**	--	--	--
	10/24/2017	7.50	1.100	3.39	17.70	49	--	0.01 U	**10.5**	**98.0**	**270**	**0.19**	**0.090**	--	--	--
	6/14/2018	6.57	1.120	1.95	18.69	212	--	0.01 U	**23.8**	**120**	**290**	**0.043**	0.0050 U	--	--	--
	12/3/2018	7.57	1.36	5.67	13.71	176	--	0.01 U	**16.4**	**130**	**370**	**0.074**	0.0017 U	--	--	--
	6/27/2019	6.97	1.11	IE	15.90	164	--	**0.09**	**4.7**	**120 J**	**340**	**0.10**	**0.026**	--	--	--
	12/11/2019	7.29	1.30	3.22	12.59	15	0.0	**0.01**	**7.0**	**140**	**290 J**	**0.076**	**0.0015 J**	0.18 U	**0.074**	--
	6/24/2020	6.76	1.41	0.00	22.66	114	42.0	**0.11**	**4.3**	**140**	**430**	**0.12**	**0.0064**	--	--	--
	12/16/2020	7.59	1.273	3.16	15.10	121.4	70.8	0.00	**7.2**	**140**	**360**	**0.14**	**0.0037**	--	--	--

Table 6. Groundwater Quality Parameters
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

Well ID	Sample Date	Field Parameters								Laboratory Analytical						
		pH	Conductivity	Dissolved Oxygen	Temperature	ORP	Turbidity	Ferrous Iron	Nitrate	Sulfate	Alkalinity	Manganese (Dissolved)	Methane	Iron (Total)	Manganese (Total)	Total Organic Carbon
	Units:	*S.U.*	*mS/cm*	*mg/L*	*°C*	*mV*	*NTU*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*
MW-14	6/29/2010	7.36	0.99	3.94	20.08	98	24.1	**0.34**	**43**	**120**	**220**	0.020 U	0.026 U	--	--	--
	12/15/2010	7.33	0.52	5.77	17.81	85	1.7	0	**26**	**110**	**180**	0.020 U	0.026 U	--	--	--
	5/29/2014	7.53	0.795	5.70	17.69	101.4	--	--	--	--	--	--	--	--	--	--
	10/29/2014	7.23	0.805	5.65	17.81	105.4	--	--	--	--	--	--	--	--	--	--
	6/4/2015	7.39	0.784	6.22	17.02	-46.6	--	--	--	--	--	--	--	--	--	--
	8/29/2016	7.71	0.877	5.19	18.76	120	--	--	--	--	--	--	--	--	--	--
	12/5/2016	6.97	0.855	6.29	15.43	178	--	--	--	--	--	--	--	--	--	--
	5/17/2017	7.71	0.923	3.02	17.44	46	--	--	--	--	--	--	--	--	--	--
	10/24/2017	7.70	0.932	6.18	17.69	144	--	--	--	--	--	--	--	--	--	--
	12/2/2018	7.87	1.01	7.32	15.75	222	--	--	--	--	--	--	--	--	--	--
	6/27/2019	7.54	1.18	3.44	16.30	160	0.0	--	--	--	--	--	--	--	--	--
	12/11/2019	7.21	1.02	4.27	14.38	107	0.8	--	--	--	--	--	--	--	--	--
	6/24/2020	7.24	1.06	4.61	20.61	116	0.0	--	--	--	--	--	--	--	--	--
	12/15/2020	7.90	1.032	7.28	16.10	111.3	75.3	--	--	--	--	--	--	--	--	--
MW-15	12/3/2018	8.02	0.950	6.16	16.03	178	--	--	--	--	--	--	--	--	--	--
	6/26/2019	7.60	0.990	4.44	18.75	168	0.0	--	--	--	--	--	--	--	--	--
	12/10/2019	7.37	1.07	4.99	12.99	63	19.8	--	--	--	--	--	--	--	--	--
	6/23/2020	7.38	0.904	4.46	27.69	108	0.0	--	--	--	--	--	--	--	--	--
	12/14/2020	7.92	1.017	6.74	15.00	92.8	73.8	--	--	--	--	--	--	--	--	--
MW-16	12/3/2018	8.04	0.949	6.37	16.40	186	--	--	--	--	--	--	--	--	--	--
	6/2/2019	7.58	1.02	4.48	18.08	166	28.0	--	--	--	--	--	--	--	--	--
	12/10/2019	7.62	1.01	6.11	15.28	-73	0	**0.01**	**8.4**	**120**	**190 J**	0.0017 U	**0.0029**	**1.1**	**0.023**	**2.7**
	6/22/2020	7.18	1.04	4.09	22.10	80	0	**0.03**	**15.7**	**130**	**180**	0.0017 U	0.00050 U	--	--	--
	12/16/2020	7.99	1.026	6.62	16.20	69.3	75.9	0.00	**17.1**	**130**	**190**	0.0017 U	0.0005 U	--	--	--
MW-17	12/3/2018	7.46	1.77	5.47	13.77	139	--	--	--	--	--	--	--	--	--	--
	6/27/2019	7.11	1.63	2.78	15.82	185	0.0	--	--	--	--	--	--	--	--	--
	12/11/2019	6.91	1.54	2.96	13.84	118	2.2	--	--	--	--	--	--	--	--	--
	6/24/2020	7.18	1.33	9.1	18.86	100	0.0	--	--	--	--	--	--	--	--	--
	12/15/2020	7.38	1.259	6.94	14.10	107	65.0	--	--	--	--	--	--	--	--	--
MW-18	12/4/2018	7.95	1.06	7.62	11.93	101	--	--	--	--	--	--	--	--	--	--
	6/26/2019	7.12	1.10	IE	18.79	126	--	**0.12**	**23.4**	**150 J**	**220**	0.0050 U	0.0017 U	--	--	--
	12/12/2019	7.42	1.49	7.25	14.20	46	0	0	**15.2**	**170**	**240**	0.0017 U	**0.0043**	0.18 U	0.0023 U	--
	6/22/2020	7.10	1.28	7.1	19.54	119	0	0.0	**10.7**	**160**	**210**	0.0017 U	0.00050 U	--	--	--
	12/15/2020	7.53	1.049	8.10	15.50	109	64.0	**0.01**	**16.5**	**150**	**220**	0.0017 U	0.0005 U	--	--	--
MW-19	12/3/2018	7.44	2.04	4.76	13.11	-75	--	--	--	--	--	--	--	--	--	--
	6/27/2019	7.27	1.05	IE	16.62	-121	--	**1.37**	**13.8**	**120**	**240**	**0.14**	**1.3**	--	--	--
	12/10/2019	7.32	1.20	7.16	16.44	-134	11.2	**0.14**	**14.0**	**150**	**220**	**0.079**	**0.27**	**0.61 J**	**0.072**	**4.0**
	6/24/2020	7.26	1.19	7.06	18.80	48	0.0	**0.02**	**13.8**	**140**	**200**	**0.028**	**0.12**	--	--	--
	12/16/2020	7.64	1.985	6.41	15.80	103	69.0	0.00	**16.1**	**140**	**200**	**0.0021 J**	0.0005 U	--	--	--
MW-20	12/12/2019	7.89	0.993	6.36	15.70	7	0	0	**21.5**	**130**	**170 J**	**0.012 J**	0.00050 U	0.18 U	**0.018**	--
	6/22/2020	7.53	1.01	7.95	20.41	93	0	**0.08**	**9.8**	**130**	**170**	0.0017 U	**0.00075 J**	--	--	--
	12/16/2020	7.91	1.905	8.04	15.70	89	67.0	**0.02**	**5.7**	**140**	**160**	**0.0019 J**	0.0005 U	--	--	--
MW-21	12/12/2019	7.71	1.02	6.25	14.21	108	1.5	0	**20.2**	**130**	**170**	0.0017 U	0.00050 U	0.18 U	**0.0024 J**	--
	6/22/2020	7.54	1.07	7.27	18.57	78	0.0	**0.10**	**35**	**130**	**160**	0.0017 U	0.00050 U	--	--	--
	12/15/2020	7.85	1.974	8.12	14.90	103	68.0	**0.01**	**20.6**	**150**	**170**	0.0017 U	0.0005 U	--	--	--

Table 6. Groundwater Quality Parameters
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

Well ID	Sample Date	Field Parameters								Laboratory Analytical						
		pH	Conductivity	Dissolved Oxygen	Temperature	ORP	Turbidity	Ferrous Iron	Nitrate	Sulfate	Alkalinity	Manganese (Dissolved)	Methane	Iron (Total)	Manganese (Total)	Total Organic Carbon
	Units:	*S.U.*	*mS/cm*	*mg/L*	*°C*	*mV*	*NTU*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*	*mg/L*
MW-22	12/11/2019	7.50	1.05	5.69	14.61	102	0.9	**0.04**	**25**	**140**	**170 J**	0.0017 U	**0.00075 J**	0.18 U	0.0023 U	--
	6/23/2020	7.62	0.992	6.57	21.61	107	0.0	**0.09**	**7.4**	**130**	**170**	0.0017 U	0.00050 U	--	--	--
	12/15/2020	7.85	1.978	8.17	15.80	92	93.0	0.00	**12.3**	**150**	**170**	0.0017 U	0.0005 U	--	--	--
MW-23	12/11/2019	7.75	1.02	5.90	15.06	12	78	0.0	**6.5**	**130**	**170**	**0.042**	0.00050 U	**0.51 J**	**0.051**	--
	6/24/2020	7.56	1.10	8.01	17.51	84	0	**0.10**	**30.8**	**130**	**180**	0.0017 U	0.00050 U	--	--	--
	12/15/2020	8.11	1.062	8.33	16.60	116.1	87.5	**0.03**	**20.5**	**150**	**170**	0.0017 U	0.0005 U	--	--	--

Notes:
Values in **bold** were detected above the detection limit, applies to laboratory-analyzed constituents

Acronyms:
-- = not analyzed or sample not collected
°C = degrees Celsius
IE = instrument error
J = Result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value.
mg/L = milligrams per liter
mS/cm = millisiemens per centimeter
mV = millivolts
NTU = nephelometric turbidity units
ORP = oxidation reduction potential
S.U. = standard unit
U = analyte not detected above limit shown

Table 7. MTCA Table 749-1 Terrestrial Ecological Evaluation Exposure Analysis
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

	Acres	Points	Site Points
1) Estimate the area of contiguous (connected) undeveloped land on the site or within 500 feet of any area of the site to the nearest 1/2 acre (1/4 acre if the area is less than 0.5 acre). "Undeveloped land" means land that is not covered by existing buildings, roads, paved areas or other barriers that will prevent wildlife from feeding on plants, earthworms, insects or other food in or on the soil. From the table to the right, find the number of points corresponding to the area and enter this number in the box to the right under Site Points.	0.25 or less	4	
	0.5	5	
	1	6	
	1.5	7	
	2	8	
	2.5	9	
	3	10	
	3.5	11	
	4.0 or more	12	**12**
2) Is this an industrial or commercial property? See WAC 173-340-7490 (3)(c). If yes, enter a score of 3 in the box to the right. If no, enter a score of 1.			3
3) Enter a score in the box to the right for the habitat quality of the site, using the rating system shown below[a,b]. (High = 1, Intermediate = 2, Low = 3)			2
4) Is the undeveloped land likely to attract wildlife? If yes, enter a score of 1 in the box to the right. If no, enter a score of 2[a,c].			1
5) Are there any of the following soil contaminants present: Chlorinated dibenzo-p-dioxins/dibenzofurans, PCB mixtures, DDT, DDE, DDD, aldrin, chlordane, dieldrin, endosulfan, endrin, heptachlor, benzene hexachloride, toxaphene, hexachlorobenzene, pentachlorophenol, pentachlorobenzene? If yes, enter a score of 1 in the box to the right. If no, enter a score of 4.			4
6) Add the numbers in the boxes on lines 2 through 5 and enter this number in the box to the right. If this number is larger than the number in the box on line 1, the simplified terrestrial ecological evaluation may be ended under WAC 173-340-7492 (2)(a)(ii).			**10**

Notes:

[a] It is expected that this habitat evaluation will be undertaken by an experienced field biologist. If this is not the case, enter a conservative score (1) for questions 3

[b] Habitat rating system. Rate the quality of the habitat as high, intermediate or low based on your professional judgment as a field biologist. The following are suggested factors to consider in making this evaluation:

- Low: Early successional vegetative stands; vegetation predominantly noxious, nonnative, exotic plant species or weeds. Areas severely disturbed by human activity, including intensively cultivated croplands. Areas isolated from other habitat used by wildlife.
- High: Area is ecologically significant for one or more of the following reasons: Late-successional native plant communities present; relatively high species diversity; used by an uncommon or rare species; priority habitat (as defined by the Washington department of fish and wildlife); part of a larger area of habitat where size or fragmentation may be important for the retention of some species.
- Intermediate: Area does not rate as either high or low.

[c] Indicate "yes" if the area attracts wildlife or is likely to do so. Examples: Birds frequently visit the area to feed; evidence of high use by mammals (tracks, scat, etc.); habitat "island" in an industrial area; unusual features of an area that make it important for feeding animals; heavy use during seasonal migrations.

Table 8. Chemical-Specific Applicable or Relevant and Appropriate Requirements
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

Media	Pathway/ Receptor	Applicable or Relevant and Appropriate Requirement	Units	TPH-g		TPH-d	TPH-o	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene
				Benzene Present	No Detectable Benzene							
Soil	Protection of Drinking Water	MTCA Method A Unrestricted Land Use (Table 740-1)	mg/kg	30	100	2,000	2,000	0.03	7.0	6.0	9.0	5.0
		MTCA Method A Industrial Properties (Table 745-1)	mg/kg	30	100	2,000	2,000	0.03	7.0	6.0	9.0	5.0
	Protection of Ecological Receptors	MTCA Simplified TEE Industrial Property (Table 749-2)	mg/kg	12,000	--	15,000	--	--	--	--	--	--
Ground-water	Protection of Drinking Water	MTCA Method A (Table 720-1)	µg/L	800	1,000	500	500	5.0	1,000	700	1,000	160
		Federal Maximum Contaminant Level Goal 40 CFR 141	µg/L	--	--	--	--	0	1,000	700	10,000	--
		Federal Maximum Contaminant Level 40 CFR 141	µg/L	--	--	--	--	5.0	1,000	700	10,000	--
		Washington State Maximum Contaminant Level 246-290 WAC	µg/L	--	--	--	--	5.0	1,000	700	10,000	--

Notes:
= Selected site cleanup level

Acronyms:
-- = not defined for this analyte
µg/L = microgram per liter
CFR = Code of Federal Regulations
mg/kg = milligram per kilogram
TEE = terrestrial ecological evaluation
TPH-d =diesel-range total petroleum hydrocarbons
TPH-g = gasoline-range total petroleum hydrocarbons
TPH-o = motor oil-range total petroleum hydrocarbons
WAC = Washington Administrative Code

Table 9. Remedial Technology Screening
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

Remedial Technology		Summary	Screening Results		Remedial Alternatives			
			Retained	Rejected	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Unsaturated Zone Technology	**Soil Vapor Extraction (SVE)**	-Common technology for unsaturated vadose zone soils -Vacuum applied to wells for removal of volatilized contaminants -Construction and routine O&M required -Primary affected site media is groundwater, not vadose zone		X				
Unsaturated and Saturated (Groundwater) Zone Technologies	**Monitored Natural Attenuation (MNA)**	-Large body of literature available on technical viability and applicability for petroleum sites -Relies only on natural chemical, biological, and physical processes -Only monitoring required; no construction	X		Included	Included	Included	Included
	Natural Source Zone Depletion (NSZD)	-ITRC literature available on technical viability and applicability for petroleum sites with residual NAPL -Relies only on volatilization, dissolution, and biodegradation -Monitoring point construction	X		Included	Included	Included	Included
	Bioventing	-Common technology for unsaturated vadose zone soils -Air (or oxygen) introduced to subsurface to enhance natural aerobic biodegradation -Construction and routine O&M required -Primary affected site media is groundwater, not vadose zone		X				
Ex-Situ Groundwater Treatment Technology	**Pump & Treat**	-Common technology for groundwater remediation -Groundwater pumped from wells and treated by aboveground equipment -Hight aquifer transmissivity requires high extraction rates -Construction and routine O&M required -Existing on-site water disposal capabilities are significantly limited		X				
In-Situ Groundwater Treatment Technologies	**Enhanced ISB (Oxygen-Releasing Compounds)**	-Enhanced ISB involves the addition of electron acceptors or donors to the aquifer to enhance naturally occurring biodegradation -Site-specific Biodegradation Assessment results indicate successful enhancement of aerobic biodegradation with electron donor addition -Passive addition of oxygen-releasing compounds via existing wells avoids mobilization of oxidizers to the petroleum storage facility	X			Included	Included	Included
	Bio-Sparging	-Bio-Sparging involves the injection of oxygen into the aquifer to enhance naturally occurring aerobic biodegradation -Site-specific Biodegradation Assessment results indicate successful enhancement of aerobic biodegradation with oxygen addition	X				Included	
	Activated Carbon (AC)-Based In-Situ Treatment	-Involves the emplacement of granular or powdered activated carbon into the aquifer -Technology uses synergy between adsorption and biodegradation for remediation of petroleum contamination -Site-specific Biodegradation Assessment results indicate natural biodegradation is occurring; carbon emplacement expected to increase degradation rate	X				Included	Included

Acronyms:
ISB = in-situ bioremediation
ITRC = Interstate Technical and Regulatory Council
NAPL = non-aqueous phase liquid

Table 10. Preliminary Design Quantities
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

				Southern Tank Area						Northern Tank Area			North Area		
				MW-3			MW-11 and MW-2			MW-17			MW-19		
Remedial Technology	Alternative(s)	Duration	Point Spacing (ft)	Area Accessible for Treatment[1] (ft^2)	Number of Points	Soil Cutting Waste[2] (tons)	Area Accessible for Treatment[1] (ft^2)	Number of Points	Soil Cutting Waste[2] (tons)	Area Accessible for Treatment[1] (ft^2)	Number of Points	Soil Cutting Waste[2] (tons)	Area Accessible for Treatment[1] (ft^2)	Number of Points	Soil Cutting Waste[2] (tons)
Enhanced ISB (Oxygen-Releasing Compounds)	2	5-15 Years[3]	Not Applicable	Not Applicable	One (1) (Well MW-3 only)	Not Applicable	Not Applicable	Two (2) (Wells MW-11 and MW-2)	Not Applicable	Not Applicable	One (1) (Well MW-17 only)	Not Applicable	Not Applicable	None	Not Applicable
	3 and 4	2-10 Years[3]	Not Applicable	Not Applicable	None	Not Applicable	Not Applicable	None	Not Applicable	Not Applicable	One (1) (Well MW-17 only)	Not Applicable	Not Applicable	None	Not Applicable
Bio-Sparging	3 and 4	2-10 Years[4]	70	14,500	5	14	9,280	4	11	17,700	0	0	9,450	0	0
Activated Carbon (AC)-Based In-Situ Treatment	4	Not applicable[5]	23	14,500	27	77	9,280	18	51	17,700	0	0	9,450	0	0
Monitoring Type															
Natural Source Zone Depletion (NSZD) Monitoring	1,2,3,4	2-15+ Years[6]	Not Applicable	Not Applicable	2	6	Not Applicable	3	9	Not Applicable	3	9	Not Applicable	0	0
Monitored Natural Attenuation (MNA)	1, 2, 3,4	2-15+ Years[7]	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable

Notes:
[1]Areas are approximate in square feet (ft^2). Target treatment areas will be finalized during work plan development.
[2]Soil cutting waste estimate is based on point installation using sonic drilling methods and the following assumptions:

Sonic drill casing outside diameter (inches) =	10.75
Total depth of point (feet) =	90
Soil cutting density (pound/cubic-foot) =	100

[3]Oxygen-releasing compound units are deployed in specified wells on an annual "pulsed" cycle. Each annual cycle consists of six months of deployment followed by removal and six months of non-deployment (no oxygen units in wells).
[4]Monthly technician site visits for the operational period.
[5]Duration period not applicable to AC treatment technology as it is implemented in a one time event.
[6]Monitor new points semi-annually for up to 10 years, followed by annually for the next 5 years (if needed).
[7]Duration to include monitoring of sixteen (16) pre-existing wells semi-annually for first two years. Monitoring reduced to eight (8) wells semi-annually for up to an additional eight years. Followed by reduction in monitoring frequency of eight (8) wells to annually for any additional duration.

Table 11. Disproportionate Analysis of Cleanup Action Alternatives
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

Alternatives	Evaluation Criteria and Weighting Factors						Total Weighted Benefit Score	Relative Benefit Ranking	Cost
	Protectiveness (30%)	Permanence (30%)	Effectiveness Over Long-Term (20%)	Management of Short-Term Risks (10%)	Technical and Administrative Implementability (10%)	Consideration of Public Concerns (10%)			
1 IC, MNA, and NSZD Monitoring	3	3	1	5	3	Pending	2.8	4	$ 689,600
2 IC, MNA, NSZD Monitoring, and Oxygen-Releasing Compounds	3	5	3	3	3	Pending	3.6	1	$ 786,400
3 IC, MNA, NSZD Monitoring, Oxygen-Releasing Compounds, and Bio-Sparging	3	5	5	1	1	Pending	3.6	2	$ 1,350,500
4 IC, MNA, NSZD Monitoring, Oxygen-Releasing Compounds, Bio-Sparging, and AC-Based In-Situ Treatment	3	5	5	1	1	Pending	3.6	3	$ 1,425,300

Notes:
1. Alternatives are relatively ranked according to the following:
   1 - Least acceptable alternative evaluated
   3 - Acceptable and satisfies a most evaluation criteria
   5 - Most acceptable alternative evaluated

Acronyms:
DCA = disproportionate cost analysis
IC = institutional controls
MNA = monitored natural attenuation
NSZD = natural source zone depletion
AC = activated carbon

Table 12. Summary of Total Costs - Remedial Alternatives
Tesoro Pasck Bulk Fuel Terminal
Pasco, Washington

Remedial Technology	1 Installation Cost	1 O&M Cost	1 Total Cost	2 Installation Cost	2 O&M Cost	2 Total Cost	3 Installation Cost	3 O&M Cost	3 Total Cost	4 Installation Cost	4 O&M Cost	4 Total Cost
Institutional Controls	$ -	$ 51,500	$ 51,500	$ -	$ 51,500	$ 51,500	$ -	$ 39,000	$ 39,000	$ -	$ 22,400	$ 22,400
Monitored Natural Attenuation (MNA)	$ -	$ 271,200	$ 271,200	$ -	$ 271,200	$ 271,200	$ -	$ 243,900	$ 243,900	$ -	$ 157,600	$ 157,600
Natural Source Zone Depletion (NSZD)	$ 83,300	$ 283,600	$ 366,900	$ 83,300	$ 283,600	$ 366,900	$ 83,300	$ 244,600	$ 327,900	$ 83,300	$ 140,000	$ 223,300
Enhanced ISB (Oxygen-Releasing Compounds)	--	--	--	$ -	$ 96,800	$ 96,800	$ -	$ 50,000	$ 50,000	$ -	$ 28,600	$ 28,600
Bio-Sparging	--	--	--	--	--	--	$ 226,200	$ 463,500	$ 689,700	$ 226,200	$ 265,300	$ 491,500
Activated Carbon (AC)-Based In-Situ Treatment	--	--	--	--	--	--	--	--	--	$ 501,900	$ -	$ 501,900
Total Alternative Cost in NPV	$689,600			$786,400			$1,350,500			$1,425,300		
Duration	10 to 15+ years			5 to 15 years			5 to 10 Years			2 to 5 years		

Notes:
Costs are provided in Net Present Value (NPV)

Table 13. Installation Cost Details - Remedial Technologies
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

Cost Item	Unit Cost	Unit	Institutional Controls	MNA	NSZD (Point Installation)		Enhanced ISB (Oxygen-Releasing Compounds)	Bio-Sparging (System Installation)		Activated Carbon (AC)-Based In-Situ Treatment (AC Emplacent/ Injection Event)	
					Quantity	Cost		Quantity	Cost	Quantity	Cost
Direct/Subcontractor Costs											
Point Installation Cost[1,2]											
NSZD	$ 6,300	/Inj. Point			8	$ 50,400		0	$ -	0	$ -
Bio-Sparging	$ 6,300	/Inj. Point			0	$ -		10	$ 63,000	0	$ -
AC-Based In-Situ Treatment	$ 4,250	/Point			0	$ -		0	$ -	45	$ 191,250
Aboveground System-Infrastructure/Equipment Installation[2]	$ 100,000	Lump Sum			0	$ -		1	$ 100,000	0	$ -
Electrical/Power Connections[3]	$ 21,000	Lump Sum			0	$ -		1	$ 21,000	0	$ -
Non-Haz Soil Cutting Waste Transportation & Disposal[2]	$ 45	/Ton			23	$ 1,035		26	$ 1,170	128	$ 5,760
AC Emplacement/Injection Event[4]	$ 234,094	Lump Sum			0	$ -		0	$ -	1	$ 234,094
Direct/Subcontractor Costs Subtotal						$ 51,435			$ 185,170		$ 431,104
Consultant Labor[2]											
Permitting and Reporting[5]											
NSZD	$ 12,000	Lump Sum			1	$ 12,000		0	$ -	0	$ -
Bio-Sparging and AC-Based In-Situ Treatment	$ 19,400	Lump Sum			0	$ -		1	$ 19,400	1	$ 19,400
Project Management	$ 2,700	/Week			2	$ 5,400		2	$ 5,400	5	$ 13,500
Consultant Field Oversight[1]	$ 1,800	/Day			8	$ 14,400		9	$ 16,200	21	$ 37,800
Consultant Labor Subtotal						$ 31,800			$ 41,000		$ 70,700
Total Installation Cost			See Table 14 (O&M Costs)	See Table 14 (O&M Costs)		**$ 83,235**	See Table 14 (O&M Costs)		**$ 226,170**		**$ 501,804**

Notes:
[1]Cost includes materials, transportation of materials, and incidentals. For point installation, two drill rigs and one vacuum truck (for subsurface clearance) are assumed
[2]Costs are based on past project experience.
[3]Cost based on 2001 EPA air-sparging guidance.
[4]Based on AC contractor Rough Order of Magnitude cost estimate dated 10/08/20
[5]Design and installation reporting.
/ = per unit
Inj. Point = injection point
MNA = monitored natural attenuation
NPV = net present value
NSZD = natural source zone depletion

Table 14. Operations and Maintenance Cost Details - Remedial Technologies
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

Cost Item	Unit Cost	Unit	Institutional Controls		Monitored Natural Attenuation (Annual Monitoring)						NSZD (Annual Monitoring)				Annual Enhanced ISB (Oxygen-Releasing Compounds)				Annual Bio-Sparging (O&M)	
			Year 1		Years 1 and 2		Years 3 through 10		Years 11 through 15		Years 1 through 10		Years 11 through 15		Alternative 2 Years 1 through 15		Alternatives 3 & 4 Years 1 through 10		Years 1 through 10	
			Quant	Cost	Quant	Cost	Quant	Cost	Quant	Cost	Quant	Cost	Quant	Cost	Quant	Cost	Quant	Cost	Quant	Cost
Direct/Subcontractor Costs[1]																				
Institutional Controls																				
Field Supplies and Materials	$ 2,500	/Year	1	$ 2,500	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -
Monitored Natural Attenuation																				
Field Supplies and Materials	$ 3,500	/MNA Event (Years 1 and 2)	0	$ -	2	$ 7,000	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -
Laboratory Analytical	$ 7,400	/MNA Event (Years 1 and 2)	0	$ -	2	$ 14,800	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -
Field Supplies and Materials	$ 1,750	/MNA Event (Years 3 through 10)	0	$ -	0	$ -	2	$ 3,500	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -
Laboratory Analytical	$ 3,700	/MNA Event (Years 3 through 10)	0	$ -	0	$ -	2	$ 7,400	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -
Field Supplies and Materials	$ 1,750	/MNA Event (Years 11 through 15)	0	$ -	0	$ -	0	$ -	1	$ 1,750	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -
Laboratory Analytical	$ 1,750	/MNA Event (Years 11 through 15)	0	$ -	0	$ -	0	$ -	1	$ 1,750	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -
NSZD																				
Field Supplies and Materials	$ 2,190	/NSZD Mon Event (Years 1 through 15)	0	$ -	0	$ -	0	$ -	0	$ -	2	$ 4,380	1	$ 2,190	0	$ -	0	$ -	0	$ -
Laboratory Analytical	$ 4,630	/NSZD Mon Event (Years 1 through 15)	0	$ -	0	$ -	0	$ -	0	$ -	2	$ 9,260	1	$ 4,630	0	$ -	0	$ -	0	$ -
Enhanced ISB																				
Field Supplies and Materials[2]	$ 4,000	/EISB Event (Alt 2, Years 1 through 15)	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	1	$ 4,000	0	$ -	0	$ -
Field Supplies and Materials[2]	$ 1,000	/EISB Event (Alts 3&4, Years 1 through 15)	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	1	$ 1,000	0	
Bio-Sparging																				
Field Supplies and Materials	$ 1,000	/Monthly Bio-sparge O&M (Years 1 through 10)	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	12	$ 12,000
Direct/Subcontractor Costs Subtotal				$ 2,500		$ 21,800		$ 10,900		$ 3,500		$ 13,640		$ 6,820		$ 4,000		$ 1,000		$ 12,000
Consultant Labor[1]																				
Institutional Controls																				
Project Management	$ 2,500	/Year	1	$ 2,500	0	0	0	$ -	$ -		0	$ -	0	$ -	0	$ -	0	$ -	0	$ -
Monitored Natural Attenuation																				
Project Management	$ 2,200	/MNA Event (Years 1 and 2)	0	$ -	2	$ 4,400	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -
Field Effort	$ 8,550	/MNA Event (Years 1 and 2)	0	$ -	2	$ 17,100	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -
Project Management	$ 1,100	/MNA Event (Years 3 through 10)	0	$ -	0	$ -	2	$ 2,200	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -
Field Effort	$ 4,280	/MNA Event (Years 3 through 10)	0	$ -	0	$ -	2	$ 8,560	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -
Project Management	$ 1,100	/MNA Event (Years 11 and 15)	0	$ -	0	$ -	0	$ -	1	$ 1,100	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -
Field Effort	$ 4,280	/MNA Event (Years 11 and 15)	0	$ -	0	$ -	0	$ -	1	$ 4,280	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -
MNA Reporting	$ 2,100	/Report	0	$ -	2	$ 4,200	2	$ 4,200	1	$ 2,100	0	$ -	0	$ -	0	$ -	0	$ -	0	$ -
NSZD																				
Project Management	$ 1,400	/NSZD Mon Event (Years 1 through 15)	0	$ -	0	$ -	0	$ -			2	$ 2,800	1	$ 1,400	0	$ -	0	$ -	0	$ -
Field Effort	$ 5,350	/NSZD Mon Event (Years 1 through 15)	0	$ -	0	$ -	0	$ -			2	$ 10,700	1	$ 5,350	0	$ -	0	$ -	0	$ -
NSZD Reporting	$ 2,100	/Report	0	$ -							2	$ 4,200	1	$ 2,100	0	$ -	0	$ -	0	$ -
Enhanced ISB																				
Project Management	$ 1,100	/EISB Event (Years 1 through 15)	0	$ -	0	$ -	0	$ -			0	$ -	0	$ -	1	$ 1,100	1	$ 1,100	0	$ -
Field Effort	$ 4,300	/EISB Event (Years 1 through 15)	0	$ -	0	$ -	0	$ -			0	$ -	0	$ -	1	$ 4,300	1	$ 4,300	0	$ -
Bio-Sparging																				
Project Management	$ 1,100	/Monthly Bio-sparge O&M (Years 1 through 10)	0	$ -	0	$ -	0	$ -			0	$ -	0	$ -	0	$ -	0	$ -	12	$ 13,200
Field Effort	$ 2,500	/Monthly Bio-sparge O&M (Years 1 through 10)	0	$ -	0	$ -	0	$ -			0	$ -	0	$ -	0	$ -	0	$ -	12	$ 30,000
Bio-Sparge Reporting	$ 2,100	/Report	0	$ -	0	$ -	0	$ -			0	$ -	0	$ -	0	$ -	0	$ -	2	$ 4,200
Consultant Labor Subtotal				$ 2,500		$ 25,700		$ 14,960		$ 7,480		$ 17,700		$ 8,850		$ 5,400		$ 5,400		$ 47,400

Table 14. Operations and Maintenance Cost Details - Remedial Technologies
Tesoro Pasco Bulk Fuel Terminal
Pasco, Washington

Years	Institutional Controls	Monitored Natural Attenuation (Annual Monitoring)			NSZD (Annual Monitoring)		Annual Enhanced ISB (Oxygen-Releasing Compounds)		Annual Bio-Sparging (O&M)
	Year 1	Years 1 and 2	Years 3 through 10	Years 11 through 15	Years 1 through 10	Years 11 through 15	Alternative 2 Years 1 through 15	Alternatives 3 & 4 Years 1 through 10	Years 1 through 10
	Cost	Cost	Cost	Cost	Cost	Cost	Cost	Cost	Cost
Net Present Value Analysis (Direct/Subcontractor Costs and Consultant Labor)[3]									
Year 1	$ 5,000	$ 47,500	$ -	$ -	$ 31,340	$ -	$ 9,400	$ 6,400	$ 59,400
Year 2	$ 4,717	$ 44,811	$ -	$ -	$ 29,566	$ -	$ 8,868	$ 6,038	$ 56,038
Year 3	$ 4,450	$ -	$ 23,015	$ -	$ 27,892	$ -	$ 8,366	$ 5,696	$ 52,866
Year 4	$ 4,198	$ -	$ 21,713	$ -	$ 26,314	$ -	$ 7,892	$ 5,374	$ 49,873
Year 5	$ 3,960	$ -	$ 20,484	$ -	$ 24,824	$ -	$ 7,446	$ 5,069	$ 47,050
Year 6	$ 3,736	$ -	$ 19,324	$ -	$ 23,419	$ -	$ 7,024	$ 4,782	$ 44,387
Year 7	$ 3,525	$ -	$ 18,230	$ -	$ 22,093	$ -	$ 6,627	$ 4,512	$ 41,875
Year 8	$ 3,325	$ -	$ 17,198	$ -	$ 20,843	$ -	$ 6,252	$ 4,256	$ 39,504
Year 9	$ 3,137	$ -	$ 16,225	$ -	$ 19,663	$ -	$ 5,898	$ 4,015	$ 37,268
Year 10	$ 2,959	$ -	$ 15,306	$ -	$ 18,550	$ -	$ 5,564	$ 3,788	$ 35,159
Year 11	$ 2,792	$ -	$ -	$ 6,131	$ -	$ 8,750	$ 5,249	$ -	$ -
Year 12	$ 2,634	$ -	$ -	$ 5,784	$ -	$ 8,255	$ 4,952	$ -	$ -
Year 13	$ 2,485	$ -	$ -	$ 5,457	$ -	$ 7,788	$ 4,672	$ -	$ -
Year 14	$ 2,344	$ -	$ -	$ 5,148	$ -	$ 7,347	$ 4,407	$ -	$ -
Year 15	$ 2,212	$ -	$ -	$ 4,856	$ -	$ 6,931	$ 4,158	$ -	$ -
Alternative 1 (15 Years) O&M Cost in NPV	$ 51,475	$ 92,311	$ 151,496	$ 27,376	$ 244,505	$ 39,070	$ -	$ -	$ -
Alternative 2 (Max 15 Years) O&M Cost in NPV	$ 51,475	$ 92,311	$ 151,496	$ 27,376	$ 244,505	$ 39,070	$ 96,773	$ -	$ -
Alternative 3 (Max 10 Years) O&M Cost in NPV	$ 39,008	$ 92,311	$ 151,496	$ -	$ 244,505	$ -	$ -	$ 49,931	$ 463,421
Alternative 4 (Max 5 Years) O&M Cost in NPV	$ 22,326	$ 92,311	$ 65,211	$ -	$ 139,936	$ -	$ -	$ 28,577	$ 265,227

Notes:
[1]Costs are based on past project experience.
[2]Based on vendor cost estimated dated 10/09/20.
[3] NPV analysis assumes a discount rate of 6%

Acronyms:
- = no associated cost
/ = per unit
ISB = in-situ bioremediation
MNA = monitored natural attenuation
NPV = net present value
NSZD = natural source zone depletion
O&M = operation and maintenance
Quant = quantity

Appendix A
Excerpts from the 2011 RI/FS

TABLE 1
Summary of Historical Releases
NWTC Pasco Terminal
Pasco, Washington

Date	Description
December 26, 1972	Failure to close 1/4" bleeder valve allowed 0.07 bbl of diesel to drip into river (0% recovered).
March 23, 1976	665 bbls of diesel released from Tank 8 (overfilled); estimated recovery 12% (80 bbls).
December 20, 1978	600 bbls of gasoline released from Tank 13 (overfilled); estimated recovery 33% (200 bbls).
August 19, 1982	25 bbls diesel released at proving meter near old truck rack after power surge (broke at coupler).
February 1, 1984	610 bbls of gasoline released from Tank 17 after roof drain line froze; estimated recovery 16% (100 bbls).
Spring 1984	<3 bbls of diesel released when barge compartment was overfilled; estimated recovery 8% (10 gallons).
May 18, 1984	3 bbls of diesel released from Tank 17; immediately cleaned up by excavation of affected soil from northeast side of tank.
August 27, 1985	1 bbl of diesel released when barge compartment was overfilled; estimated recovery 99%.
August 1986	Excavated area around pipelines near river; found leak in aviation fuel (Jet A) line. Soil removed and replaced with clean backfill. Subsequently, all buried pipelines at the terminal were replaced with above ground pipelines wherever physically possible.
January 2, 1991	0.48 bbl of gasoline released when line split due to freezing; location not identified.
June 25, 1992	2 bbl released when bleeder valve on prover (near scraper canopy) left open; recovered 100%.
July 2, 1994	2 bbls of diesel released when bleeder valve (located between Tanks 6 & 13) left open on oil booster pump; product captured by oil/water drain system.
July 3, 1995	1 bbl of gasoline released from defective weld on underground pipe near prover at old truck loading rack.
July 6, 1995	Small pinhole gasoline leak in piping at old truck loading rack northeast of Tank 1; quantity not indicated (could be same as July 3, 1995 leak).
August 7, 1997	10 bbls of diesel released when bleeder valve left open on barge manifold located near Tanks 15 & 16.
January 21, 2000	Sump overflow at the Barge Dock: Approximately 18 gallons of Transmix dripped onto rocks below the dock and entered the Snake River; a sheen was noted on the water. Boom and absorbent pads utilized to remove product from the water.
February 2, 2000	Truck Rack: Approximately 75 gallons of high sulfur of diesel spilled onto the asphalt pavement and drained to the oil/water separator; all product recovered.
July 21, 2000	Gasoline leak identified by Tidewater from one of their transfer lines approx. 60 feet west of Chevron Tank 19. Loss was initially estimated to be 8,000 gallons (minimum), later updated to 35,000-41,000 gallons. Tidewater notified Ecology and initiated emergency response.
September 5, 2000	Barge Loading Area: Less than 4 ounces of Jet A leak from a drain gasket and entered the Snake River, which dissipated quickly. Ecology and the NRC were notified.
May 2, 2001	Approximately 2 gallons dripped from the 4" check valve fitting on the low sulfur diesel fuel rack line located a few feet west of Tank 12. Approximately 0.5 cy of soil was removed.
December 1, 2001	Less than 0.11 bbl (4-5 gallons) of Red Dye leaked from pressure safety valve vent during startup of the north line from Tidewater to the Mainline pumps. Leak was contained inside the skid and drained to the manifold pump near pump station building and warehouse.
December 27, 2001	Approximately 0.10 bbl (4-5 gallons) of Red Dye released onto gravel through an improperly installed valve while connecting the drain hose to the bulk tank at additive basins; removed affected gravel.
April 18, 2006	Truck Rack: Approximately 2 gallons of gasoline sprayed onto concrete truck pad when the prover was overfilled. Water used to flush the pad drained to the o/w separator.
April 1, 2008	Waste Water System: Test results from an effluent sample collected on 3/3/2008 were outside permit limits for BTEX and pH. An estimated 7 bbls (combination of water, diesel, gasoline, and jet fuel) were released to the facility's lined evaporation pond; no release to adjacent land or river.
April 22, 2008	An estimated 50 bbls of denatured ethanol (biofuel) leaked onto ground from 3/4 inch sampling port line on south side of Tank 5. Spill reported to Ecology in a letter dated April 30, 2008.
July 24, 2008	Truck Rack: 120 gallons (~3 bbls) of Jet A was released onto concrete when a tank compartment was overfilled; fuel entered oil/water separator.
January 28, 2009	Truck Rack: 29 gallons of high sulfur diesel leaked from a customer's tanker onto the concrete and entered the oil/water separator.

Note:
Accurate spill records for the Pasco Terminal were not kept before 1973 (Lewis, 1983).

Table 2
Summary of CPL Investigations and Remedial Activities
NWTC Pasco Terminal
Pasco, Washington

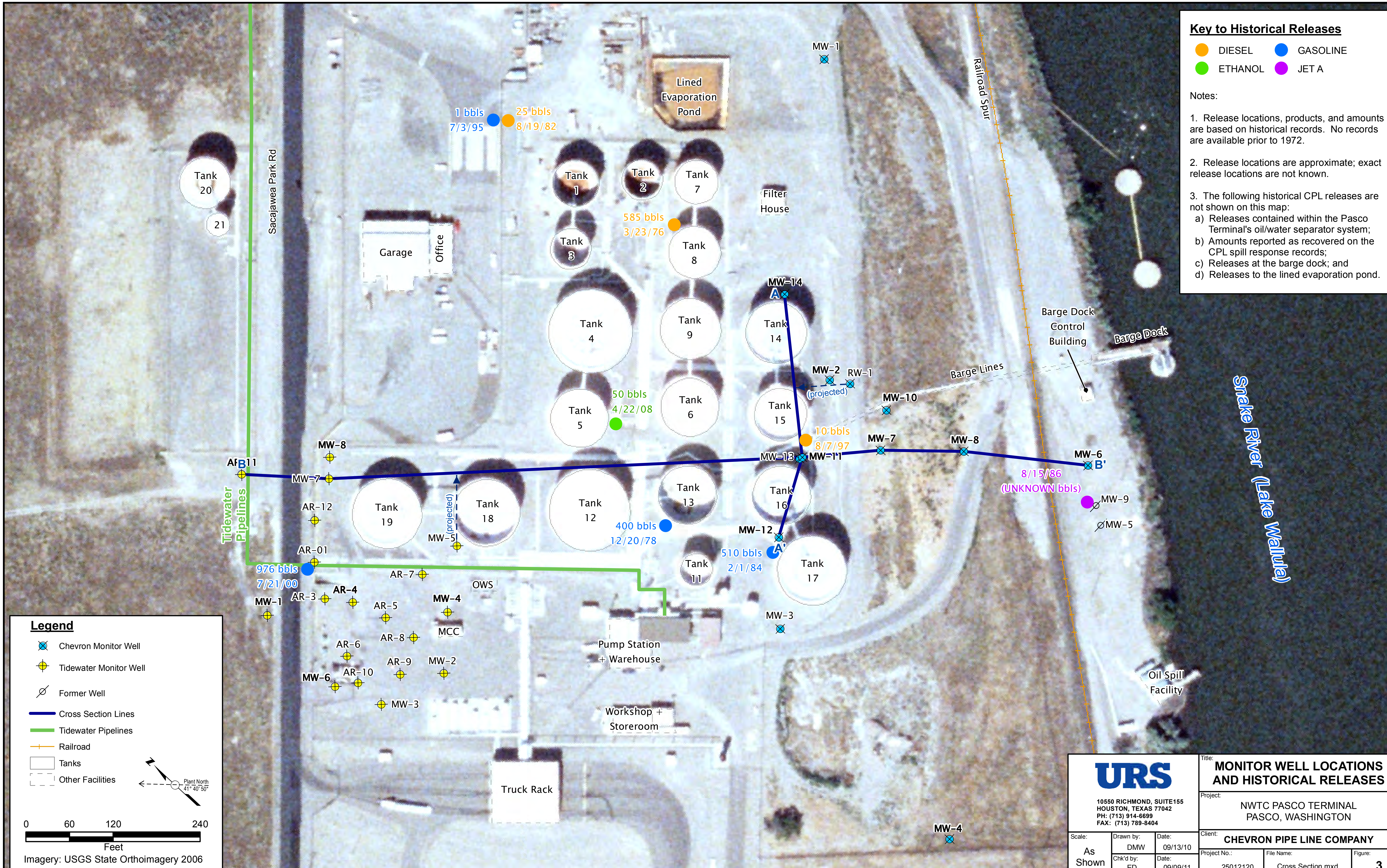
Date	Description
October 31 - November 3, 1983	MW-1 through MW-4 installed by Environmental Emergency Services Co. (no logs); investigation focused on areas downgradient of known spills or surface drainage.
July 14, 1986	Phase-separated hydrocarbon (PSH) detected in MW-2. Sheen observed along river bank; deployed "sea curtain".
1986 (summer)	MW-5 installed by Chevron USA (no log).
August 1986	Excavated area around pipelines near river; found leak in aviation fuel (Jet A) line. Soil removed and replaced with clean backfill.
October 28, 1986	Product samples collected from MW-2 and sorbent pads in river; fingerprinting indicated PSH at MW-2 was unleaded gasoline; whereas the sheen on the river was aviation fuel.
November 17-25, 1986	MW-6 through MW-9 installed by GeoEngineers Incorporated.
January 1987	Pumping system (in MW-5), oil/water (o/w) separator, and water exfiltration gallery installed by Crowley Environmental Services.
February 11, 1987	Sample from river analyzed to determine product type; confirmed as Jet A.
January 9 - April 2, 1987	Attempted to reverse direction of groundwater flow by pumping from MW-5; unsuccessful (well yield too low) - sheen persisted.
May 5-15, 1987	Excavated ~1,900 cubic yards (cy) of soil from shoreline area Source of sheen appeared to be located ~30 feet west of MW-5. MW-5 and MW-9 were destroyed during excavation. MW-5 replaced with a 48-inch diameter corrugated metal pipe, surrounded by pea gravel.
December 15, 1987	Product-only skimmer pump installed in MW-2; ineffective at reducing PSH thickness.
January 14, 1988	RZA conducted a 30-minute pumping test in MW-2; recommended (on January 25, 1988) installing a dual pump system.
May 10 - June 24, 1988	RZA conducted a longer pumping test at MW-2, pumping at 7-8 gpm in an attempt to create a cone of depression. Installed a product-only pump on June 7, 1988; operated as a dual-pump system through June 24, 1988.
June 29, 1988	RZA recommended installing a product-only pump in MW-2, based on recently concluded pumping test.
January 4-17, 1989	MW-10 through MW-14 and RW-1 installed by Rittenhouse-Zeman & Associates, Inc. (RZA). PID readings indicated hydrocarbon vapors in vadose zone at MW-11, MW-12 and MW-13 (screen in MW-13 did not extend to water table).
January 18-25, 1989	Conducted intermittent test pumping in RW-1 (dual pump system installed January 24, 1989); maximum pumping rate achieved was 43 gpm, with 0.07 foot of drawdown.
February 17, 1989	RZA recommended installing a groundwater depression pump and a skimmer pump in RW-1.
March 28-29, 1989	Conducted additional test pumping in RW-1; measured only 0.08 foot of drawdown after pumping more than 19 hours at 100 gpm. RZA proposed installation of a bioventing (aka soil vapor extraction, or SVE) system.
May 16, 1989	RZA recommended continued pumping from RW-1, using the dual-pump system with a separation of 10 feet between the pumps (to maintain good effluent quality).
May 16, 1989	Ecology approved abandonment of onsite water supply well WAS 173-160-560, located in NW part of site (plugged in 1993, after pump reset at shallower depth in 1982).
October 17-20, 1989	Two separate SVE systems installed by RZA: Upper, multi-well system in tank area included MW-2, MW-12, and MW-13; lower system, outside tank containment, included only MW-10.
April 12, 1990	MW-13 shut-off from upper SVE system.
August 6, 1990	PSH thickness in MW-2 = 0.15 foot. Calculated ~9.4 pounds per day (lb/day) of BTEX was removed by the upper SVE system from MW-2 and MW-12; ~1.87 lb/day removed from the MW-10 SVE system.
November 18-19, 1990	Calculated BTEX removals were ~15.9 lb/day for the upper SVE system (MW-2, MW-12 and MW-13), and ~1.02 lb/day for the MW-10 SVE system. PSH measured in MW-2 = 0.10 foot.
November 1990 - August 1991	Quarterly groundwater sampling performed after decline in PSH thickness.
February 13-14, 1991	Calculated BTEX removals were ~8.21 lb/day from the upper SVE system (MW-2, MW-12 and MW-13), and ~0.07 lb/day for the MW-10 SVE system. PSH measured in MW-2 = 0.39 foot.

Table 2
Summary of CPL Investigations and Remedial Activities
NWTC Pasco Terminal
Pasco, Washington

Date	Description
March 28, 1991	PSH measured in MW-3 for the first time.
May 6, 1991	PSH measured in MW-11 for the first time.
May 14-15, 1991	Calculated BTEX removals were ~2.052 lb/day from the upper SVE system for (MW-2, MW-12 and MW-13), and ~0.044 lb/ from the MW-10 SVE system. PSH in MW-2 = 0.56 foot. PSH was also measured in MW-3 and MW-11. PSH in all three wells determined from gas chomatographs to be similar to #1 diesel fuel.
August 7-8, 1991	Calculated BTEX removals were ~0.602 lb/day from the upper SVE system for (MW-2, MW-12, and MW-13), and ~0.091 lb/ from the MW-10 SVE system. PSH increased MW-2 = 3.35 feet. PSH also increased in MW-3 and MW-11. Fingerprint analyses identified the PSH as diesel #1 at MW-3, and diesel #2 at MW-2 and MW-11.
August 22, 1991	A bubbler (air sparge) hose was installed in MW-2 to help volatize the gasoline portion of the PSH.
August 27, 1991	Skimmer pump is reinstalled on MW-2; ~4 gallons of PSH recovered
September 10, 1992	MW-10 SVE system dismantled. Air-sparging (AS) hoses added to MW-2 and MW-11 to supplement SVE system. Skimmer pump moved from MW-2 to MW-3.
September 16, 1992	Calculated removals from upper AS/SVE system (MW-2, MW-12, and MW-13) removed ~3.68 lb/day BTEX, and ~25.45 lb/day TPH.
December 8, 1992	No measurable PSH in any well (until July 1993 in MW-3). Upper AS/SVE system (MW-2, MW-12, and MW-13) removed ~2.89 lb/day BTEX, and ~16.45 lb/day TPH.
April 2, 1993	Upper AS/SVE system (MW-2, MW-12, and MW-13) removed ~0.006 lb/day BTEX, and ~0.03 lb/day TPH.
July 15, 1993	PSH measured in MW-3 =1.26 feet. Upper AS/SVE system (MW-2, MW-12, and MW-13) removed ~0.00521 lb/day BTEX.
November 5, 1993	Skimmer pump removed from MW-3, AS hose installed, and well reconnected to upper AS/SVE system. Upper AS/SVE system (MW-2, MW-3, MW-12, and MW-13) removed ~0.00085 lb/day BTEX.
December 28, 1993	No measurable PSH observed in MW-3. Upper AS/SVE system (MW-2, MW-3, MW-12, and MW-13) removed ~0.00407 lb/day BTEX.
January 18, 1994	Date of final RZA report. Chevron took over measurement of groundwater levels, PSH thickness, and operation of the AS/SVE system.
January 26, 1994	Chevron letter to Charles Neuchterlein (Ecology) stating that "Chevron will continue to operate the remediation system and monitor the site on a semi-annual basis."
February 1, 1994	Last RZA monitoring event; limited to measurement of groundwater levels and PSH thicknesses.
July 19, 1994	Chevron letter to Charles Neuchterlein (Ecology) proposing that 1) the remediation system will be disconnected (not implemented), 2) all wells will be checked monthly for water level and signs of PSH, 3) the riverbank checked monthly for signs of hydrocarbon seepage, and 4) wells MW-2, MW-3, MW-12 and MW-13 will be sampled quarterly for BTEX and TPH.
January 1995 through February 1997	Monthly measurements indicated measureable PSH was sometimes present in RW-1, MW-2, MW-3, MW-6, MW-7, MW-8, and MW-12.
September 21, 1995	Chevron letter to Charles Neuchterlein (Ecology) clarifying that the AS/SVE system was not turned off, and continues to operate.
November 8, 1995	AS/SVE system adjusted to optimize vapor recovery from MW-3.
April 19, 1997 to Late June 1998	Quarterly measurements indicated no measurable PSH was present in the wells after February 27, 1997 (in MW-3).
June 24, 1998	Olympus Environmental, Inc. began to provide environmental services at the Pasco Terminal.
August 17, 1998	Chevron letter to Charles Neuchterlein (Ecology) proposing to continue AS/SVE system operations for another year, and conduct quarterly groundwater monitoring.
September 16, 1998	Olympus observed the AS/SVE system was turned off; notified Chevron.
November 27, 1998	MW-12 reconnected to the AS system.
December 9, 1998	Soil samples collected during tank removal project southeast of Tank 7.

Table 2
Summary of CPL Investigations and Remedial Activities
NWTC Pasco Terminal
Pasco, Washington

Date	Description
January 20, 1999	Soil samples collected by DWR Consultants, Inc. for a tank installation project southeast of Tank 7 identified a thin layer of petroleum product (diesel) about 23 feet bgs (~62 feet above groundwater).
March 29, 1999	AS/SVE system turned off 3 days prior to sampling event; reactivated on March 30, 1999. Broken wellhead connection observed at MW-13.
June 24, 1999	AS/SVE system turned off 3 days prior to sampling event; reactivated on June 25, 1999. Broken wellhead connection observed at MW-13. MW-3 observed to have a product sheen.
October 1999	Maxim Technologies began providing environmental services at the Pasco Terminal.
October 8, 1999	PSH measured in MW-3 = 0.77 foot; MW-12 had a sheen. SVE system observed to be off; restarted after sampling event, and maintenance was performed. Maxim recommended repairs to both the AS and SVE systems.
June 8, 2000	SVE system turned off; repairs needed. Maxim recommended termination of active remediation. Observed a hydrocarbon-absorbing sock in MW-3 (no information available on when it was originally installed).
July 2000	Operation of the "upper" bioventing system in MW-2, MW-12, and MW-13 ceased.
September 13, 2000	Product sample collected from CPL well MW-3; fingerprinting indicated PSH was 10% gasoline, 53% Jet A, and 37% diesel.
March 29, 2001	Chevron analyzed water samples from Tidewater wells MW-5, MW-7, MW-8, and AR-12. MW-5 contained both gasoline and diesel components, whereas the other samples contained only gasoline. Chromatograms for the MW-8 and AR-12 samples do not match well, suggesting two different fuel sources, or major differences in how the fuels have biodegraded. None of the samples matched the product sample from CPL well MW-3.
September 2001	Ended quarterly monitoring of CPL wells; began annual monitoring program.
2002-2008	Annual groundwater monitoring of CPL wells; reports submitted to Ecology.
September 11, 2003	No measurable PSH observed in any CPL well after this date.
June 22-24, 2010	Gauging, redevelopment and rehabilitation of CPL monitor wells in preparation for the site-wide groundwater monitoring event. MW-1 found to be filled with gravel above top of screen; old, partially disintegrated, absorbent sock removed from MW-3.
June 28-30,2010	Site-wide groundwater monitoring event conducted by CPL and Tidewater for RI/FS.



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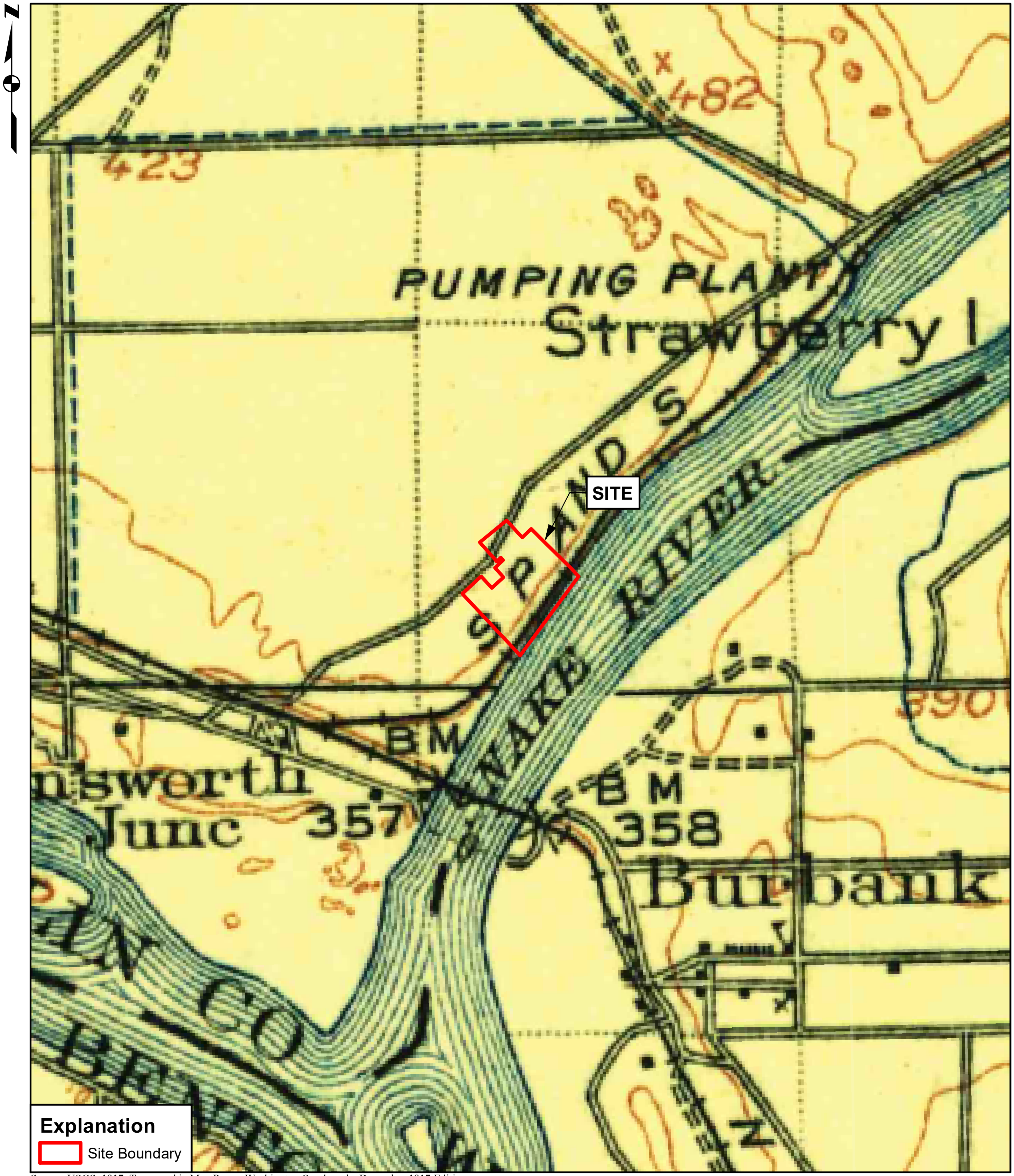
July 2003 – June 2003 Groundwater Sampling Results, Tidewater Barge Lines, Pasco Fuel Release Site

February 2004 – Rounds 3 and 4 Post-Remediation Sampling Results, Tidewater Barge Lines, Pasco Fuel Release Site

June 2005 - Tidewater Remediation System Decommissioning and Performance Monitoring Plan, Tidewater Barge Lines, Pasco Fuel Release Site

May 16, 2006 - Supplemental Groundwater Sampling, Tidewater Barge Lines, Pasco Fuel Release Site

Appendix B
Historical Records



Source: USGS, 1917. Topographic Map Pasco, Washington Quadrangle, December 1917 Edition

1,000 0 1,000 2,000
SCALE IN FEET

AECOM

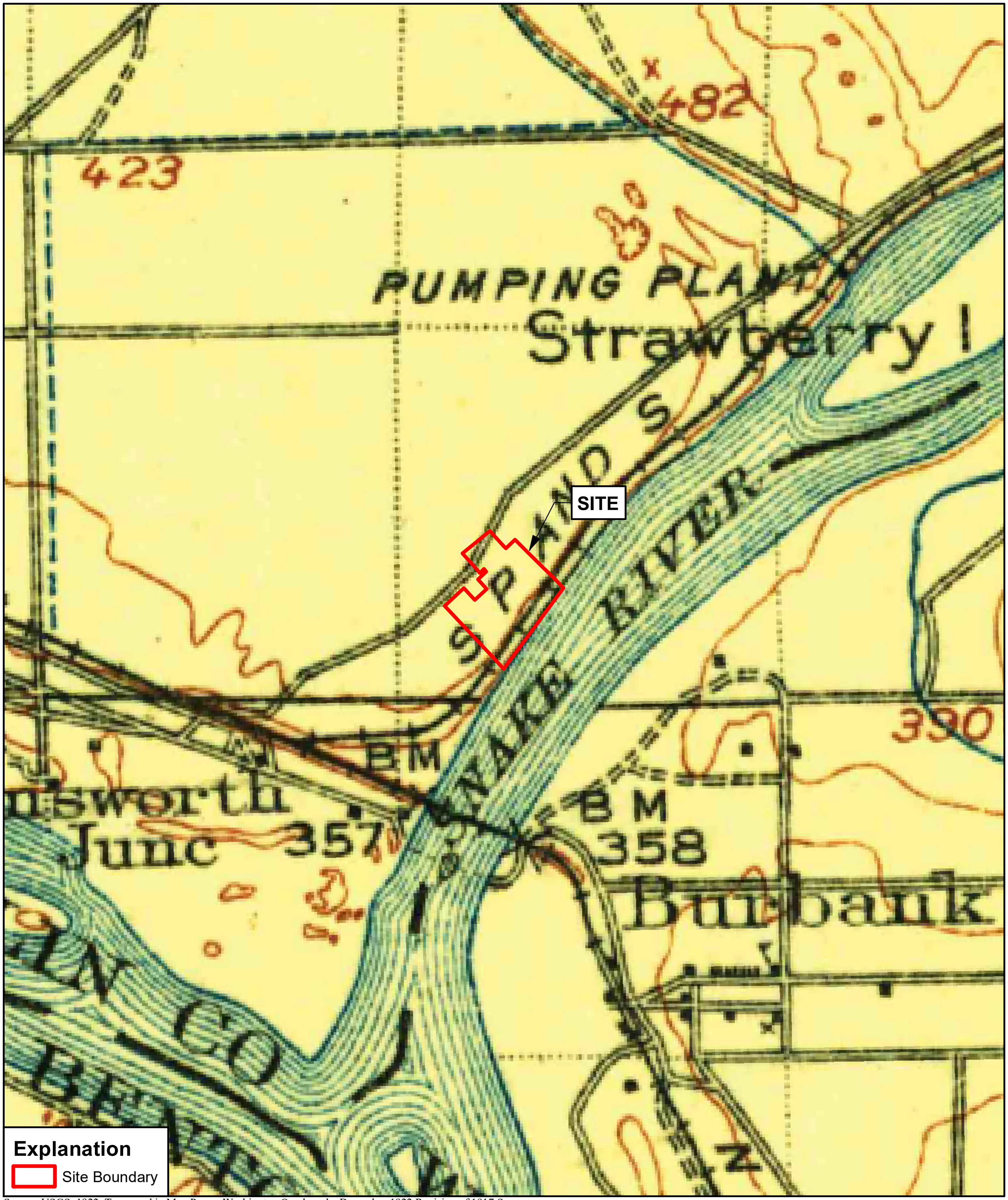
1917 USGS TOPOGRAPHIC MAP

TESORO LOGISTICS OPERATIONS, LLC
TESORO PASCO BULK FUEL TERMINAL
PASCO, WASHINGTON

60650612

FIGURE B1

K:\Tesoro_Pasco\MXD\RI\Fig B1 1917 USGS Topographic Map.mxd



Source: USGS, 1922. Topographic Map Pasco, Washington Quadrangle, December 1922 Revision of 1917 Survey

1,000 0 1,000 2,000
SCALE IN FEET

AECOM

1922 USGS TOPOGRAPHIC MAP

TESORO LOGISTICS OPERATIONS, LLC
TESORO PASCO BULK FUEL TERMINAL
PASCO, WASHINGTON

60650612

FIGURE B2

K:\Tesoro_Pasco\MXD\RI\Fig B2 1922 USGS Topographic Map.mxd

Source: U.S. Army Corps of Engineers, 1945. Aerial Photograph.

1,000 0 1,000 2,000
SCALE IN FEET

AECOM

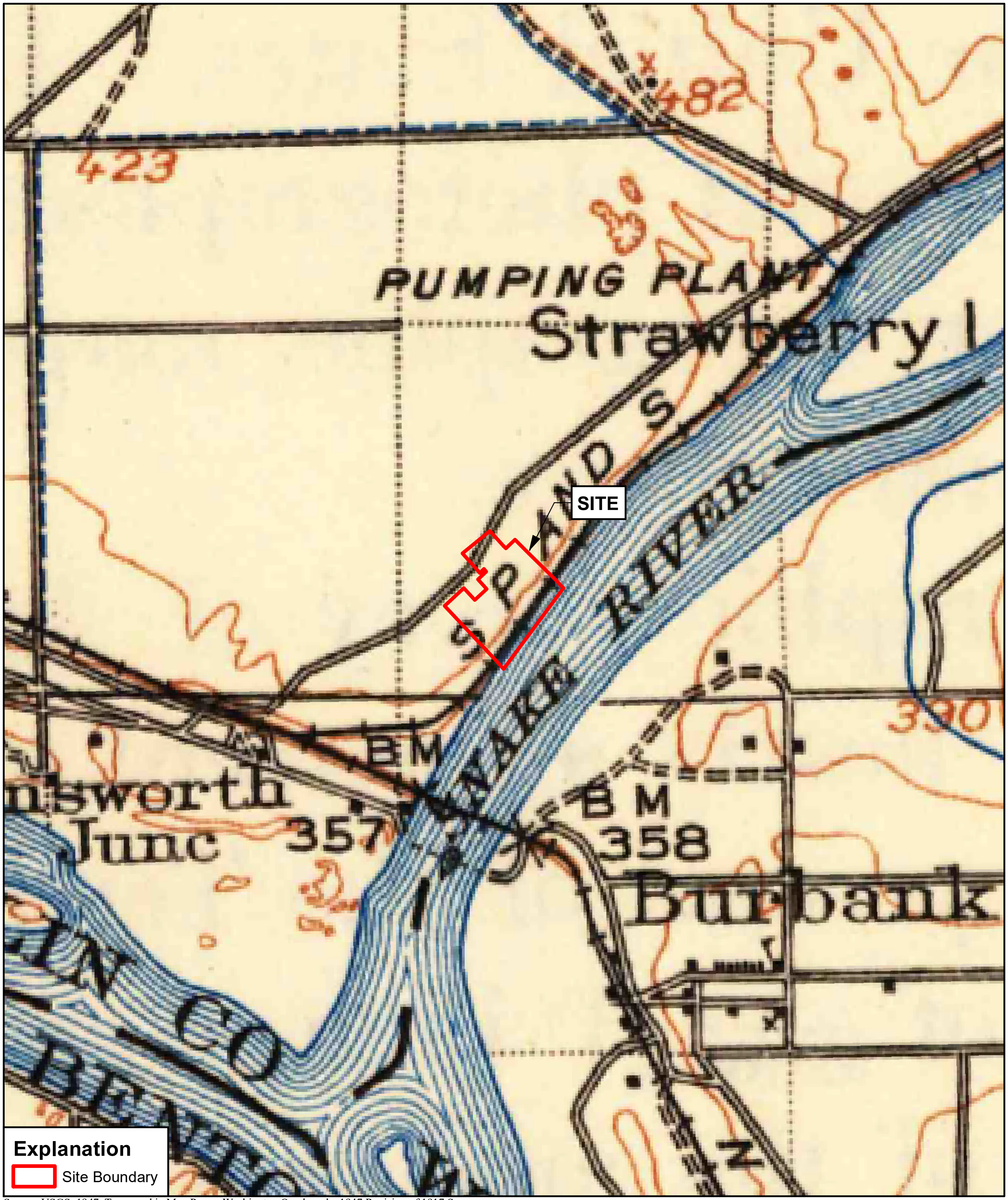
1945 AERIAL

TESORO LOGISTICS OPERATIONS, LLC
TESORO PASCO BULK FUEL TERMINAL
PASCO, WASHINGTON

60650612

FIGURE B3

K:\Tesoro Pasco\MXD\RI\Fig B3 1945 Aerial.mxd



Source: USGS, 1947. Topographic Map Pasco, Washington Quadrangle, 1947 Revision of 1917 Survey

1,000 0 1,000 2,000
SCALE IN FEET

AECOM

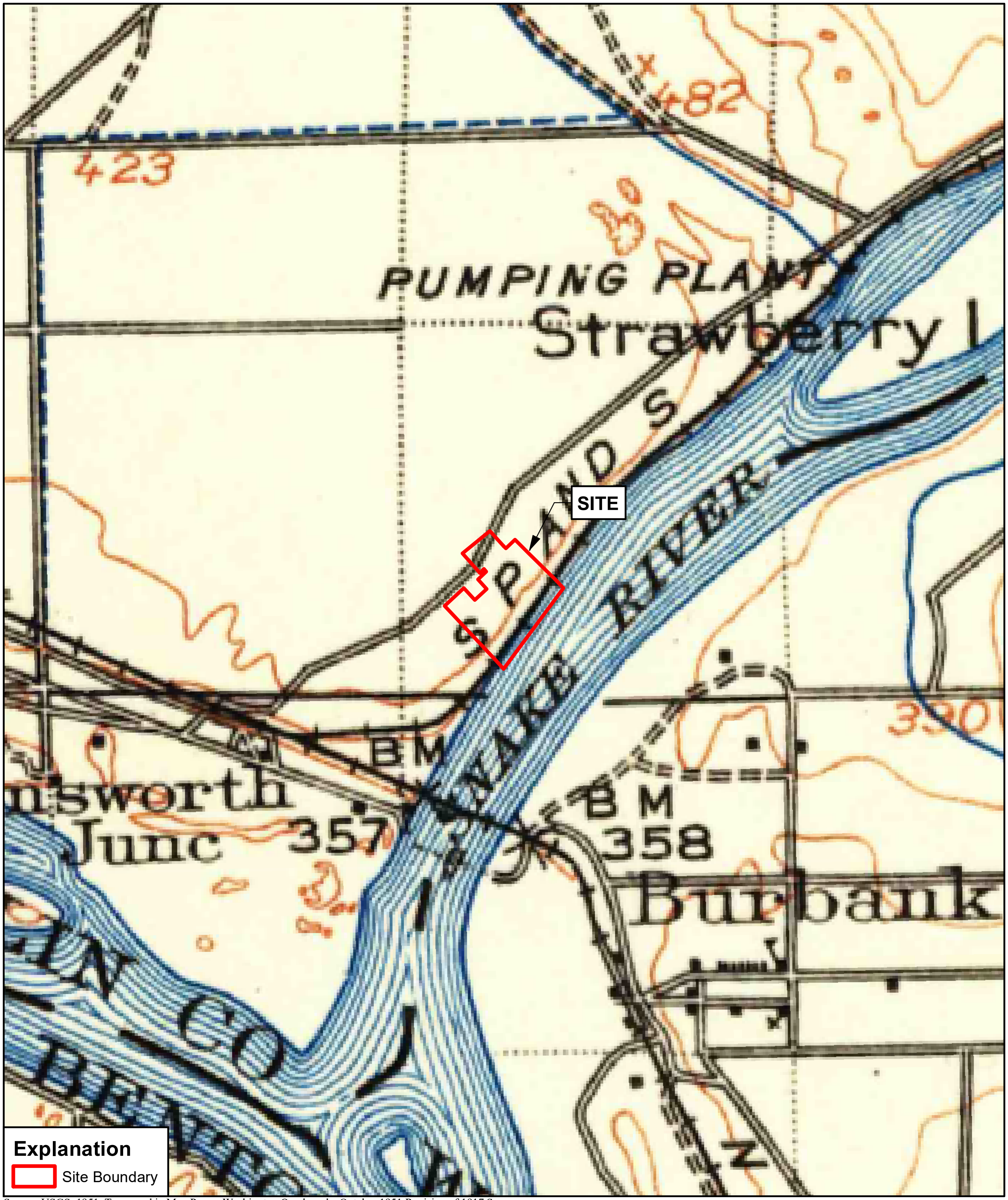
1947 USGS TOPOGRAPHIC MAP

TESORO LOGISTICS OPERATIONS, LLC
TESORO PASCO BULK FUEL TERMINAL
PASCO, WASHINGTON

60650612

FIGURE B4

K:\Tesoro_Pasco\MXD\RI\Fig B4 1947 USGS Topographic Map .mxd



Source: USGS, 1951. Topographic Map Pasco, Washington Quadrangle, October 1951 Revision of 1917 Survey

1,000 0 1,000 2,000

SCALE IN FEET

AECOM

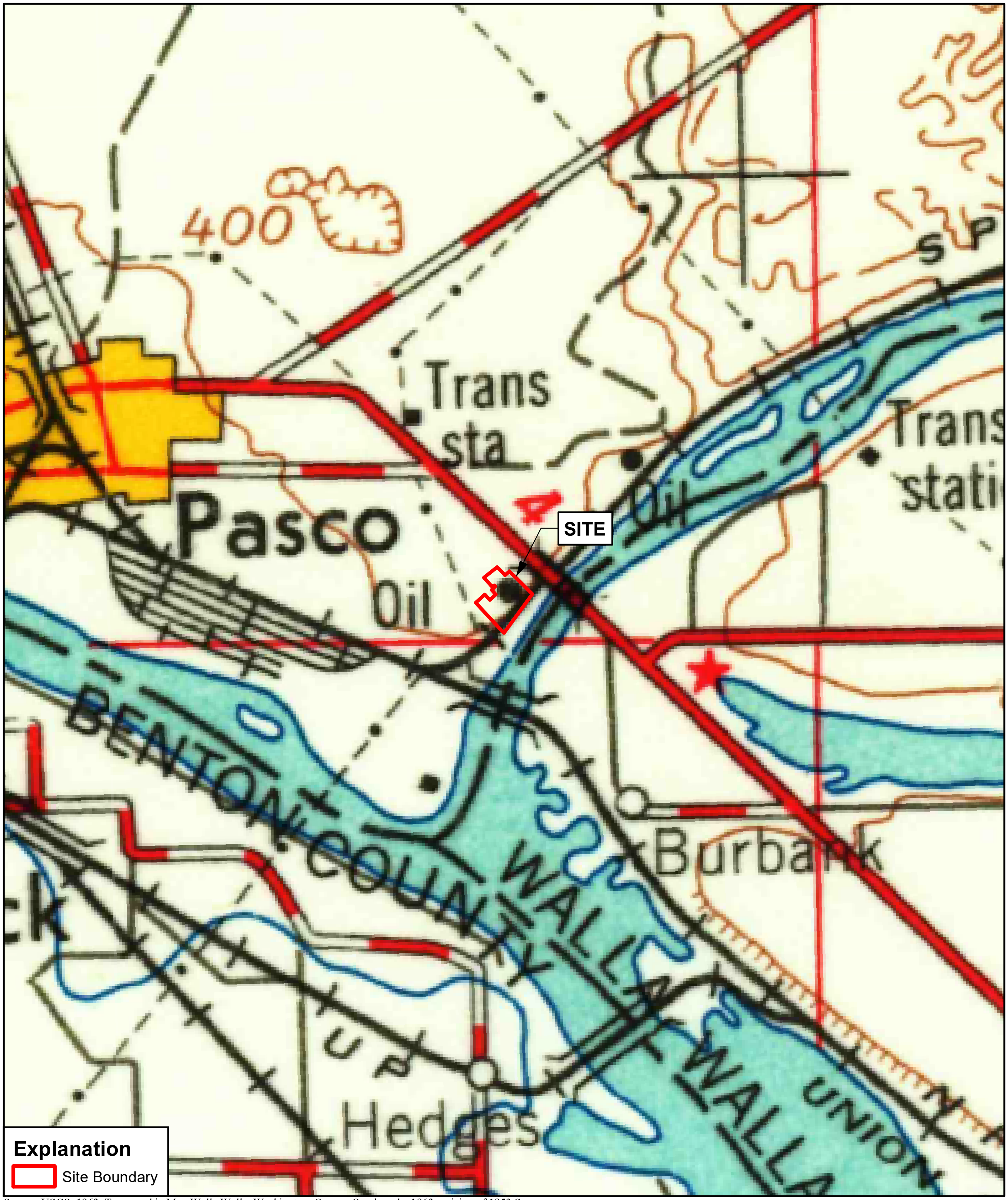
1951 USGS TOPOGRAPHIC MAP

TESORO LOGISTICS OPERATIONS, LLC
TESORO PASCO BULK FUEL TERMINAL
PASCO, WASHINGTON

60650612

FIGURE B5

K:\Tesoro_Pasco\MXD\RI\Fig B5 1951 USGS Topographic Map.mxd



Source: USGS, 1963. Topographic Map Walla Walla, Washington; Oregon Quadrangle. 1963 revision of 1953 Survey

2,000 0 2,000 4,000
SCALE IN FEET

AECOM

1953 USGS TOPOGRAPHIC MAP

TESORO LOGISTICS OPERATIONS, LLC
TESORO PASCO BULK FUEL TERMINAL
PASCO, WASHINGTON

60650612

FIGURE B6

K:\Tesoro_Pasco\MXD\RI\Fig B6 1953 USGS Topographic Map.mxd

Nearest Water Wells within approximately 1-mile

Well Report ID 173850

Appl.#7987
Permit #7487 #1

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION AND DEVELOPMENT

WELL LOG

No. 9/30E-34Q

Date May 10, 1967

Record by

Source

Location: State of WASHINGTON

County Franklin

Area

Map

N½ SW ¼ SE ¼ sec 34 T. 9 N., R. 30 E./W.

34

Diagram of Section

Drilling Co.

Address

Method of Drilling Cable Date , 19

Owner Vernon J. Rickords

Address South 1505 Road #40 East Pasco, Wash.

Land surface, datum ft. above/below

SWL: 75

Correlation	Material	Thickness (feet)	Depth (feet)
	(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)		
	No Log (see well #2	0	100
	Irrigation, municipal		
	Pump: 7½ and 3 h.p. submersible		
	Jacuzzi		
	probably 40 gpm		

Turn up Sheet of sheets

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION AND DEVELOPMENT

Appl.# 7987
Permit # 7487 #2

WELL LOG

No. 9 / 30E - 34 Q

Date May 10, 1967

Record by Driller

Source Driller

Location: State of WASHINGTON

County Franklin

Area

Map

N½SW ¼ SE ¼ sec. 34 T. 9 N., R. 30 E. W.

34

Diagram of Section

Drilling Co. Haden Drilling Co.

Address

Method of Drilling Cable Date , 19

Owner Vernon J. Rickords

Address South 1505 Road #40 East Pasco, Wash.

Land surface, datum ft. above below

SWL: 74 Dims: 10" x 89'

Correlation	Material	Thickness (feet)	Depth (feet)
	(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)		
	Irrigation, municipal		
	Sand, blow, brown	0	60
	Sand, brown with some gravel	60	65
	Sand, brown, coarse	65	75
	Sand, black, coarse and gravel	75	89
	up to 4"		
	Casing: 10" from 0-89'		
	Perforated from 84-88'		
	Surface sealed with clay to 10'*		
	Bailer Test: 40 gpm with 1' DD after 2 hrs.		
	Test made March, 1967		
	Pump: 7½ h.p. turbine		
	Jacuzzi		
	Meter 73-8-381		

Turn up Sheet of sheets

File Original and First Copy with the Division of Water Management
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

Application No. 63-70662
Permit No. 63-20662

(1) OWNER: Name LAKEVIEW MOBILE HOME PARK Address S. 1505 ROAD 40 E. PASCO

(2) LOCATION OF WELL: County FRANKLIN S½ SW ¼ SE ¼ Sec. 34 T. 9 N., R. 30 W.M.
Bearing and distance from section or subdivision corner NOT KNOWN

(3) PROPOSED USE: Domestic ☐ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☒

(4) TYPE OF WORK: Owner's number of well (if more than one)....
New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☒ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 12 inches.
Drilled 96 ft. Depth of completed well 96 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 12" Diam. from 0 ft. to 83 ft.
Threaded ☐ ....." Diam. from ..... ft. to ..... ft.
Welded ☒ ....." Diam. from ..... ft. to ..... ft.

Perforations: Yes ☐ No ☒
Type of perforator used.....
SIZE of perforations ..... in. by ..... in.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.

Screens: Yes ☒ No ☐
Manufacturer's Name JOHNSON - 304 S.S.
Type..... Model No.....
Diam. 12 Slot size 040 from 83 ft. to 86 ft.
Diam. ..... Slot size 025 from 86 ft. to 96 ft.

Gravel packed: Yes ☐ No ☒ Size of gravel: .....
Gravel placed from ..... ft. to ..... ft.

Surface seal: Yes ☒ No ☐ To what depth? 18 ft.
Material used in seal BENTONITE
Did any strata contain unusable water? Yes ☐ No ☒
Type of water?..... Depth of strata.....
Method of sealing strata off.....

(7) PUMP: Manufacturer's Name NON INSTALLED YET
Type: ..... H.P. .....

(8) WATER LEVELS: Land-surface elevation above mean sea level.... 400 ft.
Static level 56.5 ft. below top of well Date 7/10/73
Artesian pressure ..... lbs. per square inch Date .....
Artesian water is controlled by..... (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☒ No ☐ If yes, by whom? C.D.Co.
Yield: 300 gal./min. with 14'6" ft. drawdown after 4 hrs.
" 500 " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level
4:44	56-6				
4:47	56-5				

Date of test 7/10/73
Bailer test..... gal./min. with..... ft. drawdown after..... hrs.
Artesian flow..... g.p.m. Date.....
Temperature of water 64 Was a chemical analysis made? Yes ☐ No ☒

(10) WELL LOG:

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
Sandy silt	0	28
Black sand	15	43
" " sm GR	15	58
C. GR, sm S	7	65
S, sm F. GR	5	70
S + F. GR	4½	74½
F. GR + S.	1½	76
F GR + S	2	78
F. S. in F. GR.	2	80
F. GR, sm S.	7	87
Sand, cm, F GR.	5	92
F. GR + S.	2	94
CEMENTED	2	96

gpm
SAT
75°
191
A
50

Work started JUNE 15, 1973 Completed July 12, 1973

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME CASCADE DRILLING CO. (Person, firm, or corporation) (Type or print)
Address P.O. DRAWER E, KENN.
[Signed] [signature] (Well Driller)
License No..... Date 7/12, 1973

(USE ADDITIONAL SHEETS IF NECESSARY)

11/16/73 RCA

S. F. No. 7356—OS—(Rev. 5-69)—5-69.

GWP-10403

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION
DIVISION OF WATER RESOURCES

WELL LOG

Record by Driller

Source Driller's Record

Location: State of WASHINGTON

County Franklin

Area Kennewick

Map

SW ¼ NE ¼ sec. 34 T. 9 N., R. 30 E.W.

Diagram of Section: 34

Drilling Co. St. George Drilling Co.

Address 701 So. 45th Ave., W. Rich., WA.

Method of Drilling Cable Date 12/1/71-1/24, 19 72

Owner Columbia East

Address 3400 W. Clearwater, Kennewick, WA

Land surface, datum 400 ft. above / below

SWL: 74 Date 1/25/72, 19 Dims. 16" X 115'

Correlation	Material	From (feet)	To (feet)
	(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)		
	Sand	0	73
	Sand, Black & Gravel	73	105
	Sand, Brown & Gravel & Clay	105	115
	Casing: 16" from 0 to 115'		
	Perforations: Mills Knife		
	3/8" X 3" from 79' to 115'		
Amp Tot 1/2	Pump Test: 2200 gpm, 20' DD	3 Hr.	

Turn up

Sheet ..... of ..... sheets

Well Report ID 173449

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION
AND DEVELOPMENT

WELL LOG

No. Appli. #2833
Cert. #1447-A

Date Dec. 19, 19 52

Record by C. F. Griggs

Source Driller's Record

Location: State of WASHINGTON

County Franklin

Area

Map

Govt. Lot 1 ¼ sec. 35 T. 9 N., R. 30 E.

DIAGRAM OF SECTION: 35

Drilling Co.

Address

Method of Drilling drilled Date Dec. 19 19 52

Owner Tidewater Shaver Barge Lines

Address Pasco, Washington

Land surface, datum ft. above / below

(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)

Correlation	Material	Thickness (feet)	Depth (feet)
	Soil & fine sand	30	30
	Heavy gravel & some boulders	50	80
	Clean water-bearing gravel	35	115
	Bottom of casing resting on large		
	boulder. Drilled through boulder		
	and entered clean water bearing gravel		
	to 120 feet. All water enters bottom		
	of casing at 115 feet.		
PUMP	TEST:		
	Dim: 115' x 10"		
	SWL: 80'.		
	Dd: 21'		
	Yield: 500 g.p.m.		
	Casing: 10" diameter from 0 to 115'		
	No perforations.		

Turn up

Sheet ____ of ____ sheets

Well Report ID 164892

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION
AND DEVELOPMENT

WELL LOG No. Decla. 540

Cert. #838-D

Date 1923, 19

Record by Curt Benninghoven

Source G. W. Decla. Claim

Location: State of WASHINGTON

County Franklin

Area

~~xxx~~ NW¼ SW¼ NE¼

¼ ¼ sec. 3 T. 8 N., R. 30 E/W.

DIAGRAM OF SECTION

Drilling Co.

Address

Method of Drilling Date 19

Owner Curt & Edith W. Benninghoven

Address Pasco, Wash.

Land surface, datum ft. above/below

CORRELATION	MATERIAL	THICKNESS (feet)	DEPTH (feet)
	(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)		
	no record		
Pump	Test:		
	Dim: 6' x 35'		
	Yield: 600 g.p.m. (Claim)		

Turn up

Sheet of sheets

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION
AND DEVELOPMENT

WELL LOG

No. Decla. #541
Cert. #839-D

Date 1928, 19

Record by Curt Benninghoven

Source G. W. Decla. Claim

Location: State of WASHINGTON

County Franklin

Area

Map

E½SE ¼ NW ¼ sec. 3 T. 8 N., R. 30 E.

DIAGRAM OF SECTION

Drilling Co.

Address

Method of Drilling Date 19

Owner Curt & Edith Benninghoven

Address Pasco, Wash.

Land surface, datum ft. above / below

Correlation	Material	Thickness (feet)	Depth (feet)

(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)

Correlation	Material	Thickness (feet)	Depth (feet)
	no record		
Pump	Test:		
	Dim: 6' x 4' x 28'		
	Yield: 350 g.p.m. (Claim)		

Turn up

Sheet of sheets

Additional Water Wells within approximately 1-mile

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

Application No.
Permit No.

(1) OWNER: Name AAA Paving Co. Address E. 3300 A Street Pasco

(2) LOCATION OF WELL: County Franklin NW¼ NW¼ NW¼ Sec. 34 T. 9 N., R. 30E W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☒ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one)
New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☐ Driven ☐
Reconditioned ☐ Rotary ☒ Jetted ☐

(5) DIMENSIONS: Diameter of well 6" inches.
Drilled 100 ft. Depth of completed well 100 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 6 " Diam. from +1 ft. to 99 ft.
Threaded ☐ " Diam. from ft. to ft.
Welded ☒ " Diam. from ft. to ft.

Perforations: Yes ☐ No ☒
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☐ No ☒
Manufacturer's Name
Type Model No.
Diam. Slot size from ft. to ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☒ Size of gravel
Gravel placed from ft. to ft.

Surface seal: Yes ☒ No ☐ To what depth? 20+ ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level 420 ft.
Static level 75 ft. below top of well Date
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☒ If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test
Air ~~Bailer test~~ 40 gal./min. with ft. drawdown after hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
SAND	0	80
SAND, GRAVEL	80	100

RECEIVED
MAY 18 1978
DEPARTMENT OF ECOLOGY
SPOKANE REGIONAL OFFICE

Work started 4-11, 1978 Completed 4-11, 1978

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Aqua Drilling Inc. (Person, firm, or corporation) (Type or print)

Address [redacted], Box 659 Hayden Lake, Id

[Signed] Theron D Lewis (Well Driller)

License No. 0718 Date 4-11, 1978

5/5/78 Pasco 7½

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20

274493

WATER WELL REPORT

Original & 1st copy – Ecology, 2nd copy – owner, 3rd copy – driller

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Construction/Decommission *("x" in circle)*
☒ Construction
○ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* ______

CURRENT Notice of Intent No. W 256472
Unique Ecology Well ID Tag No. BAL 761
Water Right Permit No. ______
Property Owner Name Agri Pak
Well Street Address 28 Pasco Kahlotus Rd
City Pasco County Franklin
Location ___1/4-1/4 NE 1/4 Sec 27 Twn 9 R 30 EWM or WWM (circle one)
Lat/Long (s, t, r Still REQUIRED) Lat Deg ______ Lat Min/Sec ______ Long Deg ______ Long Min/Sec ______
Tax Parcel No. 113-710-093

PROPOSED USE: ☒ Domestic ☐ Industrial ☐ Municipal ☐ DeWater ☐ Irrigation ☐ Test Well ☐ Other ______

TYPE OF WORK: Owner's number of well (if more than one) ______
☒ New well ☐ Reconditioned ☐ Deepened *Method:* ☐ Dug ☐ Bored ☐ Driven ☐ Cable ☒ Rotary ☐ Jetted

DIMENSIONS: Diameter of well 8 inches, drilled 420 ft.
Depth of completed well 420 ft.

CONSTRUCTION DETAILS
Casing Installed: ☒ Welded 8" Diam. from +1 ft. to 155 ½ ft.
☒ Liner installed 6 PVC Diam. from 20 ft. to 420 ft.
☐ Threaded ______" Diam. from ______ ft. to ______ ft.

Perforations: ☒ Yes ☐ No
Type of perforator used Saw
SIZE of perfs 1/8 in. by 6 in. and no. of perfs 250 from 320 ft. to 420 ft.

Screens: ☐ Yes ☒ No ☐ K-Pac Location ______
Manufacturer's Name ______
Type ______ Model No. ______
Diam. ______ Slot size ______ from ______ ft. to ______ ft.
Diam. ______ Slot size ______ from ______ ft. to ______ ft.

Gravel/Filter packed: ☐ Yes ☒ No ☐ Size of gravel/sand ______
Materials placed from ______ ft. to ______ ft.

Surface Seal: ☒ Yes ☐ No To what depth? 155 ft.
Material used in seal Bentonite & Casing
Did any strata contain unusable water? ☐ Yes ☒ No
Type of water? ______ Depth of strata ______
Method of sealing strata off ______

PUMP: Manufacturer's Name ______
Type: ______ H.P. ______

WATER LEVELS: Land-surface elevation above mean sea level ______ ft.
Static level 76 ft. below top of well Date 10/22/07
Artesian pressure ______ lbs. per square inch Date ______
Artesian water is controlled by ______ (cap, valve, etc.)

WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? ☐ Yes ☐ No If yes, by whom? ______
Yield: ______ gal./min. with ______ ft. drawdown after ______ hrs.
Yield: ______ gal./min. with ______ ft. drawdown after ______ hrs.
Yield: ______ gal./min. with ______ ft. drawdown after ______ hrs.
Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test ______
Bailer test ______ gal./min. with ______ ft. drawdown after ______ hrs.
Airtest 300 gal./min. with stem set at 300 ft. for 2 hrs.
Artesian flow ______ g.p.m. Date ______
Temperature of water ______ Was a chemical analysis made? ☐ Yes ☐ No

CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
TAN SAND	0	8
BLACK SAND	8	56
BLACK & GRAVEL	56	94
TAN SILT SAND & GRAVEL	94	126
TAN CLAY	126	134
GREY CLAY	134	152
PORICE BLACK BASALT H2O	152	178
PORICE RED BASALT H2O	178	185
BLACK BASALT HARD	185	239
PORICE BLACK BASALT	239	254
BLACK BASALT HARD	254	343
PORICE BLACK BASALT	343	347
BLACK BASALT HARD	347	388
PORICE BLACK BASALT W/	388	—
TRACE OF BLUE SILTSTONE	—	400
ABOVE W/ PORICE RED BAS.	400	407
BLACK BASALT	407	420

RECEIVED
OCT 24 2007
DEPARTMENT OF ECOLOGY
EASTERN REGIONAL OFFICE

Start Date 10/17/07 Completed Date 10/22/07

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee Name (Print) Jeremy Rude
Driller/Engineer/Trainee Signature [signature]
Driller or trainee License No. 2691

If TRAINEE,
Driller's Licensed No. ______
Driller's Signature ______

Drilling Company Nelson Well Drilling
Address 7505 W. Court St
City, State, Zip Pasco WA 99301
Contractor's Registration No. NELSOWD 198CQ Date 10/22/07

Ecology is an Equal Opportunity Employer.

ECY 050-1-20 (Rev 3/05)

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

[redacted]

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

File Original and First Copy with Department of Ecology
Second Copy—Owner's Copy
Third Copy—Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. [redacted]

Water Right Permit No. ____

(1) **OWNER:** Name Al Fountain Address 381 Paso Kahlotus Hwy.

(2) **LOCATION OF WELL:** County Franklin NE ¼ NE ¼ Sec 27 T. 9 N., R. 30 E W.M.

(2a) **STREET ADDDRESS OF WELL** (or nearest address) ____

(3) **PROPOSED USE:** ☒ Domestic ☐ Irrigation ☐ DeWater Industrial ☐ Test Well ☐ Municipal ☐ Other ☐

(4) **TYPE OF WORK:** Owner's number of well (if more than one) ____
Abandoned ☐ New well ☒ Deepened ☐ Reconditioned ☐
Method: Dug ☐ Cable ☐ Rotary ☒ Bored ☐ Driven ☐ Jetted ☐

(5) **DIMENSIONS:** Diameter of well 6 inches.
Drilled 102 feet. Depth of completed well 101 ft.

(6) **CONSTRUCTION DETAILS:**
Casing installed: 6 " Diam. from +2 ft. to 96 ft.
Welded ☒ ____ " Diam. from ____ ft. to ____ ft.
Liner installed ☐
Threaded ☐ ____ " Diam. from ____ ft. to ____ ft.

Perforations: Yes ☐ No ☒
Type of perforator used ____
SIZE of perforations ____ in. by ____ in.
____ perforations from ____ ft. to ____ ft.
____ perforations from ____ ft. to ____ ft.
____ perforations from ____ ft. to ____ ft.

Screens: Yes ☒ No ☐
Manufacturer's Name Johnson
Type Stainless Steel Model No. ____
Diam. 6 Slot size 20 from 96 ft. to 101 ft.
Diam. ____ Slot size ____ from ____ ft. to ____ ft.

Gravel packed: Yes ☐ No ☒ Size of gravel ____
Gravel placed from ____ ft. to ____ ft.

Surface seal: Yes ☒ No ☐ To what depth? 20 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? ____ Depth of strata ____
Method of sealing strata off ____

(7) **PUMP:** Manufacturer's Name ____
Type: ____ H.P. ____

(8) **WATER LEVELS:** Land-surface elevation above mean sea level ____ ft.
Static level 77'6" ft. below top of well Date 10-19
Artesian pressure ____ lbs. per square inch Date ____
Artesian water is controlled by ____ (Cap, valve, etc.)

(9) **WELL TESTS:** Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☒ If yes, by whom? ____
Yield: ____ gal./min. with ____ ft. drawdown after ____ hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test ____
Bailer test ____ gal./min. with ____ ft. drawdown after ____ hrs.
Airtest 50 gal./min. with stem set at 98 ft. for 2 hrs.
Artesian flow ____ g.p.m. Date ____
Temperature of water ____ Was a chemical analysis made? Yes ☐ No ☐

(10) **WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION**

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
Sand Tan	0	9
Sand Tan Silty	9	34
Sand Black Fine	34	39
Sand Tan	39	53
Sand Tan silty	53	58
Sand Black Fine	58	62
Sand Black Some Fine gravel	62	64
Sand Tan	64	68
Sand Black gravel	68	72
Sand Black Water @ 77'6"	72	93
Gravel 4" minus sand Black Water Bearing	93	101
Sand Tan gravel	101	102

RECEIVED
[redacted] 25 1990
DEPARTMENT OF ECOLOGY
SPOKANE REGIONAL OFFICE

Work started 10-19, 19__. Completed 10-19, 1990

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME NELSON Well Drilling Inc
(PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)
Address 10036 W Argent Pasco
(Signed) James Nelson (WELL DRILLER) License No. 361
Contractor's Registration No. NELSOWD194CQ Date 10-22, 1990

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20 (10/87) -1329-

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTO

Application No. 63 21801
Permit No. G3 21801 P

(1) OWNER: Name ALDERSON Address

(2) LOCATION OF WELL: County Franklin SE ½ ¼ NE ¼ Sec 27 T. 9 N., R. 30E W.M.

Bearing and distance from section or subdivision corner 2320 FT S and 1320 FT W From the NE Corner of Sec 27

(3) PROPOSED USE: Domestic ☐ Industrial ☐ Municipal ☐ Irrigation ☒ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one)
New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☒ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 16" inches.
Drilled 100 ft. Depth of completed well 98 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 16 " Diam. from +1 ft. to 83 ft.
Threaded ☐ " Diam. from ft. to ft.
Welded ☒ " Diam. from ft. to ft.

Perforations: Yes ☐ No ☒
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☒ No ☐
Manufacturer's Name Johnson
Type Stanless Model No.
Diam. 16" Slot size 100 from 83 ft. to 88 ft.
Diam. 16" Slot size 150 from 85 ft. to 93 ft.
16 130 83 98

Gravel packed: Yes ☐ No ☒ Size of gravel:
Gravel placed from ft. to ft.

Surface seal: Yes ☒ No ☐ To what depth? 21 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level.... ft.
Static level 74-6 ft. below top of well Date 11-13-75
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐ If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test
Bailer test gal./min. with ft. drawdown after hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG: Sec 27

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Soil	0	7
Sand Gray	7	55
Sand Black + Gravel	55	82
Gravel + Sand Black	82	98.6
Gravel Ringold	98.6	100
Screen 16" Telescope —		
K Packer - 1 FT Tight wind		
5 FT 100 Slot		
5 FT 150 Slot		
5 FT 130 Slot		
Bail Bottom.		
304 Stanless wire wound		

Work started 9-26, 1975 Completed 11-13, 1975

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Nelson Well Drilling (Person, firm, or corporation) (Type or print)
Address P.O. Box 2814 Pasco
[Signed] James Nelson (Well Driller)
License No. 361 Date 11-13, 1975

12/14/75

(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. 7356—OS—(Rev. 4-71).

3

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

File Original and First Copy with
Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

Application No. ....
Permit No. 52401

(1) OWNER: Name Akerson Bros Address P.O. Box 532 Pasco Wa 99301

(2) LOCATION OF WELL: County Franklin — NE 1/4 NE 1/4 Sec 26 T 9 N., R 30 W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☐ Industrial ☐ Municipal ☐
Irrigation ☒ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) ....
New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☒ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 16 inches.
Drilled est 165 ft. Depth of completed well 165 ft. (estimated)

(6) CONSTRUCTION DETAILS:

Casing installed: 16 " Diam. from 0 ft. to ...... ft.
Threaded ☐ ...... " Diam. from ...... ft. to ...... ft.
Welded ☒ ...... " Diam. from ...... ft. to ...... ft.

Perforations: Yes ☒ No ☐
Type of perforator used unknown
SIZE of perforations ...... in. by ...... in.
...... perforations from ...... ft. to ...... ft.
unknown perforations from ...... ft. to ...... ft.
...... perforations from ...... ft. to ...... ft.

Screens: Yes ☐ No ☐ unknown
Manufacturer's Name ......
Type ...... Model No. ......
Diam. ...... Slot size ...... from ...... ft. to ...... ft.
Diam. ...... Slot size ...... from ...... ft. to ...... ft.

Gravel packed: Yes ☐ No ☐ Size of gravel: ......
Gravel placed from ...... ft. to ...... ft.

Surface seal: unknown Yes ☐ No ☐ To what depth? ...... ft.
Material used in seal ......
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? ...... Depth of strata ......
Method of sealing strata off ......

(7) PUMP: Manufacturer's Name Layne
Type: Turbine H.P. 200

(8) WATER LEVELS: Land-surface elevation above mean sea level.... 480 ft.
Static level ...... ft. below top of well Date ......
Artesian pressure ...... lbs. per square inch Date ......
Artesian water is controlled by
unknown (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☒ No ☐ If yes, by whom? Layne
Yield: ...... gal./min. with ...... ft. drawdown after ...... hrs.
" ...... " ...... " ...... "
" ...... " ...... " ...... "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test ......
Bailer test ...... gal./min. with ...... ft. drawdown after ...... hrs.
Artesian flow ...... g.p.m. Date ......
Temperature of water ...... Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
St. George Drilling Co refuses to comply with filling out this form or providing data requested He further refused to return water well report sent him. Consequently I am unable to provide much of the desired data		
Jack Akerson		

Work started ...... , 19...... Completed ...... , 19......

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME ......
(Person, firm, or corporation) (Type or print)

Address ......

[Signed] ......
(Well Driller)

License No. ...... Date ...... , 19......

11/14

(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. 7356—OS—(Rev. 4-71)

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

Application No. ....
Permit No. ....

(1) OWNER: Name ~~Ronald Johnson~~ Alexander Buxbaum   Address Star Route Box 1001, Pasco, WA 99301

(2) LOCATION OF WELL: County Franklin   S½, SW¼ — SE ¼ NE ¼ Sec 27 T 9 N., R 30E W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☒ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one)....
New well ☒ Deepened ☐ Reconditioned ☐
Method: Dug ☐ Bored ☐ Cable ☐ Driven ☐ Rotary ☒ Jetted ☐

(5) DIMENSIONS: Diameter of well 8 inches.
Drilled 120 ft. Depth of completed well 120 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 8 " Diam. from +1 ft. to 119 ft.
Threaded ☐ ...." Diam. from .... ft. to .... ft.
Welded ☒ ...." Diam. from .... ft. to .... ft.

Perforations: Yes ☐ No XX
Type of perforator used ....
SIZE of perforations .... in. by .... in.
.... perforations from .... ft. to .... ft.
.... perforations from .... ft. to .... ft.
.... perforations from .... ft. to .... ft.

Screens: Yes ☐ No XX
Manufacturer's Name ....
Type .... Model No. ....
Diam. .... Slot size .... from .... ft. to .... ft.
Diam. .... Slot size .... from .... ft. to .... ft.

Gravel packed: Yes ☐ No XX Size of gravel: ....
Gravel placed from .... ft. to .... ft.

Surface seal: Yes XX No ☐ To what depth? 20 ft.
Material used in seal bentonite
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? .... Depth of strata ....
Method of sealing strata off ....

(7) PUMP: Manufacturer's Name ....
Type: .... H.P. ....

(8) WATER LEVELS: Land-surface elevation above mean sea level.... 420 ft.
Static level 80 ft. below top of well Date 1/8/83
Artesian pressure .... lbs. per square inch Date ....
Artesian water is controlled by .... (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☒ If yes, by whom? ....
Yield: 75 gal./min. with .... ft. drawdown after .... hrs.
" ESTIMATED AIRLIFT " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test ....
Bailer test .... gal./min. with .... ft. drawdown after .... hrs.
Artesian flow .... g.p.m. Date ....
Temperature of water .... Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Sand, fine	0	55
Sand, medium w/some gravel	55	75
Gravel, course & cobble	75	78
Sand, course w/water	78	85
Gravel, course 4" - 1/2" w/water	85	120
NO PVC Liner Installed		
8" Drive Shoe Installed		

RECEIVED
JAN 21 1983
DEPARTMENT OF ECOLOGY
SPOKANE REGIONAL OFFICE

Work started 1/07/ 1983 Completed 1/08/ 1983

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME PONDEROSA DRILLING & DEVELOPMENT INC.
(Person, firm, or corporation) (Type or print)

Address E. 6010 BROADWAY, SPOKANE, WA 99206

[Signed] Paul Hawkins
Paul Hawkins (Well Driller)

License No. 1007 Date 1/08/ 1983

1/21/83

(USE ADDITIONAL SHEETS IF NECESSARY)

Pasco

ECY 050-1-20

File Original and First Copy with Department of Ecology
Second Copy—Owner's Copy
Third Copy—Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. [redacted]

Water Right Permit No. ______

(1) OWNER: Name BPA Franklin Substation Pasco Address ______

(2) LOCATION OF WELL: County Franklin SW ¼ NW ¼ Sec 27 T. 9 N., R 30 W.M.

(2a) STREET ADDDRESS OF WELL (or nearest address) ______

(3) PROPOSED USE: ☐ Domestic ☐ Irrigation ☐ DeWater Industrial ☐ Test Well ☐ Municipal ☐ Other ☒

(4) TYPE OF WORK: Owner's number of well (if more than one) 2

Abandoned ☐ New well ☒ Deepened ☐ Reconditioned ☐ Method: Dug ☐ Cable ☐ Rotary ☒ Bored ☐ Driven ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 12 x 8 inches.
Drilled 650 feet. Depth of completed well 650 ft.

(6) CONSTRUCTION DETAILS:

Casing Installed: 8" Diam. from +2 ft. to 164 ft.
Welded ☒ ______ " Diam. from ______ ft. to ______ ft.
Liner installed ☐
Threaded ☐ ______ " Diam. from ______ ft. to ______ ft.

Perforations: Yes ☐ No ☒
Type of perforator used ______
SIZE of perforations ______ in. by ______ in.
______ perforations from ______ ft. to ______ ft.
______ perforations from ______ ft. to ______ ft.
______ perforations from ______ ft. to ______ ft.

Screens: Yes ☐ No ☒
Manufacturer's Name ______
Type ______ Model No. ______
Diam. ______ Slot size ______ from ______ ft. to ______ ft.
Diam. ______ Slot size ______ from ______ ft. to ______ ft.

Gravel packed: Yes ☐ No ☒ Size of gravel ______
Gravel placed from ______ ft. to ______ ft.

Surface seal: Yes ☒ No ☐ To what depth? 650 ft.
Material used in seal Bentonite & cement
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? ______ Depth of strata ______
Method of sealing strata off ______

(7) PUMP: Manufacturer's Name ______
Type: ______ H.P. ______

(8) WATER LEVELS: Land-surface elevation above mean sea level ______ ft.
Static level 129 ft. below top of well Date ______
Artesian pressure ______ lbs. per square inch Date ______
Artesian water is controlled by ______ (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐ If yes, by whom? ______
Yield: ______ gal./min. with ______ ft. drawdown after ______ hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test ______
Bailer test ______ gal./min. with ______ ft. drawdown after ______ hrs.
Airtest ______ gal./min. with stem set at ______ ft. for ______ hrs.
Artesian flow ______ g.p.m. Date ______
Temperature of water ______ Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
Sand silt and cobbles	0	6
Fine brown sand	6	10
Fine brown sand w/clay	10	20
Fine brown sand w/clay	20	30
Fine brownsand w/clay	30	40
Fine brown sand w/clay	40	50
Fine brown sand w/clay	50	60
Fine brown sand w/clay	60	70
Fine brown sand w/clay	70	80
Black sand w/gravel	80	90
Black sand w/gravel	90	100
Black sand w/gravel	100	110
Black sand gravel & water	110	120
Black sand gravel & water	120	130
Brown clay	130	131
Blue clay	131	140
Blue clay	140	150
Blue clay	150	157
Broken rock w/blue shale caving	157	160
Fractured black basalt w/blue shale	160	170
Fractured black basalt w/blue shale	170	180
Fractured black basalt w/red	180	190
Hard gray basalt	190	200
Hard gray basalt	200	210
Hard gray basalt	210	220
Hard gray basalt	220	230
Hard gray basalt	230	240
Hard gray basalt	240	250
Hard gray basalt	250	260
Pouris black basalt w/blue shale	260	270
Pouris black basalt w/blue shale	270	280
Hard gray basalt	280	290
Hard gray basalt	290	300
Hard gray basalt	300	310

Work started ______, 19__. Completed ______, 19__

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME Ponderosa Drilling & Development, Inc.
(PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address E. 6010 Broadway Spokane, WA 99212

(Signed) Bob Britton License No. 0043
(WELL DRILLER) (Bob Britton)

Contractor's Registration No. PO-ND-EI*248JE Date 12/29, 19 92

(USE ADDITIONAL SHEETS IF NECESSARY)

The Dep. The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

File Original and First Copy with Department of Ecology
Second Copy—Owner's Copy
Third Copy—Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No ____

Water Right Permit No. ____

(1) OWNER: Name BPA Franklin Substation Pasco Address ____

(2) LOCATION OF WELL: County ____ ¼ ____ ¼ Sec ____ T. ____ N., R. ____ W.M.

(2a) STREET ADDDRESS OF WELL (or nearest address) ____

(3) PROPOSED USE: ☐ Domestic ☐ Irrigation ☐ DeWater Industrial ☐ Test Well ☐ Municipal ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) ____

Abandoned ☐ New well ☐ Deepened ☐ Reconditioned ☐ Method: Dug ☐ Cable ☐ Rotary ☐ Bored ☐ Driven ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well ____ inches.
Drilled ____ feet. Depth of completed well ____ ft.

(6) CONSTRUCTION DETAILS:

Casing installed: ____ " Diam. from ____ ft. to ____ ft.
Welded ☐ ____ " Diam. from ____ ft. to ____ ft.
Liner installed ☐ ____ " Diam. from ____ ft. to ____ ft.
Threaded ☐

Perforations: Yes ☐ No ☐
Type of perforator used ____
SIZE of perforations ____ in. by ____ in.
____ perforations from ____ ft. to ____ ft.
____ perforations from ____ ft. to ____ ft.
____ perforations from ____ ft. to ____ ft.

Screens: Yes ☐ No ☐
Manufacturer's Name ____
Type ____ Model No. ____
Diam. ____ Slot size ____ from ____ ft. to ____ ft.
Diam. ____ Slot size ____ from ____ ft. to ____ ft.

Gravel packed: Yes ☐ No ☐ Size of gravel ____
Gravel placed from ____ ft. to ____ ft.

Surface seal: Yes ☐ No ☐ To what depth? ____ ft.
Material used in seal ____
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? ____ Depth of strata ____
Method of sealing strata off ____

(7) PUMP: Manufacturer's Name ____
Type: ____ H.P. ____

(8) WATER LEVELS: Land-surface elevation above mean sea level ____ ft.
Static level ____ ft. below top of well Date ____
Artesian pressure ____ lbs. per square inch Date ____
Artesian water is controlled by ____ (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐ If yes, by whom? ____
Yield: ____ gal./min. with ____ ft. drawdown after ____ hrs.
" " "
" " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

8 1993

Date of test ____
Bailer test ____ gal./min. with ____ ft. drawdown after ____ hrs.
Airtest ____ gal./min. with stem set at ____ ft. for ____ hrs.
Artesian flow ____ g.p.m. Date ____
Temperature of water ____ Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
Fractured gray basalt	310	320
Fractured gray basalt	320	330
Fractured gray basalt	330	340
Fractured gray basalt	340	350
Fractured gray basalt	350	360
Fractured gray basalt	360	370
Fractured gray basalt	370	380
Fractured gray basalt	380	390
Pouris basalt w/blue shale & water	390	400
Pouris basalt w/blue shale & water	400	410
Hard gray basalt w/fractures	410	420
Hard gray basalt w/fractures	420	430
Hard gray basalt w/fractures	430	440
Hard gray basalt w/fractures	440	450
Hard gray basalt w/fractures	450	460
Hard gray basalt w/fractures	460	470
Black basalt medium	470	480
Black basalt medium	480	490
Soft gray basalt	490	500
Hard gray basalt	500	510
Hard gray basalt	510	520
Hard gray basalt	520	530
Black basalt w/red & water	530	540
Black basalt w/red & water	540	550
Black basalt w/red and water	550	560
Black basalt w/red and water	560	570
Fractured black basalt	570	580
Fractured black basalt w/blue shale	580	590
Fractured black basalt	590	600
Fractured hard black basalt	600	610
Fractured hard black basalt	610	620
Fractured black hard basalt	620	630
Fractured hard black basalt	630	640
Fractured black hard basalt	640	650

Work started ____, 19__. Completed ____, 19__

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME Ponderosa Drilling & Development, Inc.
(PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address E. 6010 Broadway Spokane, WA 99212

(Signed) Bob Britton License No. 0043
(WELL DRILLER) (Bob Britton)

Contractor's Registration No. PO-ND EI*248JE Date 12/29, 19 92

(USE ADDITIONAL SHEETS IF NECESSARY)

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

File Original and First Copy with Department of Ecology
Second Copy—Owner's Copy
Third Copy—Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. [redacted]

Water Right Permit No. ____________

(1) **OWNER:** Name *Bill Robinson* Address *3803 W. Nixon Pasco, WA.*

(2) **LOCATION OF WELL:** County *Franklin* ___ ¼ *SW* ¼ Sec *27* T. *9* N., R. *30E* W.M.

(2a) **STREET ADDDRESS OF WELL** (or nearest address) *Lewis St & Hwy 12*

(3) **PROPOSED USE:** [X] Domestic [ ] Irrigation [ ] DeWater [ ] Industrial [ ] Test Well [ ] Municipal [ ] Other

(4) **TYPE OF WORK:** Owner's number of well (if more than one) ____________

Abandoned [ ] New well [X] Deepened [ ] Reconditioned [ ]
Method: Dug [ ] Cable [X] Rotary [ ] Bored [ ] Driven [ ] Jetted [ ]

(5) **DIMENSIONS:** Diameter of well *6* inches.
Drilled *384* feet. Depth of completed well *384* ft.

(6) **CONSTRUCTION DETAILS:**

Casing installed: *6* " Diam. from *+2* ft. to *182* ft.
Welded [X] ____ " Diam. from ____ ft. to ____ ft.
Liner installed [ ] ____ " Diam. from ____ ft. to ____ ft.
Threaded [ ]

Perforations: Yes [ ] No [X]
Type of perforator used ____________
SIZE of perforations ____ in. by ____ in.
____ perforations from ____ ft. to ____ ft.
____ perforations from ____ ft. to ____ ft.
____ perforations from ____ ft. to ____ ft.

Screens: Yes [ ] No [X]
Manufacturer's Name ____________
Type ____________ Model No. ____________
Diam. ____ Slot size ____ from ____ ft. to ____ ft.
Diam. ____ Slot size ____ from ____ ft. to ____ ft.

Gravel packed: Yes [ ] No [X] Size of gravel ____________
Gravel placed from ____ ft. to ____ ft.

Surface seal: Yes [X] No [ ] To what depth? *20* ft.
Material used in seal *Bentonite*
Did any strata contain unusable water? Yes [ ] No [X]
Type of water? ____________ Depth of strata ____________
Method of sealing strata off ____________

(7) **PUMP:** Manufacturer's Name *Aeromotor*
Type: *Submersible* H.P. *1½*

(8) **WATER LEVELS:** Land-surface elevation above mean sea level ____ ft.
Static level *84* ft. below top of well Date *3-26-90*
Artesian pressure ____ lbs. per square inch Date ____
Artesian water is controlled by ____________ (Cap, valve, etc.))

(9) **WELL TESTS:** Drawdown is amount water level is lowered below static level
Was a pump test made? Yes [X] No [ ] If yes, by whom? *B+H Drilling #2*
Yield: *25* gal./min. with *51* ft. drawdown after *4* hrs.
" *25* " *49⁸* " *1* "
" *25* " *38²* " *½* "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level
0	135⁸	6	96¹	15	84 9/2
2	109⁶	8	90⁵	20	84²
4	97⁸	10	87⁴	30	84

Date of test *3-26-90*

Bailer test ____ gal./min. with ____ ft. drawdown after ____ hrs.
Airtest ____ gal./min. with stem set at ____ ft. for ____ hrs.
Artesian flow ____ g.p.m. Date ____
Temperature of water ____ Was a chemical analysis made? Yes [ ] No [X]

(10) **WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION**

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
fine brown sand	0	80
very fine brown silty sand	80	110
tan clay	110	118
compacted gravel, silt, fine brown sand	118	171
compacted silt	171	177
black basalt, hard	177	267
grayish black basalt, med hard	267	371
black basalt, softer with water	371	384

RECEIVED
APR 4 1990
DEPARTMENT OF ECOLOGY
SPOKANE REGIONAL OFFICE

Work started *2-6*, 19*90* Completed *3-26*, 19*90*

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME *B+H Drilling #2*
(PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address *P.O. Box 343 Burbank, WA.*

(Signed) *[signature]* License No. *0065*
(WELL DRILLER)

Contractor's Registration No. *BHDRI2*135NR* Date *4-3*, 19*90*

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20 (10/87) -1329- 3

File Original and First Copy with Department of Ecology
Second Copy—Owner's Copy
Third Copy—Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. [redacted]

Water Right Permit No. ______

(1) OWNER: Name B.P.A. Franklin Substation Pasco Address ______

(2) LOCATION OF WELL: County Franklin SW ¼ NW ¼ Sec 27 T 9 N., R 30 W.M.

(2a) STREET ADDDRESS OF WELL (or nearest address) ______

(3) PROPOSED USE: ☐ Domestic ☐ Irrigation ☐ DeWater Industrial ☐ Test Well ☐ Municipal ☐ Other ☒

(4) TYPE OF WORK: Owner's number of well (if more than one) 1

Abandoned ☐ New well ☒ Deepened ☐ Reconditioned ☐ Method: Dug ☐ Cable ☐ Rotary ☐ Bored ☐ Driven ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 6" inches.
Drilled 650 feet. Depth of completed well ______ ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 6" Diam. from 0 ft. to 170 ft.
Welded ☒ ______ " Diam. from ______ ft. to ______ ft.
Liner installed ☐
Threaded ☐ ______ " Diam. from ______ ft. to ______ ft.

Perforations: Yes ☐ No ☒
Type of perforator used ______
SIZE of perforations ______ in. by ______ in.
______ perforations from ______ ft. to ______ ft.
______ perforations from ______ ft. to ______ ft.
______ perforations from ______ ft. to ______ ft.

Screens: Yes ☐ No ☒
Manufacturer's Name ______
Type ______ Model No. ______
Diam. ______ Slot size ______ from ______ ft. to ______ ft.
Diam. ______ Slot size ______ from ______ ft. to ______ ft.

Gravel packed: Yes ☐ No ☒ Size of gravel ______
Gravel placed from ______ ft. to ______ ft.

Surface seal: Yes ☒ No ☐ To what depth? 650 ft.
Material used in seal ~~XXXXXXXX~~ cement grout
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? ______ Depth of strata ______
Method of sealing strata off ______

(7) PUMP: Manufacturer's Name ______
Type: ______ H.P. ______

(8) WATER LEVELS: Land-surface elevation above mean sea level ______ ft.
Static level 130 ft. below top of well Date 1/20/93
Artesian pressure ______ lbs. per square inch Date ______
Artesian water is controlled by ______ (Cap, valve, etc.))

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐ If yes, by whom? ______
Yield: ______ gal./min. with ______ ft. drawdown after ______ hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test ______
Bailer test ______ gal./min. with ______ ft. drawdown after ______ hrs.
Airtest ______ gal./min. with stem set at ______ ft. for ______ hrs.
Artesian flow ______ g.p.m. Date ______
Temperature of water ______ Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
Sand & silts	0	5
Fine brown sands	5	15
Fine salt & pepper sands	15	25
Fine brown sands with clay	25	35
Fine brown sands with clay	35	45
Fine brown sands with clay	45	55
Fine brown sands with clay	55	65
Fine brown sands with clay	65	75
Coarse black sands & gravels	75	85
Coarse black sands & gravels	85	95
Coarse black sands & gravels water	95	100
Coarse sands brown water	100	110
Gravels sands water	110	120
Gravels sands water	120	130
Gravels sands water	130	140
Basalt gravel sands water	140	145
Brown clay dry	145	155
Blue clay dry	155	164
Broken basalt, basalt gravels	164	170
Soft fractured broken basalt	170	180
Soft fractured broken basalt	180	190
Hard black basalt	190	205
Hard black basalt	205	210
Broken black basalt water	210	215
Hard gray basalt	215	225
Hard gray basalt	225	235
Hard gray basalt	235	245
Broken soft basalt w/red	245	255
Broken soft basalt w/red	255	265
Hard gray basalt	265	275
Hard gray basalt	275	285
Hard gray basalt	285	295
Hard gray basalt	295	305
Hard gray basalt	305	315

Work started ______, 19. Completed ______, 19

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME Ponderosa Drilling & Development, Inc.
(PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address E. 6010 Broadway Spokane, WA 99212

(Signed) ______ License No. 1856
(WELL DRILLER) Robbi Mills

Contractor's Registration No. PO-ND-EI*248JE Date 1/31, 1993

(USE ADDITIONAL SHEETS IF NECESSARY)

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

The Dept. The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

File Original and First Copy with Department of Ecology
Second Copy—Owner's Copy
Third Copy—Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

Start Card No. ____
Water Right Permit No. ____

(1) OWNER: Name ____ Address ____

(2) LOCATION OF WELL: County ____ ¼ ____ ¼ Sec. ____ T. ____ N., R. ____ W.M.

(2a) STREET ADDDRESS OF WELL (or nearest address) ____

(3) PROPOSED USE: ☐ Domestic ☐ Irrigation ☐ DeWater Industrial ☐ Test Well ☐ Municipal ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) ____
Abandoned ☐ New well ☐ Deepened ☐ Reconditioned ☐ Method: Dug ☐ Cable ☐ Rotary ☐ Bored ☐ Driven ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well ____ inches.
Drilled ____ feet. Depth of completed well ____ ft.

(6) CONSTRUCTION DETAILS:
Casing installed: ____ " Diam. from ____ ft. to ____ ft.
Welded ☐ ____ " Diam. from ____ ft. to ____ ft.
Liner installed ☐ ____ " Diam. from ____ ft. to ____ ft.
Threaded ☐

Perforations: Yes ☐ No ☐
Type of perforator used ____
SIZE of perforations ____ in. by ____ in.
____ perforations from ____ ft. to ____ ft.
____ perforations from ____ ft. to ____ ft.
____ perforations from ____ ft. to ____ ft.

Screens: Yes ☐ No ☐
Manufacturer's Name ____
Type ____ Model No. ____
Diam. ____ Slot size ____ from ____ ft. to ____ ft.
Diam. ____ Slot size ____ from ____ ft. to ____ ft.

Gravel packed: Yes ☐ No ☐ Size of gravel ____
Gravel placed from ____ ft. to ____ ft.

Surface seal: Yes ☐ No ☐ To what depth? ____ ft.
Material used in seal ____
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? ____ Depth of strata ____
Method of sealing strata off ____

(7) PUMP: Manufacturer's Name ____
Type: ____ H.P. ____

(8) WATER LEVELS: Land-surface elevation above mean sea level ____ ft.
Static level ____ ft. below top of well Date ____
Artesian pressure ____ lbs. per square inch Date ____
Artesian water is controlled by ____ (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐ If yes, by whom? ____
Yield: ____ gal./min. with ____ ft. drawdown after ____ hrs.

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test ____
Bailer test ____ gal./min. with ____ ft. drawdown after ____ hrs.
Airtest ____ gal./min. with stem set at ____ ft. for ____ hrs.
Artesian flow ____ g.p.m. Date ____
Temperature of water ____ Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
Hard gray basalt	315	325
Hard gray basalt	325	335
Hard gray basalt	335	345
Hard gray basalt	345	355
Black soft pouris basalt water	355	365
Black hard basalt water	365	375
Black hard basalt water	375	385
Black hard basalt water	385	395
Black hard basalt water	395	403
Black soft basalt blue shale	403	413
Hard black basalt	413	423
Hard gray basalt	423	433
Hard gray basalt	433	443
Hard gray basalt	443	453
Hard gray basalt	453	463
Hard gray basalt w/fractures	463	473
Hard gray basalt w/fractures	473	483
Soft black pouris basalt	483	493
Soft black pouris basalt	493	503
Soft black pouris basalt	503	513
Soft black pouris basalt	513	523
Hard black basalt	523	533
Hard black basalt	533	543
Hard black basalt	543	553
Hard black basalt	553	563
Hard black basalt w/fractures	563	573
Hard black basalt w/fractures	573	583
Hard black basalt w/fractures	583	593
Hard black basalt w/fractures	593	603
Hard black basalt w/fractures	603	613
Solid hard black basalt	613	623
Solid hard black basalt	623	633

Work started ____ 19__ Completed ____ 19__

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME Ponderosa Drilling & Development, Inc.
(PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address E. 6010 Broadway Spokane, WA 99212

(Signed) ____ License No. 1856
(WELL DRILLER) Robbi Mills

Contractor's Registration No. PO-ND-EI*824JE Date 1/31, 19 93

(USE ADDITIONAL SHEETS IF NECESSARY)

The Dep. The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

File Original and First Copy with Department of Ecology
Second Copy—Owner's Copy
Third Copy—Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. ______

Water Right Permit No. ______

(1) **OWNER:** Name ______ Address ______

(2) **LOCATION OF WELL:** County ______ ¼ ______ ¼ Sec. ______ T. ______ N., R. ______ W.M.

(2a) **STREET ADDDRESS OF WELL** (or nearest address) ______

(3) **PROPOSED USE:** ☐ Domestic ☐ Irrigation ☐ DeWater Industrial ☐ Test Well ☐ Municipal ☐ Other ☐

(4) **TYPE OF WORK:** Owner's number of well (If more than one) ______

Abandoned ☐ New well ☐ Deepened ☐ Reconditioned ☐ Method: Dug ☐ Cable ☐ Rotary ☐ Bored ☐ Driven ☐ Jetted ☐

(5) **DIMENSIONS:** Diameter of well ______ inches.

Drilled ______ feet. Depth of completed well ______ ft.

(6) **CONSTRUCTION DETAILS:**

Casing installed: ______ " Diam. from ______ ft. to ______ ft.

Welded ☐ ______ " Diam. from ______ ft. to ______ ft.

Liner installed ☐ ______ " Diam. from ______ ft. to ______ ft.

Threaded ☐

Perforations: Yes ☐ No ☐

Type of perforator used ______

SIZE of perforations ______ in. by ______ in.

______ perforations from ______ ft. to ______ ft.

______ perforations from ______ ft. to ______ ft.

______ perforations from ______ ft. to ______ ft.

Screens: Yes ☐ No ☐

Manufacturer's Name ______

Type ______ Model No. ______

Diam. ______ Slot size ______ from ______ ft. to ______ ft.

Diam. ______ Slot size ______ from ______ ft. to ______ ft.

Gravel packed: Yes ☐ No ☐ Size of gravel ______

Gravel placed from ______ ft. to ______ ft.

Surface seal: Yes ☐ No ☐ To what depth? ______ ft.

Material used in seal ______

Did any strata contain unusable water? Yes ☐ No ☐

Type of water? ______ Depth of strata ______

Method of sealing strata off ______

(7) **PUMP:** Manufacturer's Name ______

Type ______ H.P. ______

(8) **WATER LEVELS:** Land-surface elevation above mean sea level ______ ft.

Static level ______ ft. below top of well Date ______

Artesian pressure ______ lbs. per square inch Date ______

Artesian water is controlled by ______ (Cap, valve, etc.)

(9) **WELL TESTS:** Drawdown is amount water level is lowered below static level

Was a pump test made? Yes ☐ No ☐ If yes, by whom? ______

Yield: ______ gal./min. with ______ ft. drawdown after ______ hrs.

" ______ " ______ " ______ "

" ______ " ______ " ______ "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test ______

Bailer test ______ gal./min. with ______ ft. drawdown after ______ hrs.

Airtest ______ gal./min. with stem set at ______ ft. for ______ hrs.

Artesian flow ______ g.p.m. Date ______

Temperature of water ______ Was a chemical analysis made? Yes ☐ No ☐

(10) **WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION**

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
Solid hard black basalt	633	643
Solid hard black basalt	643	650
6" Drive shoe utilized		

Work started 1/4/93, 19. Completed 1/20, 19 93

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME Ponderosa Drilling & Development, Inc.
(PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)

Address E. 6010 Broadway Spokane, WA 99212

(Signed) [signature] License No. 1856
(WELL DRILLER) Robbi Mills

Contractor's Registration No. PO-ND-EI*248JE Date 1/31, 19 93

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20 (10/87) -1329-

437929

DEPARTMENT OF ECOLOGY State of Washington

WATER WELL REPORT

RECEIVED
MAY 19 2011
DEPARTMENT OF ECOLOGY
EASTERN REGIONAL OFFICE

Notice of Intent Number WE12662

Property Owner Last Name CARRSON AG, LLC First Name

Organization Name

Well Tag ID Number (e.g., AAA-001) APJ-222 Variance Granted? (Circle One) Yes (No)

Water Right Permit Required? (Circle One) (Yes) or No If Yes, enter Water Right Permit Here (Required) G3-21801P

Well Use (Circle All That Apply):	Type of Work (Circle One):	Method (Circle One):
(Agricultural Irrigation) Domestic Individual Irrigation Parks and recreation Test Well Other Commercial Group Domestic Municipal Stockwater	Alteration Hydrofracturing Replacement Other Deepened Well (New)	Cable Dug Jetted Other Driven Hydrofracturing – (Rotary)

Drilling Start Date 3-19-11 **Drilling Completion Date** 4-26-11

Well Location Only (No Mailing Address, No PO Box, Cross Streets are ok)

Well Street Address 561 Commercial

Well City Pasco Well County Franklin Well Zip Code 99301

Tax Parcel Number 113710084

If claiming tax parcel exemption (Circle One) Tribal Federal Property Right of Way Railroad Land

NW	NE	NW	NE
SW	SE	X SW	SE
NW	NE	NW	NE
SW	SE	SW	SE

Place an "X" in ¼, ¼

Township 9 N Range 30 Circle One (East) or West Section 27

Lattitude Decimal Degrees; Longitude West Decimal Degrees

CONSTRUCTION INFORMATION – SECURELY ATTACH (STAPLE) ADDITIONAL SHEETS OF INFORMATION (NO DRAWINGS) AS NEEDED.

Diameter of Well ft 10 in, Drilled 131 ft in Depth of Completed Well 131 ft in

Casings (At least one Casing must have 6 in of stickup and all fields must be filled out for each casing entered)

Type (Circle One) Concrete Plastic (Steel) Other Diameter 10 inches Stickup 12 inches Depth 0 ft in, TO 106 ft 10 in

Type (Circle One) Concrete Plastic Steel Other Diameter inches Stickup inches Depth ft in, TO ft in

Liners? Circle One Yes (No) (If yes, then complete the below fields that apply)

Type 1 (Circle One) PVC Steel Other Diameter in, From ft in TO ft in

Type 2 (Circle One) PVC Steel Other Diameter in, From ft in TO ft in

Perforations? Circle One Yes (No) (If yes, then complete the below fields that apply)

Type of Perforator (Circle One) Drill Mills Knife Saw cut Star Torch Cut Other Perforation size in by in Total Perforations

Perforation 1 from ft in, TO ft inches **Perforation 2** from ft in, TO ft inches

Screens? (Circle One) (Yes) No (If yes, then complete the below fields that apply)

Mfr 1 Johnson Type Stainless Diam 9 5/8 in Slot Size 60 From 106 ft in TO 126 ft in

Mfr 2 Type Diam in Slot Size From ft in TO ft in

ECY 050-1-20 (Rev 1/11) **The Department of Ecology does NOT warranty the Data and/or Information on this Well Report.**
If you need this document in an alternate format, please call the Water Resources Program at 360-407-6872.
Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

Sand/Gravel Packing? (Circle One) Yes No **(If yes, then complete the below fields that apply)**

Packing Material 1 Circle One 10-20 20-40 8-12 Coarse Sand Pea Gravel From____ft ____in TO ____ft ____in
Packing Material 2 Circle One 10-20 20-40 8-12 Coarse Sand Pea Gravel From____ft ____in TO ____ft ____in

Surface Seal Was there an existing surface seal? Yes or No____ Depth of Seal 21 ft ____in
Type of Seal Material (Circle One) Bentonite Bentonite Slurry Concrete Dry Bentonite Neat Cement Neat Cement Grout

Pump Pump Installed? (Circle One) Yes No If yes, Mfr Name____ Pump Type____ HP____

Static Water Level (Circle One and fill in the blanks if needed)

Yes Measured Level (Below top of well) 76 ft 6 in Date Measured 4-26-11
Flowing Artesian (Circle One) Greater Than or Equal To ____GPM ____PSI Artesian Water Controlled by (e.g. Cap, Valve, etc.)____
Dry Hole
Unusable Water Strata? (Circle One) Yes No If Yes is circled, method of sealing strata off____
Strata 1 (Specify Unusable Water Type)____ From____ft ____in TO____ft ____in
Strata 2 (Specify Unusable Water Type)____ From____ft ____in TO____ft ____in

General Well Tests (Circle all that apply and fill in the blanks)
Bailer Test Date of test____ (Circle One) Greater Than or Equal To ____GPM, with ____ Drawdown after____hrs ____min
Air Test Date of test____ (Circle One) Greater Than or Equal To ____GPM, with stem set at ____ft ____in
Test Duration ____hrs ____min
Pump Test Date of test____ Test performed by____
Note: Drawdown=the amount the water level is lowered below the static level
Yield ____gpm, with ____ft ____in; Drawdown after____hrs ____min Yield ____gpm, with ____ft ____in; Drawdown after____hrs ____min
Yield ____gpm, with ____ft ____in; Drawdown after____hrs ____min Yield ____gpm, with ____ft ____in; Drawdown after____hrs ____min
Yield ____gpm, with ____ft ____in; Drawdown after____hrs ____min Yield ____gpm, with ____ft ____in; Drawdown after____hrs ____min
Note: Recovery=The time taken at zero when the pump is turned off. Water level is measured from the well top to...Ask Lars for wording
Time____hrs____min; Water Level____ft____in Time____hrs____min; Water Level____ft____in Time____hrs____min; Water Level____ft____in
Time____hrs____min; Water Level____ft____in Time____hrs____min; Water Level____ft____in Time____hrs____min; Water Level____ft____in
Time____hrs____min; Water Level____ft____in Time____hrs____min; Water Level____ft____in Time____hrs____min; Water Level____ft____in

Well Lithology Details – Your lithology MUST be reported to the drilled depth of the well. Please check your "From" and "To" feet and inches for accuracy.

Layer Formation Description	From	To	Layer Formation Description	From	To
Tan Sand	0	5			
Boulder	5	6			
Black Sand	6	104			
Gravel w/Tan Sand	104	114			
Tan & Black Sandy Gravel	114	120			
Large Sandy Gravel	120	131			

Comments – Enter any other important well construction and/or location details here.____

CERTIFICATION – I hereby certify that I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington Well construction standards. Materials used and the information reported within the Well Report are true to my best knowledge and belief.

(Circle One) Driller Trainee Engineer Name(Print) Josh Burns
Driller/Engineer/Trainee Signature [signature]
Driller/Trainee/PE License No. 2866

Drilling Company Nelson Drilling, LLC
Address 600 W. Vineyard DR.
City, State, Zip Pasco, WA. 99301
Phone Number (509) 547-3018
Email Address nelsondrilling3018@yahoo.com

If TRAINEE, Mentor Driller License No.____
Mentor Driller Signature____

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

WATER WELL REPORT

Original & 1st copy – Ecology, 2nd copy – owner, 3rd copy – driller

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Construction/Decommission *("x" in circle)* 307712

☒ Construction

○ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* ______

CURRENT Notice of Intent No. W 256497

Unique Ecology Well ID Tag No. APJ 204

Water Right Permit No. ______

Property Owner Name Carson ay LK

Well Street Address 28 Paso Robles Hwy

City Pasco County Franklin

Location SW 1/4-1/4 NE 1/4 Sec 27 Twn 9 R 30 (EWM) or WWM circle one

Lat/Long (s, t, r Still REQUIRED) Lat Deg ______ Lat Min/Sec ______ Long Deg ______ Long Min/Sec ______

Tax Parcel No. 113 210 084

PROPOSED USE: ☐ Domestic ☐ Industrial ☐ Municipal ☐ DeWater ☐ Irrigation ☐ Test Well ☐ Other ______

TYPE OF WORK: Owner's number of well (if more than one) ______

☒ New well ☐ Reconditioned *Method:* ☐ Dug ☐ Bored ☐ Driven

☐ Deepened ☒ Cable ☐ Rotary ☐ Jetted

DIMENSIONS: Diameter of well 12 inches, drilled 114 ft.

Depth of completed well 113½ ft.

CONSTRUCTION DETAILS

Casing Installed: ☒ Welded 12" Diam. from +2 ft. to 93½ ft.

☐ Liner installed ______" Diam. from ______ ft. to ______ ft.

☐ Threaded ______" Diam. from ______ ft. to ______ ft.

Perforations: ☐ Yes ☒ No

Type of perforator used ______

SIZE of perfs ______ in. by ______ in. and no. of perfs ______ from ______ ft. to ______ ft.

Screens: ☒ Yes ☐ No ☐ K-Pac Location 94½ 108½

Manufacturer's Name ______

Type ______ Model No. ______

Diam. 12 Slot size ______ from ______ ft. to ______ ft.

Diam. ______ Slot size ______ from ______ ft. to ______ ft.

Gravel/Filter packed: ☐ Yes ☐ No ☐ Size of gravel/sand ______

Materials placed from ______ ft. to ______ ft.

Surface Seal: ☒ Yes ☐ No To what depth? 19 + ft.

Material used in seal BENTONITE

Did any strata contain unusable water? ☐ Yes ☒ No

Type of water? ______ Depth of strata ______

Method of sealing strata off ______

PUMP: Manufacturer's Name ______

Type: ______ H.P. ______

WATER LEVELS: Land-surface elevation above mean sea level ______ ft.

Static level 76½ ft. below top of well Date 4/29/08

Artesian pressure ______ lbs. per square inch Date ______

Artesian water is controlled by ______ (cap, valve, etc.)

WELL TESTS: Drawdown is amount water level is lowered below static level

Was a pump test made? ☐ Yes ☐ No If yes, by whom? ______

Yield: 300 gal./min. with 13 ft. drawdown after 4 hrs.

Yield: ______ gal./min. with ______ ft. drawdown after ______ hrs.

Yield: ______ gal./min. with ______ ft. drawdown after ______ hrs.

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level
1:00	97				
1:05	76½				

Date of test ______

Bailer test ______ gal./min. with ______ ft. drawdown after ______ hrs.

Airtest ______ gal./min. with stem set at ______ ft. for ______ hrs.

Artesian flow ______ g.p.m. Date ______

Temperature of water ______ Was a chemical analysis made? ☐ Yes ☐ No

CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
FINE TAN SAND	0	14
FINE BLACK SAND	14	25
COARSE BLACK SAND	25	71
COARSE BLACK SAND W/TRACE	71	—
OF GRAVEL 1" MINUS	—	77
COARSE BLACK SAND	77	93
COARSE BLACK SAND & GRAVEL	93	100
TAN SAND & GRAVEL	100	109
TAN SAND, SILT W/LESS	109	—
GRAVEL	—	114

RECEIVED
MAY 14 2008
DEPARTMENT OF ECOLOGY
EASTERN REGIONAL OFFICE

Start Date 4/1/08 Completed Date 4/29/08

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee Name (Print) JEREMY RUDE

Driller/Engineer/Trainee Signature [signature]

Driller or trainee License No. 2651

If TRAINEE,
Driller's Licensed No. ______
Driller's Signature ______

Drilling Company NELSON WELL DRILLING

Address 7505 W. COURT ST.

City, State, Zip PASCO WA 99301

Contractor's Registration No. NELSOWD198LQ Date 5/11/08

Ecology is an Equal Opportunity Employer.

 The Department of Ecology does NOT warranty the Data and/or Information on this Well Report.

Appl. 10697
Per. 9978

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION
DIVISION OF WATER RESOURCES

WELL LOG

Record by Driller
Source Driller's record

Location: State of WASHINGTON
County Franklin
Area
Map
NE¼SW ¼ NW ¼ sec. 26 T. 9 N., R. 30 E.W.

Diagram of Section: 26

Drilling Co. St. George Drilling Co.
Address 945 42nd Place Richland, WA
Method of Drilling cable .. Date July 1, 1970
Owner Columbia East Limited Partnership
Address 2500 W.Kennewick, WA Kennewick, WA
Land surface, datum 420 ft. above/below
SWL: 58 Date July 1, 1970, Dims. 16" x 126'

CORRELATION	MATERIAL	From (feet)	To (feet)
	(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)		
	Irrigation		
	sand & silt	0	62
	sand & gravel (small)	62	90
	Gravel 3" & smaller	90	126
	Basalt, Bedrock	126	
	Casing: 16" from 0' to 123'		
	Perforation: Mills knife 800	per. 75'	to 11
	Graavel packed: 123' to 126'		
	Pump test: 2200 gpm with 30' DD	after	4 hrs.

Turn up

Sheet ...... of ...... sheets

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

File Original and First Copy with the Division of Water Management
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

Application No. 10697
Permit No. 9978

(1) OWNER: Name Columbia East Partnership Address 3500 W. Kennewick Ave. Kennewick, Wash

(2) LOCATION OF WELL: County Franklin NE¼ SW ¼ NW ¼ Sec 26 T 9 N., R 30 W.M.
Bearing and distance from section or subdivision corner 1300' East and 1500' South NW Corner Sec. 26

(3) PROPOSED USE: Domestic ☐ Industrial ☐ Municipal ☐ Irrigation ☒ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) 2
New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☒ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 16 inches.
Drilled 126 ft. Depth of completed well 126 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 16 " Diam. from 0 ft. to 123 ft.
Threaded ☐ " Diam. from ft. to ft.
Welded ☒ " Diam. from ft. to ft.

Perforations: Yes ☒ No ☐
Type of perforator used Mills Knife
SIZE of perforations 3/8 in. by 3 in.
800 perforations from 75 ft. to 115 ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☐ No ☒
Manufacturer's Name
Type Model No.
Diam. Slot size from ft. to ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☒ No ☐ Size of gravel: 3/4
Gravel placed from 123 ft. to 126 ft.

Surface seal: Yes ☐ No ☒ To what depth? ft.
Material used in seal
Did any strata contain unusable water? Yes ☒ No ☐
Type of water? good Depth of strata 58
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level 420 ft.
Static level 58 ft. below top of well Date 7/1/70
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☒ No ☐ If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" 2200 " 30 " 4 hrs "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test
Bailer test gal./min. with ft. drawdown after hrs.
Artesian flow g.p.m. Date
Temperature of water 66° Was a chemical analysis made? Yes ☐ No ☒

(10) WELL LOG: Well #2

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
Sand + Silt	0	62
sand + small Gravel	62	90
Gravel 3 in + Smaller	90	126
Bedrock (~~Basalt~~ BASALT	126	

9 gpm
668 SAF
719 A
283

Work started 6/1, 1970 Completed 7/1, 1970

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME St George Drilling Co
(Person, firm, or corporation) (Type or print)

Address 945 42nd Place
W. Richland Wash

[Signed] Peter E. St George
(Well Driller)

License No. 223-02-6920 Date 7/1/70, 19

OK Ben

S. F. No. 7356—OS—(Rev. 5-69)—5-69.

(USE ADDITIONAL SHEETS IF NECESSARY)

File Original and First Copy with the Division of Water Management
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT WRIA ~~20~~ 33
STATE OF WASHINGTON

Application No. 10698
Permit No. 9979

(1) OWNER: Name Columbia East Partnership Address 3?? Kennewick Ave Kennewick, Washington

(2) LOCATION OF WELL: County Franklin SE NW, sec. Sec. 26 T. 9 N., R. 30 W.M.

[redacted]ring and distance from section or subdivision corner 1280' South and 1840' East from W 1/4 Corner Sec 26

(3) PROPOSED USE: Domestic ☐ Industrial ☑ Municipal ☐ Irrigation ☑ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) 1
New well ☑ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☑ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 20" inches.
Drilled 133 ft. Depth of completed well 133 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 20" Diam. from 0 ft. to 129 ft.
Threaded ☐ " Diam. from ft. to ft.
Welded ☒ " Diam. from ft. to ft.

Perforations: Yes ☑ No ☐
Type of perforator used Mills Knife
SIZE of perforations 1/4 in. by ? in.
perforations from 85 ft. to 116 ft.
perforations from 123 ft. to 129 ft.
perforations from ft. to ft.

Screens: Yes ☐ No ☑
Manufacturer's Name
Type Model No.
Diam. Slot size from ft. to ft.
Diam. Slot size from ft. to ft.

[redacted] Gravel packed: Yes ☑ No ☐ Size of gravel: 3/4 less
Gravel placed from 133 ft. to 129 ft.

Surface seal: Yes ☐ No ☑ To what depth? ft.
Material used in seal
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P. 400

(8) WATER LEVELS: Land-surface elevation above mean sea level 5/16/70 ft.
Static level 78 ft. below top of well Date
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☑ No ☐ If yes, by whom? Others

Yield: gal./min.	with ft. drawdown	after hrs.
2700	13 ft.	6:00
"	"	"

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level
	~~2700~~				

[redacted] of test
Bailer test / gal./min. with ft. drawdown after hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes ☐ No ☐

OK/WR

(10) WELL LOG: Well #1

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Sand + ~~???~~ silt	0	85
Gravel	85	117
Sand	117	121
Sand + Gravel	121	133
Clay	133	

0 910 gpm
980 AF/yr
283 Acres

Cancelled

Work started May 1, 1970 Completed May 16, 1970

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME St George Drilling Co. (Person, firm, or corporation) (Type or print)

Address W. Richland, Wash.

[Signed] Peter E. H[illegible] (Well Driller)

License No 223-02-6920 Date 5-14, 1970

(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. 7356—OS—(Rev. 5-69)—5-69.

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION
DIVISION OF WATER RESOURCES

A-10698
P-9979

WELL LOG

Record by: Driller
Source: Driller's Record

Location: State of WASHINGTON
County: Franklin
Area: 1280' S and 1240' E
Map: from W¼ corner
¼ ¼ sec. 26 T. 9 N., R. 30 E.

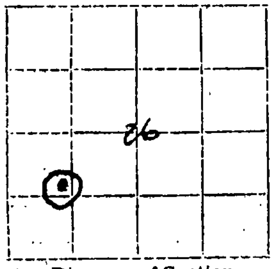


Diagram of Section

Drilling Co. St. George Drilling Company
Address: West Richland
Method of Drilling: Cable Date: May 16, 1970
Owner: Columbia East
Address: 2500 W. Kennewick Ave., Kennewick
Land surface, datum 420 ft. above / below
SWL: 78' Date: May 16, 1970 Dims.: 20"x133'

CORRELATION	MATERIAL	From (feet)	To (feet)
	(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)		
	Irrigation and industrial use		
	Sand and silt	0	85
	Gravel	85	119
	Sand	119	121
	Sand and gravel	121	133
	Clay	133	
	Casing installed: 0 to 129'		
	Perforated from 85 to 116'		
	from 123 to 139'		
	Gravel placed from 133 to 129'		
	Yield: 2200 gpm w/13' dd after 6 hrs		

Turn up Sheet ...... of ...... sheets

Franklin SS

STATE OF WASHINGTON
DEPARTMENT OF CONSERVATION AND DEVELOPMENT

WELL LOG No. A-6534

Date Dec. 12, 1962

Record by driller

Source driller's record

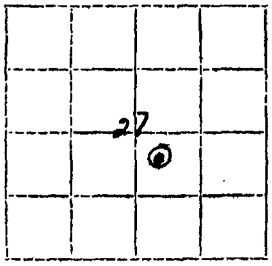


Diagram of Section

Location: State of WASHINGTON

County Franklin

Area

Map

NW¼ SE¼ sec. 27 T. 9 N., R. 30 E./W.

Drilling Co.

Address

Method of Drilling cable Date 6-14, 1951

Owner Dept. of Interior, Bonneville Power Administration

Address P. O. Box 3537, Portland 8, Oregon

Land surface, datum ft. above/below

Correlation	Material	Thickness (feet)	Depth (feet)
	(Transcribe driller's terminology literally but paraphrase as necessary, in parentheses. If material water-bearing, so state and record static level if reported. Give depths in feet below land-surface datum unless otherwise indicated. Correlate with stratigraphic column, if feasible. Following log of materials, list all casings, perforations, screens, etc.)		
	Sand	0	75
	Sand and gravel (gravel increases from 5% at 75 ft to 50% at 95 ft.)	75	95
	Sand 60%, gravel 40%, some clay at 101 and downward	95	109
	Gravel	109	116
	Gravel, coarse, and sand	116	121
Casing: 10 in diam from 0 to 116 ft.			
	Open hole from 116 to 121 ft.		
Perforations from 95 ft to 111 ft.			
Static level 87 ft (July, 1951)			
Yield: 180 gpm with 13 ft drawdown after 22 hrs.			
Pump: Deep well turbine - 20 HP			

Turn up

Sheet ...... of ...... sheets

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

30545

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. W18963
UNIQUE WELL I.D. # ______
Water Right Permit No. ______

(1) **OWNER:** Name Devries Dairy Address 84 Pasco Kahlotus Hwy Pasco 9930[illegible]

(2) **LOCATION OF WELL:** County Franklin N 1/2 NW 1/4 Sec 22 T. 9 N., R 30E W.M.

(2a) **STREET ADDRESS OF WELL** (or nearest address) ______

(3) **PROPOSED USE:** ☐ Domestic ☒ Irrigation ☐ DeWater ☐ Industrial ☐ Test Well ☐ Municipal ☐ Other
Replacement

(4) **TYPE OF WORK:** Owner's number of well (If more than one) ______
Abandoned ☐ New well ☒ Deepened ☐ Reconditioned ☐
Method: Dug ☐ Cable ☒ Rotary ☐ Bored ☐ Driven ☐ Jetted ☐

(5) **DIMENSIONS:** Diameter of well 16 inches.
Drilled 112 feet. Depth of completed well 111 ft.

(6) **CONSTRUCTION DETAILS:**
Casing installed: 16" Diam. from +1 ft. to 94 ft.
Welded ☒ ______" Diam. from ______ ft. to ______ ft.
Liner installed ☐ ______" Diam. from ______ ft. to ______ ft.
Threaded ☐

Perforations: Yes ☐ No ☒
Type of perforator used ______
SIZE of perforations ______ in. by ______ in.
______ perforations from ______ ft. to ______ ft.
______ perforations from ______ ft. to ______ ft.
______ perforations from ______ ft. to ______ ft.

Screens: Yes ☒ No ☐
Manufacturer's Name Nagasaki
Type Stainless Model No. ______
Diam. 16 Slot size [illegible] from 94 ft. to 107 ft.
Diam. 16 Slot size 0 from 107 ft. to 111 ft.

Gravel packed: Yes ☐ No ☒ Size of gravel ______
Gravel placed from ______ ft. to ______ ft.

Surface seal: Yes ☒ No ☐ To what depth? 50 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? ______ Depth of strata ______
Method of sealing strata off ______

(7) **PUMP:** Manufacturer's Name ______
Type: ______ H.P. ______

(8) **WATER LEVELS:** Land-surface elevation above mean sea level ______ ft.
Static level 71 ft. below top of well Date 4-19-95
Artesian pressure ______ lbs. per square inch Date ______
Artesian water is controlled by ______ (Cap, valve, etc.)

(9) **WELL TESTS:** Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐ If yes, by whom? ______
Yield: ______ gal./min. with ______ ft. drawdown after ______ hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test ______
Bailer test ______ gal./min. with ______ ft. drawdown after ______ hrs.
Airtest ______ gal./min. with stem set at ______ ft. for ______ hrs.
Artesian flow ______ g.p.m. Date ______
Temperature of water ______ Was a chemical analysis made? Yes ☐ No ☐

(10) **WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION**

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
Sand Tan	0	16
Sand Tan Silty	16	30
Sand Black fine	30	41
Sand Black course H_2O @ 71'	41	86
Sand Black gravel	86	91
Gravel + Sand Black	91	107
Sand Tan Gravel silty	107	111
Clay Blue	111	112

RECEIVED MAY 22 1995

Work Started 3-30, 1995. Completed 4-19, 1995

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME NELSON Well Drilling Inc (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)
Address 5200 W Argent Pasco
(Signed) Jim Nelson (WELL DRILLER) License No. 361
Contractor's Registration No. NELSOWD198CQ Date 4-19, 1995

(USE ADDITIONAL SHEETS IF NECESSARY)

Ecology is an Equal Opportunity and Affirmative Action employer. For special accommodation needs, contact the Water Resources Program at (206) 407-6600. The TDD number is (206) 407-6006.

ECY 050-1-20 (9/93)

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

Application No. /
Permit No. /

(1) OWNER: Name EARLED KAHL Address Box 51, Spokane, WA. 99210

(2) LOCATION OF WELL: County FRANKLIN Portion of NE ¼ SW ¼ Sec 27 T 9 N., R 30 W.M.
Bearing and distance from section or subdivision corner approx. 100ft Known as Tract A-Tax Parcel #113-730-035

(3) PROPOSED USE: Domestic ☑ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) ....
New well ☑ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☑ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 121 ft. Depth of completed well 121 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 6 " Diam. from +1 ft. to 116 ft.
Threaded ☐ ...... " Diam. from ...... ft. to ...... ft.
Welded ☑ ...... " Diam. from ...... ft. to ...... ft.

Perforations: Yes ☐ No ☑
Type of perforator used ......
SIZE of perforations ...... in. by ...... in.
...... perforations from ...... ft. to ...... ft.
...... perforations from ...... ft. to ...... ft.
...... perforations from ...... ft. to ...... ft.

Screens: Yes ☑ No ☐
Manufacturer's Name Johnson
Type Stainless Steel Model No. 304
Diam. 5 Slot size 15 from 116 ft. to 121 ft.
Diam. ...... Slot size ...... from ...... ft. to ...... ft.

Gravel packed: Yes ☐ No ☑ Size of gravel: ......
Gravel placed from ...... ft. to ...... ft.

Surface seal: Yes ☑ No ☐ To what depth? 30 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☑
Type of water? ...... Depth of strata ......
Method of sealing strata off ......

(7) PUMP: Manufacturer's Name ......
Type: ...... H.P. ......

(8) WATER LEVELS: Land-surface elevation above mean sea level.... 420 310 ft.
Static level 76 ft. below top of well Date 7/81
Artesian pressure ...... lbs. per square inch Date ......
Artesian water is controlled by ...... (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☑ If yes, by whom? ......
Yield: ...... gal./min. with ...... ft. drawdown after ...... hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test ......
Bailer test 20 gal./min. with 0 ft. drawdown after 1 hrs.
Artesian flow ...... g.p.m. Date ......
Temperature of water ...... Was a chemical analysis made? Yes ☐ No ☑

(10) WELL LOG:
Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Fine Brown Sand & Silt	0	28
Sandy Brown Clay	28	34
Sand & Silt. Dry	34	66
Med. Sand & Fine gravel	66	86
Sand & Silt, Fine gravel	86	97
Course Sand Fine gravel	97	106
Course & Fine Sand w/course gravel Water Bearing	106	121

RECEIVED
AUG 20 1981
DEPARTMENT OF ECOLOGY
SPOKANE REGIONAL OFFICE

RECEIVED
AUG 14 [illegible]
DEPARTMENT OF ECOLOGY
CENTRAL REGION OFFICE

Work started June, 1981 Completed July, 1981

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Hatch Drilling Co. Inc. (Person, firm, or corporation) (Type or print)
Address 6417 W. Court St Pasco
[Signed] [signature] (Well Driller)
License No. 0176 Date 7/8, 1981

8/31/81

(USE ADDITIONAL SHEETS IF NECESSARY)

Drive.

Pasco

ECY 050-1-20

WATER WELL REPORT

ECOLOGY Original & 1st copy Ecology 2nd copy owner 3rd copy driller

Construction/Decommission (x in circle) 138338

(x) Construction

( ) Decommission ORIGINAL CONSTRUCTION Notice of Intent Number ______

CURRENT Notice of Intent No W 168812

Unique Ecology Well ID Tag No A66-462

Water Right Permit No ______

Property Owner Name Ed Capron

Well Street Address 320 Comercial

City Pasco County Franklin

Location SE 1/4- 1/4 NW 1/4 Sec 27 Twn 9 R 30 (EWM circle one) or WWM

Lat/Long (s,t,r still REQUIRED) Lat Deg ______ Lat Min/Sec ______ Long Deg ______ Long Min/Sec ______

Tax Parcel No ______

PROPOSED USE [x] Domestic [ ] Industrial [ ] Municipal [ ] DeWater [ ] Irrigation [ ] Test Well [ ] Other ______

TYPE OF WORK Owner's number of well (if more than one) ______
[x] New Well [ ] Reconditioned Method [ ] Dug [ ] Bored [ ] Driven
[ ] Deepened [ ] Cable [x] Rotary [ ] Jetted

DIMENSIONS Diameter of well 6 inches drilled 140 ft
Depth of completed well 140 ft

CONSTRUCTION DETAILS
Casing Installed [x] Welded 6 Diam from 0 ft to 140 ft
[ ] Liner installed ______ Diam from ______ ft to ______ ft
[ ] Threaded ______ Diam from ______ ft to ______ ft

Perforations [x] Yes [ ] No
Type of perforator used Air
SIZE of perfs 1 in by 1/2 in and no of perfs 160 from 110 ft to 120 ft

Screens [ ] Yes [x] No [ ] K Pac Location ______
Manufacturer's Name ______
Type ______ Model No ______
Diam ______ Slot Size ______ from ______ ft to ______ ft
Diam ______ Slot Size ______ from ______ ft to ______ ft

Gravel/Filter packed [ ] Yes [x] No [ ] Size of gravel/sand ______
Materials placed from ______ ft to ______ ft

Surface Seal [x] Yes [ ] No To what depth? 20 ft
Materials used in seal Bentonite
Did any strata contain unusable water? [ ] Yes [x] No
Type of water? ______ Depth of strata ______
Method of sealing strata off ______

PUMP Manufacturer's Name ______
Type ______ H P ______

WATER LEVELS Land surface elevation above mean sea level ______ ft
Static level 70 ft below top of well Date ______
Artesian pressure ______ lbs per square inch Date ______
Artesian water is controlled by ______ (cap valve etc)

WELL TESTS Drawdown is amount water level is lowered below static level
Was a pump test made? [ ] Yes [ ] No If yes by whom? ______
Yield ______ gal./min with ______ ft drawdown after ______ hrs
Yield ______ gal./min with ______ ft drawdown after ______ hrs
Yield ______ gal./min with ______ ft drawdown after ______ hrs

Recovery data (time taken as zero when pump turned off)(water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test ______
Bailer test ______ gal./min with ______ ft drawdown after ______ hrs
Airtest 90 gal./min with stem set at 90 ft for 4 hrs
Artesian flow ______ g p m Date ______
Temperature of water ______ Was a chemical analysis made? [ ] Yes [x] No

CONSTRUCTION OR DECOMMISSION PROCEDURE
Formation Describe by color character size of material and structure and the kind and nature of the material in each stratum penetrated with at least one entry for each change of information Indicate all water encountered
(USE ADDITIONAL SHEETS IF NECESSARY)

MATERIAL	FROM	TO
Sand Brown	0	24
Sand Black	24	65
Sand & Gravel	65	140
Clay	140	150
Basalt	150	

RECEIVED SEP - 2 2003 DEPARTMENT OF ECOLOGY EASTERN REGIONAL OFFICE

Start Date 2-20-03 Completed Date 2-21-03

WELL CONSTRUCTION CERTIFICATION I constructed and/or accept responsibility for construction of this well and its compliance with all Washington well construction standards Materials used and the information reported above are true to my best knowledge and belief

[x] Driller [ ] Engineer [ ] Trainee Name (Print) Todd Haney
Driller/Engineer/Trainee Signature [signature]
Driller or Trainee License No 2343

If trainee, licensed driller's Signature and License no ______

Drilling Company Statewide Well Drilling
Address 101 Kau Trail rd
City State Zip Pasco WA 99301
Contractor's Registration No STATEWD015LZ Date 4/04

Ecology is an Equal Opportunity Employer ECY 050 1 20 (Rev 4/01)

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

261284

WATER WELL REPORT

Original & 1st copy – Ecology, 2nd copy – owner, 3rd copy – driller

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Construction/Decommission *("x" in circle)*

☒ Construction

○ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* ____________

CURRENT Notice of Intent No. W 256429

Unique Ecology Well ID Tag No. APG 033

Water Right Permit No. ____________

Property Owner Name Freeze Pack

Well Street Address Commercial ave

City Pasco County Franklin

Location SE 1/4-1/4 NE 1/4 Sec 27 Twn 9N R 30 EWM or WWM (circle one)

Lat/Long (s, t, r Still REQUIRED) Lat Deg ______ Lat Min/Sec ______ Long Deg ______ Long Min/Sec ______

Tax Parcel No. 113-720-109

PROPOSED USE: ☒ Domestic ☐ Industrial ☐ Municipal ☐ DeWater ☐ Irrigation ☐ Test Well ☐ Other ______

TYPE OF WORK: Owner's number of well (if more than one) ______

☒ New well ☐ Reconditioned *Method:* ☐ Dug ☐ Bored ☐ Driven

☐ Deepened ☐ Cable ☒ Rotary ☐ Jetted

DIMENSIONS: Diameter of well 6 inches, drilled 401 ft.

Depth of completed well 401 ft.

CONSTRUCTION DETAILS

Casing Installed: ☒ Welded 6" Diam. from +1 ft. to 162 ft.

☐ Liner installed ____" Diam. from ____ ft. to ____ ft.

☐ Threaded ____" Diam. from ____ ft. to ____ ft.

Perforations: ☐ Yes ☒ No

Type of perforator used ______

SIZE of perfs ____ in. by ____ in. and no. of perfs ____ from ____ ft. to ____ ft.

Screens: ☐ Yes ☒ No ☐ K-Pac Location ______

Manufacturer's Name ______

Type ______ Model No. ______

Diam. ____ Slot size ____ from ____ ft. to ____ ft.

Diam. ____ Slot size ____ from ____ ft. to ____ ft.

Gravel/Filter packed: ☐ Yes ☒ No ☐ Size of gravel/sand ______

Materials placed from ____ ft. to ____ ft.

Surface Seal: ☒ Yes ☐ No To what depth? 162 ft.

Material used in seal BENTONITE & CASING

Did any strata contain unusable water? ☐ Yes ☒ No

Type of water? ______ Depth of strata ______

Method of sealing strata off ______

PUMP: Manufacturer's Name ______

Type: ______ H.P. ______

WATER LEVELS: Land-surface elevation above mean sea level ____ ft.

Static level 74 ft. below top of well Date 4/30/07

Artesian pressure ____ lbs. per square inch Date ____

Artesian water is controlled by ______ (cap, valve, etc.)

WELL TESTS: Drawdown is amount water level is lowered below static level

Was a pump test made? ☐ Yes ☐ No If yes, by whom? ______

Yield: ____ gal./min. with ____ ft. drawdown after ____ hrs.

Yield: ____ gal./min. with ____ ft. drawdown after ____ hrs.

Yield: ____ gal./min. with ____ ft. drawdown after ____ hrs.

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test ______

Bailer test ____ gal./min. with ____ ft. drawdown after ____ hrs.

Airtest 75 gal./min. with stem set at 380 ft. for 1 hrs.

Artesian flow ____ g.p.m. Date ____

Temperature of water ____ Was a chemical analysis made? ☐ Yes ☒ No

CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
TAN SAND	0	12
BLACK SAND	12	56
BLACK SAND SOME GRAVEL	56	59
BLACK SAND	59	79
SAND & GRAVEL	79	127
TAN CLAY	127	132
BLUE CLAY	132	160
PORUS BASALT	160	179
BLACK BASALT HARD	179	256
PORUS BLACK BASALT	256	262
BLACK BASALT HARD	262	359
PORUS BLACK BASALT	359	367
BLACK BASALT	367	397
PORUS BLACK BASALT	397	401
75 GPM @ 380'		
42 GPM @ 140'		
34 GPM @ 120'		
26 GPM @ 100'		

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MAY 14 2007

DEPARTMENT OF ECOLOGY EASTERN REGIONAL OFFICE

Start Date 4/26/07 Completed Date 4/30/07

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☐ Driller ☐ Engineer ☐ Trainee Name (Print) JEREMY RUDE

Driller/Engineer/Trainee Signature [signature]

Driller or trainee License No. 2691

If TRAINEE, Driller's Licensed No. ______

Driller's Signature ______

Drilling Company NELSON WELL DRILLING

Address 7505 W. COURT ST.

City, State, Zip PASCO WA. 99301

Contractor's Registration No. NELSOWD198CQ Date 4/30/07

Ecology is an Equal Opportunity Employer.

The Department of Ecology does NOT warranty the Data and/or Information on this Well Report.

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

File Original and First Copy with Department of Ecology
Second Copy—Owner's Copy
Third Copy—Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. [redacted]

Water Right Permit No.

(1) OWNER: Name Gary Osborn Address 3610 E A St Pasco Wa

(2) LOCATION OF WELL: County Franklin NE ¼ NW ¼ Sec 34 T 9 N., R 30E W.M.

(2a) STREET ADDDRESS OF WELL (or nearest address)

(3) PROPOSED USE: [X] Domestic [ ] Irrigation [ ] DeWater Industrial [ ] Test Well [ ] Municipal [ ] Other [ ]

(4) TYPE OF WORK: Owner's number of well (if more than one)
Abandoned [ ] New well [X] Deepened [ ] Reconditioned [ ]
Method: Dug [ ] Cable [ ] Rotary [X] Bored [ ] Driven [ ] Jetted [ ]

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 98 feet. Depth of completed well 97'4" ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 6 " Diam. from +3 ft. to 97'4' ft.
Welded [X] " Diam. from ft. to ft.
Liner installed [ ]
Threaded [ ] " Diam. from ft. to ft.

Perforations: Yes [ ] No [X]
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes [ ] No [X]
Manufacturer's Name
Type Model No.
Diam. Slot size from ft. to ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes [ ] No [X] Size of gravel
Gravel placed from ft. to ft.

Surface seal: Yes [X] No [ ] To what depth? 25 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes [ ] No [X]
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ft.
Static level 74 ft. below top of well Date 11-19-90
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes [ ] No [ ] If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test
Bailer test gal./min. with ft. drawdown after hrs.
Airtest 25 gal./min. with stem set at 94 ft. for hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes [ ] No [ ]

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
Sand Tan	0	3
Sand Black	3	16
Sand Black Trace Gravel	16	34
Sand Black	34	52
Sand Black Trace Gravel water @ 74 feet	52	84
Gravel + Sand Black	84	97½
Sand Tan gravel	97½	98

RECEIVED
DEC 11 1990
DEPARTMENT OF ECOLOGY
SPOKANE REGIONAL OFFICE

Work started 11-19, 19 . Completed 11-19, 1990

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME NELSON Well Drilling Inc (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)
Address 10036 W Argent Pasco
(Signed) James Nelson (WELL DRILLER) License No. 361
Contractor's Registration No. NELSOWD196CQ Date 11-19, 1990

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20 (10/87) -1329- 3

File Original and First Copy with the Division of Water Management
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT 4
STATE OF WASHINGTON

Application No. ....
Permit No. 10377

(1) **OWNER:** Name GUY SULLIVAN Address PASCO, WASH

(2) **LOCATION OF WELL:** County FRANKLIN E 1/2 NW 1/4 NW 1/4 Sec 21 T 9 N., R 30 W.M.
g and distance from section or subdivision corner 50 FT.

(3) **PROPOSED USE:** Domestic ☐ Industrial ☐ Municipal ☐ Irrigation ☒ Test Well ☐ Other ☐

(4) **TYPE OF WORK:** Owner's number of well (if more than one) 6
New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☐ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) **DIMENSIONS:** Diameter of well 16 inches.
Drilled 69 ft. Depth of completed well 69 ft.

(6) **CONSTRUCTION DETAILS:**
Casing installed: 16 " Diam. from 57'11" ft. to 0 ft.
Threaded ☐ ...... " Diam. from ...... ft. to ...... ft.
Welded ☒ ...... " Diam. from ...... ft. to ...... ft.

Perforations: Yes ☐ No ☒
Type of perforator used ......
SIZE of perforations ...... in. by ...... in.
...... perforations from ...... ft. to ...... ft.
...... perforations from ...... ft. to ...... ft.
...... perforations from ...... ft. to ...... ft.

Screens: Yes ☒ No ☐
Manufacturer's Name JOHNSON
Type 304 STAINLESS Model No. ......
Diam. 14 Slot size 60.125 from 69 ft. to 54 ft.
Diam. ...... Slot size ...... from ...... ft. to ...... ft.

Gravel packed: Yes ☐ No ☒ Size of gravel: ......
Gravel placed from ...... ft. to ...... ft.

Surface seal: Yes ☒ No ☐ To what depth? 18 ft.
Material used in seal BENTONITE - GROUT
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? ...... Depth of strata ......
Method of sealing strata off ......

(7) **PUMP:** Manufacturer's Name LAYNE
Type: TURBINE H.P. 200

(8) **WATER LEVELS:** Land-surface elevation above mean sea level 420 ft.
Static level 36'-9" ft. below top of well Date 3/17/73
Artesian pressure ...... lbs. per square inch Date ......
Artesian water is controlled by ...... (Cap, valve, etc.)

(9) **WELL TESTS:** Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☒ No ☐ If yes, by whom? ......
Yield: 1800 gal./min. with 15 ft. drawdown after 6 hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level
DATA	TAKEN	BY	LAYNE		

Date of test ......
Bailer test ...... gal./min. with ...... ft. drawdown after ...... hrs.
Artesian flow ...... g.p.m. Date ......
Temperature of water 62 Was a chemical analysis made? Yes ☐ No ☐

(10) **WELL LOG:**

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
SOIL		15
C.S. & F.GR	5	20
F.GR & S	13	33
S. & F.GR.	14	47
C.S & F.GR	3	50
S & F.GR.	6	56
F.GR. & C.S.	2	58
F.GR. SOME S	9	67
F.GR. & F.S.	1	68
S, SED. & F.GR.	1	69

Work started 2/28, 1973. Completed 3/17, 1973

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME CASCADE DRILLING Co (Person, firm, or corporation) (Type or print)

Address P.O. DRAWER E

[Signed] (Well Driller)

License No. 223-01-5473 Date 4/25, 1973

(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. 7356—OS—(Rev. 5-69)—5-69.

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy
5-47-4805

WATER WELL REPORT
STATE OF WASHINGTON

Application No. ....
Permit No. ....

(1) OWNER: Name Jack Aldenson Address ST Rt 1 Box 1008 Pasco, Wn.

(2) LOCATION OF WELL: County Franklin — ¼ ¼ Sec 26 T 9 N., R 30 W.M.
Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☑ Industrial ☐ Municipal ☐
Irrigation ☑ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) 1
New well ☑ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☑ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 10" inches.
Drilled 161 ft. Depth of completed well 161 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 10" Diam. from 0 ft. to 161 ft.
Threaded ☐ ......" Diam. from ...... ft. to ...... ft.
Welded ☑ ......" Diam. from ...... ft. to ...... ft.

Perforations: Yes ☑ No ☐
Type of perforator used mills Knife
SIZE of perforations 3/8 in. by 2 in.
144 perforations from 140 ft. to 158 ft.
...... perforations from ...... ft. to ...... ft.
...... perforations from ...... ft. to ...... ft.

Screens: Yes ☐ No ☑
Manufacturer's Name ......
Type ...... Model No. ......
Diam. ...... Slot size ...... from ...... ft. to ...... ft.
Diam. ...... Slot size ...... from ...... ft. to ...... ft.

Gravel packed: Yes ☐ No ☑ Size of gravel: ......
Gravel placed from ...... ft. to ...... ft.

Surface seal: Yes ☑ No ☐ To what depth? 20 ft.
Material used in seal Benenite
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? ...... Depth of strata ......
Method of sealing strata off ......

(7) PUMP: Manufacturer's Name ......
Type: ...... H.P. ......

(8) WATER LEVELS: Land-surface elevation above mean sea level.... ft.
Static level 116 ft. below top of well Date 8-23-53
Artesian pressure ...... lbs. per square inch Date ......
Artesian water is controlled by ...... (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☑ No ☐ If yes, by whom? Layne pumps
Yield: 70 gal./min. with 26 ft. drawdown after 1 hrs.
" 80 " 25 " 2 "
" 100 " 24 " 3 "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test 8-30-53
Bailer test ...... gal./min. with ...... ft. drawdown after ...... hrs.
Artesian flow ...... g.p.m. Date ......
Temperature of water 54° Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Top Soil Sand	0	17
Red Clay Soft	17	25
Black Sand	25	55
Fine Sand & Clay Sandy Clay	55	105
med Gravel	105	130
Fine Sand	130	140
small & med Gravel	140	160
Basalt Black	160	161

[illegible]

Work started 8-6, 1953 Completed 8-24, 1953

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Laylor Drilling (Person, firm, or corporation) (Type or print)

Address Rt 3 Box 3298 Kennewick, Wn.

[Signed] Jerry W. Laylor (Well Driller)

License No. 555 Date 9-25, 1953

GLEN MADDOX
OREGON NO.

9/10/73

(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. 7356—OS—(Rev. 4-71).

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

Application No. ....
Permit No. ....

(1) **OWNER:** Name Kew Creek Address

(2) **LOCATION OF WELL:** County Franklin — SE ¼ NE ¼ Sec. 27 T. 9 N., R. 30 W.M.

Bearing and distance from section or subdivision corner

(3) **PROPOSED USE:** Domestic ☑ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) **TYPE OF WORK:** Owner's number of well (if more than one)
New well ☑ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☑ Driven ☐
Reconditioned ☐ Rotary ☐ Jetted ☐

(5) **DIMENSIONS:** Diameter of well 6 inches.
Drilled 95 ft. Depth of completed well 93 ft.

(6) **CONSTRUCTION DETAILS:**
Casing installed: 6" Diam. from +1 ft. to 88 ft.
Threaded ☐ ....." Diam. from ..... ft. to ..... ft.
Welded ☑ ....." Diam. from ..... ft. to ..... ft.

Perforations: Yes ☐ No ☑
Type of perforator used
SIZE of perforations ..... in. by ..... in.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.

Screens: Yes ☑ No ☐
Manufacturer's Name Johnson
Type Stainless Model No.
Diam. 6 Slot size .015 from 88 ft. to 93 ft.
Diam. ..... Slot size ..... from ..... ft. to ..... ft.

Gravel packed: Yes ☐ No ☑ Size of gravel:
Gravel placed from ..... ft. to ..... ft.

Surface seal: Yes ☑ No ☐ To what depth? 22 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☑
Type of water? ..... Depth of strata
Method of sealing strata off

(7) **PUMP:** Manufacturer's Name
Type: ..... H.P.

(8) **WATER LEVELS:** Land-surface elevation above mean sea level 475 ft.
Static level 78 ft. below top of well Date 3-21-77
Artesian pressure ..... lbs. per square inch Date
Artesian water is controlled by ..... (Cap, valve, etc.)

(9) **WELL TESTS:** Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐ If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test
Bailer test 25 gal./min. with 1 ft. drawdown after 2 hrs.
Artesian flow ..... g.p.m. Date
Temperature of water ..... Was a chemical analysis made? Yes ☐ No ☑

(10) **WELL LOG:**
Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.

MATERIAL	FROM	TO
Silty tan Sand	0	78
Gravel, 3" minus, sand, H2O	78	93
Silt, tan	93	95
Pasco 7 1/2 Flat		
46140 7119 2218 (P)		

RECEIVED
MAR 6 - 1978
DEPARTMENT OF ECOLOGY
SPOKANE REGIONAL OFFICE

Work started 3-17, 1977. Completed 3-22, 1977

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME D.V. Wyland & Co (Person, firm, or corporation) (Type or print)
Address P.O. Box 6779, Kennewick
[Signed] Gary Eisenman (Well Driller)
License No. 0116 Date ....., 19

3/6/78

(USE ADDITIONAL SHEETS IF NECESSARY)

S. F. No. 7356—OS—(Rev 4-71)
ECY-070-28

File Original and First Copy with Department of Ecology
Second Copy—Owner's Copy
Third Copy—Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. [redacted]

Water Right Permit No. ~~[illegible]~~ R

(1) OWNER: Name Malon Cowgill Address

(2) LOCATION OF WELL: County ~~Benton~~ Franklin SE ¼ SE ¼ Sec 26 T. 9 N., R 30 W.M.

(2a) STREET ADDDRESS OF WELL (or nearest address)

(3) PROPOSED USE: ☒ Domestic ☐ Irrigation ☐ DeWater Industrial ☐ Test Well ☐ Municipal ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one)

Abandoned ☐ New well ☒ Deepened ☐ Reconditioned ☐ Method: Dug ☐ Cable ☐ Rotary ☒ Bored ☐ Driven ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 60 feet. Depth of completed well 60 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 6 " Diam. from +1 ft. to 60 ft.
Welded ☒ " Diam. from ft. to ft.
Liner installed ☐
Threaded ☐ " Diam. from ft. to ft.

Perforations: Yes ☐ No ☒
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☐ No ☒
Manufacturer's Name
Type Model No.
Diam. Slot size from ft. to ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☒ Size of gravel
Gravel placed from ft. to ft.

Surface seal: Yes ☒ No ☐ To what depth? 34 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ft.
Static level 34 ft. below top of well Date
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.))

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐ If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test
Bailer test gal./min. with ft. drawdown after hrs.
Airtest 70 gal./min. with stem set at 55 ft. for 2 hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
Ash + Brown Sand	0	2
Basalt Balders and Brown sand	2	34
Basalt Gravel 3/4 to 7/8	34	60

Work started 12-7-92, 19. Completed, 19

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME St George Drilling (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)
Address 701 So 45 AVE W. Richland
(Signed) Peter E. St George (WELL DRILLER) License No. 0483
Contractor's Registration No. 601-048-715 Date 12-7-92, 19

(USE ADDITIONAL SHEETS IF NECESSARY)

File Original and First Copy with Department of Ecology
Second Copy -- Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

Application No. ....
Permit No. ....

(1) OWNER: Name Paul Savage Address 524 Rd 39 Pasco, Wa

(2) LOCATION OF WELL: County Franklin — SW ¼ NW ¼ Sec 27 T 9 N., R 30E W.M.
Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☒ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) ....
New well ☒ Deepened ☐ Reconditioned ☐
Method: Dug ☐ Bored ☐ Cable ☒ Driven ☐ Rotary ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 8" inches.
Drilled 112 ft. Depth of completed well 112 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: ....." Diam. from ..... ft. to ..... ft.
Threaded ☐ ....." Diam. from ..... ft. to ..... ft.
Welded ☒ 8" Diam. from 0 ft. to 112 ft.

Perforations: Yes ☐ No ☒
Type of perforator used ....
SIZE of perforations ..... in. by ..... in.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.

Screens: Yes ☐ No ☒
Manufacturer's Name ....
Type .... Model No. ....
Diam. ..... Slot size ..... from ..... ft. to ..... ft.
Diam. ..... Slot size ..... from ..... ft. to ..... ft.

Gravel packed: Yes ☐ No ☒ Size of gravel: ....
Gravel placed from ..... ft. to ..... ft.

Surface seal: Yes ☒ No ☐ To what depth? 18 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? ..... Depth of strata .....
Method of sealing strata off ....

(7) PUMP: Manufacturer's Name ....
Type: .... H.P. .....

(8) WATER LEVELS: Land-surface elevation above mean sea level ~~390~~ ft. 440
Static level ..... ft. below top of well Date .....
Artesian pressure ..... lbs. per square inch Date .....
Artesian water is controlled by .... (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☒ If yes, by whom? ....
Yield: ..... gal./min. with ..... ft. drawdown after ..... hrs.
" ..... " ..... " ..... "
" ..... " ..... " ..... "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test ....
Bailer test 25 gal./min. with 6 ft. drawdown after 2 hrs.
Artesian flow ..... g.p.m. Date .....
Temperature of water 62 Was a chemical analysis made? Yes ☐ No ☒

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Silty sand	0	62
gray sand	62	99
Black Course sand	99	110
3/4 minus gravel + sand	110	112

RECEIVED
JUL 6 - 1978
DEPARTMENT OF ECOLOGY
SPOKANE REGIONAL OFFICE

Work started 6/16 1978 Completed 6/23 1978

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME L.W Smith Well Drilling (Person, firm, or corporation) (Type or print)
Address 9808 W. Argent, Pasco, Wn.
[Signed] Loyd W Smith (Well Driller)
License No. 0985 Date 7/3 1978

7/6/78 Pasco 7½

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Application No. ....

Permit No. ....

(1) OWNER: Name Robert Alderson Address ....

(2) LOCATION OF WELL: County Franklin SE ¼ SW ¼ Sec 26 T 9 N., R 30 E W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☒ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) ....

New well ☒ Deepened ☐ Reconditioned ☐

Method: Dug ☐ Bored ☐ Cable ☐ Driven ☐ Rotary ☒ Jetted ☐

(5) DIMENSIONS: Diameter of well 8 inches.
Drilled 137½ ft. Depth of completed well 137 ft.

(6) CONSTRUCTION DETAILS: 277 WAll

Casing installed: 8 " Diam. from 12 ft. to 132 ft.
Threaded ☐ ....." Diam. from ..... ft. to ..... ft.
Welded ☒ ....." Diam. from ..... ft. to ..... ft.

Perforations: Yes ☐ No ☒
Type of perforator used ....
SIZE of perforations ..... in. by ..... in.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.

Screens: Yes ☒ No ☐
Manufacturer's Name Johnson
Type Stainless Model No. 304-L
Diam. ..... Slot size ..... from ..... ft. to ..... ft.
Diam. ..... Slot size ..... from ..... ft. to ..... ft.

Gravel packed: Yes ☐ No ☒ Size of gravel: ....
Gravel placed from ..... ft. to ..... ft.

Surface seal: Yes ☒ No ☐ To what depth? 35 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? ..... Depth of strata .....
Method of sealing strata off ....

(7) PUMP: Manufacturer's Name ....
Type: ..... H.P. .....

(8) WATER LEVELS: Land-surface elevation above mean sea level.... 430 ft.
Static level 104 ft. below top of well Date .....
Artesian pressure ..... lbs. per square inch Date .....
Artesian water is controlled by ..... (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐ If yes, by whom? .....
Yield: ..... gal./min. with ..... ft. drawdown after ..... hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test .....
Bailer test 80 gal./min. with 10 ft. drawdown after 4 hrs.
Artesian flow ..... g.p.m. Date .....
Temperature of water ..... Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
SAND TAN	0	8
SAND Black	8	16
SAND Black + Gravel 6"	16	34
SAND Black some 1" gravel	34	97
Gravel 3" minus + Sand BK	97	104
Gravel 2" minus + Sand BK Water Bearing	104	111
Gravel 6" minus sand TAN Water Bearing	111	137½

RECEIVED
SEP 23 1981
DEPARTMENT OF ECOLOGY
SPOKANE REGIONAL OFFICE

Work started 7-16, 19 80 Completed 7-18, 19 80

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Nelson Well Drilling Inc (Person, firm, or corporation) (Type or print)

Address 10036 West Argent Pasco

[Signed] James Nelson (Well Driller)

License No. 361 Date 7-18, 19 80

9/28/81

(USE ADDITIONAL SHEETS IF NECESSARY)

Pasco

S. F. No. 7356—OS—(Rev. 4-71)
ECY-070-28

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

269136

WATER WELL REPORT

WASHINGTON STATE DEPARTMENT OF ECOLOGY

Original & 1st copy – Ecology, 2nd copy – owner, 3rd copy – driller

Construction/Decommission (*"x" in circle*)

☒ Construction

○ Decommission *ORIGINAL INSTALLATION Notice of Intent Number* ______

CURRENT Notice of Intent No. W 256 471

Unique Ecology Well ID Tag No. APK 048

Water Right Permit No. ______

Property Owner Name Roy Johnson

Well Street Address 24 Paseo Kahlotus Rd

City Pasco County Franklin

Location SE 1/4-1/4 NE 1/4 Sec 27 Twn 9N R 30 EWM or WWM (circle one)

Lat/Long (s, t, r Still **REQUIRED**) Lat Deg ______ Lat Min/Sec ______ Long Deg ______ Long Min/Sec ______

Tax Parcel No. 113 710 057

PROPOSED USE: ☒ Domestic ☐ Industrial ☐ Municipal ☐ DeWater ☐ Irrigation ☐ Test Well ☐ Other ______

TYPE OF WORK: Owner's number of well (if more than one) ______

☒ New well ☐ Reconditioned ☐ Deepened *Method:* ☐ Dug ☐ Bored ☐ Driven ☐ Cable ☒ Rotary ☐ Jetted

DIMENSIONS: Diameter of well 6 inches, drilled 378 ft.
Depth of completed well 378 ft.

CONSTRUCTION DETAILS

Casing Installed: ☒ Welded 6" Diam. from +1 ft. to 156 1/4 ft.
☒ Liner installed 4 1/2" Diam. from +138 ft. to 378 ft.
☐ Threaded ______" Diam. from ______ ft. to ______ ft.

Perforations: ☒ Yes ☐ No

Type of perforator used SAW

SIZE of perfs 1/8 in. by 6 in. and no. of perfs 228 from 318 ft. to 378 ft.

Screens: ☐ Yes ☒ No ☐ K-Pac Location ______

Manufacturer's Name ______

Type ______ Model No. ______

Diam. ______ Slot size ______ from ______ ft. to ______ ft.

Diam. ______ Slot size ______ from ______ ft. to ______ ft.

Gravel/Filter packed: ☐ Yes ☒ No ☐ Size of gravel/sand ______

Materials placed from ______ ft. to ______ ft.

Surface Seal: ☒ Yes ☐ No To what depth? 156 1/4 ft.

Material used in seal BENTONITE & CASING

Did any strata contain unusable water? ☐ Yes ☒ No

Type of water? ______ Depth of strata ______

Method of sealing strata off ______

PUMP: Manufacturer's Name ______

Type: ______ H.P. ______

WATER LEVELS: Land-surface elevation above mean sea level ______ ft.

Static level 82 ft. below top of well Date 7/30/07

Artesian pressure ______ lbs. per square inch Date ______

Artesian water is controlled by ______ (cap, valve, etc.)

WELL TESTS: Drawdown is amount water level is lowered below static level

Was a pump test made? ☐ Yes ☐ No If yes, by whom? ______

Yield: ______ gal./min. with ______ ft. drawdown after ______ hrs.

Yield: ______ gal./min. with ______ ft. drawdown after ______ hrs.

Yield: ______ gal./min. with ______ ft. drawdown after ______ hrs.

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test ______

Bailer test ______ gal./min. with ______ ft. drawdown after ______ hrs.

Airtest 60+ gal./min. with stem set at 360 ft. for 2 hrs.

Artesian flow ______ g.p.m. Date ______

Temperature of water ______ Was a chemical analysis made? ☐ Yes ☐ No

CONSTRUCTION OR DECOMMISSION PROCEDURE

Formation: Describe by color, character, size of material and structure, and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information. (USE ADDITIONAL SHEETS IF NECESSARY.)

MATERIAL	FROM	TO
TAN SAND	0	5
GREY SAND	5	8
BLACK SAND	8	84
SAND AND GRAVEL	84	115
TAN CLAY	115	134
GREY CLAY	134	152
PORICE BLACK BASALT	152	163
BLACK BASALT	163	344
PORICE BLACK BASALT H2O	344	348
PORICE BROWN BASALT H2O	348	351
BLACK BASALT SEMI PORICE	351	362
PORICE BLACK BASALT H2O	362	366
BLACK BASALT HARD	366	378

60 GPM @ 300
45 GPM @ 260
40 GPM @ 220
30 GPM @ 180

RECEIVED
AUG 17 2007
DEPARTMENT OF ECOLOGY
EASTERN REGIONAL OFFICE

Start Date 7/26/07 Completed Date 7/30/07

WELL CONSTRUCTION CERTIFICATION: I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

☒ Driller ☐ Engineer ☐ Trainee Name (Print) Jeremy Rude

Driller/Engineer/Trainee Signature [signature]

Driller or trainee License No. 2691

If TRAINEE, Driller's Licensed No. ______

Driller's Signature ______

Drilling Company NELSON WELL DRILLING

Address 7505 W. COURT ST.

City, State, Zip PASCO WA 99301

Contractor's Registration No. NELSOWD 198CQ Date 7/30/07

Ecology is an Equal Opportunity Employer.

ECY 050-1-20 (Rev 3/05)

The Department of Ecology does NOT warranty the Data and/or Information on this Well Report.

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

W093704

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

61343

WATER WELL REPORT

STATE OF WASHINGTON

RECEIVED NOV 12 1998 DEPARTMENT OF ECOLOGY EASTERN REGIONAL OFFICE

Start Card No. 09374-W
UNIQUE WELL I.D. # ACX-440
Water Right Permit No. ______

(1) OWNER: Name Simon Lopez Address 314 RD 34 Pasco Wa 99301

(2) LOCATION OF WELL: County Frankling - NW 1/4 SW 1/4 Sec 27 T. 9 N., R 30E W.M.

(2a) STREET ADDRESS OF WELL (or nearest address) Hwy 12 E Lewis ST

(3) PROPOSED USE: [x] Domestic [ ] Irrigation [ ] DeWater [ ] Industrial [ ] Test Well [ ] Municipal [ ] Other

(4) TYPE OF WORK: Owner's number of well (If more than one) ______
[ ] Abandoned [x] New well [ ] Deepened [ ] Reconditioned
Method: [ ] Dug [ ] Cable [x] Rotary [ ] Bored [ ] Driven [ ] Jetted

(5) DIMENSIONS: Diameter of well 6 inches.
Drilled 142 feet. Depth of completed well 140 ft.

(6) CONSTRUCTION DETAILS:
Casing Installed: 6" Diam. from +2 ft. to 140 ft.
[x] Welded ______" Diam. from ______ ft. to ______ ft.
[ ] Liner installed
[ ] Threaded ______" Diam. from ______ ft. to ______ ft.

Perforations: Yes [ ] No [x]
Type of perforator used ______
SIZE of perforations ______ in. by ______ in.
______ perforations from ______ ft. to ______ ft.
______ perforations from ______ ft. to ______ ft.
______ perforations from ______ ft. to ______ ft.

Screens: Yes [x] No [ ]
Manufacturer's Name Johnson
Type Telescope + STAINLESS Model No. ______
Diam. 5" Slot size 08 from 135 ft. to 140 ft.
Diam. ______ Slot size ______ from ______ ft. to ______ ft.

Gravel packed: Yes [ ] No [x] Size of gravel ______
Gravel placed from ______ ft. to ______ ft.

Surface seal: Yes [x] No [ ] To what depth? 18 ft.
Material used in seal Benonite
Did any strata contain unusable water? Yes [ ] No [ ]
Type of water? ______ Depth of strata ______
Method of sealing strata off OVER BORE

(7) PUMP: Manufacturer's Name ______
Type: ______ H.P. ______

(8) WATER LEVELS: Land-surface elevation above mean sea level ______ ft.
Static level 85 ft. below top of well Date ______
Artesian pressure ______ lbs. per square inch Date ______
Artesian water is controlled by ______ (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes [ ] No [ ] If yes, by whom? ______
Yield: ______ gal./min. with ______ ft. drawdown after ______ hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test ______
Bailer test ______ gal./min. with ______ ft. drawdown after ______ hrs.
Airtest 20+ gal./min. with stem set at 130 ft. for 4 hrs.
Artesian flow ______ g.p.m. Date ______
Temperature of water ______ Was a chemical analysis made? Yes [ ] No [ ]

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
Sand	0	98
Sand + Gravel	98	142

Work Started June 8, 19. Completed June 10, 1998

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME StateWide Drilling Inc. (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)
Address 101 KAU Trail Rd Pasco Wa 99301
(Signed) Jady L. Carpenter (WELL DRILLER) License No. 1900
Contractor's Registration No. STATEWD077DQ Date 4/99, 19 ______

(USE ADDITIONAL SHEETS IF NECESSARY)

Ecology is an Equal Opportunity and Affirmative Action employer. For special accommodation needs, contact the Water Resources Program at (206) 407-6600. The TDD number is (206) 407-6006.

ECY 050-1-20 (9/93)

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

173239

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT

STATE OF WASHINGTON

Application No. ....
Permit No. ....

(1) **OWNER:** Name Sullivan and Anderson Enterprises Address E. 1320 Spokane ST. Pasco, WN

(2) **LOCATION OF WELL:** County Franklin — NE ¼ NE ¼ Sec 34 T 9 N., R 30E W.M.
Bearing and distance from section or subdivision corner Lot # 34 & 35

(3) **PROPOSED USE:** Domestic ☒ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) **TYPE OF WORK:** Owner's number of well (if more than one) ....
New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☐ Driven ☐
Reconditioned ☐ Rotary ☒ Jetted ☐

(5) **DIMENSIONS:** Diameter of well 6" inches.
Drilled 109 ft. Depth of completed well 109 ft.

(6) **CONSTRUCTION DETAILS:**

Casing installed: 6" Diam. from +1 ft. to 108 ft.
Threaded ☐ ....." Diam. from ..... ft. to ..... ft.
Welded ☒ ....." Diam. from ..... ft. to ..... ft.

Perforations: Yes ☐ No ☒
Type of perforator used ....
SIZE of perforations ..... in. by ..... in.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.

Screens: Yes ☐ No ☒
Manufacturer's Name ....
Type ..... Model No. .....
Diam. ..... Slot size ..... from ..... ft. to ..... ft.
Diam. ..... Slot size ..... from ..... ft. to ..... ft.

Gravel packed: Yes ☐ No ☒ Size of gravel: .....
Gravel placed from ..... ft. to ..... ft.

Surface seal: Yes ☒ No ☐ To what depth? 20+ ft.
Material used in seal ....
Did any strata contain unusable water? Yes ☐ No ☐
Type of water? ..... Depth of strata .....
Method of sealing strata off ....

(7) **PUMP:** Manufacturer's Name ....
Type: ..... H.P. .....

(8) **WATER LEVELS:** Land-surface elevation above mean sea level.... 420 ft.
Static level 85 ft. below top of well Date .....
Artesian pressure ..... lbs. per square inch Date .....
Artesian water is controlled by ..... (Cap, valve, etc.)

(9) **WELL TESTS:** Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☒ No ☐ If yes, by whom? .....
Yield: ..... gal./min. with ..... ft. drawdown after ..... hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test .....
~~Bailer~~ AIR test 40 gal./min. with ..... ft. drawdown after ..... hrs.
Artesian flow ..... g.p.m. Date .....
Temperature of water ..... Was a chemical analysis made? Yes ☐ No ☐

(10) **WELL LOG:**

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Fine Brn sand.	0	92
Course Gravel	92	109

Copied

RECEIVED
MAY 18 1978
DEPARTMENT OF ECOLOGY
SPOKANE REGIONAL OFFICE

Work started 4-11, 1978 Completed 4-12, 1978

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME Aqua Drilling Inc (Person, firm, or corporation) (Type or print)
Address ~~Box~~ 659 Hayden Lake, Idaho

[Signed] Theron D. Lewis (Well Driller)

License No. 0718 Date 4-12, 1978

5/18/78

Pasco 7½

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

196082

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. W18916
UNIQUE WELL I.D. #
Water Right Permit No. G3 29050-P

(1) OWNER: Name Triple A Farming Co Address 558 Kahlotus Hyw Pasco

(2) LOCATION OF WELL: County Franklin SE 1/4 SE 1/4 Sec 26 T. 9 N., R. 30E W.M.

(2a) STREET ADDRESS OF WELL (or nearest address)

(3) PROPOSED USE: ☐ Domestic ☒ Irrigation ☐ DeWater Industrial ☐ Test Well ☐ Municipal ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (If more than one)
Abandoned ☐ New well ☒ Deepened ☐ Reconditioned ☐ Method: Dug ☐ Cable ☒ Rotary ☐ Bored ☐ Driven ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 16 inches.
Drilled 82'6" feet. Depth of completed well 82'6" ft.

(6) CONSTRUCTION DETAILS:
Casing Installed: 16" Diam. from +1 ft. to 66 ft.
Welded ☒ " Diam. from ft. to ft.
Liner installed ☐ " Diam. from ft. to ft.
Threaded ☐

Perforations: Yes ☐ No ☒
Type of perforator used
SIZE of perforations in. by in.
perforations from ft. to ft.
perforations from ft. to ft.
perforations from ft. to ft.

Screens: Yes ☒ No ☐
Manufacturer's Name Huston
Type Stainless Model No.
Diam. 16T Slot size 250 from 65'6" ft. to 78'6" ft.
Diam. Slot size from ft. to ft.

Gravel packed: Yes ☐ No ☒ Size of gravel
Gravel placed from ft. to ft.

Surface seal: Yes ☒ No ☐ To what depth? 18 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name
Type: H.P.

(8) WATER LEVELS: Land-surface elevation above mean sea level ft.
Static level 52 ft. below top of well Date 4-1-94
Artesian pressure lbs. per square inch Date
Artesian water is controlled by (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐ If yes, by whom?
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test
Bailer test gal./min. with ft. drawdown after hrs.
Airtest gal./min. with stem set at ft. for hrs.
Artesian flow g.p.m. Date
Temperature of water Was a chemical analysis made? Yes ☐ No ☐

(10) WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
Sand Tan	0	13
Sand Black	13	18
Sand Black gravel	18	23
Cobbles gravel sand Black	23	42
Sand Tan Silty	42	46
Sand Black Gravel Water @ 52 feet	46	54
Gravel + Sand Black	54	62
Gravel cobbles sand Grey	62	72
Gravel cobbles sand Tan	72	78
Gravel cobbles sand Tan Cemented	78	82'6"

APR 26

Work Started 3-14, 19. Completed 4-1, 1994

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME Nelson Well Drilling Inc (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)
Address 8200 W Argent Pasco
(Signed) Jim Nelson (WELL DRILLER) License No. 361
Contractor's Registration No. NELSOWD191CQ Date 4-1, 1994

(USE ADDITIONAL SHEETS IF NECESSARY)

ECL 050-1-20 (2/93)

The Department of Ecology does NOT Warranty the Data and/or the Information on this Well Report.

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

30522

WATER WELL REPORT

STATE OF WASHINGTON

Start Card No. W 18917
UNIQUE WELL I.D. # ______
Water Right Permit No. G3-28663P

(1) **OWNER:** Name Triple A Farming Address 558 Passo Kohlotus Rd Pasco 99301

(2) **LOCATION OF WELL:** County Franklin — SE 1/4 SE 1/4 Sec 27 T. 9 N., R 30E W.M.

(2a) **STREET ADDRESS OF WELL** (or nearest address) ______

(3) **PROPOSED USE:** ☐ Domestic ☒ Irrigation ☐ DeWater ☐ Industrial ☐ Test Well ☐ Municipal ☐ Other

(4) **TYPE OF WORK:** Owner's number of well (If more than one) ______
Abandoned ☐ New well ☒ Deepened ☐ Reconditioned ☐
Method: Dug ☐ Cable ☐ Rotary ☒ Bored ☐ Driven ☐ Jetted ☐

(5) **DIMENSIONS:** Diameter of well 16 inches.
Drilled 106 feet. Depth of completed well 106 ft.

(6) **CONSTRUCTION DETAILS:**
Casing Installed: 16" Diam. from +1 ft. to 92 ft.
Welded ☒ ______" Diam. from ______ ft. to ______ ft.
Liner installed ☐
Threaded ☐ 14" Diam. from 102'6 ft. to 106 ft.

Perforations: Yes ☐ No ☒
Type of perforator used ______
SIZE of perforations ______ in. by ______ in.
______ perforations from ______ ft. to ______ ft.
______ perforations from ______ ft. to ______ ft.
______ perforations from ______ ft. to ______ ft.

Screens: Yes ☒ No ☐
Manufacturer's Name Nagaoka
Type Stainless Steel Model No. ______
Diam. 16" Slot size Variable from 92'6" ft. to 102'6" ft.
Diam. ______ Slot size ______ from ______ ft. to ______ ft.

Gravel packed: Yes ☐ No ☒ Size of gravel ______
Gravel placed from ______ ft. to ______ ft.

Surface seal: Yes ☒ No ☐ To what depth? 30 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? ______ Depth of strata ______
Method of sealing strata off ______

(7) **PUMP:** Manufacturer's Name ______
Type: ______ H.P. ______

(8) **WATER LEVELS:** Land-surface elevation above mean sea level ______ ft.
Static level 78 ft. below top of well Date 10-31-95
Artesian pressure ______ lbs. per square inch Date ______
Artesian water is controlled by ______ (Cap, valve, etc.)

(9) **WELL TESTS:** Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☐ If yes, by whom? ______
Yield: ______ gal./min. with ______ ft. drawdown after ______ hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test ______
Bailer test ______ gal./min. with ______ ft. drawdown after ______ hrs.
Airtest ______ gal./min. with stem set at ______ ft. for ______ hrs.
Artesian flow ______ g.p.m. Date ______
Temperature of water ______ Was a chemical analysis made? Yes ☐ No ☐

(10) **WELL LOG or ABANDONMENT PROCEDURE DESCRIPTION**

Formation: Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of information.

MATERIAL	FROM	TO
Sand Tan	0	14
Sand Black silty	14	30
Sand Black	30	84
Gravel 4" mixed sand Black water Bearing	84	103
Sand Tan gravel Ringold formation (Tight)	103	106

RECEIVED
DEC - 1 1995
DEPARTMENT OF ECOLOGY
EASTERN REGIONAL OFFICE

Work Started 11-10 19 95. Completed 10-31, 1995

WELL CONSTRUCTOR CERTIFICATION:

I constructed and/or accept responsibility for construction of this well, and its compliance with all Washington well construction standards. Materials used and the information reported above are true to my best knowledge and belief.

NAME Nelson Well Drilling Inc (PERSON, FIRM, OR CORPORATION) (TYPE OR PRINT)
Address 8200 W Argent Pasco
(Signed) [signature] (WELL DRILLER) License No. 361
Contractor's Registration No. NELSOWD198CQ Date 10-31-95, 19

(USE ADDITIONAL SHEETS IF NECESSARY)

Ecology is an Equal Opportunity and Affirmative Action employer. For special accommodation needs, contact the Water Resources Program at (206) 407-6600. The TDD number is (206) 407-6006.

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

Application No. ....
Permit No. ....

(1) OWNER: Name Washington Idaho Laborers Address 3921 E; Francis; Spokane, Wn., 99207

(2) LOCATION OF WELL: County Franklin N½, NE¼ SE ¼ SW ¼ Sec 27 T 9 N., R 30 W.M.
Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☒ Industrial ☐ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) ....
New well ☒ Method: Dug ☐ Bored ☐
Deepened ☐ Cable ☐ Driven ☐
Reconditioned ☐ Rotary ☒ Jetted ☐

(5) DIMENSIONS: Diameter of well 8 inches.
Drilled 135 ft. Depth of completed well 135 ft.

(6) CONSTRUCTION DETAILS:
Casing installed: 8 " Diam. from +1 ft. to 125 ft.
Threaded ☐ .... " Diam. from .... ft. to .... ft.
Welded ☒ .... " Diam. from .... ft. to .... ft.

Perforations: Yes ☐ No ☒
Type of perforator used ....
SIZE of perforations .... in. by .... in.
.... perforations from .... ft. to .... ft.
.... perforations from .... ft. to .... ft.
.... perforations from .... ft. to .... ft.

Screens: Yes ☒ No ☐
Manufacturer's Name Johnson
Type Stainless Steel Model No. ....
Diam. 8 Slot size 20 from 125 ft. to 135 ft.
Diam. .... Slot size .... from .... ft. to .... ft.

Gravel packed: Yes ☐ No ☒ Size of gravel: ....
Gravel placed from .... ft. to .... ft.

Surface seal: Yes ☒ No ☐ To what depth? 18 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? .... Depth of strata ....
Method of sealing strata off ....

(7) PUMP: Manufacturer's Name Berkeley
Type: Submirsible H.P. 5

(8) WATER LEVELS: Land-surface elevation above mean sea level 420 ft.
Static level 74 ft. below top of well Date 8/80
Artesian pressure .... lbs. per square inch Date ....
Artesian water is controlled by .... (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☒ If yes, by whom? ....
Yield: gal./min. with ft. drawdown after hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test ....
Bailer test 50 gal./min. with 10 ft. drawdown after 2 hrs.
Artesian flow .... g.p.m. Date ....
Temperature of water .... Was a chemical analysis made? Yes ☐ No ☒

(10) WELL LOG:
Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Sand, some clay	0	5
Silty sand	5	11
3/4" minus gravel with sand & clay	11	12
Cemented gravel	12	16
Clay & gravel	16	24
Sand & silt	24	70
Yellow clay	70	76
Clay & gravel- up to 2" some water	76	84
Sand & water	84	104
Clay & sand - no water	104	109
Sand, large boulders some water	109	123
Sand & gravel with water	123	135

RECEIVED
[illegible] 1980
DEPARTMENT OF ECOLOGY
SPOKANE REGIONAL OFFICE

Work started 7-15, 19 80. Completed 7-18, 19 80

WELL DRILLER'S STATEMENT:
This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME B & H DRILLING
(Person, firm, or corporation) (Type or print)
Address Rt. 3 Box 3365-A, Kennewick, Wn. 99336
[Signed] H. A. Bultena
(Well Driller)
License No. 0046 Date 9-8, 1980

10/22/80

(USE ADDITIONAL SHEETS IF NECESSARY)

ECY 050-1-20

File Original and First Copy with Department of Ecology
Second Copy — Owner's Copy
Third Copy — Driller's Copy

WATER WELL REPORT
STATE OF WASHINGTON

Application No. ....
Permit No. ....

(1) OWNER: Name Western Farm Service Address Star Rt., Box 1004 - Pasco, Wa.

(2) LOCATION OF WELL: County Franklin S 1/2 - SE ¼ NW ¼ Sec. 27 T. 9 N., R. 30 W.M.

Bearing and distance from section or subdivision corner

(3) PROPOSED USE: Domestic ☐ Industrial ☒ Municipal ☐ Irrigation ☐ Test Well ☐ Other ☐

(4) TYPE OF WORK: Owner's number of well (if more than one) ....
New well ☒ Deepened ☐ Reconditioned ☐
Method: Dug ☐ Cable ☒ Rotary ☐ Bored ☐ Driven ☐ Jetted ☐

(5) DIMENSIONS: Diameter of well 8 inches.
Drilled 120 ft. Depth of completed well 120 ft.

(6) CONSTRUCTION DETAILS:

Casing installed: 8 " Diam. from +1 ft. to 115 ft.
Threaded ☐ ....." Diam. from ..... ft. to ..... ft.
Welded ☒ ....." Diam. from ..... ft. to ..... ft.

Perforations: Yes ☐ No ☒
Type of perforator used
SIZE of perforations ..... in. by ..... in.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.
..... perforations from ..... ft. to ..... ft.

Screens: Yes ☒ No ☐
Manufacturer's Name Johnson
Type Stainless Steel Model No.
Diam. ..... Slot size ..... from ..... ft. to ..... ft.
Diam. 8 Slot size 30 from 115 ft. to 120 ft.

Gravel packed: Yes ☐ No ☒ Size of gravel:
Gravel placed from ..... ft. to ..... ft.

Surface seal: Yes ☒ No ☐ To what depth? 18 ft.
Material used in seal Bentonite
Did any strata contain unusable water? Yes ☐ No ☒
Type of water? ..... Depth of strata
Method of sealing strata off

(7) PUMP: Manufacturer's Name Red Jacket
Type: Submirsible H.P. 10

(8) WATER LEVELS: Land-surface elevation above mean sea level 400 ft.
Static level 84 ft. below top of well Date 12/28/82
Artesian pressure ..... lbs. per square inch Date
Artesian water is controlled by ..... (Cap, valve, etc.)

(9) WELL TESTS: Drawdown is amount water level is lowered below static level
Was a pump test made? Yes ☐ No ☒ If yes, by whom?
Yield: ..... gal./min. with ..... ft. drawdown after ..... hrs.
" " " "
" " " "

Recovery data (time taken as zero when pump turned off) (water level measured from well top to water level)

Time	Water Level	Time	Water Level	Time	Water Level

Date of test
Bailer test 40 gal./min. with 0 ft. drawdown after 2 hrs.
Artesian flow ..... g.p.m. Date
Temperature of water ..... Was a chemical analysis made? Yes ☐ No ☒

(10) WELL LOG:

Formation: *Describe by color, character, size of material and structure, and show thickness of aquifers and the kind and nature of the material in each stratum penetrated, with at least one entry for each change of formation.*

MATERIAL	FROM	TO
Sand	0	6
Clay & Silt	6	8
Sand	8	12
Clay & Silt	12	14
Yellow Clay	14	31
Sand - some 1/4" Gravel	31	38
Large Boulder	38	42
Silt	42	44
Large Boulder	44	47
3/4" Gravel	47	54
2' Boulders	54	61
1/4" Gravel	61	84
Ringold	84	92
1/4" Gravel	92	119
Ringold	119	120

Work started 11/9, 1982 Completed 12/28, 1982

WELL DRILLER'S STATEMENT:

This well was drilled under my jurisdiction and this report is true to the best of my knowledge and belief.

NAME B&H Drilling (Person, firm, or corporation) (Type or print)
Address Rt. 3 Box 336 SA - Kennewick, Wa.
[Signed] H. A. Bultena (Well Driller)
License No. 0046 Date 12/29, 1982

1/4/83

(USE ADDITIONAL SHEETS IF NECESSARY)

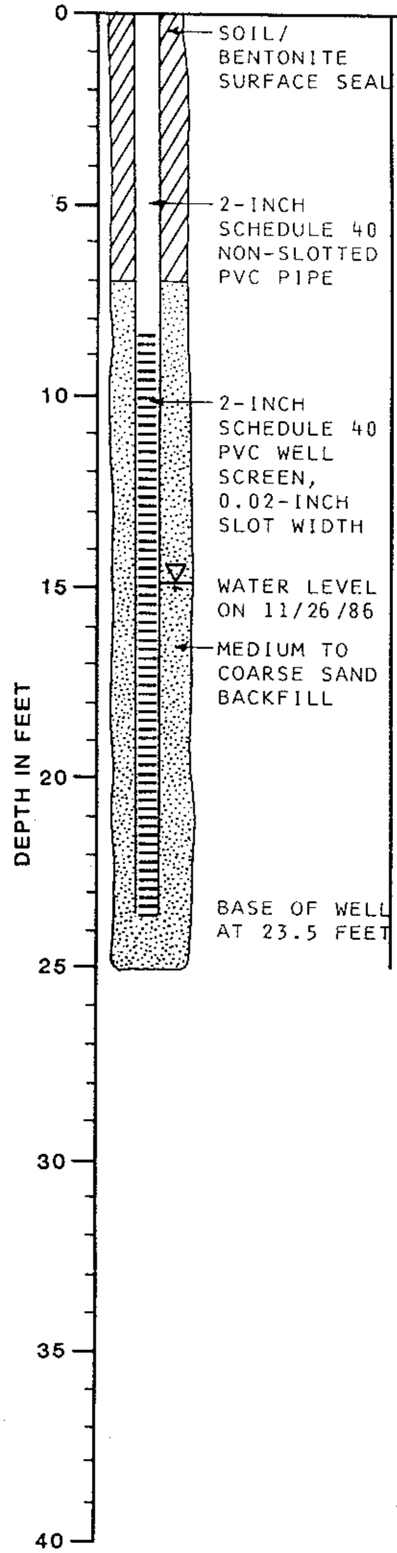
Pasco

ECY 050-1-20

Appendix C
Well Construction and Boring Logs

MONITOR WELL NO. 6

WELL SCHEMATIC
Casing Elevation:357.10
Casing Stickup:1.6 feet



DESCRIPTION
Surface Elevation: 355.5 feet

Depth (feet)	Blow-Count	Samples	Group Symbol	Description
0			SP	BROWN FINE TO MEDIUM SAND (LOOSE, MOIST)
~4	24	■		
~9	9	■		
~14	8	■		GRADES TO WET
~17			ML	GRAYISH-BROWN SANDY SILT WITH OCCASIONAL GRAVEL (STIFF, MOIST)
~19	23	■		
~24	19	■		

BORING COMPLETED AT 25 FEET ON 11/17/86

Note: See Figure A-2for Explanation of Symbols

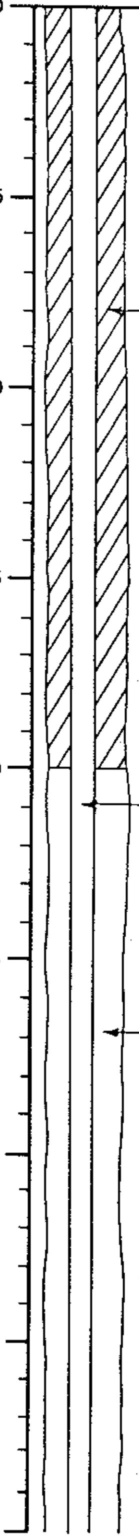
GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-3

MONITOR WELL NO. 7

WELL SCHEMATIC
Casing Elevation: 409.10
Casing Stickup: 1.5 feet



DEPTH IN FEET

Depth (ft)	Blow-Count	Samples	Group Symbol	DESCRIPTION Surface Elevation: 407.6 feet
0			SP	BROWN FINE TO MEDIUM SAND (LOOSE, DRY)
5				
~8	13	■		GRADES TO GRAY, MEDIUM DENSE, AND MOIST
10				
15				
~18	17	■		
20				
25				
~28	19	■		
30			GP	LAYER OF SANDY FINE GRAVEL (MEDIUM DENSE, MOIST)
~31			SP	GRAY FINE TO MEDIUM SAND WITH A SLIGHT PRODUCT ODOR (MEDIUM DENSE, MOIST)
35				
~38	18	■		
40				

Note: See Figure A-2 for Explanation of Symbols

GeoEngineers Incorporated

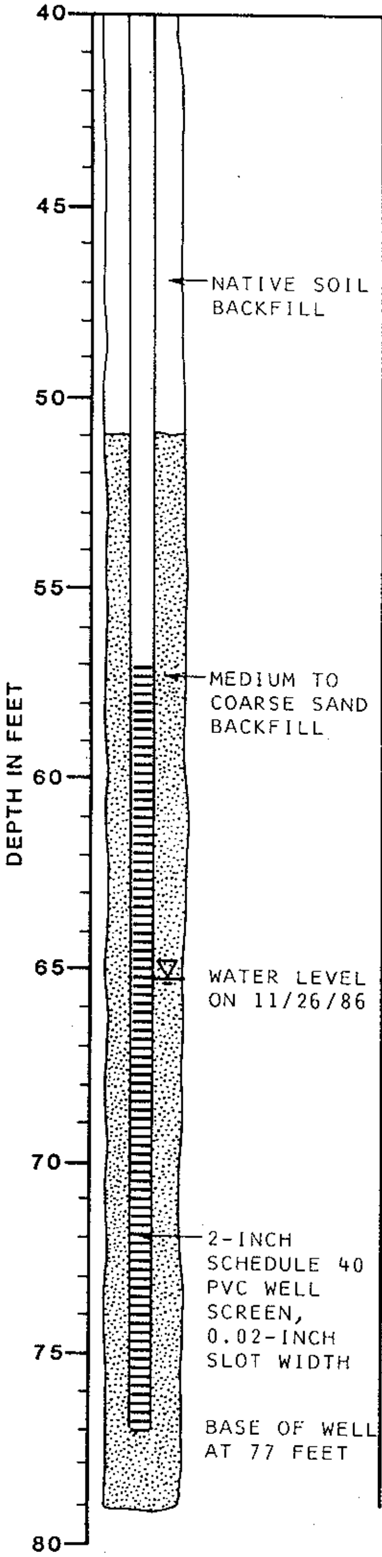
LOG OF MONITOR WELL

FIGURE A-4

MONITOR WELL NO. 7
(Continued)

WELL SCHEMATIC
Casing Elevation:
Casing Stickup:

DESCRIPTION
Surface Elevation:



Blow-Count	Samples	Group Symbol	Description
		SP	
23	■		GRADES TO MODERATE PRODUCT ODOR
23	■		
28	■		
		SP	BROWN FINE SAND WITH A TRACE OF SILT (MEDIUM DENSE, MOIST TO WET)
		SP	GRAY GRAVELLY COARSE SAND (DENSE, WET)
74/11"	■	SP/SM	GRAY GRAVELLY COARSE SAND (DENSE, WET)
		GW	GRAY SANDY FINE TO COARSE GRAVEL (DENSE, WET)
48	■		
56	■		

BORING COMPLETED AT 79 FEET ON 11/18/86

Note: See Figure A-2 for Explanation of Symbols

GeoEngineers Incorporated

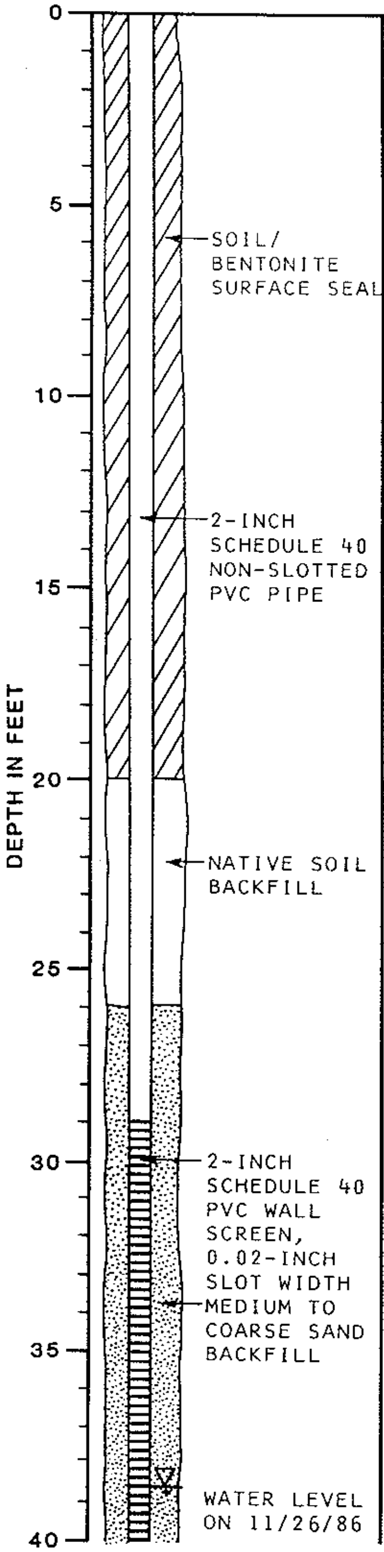
LOG OF MONITOR WELL

FIGURE A-5

MONITOR WELL NO. 8

WELL SCHEMATIC
Casing Elevation: 383.42
Casing Stickup: 2.5 feet

DESCRIPTION
Surface Elevation: 380.9 feet



Depth (feet)	Blow-Count	Samples	Group Symbol	Description
0			SP	BROWN FINE TO MEDIUM SAND (LOOSE, MOIST)
10	13	■		GRADES TO GRAY AND MEDIUM DENSE
20	16	■		
30	16	■		
35	22	■		GRADES TO MOIST TO WET

Note: See Figure A-2 for Explanation of Symbols

GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-6

MONITOR WELL NO. 8

(Continued)

WELL SCHEMATIC
Casing Elevation:
Casing Stickup:

Surface Elevation:

Depth (feet)	Blow-Count	Samples	Group Symbol	DESCRIPTION
40	22	■	SP	
45	34	■	GW/SW	GRAY SANDY FINE TO COARSE GRAVEL WITH LAYERS OF GRAVELLY FINE TO COARSE SAND (DENSE, WET)
50	55	■		
			SP	BROWN FINE SAND (DENSE, WET)
			GW/SW	GRAY SANDY FINE TO COARSE GRAVEL WITH LAYERS OF GRAVELLY FINE TO COARSE SAND (DENSE, WET)
55	60	■		

BASE OF WELL AT 54 FEET

BORING COMPLETED AT 56 FEET ON 11/25/86

DEPTH IN FEET: 40, 45, 50, 55, 60, 65, 70, 75, 80

Note: See Figure A-2 for Explanation of Symbols

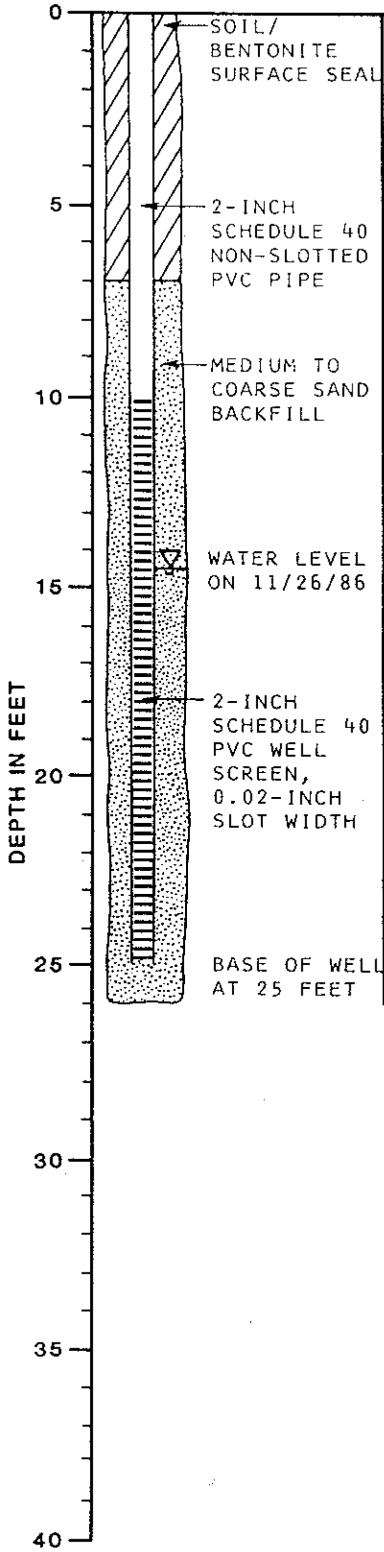
GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-7

MONITOR WELL NO.9

WELL SCHEMATIC
Casing Elevation: 359.39
Casing Stickup: 5.2 feet



DESCRIPTION
Surface Elevation: 354.2 feet

Depth (feet)	Blow-Count	Samples	Group Symbol	Description
0			SP	BROWN FINE TO MEDIUM SAND (LOOSE, MOIST)
5	12	■		GRADES TO MEDIUM DENSE
10	22	■		
14			SM	DARK BROWN SILTY FINE SAND (VERY LOOSE, WET)
15	4	■		
18			ML	BROWN SANDY SILT (VERY SOFT, WET)
20	1	■		
23			SP	BROWN GRAVELLY COARSE SAND (MEDIUM DENSE, WET)
25	34	■		

BORING COMPLETED AT 26 FEET ON 11/20/86

Note: See Figure A-2 for Explanation of Symbols

GeoEngineers Incorporated

LOG OF MONITOR WELL

FIGURE A-8

RZA

RITTENHOUSE-ZEMAN & ASSOCIATES, INC.
Geotechnical & Hydrogeological Consultants

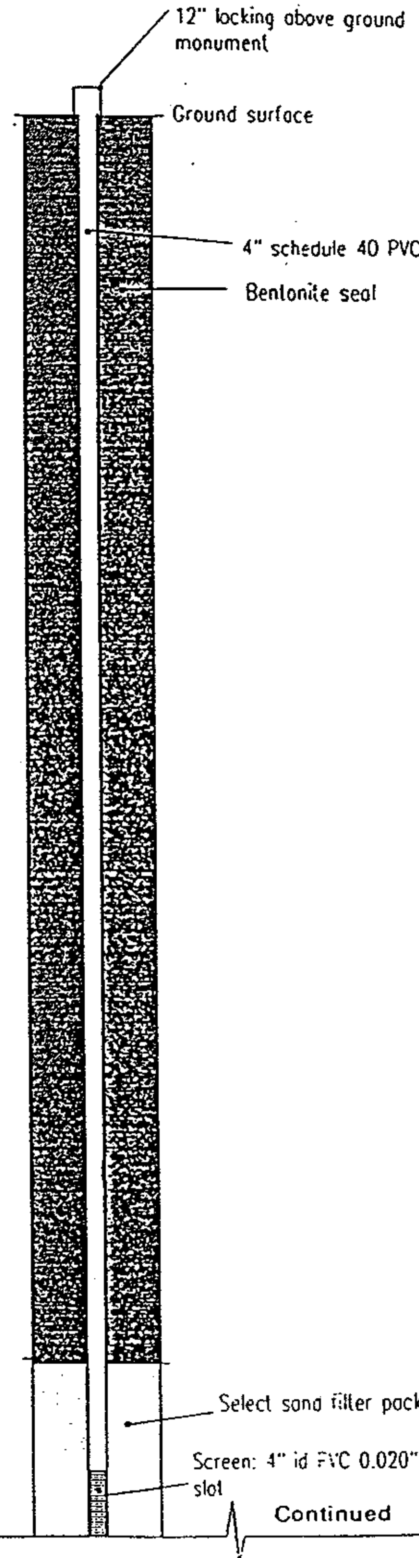
WELL NUMBER MW-10 PAGE 1 OF 2
PROJECT NAME Chevron Terminal W.O. W-5359-1
DATE BEGUN 5 Jan 89 DATE COMPLETED 6 Jan 89

SOIL OR ROCK DESCRIPTION

DRILLED BY: STACO
DRILLING METHOD: Air Rotary
REFERENCE ELEVATION: SURFACE
TOP OF CASING ELEVATION: 78.86

SOIL OR ROCK DESCRIPTION	SOIL SAMPLES	SAMPLE INTERVAL	LABORATORY/CGI	DEPTH (IN FEET)	BLOW COUNT	WATER LEVEL
Loose, gray brown, dry, fine SAND; some medium sand						
	S-1					
grading gray	S-2			10		
Gray, dry to damp, medium SAND; trace to some fine and coarse sand	S-3					
	S-4			20		
	S-5					
grading gray, coarser						
	S-6			30		
	S-7					
	S-8			40		
	S-9					
	S-10			50		
	S-11					

AS-BUILT

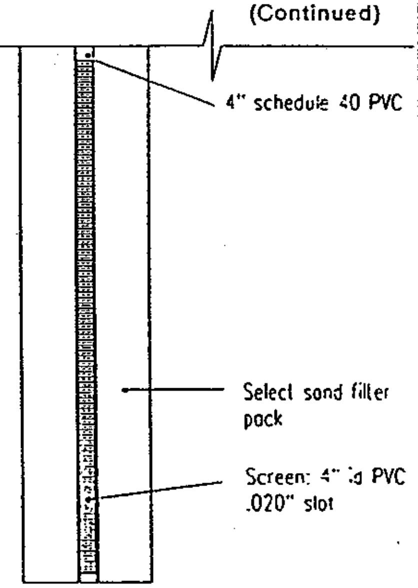


Continued

RZA
RITTENHOUSE-ZEMAN & ASSOCIATES, INC.
Geotechnical & Hydrogeological Consultants

WELL NUMBER MW-10
PROJECT NAME Chevron Terminal W.O. W-5359-1
DATE BEGUN 5 Jan 89 DATE COMPLETED 6 Jan 89

SOIL OR ROCK DESCRIPTION	SOIL SAMPLES	SAMPLE INTERVAL	LABORATORY/CGI	DEPTH (IN FEET)	BLOW COUNT	WATER LEVEL	AS-BUILT
DRILLED BY: STACO DRILLING METHOD: Air Rotary REFERENCE ELEVATION: SURFACE TOP OF CASING ELEVATION: 78.86							
							(Continued)
Gray, dry to damp, medium SAND; trace to some fine and coarse sand (continued)	S-11						
grading moist to wet	S-12			60		▽	
	S-13						
	S-14			70			
	S-15						
Bottom of borehole at 78-1/4 ft.				80			
				90			
				100			



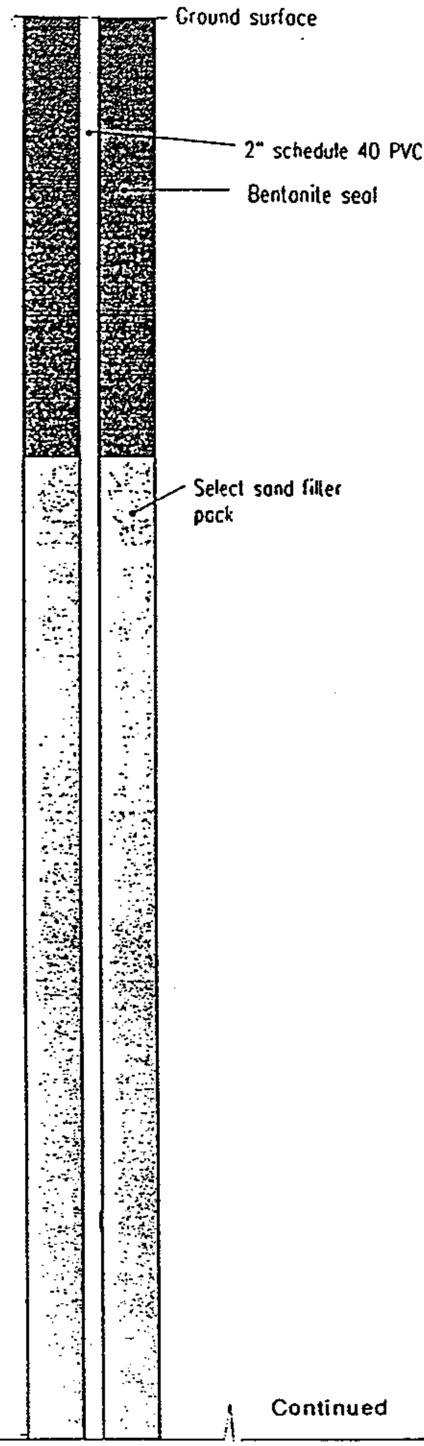
RZA RITTENHOUSE-ZEMAN & ASSOCIATES, INC.
Geotechnical & Hydrogeological Consultants

WELL NUMBER MW-11 PAGE 1 OF 2
PROJECT NAME Chevron Terminal W.O. W-5359-1
DATE BEGUN 16 Jan 89 DATE COMPLETED 16 Jan 89

DRILLED BY: Associated
DRILLING METHOD: HSA/SPT
REFERENCE ELEVATION: SURFACE
TOP OF CASING ELEVATION: 97.15

SOIL OR ROCK DESCRIPTION	SOIL SAMPLES	SAMPLE INTERVAL	LABORATORY/CGI	DEPTH (IN FEET)	BLOW COUNT	WATER LEVEL
Loose to medium dense, damp, medium to dark brown, fine to medium SAND; trace silt	S-1	I	0			
grading gray	S-2	I	0	10	7	
Medium dense, gray, damp, fine to medium SAND	S-3	I	0		17	
	S-4	I	0	20	15	
	S-5	I	0		22	
	S-6	I	0		15	
trace gravel grading moist				30		
moderate to strong petroleum hydrocarbon odor	S-7	I	11 lab		20	
Medium dense, moist, light gray, fine SAND; trace medium sand	S-8	I	7	40	20	
	S-9	I	9		22	
	S-10	I	7	50	22	
	S-11	I	8		20	
grading dense	S-12	_			36	

AS-BUILT



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RZA
RITTENHOUSE-ZEMAN & ASSOCIATES, INC.
Geotechnical & Hydrogeological Consultants

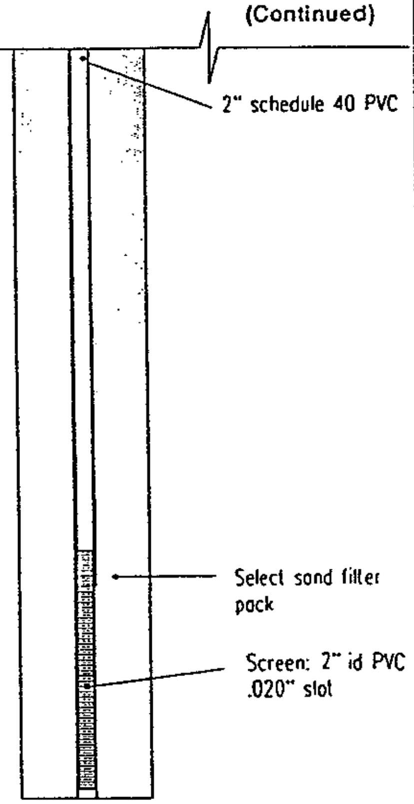
WELL NUMBER MW-11 PAGE 2 OF 2
PROJECT NAME Chevron Terminal W.O. W-5359-1
DATE BEGUN 16 Jan 89 DATE COMPLETED 16 Jan 89

SOIL OR ROCK DESCRIPTION

DRILLED BY: Associated
DRILLING METHOD: HSA/SPT
REFERENCE ELEVATION: SURFACE
TOP OF CASING ELEVATION: 97.15

SOIL OR ROCK DESCRIPTION	SOIL SAMPLES	SAMPLE INTERVAL	LABORATORY/CGI	DEPTH (IN FEET)	BLOW COUNT	WATER LEVEL
Dense, moist, light gray, fine SAND; trace medium sand (continued)	S-12	I	6		36	
trace degraded petroleum hydrocarbon odor				60		
	S-13	I	2		36	
	S-14	I	2		36	
				70		
	S-15	I	2		41	
	S-16	I	2		50	ATD
				80		
Gravel						
Bottom of borehole at 84-1/2 ft.						
				90		
				100		

AS-BUILT



RZA
RITTENHOUSE-ZEMAN & ASSOCIATES, INC.
Geotechnical & Hydrogeological Consultants

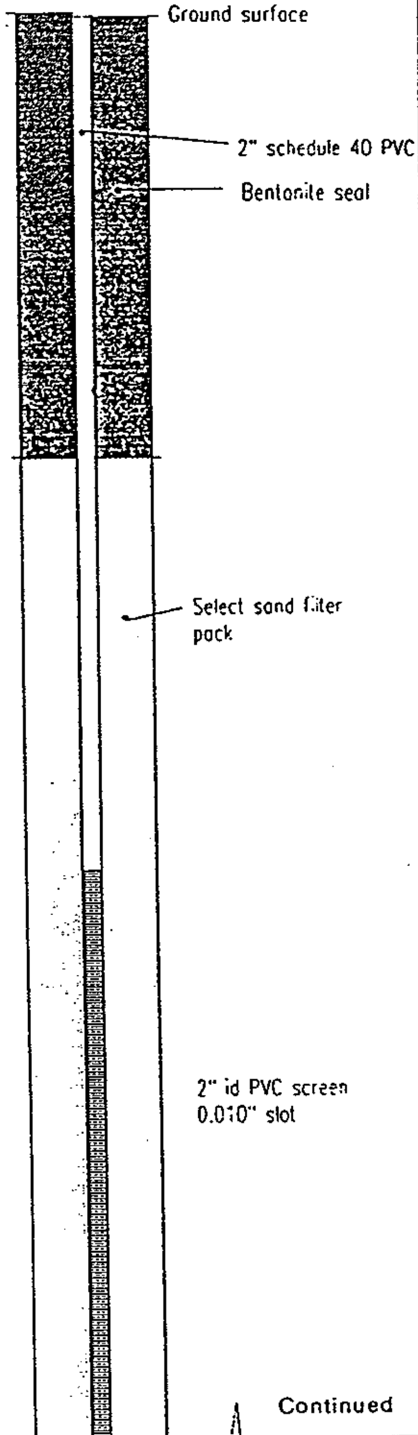
WELL NUMBER MW-12 PAGE 1 OF 2
PROJECT NAME Chevron Terminal W.O. W-5359-1
DATE BEGUN 16 Jan 89 DATE COMPLETED 17 Jan 89

SOIL OR ROCK DESCRIPTION

DRILLED BY: Associated
DRILLING METHOD: HSA/SPT
REFERENCE ELEVATION: SURFACE
TOP OF CASING ELEVATION: 97.20

SOIL OR ROCK DESCRIPTION	SOIL SAMPLES	LABORATORY/CGI	DEPTH (IN FEET)	BLOW COUNT	WATER LEVEL
	S-1	0			
Medium dense, damp, light brown, fine SAND; trace medium sand	S-2	0		10	
			10		
grading gray	S-3	0		9	
grading moist slight degraded petroleum hydrocarbon odor	S-4	0		25	
			20		
	S-5	1		24	
	S-6	1		24	
			30		
	S-7	1		21	
moderate to strong petroleum hydrocarbon odor	S-8	4		36	
			40		
	S-9	14		28	
	S-10	11 lab		36	
			50		
	S-11	10		35	
	S-12			22	

AS-BUILT



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WELL NUMBER MW-12 PAGE 2 OF 2
PROJECT NAME Chevron Terminal W.O. W-5359-1
DATE BEGUN 16 Jan 89 DATE COMPLETED 17 Jan 89

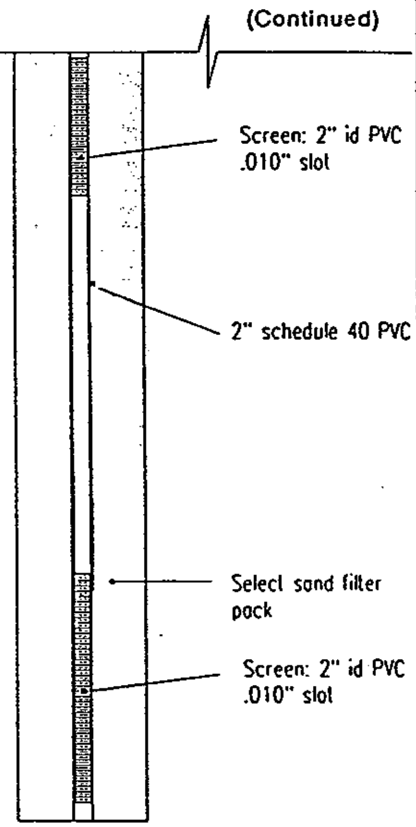
SOIL OR ROCK DESCRIPTION

DRILLED BY: Associated
DRILLING METHOD: HSA/SPT
REFERENCE ELEVATION: SURFACE
TOP OF CASING ELEVATION: 97.20

SOIL OR ROCK DESCRIPTION	SOIL SAMPLES	SAMPLE INTERVAL	LABORATORY/CGI	DEPTH (IN FEET)	BLOW COUNT	WATER LEVEL
Dense, damp to moist, dark gray, fine SAND; trace medium sand (continued)						
moderate to strong petroleum hydrocarbon odor	S-12	I	10		22	
				60		
	S-13	I	8		24	
slight to moderate petrloleum hydrocarbon odor	S-14	I	5		34	
				70		
grading to very dense and wet to saturated	S-15	I	3		55	
	S-16	I	1		45	ATD
Gravel				80		
Bottom of borehole at 85 ft.						
				90		
				100		

AS-BUILT

(Continued)



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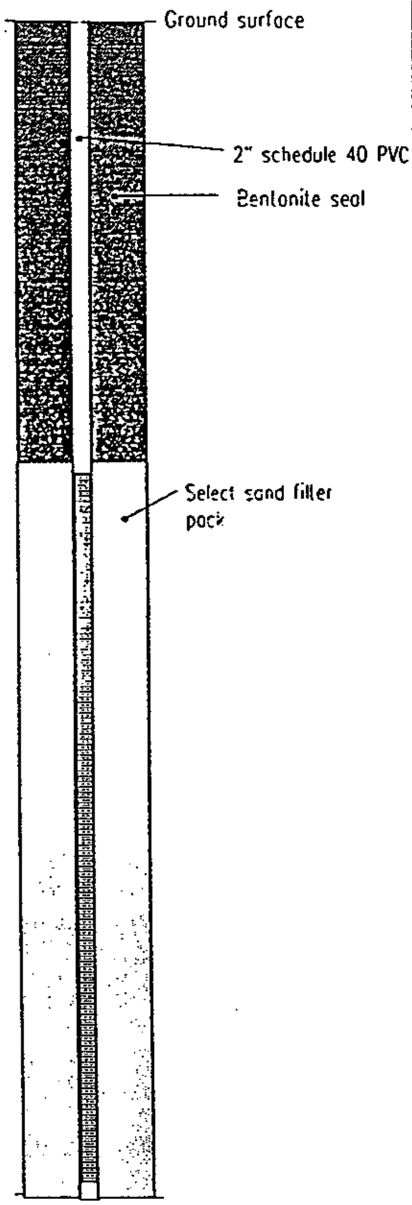
Geotechnical & Hydrogeological Consultants

WELL NUMBER MW-13 PAGE 1 OF 1
PROJECT NAME Chevron Terminal W.O. W-5359-1
DATE BEGUN 17 Jan 89 DATE COMPLETED 17 Jan 89

SOIL OR ROCK DESCRIPTION	SOIL SAMPLES	SAMPLE INTERVAL	LABORATORY/CGI	DEPTH (IN FEET)	BLOW COUNT	WATER LEVEL
DRILLED BY: Associated DRILLING METHOD: HSA/SPT REFERENCE ELEVATION: SURFACE TOP OF CASING ELEVATION:						
Loose to medium dense, damp, medium to dark brown, fine to medium SAND; trace silt						
grading gray						
				10		
Medium dense, gray, damp, fine to medium SAND						
				20		
trace gravel grading moist				30		
moderate to strong petroleum hydrocarbon odor						
Medium dense, moist, light gray, fine SAND; trace medium sand				40		
Bottom of borehole at 48 ft						
				50		

AS-BUILT



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Geotechnical & Hydrogeological Consultants

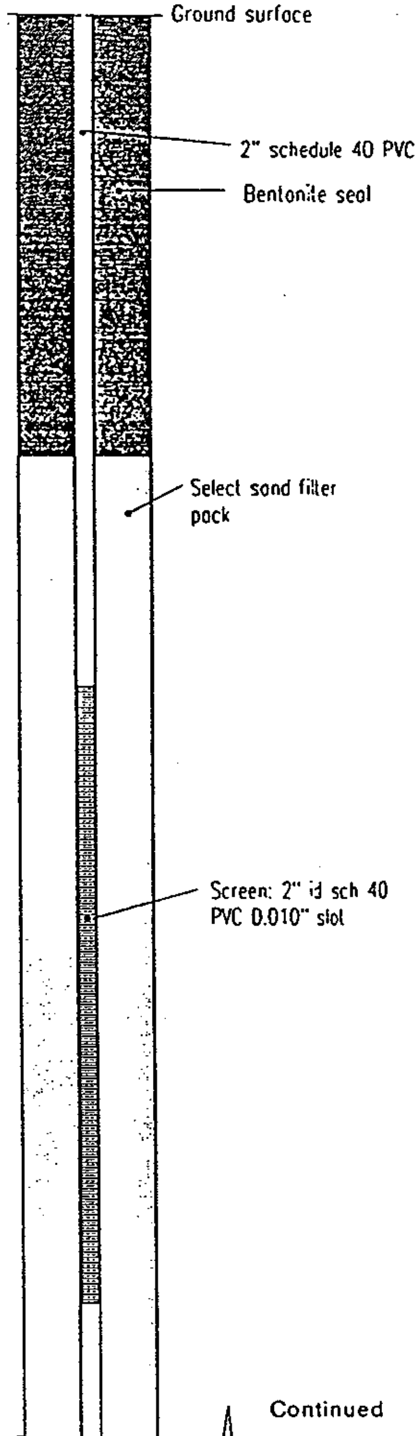
WELL NUMBER MW-14
PROJECT NAME Chevron Terminal W.O. W-5359-1
DATE BEGUN 17 Jan 89 DATE COMPLETED 17 Jan 89

SOIL OR ROCK DESCRIPTION

DRILLED BY: Associated
DRILLING METHOD: HSA/SPT
REFERENCE ELEVATION: SURFACE
TOP OF CASING ELEVATION: **94.92**

SOIL OR ROCK DESCRIPTION	SOIL SAMPLES	SAMPLE INTERVAL	LABORATORY/CGI	DEPTH (IN FEET)	BLOW COUNT	WATER LEVEL
Medium dense, damp, gray brown, fine to medium SAND; trace silt	S-1	I	0		16	
	S-2	I	0		22	
				10		
	S-3	I	0		22	
Medium dense, damp, dark brown to black, medium SAND						
	S-4	I	0			
grading finer, brown-gray					15	
				20		
	S-5	I	0		17	
	S-6	I	0		33	
				30		
	S-7	I	0		24	
	S-8	I	0 lab		43	
				40		
	S-9	I	0		25	
	S-10	I	0		36	
trace gravel grading moist				50		
	S-11	I	0		28	
	S-12				24	

AS-BUILT



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Geotechnical & Hydrogeological Consultants

WELL NUMBER MW-14 PAGE 2 OF 2

PROJECT NAME Chevron Terminal W.O. W-5359-1

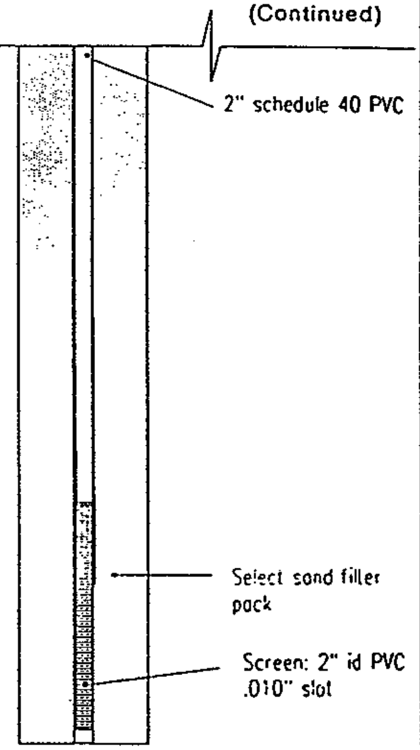
DATE BEGUN 17 Jan 89 DATE COMPLETED 17 Jan 89

SOIL OR ROCK DESCRIPTION

DRILLED BY: Associated
DRILLING METHOD: HSA/SPT
REFERENCE ELEVATION: SURFACE
TOP OF CASING ELEVATION: 94.92

SOIL OR ROCK DESCRIPTION	SOIL SAMPLES	SAMPLE INTERVAL	LABORATORY/CGI	DEPTH (IN FEET)	BLOW COUNT	WATER LEVEL
Medium dense, moist, brown-gray, fine SAND (continued)						
	S-12	I	0		34	
				60		
	S-13	I	0		25	
denser	S-14	I	0		29	
				70		
Saturated, black, fine to coarse SAND slight petroleum hydrocarbon odor	S-15	I	0		30	
						▽
Gravel				80		
Bottom of borehole at 82-1/2 ft.						
				90		
				100		

AS-BUILT



Project: Tesoro Pasco Project Location: Pasco, WA Project Number: 60569792	**Log of Boring/Well AB4/MW-15** Sheet 1 of 1

Date(s) Drilled	9/5/2018	Logged By	Michaela McCoog	Checked By	Jeremy Haney
Drilling Method	Hollow Stem Auger	Drill Bit Size/Type	4 1/4-inch	Total Depth of Borehole	23.5 feet
Drill Rig Type	Track Mounted	Drilling Contractor	Environmental West	Approximate Surface Elevation	Not available
Groundwater Level	15 feet bgs	Sampling Method(s)	Hand Auger/Split Spoon	Hammer Data	140 lb hammer; 30" drop
Borehole Backfill	Monitoring well	Location	See location figure		

Elevation, feet	Depth, feet	SAMPLES Type / Number	Recovery, inches	PID, ppm	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0						**SAND and GRAVEL** at surface. Air-knifed to 4.92 feet bgs.		
		S-1	6	0		SP	**SAND** Brown, fine to medium, moist, loose. No odor.		Sample AB4-180905-(5-5.5)
	10	S-2	18				Grades to medium dense. No odor.		Sample AB4-180905-(10-11.5)
		S-3	18			SM	**SILTY SAND** Brown, fine to medium, wet, very loose. No odor.		
	20	S-4	15	0		SM	**SILT** Brown, trace fine sand, wet, soft. No odor.		
		S-5	14	0		SM-GM	**SANDY SILT** Brown, some rounded gravel, trace small rock chips, wet, very dense. No odor.		Sample AB4-180905-(23-24.8)
							Boring terminated at 24.8 feet bgs.		
	30								
	40								
	50								
	60								
	70								
	80								
	90								
	100								
	110								

Well Details
2-inch 40 PVC well casing: 3 feet ags to 23.5 feet bgs
Above ground monument: 3 feet ags
Concrete: 0 to 3 feet bgs
Bentonite chips: 3 feet to 6.5 feet bgs
10/20 Colorado silica sand: 6.5 feet to 23.5 feet bgs
0.01-slot PVC screen: 8.5 feet to 23.5 feet bgs

Notes: ags = above ground surface, bgs = below ground surface

Project: Tesoro Pasco
Project Location: Pasco, WA
Project Number: 60569792

Log of Boring/Well MW-16

Date(s) Drilled	**9/6/2018**	Logged By	**Michaela McCoog**	Checked By	**Jeremy Haney**
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**4 1/4-inch**	Total Depth of Borehole	**30.0 feet**
Drill Rig Type	**Track Mounted**	Drilling Contractor	**Environmental West**	Approximate Surface Elevation	**Not available**
Groundwater Level	**24 feet bgs**	Sampling Method(s)	**Hand Auger/Split Spoon**	Hammer Data	**140 lb hammer; 30" drop**
Borehole Backfill	**Monitoring well**	Location	**See location figure**		

Elevation, feet	Depth, feet	SAMPLES Type	Number	Recovery, inches	PID, ppm	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0							**SAND and GRAVEL** at surface. Air-knifed to 5 feet bgs.		Post shift PID check showed PID was not working properly due to sensor misplacement. PID measurements are considered invalid.
			S-1	6	0		SP	**SAND** Dark brown, fine to medium, moist, loose. No odor. [5-6-4]		
	10		S-2	10	0					Sample MW16-180906-(10-11.5)
			S-3	12	0			Grades to medium dense. Slight gasoline/varnish-like odor. [6-4-7]		Sample MW16-180906-(15-16.5), MW16-180906-(15-16.5)-D
	20		S-4	12	0			Grades to loose. Gasoline/varnish-like odor. [3-4-6]		Sample MW16-180906-(20-21.5)
			S-5	12	0			Grades to trace silt, wet, medium dense. Gasoline/varnish-like odor. [6-7-6]		
	30		S-6	16	0			Grades to trace silt, trace fine rounded gravel, trace coarse sand. Slight odor. [8-9-10] Boring terminated at 30 feet bgs.		
	40									
	50									
	60									
	70									
	80									
	90									
	100									
	110									

Well Details
2-inch 40 PVC well casing: 3 feet ags to 30 feet bgs
Above ground monument: 3 feet ags
Concrete: 0 to 3 feet bgs
Bentonite grout: 3 feet to 15 feet bgs
Bentonite chips: 15 feet to 18 feet bgs
10/20 Colorado silica sand: 18 feet to 30 feet bgs
0.01-slot PVC screen: 20 feet to 30 feet bgs

Notes: ags = above ground surface, bgs = below ground surface

Project: Tesoro Pasco
Project Location: Pasco, WA
Project Number: 60569792

Log of Boring/Well MW-17

Date(s) Drilled	**9/7/2018**	Logged By	**Michaela McCoog**	Checked By	**Jeremy Haney**
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**4 1/4-inch**	Total Depth of Borehole	**83.0 feet**
Drill Rig Type	**Track Mounted**	Drilling Contractor	**Environmental West**	Approximate Surface Elevation	**Not available**
Groundwater Level	**77 feet bgs**	Sampling Method(s)	**Hand Auger/Split Spoon**	Hammer Data	**140 lb hammer; 30" drop**
Borehole Backfill	**Monitoring well**	Location	**See location figure**		

Elevation, feet	Depth, feet	SAMPLES: Type Number	Recovery, inches	PID, ppm	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0						**SAND and GRAVEL** at surface.		
		S-1	18	2.5		SP	**SAND** Dark brown, fine to medium, moist, loose. No odor. [4-4-4]		Sample MW17-180907-(5-6.5)
	10	S-2	13	0			Grades to brown, trace silt. No odor. [2-3-3]		
		S-3	18	0.3			Grades to some silt. No odor [3-4-5]		Sample MW17-180907-(15-16.5)
	20	S-4	18	0.8			Grades to trace silt, medium dense. Slight sweet odor. [9-7-8]		Sample MW17-180907-(20-21.5)
		S-5	16	2.0			[4-6-9]		Sample MW17-180907-(25-26.5)
	30	S-6	18	0.9			Grades to no silt. Slight sweet odor. [6-5-6]		Sample MW17-180907-(30-31.5)
		S-7	17	0.7			Grades to no odor. [6-7-8]		Sample MW17-180907-(35-36.5)
	40	S-8	18	1.1			Grades to slight sweet odor. [6-9-11]		Sample MW17-180907-(40-41.5)
		S-9	18	1.1			[5-7-9]		Sample MW17-180907-(45-46.5)
	50	S-10	18	1.4			Grades to no odor. [5-7-7]		Sample MW17-180907-(50-51.5)
		S-11	15	1.1			[5-8-7]		Sample MW17-180907-(55-56.5), MW17-180907-(55-56.5)-D
	60	S-12	18	1.7			Grades to slight odor. [7-9-9]		Sample MW17-180907-(60-61.5)
		S-13	18	1.1			[5-9-9]		Sample MW17-180907-(65-66.5)
	70	S-14	18	0.9			[7-10-12]		Sample MW17-180907-(70-71.5)
		S-15		0.4			Grades to dark brown, trace silt. [10-15-15] ▼		Sample MW17-180907-(75-76.5)
	80	S-16	8	0.6		SP	**SAND** Dark brown, fine to coarse, some rounded gravel, wet, dense. No odor. [15-18-27]		
							Boring terminates at 83 feet bgs.		**Well Details** 2-inch 40 PVC well casing: 3 feet ags to 83 feet bgs Above ground monument: 3 feet ags Concrete: 0 to 3 feet bgs Bentonite grout: 3 feet to 68 feet bgs Bentonite chips: 68 feet to 71 feet bgs 10/20 Colorado silica sand: 71 feet to 83 feet bgs 0.01-slot PVC screen: 73 feet to 83 feet bgs
	90								
	100								
	110								

Notes: ags = above ground surface, bgs = below ground surface

Project: Tesoro Pasco
Project Location: Pasco, WA
Project Number: 60569792

Log of Boring/Well MW-18

Date(s) Drilled	**10/11/2018**	Logged By	**Michaela McCoog**	Checked By	**Jeremy Haney**
Drilling Method	**Sonic**	Drill Bit Size/Type	**6 5/8-inch**	Total Depth of Borehole	**87.0 feet**
Drill Rig Type	**Speed Sonar 15k**	Drilling Contractor	**Environmental West**	Approximate Surface Elevation	**Not available**
Groundwater Level	**77 feet bgs**	Sampling Method(s)	**Sonic Sleeves**	Hammer Data	**Not available**
Borehole Backfill	**Monitoring well**	Location	**See location figure**		

Elevation, feet	Depth, feet	SAMPLES: Type Number	SAMPLES: Recovery, inches	SAMPLES: PID, ppm	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0						3-inch asphalt at surface. Air-knifed to 5.33 feet bgs.		
		S-1	20	0.1		SP	**SAND** Brown, fine to medium, trace fine rounded gravel, poorly graded, loose, dry.		Sample MW18-181011-(5-7)
		S-2	2	0.1					
	10						Grades to trace fine to medium rounded gravel, poory graded, moist.		
									Sample MW18-181011-(12-17)
		S-3	4	5.6		SP	**SAND** Brown, fine to medium, medium dense, moist.		Sample MW18-181011-(17-19), MW18-181011-(17-19)-D
	20			0.8					
				0.5					
				0.6			Grades finer with trace silt.		
				1.1			Grades to no silt.		
		S-4	6	0.6					
	30			0.6					Sample MW18-181011-(29-31), MW18-181011-(29-31)-MS/MSD
				0.6					
				0.4					
				0.6					
		S-5	6	0.5			Grades to trace silt.		
	40			0.4					
				0.4					
				0.8					Sample MW18-181011-(43-45)
				0.7					
		S-6	9.5	4.8			Grades to poorly graded.		
	50			4.9					Sample MW18-181011-(49-51)
				4.1					
				3.2					
				3.0					
		S-7	8.5	4.8					
	60			5.6			Grades to some silt.		Sample MW18-181011-(59-61)
				4.8					
				3.6			Grades to trace silt.		
				5.1					
		S-8	9.6	4.1					
	70			3.5					
				4.6					
				4.0					
				4.9					Sample MW18-181011-(75-77)
		S-9	9	4.7			Grades to wet.		
	80			4.1			Grades to some coarse sand and no silt.		
				4.6		SP	**SAND** Brown, fine to coarse, some round gravel, trace fine rounded cobbles, wet.		
				4.2					
				3.7			Boring terminates at 87 feet bgs.		**Well Details** 2-inch 40 PVC well casing: 30 inches ags to 87 feet bgs Above ground monument: 30 inches ags Concrete: 0 to 2 feet bgs Bentonite grout: 2 feet to 68 feet bgs Bentonite chips: 68 feet to 70 feet bgs 10/20 Colorado silica sand: 70 feet to 87 feet bgs 0.01-slot PVC screen: 72 feet to 87 feet bgs
	90								
	100								
	110								

Notes: ags = above ground surface, bgs = below ground surface

Project: Tesoro Pasco **Project Location: Pasco, WA** **Project Number: 60569792**	# Log of Boring/Well MW-19 Sheet 1 of 1

Date(s) Drilled	**10/12/2018**	Logged By	**Michaela McCoog**	Checked By	**Jeremy Haney**
Drilling Method	**Sonic**	Drill Bit Size/Type	**6 5/8-inch**	Total Depth of Borehole	**87.0 feet**
Drill Rig Type	**Speed Sonar 15k**	Drilling Contractor	**Environmental West**	Approximate Surface Elevation	**Not available**
Groundwater Level	**77 feet bgs**	Sampling Method(s)	**Sonic Sleeves**	Hammer Data	**Not available**
Borehole Backfill	**Monitoring well**	Location	**See location figure**		

Elevation, feet	Depth, feet	SAMPLES: Type Number	SAMPLES: Recovery, inches	SAMPLES: PID, ppm	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0						**GRAVEL** at surface Air-knifed to 4.83 feet bgs.		
		S-1	2	1.6		SP	**SAND** Brown, fine to medium, poorly graded, loose, dry.		Sample MW19-181012-(5-7)
		S-2	4	0.7			Grades to trace rounded gravel.		Sample MW19-181012-(7-9)
	10			0.2					
				0.2			Grades to trace silt.		
				0.5					
				0.9					
		S-3	3	1.0					Sample MW19-181012-(17-22)
	20								
				2.5					Sample MW19-181012-(22-27)
				2.3			Grades to trace to some silt, medium dense, moist.		
	30			3.4					
				3.5			Grades to no silt.		Sample MW19-181012-(31-33), MW19-181012-(31-33)-D
				2.9					
				2.6					
				3.9			Grades to trace silt.		
	40			3.4					
				3.7					
				4.4					Sample MW19-181012-(43-45)
				4.4					
		S-4	10	4.8					Sample MW19-181012-(47-49)
	50			5.6					
				5.3					
				5.1					
				4.6					
		S-5	10	3.0					
	60			3.9					Sample MW19-181012-(59-61)
				3.5					
				3.8					
				3.8					
		S-6	10	8.9		SP	**SAND** Brown to dark brown, fine to medium, medium dense, moist. Slight petroleum odor.		
	70			8.9					
				21.4					
				16.1					
				26.9			▼		Sample MW19-181012-(75-77)
				691		SPG	**SAND** Dark gray, fine to coarse with fine to coarse rounded gravel, trace cobbles. Strong petroleum odor.		
	80			1141					
						GWS	**GRAVEL** Layers of fine to coarse, trace cobbles, trace sand, wet. Strong petroleum odor.		
							Boring terminates at 87 feet bgs.		**Well Details** 2-inch 40 PVC well casing: 30 inches ags to 87 feet bgs Above ground monument: 30 inches ags Concrete: 0 to 2 feet bgs Bentonite grout: 2 feet to 68 feet bgs Bentonite chips: 68 feet to 70 feet bgs 10/20 Colorado silica sand: 70 feet to 87 feet bgs 0.01-slot PVC screen: 72 feet to 87 feet bgs
	90								
	100								
	110								

Notes: ags = above ground surface, bgs = below ground surface

Log of Boring MW-20

Sheet 1 of 3

Project: Tesoro - Pasco
Project Location: Pasco, WA
Project Number: 60626769

Date(s) Drilled	**11/24/2019 - 11/25/2019**	Logged By	**D. Hose**	Checked By	**J. Haney**
Drilling Method	**Sonic**	Borehole Diameter	**6 inch**	Total Depth of Borehole	**99.0 feet**
Drill Rig Type	**LS600**	Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**423.32 feet NGVD29**
Groundwater Level and Date Measured	**84 feet bgs**	Sampling Method(s)	**4-inch ID by 10' core barrel**	WA Dept of Ecology Well ID	**BMG 175**
Borehole Backfill	**Monitoring well**	Location	**325725.096 N 2012936.726 E NAD 83 (91)**		

Elevation, feet	Depth, feet	SAMPLES: Feet Driven	SAMPLES: Feet Recovered	SAMPLES: PID, ppm	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0						Cleared with air knife. Gravel surface conditions.		
420									
	5								
415									
	10			ND		SP	**SAND** Dark gray (5YR4/1), loose, moist, medium grained, poorly graded, subangular to subrounded. No structure, no odor, no sheen.		
410									
						SP-SM	**SAND with silt** Dark gray (5YR4/1), loose, moist, medium grained, poorly graded, subangular to subrounded.		
	15			ND					
						SP	**SAND** Dark gray (5YR4/1), loose, moist, medium grained, poorly graded, subangular to subrounded. No structure, no odor, no sheen.		
				ND					
405									
	20								
				2.0					
400									
							Grades to very dark gray (5YR3/1), fine grained.		
	25					SP	**SAND** Dark gray (5YR4/1), loose, moist, fine grained, rounded. No odor, no sheen.		
				2.5					
395									
	30								

Project: Tesoro - Pasco
Project Location: Pasco, WA
Project Number: 60626769

Log of Boring MW-20

Elevation, feet	Depth, feet	SAMPLES: Feet Driven	SAMPLES: Feet Recovered	SAMPLES: PID, ppm	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	30								
				11					
390									
				5					
	35								
				4			Occasional gravel to 1-inch diameter.		
						SM	**SILTY SAND** Dark gray (5YR4/1), firm, moist, very fine grained, friable.		
				2.5		SP	**SAND** Dark gray (5YR4/1), loose, moist, fine grained, rounded. No odor, no sheen.		
385									
				12		SM	**SILTY SAND** Dark gray (5YR4/1), firm, moist, very fine grained, rounded, friable.		
	40								
				8					
						SP	**SAND** Very dark gray (5YR3/1), loose, moist, fine grained, poorly graded, rounded, massive. No structure, no odor, no sheen.		
380									
				10					
	45								
				7					
				8		SM	**SILTY SAND** Very dark gray (5Y3/1), firm, moist, fine grained, rounded, friable. No odor, no sheen.		
375									
				5					
	50								
				6		SP	**SAND** Very dark gray (5YR3/1), loose, moist, fine grained, poorly graded, rounded, massive. No odor, no sheen.		
370									
				5					
	55								
				4					
365						SM	**SILTY SAND** Very dark gray (5YR3/1), firm, moist, fine grained, poorly graded, rounded, friable. No odor, no sheen.		
				5					
	60								
				2.3		SP	**SAND** Dark gray (5YR4/1), loose, moist, fine grained, poorly graded, massive. No odor, no sheen.		
				2.6					
360									
				18					
	65								

Elevation, feet	Depth, feet	SAMPLES: Feet Driven	SAMPLES: Feet Recovered	SAMPLES: PID, ppm	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	65			9.8					
				23		SM	**SILTY SAND** Very dark gray (5YR3/1), firm, moist, fine grained, poorly graded. No odor, no sheen.		
355									MW20-191125 (68-71)
	70			124					
				191					
						SP	**SAND** Dark gray (5YR4/1), loose, moist, fine grained, poorly graded, massive. No odor, no sheen.		
				10					
350									
	75			14					
				34					
345				41					
	80								
				19		SM	**SILTY SAND** Very dark gray (5YR3/1), firm, moist, fine grained, rounded. No odor, no sheen.		
340				7.1			▼		
	85					SP	**SAND** Black (5YR2.5/1), loose, moist, medium grained, poorly graded, subrounded to subangular, massive. Slight petroleum odor, no sheen.		
				62					MW20-191125 (86-90)
				240					
335				1400			Grades to strong petroleum odor.		Scarlet Red test - slight red positive
	90						Grades to coarse sand with occasional gravel with 1-inch diameter, wet. Strong petroleum odor.		
				1100					
						SW	**SAND with gravel** Very dark gray (5YR3/1), hard, wet, coarse sand, well graded, angular to subrounded, subrounded gravel with 1-inch diameter. Slight petroleum odor.		
				8.1					
330									**Well Details** 2-inch 40 PVC well casing: 0 to 2 feet bgs; Quik grout: 2 feet to 72 feet bgs; 3/8" bentonite chips: 72 feet to 77 feet bgs; Cemex #2/12 sand: 77 feet to 79 feet bgs; 0.01-slot PVC screen: 79 feet to 94 feet bgs
	95			3.5					
				20					
325				16					
							Soil boring terminated at 99 feet bgs.		
	100								

Notes: bgs = below ground surface

Date(s) Drilled	11/19/2019	Logged By	M. McCoog	Checked By	J. Haney
Drilling Method	Sonic	Borehole Diameter	6 inch	Total Depth of Borehole	93.0 feet
Drill Rig Type	LS600	Drilling Contractor	Cascade Drilling	Approximate Surface Elevation	423.43 feet NGVD29
Groundwater Level and Date Measured	82 feet bgs	Sampling Method(s)	4-inch ID by 10' core barrel	WA Dept of Ecology Well ID	BMG174
Borehole Backfill	Monitoring well	Location	325594.049 N 2013251.362 E NAD 83 (91)		

Elevation, feet	Depth, feet	SAMPLES: Feet Driven	SAMPLES: Feet Recovered	SAMPLES: PID, ppm	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	REMARKS
	0					Cleared with air knife. Sand surface conditions.	
420							
	5						
415		8	5.8	0.6	SP-SM	**SAND with SILT** Brown (7.5YR4/3), loose, dry, fine to medium, poorly sorted.	
					SP	**SAND** Brown (7.5YR4/3), loose, dry, fine to medium, poorly sorted. No staining, no odor.	
	10			0.4			
				0.5			
410							
				1.3			
	15						
		10	4.1	0.5	SW	**SAND** Brown (7.5YR4/3), loose, dry, fine to medium, well graded.	
405				1.4			
	20			2.4	SP	**SAND** Brown (7.5YR4/3) to dark brown (7.5YR4/2), loose, dry, fine to medium, poorly graded. Mostly medium sand.	
					SP-SM	**SAND with SILT** Brown (7.5YR4/3), dry, loose, fine to medium. Trace fine to coarse, subrounded to subangular gravel. No staining, no odor.	
400							
	25						
		10	4.5	7.0	SP	**SAND** Brown (7.5YR4/3), loose, dry, fine to medium. Mostly medium sand. No staining, no odor.	
395							
	30						

Elevation, feet	Depth, feet	Feet Driven	Feet Recovered	PID, ppm	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	30			6.7			Grades to medium dense, mostly fine sand with trace gravel.		
390									
	35								
		10	3.6	2.0		SW	**SAND** Brown (7.5YR4/3), medium dense, dry, fine to medium, well graded. Trace rounded gravel.		
				4.0					
385									
	40								
380									
				2.9					
	45								
		10	6.2	2.2		SP	**SAND** Brown (7.5YR4/3), medium dense, dry, fine to medium, moderately graded. Trace fine rounded gravel. No staining, no odor.		
375							Gravel increases in size and frequency with depth.		
	50								
				2.7					
				2.4					
370									
				0.7					
	55								
		10	6.2	2.4		SW	**SAND** Brown (7.5YR4/3), medium dense, dry, fine to medium, well graded. Trace fine rounded gravel in top 1-foot layer. No staining, no odor.		
365				3.4					
	60								
				1.1					
360									
				1.9					
	65								

Project: Tesoro - Pasco	**Log of Boring MW-21**
Project Location: Pasco, WA	Sheet 3 of 3
Project Number: 60626769	

Elevation, feet	Depth, feet	SAMPLES: Feet Driven	SAMPLES: Feet Recovered	SAMPLES: PID, ppm	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	REMARKS
	65						
		10	6.8	1.3	SP	**SAND** Brown (7.5YR4/3), medium dense, dry, fine to medium. No odor, no staining.	
355				0.4			
	70			0.6			Scarlet Red test - negative
350				1.1			
	75						
		10	6.8	1.0			
345							
	80				SP	**SAND** Brown (7.5YR4/3), medium dense, moist to wet, fine to medium with pockets of silty fine sand. No staining, no odor.	
				0.6	SW	**SAND with GRAVEL** Dark brown (7.5YR3/2), dense, wet, medium to coarse, poorly sorted with fine to coarse rounded to subrounded gravel. No staining, no odor.	
340				0.8			
	85			0.4			
		10	2.8	1.2	SW	**SAND with GRAVEL** Black (7.5YR2.5/1), dense, wet, medium to coarse, fine subrounded gravel. Trace silt. No staining, no odor.	
				1.0			**Well Details** 2-inch 40 PVC well casing: 0 to 2 feet bgs Quik grout: 2 feet to 70 feet bgs 3/8" bentonite chips: 70 feet to 75 feet bgs Cemex #2/12 sand: 75 feet to 77 feet bgs 0.01-slot PVC screen: 77 feet to 92 feet bgs
335					GW	**GRAVEL** Dark brown (7.5YR3/2) dense, wet, fine to coarse, rounded to subrounded with little medium to coarse sand.	
	90			1.5			
330						Boring terminated at 93 feet bgs.	
	95						
325							
	100						

Notes: bgs = below ground surface

Report: PORT_ENV_PID_WELL_LITHOLOGY; File: PASCO WA.GPJ; 9/3/2020 MW-21

Project: Tesoro - Pasco **Project Location: Pasco, WA** **Project Number: 60626769**	**Log of Boring MW-22** Sheet 1 of 3

Date(s) Drilled	**11/21/2019 - 11/22/2019**	Logged By	**M. McCoog**	Checked By	**J. Haney**
Drilling Method	**Sonic**	Borehole Diameter	**6 inch**	Total Depth of Borehole	**95.0 feet**
Drill Rig Type	**LS600**	Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**417.59 feet NGVD29**
Groundwater Level and Date Measured	**85 feet bgs**	Sampling Method(s)	**4-inch ID by 10' core barrel**	WA Dept of Ecology Well ID	**BMG176**
Borehole Backfill	**Monitoring well**	Location	**324772.561 N 2012662.284 E NAD 83 (91)**		

Elevation, feet	Depth, feet	SAMPLES: Feet Driven	SAMPLES: Feet Recovered	SAMPLES: PID, ppm	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0						Cleared with air knife. Sand surface conditions.		
415									
	5								
410		10	5.3			SP	**SAND** Brown (7.5YR5/3), loose, dry, fine to medium, moderately graded. Trace fine rounded gravel. No staining, no odor.		
				0.9					
	10								
405				0.5					
	15								
400		10	3.8	0.5		SP	**SAND** Brown (7.5YR4/3), loose, dry, fine to medium. Trace fine gravel to coarse sand, trace silt. Top 1 foot mostly medium sand.		
	20			0.8					
395							Layer of coarse, rounded gravel and cobbles within sand.		
	25			1.5					
390		10	4.0	2.4		SP	**SAND** Very dark brown (10YR2/2), loose, dry, fine to medium, poorly sorted, subangular to subrounded. Trace coarse sand. No staining, no odor.		
	30								

Elevation, feet	Depth, feet	SAMPLES Feet Driven	Feet Recovered	PID, ppm	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	30								
385									
				0.8		SP	**SAND** Dary grayish-brown (10YR4/2), loose, dry, fine, well sorted. No staining, no odor.		
	35								
				0.5					
380		10	4.6	2.9		SP	**SAND** Dark grayish-brown (10YR4/2), loose, dry, fine to medium. Trace fine rounded gravel.		
	40						Fines downward with trace coarse rounded gravel.		
375				2.4					
	45								
				1.9					
370		10	6.4	2.6		SP	**SAND** Dark grayish-brown (10YR4/2), loose, dry, fine to medium, well sorted. Trace coarse sand, trace fine to coarse subrounded to subangular gravel. No staining, no odor.		
	50								
365									
				4.4					
	55						1 foot layer of coarse rounded to subrounded gravel.		
				3.0					
360		10	7.6	7.0		SP	**SAND** Dark grayish-brown (10YR4/2), loose to medium dense, dry, fine to medium. Trace silt, trace fine rounded gravel. No staining, no odor.		
				1.7					
	60						Grades to less gravel and more uniform with depth.		
				4.4					
355									
				1.5					
				1.9					
	65								

Elevation, feet	Depth, feet	Feet Driven	Feet Recovered	PID, ppm	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	REMARKS
	65						
				1.5			
350		10	7.8	1.8	SP	**SAND** Dark grayish-brown (10YR4/2), medium dense, dry, fine, well sorted. Trace to little silt. No staining, no odor.	
	70			4.0			
				6.4			
345				6.7			
					SP	**SAND** Dark grayish-brown (10YR4/2), medium dense to loose, moist to dry, fine to medium, well sorted.	
	75			15.8	SP	**SAND** Very dark gray (10YR3/1), moist, fine to medium, well sorted. Strong odor, some soil staining.	MW22-191121-(75-77) Scarlet Red test - negative
340				0.4	SP	**SAND** Dark grayish-brown (10YR4/2), medium dense, moist, fine to medium, well sorted.	
	80			0.8			
335				0.8			
					SW	**SAND** Very dark gray (10YR3/1), medium dense, wet, poorly sorted with pockets of black medium to coarse sand. Staining and odor.	
	85			6.8	SP	**SAND** Very dark grayish brown (10YR3/2), medium dense, wet, fine, well sorted. Slight odor.	
				0.6	SP	**GRAVELLY SAND** Black (10YR2/1), medium dense, saturated, medium to coarse, subrounded. Odor.	
330		10	6.2	1.1	SP	**SAND** Very dark gray (10YR3/1), wet, fine, little silt with one rounded cobble.	
				0.6			
	90				SP	**SAND** Black (10YR2/1), dense, wet, medium to coarse with rounded to subrounded gravel. No strong odor.	**Well Details** 2-inch 40 PVC well casing: 0 to 2 feet bgs Quik grout: 2 feet to 75 feet bgs 3/8" bentonite chips: 75 feet to 77 feet bgs Cemex #2/12 sand: 77 feet to 79 feet bgs 0.01-slot PVC screen: 79 feet to 94 feet bgs
				0.6			
325							
				2.1	GP	**COBBLES and GRAVEL** Dense, wet, coarse, rounded to subrounded, little sand.	
	95					Boring terminated at 95 feet bgs.	
320							
	100						

Notes: bgs = below ground surface

Project: Tesoro - Pasco Project Location: Pasco, WA Project Number: 60626769	**Log of Boring MW-23** Sheet 1 of 3

Date(s) Drilled	**11/23/2019 - 11/24/2019**	Logged By	**M. McCoog**	Checked By	**J. Haney**
Drilling Method	**Sonic**	Borehole Diameter	**6 inch**	Total Depth of Borehole	**90.0 feet**
Drill Rig Type	**LS600**	Drilling Contractor	**Cascade Drilling**	Approximate Surface Elevation	**422.03 feet NGVD29**
Groundwater Level and Date Measured	**85 feet bgs**	Sampling Method(s)	**4-inch ID by 10' core barrel**	WA Dept of Ecology Well ID	**BMG173**
Borehole Backfill	**Monitoring well**	Location	**324916.047 N 2012515.709 E NAD 83 (91)**		

Elevation, feet	Depth, feet	SAMPLES Feet Driven	SAMPLES Feet Recovered	SAMPLES PID, ppm	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0						Cleared with air knife. Gravel surface conditions.		
420									
	5								
		10	3.8			SP	**SAND** Brown (10YR4/3), loose, dry, fine to medium, well sorted. One rounded cobble. No staining, no odor.		
415									
				1.1					
							Fines and lightens with depth.		
	10								
				0.5					
410									
	15								
				2.3					
		10	4.5				Trace gravel.		
405									
				1.2					
	20								
400						SP	**SAND** Grayish-brown (10YR5/2), loose, dry, fine. Trace silt.		
				2.0					
						SP	**SAND** Dark grayish brown (10YR4/2), loose, dry, fine to medium, well sorted. No staining, no odor.		
	25								
				1.1					
		10	4.7						
395									
				1.6					
	30								

Project: Tesoro - Pasco
Project Location: Pasco, WA
Project Number: 60626769

Log of Boring MW-23

Elevation, feet	Depth, feet	Samples: Feet Driven	Samples: Feet Recovered	Samples: PID, ppm	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	30								
390						BOULDER	Cobble.		
				2.0		SP	**SAND** Brown (10YR4/3), loose, dry, fine to medium, well sorted. Trace silt. No staining, no odor.		
	35								
385		10	5.5	0.6		SP	**SAND** Dark brown (10YR3/3), loose, dry, fine to medium, well sorted. Trace rounded gravel. No staining, no odor.		
				1.1					
	40			3.5					
380									
				4.2					
	45								
375		10	8.3	0.6		SP	**SAND** Brown (10YR5/3), loose, dry, fine to medium, well sorted. Trace silt. No staining, no odor.		
				0.4					
	50			0.1					
370				1.3					
				1.2					
	55								
365		10	8.8	10.6		SP	**SAND** Brown (10YR4/3), medium dense to loose, dry, fine, well sorted, with medium sand. No staining, no odor.		
				7.1					
	60						1/2-foot layer of compacted fine sand.		
360				0.8		SP	**SAND** Brown (10YR4/3), loose, dry, medium, well sorted. No odor.		
	65			4.2					

Project: Tesoro - Pasco
Project Location: Pasco, WA
Project Number: 60626769

Log of Boring MW-23

Elevation, feet	Depth, feet	SAMPLES: Feet Driven	SAMPLES: Feet Recovered	SAMPLES: PID, ppm	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	65			7.6			Fines downward.		
355		10	8.0	6.1		SP	**SAND** Brown (10YR4/3), medium dense, dry, fine to medium. Trace silt. No staining, no odor.		
				8.0					
	70			9.4					
350				9.9					
				10.1					
	75			11.7					
345		10	8.4			SP	**SAND** Brown (10YR5/3), medium dense, dry, fine. Trace silt. No odor.		
	80			10.5					MW23-191124-(80-82) Scarlet Red test - negative
340				12.8					
				20.5					
	85			17.7		SP	**SAND** Brown (10YR4/3), loose to medium dense, moist to wet, medium, well sorted with fine sand. No staining, no odor.		
						SW	**SAND** Very dark grayish-brown (10YR3/2), loose, wet, fine to medium, poorly sorted. No odor.		
335		10	7.0	11.3		SW	**SAND** Dary grayish-brown (10YR3/2), loose, wet, fnie to medium, poorly sorted. Trace silt. No staining, no odor.		
				2.8					
	90			3.0					**Well Details** 2-inch 40 PVC well casing: 0 to 2 feet bgs Quik grout: 2 feet to 76 feet bgs 3/8" bentonite chips: 76 feet to 78 feet bgs Cemex #2/12 sand: 78 feet to 80 feet bgs 0.01-slot PVC screen: 80 feet to 95 feet bgs
330				3.2					
	95					GP	**GRAVEL with COBBLES** Dense, wet, coarse, rounded to subrounded, little coarse sand. Trace silt. No odor.		
325							Boring terminated at 96 feet bgs.		
	100								

Notes: bgs = below ground surface

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Geotechnical & Hydrogeological Consultants

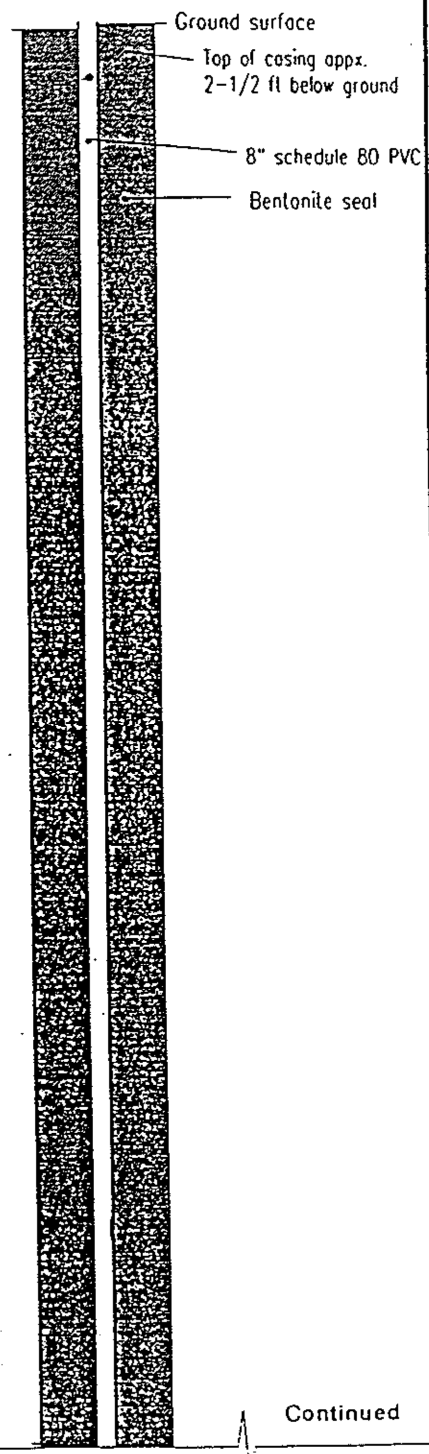
WELL NUMBER RW-1 PAGE 1 OF 2
PROJECT NAME Chevron Terminal W.O. W-5359-1
DATE BEGUN 21 Dec 88 DATE COMPLETED 4 Jan 89

SOIL OR ROCK DESCRIPTION

DRILLED BY: STACO
DRILLING METHOD: Air Rotary
REFERENCE ELEVATION: SURFACE
TOP OF CASING ELEVATION: 90.87

SOIL OR ROCK DESCRIPTION	SOIL SAMPLES	SAMPLE INTERVAL	LABORATORY/CGI	DEPTH (IN FEET)	BLOW COUNT	WATER LEVEL
Very dense, brown and gray-brown, cobbley, gravelly SAND (fill)						
Medium brown, fine to medium SAND; trace to some coarse sand (fill)	S-1					
Medium to dark brown, gravelly, fine to coarse SAND						
grading gray and brown	S-2			10		
	S-3					
	S-4			20		
	S-5					
grading gray, coarser						
Gravel lense	S-6			30		
	S-7					
	S-8			40		
Brown-gray and gray, fine to coarse SAND; harder drilling						
grading finer	S-9					
	S-10			50		
	S-11					

AS-BUILT



Continued

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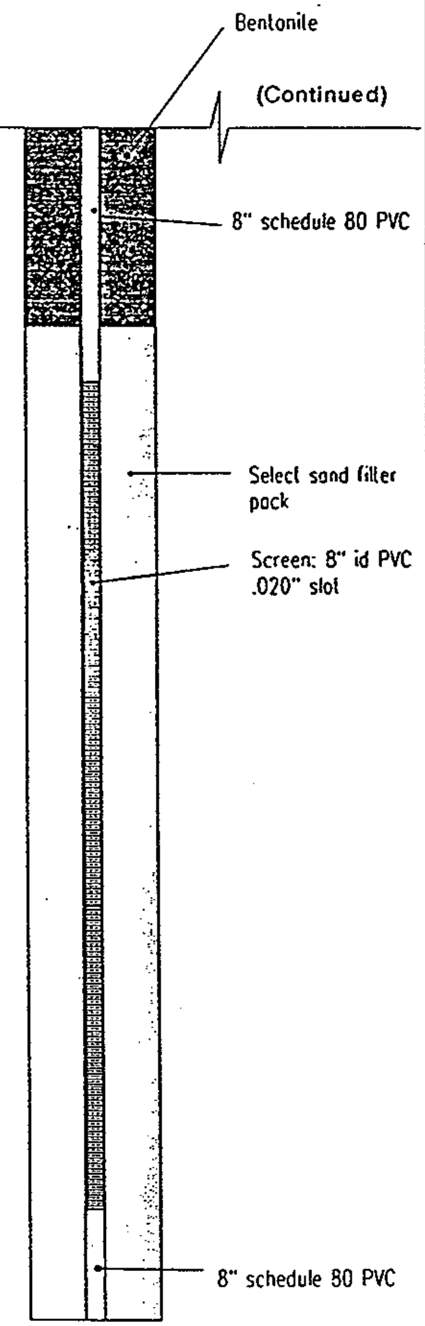
WELL NUMBER RW-1 PAGE 2 OF 2
PROJECT NAME Chevron Terminal W.O. W-5359-1
DATE BEGUN 21 Dec 89 DATE COMPLETED 4 Jan 89

SOIL OR ROCK DESCRIPTION

DRILLED BY: STACO
DRILLING METHOD: Air Rotary
REFERENCE ELEVATION: SURFACE
TOP OF CASING ELEVATION: 90.87

SOIL OR ROCK DESCRIPTION	SOIL SAMPLES	SAMPLE INTERVAL	LABORATORY/CGI	DEPTH (IN FEET)	BLOW COUNT	WATER LEVEL
Brown and gray, Fine to coarse SAND; harder drilling (continued)	S-11					
	S-12			60		
	S-13					
	S-14			70		
	S-15					▽
Gray, gravelly SAND; harder drilling	S-16			80		
Gray-black, tan, red GRAVEL; very hard drilling, cobbles	S-17					
	S-18			90		
Gray-black, tan, red, finer GRAVEL; appx. 3/8" to 2" dia.	S-19					
	S-20			100		
Gray-black, tan, red GRAVEL; very hard drilling; cobbles, boulders	S-21					
Bottom of borehole at 105 ft.						

AS-BUILT



Project: Tesoro Pasco
Project Location: Pasco, WA
Project Number: 60569792

Log of Boring/Well VE-1

Date(s) Drilled	**9/6/2018**	Logged By	**Michaela McCoog**	Checked By	**Jeremy Haney**
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**4 1/4-inch**	Total Depth of Borehole	**25.0 feet**
Drill Rig Type	**Track Mounted**	Drilling Contractor	**Environmental West**	Approximate Surface Elevation	**Not available**
Groundwater Level	**Not applicable**	Sampling Method(s)	**Not applicable**	Hammer Data	**140 lb hammer; 30" drop**
Borehole Backfill	**Vapor extraction well**	Location	**See location figure**		

Elevation, feet	Depth, feet	SAMPLES Type Number	SAMPLES Recovery, inches	SAMPLES PID, ppm	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0					SP	**SAND** Brown, fine to medium. No samples taken. Adjacent to MW-17: reference MW-17 boring log.		
	10								
	20								
	30								**Well Details** 2-inch 40 PVC well casing: 3 feet ags to 25 feet bgs Above ground monument: 3 feet ags Concrete: 0 to 3 feet bgs Bentonite grout: 3 feet to 10 feet bgs Bentonite chips: 10 feet to 13 feet bgs 10/20 Colorado silica sand: 13 feet to 25 feet bgs 0.01-slot PVC screen: 15 feet to 25 feet bgs
	40								
	50								
	60								
	70								
	80								
	90								
	100								
	110								

Notes: ags = above ground surface, bgs = below ground surface

Project: Tesoro Pasco **Project Location: Pasco, WA** **Project Number: 60569792**	# Log of Boring/Well VE-2 Sheet 1 of 1

Date(s) Drilled	**9/7/2018**	Logged By	**Michaela McCoog**	Checked By	**Jeremy Haney**
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**4 1/4-inch**	Total Depth of Borehole	**40.0 feet**
Drill Rig Type	**Track Mounted**	Drilling Contractor	**Environmental West**	Approximate Surface Elevation	**Not available**
Groundwater Level	**Not applicable**	Sampling Method(s)	**Not applicable**	Hammer Data	**140 lb hammer; 30" drop**
Borehole Backfill	**Vapor extraction well**	Location	**See location figure**		

Elevation, feet	Depth, feet	SAMPLES: Type Number	SAMPLES: Recovery, inches	SAMPLES: PID, ppm	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0						Air-knifed to 5 feet bgs. No samples taken. Adjacent to MW-17: reference MW-17 boring log.		
	5					SP	**SAND** Brown, fine to medium.		
	10								
	20								
	30								
	40						Boring terminated at 40 feet bgs.		**Well Details** 2-inch 40 PVC well casing: 3 feet ags to 40 feet bgs Above ground monument: 3 feet ags Concrete: 0 to 3 feet bgs Bentonite grout: 3 feet to 25 feet bgs Bentonite chips: 25 feet to 28 feet bgs 10/20 Colorado silica sand: 28 feet to 40 feet bgs 0.01-slot PVC screen: 30 feet to 40 feet bgs
	50								
	60								
	70								
	80								
	90								
	100								
	110								

Notes: ags = above ground surface, bgs = below ground surface

Project: Tesoro Pasco
Project Location: Pasco, WA
Project Number: 60569792

Log of Boring/Well VE-3

Date(s) Drilled	**9/8/2018**	Logged By	**Michaela McCoog**	Checked By	**Jeremy Haney**
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**4 1/4-inch**	Total Depth of Borehole	**40.0 feet**
Drill Rig Type	**Track Mounted**	Drilling Contractor	**Environmental West**	Approximate Surface Elevation	**Not available**
Groundwater Level	**Not applicable**	Sampling Method(s)	**Hand Auger/Split Spoon**	Hammer Data	**140 lb hammer; 30" drop**
Borehole Backfill	**Vapor extraction well**	Location	**See location figure**		

Elevation, feet	Depth, feet	SAMPLES Type Number	Recovery, inches	PID, ppm	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0						**SAND and GRAVEL** at surface. Air-knifed to 5 feet bgs.		
	10	S-1	14	6.3		SP	**SAND** Brown, fine to medium, dry, loose. No odor [3-5-5]		Sample VE3-180908-(10-11.5)
	20	S-2	16	0.2			Grades to moist. No odor. [2-3-5]		Sample VE3-180908-(20-21.5)
	30	S-3	17	0.3			Grades to medium dense. No odor. [3-7-8]		Sample VE3-180908-(30-31.5)
	40	S-4	18	0			[7-8-6] Boring terminated at 40 feet bgs.		Sample VE3-180908-(40-41.5)
	50								
	60								
	70								
	80								
	90								
	100								
	110								

Well Details
2-inch 40 PVC well casing: 3 feet ags to 40 feet bgs
Above ground monument: 3 feet ags
Concrete: 0 to 3 feet bgs
Bentonite grout: 3 feet to 25 feet bgs
Bentonite chips: 25 feet to 28 feet bgs
10/20 Colorado silica sand: 28 feet to 40 feet bgs
0.01-slot PVC screen: 30 feet to 40 feet bgs

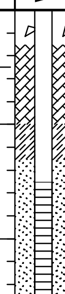
Notes: ags = above ground surface, bgs = below ground surface

Project: Tesoro Pasco			
Project Location: Pasco, WA			
Project Number: 60569792			

Log of Boring/Well VE-4

Date(s) Drilled	**9/8/2018**	Logged By	**Michaela McCoog**	Checked By	**Jeremy Haney**
Drilling Method	**Hollow Stem Auger**	Drill Bit Size/Type	**4 1/4-inch**	Total Depth of Borehole	**25.0 feet**
Drill Rig Type	**Track Mounted**	Drilling Contractor	**Environmental West**	Approximate Surface Elevation	**Not available**
Groundwater Level	**Not applicable**	Sampling Method(s)	**Hand Auger/Split Spoon**	Hammer Data	**140 lb hammer; 30" drop**
Borehole Backfill	**Vapor extraction well**	Location	**See location figure**		

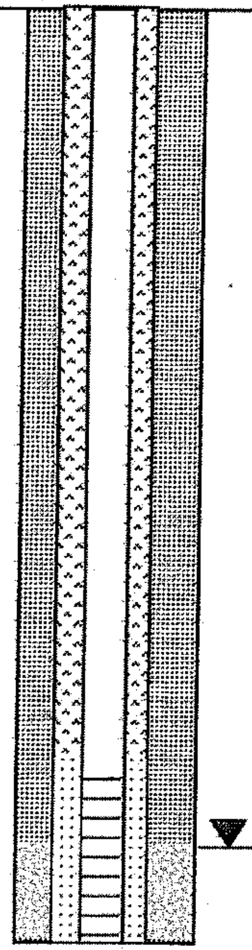
Elevation, feet	Depth, feet	SAMPLES: Type Number	SAMPLES: Recovery, inches	SAMPLES: PID, ppm	Graphic Log	Lithologic Log (USCS Code)	MATERIAL DESCRIPTION	Well Graphic	REMARKS
	0						**SAND and GRAVEL** at surface. Air-knifed to 5 feet bgs.		
		S-1	6	0.5		SP	**SAND** Brown, fine to medium, moist, loose.		Sample VE4-180908-(5-5.5)
	10								
	20								
	25						Boring terminated at 25 feet bgs.		
	30								**Well Details** 2-inch 40 PVC well casing: 3 feet ags to 25 feet bgs Above ground monument: 3 feet ags Concrete: 0 to 3 feet bgs Bentonite grout: 3 feet to 10 feet bgs Bentonite chips: 10 feet to 13 feet bgs 10/20 Colorado silica sand: 13 feet to 25 feet bgs 0.01-slot PVC screen: 15 feet to 25 feet bgs
	40								
	50								
	60								
	70								
	80								
	90								
	100								
	110								



Notes: ags = above ground surface, bgs = below ground surface

Logged by: David Samples R.G. Subcontractor: Environmental West Exploration (drillers)	Started: 8/10/00 Finished: 8/10/00 Equipment: Air Rotary Rig	Surface Elevation: 425.65′ ASL Top of Casing Elevation: 423.57′ Monitoring Device: GasTech Model 201

Monitoring Well AR-11 2″ OD, 20 screen slot, 10-20 Colorado sand, bentonite chips.	SHEEN	HEAD SPACE (ppm)	DEPTH In Feet	LITHOLOGIC DESCRIPTION and USCS symbol	SAMPLE INTERVAL	LAB RESULTS	BLOW COUNT
			5				
			10				
			15				
	NS	20	20	Predominantly gray fine to medium size loose sand, slightly moist. No staining or odors. SP	20′	TPG-Gx - ND	10-23-21
			25				
			30				
			35				
			40				
			45				
	NS	40	50	Predominantly gray fine to medium size loose sand, slightly moist. No staining or odors. SP	50′	TPG-Gx - ND	15-20-24
			55				
			60				
			65				
			70				
			75				
	NS	60	80	At approx 80 feet medium to coarse gray sand, rounded pebbles, and rock fragments, wet. No staining or odors. GP	80′	TPG-Gx - ND	33-50/5
			85				
			90			AR-11-GW 8/14/00 TPH-Gx - ND TPH-Dx = ND B - ND E - ND T - ND X - ND	
Screen set from 73 to 88 feet.			95				
			100				



Blank Casing

Screened Casing

Sand

Gravel

Bentonite Seal

Groundwater Level

Static Water Level

NS - No Sheen
SS - Slight Sheen
MS - Moderate Sheen
HS - Heavy Sheen

NA - Not Analyzed
ND - None Detected
ppm - Parts Per Million
ppb - Parts Per Billion

TCM NORTHWEST, INC 2092 NW Aloclek Drive, # 510 Hillsboro, OR 97124	Tidewater Pipeline Release Sacajawea Road Pasco, WA	**Monitoring Well AR-11**

WELL SUMMARY SHEET

Page 1 of 1

Date: 3-7-01

Well ID: NA		Well Name: MW-5	
Location: Chevron Pipeline Co., Pasco		Project: Tidewater Remediation	
Prepared By: L.D. Walker	Date: 3-7-01	Reviewed By:	Date:
Signature: LD Walker		Signature:	

CONSTRUCTION DATA

Description

Borehole was 6"-dia.

2"-ID sch 40 PVC tubing: 0.4' → 74.5'

3/8" Bentonite ~~pellets~~ crumbles (hydrated): 0.5' → 72.0'

10-20 mesh Silica Sand: 72.0' → 89.0'

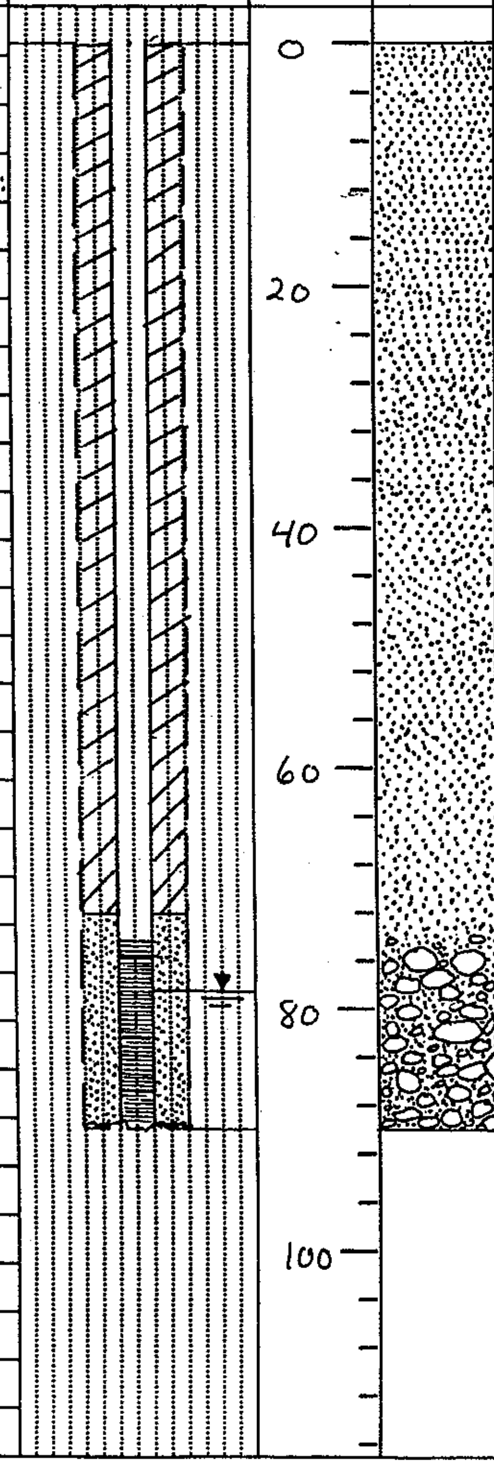
0.020-in slot 2"-ID sch. 40 PVC Screen: 74.5' → 89.5'

03/19/01 Tag bottom @ 89.2

All temporary casing removed from ground

All depths in feet below ground surface

Diagram / **Depth in Feet** / **Graphic Log**



GEOLOGIC/HYDROLOGIC DATA

Lithologic Description

0' → 75': SAND

75' → 90': Sandy GRAVEL

TD = 90'

Water level: 78.90' bgs (3-7-01)

Appendix D

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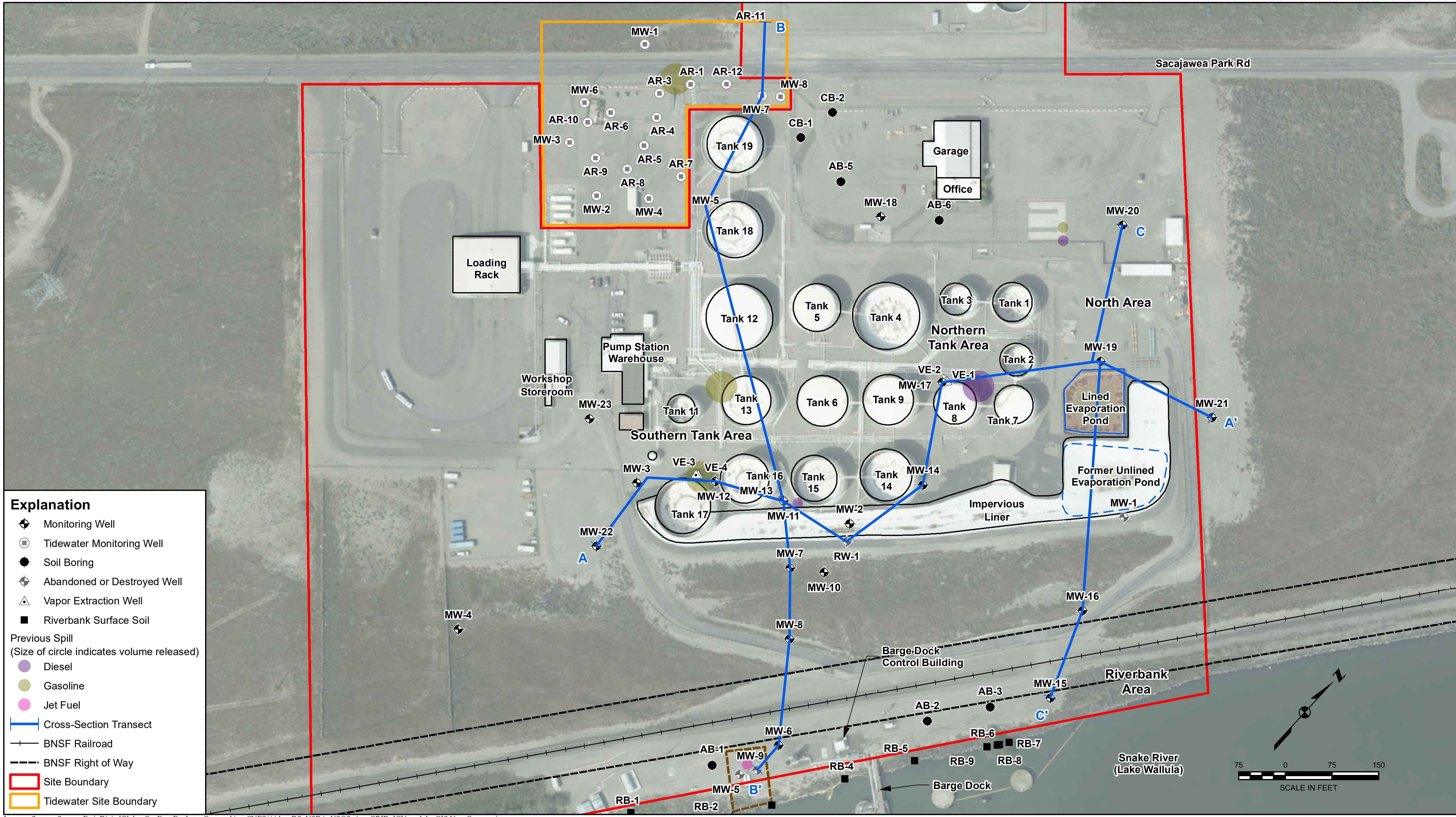
Appendix E

Additional Figures with Sample Analytical Data



Imagery Source: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

K:\Tesoro_Pasco\MXD\RI\Fig D1 Cross-Section Location Map.mxd

AECOM

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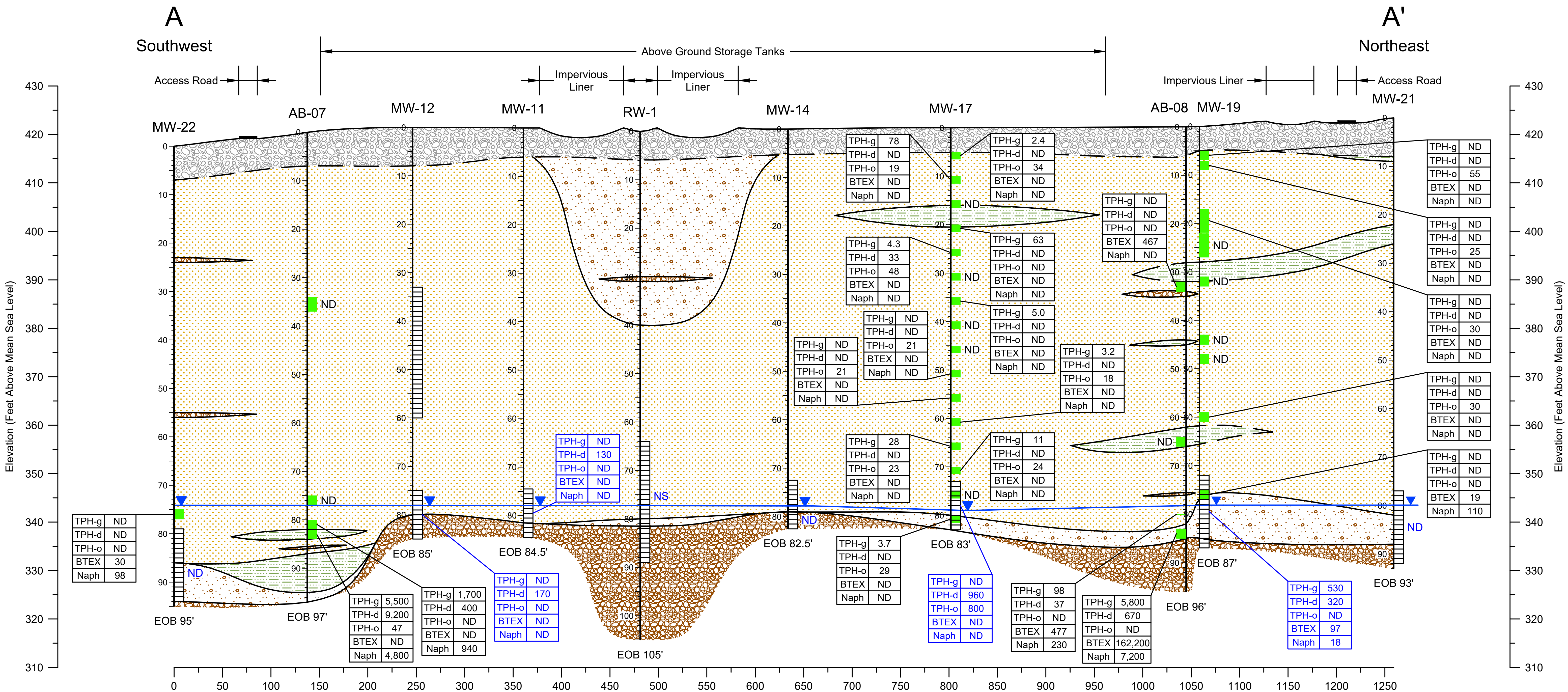
CROSS-SECTION LOCATION MAP

TESORO LOGISTICS OPERATIONS, LLC
TESORO PASCO BULK FUEL TERMINAL
PASCO, WASHINGTON

FIGURE E1



Borehole Legend

Boring Designation — MW-16

Depth (Feet Below Ground Surface)

— Soil Sample Interval
ND = No Detections

— Groundwater Level
December 2019

— Well Screen
ND = No Detections
NS = Not Sampled

End of Boring — EOB 30'

Main Stratigraphic Units

- Surface Sand and Gravel - Fill
- Sandy Silt
- Sandy Silt with Gravel
- Silty Sand
- Sand
- Gravelly Sand
- Gravel or Sandy Gravel

Depositional Environments

- Anthropogenic
- Hanford Formation:
  - Low Energy - Slack-Water, Back Flooded Areas
  - Transitional Between Slack-Water Areas and Flood Channels
  - In or Adjacent to Cataclysmic Flood Channels

Analytical Notes:

1. Groundwater Samples Collected in December 2019.
2. Groundwater Results Reported in Micrograms per Liter (µg/L).
3. Soil Results Reported in Milligrams per Kilogram (mg/kg).
4. TPH-g = Total Petroleum Hydrocarbon - Gasoline Range.
5. TPH-d = Total Petroleum Hydrocarbon - Diesel Range.
6. TPH-o = Total Petroleum Hydrocarbon - Motor Oil Range.
7. BTEX = Combined Benzene, Toluene, Ethylbenzene and Total Xylenes.
8. Naph = Naphthalene.
9. ND = Analyte Not Detected Above Method Detection Limit.

CROSS SECTION A - A'

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PASCO, WASHINGTON

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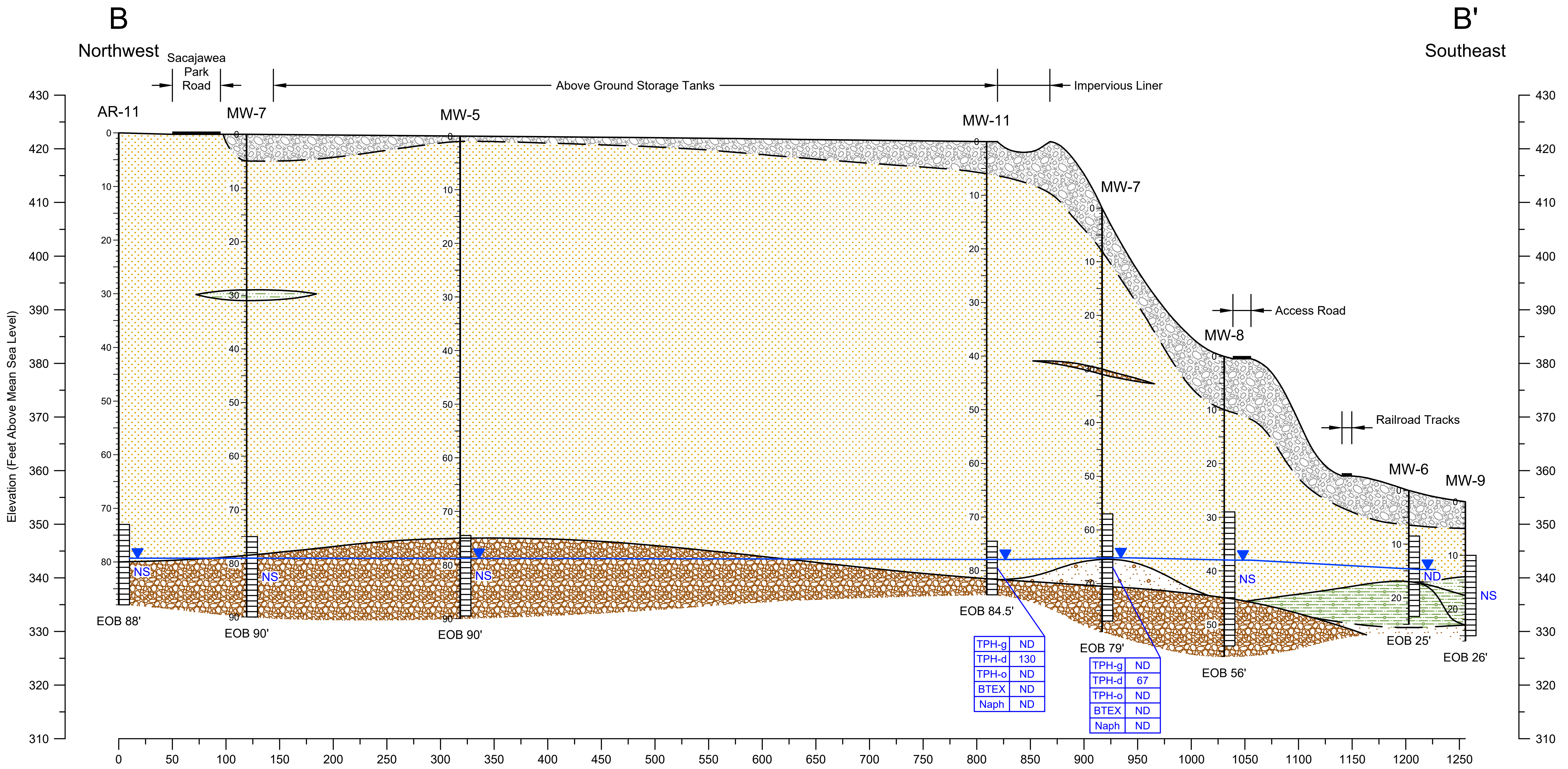
FIGURE E2



Borehole Legend

Boring Designation — MW-16

Depth (Feet Below Ground Surface): 0, 10, 20, 30

— Soil Sample Interval
ND = No Detections

— Groundwater Level
December 2019

— Well Screen
ND = No Detections
NS = Not Sampled

End of Boring — EOB 30'

Main Stratigraphic Units	Depositional Environments
Surface Sand and Gravel - Fill	Anthropogenic
Sandy Silt	Hanford Formation: Low Energy - Slack-Water, Back Flooded Areas
Sandy Silt with Gravel	Hanford Formation: Low Energy - Slack-Water, Back Flooded Areas
Silty Sand	Hanford Formation: Low Energy - Slack-Water, Back Flooded Areas
Sand	Transitional Between Slack-Water Areas and Flood Channels
Gravelly Sand	In or Adjacent to Cataclysmic Flood Channels
Gravel or Sandy Gravel	In or Adjacent to Cataclysmic Flood Channels

Analytical Notes:

1. Groundwater Samples Collected in December 2019.
2. Groundwater Results Reported in Micrograms per Liter (µg/L).
3. Soil Results Reported in Milligrams per Kilogram (mg/kg).
4. TPH-g = Total Petroleum Hydrocarbon - Gasoline Range.
5. TPH-d = Total Petroleum Hydrocarbon - Diesel Range.
6. TPH-o = Total Petroleum Hydrocarbon - Motor Oil Range.
7. BTEX = Combined Benzene, Toluene, Ethylbenzene and Total Xylenes.
8. Naph = Naphthalene.
9. ND = Analyte Not Detected Above Method Detection Limit.

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CROSS SECTION B - B'

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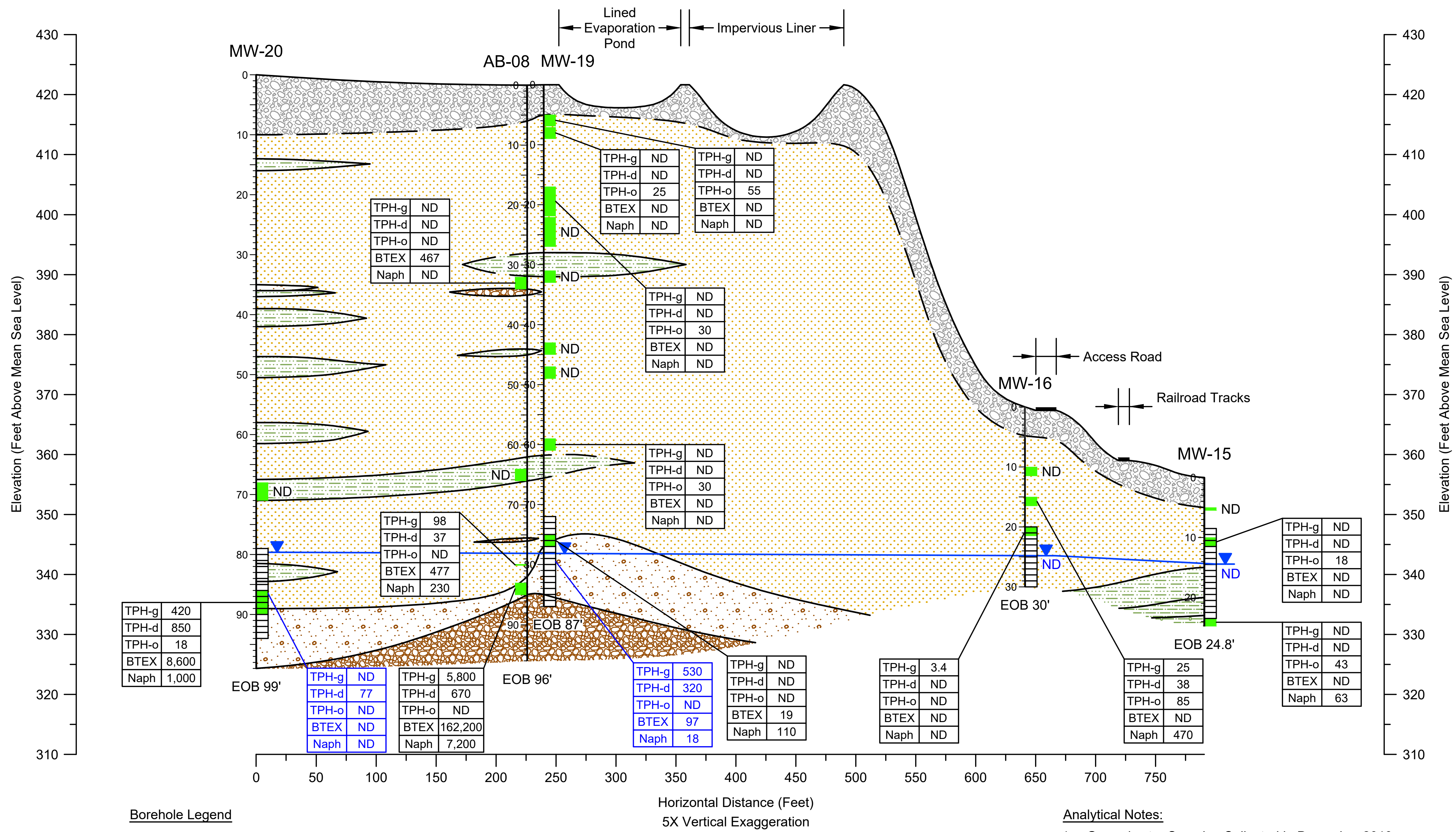
FIGURE E3



Borehole Legend

Boring Designation — MW-16

Soil Sample Interval
ND = No Detections

Depth (Feet Below Ground Surface)

Groundwater Level December 2019

Well Screen
ND = No Detections
NS = Not Sampled

End of Boring — EOB 30'

Main Stratigraphic Units

- Surface Sand and Gravel - Fill
- Sandy Silt
- Sandy Silt with Gravel
- Silty Sand
- Sand
- Gravelly Sand
- Gravel or Sandy Gravel

Depositional Environments

- Anthropogenic

Hanford Formation:

- Low Energy - Slack-Water, Back Flooded Areas
- Transitional Between Slack-Water Areas and Flood Channels
- In or Adjacent to Cataclysmic Flood Channels

Analytical Notes:

1. Groundwater Samples Collected in December 2019.
2. Groundwater Results Reported in Micrograms per Liter (µg/L).
3. Soil Results Reported in Milligrams per Kilogram (mg/kg).
4. TPH-g = Total Petroleum Hydrocarbon - Gasoline Range.
5. TPH-d = Total Petroleum Hydrocarbon - Diesel Range.
6. TPH-o = Total Petroleum Hydrocarbon - Motor Oil Range.
7. BTEX = Combined Benzene, Toluene, Ethylbenzene and Total Xylenes.
8. Naph = Naphthalene.
9. ND = Analyte Not Detected Above Method Detection Limit.

CROSS SECTION C - C'

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FIGURE E4

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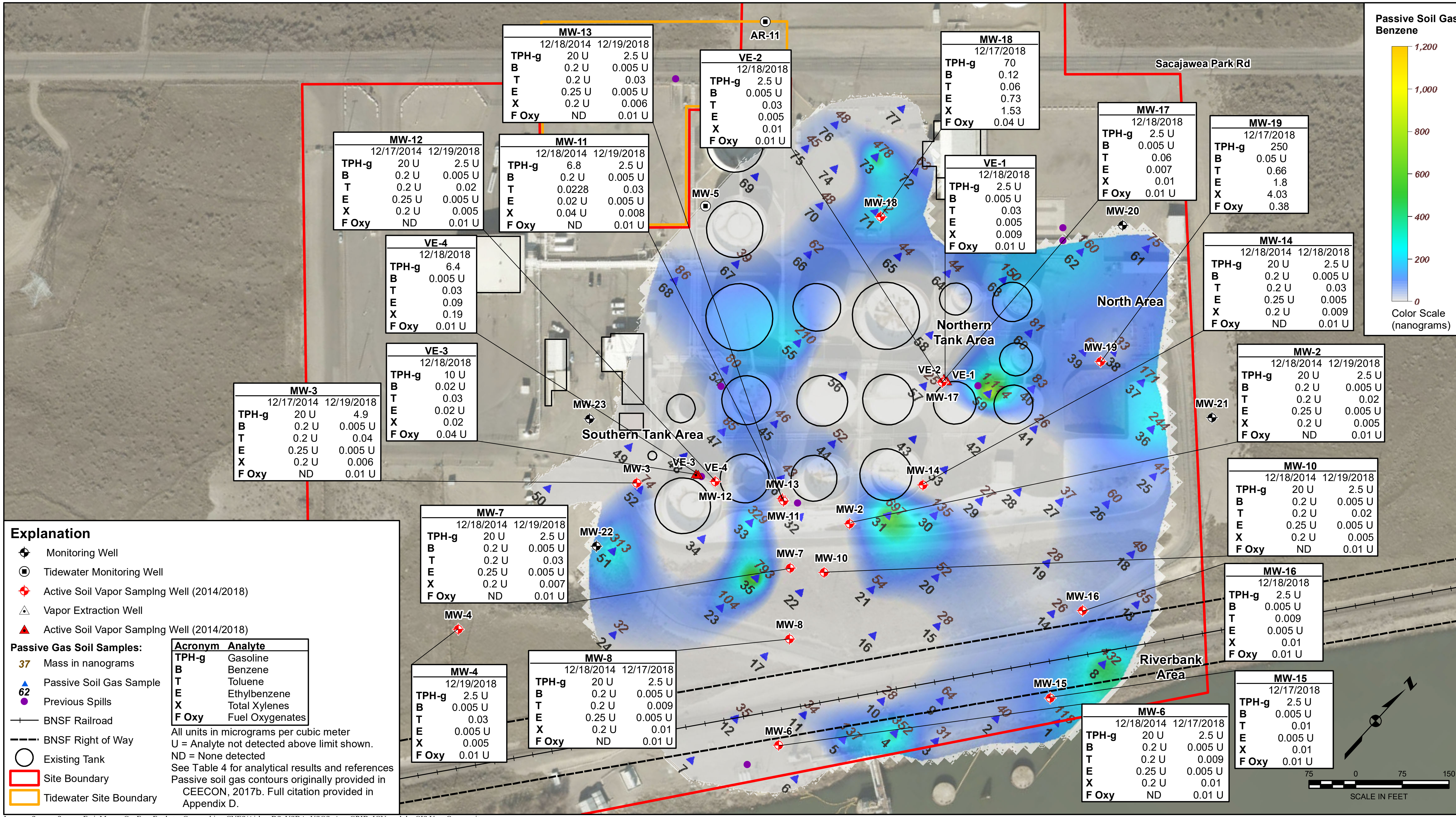

Imagery Source: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

PASSIVE SOIL GAS DISTRIBUTION AND ACTIVE SOIL VAPOR SAMPLING – BENZENE

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PASCO, WASHINGTON

AECOM

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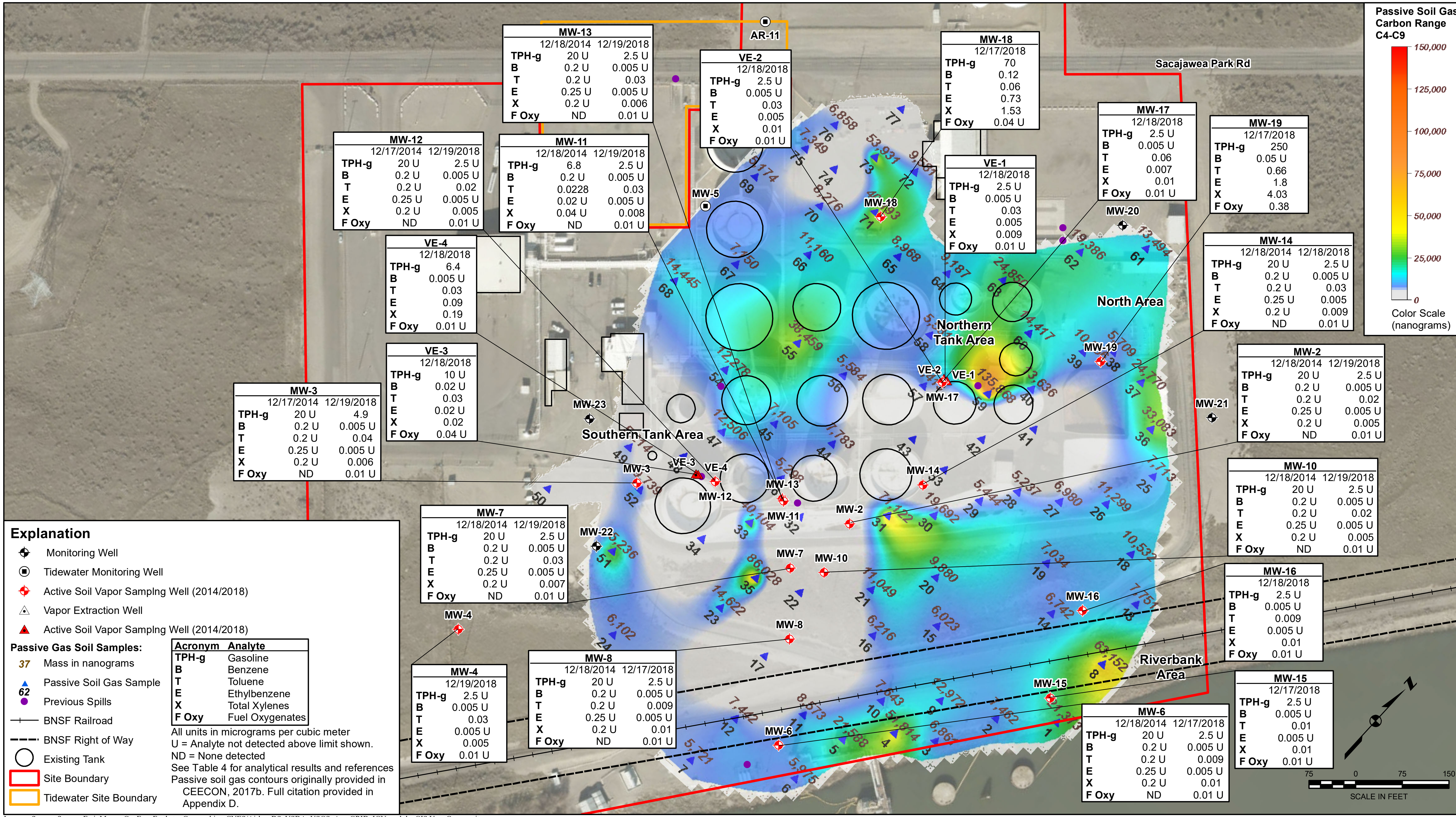
FIGURE E5

K:\Tesoro_Pasco\MXD\RI\Fig E5 Passive Soil Gas Distribution and Active Soil Vapor Sampling - Benzene.mxd



Imagery Source: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

K:\Tesoro_Pasco\MXD\RI\Fig E6 Passive Soil Gas Distribution and Active Soil Vapor Sampling - Carbon Range C4-C9.mxd

PASSIVE SOIL GAS DISTRIBUTION AND ACTIVE SOIL VAPOR SAMPLING – PETROLEUM HYDROCARBON RANGE C4-C9

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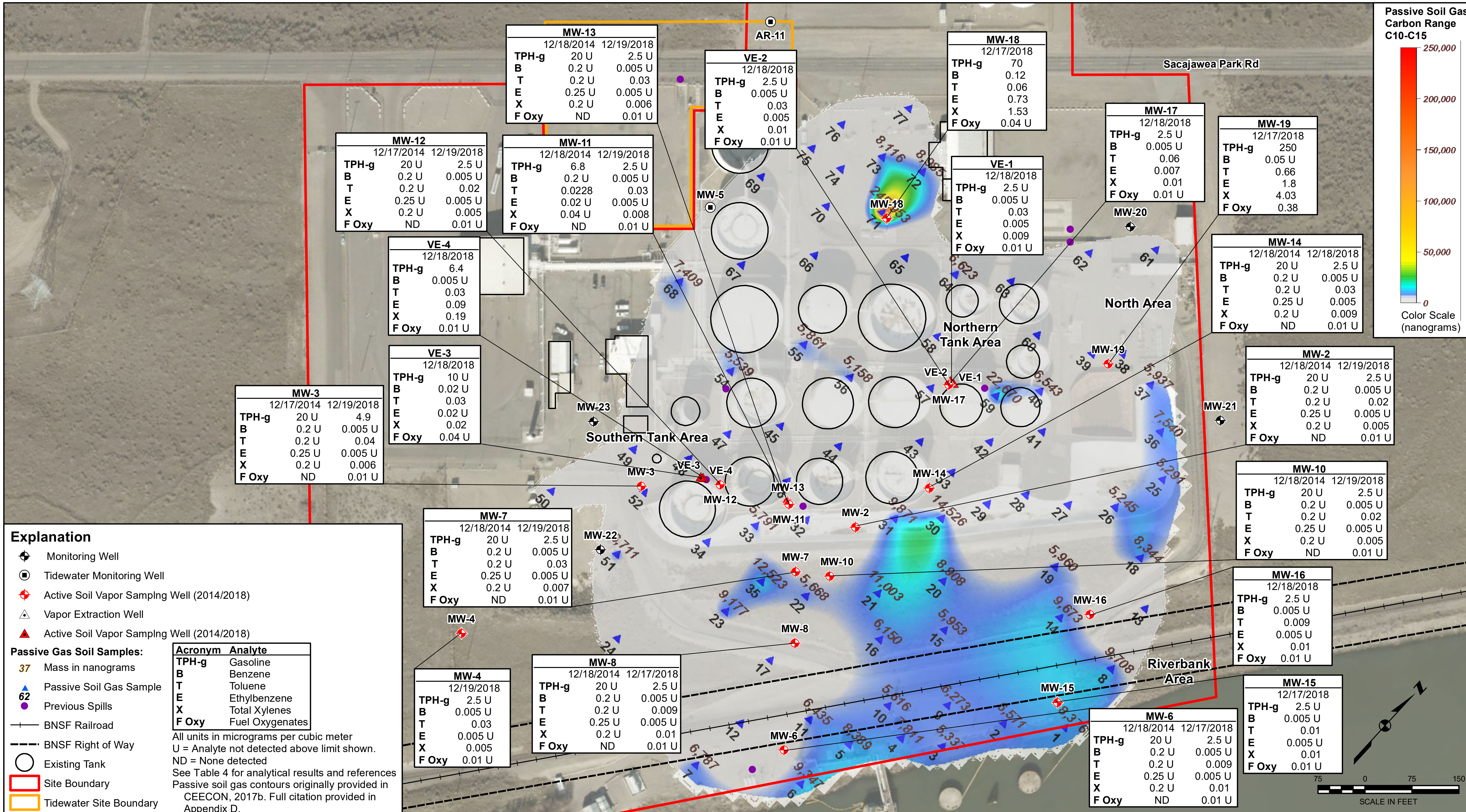
PASCO, WASHINGTON

FIGURE E6



Imagery Source: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

PASSIVE SOIL GAS DISTRIBUTION AND ACTIVE SOIL VAPOR SAMPLING – PETROLEUM HYDROCARBON RANGE C10-C15

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PASCO, WASHINGTON

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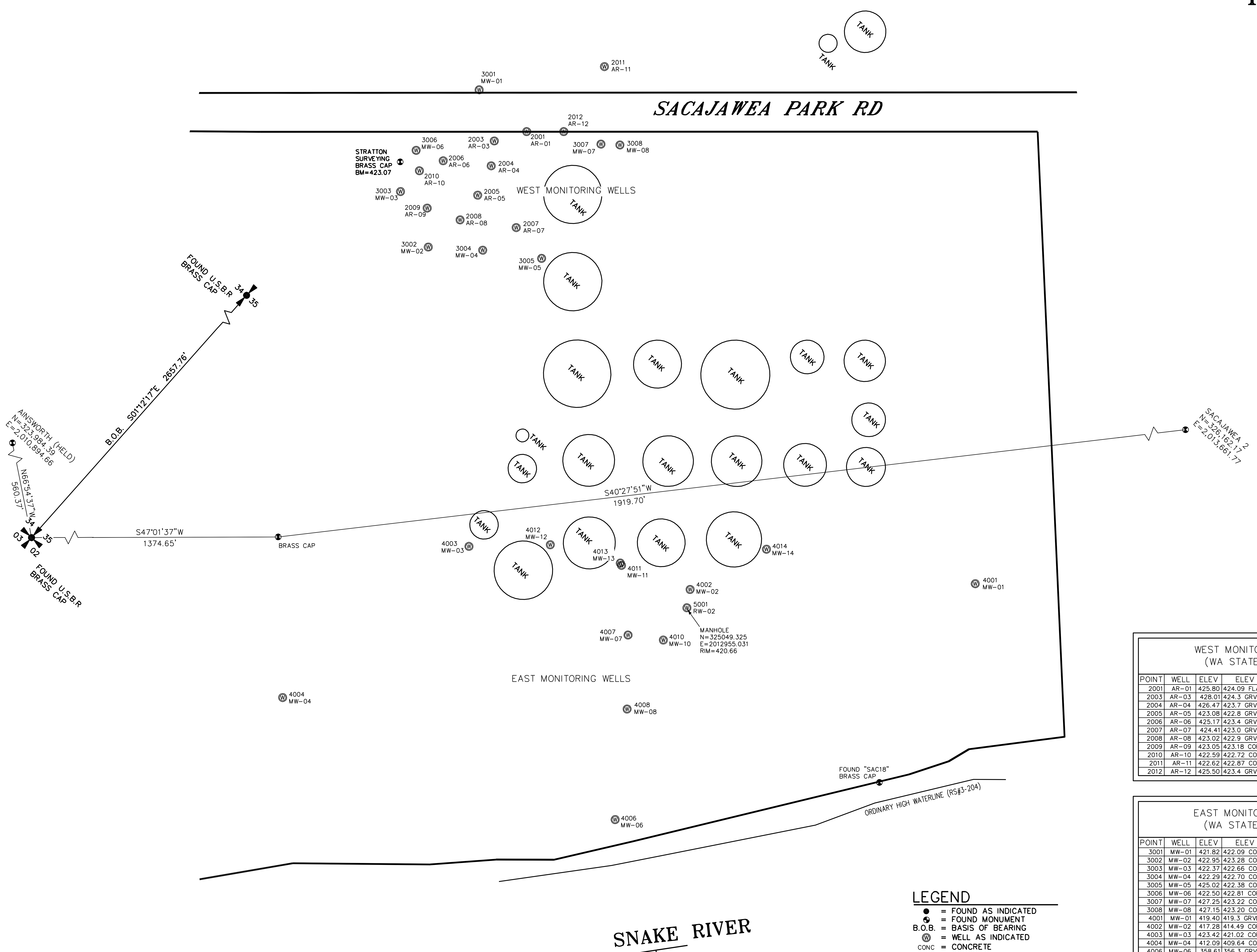
FIGURE E7

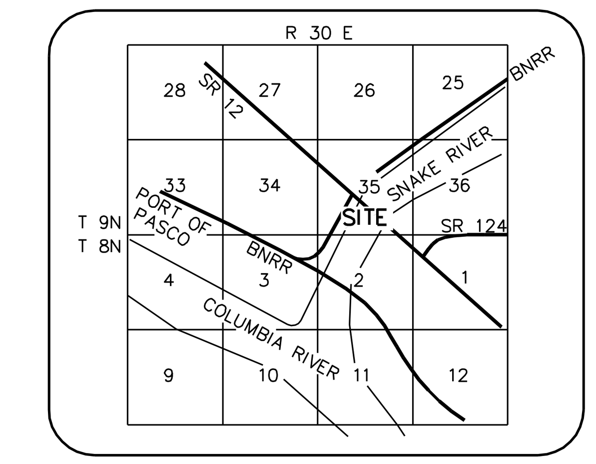
K:\Tesoro_Pasco\MXD\RI\Fig E7 Passive Soil Gas Distribution and Active Soil Vapor Sampling - Carbon Range C10-C15.mxd

Appendix F
Survey Reports

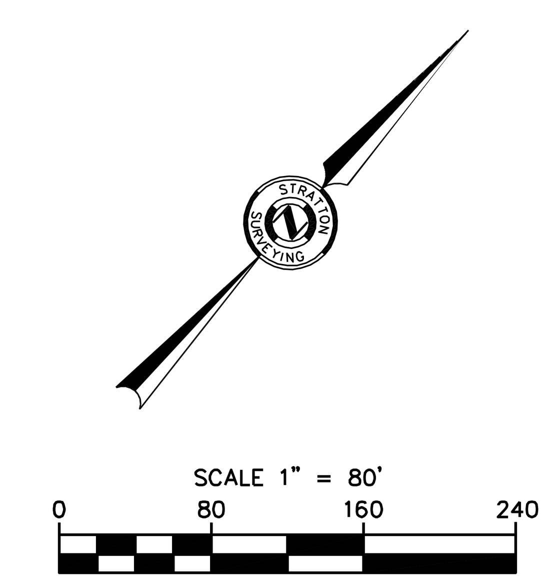
TOPOGRAPHIC SURVEY
MONITORING WELLS

S.W. 1/4 OF SEC. 35, T.9N., R.30E., W.M.
CITY OF PASCO
FRANKLIN COUNTY, WASHINGTON





VICINITY SKETCH
NOT TO SCALE



SCALE 1" = 80'
0 80 160 240

BASIS OF BEARING
WA STATE GRID: SOUTH ZONE
RS#3-204

SURVEY DATUM
VERTICAL: NGVD 29
BM SHOWN HEREON
HORIZONTAL: NAD 83 (91)
GROUND DISTANCES SHOWN HEREON

EQUIPMENT USED
A THREE-SECOND TOTAL STATION
TOPCON RTK GPS

LEGEND

●	= FOUND AS INDICATED
◐	= FOUND MONUMENT
B.O.B.	= BASIS OF BEARING
Ⓦ	= WELL AS INDICATED
CONC	= CONCRETE
GRVL	= GRAVEL
MW	= MONITORING WELL
RW	= RECOVERY WELL
AR	= ACTIVE RECOVERY

WEST MONITORING WELL COORDINATES
(WA STATE PLANE FEET GROUND)

POINT	WELL	ELEV	ELEV	NORTHING	EASTING	LATITUDE	LONGITUDE
2001	AR-01	425.80	424.09 FLANGE	325422.21	2012272.12	46°12'58.42"	-119°1'51.31"
2003	AR-03	428.01	424.3 GRVL	325377.56	2012245.24	46°12'57.99"	-119°1'51.71"
2004	AR-04	426.47	423.7 GRVL	325346.11	2012267.84	46°12'57.67"	-119°1'51.39"
2005	AR-05	423.08	422.8 GRVL	325298.64	2012283.32	46°12'57.20"	-119°1'51.19"
2006	AR-06	425.17	423.4 GRVL	325301.42	2012208.08	46°12'57.24"	-119°1'52.26"
2007	AR-07	424.41	423.0 GRVL	325302.37	2012361.03	46°12'57.22"	-119°1'50.08"
2008	AR-08	423.02	422.9 GRVL	325252.13	2012289.28	46°12'56.74"	-119°1'51.11"
2009	AR-09	423.05	423.18 CONC	325230.96	2012239.63	46°12'56.54"	-119°1'51.83"
2010	AR-10	422.59	422.72 CONC	325265.14	2012191.62	46°12'56.89"	-119°1'52.50"
2011	AR-11	422.62	422.87 CONC	325577.52	2012292.09	46°12'59.95"	-119°1'50.99"
2012	AR-12	425.50	423.4 GRVL	325461.16	2012314.20	46°12'58.80"	-119°1'50.70"

EAST MONITORING WELL COORDINATES
(WA STATE PLANE FEET GROUND)

POINT	WELL	ELEV	ELEV	NORTHING	EASTING	LATITUDE	LONGITUDE
3001	MW-01	421.82	422.09 CONC	325419.68	2012174.31	46°12'58.41"	-119°1'52.70"
3002	MW-02	422.95	423.28 CONC	325187.91	2012281.78	46°12'56.11"	-119°1'51.24"
3003	MW-03	422.37	422.66 CONC	325221.69	2012192.03	46°12'56.46"	-119°1'52.50"
3004	MW-04	422.29	422.70 CONC	325241.53	2012346.83	46°12'56.62"	-119°1'50.30"
3005	MW-05	425.02	422.38 CONC	325294.11	2012422.17	46°12'57.13"	-119°1'49.21"
3006	MW-06	422.50	422.81 CONC	325284.83	2012166.48	46°12'57.09"	-119°1'52.85"
3007	MW-07	427.25	423.22 CONC	325485.95	2012369.50	46°12'59.03"	-119°1'49.91"
3008	MW-08	427.15	423.20 CONC	325504.88	2012391.90	46°12'59.22"	-119°1'49.59"
4001	MW-01	419.40	419.3 GRVL	325380.52	2013255.52	46°12'57.83"	-119°1'37.34"
4002	MW-02	417.28	414.49 CONC	325074.59	2012938.19	46°12'54.87"	-119°1'41.93"
4003	MW-03	423.42	421.02 CONC	324891.22	2012642.18	46°12'53.11"	-119°1'46.19"
4004	MW-04	412.09	409.64 CONC	324524.21	2012589.67	46°12'49.50"	-119°1'47.04"
4006	MW-06	358.61	356.3 GRVL	324734.95	2013094.86	46°12'51.49"	-119°1'39.80"
4007	MW-07	411.40	408.94 CONC	324957.76	2012915.65	46°12'53.72"	-119°1'42.29"
4008	MW-08	383.91	381.3 GRVL	324872.85	2012992.28	46°12'52.87"	-119°1'41.22"
4010	MW-10	407.91	404.97 CONC	324989.14	2012960.95	46°12'54.02"	-119°1'41.63"
4011	MW-11	423.48	421.34 CONC	325029.83	2012835.10	46°12'54.45"	-119°1'43.41"
4012	MW-12	423.65	421.48 CONC	324978.49	2012732.74	46°12'53.96"	-119°1'44.88"
4013	MW-13	424.07	421.94 CONC	325031.26	2012831.28	46°12'54.46"	-119°1'43.47"
4014	MW-14	421.97	421.11 CONC	325200.39	2012982.56	46°12'56.10"	-119°1'41.27"
5001	RW-01	417.29	NOT USED	325050.49	2012953.80	46°12'54.63"	-119°1'41.72"

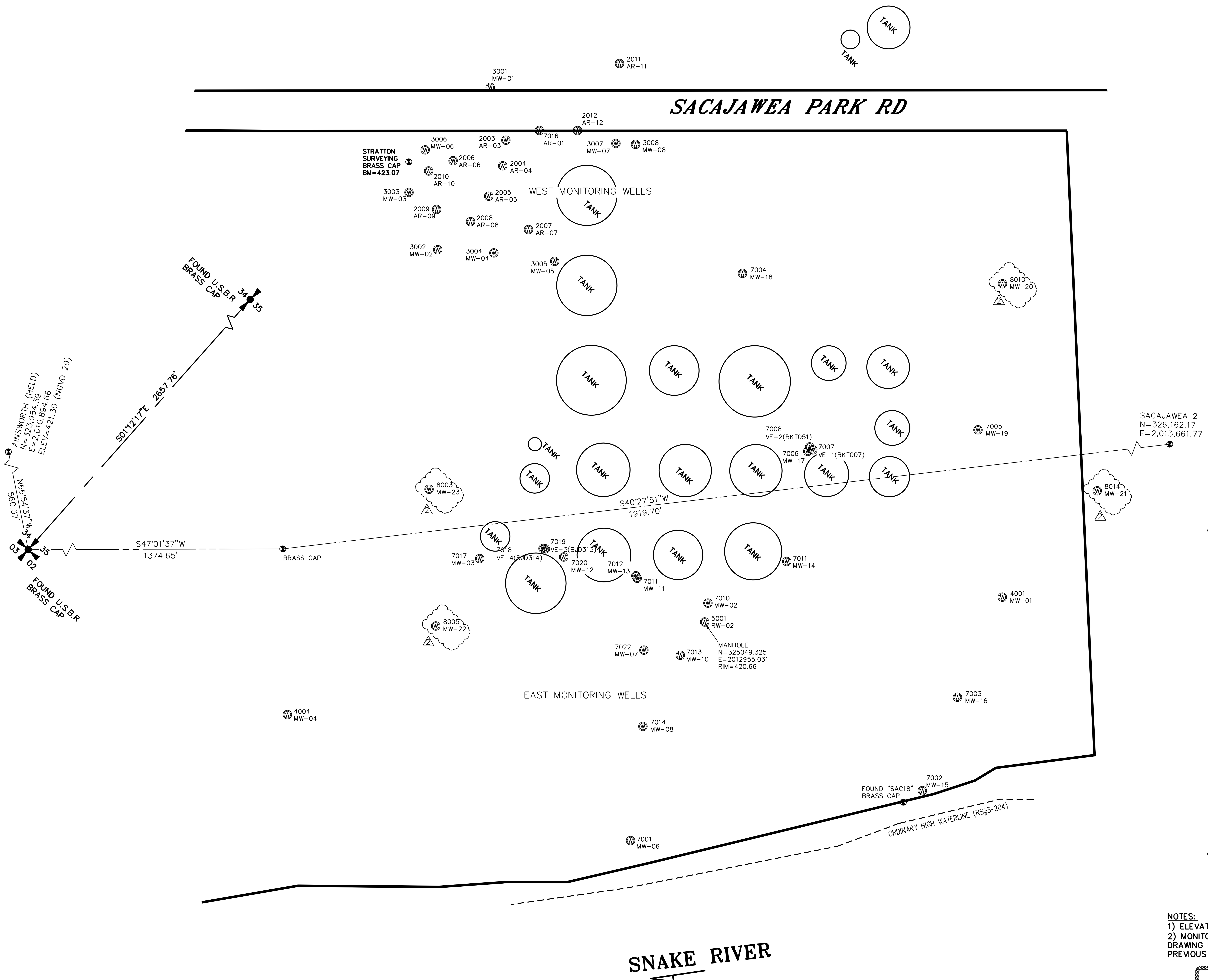
TOPOGRAPHIC SURVEY FOR
URS

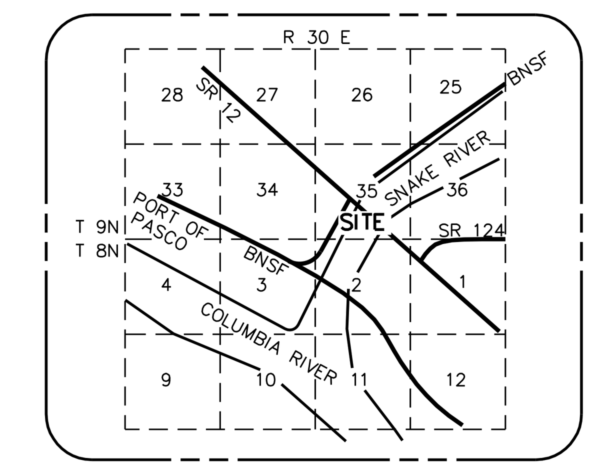
STRATTON SURVEYING & MAPPING, PC
7525 W. DESCHUTES PL. UNIT 1C
KENNEWICK, WA 99336
(509) 735-7364
FAX: (509) 735-6560
stratton@strattonsurvey.com

1247WS1.DWG	
DATE: 07/12/10	SHT. 1 OF 1
DRAWN BY: DCI	JOB # 1247

WORK SHEET
MONITORING WELLS

S.W. 1/4 OF SEC. 35, T.9N., R.30E., W.M.
CITY OF PASCO
FRANKLIN COUNTY, WASHINGTON





VICINITY SKETCH
NOT TO SCALE

POINT TABLE				
POINT NO.	DESCRIPTION	ELEVATION	NORTHING	EASTING
7000	AR-03.PIPE	423.80	325422.435	2012271.901
7001	MW.6	358.52	324734.994	2013094.558
7002	MW.15	358.50	325086.624	2013364.511
7003	MW.16	370.92	325224.955	2013308.089
7004	MW.18	423.69	325471.936	2012640.728
7005	MW.19	424.20	325539.662	2013058.631
7006	MW.17	424.28	325342.855	2012893.522
7007	VE.-1(BKT007)	424.15	325349.604	2012897.489
7008	VE.-2(BKT051)	423.25	325349.623	2012891.050
7009	MH.14	421.84	325200.637	2012982.336
7010	MW.2	417.23	325074.904	2012937.736
7011	MW.11	423.44	325029.784	2012834.914
7012	MW.13	424.05	325031.365	2012831.127
7013	MW.10	407.83	324989.314	2012960.533
7014	MW.8	383.76	324873.003	2012992.060
7016	AR.1	423.99	325422.735	2012271.718
7017	MW.3	423.40	324891.488	2012641.745
7018	VE.4(BJD314)	423.64	324966.751	2012701.465
7019	VE.3(BJD313)	423.70	324968.768	2012704.531
7020	MW.12	423.62	324978.468	2012732.605
7021	MW.4	412.05	324524.487	2012589.193
7022	MW.7	411.32	324957.838	2012915.419
8003	MW.23	421.74	324916.047	2012515.709
8005	MW.22	420.45	324772.561	2012662.284
8010	MW.20	426.52	325725.096	2012936.726
8014	MW.21	426.16	325594.049	2013251.362

SCALE 1" = 80'
0 80 160 240

BASIS OF BEARING
WA STATE GRID: SOUTH ZONE

SURVEY DATUM
VERTICAL: NGVD 29
BM SHOWN HEREON
HORIZONTAL: NAD 83 (91)
GROUND DISTANCES & COORDINATES SHOWN HEREON

EQUIPMENT USED
SPECTRA RTK GPS

LEGEND

- ● = FOUND AS INDICATED
- = FOUND MONUMENT
- Ⓦ = WELL AS INDICATED
- MW = MONITORING WELL
- VE = VAPOR EXTRACTION WELL
- AR = ACTIVE RECOVERY

NOTES:
1) ELEVATION WERE TAKEN ON THE INSIDE CASE OF THE WELLS.
2) MONITORING WELLS, VE WELLS AND AR WELLS DEPICTED ON THE DRAWING BUT NOT SHOWN IN THE POINT CHART ABOVE ARE FROM PREVIOUS SURVEY DATA GATHERED IN SEPTEMBER OF 2010 FOR URS.

HORIZONTAL CONTROL

WASHINGTON STATE SOUTH ZONE, US SURVEY FEET, NAD 83(91). PER GPS TIES WERE MADE TO AINSWORTH AND SACAJAWEA 2 NGS CONTROL POINTS AND PROJECTED TO GROUND AT AINSWORTH

GROUND DISTANCES ARE SHOWN HEREON.

PRELIMINARY FOR REVIEW

1 UPDATED DATA ON MW 18.
2 NEW MONITORING WELL DATA GATHERED ON DECEMBER 10, 2019.

WORK SHEET FOR
AECOM

STRATTON SURVEYING & MAPPING, PC
313 NORTH MORAIN STREET
KENNEWICK, WA 99336
(509) 735-7364
FAX: (509) 735-6560
stratton@strattonsurvey.com

1247WS15D.DWG	© 2020
DATE: 01/14/2020	SHT. 1 OF 1
DRAWN BY: DCI/AAD	JOB # 1247

Appendix G
Terrestrial Ecological Evaluation Form

DEPARTMENT OF ECOLOGY
State of Washington

Voluntary Cleanup Program

Washington State Department of Ecology
Toxics Cleanup Program

TERRESTRIAL ECOLOGICAL EVALUATION FORM

Under the Model Toxics Control Act (MTCA), a terrestrial ecological evaluation is necessary if hazardous substances are released into the soils at a Site. In the event of such a release, you must take one of the following three actions as part of your investigation and cleanup of the Site:

1. Document an exclusion from further evaluation using the criteria in WAC 173-340-7491.
2. Conduct a simplified evaluation as set forth in WAC 173-340-7492.
3. Conduct a site-specific evaluation as set forth in WAC 173-340-7493.

When requesting a written opinion under the Voluntary Cleanup Program (VCP), you must complete this form and submit it to the Department of Ecology (Ecology). The form documents the type and results of your evaluation.

Completion of this form is not sufficient to document your evaluation. You still need to document your analysis and the basis for your conclusion in your cleanup plan or report.

If you have questions about how to conduct a terrestrial ecological evaluation, please contact the Ecology site manager assigned to your Site. For additional guidance, please refer to https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Terrestrial-ecological-evaluation.

Step 1: IDENTIFY HAZARDOUS WASTE SITE	
Please identify below the hazardous waste site for which you are documenting an evaluation.	
Facility/Site Name: Tesoro Pasco Bulk Fuel Terminal	
Facility/Site Address: 2900 Sacajawea Park Road, Pasco, Washington	
Facility/Site No: 55763995	VCP Project No.: 4867

Step 2: IDENTIFY EVALUATOR		
Please identify below the person who conducted the evaluation and their contact information.		
Name: Heather Patterson		Title: Risk Assessor
Organization: AECOM		
Mailing address: 111 SW Columbia, Suite 1500		
City: Portland	State: OR	Zip code: 97201
Phone: 916-690-2115	Fax: 503-222-4292	E-mail: heather.patterson@aecom.com

Step 3: DOCUMENT EVALUATION TYPE AND RESULTS

A. Exclusion from further evaluation.

1. Does the Site qualify for an exclusion from further evaluation?

☐ Yes — *If you answered **"YES,"** then answer **Question 2**.*

☒ No or Unknown — *If you answered **"NO" or "UNKNOWN,"** then skip to **Step 3B** of this form.*

2. What is the basis for the exclusion? *Check all that apply. Then skip to **Step 4** of this form.*

Point of Compliance: WAC 173-340-7491(1)(a)

☐ All soil contamination is, or will be,* at least 15 feet below the surface.

☐ All soil contamination is, or will be,* at least 6 feet below the surface (or alternative depth if approved by Ecology), and institutional controls are used to manage remaining contamination.

Barriers to Exposure: WAC 173-340-7491(1)(b)

☐ All contaminated soil, is or will be,* covered by physical barriers (such as buildings or paved roads) that prevent exposure to plants and wildlife, and institutional controls are used to manage remaining contamination.

Undeveloped Land: WAC 173-340-7491(1)(c)

☐ There is less than 0.25 acres of contiguous# undeveloped± land on or within 500 feet of any area of the Site and any of the following chemicals is present: chlorinated dioxins or furans, PCB mixtures, DDT, DDE, DDD, aldrin, chlordane, dieldrin, endosulfan, endrin, heptachlor, heptachlor epoxide, benzene hexachloride, toxaphene, hexachlorobenzene, pentachlorophenol, or pentachlorobenzene.

☐ For sites not containing any of the chemicals mentioned above, there is less than 1.5 acres of contiguous# undeveloped± land on or within 500 feet of any area of the Site.

Background Concentrations: WAC 173-340-7491(1)(d)

☐ Concentrations of hazardous substances in soil do not exceed natural background levels as described in WAC 173-340-200 and 173-340-709.

* An exclusion based on future land use must have a completion date for future development that is acceptable to Ecology.

± "Undeveloped land" is land that is not covered by building, roads, paved areas, or other barriers that would prevent wildlife from feeding on plants, earthworms, insects, or other food in or on the soil.

\# "Contiguous" undeveloped land is an area of undeveloped land that is not divided into smaller areas of highways, extensive paving, or similar structures that are likely to reduce the potential use of the overall area by wildlife.

B. Simplified evaluation.

1. Does the Site qualify for a simplified evaluation?

☒ Yes *If you answered **"YES,"** then answer **Question 2** below.*

☐ No or Unknown *If you answered **"NO"** or **"UNKNOWN,"** then skip to **Step 3C** of this form.*

2. Did you conduct a simplified evaluation?

☒ Yes *If you answered **"YES,"** then answer **Question 3** below.*

☐ No *If you answered **"NO,"** then skip to **Step 3C** of this form.*

3. Was further evaluation necessary?

☐ Yes *If you answered **"YES,"** then answer **Question 4** below.*

☒ No *If you answered **"NO,"** then answer **Question 5** below.*

4. If further evaluation was necessary, what did you do?

☐ Used the concentrations listed in Table 749-2 as cleanup levels. *If so, then skip to **Step 4** of this form.*

☐ Conducted a site-specific evaluation. *If so, then skip to **Step 3C** of this form.*

5. If no further evaluation was necessary, what was the reason? *Check all that apply. Then skip to **Step 4** of this form.*

Exposure Analysis: WAC 173-340-7492(2)(a)

☐ Area of soil contamination at the Site is not more than 350 square feet.

☐ Current or planned land use makes wildlife exposure unlikely. Used Table 749-1.

Pathway Analysis: WAC 173-340-7492(2)(b)

☒ No potential exposure pathways from soil contamination to ecological receptors.

Contaminant Analysis: WAC 173-340-7492(2)(c)

☒ No contaminant listed in Table 749-2 is, or will be, present in the upper 15 feet at concentrations that exceed the values listed in Table 749-2.

☐ No contaminant listed in Table 749-2 is, or will be, present in the upper 6 feet (or alternative depth if approved by Ecology) at concentrations that exceed the values listed in Table 749-2, and institutional controls are used to manage remaining contamination.

☐ No contaminant listed in Table 749-2 is, or will be, present in the upper 15 feet at concentrations likely to be toxic or have the potential to bioaccumulate as determined using Ecology-approved bioassays.

☐ No contaminant listed in Table 749-2 is, or will be, present in the upper 6 feet (or alternative depth if approved by Ecology) at concentrations likely to be toxic or have the potential to bioaccumulate as determined using Ecology-approved bioassays, and institutional controls are used to manage remaining contamination.

C. Site-specific evaluation. A site-specific evaluation process consists of two parts: (1) formulating the problem, and (2) selecting the methods for addressing the identified problem. Both steps require consultation with and approval by Ecology. *See* WAC 173-340-7493(1)(c).

1. Was there a problem? *See* WAC 173-340-7493(2).

☐ Yes *If you answered **"YES,"** then answer **Question 2** below.*

☐ No *If you answered **"NO,"** then identify the reason here and then skip to **Question 5** below:*

- ☐ No issues were identified during the problem formulation step.
- ☐ While issues were identified, those issues were addressed by the cleanup actions for protecting human health.

2. What did you do to resolve the problem? *See* WAC 173-340-7493(3).

☐ Used the concentrations listed in Table 749-3 as cleanup levels. *If so, then skip to **Question 5** below.*

☐ Used one or more of the methods listed in WAC 173-340-7493(3) to evaluate and address the identified problem. *If so, then answer **Questions 3 and 4** below.*

3. If you conducted further site-specific evaluations, what methods did you use? *Check all that apply. See* WAC 173-340-7493(3).

☐ Literature surveys.

☐ Soil bioassays.

☐ Wildlife exposure model.

☐ Biomarkers.

☐ Site-specific field studies.

☐ Weight of evidence.

☐ Other methods approved by Ecology. If so, please specify:

4. What was the result of those evaluations?

☐ Confirmed there was no problem.

☐ Confirmed there was a problem and established site-specific cleanup levels.

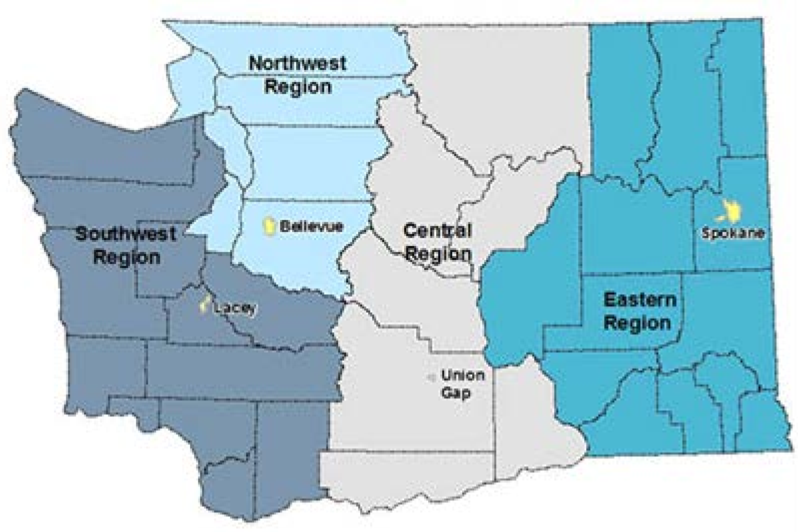
5. Have you already obtained Ecology's approval of both your problem formulation and problem resolution steps?

☐ Yes If so, please identify the Ecology staff who approved those steps:

☐ No

Step 4: SUBMITTAL

Please mail your completed form to the Ecology site manager assigned to your Site. If a site manager has not yet been assigned, please mail your completed form to the Ecology regional office for the County in which your Site is located.



Northwest Region: Attn: VCP Coordinator 3190 160th Ave. SE Bellevue, WA 98008-5452	**Central Region:** Attn: VCP Coordinator 1250 West Alder St. Union Gap, WA 98903-0009
Southwest Region: Attn: VCP Coordinator P.O. Box 47775 Olympia, WA 98504-7775	**Eastern Region:** Attn: VCP Coordinator N. 4601 Monroe Spokane WA 99205-1295

If you need this publication in an alternate format, please call the Toxics Cleanup Program at 360-407-7170. People with hearing loss can call 711 for Washington Relay Service. People with a speech disability can call 877-833-6341.

Appendix H
Sustainability Assessment

AECOM
4051 Ogletown Road
Newark, DE 19713

302.781.5900 tel

Memorandum

To	Shira Degrood, AECOM Jacob Barnes, AECOM	Page 1
Subject	Summary Sustainability Assessment Tesoro Pasco Terminal	
From	Maureen McBride and Gerlinde Wolf, AECOM	
Date	May 11, 2021	

Introduction

Marathon Petroleum Corporation (MPC) has engaged AECOM Technical Services (AECOM) to undertake a sustainability assessment of feasible remedial actions for the Remedial Investigation/Feasibility Study (RI/FS) Report for Tesoro Logistics Operations, LLC, a subsidiary of MPLX LP, (Tesoro) at the Tesoro Pasco Bulk Fuel Terminal located at 2900 Sacajawea Park Road, Pasco, Washington.

The feasible technologies are as follows:

- Alternative 1: Monitored Natural Attenuation (MNA) and Natural Source Zone Depletion (NSZD)
- Alternative 2: MNA, Natural Source Zone Depletion NSZD, and Oxygen-Releasing Compounds
- Alternative 3: MNA, NSZD, Oxygen-Releasing Compounds, and Bio-Sparging
- Alternative 4: MNA, NSZD, Oxygen-Releasing Compounds, Bio-Sparging, and Activated Carbon-Based In-Situ Treatment

Sustainable remediation (consideration of environmental, economic and social impacts of remediation) is an established process, which is outlined in international guidance including the Sustainable Remediation Forum SuRF-UK framework and the International Standard ISO18504 Sustainable Remediation. Sustainable remediation is defined as the elimination and/or control of unacceptable risks in a safe and timely manner while optimizing the environmental, social and economic value of the work (ref: ISO18504, 2017).

Sustainable remediation is not a ‘do nothing’ approach or a ‘silver bullet’ alternate remediation methodology. Sustainable remediation is about incorporating sustainable choices and design thinking into all stages of the remediation, and balancing economic, social and environmental factors in meeting the remediation needs, stakeholder needs and in reducing the risks.

Sustainability assessments of remedial alternatives should look at a broad range of interactions that include:

- The environmental footprint of remedial alternatives, including energy consumption, local and global emission generations, and consumption of raw materials

- Economic analysis, including cost benefit considerations
- Social considerations, including consideration of how the remedial alternative will impact (both positively and/or negatively) the surrounding community

This sustainability assessment also included remedy resilience to climate change effects and extreme weather events. As stated in the State of Washington's guidance document, *Adaptation Strategies for Resilient Cleanup Remedies*, "adapting to climate change impacts is a critical challenge for Washington state." In accordance with the guidance, the project team considered whether climate change may affect the implementation and/or the long-term success of each potential remedial alternative.

Sustainability is one of several criteria used for remedy selection as part of the detailed alternatives evaluation in the RI/FS Report. This memo summarizes the tools, process, and results of the sustainability assessment.

Tools

The sustainability of remediation alternatives is typically assessed against a number of indicators and metrics to quantify each indicator. Indicators are generally grouped under the three sustainability categories of environmental, social and economic. Often an environmental footprint calculation is completed and used as a basis for information to make broader sustainability conclusions.

Two sustainable remediation tools were used to complete this assessment. SiteWise™ was used to calculate the environmental footprint of each remedial alternative, while the AECOM Qualitative Sustainable Remediation Tool (AqSRT) was used to evaluate the relative sustainability of the remedial alternatives for several economic, environmental, and social assessment criteria.

SiteWise™

SiteWise™ is an industry-standard tool for calculating environmental footprint for remediation processes. The tool is a spreadsheet estimator based on life cycle equivalents. SiteWise™ consists of a series of inter-connected Microsoft Excel® spreadsheets which estimate the environmental footprint of remediation activities in terms of specific sustainability metrics. SiteWise™ was developed in a joint effort by Battelle Memorial Institute, the United States Navy, and the United States Army Corps of Engineers.

Use of the SiteWise™ tool involves developing a conceptual design of each remediation option and using these designs as the basis for the inputs in the tool.

The SiteWise™ tool can be used to calculate the following metrics using life cycle equivalents (i.e. published emission factors, consumption rates, and accident statistics):

- Air emissions, including:
  - Greenhouse gases (GHGs), reported as the combined total of carbon dioxide (CO_2) methane (CH_4), and nitrous oxide (N_2O)
  - On-site and total nitrogen oxides (NO_X)
  - On-site and total sulfur oxides (SO_X)
  - On-site and total airborne particulate matter (PM_{10})
- Energy use

- Water consumption
- Accident risk (injury and fatality)
- Hazardous and non-hazardous waste quantities

SiteWise^{TM} quantifies metrics associated with materials production (including raw materials and other construction/treatment materials); transportation of materials, personnel, and equipment to the site; on-site construction activities (i.e., excavation and capping equipment operation); on-site labor; transportation of waste for off-site disposal; and management of landfills proportional to the quantity of waste disposed. The emissions factors in SiteWise^{TM} are reflective of the full life cycle of materials and waste; impacts are inclusive of material production and management of waste at the landfill, even though these activities are conducted off-site.

AqSRT

The AqSRT is a qualitative tool that allows for the evaluation of social, economic, and environmental impacts that are not easily quantified or included in SiteWise^{TM} through relative ranking and weighting of sustainability indicators.

The AqSRT, a propriety tool developed by heritage URS Corporation (now AECOM), was developed to facilitate the integration of sustainable remediation into the overall process of site investigation and remediation. It was developed in alignment with the sustainability appraisal framework established by the Sustainable Remediation Forum in the United Kingdom (SuRF-UK) (SuRF-UK 2010).

Using the SuRF-UK Indicator Set for Sustainable Remediation Assessment (SuRF-UK 2011) a series of 15 assessment criteria (metrics) are weighted on a scale of 1-5 according to relevance to the project, yielding a relative importance of each criteria. Then the remedial alternatives are compared and given a relative ranking from 1-5 based on project team judgment of the degree to which a given remedial technology addresses the sustainability criteria. This allows for a 2-factor relative weighting evaluation of social, economic, and environmental metrics versus themselves and the metrics versus the remedial alternatives. For this project, best professional judgement was used to select the metric weighting based on detailed understanding of the project and inferred stakeholder values.

Assessment Approach

This sustainable remediation assessment scope involves the following principal elements:

- Develop a conceptual outline of each remedial alternative and identify the necessary SiteWise^{TM} inputs for each.
- Evaluate the inputs of each remedial alternative to develop a consistent and defensible baseline for each option within the SiteWise^{TM} domain.
- Run the SiteWise^{TM} model for each remedial alternative o, optimize the model parameters to generate realistic outputs, and conduct a technical review for consistency and ‘real-world’ practicality.
- Develop site specific assessment criteria for the AqSRT model based on priority sustainability metrics for the site. Assign a weight from 1-5 to each assessment criteria based on environmental metrics results from the SiteWise^{TM} tool, discussions of criteria importance to MPC, and inferred stakeholder values for the community. Assign a score from 1-5 for each of the assessment criteria in relation to the degree to which each remedial alternative addresses each sustainability criteria.

- Interpret data and outputs in terms of sustainability metrics to evaluate the net benefits and impacts of each remedial alternative.
- Compare the results of the two tools and identify the sustainability merits of each alternative.

Tool Inputs and Results

A brief description of the remediation scenarios that were included in this assessment is provided in the table below.

Remedial Alternative	Overview	O&M Scope
1: MNA and NSZD	Groundwater monitoring using existing wells; use multiple lines of evidence to support degradation of residual-phase hydrocarbon source material, including soil gas screening at existing monitoring wells and vapor probes and down-well temperature profiling	MNA: up to 15+ years GW monitoring NSZD: up to 15+ years monitoring
2: MNA, NSZD, Oxygen-Releasing Compound	Groundwater monitoring using existing wells; use multiple lines of evidence to support degradation of residual-phase hydrocarbon source material, including soil gas screening at existing monitoring wells and vapor probes and down-well temperature profiling; enhanced aerobic biodegradation	MNA: up to 15 years GW monitoring NSZD: up to 15 years monitoring Oxygen-Releasing Compound: up to 15 years, replace in-well oxygen-releasing compound 1 time per year
3: MNA, NSZD, Oxygen-Releasing Compounds, and Bio-Sparging	Same elements as Alternative 2, plus enhanced aerobic degradation via oxygen (air) injection	MNA: up to 10 years GW monitoring NSZD: up to 10 years monitoring Oxygen-Releasing Compound: up to 10 years, replace in-well oxygen-releasing compound 1 time per year Biosparging: up to 10 years monthly inspections
4: MNA, NSZD, Oxygen-Releasing Compounds, Bio-Sparging and Activated Carbon-Based In-Situ Treatment	Same elements as Alternative 3, plus activated carbon injection in treatment areas via existing wells	MNA: up to 5 years GW monitoring NSZD: up to 5 years monitoring Oxygen-Releasing Compound: up to 10 years, replace in-well oxygen-releasing compound 1 time per year Biosparging: up to 5 years monthly inspections AC Treatment: one-time injection, no O&M

SiteWise™ Inputs

As described above, the SiteWise™ inputs were generated based on a conceptual design of each remedial alternative as detailed in the Remedial Investigation/Feasibility Study Report (RI/FS). The conceptual designs serve as the basis for the SiteWise™ models and include details regarding various components to each of the remedial scenarios. The inputs and assumptions were based on vendor information, previous experience, and sound engineering judgement.

SiteWise^{TM} Results

Once the conceptual designs and inputs and assumptions tables were generated and reviewed by the SiteWise^{TM} assessment team, the SiteWise^{TM} tool was run for each remedial alternative individually, and then compiled to create a final summary which compares the environmental footprint of all of the remedial alternatives. The SiteWise^{TM} results files are included in Attachment A.

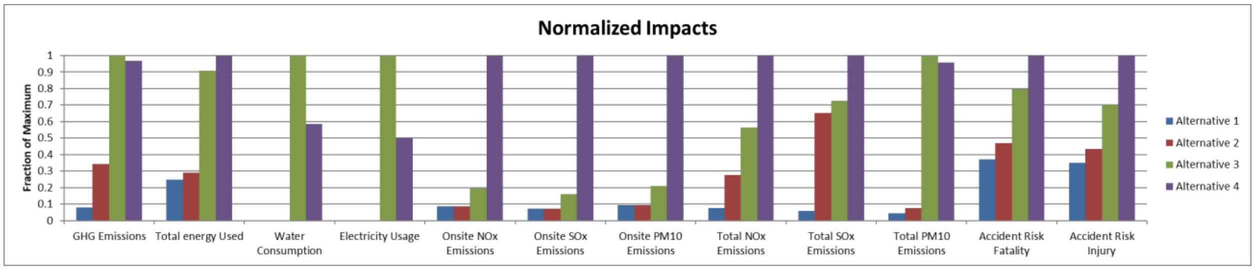
Each alternative's SiteWise^{TM} results include a detailed breakdown of how each component of the remediation (construction, operation, residual handling, etc.) contributes to the various environmental metrics. The individual results for each alternative provide insight as to which stages of the remedial process produce the most impacts and can provide insight into transportation impacts as well. The final summary comparison results from the SiteWise^{TM} tool focus on the bigger picture and present the total environmental footprint from all components for each remedial alternative. The main outputs from the final summary results comparison are presented and described below.

The following table compares the estimated environmental footprint that would be generated by the implementation of each remedial alternative. NOx, SOx, and PM10 emissions are separated into onsite and offsite generation to identify the difference between emissions generated due to onsite work such as installation and system operation, and offsite work such as electricity and material production and transportation of personnel.

Remedial Alternatives	GHG Emissions	Total energy Used	Water Consumption	Electricity Usage	Onsite NO_x Emissions	Onsite SO_x Emissions	Onsite PM_{10} Emissions
	metric ton	MMBTU	gallons	MWH	metric ton	metric ton	metric ton
Alternative 1	24	4,462	-	-	0.039	0.004	0.003
Alternative 2	104	5,258	-	-	0.039	0.004	0.003
Alternative 3	302	16,412	666,298	1,306	0.087	0.009	0.008
Alternative 4	292	18,046	389,946	653	0.446	0.056	0.038

Remedial Alternatives	Non-Hazardous Waste Landfill Space	Total NO_x Emissions	Total SO_x Emissions	Total PM_{10} Emissions	Accident Risk Fatality	Accident Risk Injury	Lost Hours - Injury
	tons	metric ton	metric ton	metric ton			
Alternative 1	23	0.05	0.01	0.01	0.0004	0.05	0.38
Alternative 2	23	0.20	0.15	0.02	0.0005	0.06	0.47
Alternative 3	49	0.40	0.17	0.22	0.0009	0.10	0.77
Alternative 4	321	0.71	0.24	0.21	0.0011	0.14	1.09

The figure below presents another way to think about the results in which the calculated values are normalized to the highest result for each metric. The alternative with the highest result for each metric is shown as 100%, while the other alternatives are shown as percentages of the maximum.



SiteWise™ Metric-Specific Results

As discussed above, all four alternatives have base components of MNA and NSZD. Alternative 2 adds oxygen-releasing compound to the base components; Alternative 3 adds oxygen-releasing compound and bio-sparging, while Alternative 4 adds oxygen-releasing compound, bio-sparging, and carbon injection. Alternative 1 consists of the base components only. As expected, the table and figure above show that Alternative 1 has the overall lowest environmental footprint for all metrics. Alternative 2 has similar results to Alternative 1 for most metrics except GHG emissions, Total NO_x, Total SO_x (for which it has the highest footprint), and accident risk. Alternatives 3 and 4 each have the highest footprint for several metrics.

A brief summary of the key findings specific to selected metrics is outlined below:

- Greenhouse Gas (GHG) Emissions: Alternative 3 has the highest GHG emissions, slightly above those for Alternative 4. For Alternative 3, GHG emissions are driven primarily by equipment use. This is primarily for electricity to run the blowers. For Alternative 4, the greatest contributor to GHG emissions is also equipment use, with consumables being the second highest contributor. Contributions for equipment use in Alternative 4 are divided between blower use, drilling, and use of the diesel pump for carbon injection. The primary contributors for consumables in both alternatives 3 and 4 are the amendment materials. Alternative 1 has the lowest emissions.
- Energy Use: Alternatives 3 and 4 have similar energy use, as do Alternatives 1 and 2. Total energy use for Alternatives 3 and 4 is approximately 3 times higher than for Alternatives 1 and 2, with Alternative 4 having the highest use. Consumables are the greatest contributor to energy use for Alternatives 2, 3 and 4. for both Alternatives. For Alternative 3, equipment operation is also a significant contributor to energy use.
- Water Consumption: When considering the remedial alternatives, it would seem that only Alternative 4 consumes a significant amount of water (to create the carbon slurry for injection). However, the SiteWise™ models show that water use for Alternative 4 is only about half of water used in Alternative 3. This results from water used during electricity production to run the blowers in Alternative 3. Depending on the distance to the power source and how its water is supplied, this may be a factor in comparing the two alternatives as water sources in the Western United States are stressed due to limited rainfall and high demand. Water consumption for Alternatives 1 and 2 is negligible.
- On-site SO_x, NO_x, and PM_{10} (criteria pollutants): Alternative 4 has significantly higher on-site criteria pollutant emissions than any of the other alternatives due to equipment use for well drilling.

- Total SO_x, NO_x, and PM_{10} (criteria pollutants): Alternative 4 has higher total NO_x emissions than the other alternatives due to equipment use for well drilling. However, consumables contribute more to total SO_x emissions for all alternatives, resulting in Alternatives 2, 3 and 4 having similar SO_x emissions to one another. This is driven primarily by the consumables for all of the alternatives; therefore, it is global, rather than local, impact. Total PM_{10} is highest for Alternatives 3 and 4, primarily from electricity use.
- Accident risk: Accident risk increases with both on-site equipment use and road miles traveled for a given remedial alternative. As expected, Alternatives 1 and 2 have the lowest accident risk. Alternative 4 has the highest; although Alternative 3 has significant exposure to accident risk due to travel during the O&M phase, this is more than offset by on-site work for injection point drilling and the higher travel requirement during the construction phase for Alternative 4.

AqSRT Inputs and Results

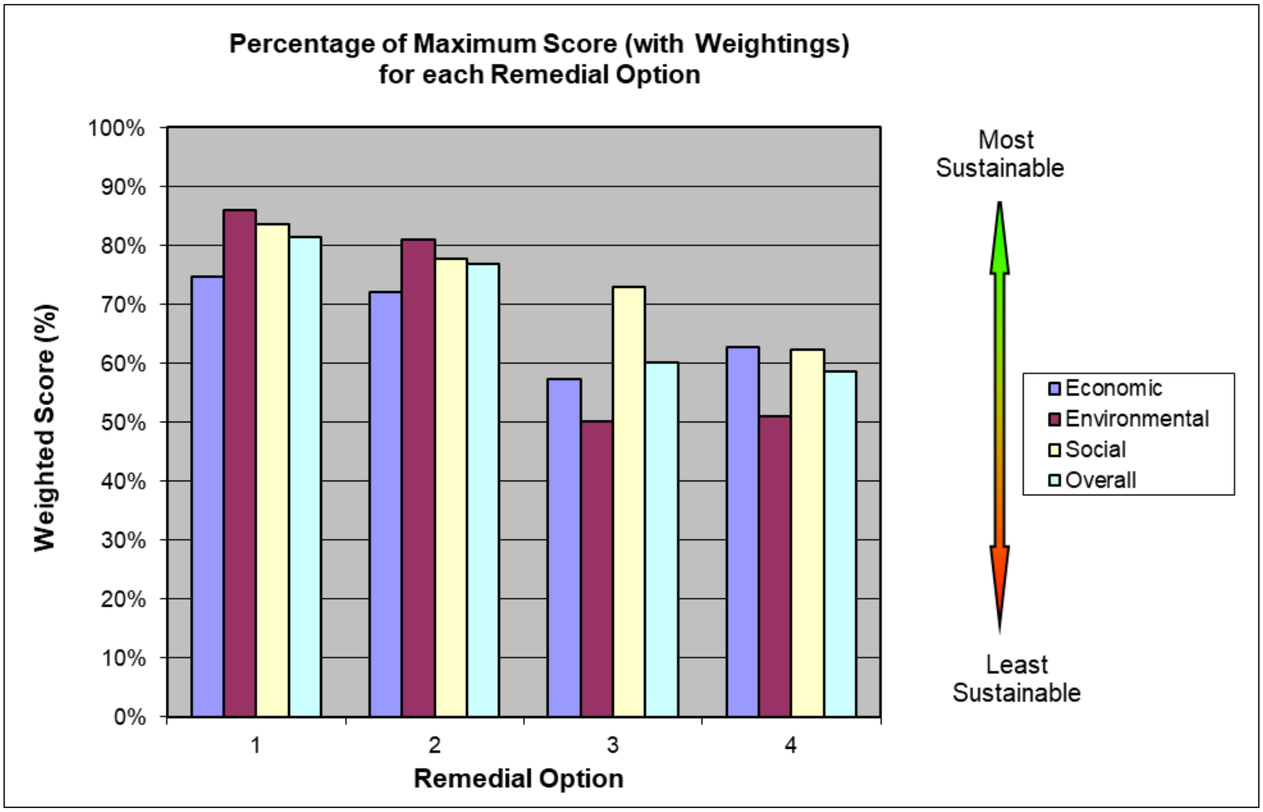
The 15 assessment criteria identified in the SuRF-UK framework and their weightings are listed in the table below, and include five criteria per sustainability pillar (i.e., economic, environmental, and social). For this assessment, site-specific criteria for the social category were included to account for the fact that the site is in a remote area without any neighborhoods, and to capture the impact that implementation of the remedy would have on the operations at the site since it is an active fuel terminal. In accordance with Agency guidance, remedy robustness, resilience, and potential for impact by climate change were included as considerations while evaluating these alternatives. The economic criteria of project lifespan and flexibility incorporates remedy resiliency. Relative sustainability rankings and justification of scores are identified in the table below. The AqSRT input file and justifications is presented in Attachment B.

AqSRT Metric-Specific Results

The figure below presents the results of the AqSRT assessment. Similar to the SiteWise™ results, Alternative 1 is identified as the most sustainable remedial alternative with the scoring for Alternative 2 being similar. Alternative 1 has the highest (most favorable) score for each of the individual economic, environmental and social pillars, also ranking highest overall. A brief summary of the key findings for each pillar is outlined below:

- Economic: Alternative 1 is the highest scoring and most sustainable option for economic criteria, followed by Alternatives 2 ,4 and 3, respectively. In contrast to Alternative 3 and 4, Alternative 1 and 2 do not include any long-term operational costs leading it to have the lowest overall direct and indirect costs. Each alternative is expected to provide a long lasting, flexible and resilient clean-up strategy, the criteria that received the highest weighting of all of the economic criteria. For this category options with a shorter clean-up timeframe scored higher since they would be least likely to encounter changing conditions.
- Environmental: Alternative 1 is the most sustainable alternative in the environmental category followed by Alternatives 2, 3 and 4 respectively. However, Alternatives 3 and 4 are scored quite a bit lower than Alternative 1. Impacts to air and impacts of groundwater and surface water are the most important indicators in this category, and Alternative 1 ranked most favorable in both of these categories. Impacts to air were ranked in accordance to the SiteWise™ assessment results, and the emissions from Alternative 1 were much lower than the other alternatives which lead to a big difference in scoring. Alternative 1 also had a high score for use of natural resources and waste generation, another important indicator.
- Social: The social category takes into account the remedy duration and timeframe in many of the criteria such as impacts to human health and safety, impacts to site

operations, and community involvement. Alternative 1 again is the most sustainable option for social criteria This alternative has the shortest implementation timeframe and therefore least amount of risk associated with implementation and has the least impact on site operations. Alternatives 3 and 4 are nearly equally scored for social sustainability, but they are estimated to have a shorter overall clean-up timeframe which is thought to be looked upon favorably by the community.



Summary and Sustainability Interpretation

Each remedial alternative has sustainability benefits and drawbacks. The SiteWise^{TM} assessment has highlighted that each of the active stages of remediation has an environmental impact in terms of energy, resource usage and environmental emissions. Overall, Alternative 1 has the lowest impact across all metrics, while Alternatives 3 and 4 each have the highest impact for several metrics. The AqSRT assessment identifies Alternative 1 as the most sustainable alternative for all three pillars of sustainability – economic, environmental, and social.

Marathon Petroleum Corporation priority metrics for environmental sustainability include GHG emissions, total energy and resource consumption and air pollution. For these metrics, Alternative 3 has the highest impacts for water consumption and electricity usage. Alternative 4 has the highest impacts for on-site criteria pollutants, total NO_x, waste, and accident risk. Both Alternatives 3 and 4 have similar impacts for GHG emissions, energy use, and total PM_{10}. Alternative 2 has only slightly higher impacts in GHG emissions and energy use than Alternative 1. Along with environmental impact other important factors such as cleanup timeframe and project cost are sustainability considerations that should be taken into account for remedy selection.

Regardless of the selected alternative, AECOM recommends that the chosen remedial option be thoroughly value-engineered during the design phase to minimize impacts; for example:

- Consider additional sampling or refined groundwater flow modeling to optimize the number and location of proposed injection sites and amount of treatment materials.
- Reduce the impact of materials through selection of lower impact materials consistent with their functional value.
- Reduce the impact of other significant contributors; for example, minimizing travel; low-emission retrofits for diesel equipment; and sourcing materials near the site when possible.

In addition, best management practices published by EPA (EPA 2012), ASTM (ASTM 2013), and ITRC (ITRC 2011) should be considered in the upcoming design and construction phases. Best management practices might consider construction practices, clean fuel and emission technologies, among others, and can be tailored to the specific site, project, and project goals.

Attachment A
SiteWise^{TM} Output

Remedial Alternatives	GHG Emissions	Total energy Used	Water Consumption	Electricity Usage	Onsite NO_x Emissions	Onsite SO_x Emissions	Onsite PM_{10} Emissions	Total NO_x Emissions	Total SO_x Emissions	Total PM_{10} Emissions	Accident Risk Fatality	Accident Risk Injury
	metric ton	MMBTU	gallons	MWH	metric ton	metric ton	metric ton	metric ton	metric ton	metric ton		
Alternative 1	23.95	4.46E+03	0.00E+00	0.00E+00	3.89E-02	3.97E-03	3.50E-03	5.39E-02	1.34E-02	9.93E-03	4.16E-04	4.77E-02
Alternative 2	103.59	5.26E+03	0.00E+00	0.00E+00	3.89E-02	3.97E-03	3.50E-03	1.97E-01	1.53E-01	1.72E-02	5.28E-04	5.92E-02
Alternative 3	301.68	1.64E+04	6.66E+05	1.31E+03	8.75E-02	8.94E-03	7.87E-03	4.03E-01	1.71E-01	2.23E-01	8.94E-04	9.57E-02
Alternative 4	291.98	1.80E+04	3.90E+05	6.53E+02	4.46E-01	5.60E-02	3.75E-02	7.13E-01	2.36E-01	2.13E-01	1.12E-03	1.37E-01

Additional Sustainability Metrics

Remedial Alternatives	Non-Hazardous Waste Landfill Space	Hazardous Waste Landfill Space	Topsoil Consumption	Costing	Lost Hours - Injury	Percent Electricity from Renewable Sources	Final Cost with Footprint Reduction
	tons	tons	cubic yards	$		%	$
Alternative 1	23.00	0.00E+00	0.00E+00	0.00E+00	3.81E-01	0.0%	0.00E+00
Alternative 2	23.00	0.00E+00	0.00E+00	0.00E+00	4.73E-01	0.0%	0.00E+00
Alternative 3	49.00	0.00E+00	0.00E+00	0.00E+00	7.66E-01	18.8%	0.00E+00
Alternative 4	321.00	0.00E+00	0.00E+00	0.00E+00	1.09E+00	18.8%	0.00E+00

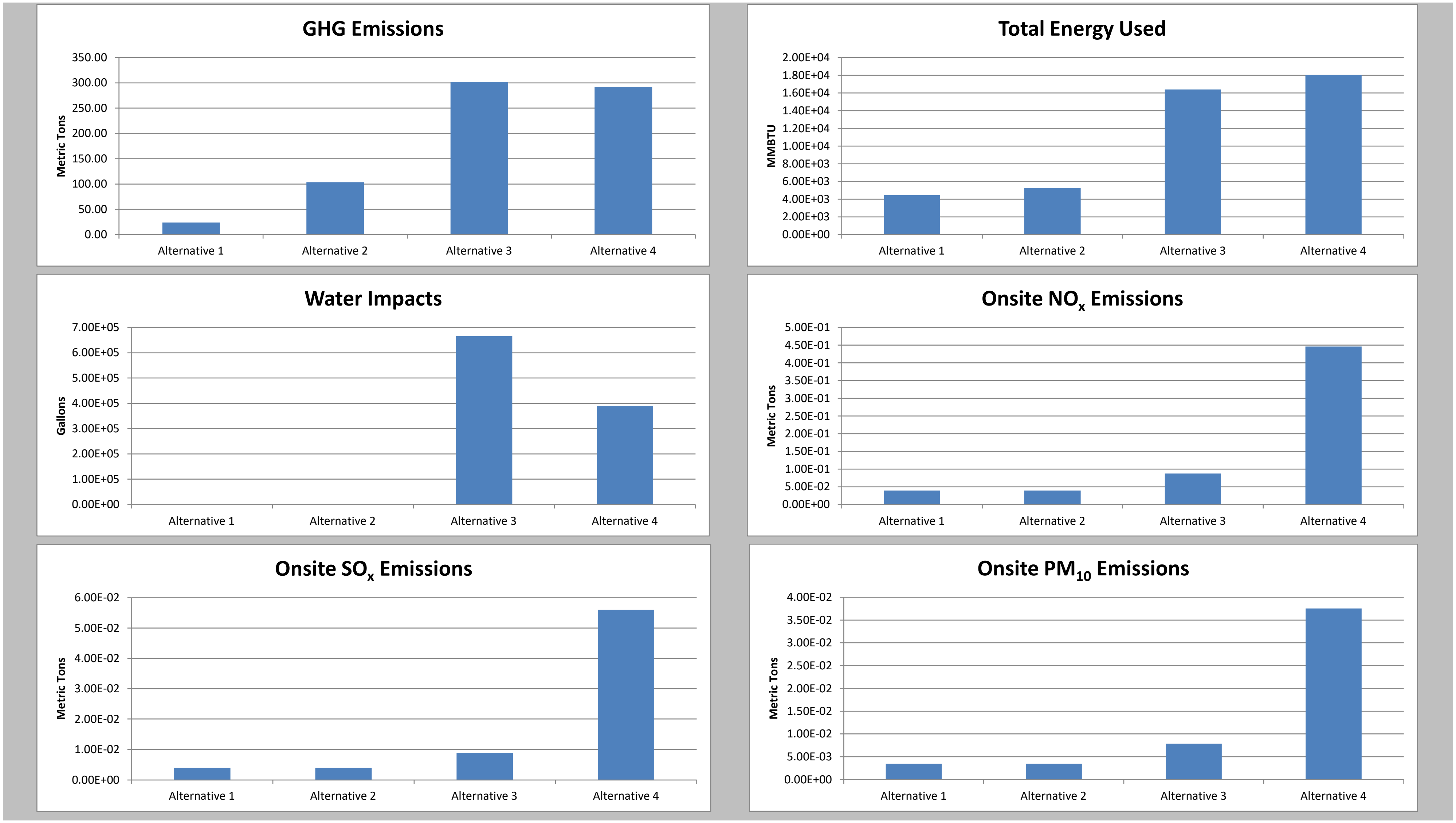
Relative Impact

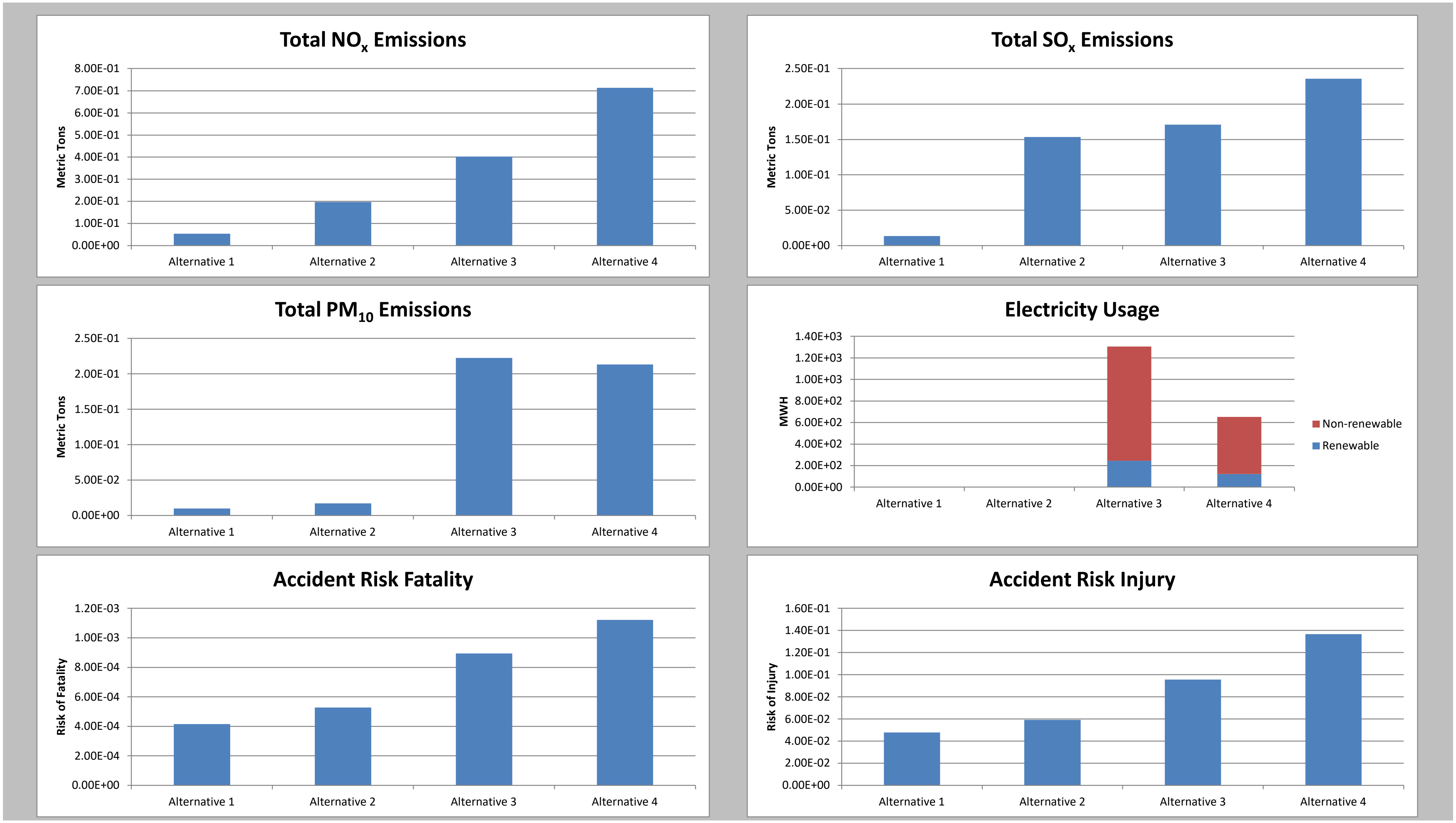
Remedial Alternatives	GHG Emissions	Energy Usage	Water Usage	Electricity Usage	Onsite NOx Emissions	Onsite SOx Emissions	Onsite PM10 Emissions	Total NOx emissions	Total SOx Emissions	Total PM10 Emissions	*Accident Risk Fatality	*Accident Risk Injury	Community Impacts	Resources Lost
Alternative 1	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	user select	user select
Alternative 2	Medium	Low	Low	Low	Low	Low	Low	Low	Medium	Low	Low	Low	user select	user select
Alternative 3	High	High	High	High	Low	Low	Low	Medium	High	High	Low	Medium	user select	user select
Alternative 4	High	High	Medium	Medium	High	High	High	High	High	High	Low	Medium	user select	user select

Relative Impact (User Override)

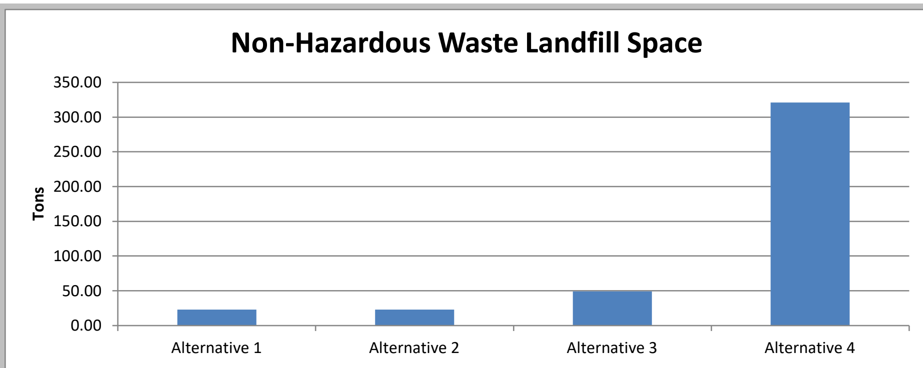
Remedial Alternatives	GHG Emissions	Energy Usage	Water Usage	Electricity Usage	Onsite NOx Emissions	Onsite SOx Emissions	Onsite PM10 Emissions	Total NOx Emissions	Total SOx Emissions	Total PM10 Emissions	*Accident Risk Fatality	*Accident Risk Injury	Community Impacts	Resources Lost
Alternative 1	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	Low	user select	user select
Alternative 2	Medium	Low	Low	Low	Low	Low	Low	Low	Medium	Low	Low	Low	user select	user select
Alternative 3	High	High	High	High	Low	Low	Low	Medium	High	High	Low	Medium	user select	user select
Alternative 4	High	High	Medium	Medium	High	High	High	High	High	High	Low	Medium	user select	user select

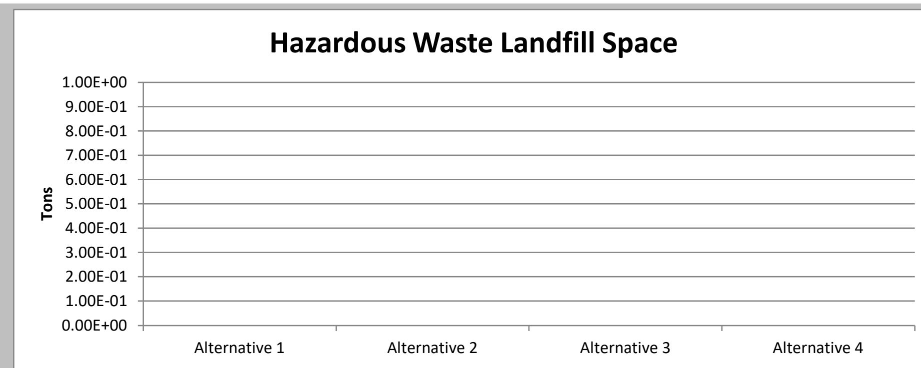
*Accident Risk is an estimate of how many accidents may occur. This risk is not the same as Cancer Risk, which is the probablity (for a single person) of getting cancer. Accident risk is not comparable to Cancer Risk due to inherent fundamental differences.

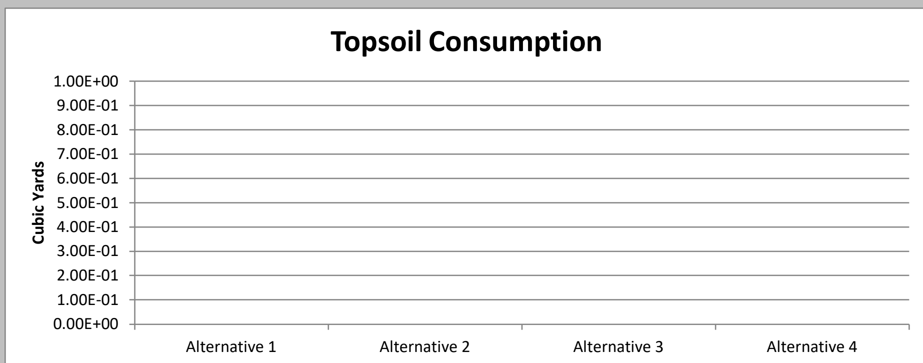

GHG Emissions
Metric Tons
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
Alternative 1
Alternative 2
Alternative 3
Alternative 4
Total Energy Used
MMBTU
2.00E+04
1.80E+04
1.60E+04
1.40E+04
1.20E+04
1.00E+04
8.00E+03
6.00E+03
4.00E+03
2.00E+03
0.00E+00
Alternative 1
Alternative 2
Alternative 3
Alternative 4
Water Impacts
Gallons
7.00E+05
6.00E+05
5.00E+05
4.00E+05
3.00E+05
2.00E+05
1.00E+05
0.00E+00
Alternative 1
Alternative 2
Alternative 3
Alternative 4
Onsite NO_x Emissions
Metric Tons
5.00E-01
4.50E-01
4.00E-01
3.50E-01
3.00E-01
2.50E-01
2.00E-01
1.50E-01
1.00E-01
5.00E-02
0.00E+00
Alternative 1
Alternative 2
Alternative 3
Alternative 4
Onsite SO_x Emissions
Metric Tons
6.00E-02
5.00E-02
4.00E-02
3.00E-02
2.00E-02
1.00E-02
0.00E+00
Alternative 1
Alternative 2
Alternative 3
Alternative 4
Onsite PM_{10} Emissions
Metric Tons
4.00E-02
3.50E-02
3.00E-02
2.50E-02
2.00E-02
1.50E-02
1.00E-02
5.00E-03
0.00E+00
Alternative 1
Alternative 2
Alternative 3
Alternative 4

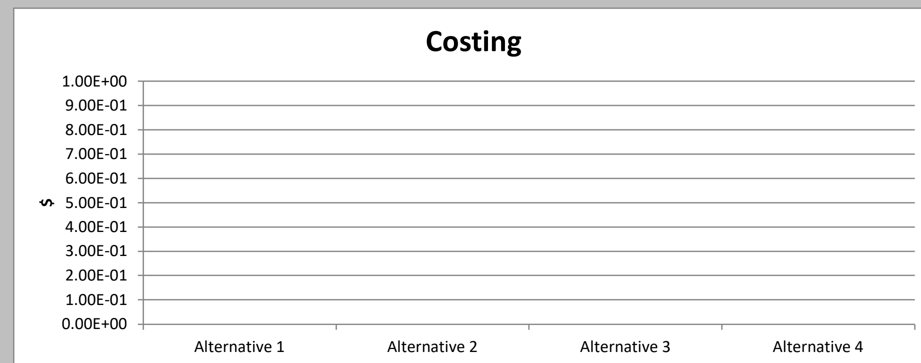


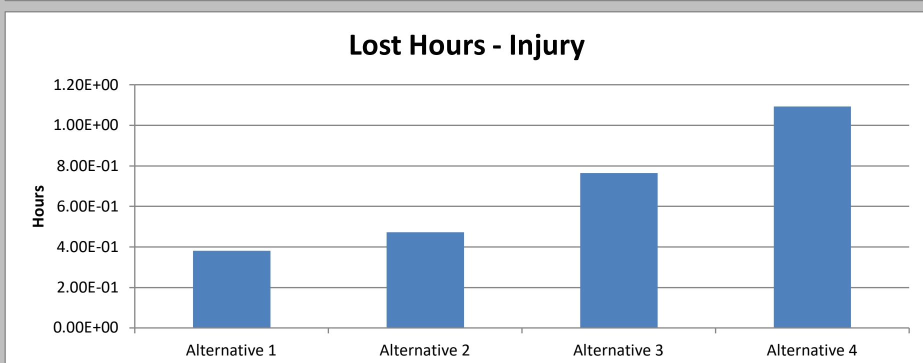
Total NOx Emissions
Metric Tons
8.00E-01
7.00E-01
6.00E-01
5.00E-01
4.00E-01
3.00E-01
2.00E-01
1.00E-01
0.00E+00
Alternative 1
Alternative 2
Alternative 3
Alternative 4
Total SOx Emissions
Metric Tons
2.50E-01
2.00E-01
1.50E-01
1.00E-01
5.00E-02
0.00E+00
Alternative 1
Alternative 2
Alternative 3
Alternative 4
Total PM10 Emissions
Metric Tons
2.50E-01
2.00E-01
1.50E-01
1.00E-01
5.00E-02
0.00E+00
Alternative 1
Alternative 2
Alternative 3
Alternative 4
Electricity Usage
MWH
1.40E+03
1.20E+03
1.00E+03
8.00E+02
6.00E+02
4.00E+02
2.00E+02
0.00E+00
Alternative 1
Alternative 2
Alternative 3
Alternative 4
Non-renewable
Renewable
Accident Risk Fatality
Risk of Fatality
1.20E-03
1.00E-03
8.00E-04
6.00E-04
4.00E-04
2.00E-04
0.00E+00
Alternative 1
Alternative 2
Alternative 3
Alternative 4
Accident Risk Injury
Risk of Injury
1.60E-01
1.40E-01
1.20E-01
1.00E-01
8.00E-02
6.00E-02
4.00E-02
2.00E-02
0.00E+00
Alternative 1
Alternative 2
Alternative 3
Alternative 4

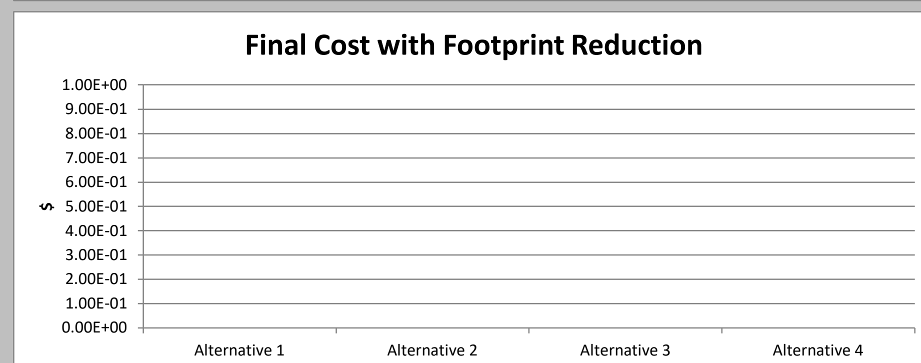

Non-Hazardous Waste Landfill Space
Tons
350.00
300.00
250.00
200.00
150.00
100.00
50.00
0.00
Alternative 1
Alternative 2
Alternative 3
Alternative 4

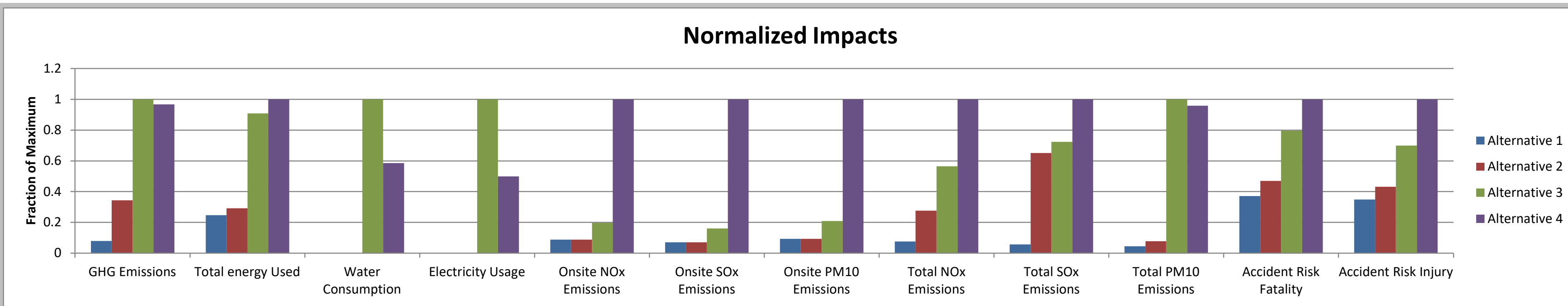

Hazardous Waste Landfill Space
Tons
1.00E+00
9.00E-01
8.00E-01
7.00E-01
6.00E-01
5.00E-01
4.00E-01
3.00E-01
2.00E-01
1.00E-01
0.00E+00
Alternative 1
Alternative 2
Alternative 3
Alternative 4


Topsoil Consumption
Cubic Yards
1.00E+00
9.00E-01
8.00E-01
7.00E-01
6.00E-01
5.00E-01
4.00E-01
3.00E-01
2.00E-01
1.00E-01
0.00E+00
Alternative 1
Alternative 2
Alternative 3
Alternative 4


Costing
$
1.00E+00
9.00E-01
8.00E-01
7.00E-01
6.00E-01
5.00E-01
4.00E-01
3.00E-01
2.00E-01
1.00E-01
0.00E+00
Alternative 1
Alternative 2
Alternative 3
Alternative 4


Lost Hours - Injury
Hours
1.20E+00
1.00E+00
8.00E-01
6.00E-01
4.00E-01
2.00E-01
0.00E+00
Alternative 1
Alternative 2
Alternative 3
Alternative 4

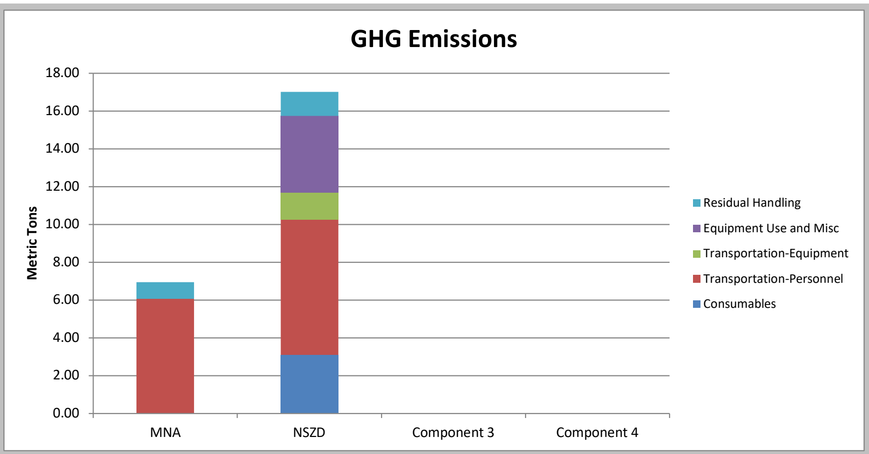

Final Cost with Footprint Reduction
$
1.00E+00
9.00E-01
8.00E-01
7.00E-01
6.00E-01
5.00E-01
4.00E-01
3.00E-01
2.00E-01
1.00E-01
0.00E+00
Alternative 1
Alternative 2
Alternative 3
Alternative 4

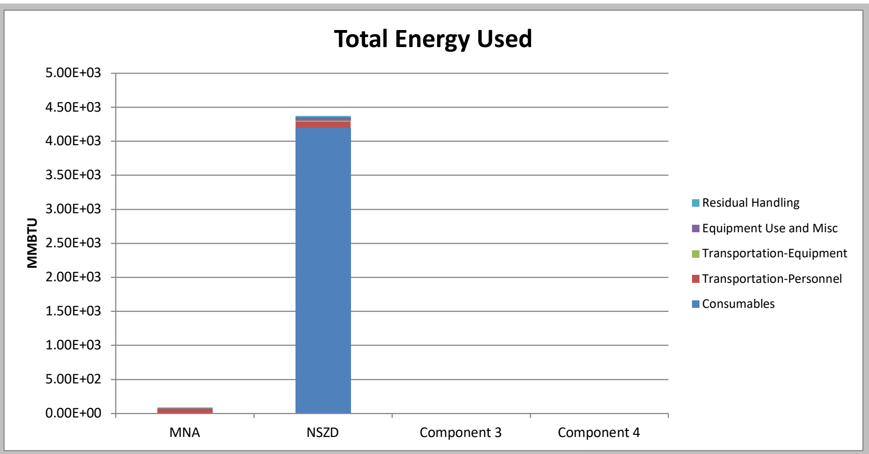

Normalized Impacts
Fraction of Maximum
1.2
1
0.8
0.6
0.4
0.2
0
GHG Emissions
Total energy Used
Water Consumption
Electricity Usage
Onsite NOx Emissions
Onsite SOx Emissions
Onsite PM10 Emissions
Total NOx Emissions
Total SOx Emissions
Total PM10 Emissions
Accident Risk Fatality
Accident Risk Injury
Alternative 1
Alternative 2
Alternative 3
Alternative 4

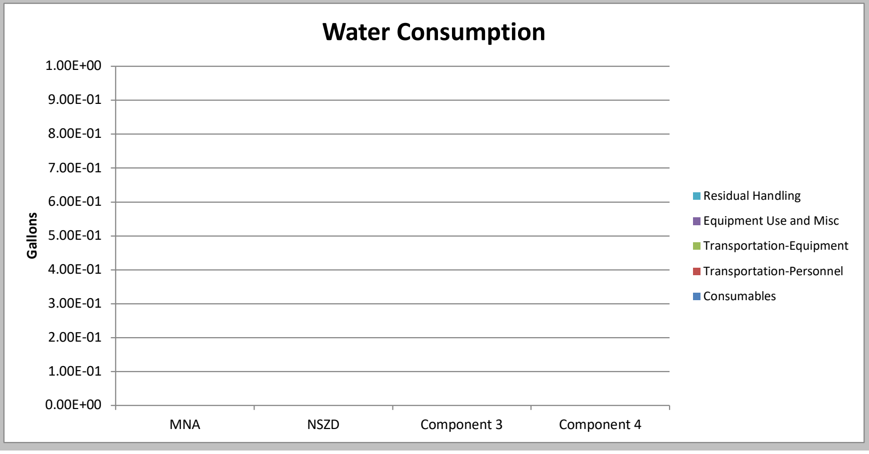
Sustainable Remediation - Environmental Footprint Summary
Alternative 1

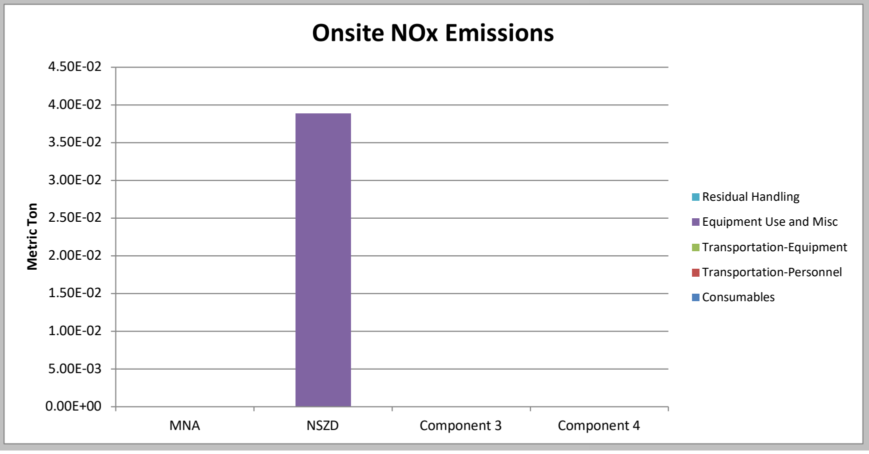
Phase	Activities	GHG Emissions	Total Energy Used	Water Consumption	Electricity Usage	Onsite NOx Emissions	Onsite SOx Emissions	Onsite PM10 Emissions	Total NOx Emissions	Total SOx Emissions	Total PM10 Emissions	Accident Risk Fatality	Accident Risk Injury
		metric ton	MMBTU	gallons	MWH	metric ton	metric ton	metric ton	metric ton	metric ton	metric ton		
MNA	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	NA	NA
	Transportation-Personnel	6.06	7.6E+01	NA	NA	NA	NA	NA	2.5E-03	7.9E-05	3.6E-04	1.7E-04	1.4E-02
	Transportation-Equipment	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.9E-06	5.9E-03
	Residual Handling	0.88	1.1E+01	NA	NA	0.0E+00	0.0E+00	0.0E+00	2.8E-04	4.9E-06	2.5E-05	4.9E-06	3.9E-04
	Sub-Total	6.94	8.79E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.80E-03	8.41E-05	3.84E-04	1.81E-04	2.01E-02
NSZD	Consumables	3.09	4.2E+03	NA	NA	NA	NA	NA	4.8E-03	7.3E-03	1.1E-03	NA	NA
	Transportation-Personnel	7.18	9.1E+01	NA	NA	NA	NA	NA	3.0E-03	9.4E-05	4.3E-04	2.0E-04	1.6E-02
	Transportation-Equipment	1.41	1.9E+01	NA	NA	NA	NA	NA	4.5E-04	1.8E-05	3.7E-05	3.6E-06	2.9E-04
	Equipment Use and Misc	4.07	4.9E+01	0.0E+00	0.0E+00	3.9E-02	4.0E-03	3.5E-03	4.1E-02	5.1E-03	3.8E-03	2.2E-05	1.0E-02
	Residual Handling	1.26	1.8E+01	NA	NA	0.0E+00	0.0E+00	0.0E+00	1.8E-03	7.9E-04	4.2E-03	5.5E-06	4.4E-04
	Sub-Total	17.01	4.37E+03	0.00E+00	0.00E+00	3.89E-02	3.97E-03	3.50E-03	5.11E-02	1.33E-02	9.55E-03	2.34E-04	2.75E-02
Component 3	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	NA	NA
	Transportation-Personnel	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Transportation-Equipment	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Component 4	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	NA	NA
	Transportation-Personnel	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Transportation-Equipment	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total		**2.4E+01**	**4.5E+03**	**0.0E+00**	**0.0E+00**	**3.9E-02**	**4.0E-03**	**3.5E-03**	**5.4E-02**	**1.3E-02**	**9.9E-03**	**4.2E-04**	**4.8E-02**

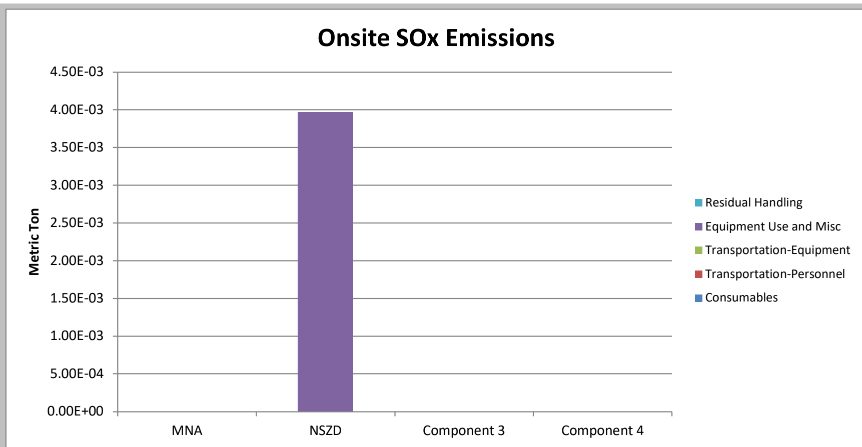
Remedial Alternative Phase	Non-Hazardous Waste Landfill Space	Hazardous Waste Landfill Space	Topsoil Consumption	Costing	Lost Hours - Injury	Percent electricity from renewable sources	Total Cost with Footprint Reduction
	tons	tons	cubic yards	$		%	
MNA	0.0E+00	0.0E+00	0.0E+00	0	1.6E-01	0.0%	$0
NSZD	2.3E+01	0.0E+00	0.0E+00	0	2.2E-01	0.0%	
Component 3	0.0E+00	0.0E+00	0.0E+00	0	0.0E+00	0.0%	
Component 4	0.0E+00	0.0E+00	0.0E+00	0	0.0E+00	0.0%	
Total	**2.3E+01**	**0.0E+00**	**0.0E+00**	**$0**	**3.8E-01**	**0.0%**	

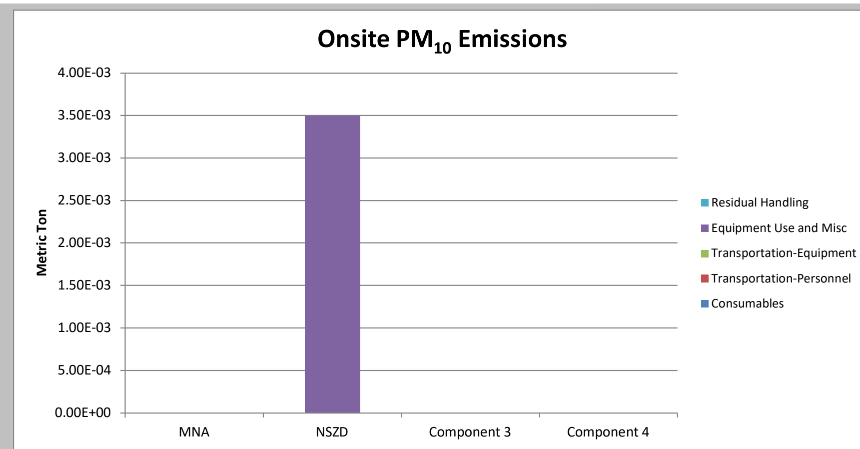

GHG Emissions
Metric Tons
18.00
16.00
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
MNA
NSZD
Component 3
Component 4
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

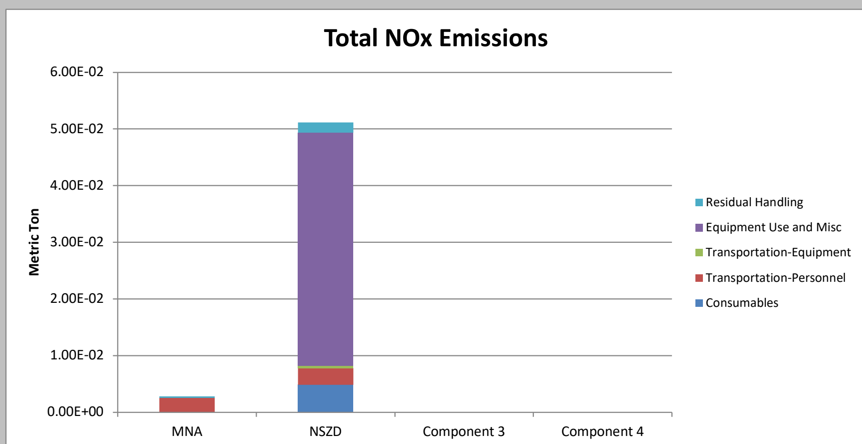

Total Energy Used
MMBTU
5.00E+03
4.50E+03
4.00E+03
3.50E+03
3.00E+03
2.50E+03
2.00E+03
1.50E+03
1.00E+03
5.00E+02
0.00E+00
MNA
NSZD
Component 3
Component 4
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

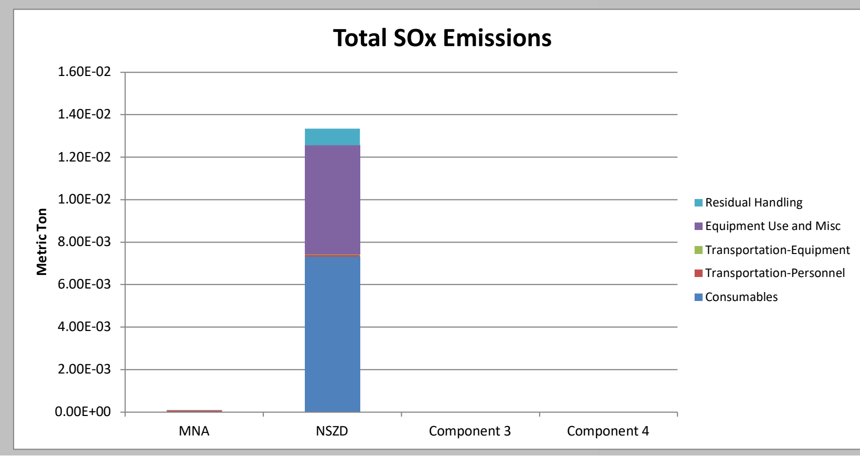

Water Consumption
Gallons
1.00E+00
9.00E-01
8.00E-01
7.00E-01
6.00E-01
5.00E-01
4.00E-01
3.00E-01
2.00E-01
1.00E-01
0.00E+00
MNA
NSZD
Component 3
Component 4
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

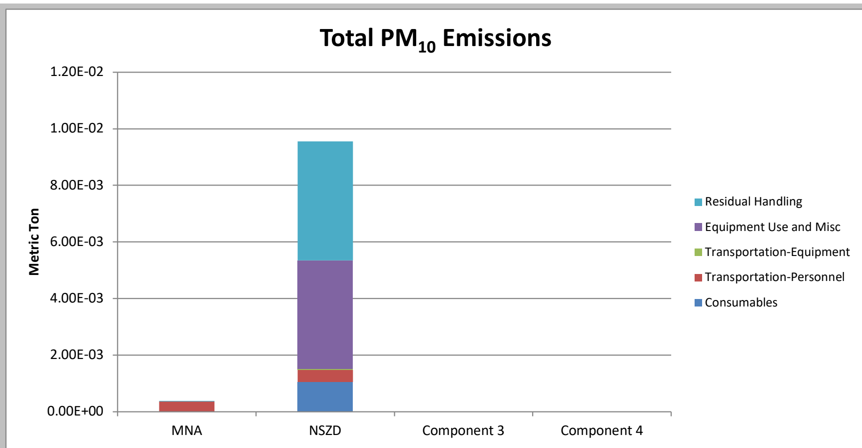

Onsite NOx Emissions
Metric Ton
4.50E-02
4.00E-02
3.50E-02
3.00E-02
2.50E-02
2.00E-02
1.50E-02
1.00E-02
5.00E-03
0.00E+00
MNA
NSZD
Component 3
Component 4
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

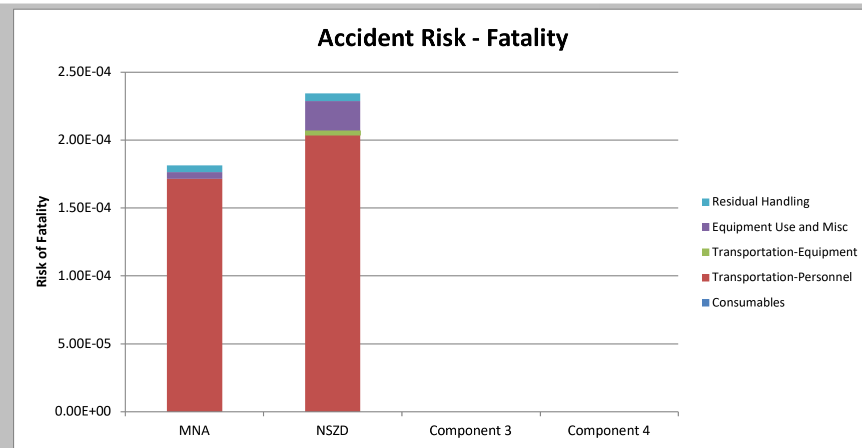

Onsite SOx Emissions
Metric Ton
4.50E-03
4.00E-03
3.50E-03
3.00E-03
2.50E-03
2.00E-03
1.50E-03
1.00E-03
5.00E-04
0.00E+00
MNA
NSZD
Component 3
Component 4
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

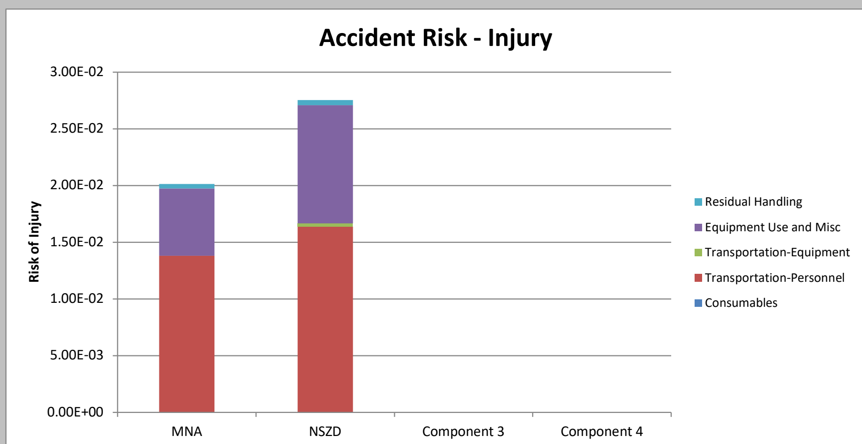

Onsite PM_{10} Emissions
Metric Ton
4.00E-03
3.50E-03
3.00E-03
2.50E-03
2.00E-03
1.50E-03
1.00E-03
5.00E-04
0.00E+00
MNA
NSZD
Component 3
Component 4
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

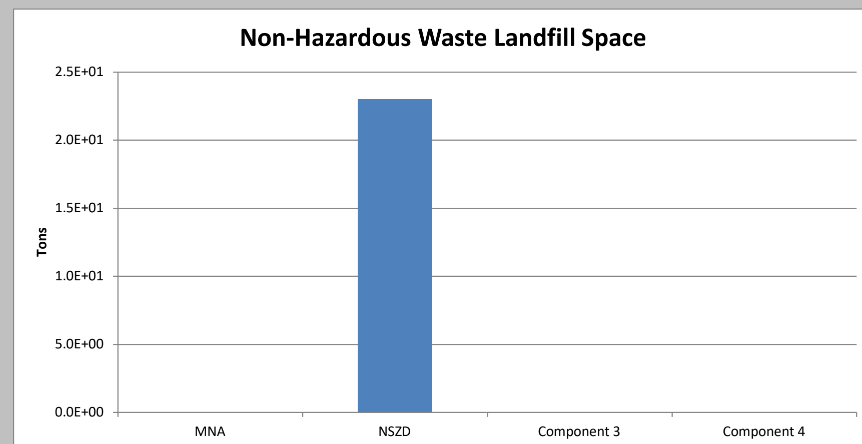

Total NOx Emissions
Metric Ton
6.00E-02
5.00E-02
4.00E-02
3.00E-02
2.00E-02
1.00E-02
0.00E+00
MNA
NSZD
Component 3
Component 4
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

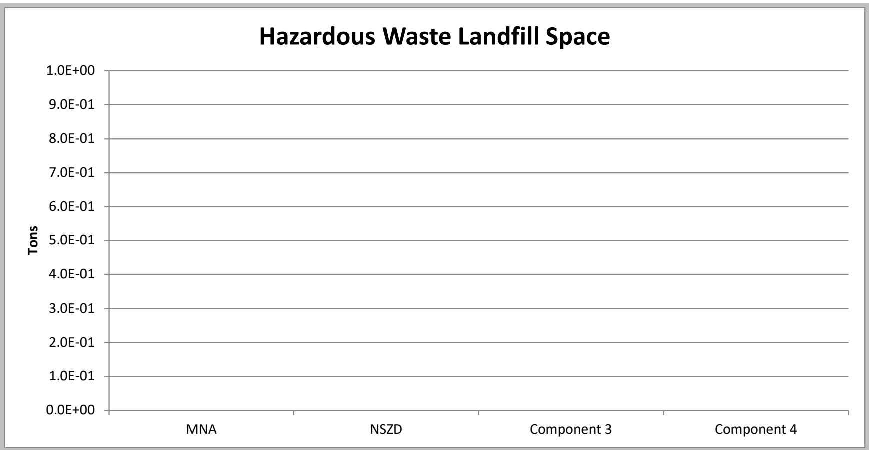

Total SOx Emissions
Metric Ton
1.60E-02
1.40E-02
1.20E-02
1.00E-02
8.00E-03
6.00E-03
4.00E-03
2.00E-03
0.00E+00
MNA
NSZD
Component 3
Component 4
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

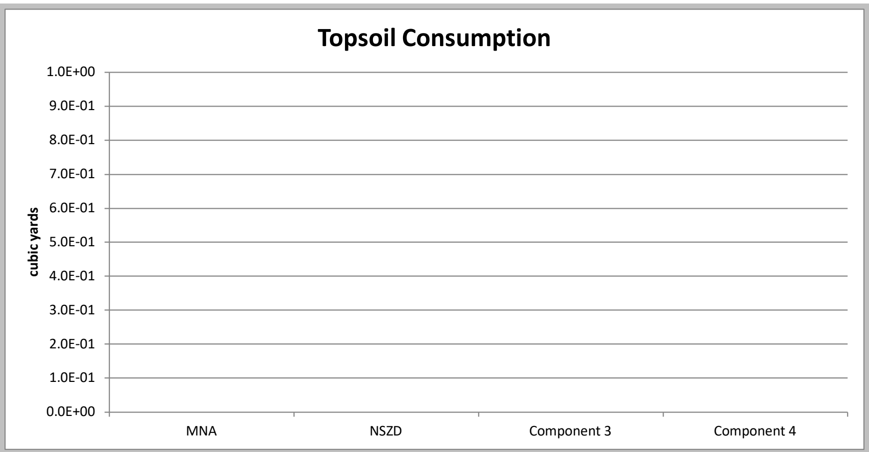

Total PM_{10} Emissions
Metric Ton
1.20E-02
1.00E-02
8.00E-03
6.00E-03
4.00E-03
2.00E-03
0.00E+00
MNA
NSZD
Component 3
Component 4
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

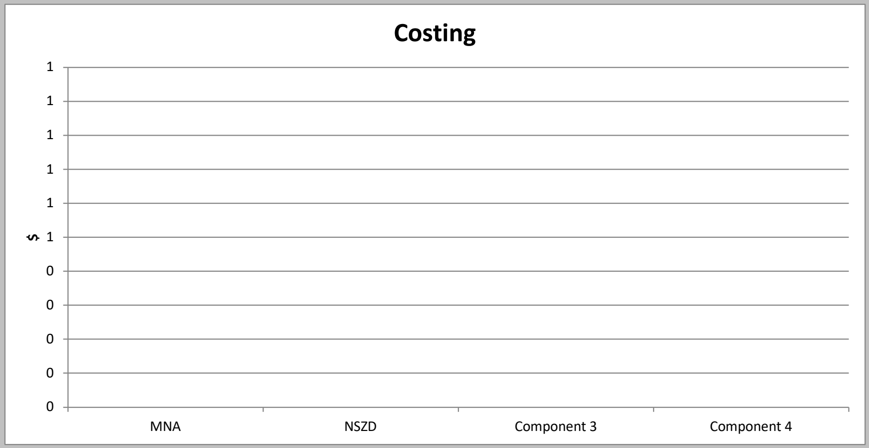

Accident Risk - Fatality
Risk of Fatality
2.50E-04
2.00E-04
1.50E-04
1.00E-04
5.00E-05
0.00E+00
MNA
NSZD
Component 3
Component 4
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

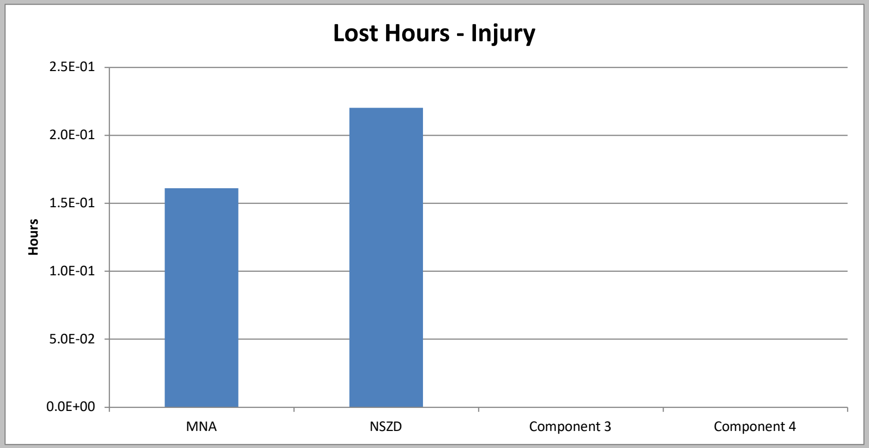

Accident Risk - Injury
Risk of Injury
3.00E-02
2.50E-02
2.00E-02
1.50E-02
1.00E-02
5.00E-03
0.00E+00
MNA
NSZD
Component 3
Component 4
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


Non-Hazardous Waste Landfill Space
Tons
2.5E+01
2.0E+01
1.5E+01
1.0E+01
5.0E+00
0.0E+00
MNA
NSZD
Component 3
Component 4


Hazardous Waste Landfill Space
Tons
1.0E+00
9.0E-01
8.0E-01
7.0E-01
6.0E-01
5.0E-01
4.0E-01
3.0E-01
2.0E-01
1.0E-01
0.0E+00
MNA
NSZD
Component 3
Component 4


Topsoil Consumption
cubic yards
1.0E+00
9.0E-01
8.0E-01
7.0E-01
6.0E-01
5.0E-01
4.0E-01
3.0E-01
2.0E-01
1.0E-01
0.0E+00
MNA
NSZD
Component 3
Component 4

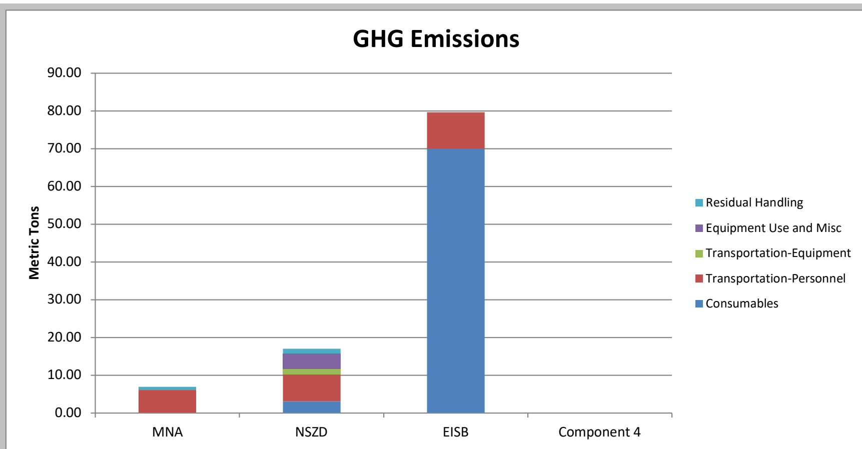

Costing
$
1
1
1
1
1
1
0
0
0
0
0
MNA
NSZD
Component 3
Component 4

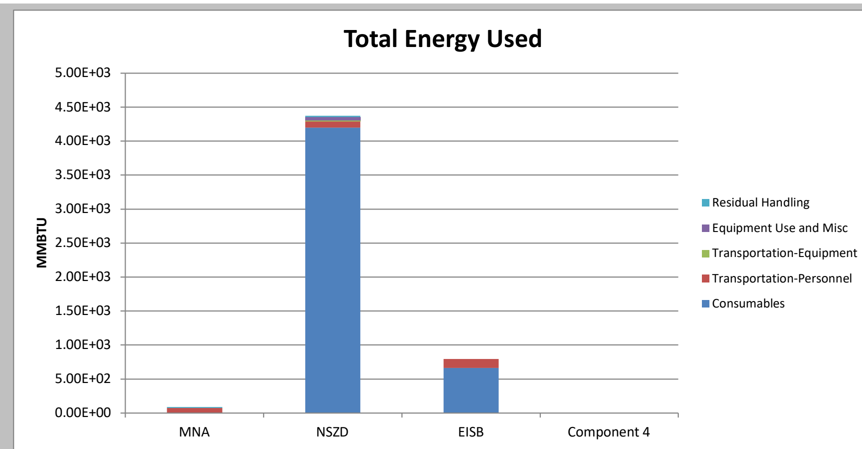

Lost Hours - Injury
Hours
2.5E-01
2.0E-01
1.5E-01
1.0E-01
5.0E-02
0.0E+00
MNA
NSZD
Component 3
Component 4

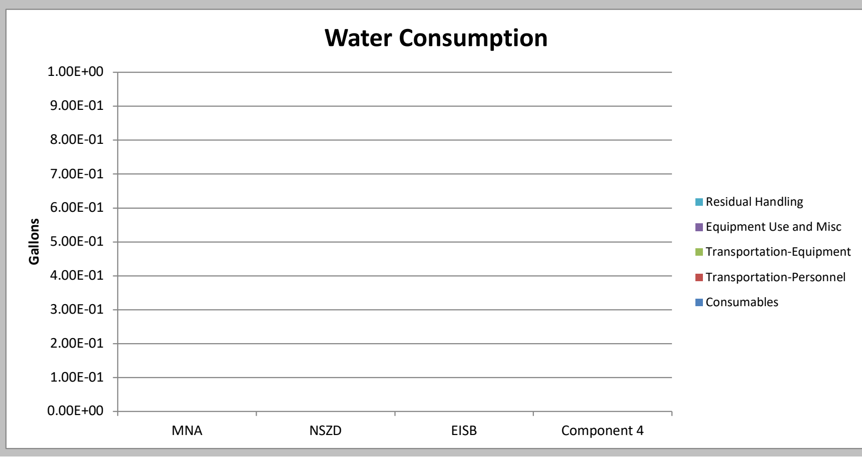
Sustainable Remediation - Environmental Footprint Summary
Alternative 2

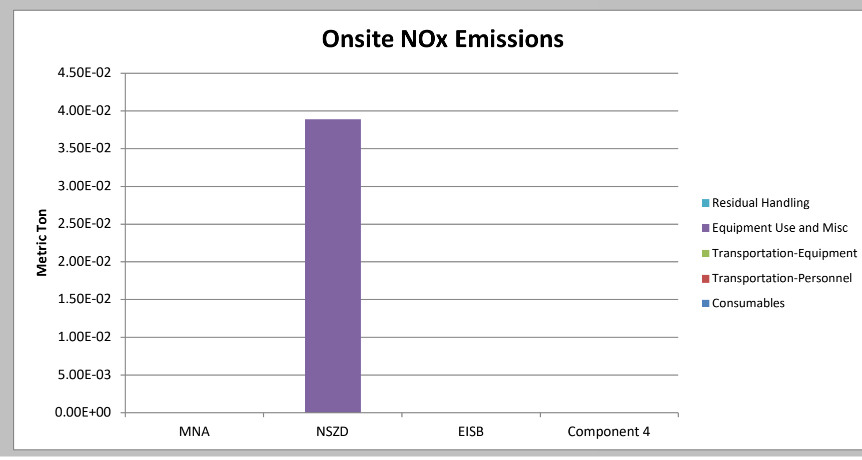
Phase	Activities	GHG Emissions	Total Energy Used	Water Consumption	Electricity Usage	Onsite NOx Emissions	Onsite SOx Emissions	Onsite PM10 Emissions	Total NOx Emissions	Total SOx Emissions	Total PM10 Emissions	Accident Risk Fatality	Accident Risk Injury
		metric ton	MMBTU	gallons	MWH	metric ton	metric ton	metric ton	metric ton	metric ton	metric ton		
MNA	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	NA	NA
	Transportation-Personnel	6.06	7.6E+01	NA	NA	NA	NA	NA	2.5E-03	7.9E-05	3.6E-04	1.7E-04	1.4E-02
	Transportation-Equipment	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.9E-06	5.9E-03
	Residual Handling	0.88	1.1E+01	NA	NA	0.0E+00	0.0E+00	0.0E+00	2.8E-04	4.9E-06	2.5E-05	4.9E-06	3.9E-04
	Sub-Total	6.94	8.79E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.80E-03	8.41E-05	3.84E-04	1.81E-04	2.01E-02
NSZD	Consumables	3.09	4.2E+03	NA	NA	NA	NA	NA	4.8E-03	7.3E-03	1.1E-03	NA	NA
	Transportation-Personnel	7.18	9.1E+01	NA	NA	NA	NA	NA	3.0E-03	9.4E-05	4.3E-04	2.0E-04	1.6E-02
	Transportation-Equipment	1.41	1.9E+01	NA	NA	NA	NA	NA	4.5E-04	1.8E-05	3.7E-05	3.6E-06	2.9E-04
	Equipment Use and Misc	4.07	4.9E+01	0.0E+00	0.0E+00	3.9E-02	4.0E-03	3.5E-03	4.1E-02	5.1E-03	3.8E-03	2.2E-05	1.0E-02
	Residual Handling	1.26	1.8E+01	NA	NA	0.0E+00	0.0E+00	0.0E+00	1.8E-03	7.9E-04	4.2E-03	5.5E-06	4.4E-04
	Sub-Total	17.01	4.37E+03	0.00E+00	0.00E+00	3.89E-02	3.97E-03	3.50E-03	5.11E-02	1.33E-02	9.55E-03	2.34E-04	2.75E-02
EISB	Consumables	69.97	6.6E+02	NA	NA	NA	NA	NA	1.4E-01	1.4E-01	7.0E-03	NA	NA
	Transportation-Personnel	9.67	1.3E+02	NA	NA	NA	NA	NA	3.1E-03	1.3E-04	2.5E-04	1.1E-04	8.9E-03
	Transportation-Equipment	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.2E-06	2.6E-03
	Residual Handling	0.00	0.0E+00	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	79.64	7.96E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E-01	1.40E-01	7.25E-03	1.12E-04	1.15E-02
Component 4	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	NA	NA
	Transportation-Personnel	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Transportation-Equipment	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Residual Handling	0.00	0.0E+00	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	0.00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total		**1.0E+02**	**5.3E+03**	**0.0E+00**	**0.0E+00**	**3.9E-02**	**4.0E-03**	**3.5E-03**	**2.0E-01**	**1.5E-01**	**1.7E-02**	**5.3E-04**	**5.9E-02**

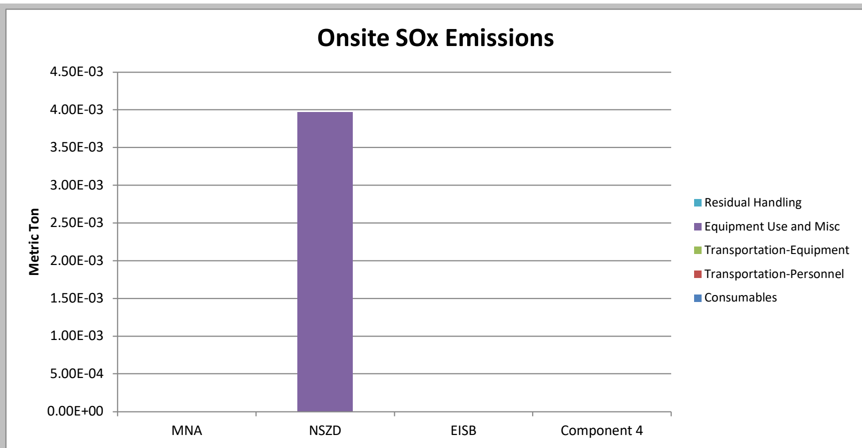
Remedial Alternative Phase	Non-Hazardous Waste Landfill Space	Hazardous Waste Landfill Space	Topsoil Consumption	Costing	Lost Hours - Injury	Percent electricity from renewable sources	Total Cost with Footprint Reduction
	tons	tons	cubic yards	$		%	
MNA	0.0E+00	0.0E+00	0.0E+00	0	1.6E-01	0.0%	$0
NSZD	2.3E+01	0.0E+00	0.0E+00	0	2.2E-01	0.0%	
EISB	0.0E+00	0.0E+00	0.0E+00	0	9.2E-02	0.0%	
Component 4	0.0E+00	0.0E+00	0.0E+00	0	0.0E+00	0.0%	
Total	**2.3E+01**	**0.0E+00**	**0.0E+00**	**$0**	**4.7E-01**	**0.0%**	

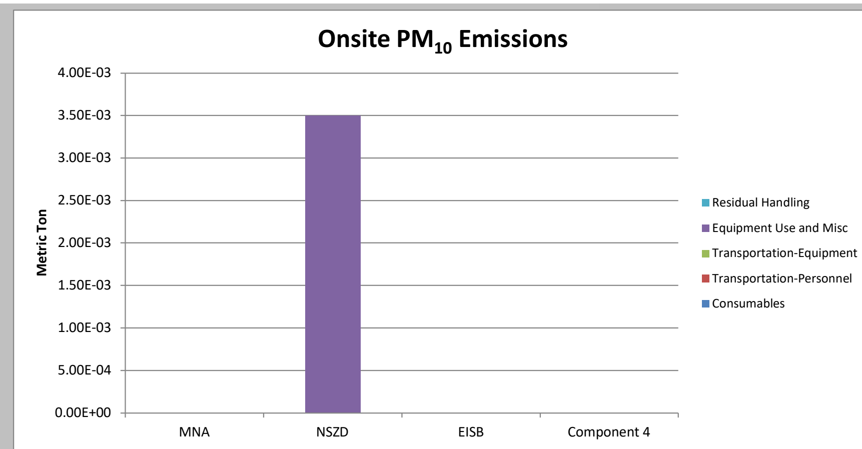

GHG Emissions
Metric Tons
90.00
80.00
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
MNA
NSZD
EISB
Component 4
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

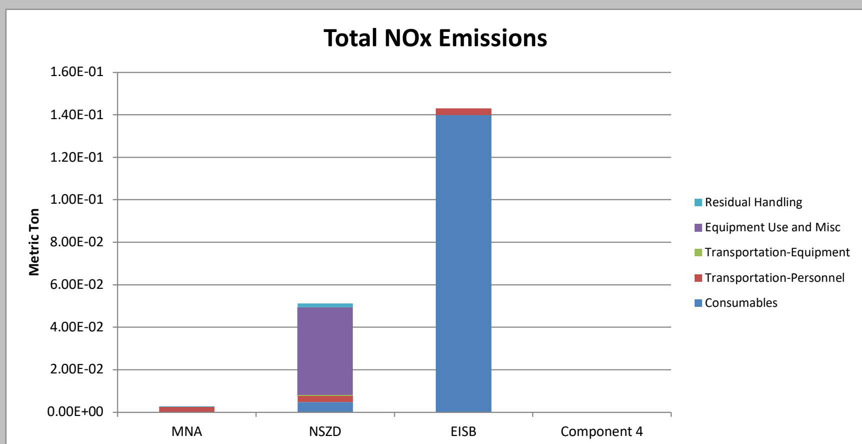

Total Energy Used
MMBTU
5.00E+03
4.50E+03
4.00E+03
3.50E+03
3.00E+03
2.50E+03
2.00E+03
1.50E+03
1.00E+03
5.00E+02
0.00E+00
MNA
NSZD
EISB
Component 4
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

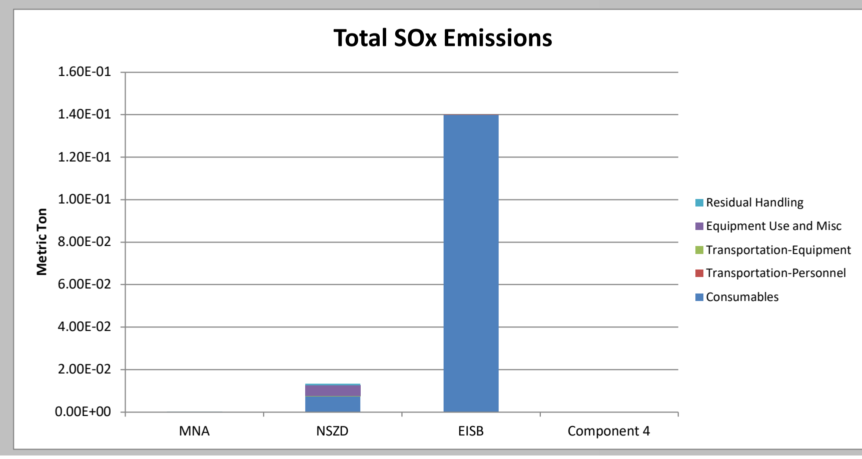

Water Consumption
Gallons
1.00E+00
9.00E-01
8.00E-01
7.00E-01
6.00E-01
5.00E-01
4.00E-01
3.00E-01
2.00E-01
1.00E-01
0.00E+00
MNA
NSZD
EISB
Component 4
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

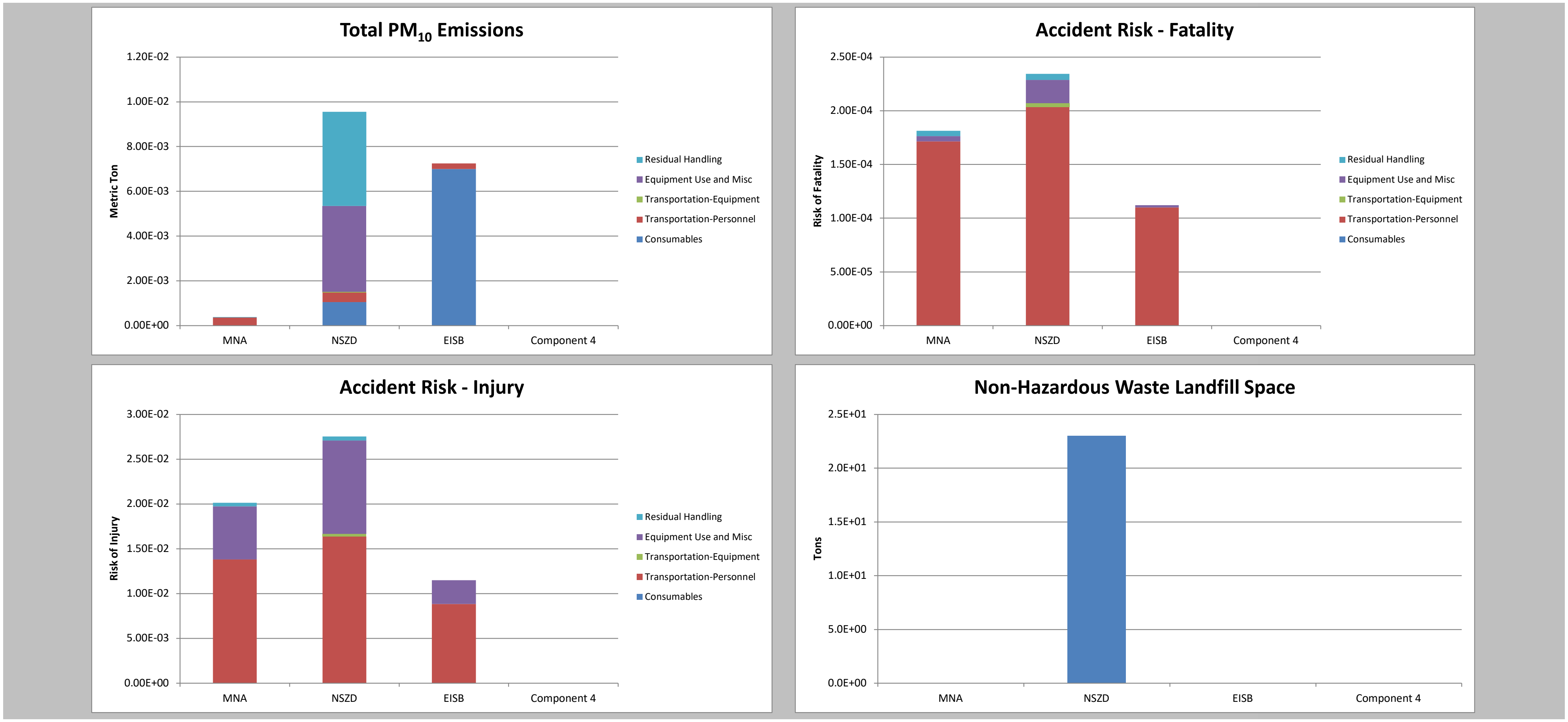

Onsite NOx Emissions
Metric Ton
4.50E-02
4.00E-02
3.50E-02
3.00E-02
2.50E-02
2.00E-02
1.50E-02
1.00E-02
5.00E-03
0.00E+00
MNA
NSZD
EISB
Component 4
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


Onsite SOx Emissions
Metric Ton
4.50E-03
4.00E-03
3.50E-03
3.00E-03
2.50E-03
2.00E-03
1.50E-03
1.00E-03
5.00E-04
0.00E+00
MNA
NSZD
EISB
Component 4
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

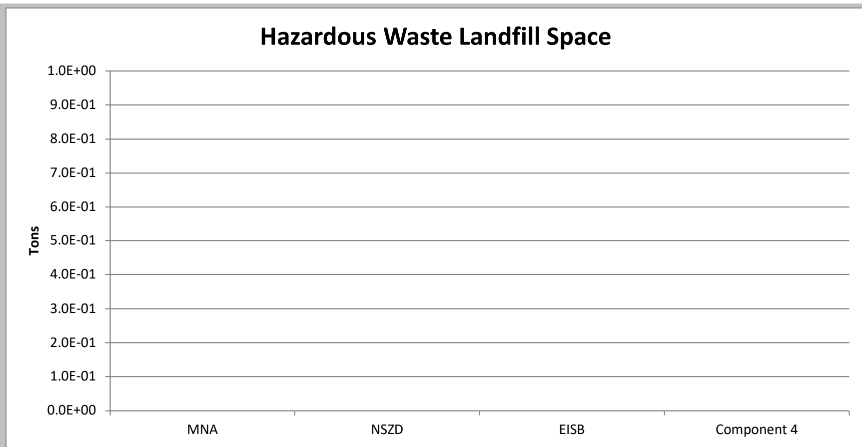

Onsite PM_{10} Emissions
Metric Ton
4.00E-03
3.50E-03
3.00E-03
2.50E-03
2.00E-03
1.50E-03
1.00E-03
5.00E-04
0.00E+00
MNA
NSZD
EISB
Component 4
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


Total NOx Emissions
Metric Ton
1.60E-01
1.40E-01
1.20E-01
1.00E-01
8.00E-02
6.00E-02
4.00E-02
2.00E-02
0.00E+00
MNA
NSZD
EISB
Component 4
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

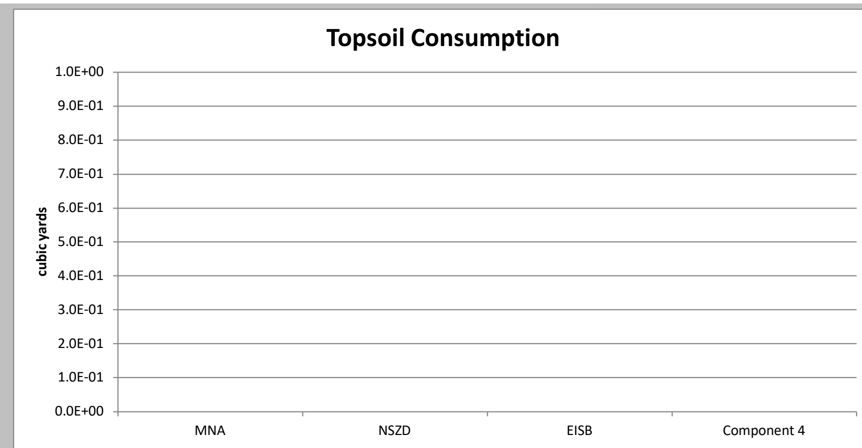

Total SOx Emissions
Metric Ton
1.60E-01
1.40E-01
1.20E-01
1.00E-01
8.00E-02
6.00E-02
4.00E-02
2.00E-02
0.00E+00
MNA
NSZD
EISB
Component 4
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables



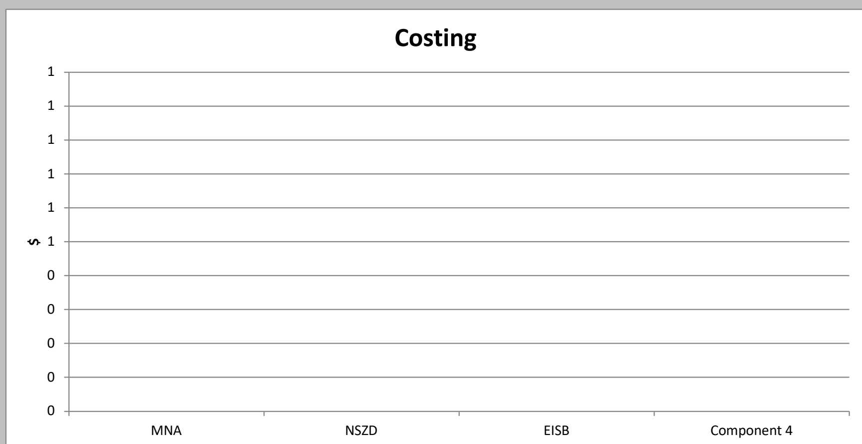
Total PM10 Emissions
Metric Ton
1.20E-02
1.00E-02
8.00E-03
6.00E-03
4.00E-03
2.00E-03
0.00E+00
MNA
NSZD
EISB
Component 4
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables
Accident Risk - Fatality
Risk of Fatality
2.50E-04
2.00E-04
1.50E-04
1.00E-04
5.00E-05
0.00E+00
MNA
NSZD
EISB
Component 4
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables
Accident Risk - Injury
Risk of Injury
3.00E-02
2.50E-02
2.00E-02
1.50E-02
1.00E-02
5.00E-03
0.00E+00
MNA
NSZD
EISB
Component 4
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables
Non-Hazardous Waste Landfill Space
Tons
2.5E+01
2.0E+01
1.5E+01
1.0E+01
5.0E+00
0.0E+00
MNA
NSZD
EISB
Component 4



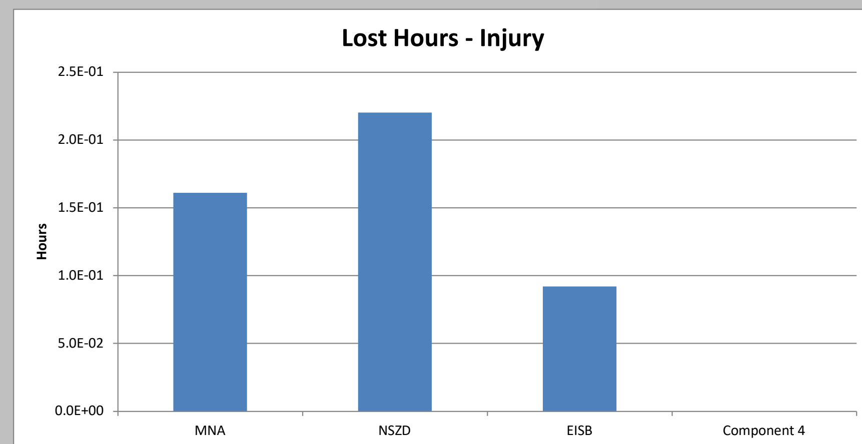
Hazardous Waste Landfill Space
Tons
1.0E+00
9.0E-01
8.0E-01
7.0E-01
6.0E-01
5.0E-01
4.0E-01
3.0E-01
2.0E-01
1.0E-01
0.0E+00
MNA
NSZD
EISB
Component 4



Topsoil Consumption
cubic yards
1.0E+00
9.0E-01
8.0E-01
7.0E-01
6.0E-01
5.0E-01
4.0E-01
3.0E-01
2.0E-01
1.0E-01
0.0E+00
MNA
NSZD
EISB
Component 4



Costing
$
1
1
1
1
1
1
0
0
0
0
0
MNA
NSZD
EISB
Component 4

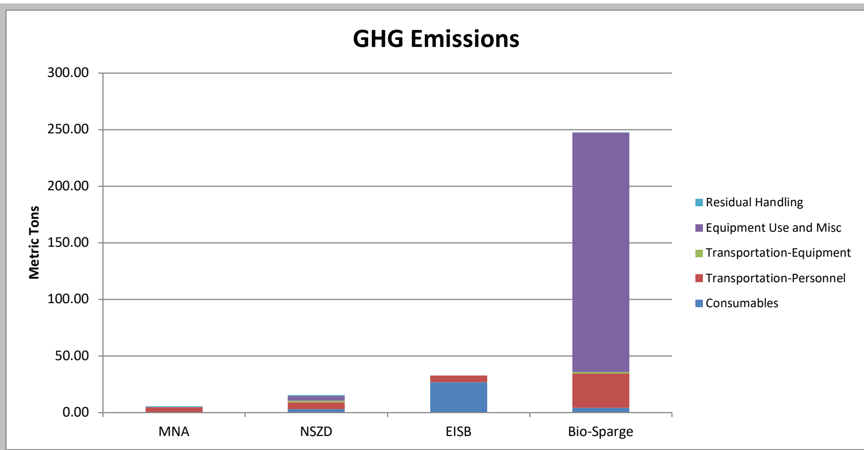


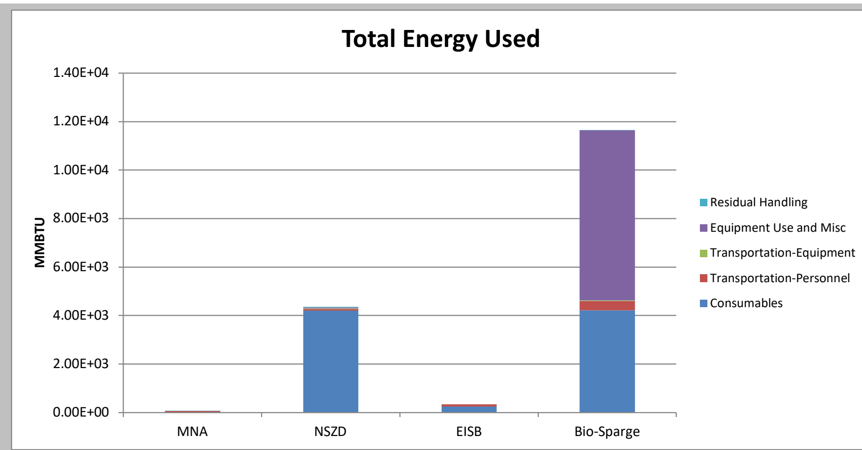
Lost Hours - Injury
Hours
2.5E-01
2.0E-01
1.5E-01
1.0E-01
5.0E-02
0.0E+00
MNA
NSZD
EISB
Component 4

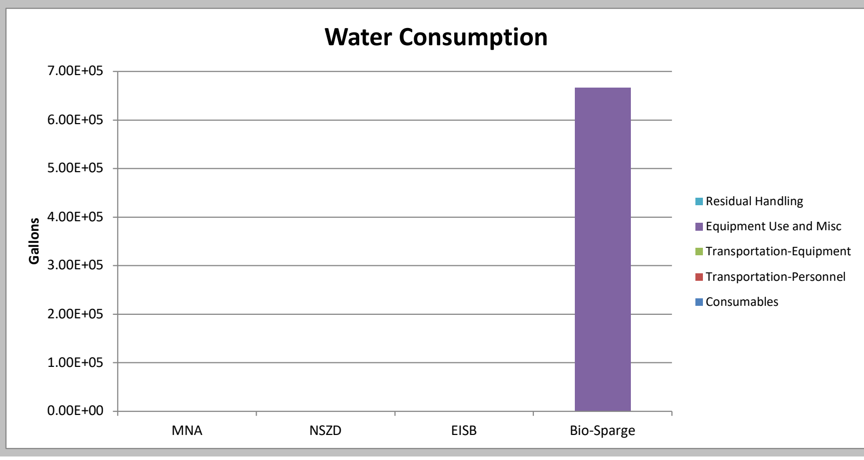
Sustainable Remediation - Environmental Footprint Summary
Alternative 3

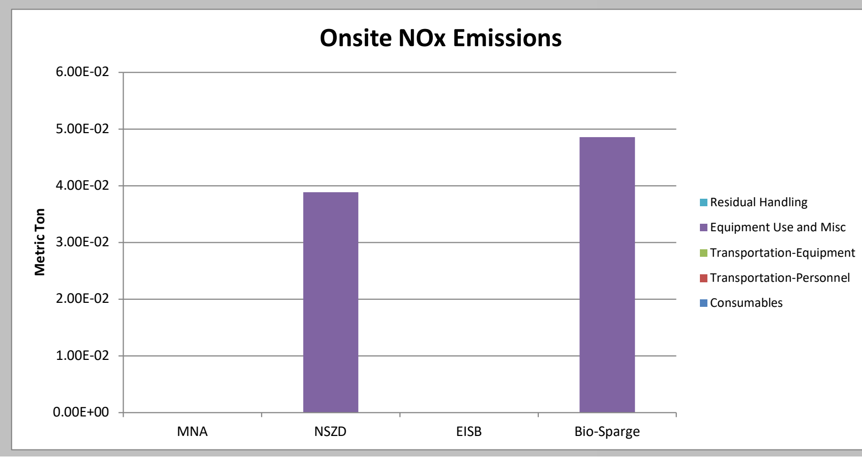
Phase	Activities	GHG Emissions (metric ton)	Total Energy Used (MMBTU)	Water Consumption (gallons)	Electricity Usage (MWH)	Onsite NOx Emissions (metric ton)	Onsite SOx Emissions (metric ton)	Onsite PM10 Emissions (metric ton)	Total NOx Emissions (metric ton)	Total SOx Emissions (metric ton)	Total PM10 Emissions (metric ton)	Accident Risk Fatality	Accident Risk Injury
MNA	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	NA	NA
	Transportation-Personnel	4.85	6.1E+01	NA	NA	NA	NA	NA	2.0E-03	6.3E-05	2.9E-04	1.4E-04	1.1E-02
	Transportation-Equipment	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	4.0E-06	4.8E-03
	Residual Handling	0.70	9.2E+00	NA	NA	0.0E+00	0.0E+00	0.0E+00	2.2E-04	3.9E-06	2.0E-05	3.9E-06	3.1E-04
	Sub-Total	5.55	7.04E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E-03	6.73E-05	3.07E-04	1.45E-04	1.62E-02
NSZD	Consumables	3.09	4.2E+03	NA	NA	NA	NA	NA	4.8E-03	7.3E-03	1.1E-03	NA	NA
	Transportation-Personnel	5.97	7.5E+01	NA	NA	NA	NA	NA	2.5E-03	7.8E-05	3.5E-04	1.7E-04	1.4E-02
	Transportation-Equipment	1.41	1.9E+01	NA	NA	NA	NA	NA	4.5E-04	1.8E-05	3.7E-05	3.6E-06	2.9E-04
	Equipment Use and Misc	4.07	4.9E+01	0.0E+00	0.0E+00	3.9E-02	4.0E-03	3.5E-03	4.1E-02	5.1E-03	3.8E-03	2.1E-05	9.6E-03
	Residual Handling	1.08	1.5E+01	NA	NA	0.0E+00	0.0E+00	0.0E+00	1.7E-03	7.9E-04	4.2E-03	4.5E-06	3.6E-04
	Sub-Total	15.62	4.36E+03	0.00E+00	0.00E+00	3.89E-02	3.97E-03	3.50E-03	5.06E-02	1.33E-02	9.47E-03	1.98E-04	2.38E-02
EISB	Consumables	26.67	2.5E+02	NA	NA	NA	NA	NA	5.3E-02	5.3E-02	2.7E-03	NA	NA
	Transportation-Personnel	6.03	8.3E+01	NA	NA	NA	NA	NA	1.9E-03	7.9E-05	1.6E-04	6.9E-05	5.5E-03
	Transportation-Equipment	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	3.6E-07	4.4E-04
	Residual Handling	0.00	0.0E+00	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Sub-Total	32.70	3.35E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.53E-02	5.34E-02	2.82E-03	6.90E-05	5.96E-03
Bio-Sparge	Consumables	4.24	4.2E+03	NA	NA	NA	NA	NA	7.0E-03	1.1E-02	1.6E-03	NA	NA
	Transportation-Personnel	30.25	3.8E+02	NA	NA	NA	NA	NA	1.3E-02	4.0E-04	1.8E-03	4.4E-04	3.6E-02
	Transportation-Equipment	1.45	1.9E+01	NA	NA	NA	NA	NA	4.5E-04	8.0E-06	4.0E-05	3.6E-06	2.9E-04
	Equipment Use and Misc	211.45	7.0E+03	6.7E+05	1.3E+03	4.9E-02	5.0E-03	4.4E-03	2.7E-01	9.2E-02	2.0E-01	3.3E-05	1.4E-02
	Residual Handling	0.42	6.8E+00	NA	NA	0.0E+00	0.0E+00	0.0E+00	1.7E-03	8.9E-04	4.7E-03	5.9E-07	4.7E-05
	Sub-Total	247.80	1.17E+04	6.66E+05	1.31E+03	4.86E-02	4.97E-03	4.37E-03	2.95E-01	1.04E-01	2.10E-01	4.82E-04	4.97E-02
Total		**3.0E+02**	**1.6E+04**	**6.7E+05**	**1.3E+03**	**8.7E-02**	**8.9E-03**	**7.9E-03**	**4.0E-01**	**1.7E-01**	**2.2E-01**	**8.9E-04**	**9.6E-02**

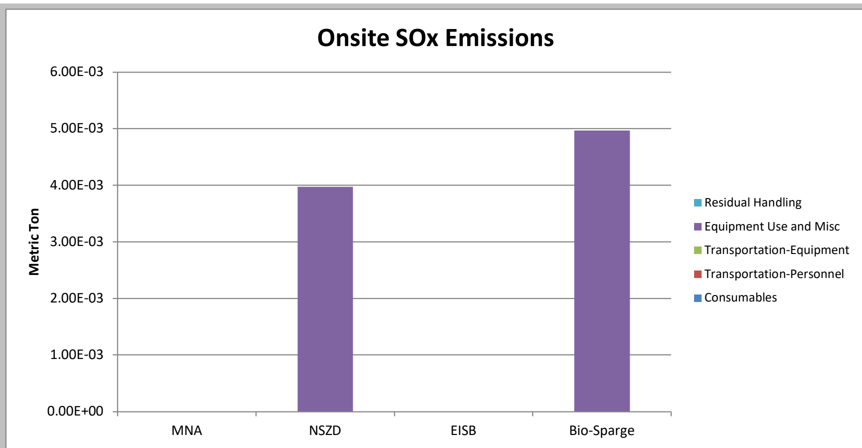
Remedial Alternative Phase	Non-Hazardous Waste Landfill Space (tons)	Hazardous Waste Landfill Space (tons)	Topsoil Consumption (cubic yards)	Costing ($)	Lost Hours - Injury	Percent electricity from renewable sources (%)	Total Cost with Footprint Reduction
MNA	0.0E+00	0.0E+00	0.0E+00	0	1.3E-01	0.0%	$0
NSZD	2.3E+01	0.0E+00	0.0E+00	0	1.9E-01	0.0%	
EISB	0.0E+00	0.0E+00	0.0E+00	0	4.8E-02	0.0%	
Bio-Sparge	2.6E+01	0.0E+00	0.0E+00	0	4.0E-01	75.3%	
Total	4.9E+01	0.0E+00	0.0E+00	$0	7.7E-01	18.8%	

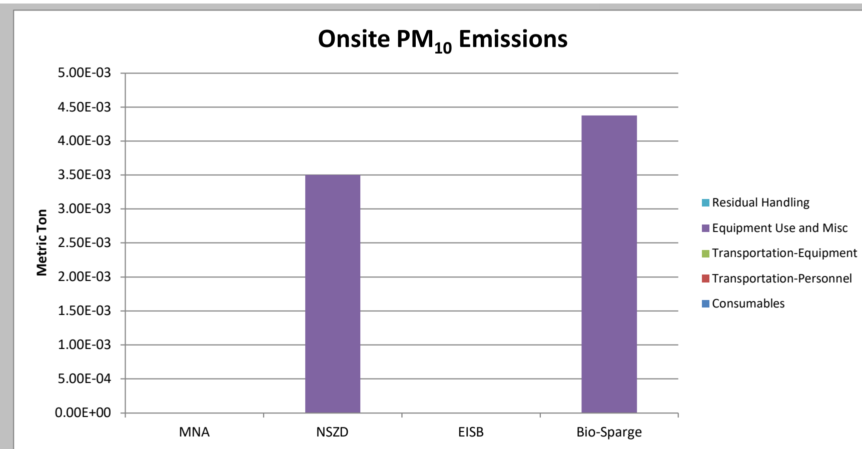

GHG Emissions
Metric Tons
300.00
250.00
200.00
150.00
100.00
50.00
0.00
MNA
NSZD
EISB
Bio-Sparge
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

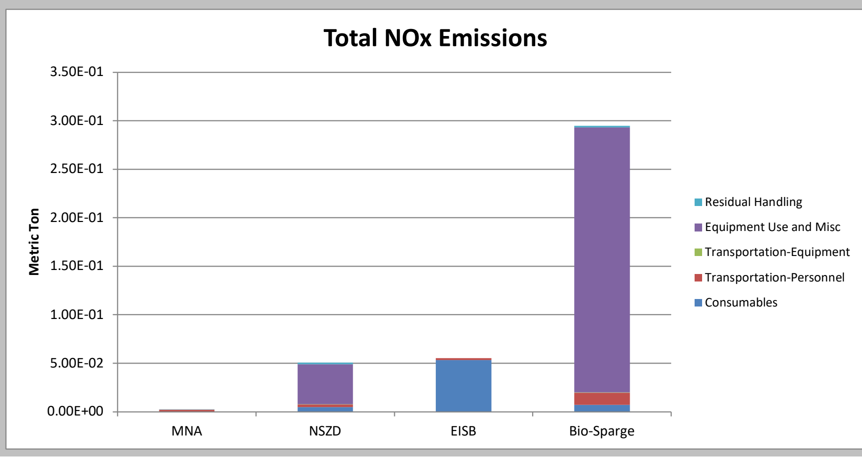

Total Energy Used
MMBTU
1.40E+04
1.20E+04
1.00E+04
8.00E+03
6.00E+03
4.00E+03
2.00E+03
0.00E+00
MNA
NSZD
EISB
Bio-Sparge
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

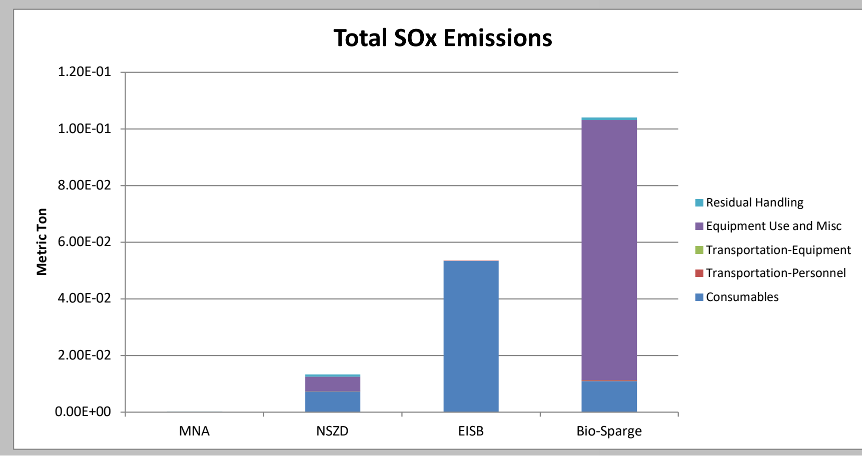

Water Consumption
Gallons
7.00E+05
6.00E+05
5.00E+05
4.00E+05
3.00E+05
2.00E+05
1.00E+05
0.00E+00
MNA
NSZD
EISB
Bio-Sparge
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

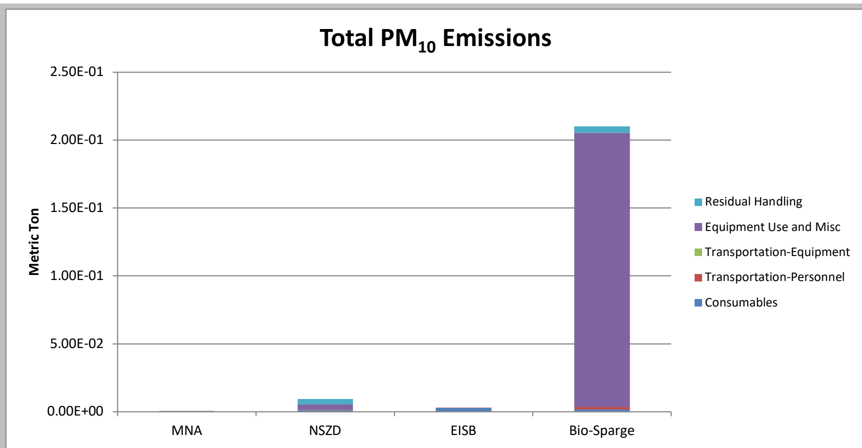

Onsite NOx Emissions
Metric Ton
6.00E-02
5.00E-02
4.00E-02
3.00E-02
2.00E-02
1.00E-02
0.00E+00
MNA
NSZD
EISB
Bio-Sparge
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

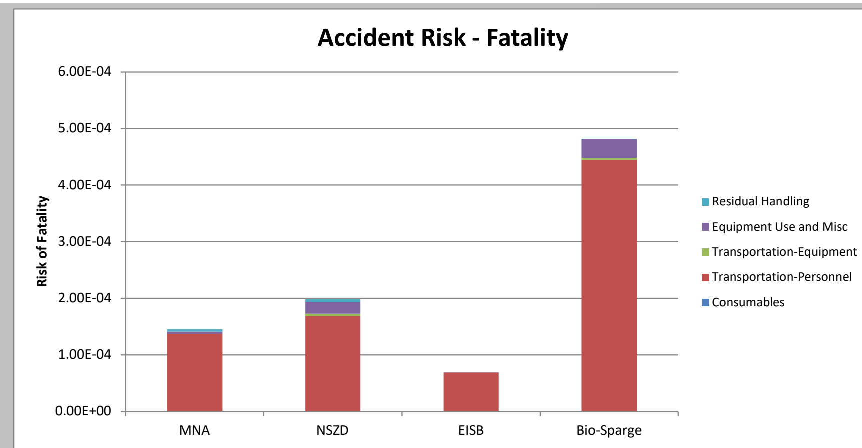

Onsite SOx Emissions
Metric Ton
6.00E-03
5.00E-03
4.00E-03
3.00E-03
2.00E-03
1.00E-03
0.00E+00
MNA
NSZD
EISB
Bio-Sparge
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

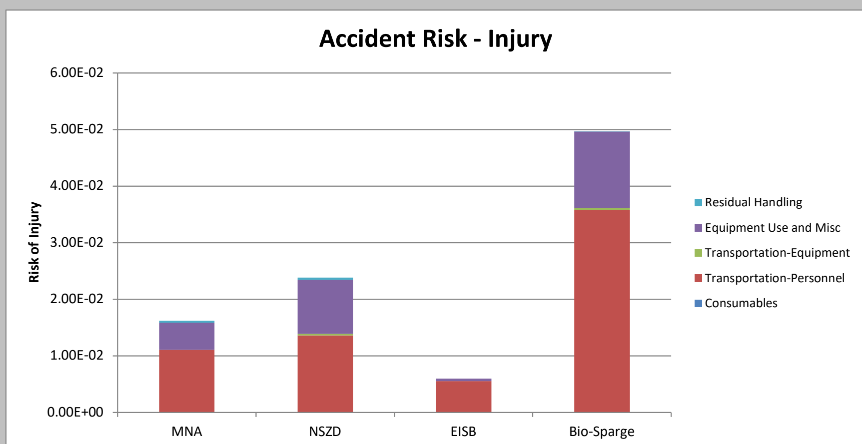

Onsite PM_{10} Emissions
Metric Ton
5.00E-03
4.50E-03
4.00E-03
3.50E-03
3.00E-03
2.50E-03
2.00E-03
1.50E-03
1.00E-03
5.00E-04
0.00E+00
MNA
NSZD
EISB
Bio-Sparge
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

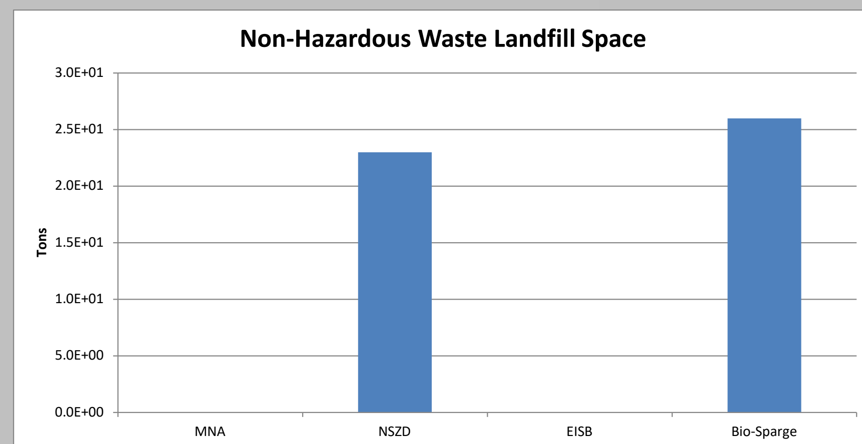

Total NOx Emissions
Metric Ton
3.50E-01
3.00E-01
2.50E-01
2.00E-01
1.50E-01
1.00E-01
5.00E-02
0.00E+00
MNA
NSZD
EISB
Bio-Sparge
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

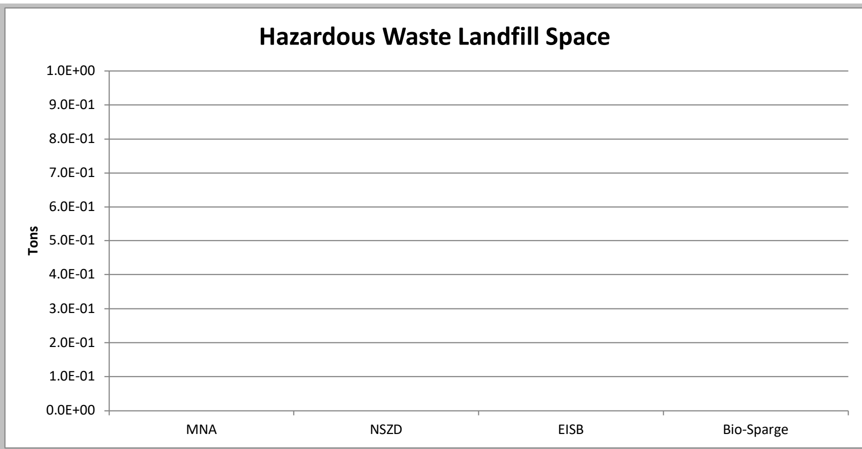

Total SOx Emissions
Metric Ton
1.20E-01
1.00E-01
8.00E-02
6.00E-02
4.00E-02
2.00E-02
0.00E+00
MNA
NSZD
EISB
Bio-Sparge
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

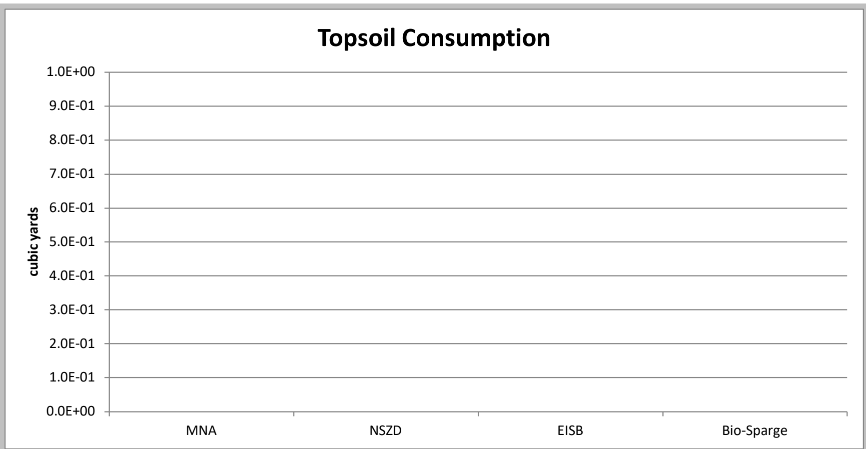

Total PM_{10} Emissions
Metric Ton
2.50E-01
2.00E-01
1.50E-01
1.00E-01
5.00E-02
0.00E+00
MNA
NSZD
EISB
Bio-Sparge
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

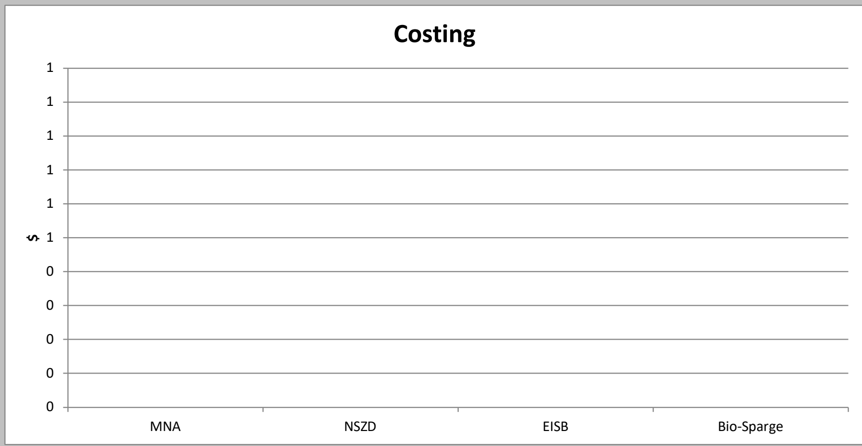

Accident Risk - Fatality
Risk of Fatality
6.00E-04
5.00E-04
4.00E-04
3.00E-04
2.00E-04
1.00E-04
0.00E+00
MNA
NSZD
EISB
Bio-Sparge
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

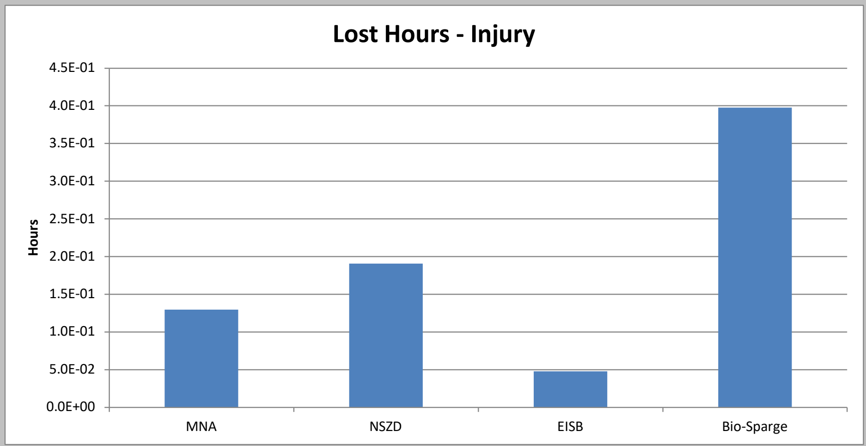

Accident Risk - Injury
Risk of Injury
6.00E-02
5.00E-02
4.00E-02
3.00E-02
2.00E-02
1.00E-02
0.00E+00
MNA
NSZD
EISB
Bio-Sparge
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


Non-Hazardous Waste Landfill Space
Tons
3.0E+01
2.5E+01
2.0E+01
1.5E+01
1.0E+01
5.0E+00
0.0E+00
MNA
NSZD
EISB
Bio-Sparge


Hazardous Waste Landfill Space
Tons
1.0E+00
9.0E-01
8.0E-01
7.0E-01
6.0E-01
5.0E-01
4.0E-01
3.0E-01
2.0E-01
1.0E-01
0.0E+00
MNA
NSZD
EISB
Bio-Sparge


Topsoil Consumption
cubic yards
1.0E+00
9.0E-01
8.0E-01
7.0E-01
6.0E-01
5.0E-01
4.0E-01
3.0E-01
2.0E-01
1.0E-01
0.0E+00
MNA
NSZD
EISB
Bio-Sparge

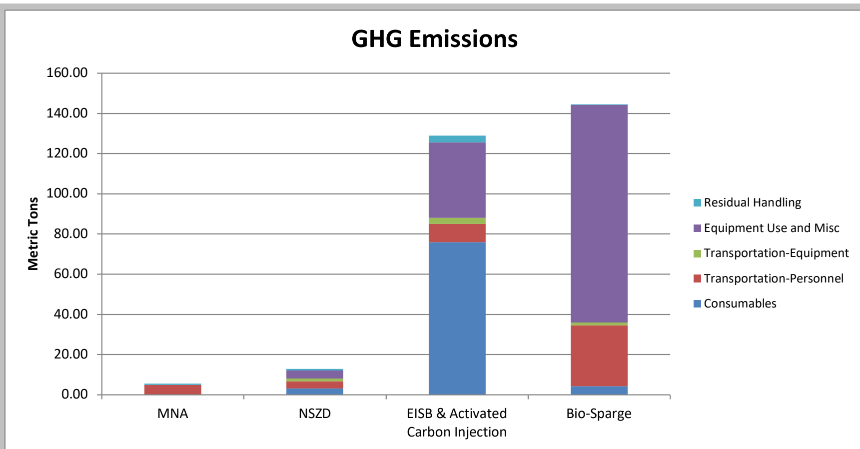

Costing
$
1
1
1
1
1
1
0
0
0
0
0
MNA
NSZD
EISB
Bio-Sparge

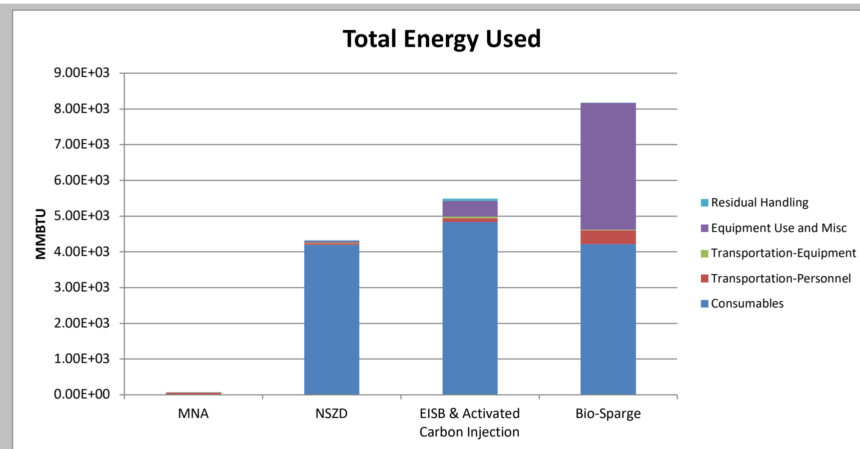

Lost Hours - Injury
Hours
4.5E-01
4.0E-01
3.5E-01
3.0E-01
2.5E-01
2.0E-01
1.5E-01
1.0E-01
5.0E-02
0.0E+00
MNA
NSZD
EISB
Bio-Sparge

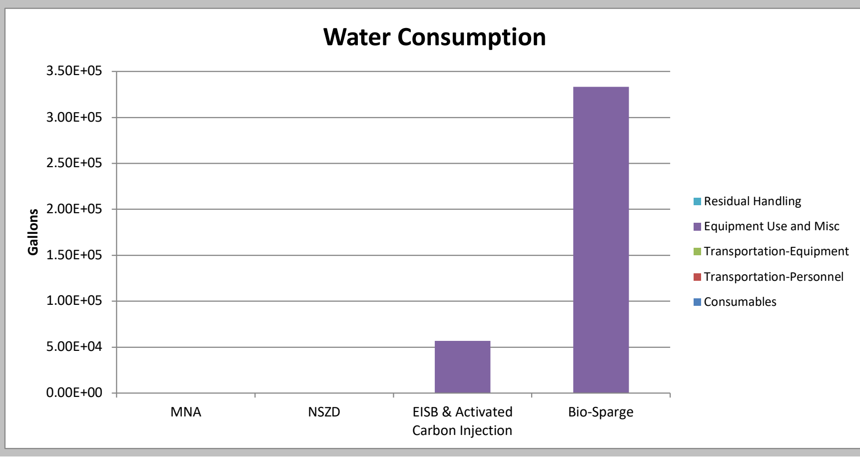
Sustainable Remediation - Environmental Footprint Summary
Alternative 4

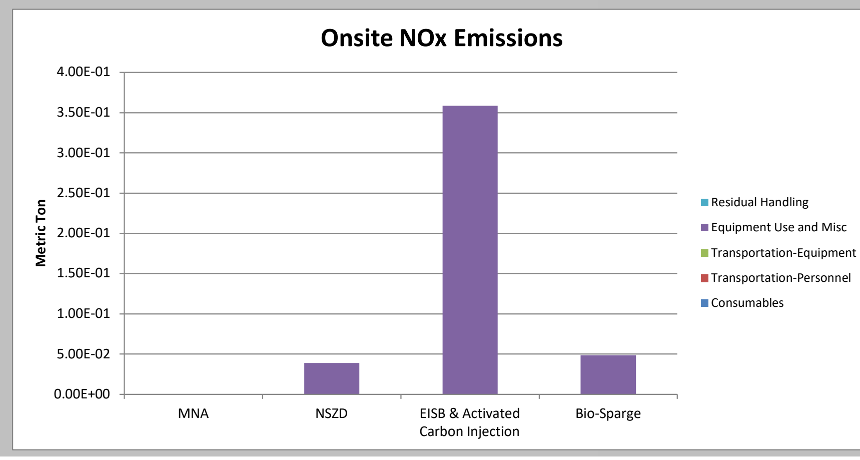
Phase	Activities	GHG Emissions	Total Energy Used	Water Consumption	Electricity Usage	Onsite NOx Emissions	Onsite SOx Emissions	Onsite PM10 Emissions	Total NOx Emissions	Total SOx Emissions	Total PM10 Emissions	Accident Risk Fatality	Accident Risk Injury
		metric ton	MMBTU	gallons	MWH	metric ton	metric ton	metric ton	metric ton	metric ton	metric ton		
MNA	Consumables	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	NA	NA
	Transportation-Personnel	4.85	6.1E+01	NA	NA	NA	NA	NA	2.0E-03	6.3E-05	2.9E-04	1.4E-04	1.1E-02
	Transportation-Equipment	0.00	0.0E+00	NA	NA	NA	NA	NA	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
	Equipment Use and Misc	0.00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	2.5E-06	3.1E-03
	Residual Handling	0.70	9.2E+00	NA	NA	0.0E+00	0.0E+00	0.0E+00	2.2E-04	3.9E-06	2.0E-05	3.9E-06	3.1E-04
	Sub-Total	5.55	7.04E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.24E-03	6.73E-05	3.07E-04	1.44E-04	1.44E-02
NSZD	Consumables	3.09	4.2E+03	NA	NA	NA	NA	NA	4.8E-03	7.3E-03	1.1E-03	NA	NA
	Transportation-Personnel	3.55	4.5E+01	NA	NA	NA	NA	NA	1.5E-03	4.6E-05	2.1E-04	1.0E-04	8.1E-03
	Transportation-Equipment	1.41	1.9E+01	NA	NA	NA	NA	NA	4.5E-04	1.8E-05	3.7E-05	3.6E-06	2.9E-04
	Equipment Use and Misc	4.07	4.9E+01	0.0E+00	0.0E+00	3.9E-02	4.0E-03	3.5E-03	4.1E-02	5.1E-03	3.8E-03	2.0E-05	7.8E-03
	Residual Handling	0.73	1.1E+01	NA	NA	0.0E+00	0.0E+00	0.0E+00	1.6E-03	7.9E-04	4.2E-03	2.5E-06	2.0E-04
	Sub-Total	12.85	4.32E+03	0.00E+00	0.00E+00	3.89E-02	3.97E-03	3.50E-03	4.95E-02	1.33E-02	9.32E-03	1.26E-04	1.64E-02
EISB & Activated Carbon Injection	Consumables	75.92	4.8E+03	NA	NA	NA	NA	NA	7.7E-02	9.4E-02	9.6E-03	NA	NA
	Transportation-Personnel	9.12	1.2E+02	NA	NA	NA	NA	NA	3.8E-03	1.2E-04	5.4E-04	2.6E-04	2.1E-02
	Transportation-Equipment	3.05	4.0E+01	NA	NA	NA	NA	NA	9.6E-04	1.7E-05	8.5E-05	7.5E-06	6.0E-04
	Equipment Use and Misc	37.46	4.4E+02	5.7E+04	0.0E+00	3.6E-01	4.7E-02	3.0E-02	3.8E-01	5.7E-02	3.3E-02	1.0E-04	3.6E-02
	Residual Handling	3.42	5.9E+01	NA	NA	0.0E+00	0.0E+00	0.0E+00	1.7E-02	9.3E-03	4.9E-02	1.4E-06	1.1E-04
	Sub-Total	128.96	5.48E+03	5.68E+04	0.00E+00	3.58E-01	4.71E-02	2.97E-02	4.77E-01	1.61E-01	9.23E-02	3.71E-04	5.78E-02
Bio-Sparge	Consumables	4.24	4.2E+03	NA	NA	NA	NA	NA	7.0E-03	1.1E-02	1.6E-03	NA	NA
	Transportation-Personnel	30.25	3.8E+02	NA	NA	NA	NA	NA	1.3E-02	4.0E-04	1.8E-03	4.4E-04	3.6E-02
	Transportation-Equipment	1.45	1.9E+01	NA	NA	NA	NA	NA	4.5E-04	8.0E-06	4.0E-05	3.6E-06	2.9E-04
	Equipment Use and Misc	108.27	3.5E+03	3.3E+05	6.5E+02	4.9E-02	5.0E-03	4.4E-03	1.6E-01	4.9E-02	1.0E-01	3.1E-05	1.2E-02
	Residual Handling	0.42	6.8E+00	NA	NA	0.0E+00	0.0E+00	0.0E+00	1.7E-03	8.9E-04	4.7E-03	5.9E-07	4.7E-05
	Sub-Total	144.62	8.17E+03	3.33E+05	6.53E+02	4.86E-02	4.97E-03	4.37E-03	1.84E-01	6.13E-02	1.12E-01	4.81E-04	4.81E-02
Total		**2.9E+02**	**1.8E+04**	**3.9E+05**	**6.5E+02**	**4.5E-01**	**5.6E-02**	**3.8E-02**	**7.1E-01**	**2.4E-01**	**2.1E-01**	**1.1E-03**	**1.4E-01**

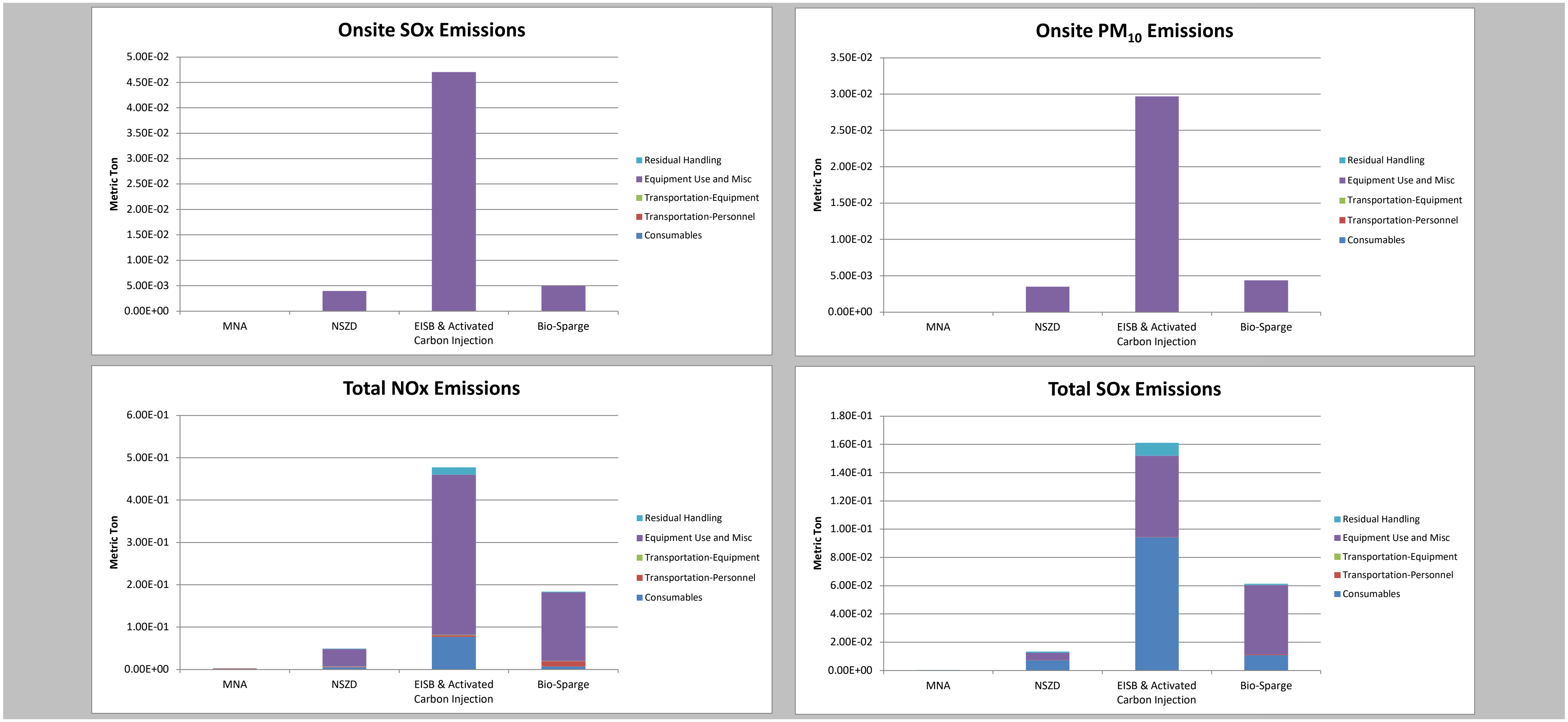
Remedial Alternative Phase	Non-Hazardous Waste Landfill Space	Hazardous Waste Landfill Space	Topsoil Consumption	Costing	Lost Hours - Injury	Percent electricity from renewable sources	Total Cost with Footprint Reduction
	tons	tons	cubic yards	$		%	
MNA	0.0E+00	0.0E+00	0.0E+00	0	1.2E-01	0.0%	$0
NSZD	2.3E+01	0.0E+00	0.0E+00	0	1.3E-01	0.0%	
EISB & Activated Carbon Injection	2.7E+02	0.0E+00	0.0E+00	0	4.6E-01	0.0%	
Bio-Sparge	2.6E+01	0.0E+00	0.0E+00	0	3.8E-01	75.3%	
Total	**3.2E+02**	**0.0E+00**	**0.0E+00**	**$0**	**1.1E+00**	**18.8%**	


GHG Emissions
Metric Tons
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
MNA
NSZD
EISB & Activated Carbon Injection
Bio-Sparge
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

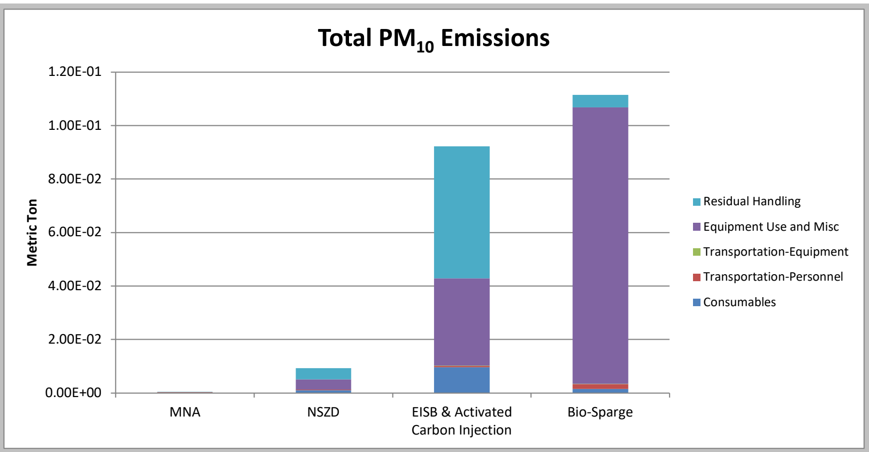

Total Energy Used
MMBTU
9.00E+03
8.00E+03
7.00E+03
6.00E+03
5.00E+03
4.00E+03
3.00E+03
2.00E+03
1.00E+03
0.00E+00
MNA
NSZD
EISB & Activated Carbon Injection
Bio-Sparge
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables


Water Consumption
Gallons
3.50E+05
3.00E+05
2.50E+05
2.00E+05
1.50E+05
1.00E+05
5.00E+04
0.00E+00
MNA
NSZD
EISB & Activated Carbon Injection
Bio-Sparge
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

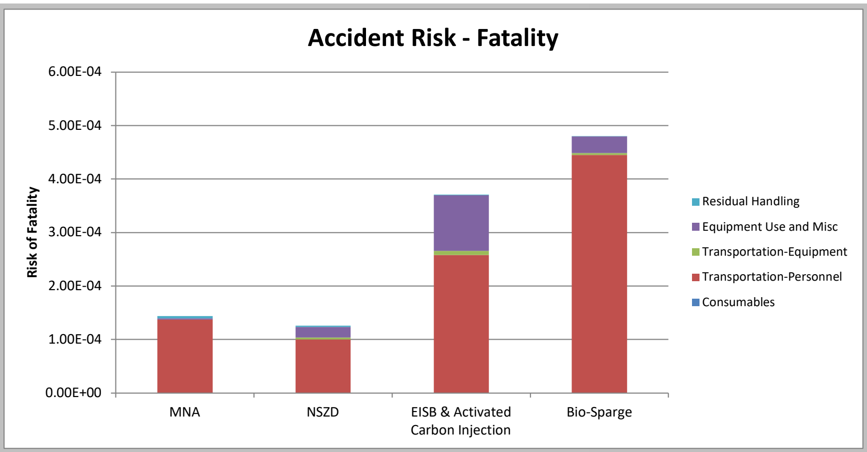

Onsite NOx Emissions
Metric Ton
4.00E-01
3.50E-01
3.00E-01
2.50E-01
2.00E-01
1.50E-01
1.00E-01
5.00E-02
0.00E+00
MNA
NSZD
EISB & Activated Carbon Injection
Bio-Sparge
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables



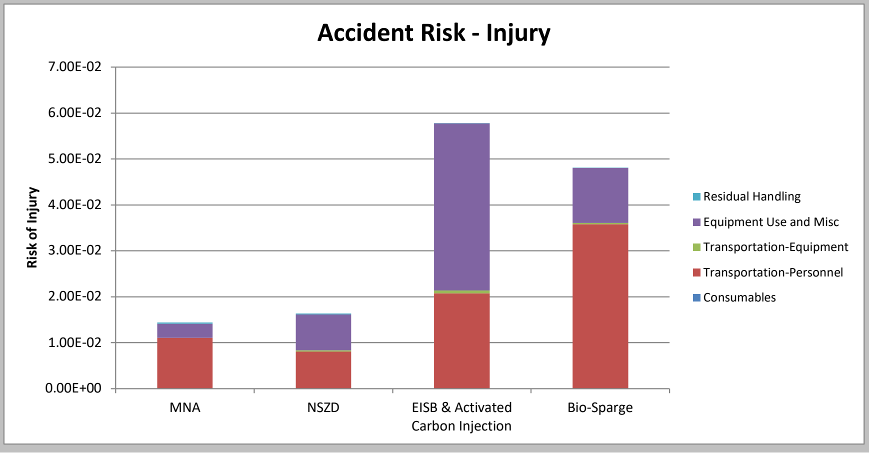
Onsite SOx Emissions
Metric Ton
5.00E-02
4.50E-02
4.00E-02
3.50E-02
3.00E-02
2.50E-02
2.00E-02
1.50E-02
1.00E-02
5.00E-03
0.00E+00
MNA
NSZD
EISB & Activated Carbon Injection
Bio-Sparge
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables
Onsite PM_{10} Emissions
Metric Ton
3.50E-02
3.00E-02
2.50E-02
2.00E-02
1.50E-02
1.00E-02
5.00E-03
0.00E+00
MNA
NSZD
EISB & Activated Carbon Injection
Bio-Sparge
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables
Total NOx Emissions
Metric Ton
6.00E-01
5.00E-01
4.00E-01
3.00E-01
2.00E-01
1.00E-01
0.00E+00
MNA
NSZD
EISB & Activated Carbon Injection
Bio-Sparge
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables
Total SOx Emissions
Metric Ton
1.80E-01
1.60E-01
1.40E-01
1.20E-01
1.00E-01
8.00E-02
6.00E-02
4.00E-02
2.00E-02
0.00E+00
MNA
NSZD
EISB & Activated Carbon Injection
Bio-Sparge
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables



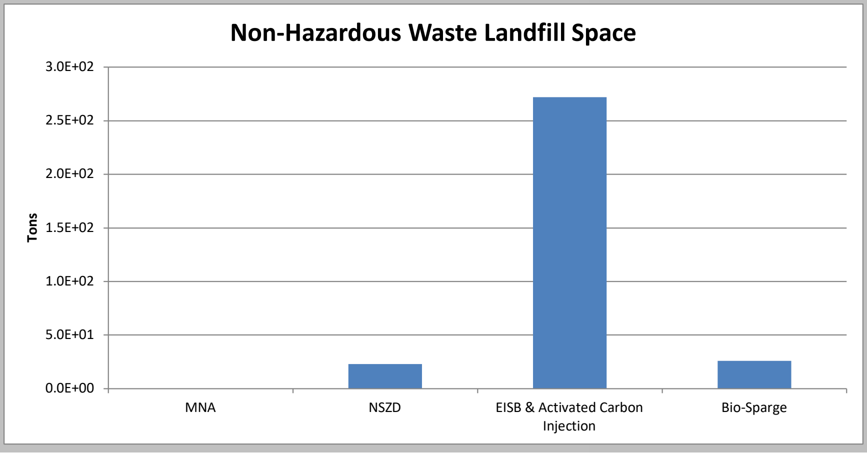
Total PM_{10} Emissions
Metric Ton
1.20E-01
1.00E-01
8.00E-02
6.00E-02
4.00E-02
2.00E-02
0.00E+00
MNA
NSZD
EISB & Activated Carbon Injection
Bio-Sparge
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables



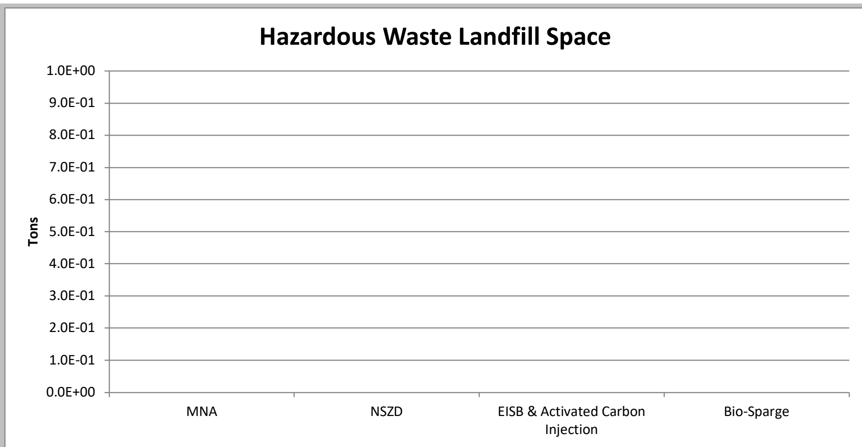
Accident Risk - Fatality
Risk of Fatality
6.00E-04
5.00E-04
4.00E-04
3.00E-04
2.00E-04
1.00E-04
0.00E+00
MNA
NSZD
EISB & Activated Carbon Injection
Bio-Sparge
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

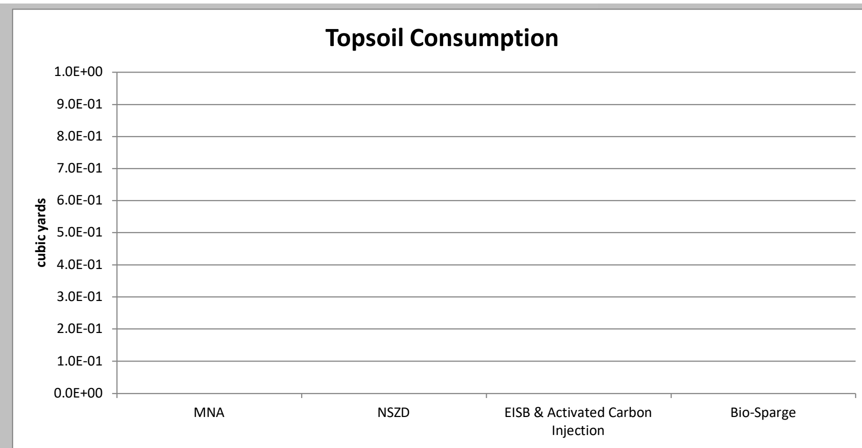


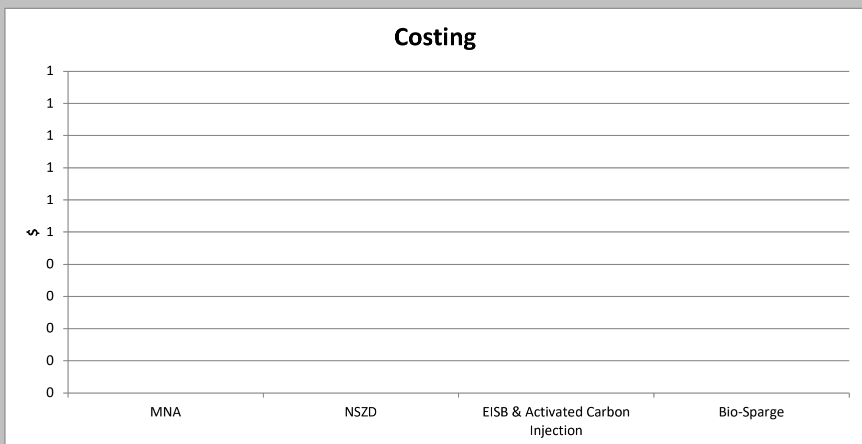
Accident Risk - Injury
Risk of Injury
7.00E-02
6.00E-02
5.00E-02
4.00E-02
3.00E-02
2.00E-02
1.00E-02
0.00E+00
MNA
NSZD
EISB & Activated Carbon Injection
Bio-Sparge
Residual Handling
Equipment Use and Misc
Transportation-Equipment
Transportation-Personnel
Consumables

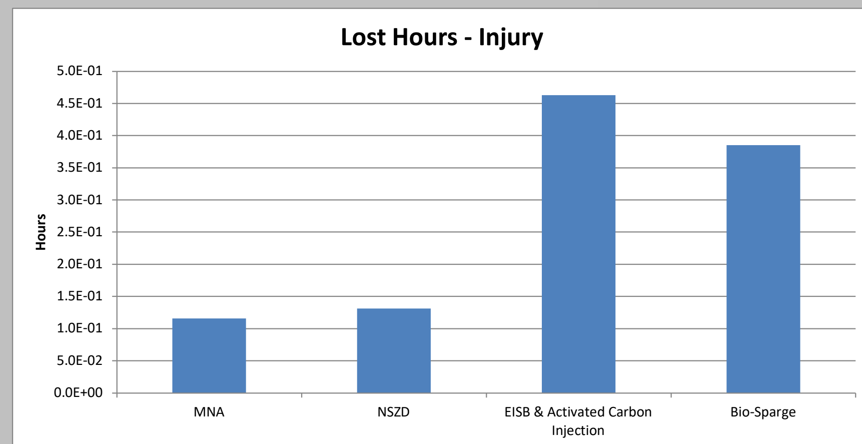


Non-Hazardous Waste Landfill Space
Tons
3.0E+02
2.5E+02
2.0E+02
1.5E+02
1.0E+02
5.0E+01
0.0E+00
MNA
NSZD
EISB & Activated Carbon Injection
Bio-Sparge


Hazardous Waste Landfill Space
Tons
1.0E+00
9.0E-01
8.0E-01
7.0E-01
6.0E-01
5.0E-01
4.0E-01
3.0E-01
2.0E-01
1.0E-01
0.0E+00
MNA
NSZD
EISB & Activated Carbon Injection
Bio-Sparge


Topsoil Consumption
cubic yards
1.0E+00
9.0E-01
8.0E-01
7.0E-01
6.0E-01
5.0E-01
4.0E-01
3.0E-01
2.0E-01
1.0E-01
0.0E+00
MNA
NSZD
EISB & Activated Carbon Injection
Bio-Sparge


Costing
$
1
1
1
1
1
1
0
0
0
0
0
MNA
NSZD
EISB & Activated Carbon Injection
Bio-Sparge


Lost Hours - Injury
Hours
5.0E-01
4.5E-01
4.0E-01
3.5E-01
3.0E-01
2.5E-01
2.0E-01
1.5E-01
1.0E-01
5.0E-02
0.0E+00
MNA
NSZD
EISB & Activated Carbon Injection
Bio-Sparge

Attachment B

AqSRT^{TM} Output

MCP - Pasco RI/FS AqSRT Assessment

STAGE 4a: Weighting of Assessment Criteria

Guidance: By making reference to stage 2, weight the assessment criteria (1 - 5 where 5 is the most important consideration and 1 is the least important consideration) according to the client and stakeholder preferences. If any of the criteria are not relevant, please insert "0". If two or more assessment criteria are equally important the to client and stakeholders they can be given the same weighting, there is no need to rank them 1 - 5.

Assessment Criteria		Weighting		Rationale
Economic	Direct Economic Costs and Benefits	3	CLICK HERE to see the list of indicators within the assessment criteria	Cost is a factor, but not highest priority
	Indirect Economic Costs and Benefits	2		Minimal chance of impacting company financials; but company reputation & regulatory compliance are a factor
	Employment and Employment Capital	1		All remedial options require small number of staff; employment not significant for this site
	Induced Economic Costs and Benefits	4		Having similar sites, this project may affect value for actions at other sites.
	Project Lifespan and Flexibility	5		Emphasis placed on robustness of remedy and desired long-term solution
Environmental	Impacts on Air	5		GHG is a key metric in GSR program
	Impacts on Soil and Ground Conditions	3		Cleanup of subsurface is remedial focus. Active terminal.
	Impacts on Groundwater and Surface Water	5		Groundwater impacts at site. Snake River empties to a reservior & to the Columbia River near site. Water availability is key in region. However, no evidence of COC migration to surface water and no water wells at or near site. Agency sees this as a key, however.
	Impacts on Ecology	3		No evidence of ecological impacts from site COCs. However, proximity of Snake River is a factor.
	Use of Natural Resources and Waste Generation	4		Cost impacts. Location; waste disposal, availability of staff and materials.
Social	Impacts on Human Health and Safety	2		High priority to project health and safety, as well as overall human health; however, minimal possibility for worker & off-site impacts. Groundwater not used for drinking water.
	Ethics and Equality	2		Relatively unpopulated area; project unlikely to impact community. Proximity of Snake River is factor.
	Impact on Site Operations	5		Minimize impacts and business disruption to the extent possible. This replaces the Neighorhood & Locality criterion; not needed as site is in isolated area
	Communities & Community Involvement	3		Relatively unpopulated area; however, used for recreation. Community interest is possible, especially because of the Snake River.
	Compliance, Uncertainty and Evidence	5		Compliance with regulations as well as degree to which remedy will perform under future conditions is a high priority

STAGE 4b: How sustainable are the different remediation options?

GUIDANCE: Number each remedial option and fill in the options table (right). For each option, score the assessment criteria from 1 - 5 relative to each other, where 5 is the most preferable technique, and 1 is the least preferable. Note that the options do not have to be ranked from 1 - 5, if two or more options have the same impact, they can be given the same score. Use the "Justify your scores" column to note down your reasoning, this will become important when it comes to writing the report or answering client questions.

Assessment Criteria		Weight	Remediation Option 1	2	3	4	Justify your scores for each of the assessment criteria
Economic	Direct Economic Costs and Benefits	3	5	4	2	1	Ranked in order of cost.
	Indirect Economic Costs and Benefits	2	5	4	2	1	Ranked in order of cost, based on internal resource allocation (most other indicators do not apply to this site).
	Employment and Employment Capital	1	1	3	5	5	A more complex remedy with operational systems and active injections will likely create more jobs. Alt 3 is less operations, but longer duration, Alt 4 is more operations up front.
	Induced Economic Costs and Benefits	4	5	4	2	3	If a less complex remedy is selected it will be more easily adaptable and applicable at other similar sites.
	Project Lifespan and Flexibility	5	2	3	4	5	Each alternative is expected to provide lasting benefits and be resilient to changing conditions and is likely to include ongoing ICs. Shorter remedies are less likely to be affected by changing conditions.
		TOTAL	18	18	15	15	
Environmental	Impacts on Air	5	5	4	2	1	Ranked in order of SiteWise emissions results.
	Impacts on Soil and Ground Conditions	3	4	4	3	3	All remedies will improve soil and grounds conditions approximately equally, Alt 3 and 4 are a bit lower due to the impacts incurred to implement the remedy.
	Impacts on Groundwater and Surface Water	5	4	4	3	3	All remedies will improve groundwater conditions approximately equally, Alt 3 and 4 are a bit lower due to the impacts incurred to implement the remedy.
	Impacts on Ecology	3	3	3	3	3	Neutral, neither remedy should impact ecology.
	Use of Natural Resources and Waste Generation	4	5	5	3	2	Ranked in order of SiteWise waste and water use results. Alt 3 has the highest water consumption, and Alt 4 has the highest waste generation.
		TOTAL	21	20	14	12	
Social	Impacts on Human Health and Safety	2	5	4	3	1	All remedies are equally protective of human health, so this ranking is based on the risks of remedy implementation to workers of which there are more for the more complex remedy.
	Ethics and Equality	2	4	5	2	3	Alt 3 and 4 provide a shorter cleanup timeframe, but create more emissions.
	Impact on Site Operations	5	5	4	3	1	Ranked in order of remedy construction duration and active site work since a longer and more active remedy construction period is more likely to have an impact at the facility. (Although terminal operation is not expected to be affected)
	Communities & Community Involvement	3	1	1	4	5	Ranked in order of remedy cleanup duration since a shorter remedy will likely be favorable to the community.
	Compliance, Uncertainty and Evidence	5	5	5	5	5	All remedies are compliant with regulations.
		TOTAL	20	19	17	15	

CLICK HERE to see the list of indicators for the assessment criteria

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