Transmittal

14 October 2021

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		Project no.	11226610
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Subject	Supplemental Investigation Work Plan		

Drawing no./ Document ref.	Issue	Description/Title	No. of copies
		Supplemental Investigation Work Plan	1

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Supplemental Investigation Work Plan

Phillips 66 Facility No. 6880
Geiger Corrections Facility – USAAC Geiger Field GF003
Spokane, Washington
Facility/Site No 663
VCP Project No. EA0263

P66 Company

14 October 2021

→ **The Power of Commitment**

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1. Introduction

1.1 Purpose of This Report

GHD is submitting this Supplemental Investigation Work Plan on behalf of P66 Company (P66) for the Geiger Corrections Facility (No. 6880) facility located at the northwest corner of South Spotted Road and Alton Road in Spokane, Washington (Property, Figure 1). In January 2019, the Washington State Department of Ecology (Ecology) issued a further action opinion letter requesting further assessment to address data gaps at the Site. In October 2019, GHD completed additional Site assessment activities and presented the results of the investigation activities in the Site Investigation Summary Report, dated March 4, 2020. Following completion of the 2019 Site assessment activities, it was determined that further assessment of the soil vapor intrusion pathway is necessary as well as delineation of shallow soil and groundwater impacts to the northwest. The purpose of this Work Plan is to provide the scope of work necessary to evaluate the soil, groundwater, and soil vapor data gaps for the Site. The scope of work will be completed in accordance with Washington Administration Code (WAC) 173-340-350.

1.2 Scope and Limitations

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

2. Site Description and Background

The Property consists of a Yellowstone Pipeline (YPL) Company pipeline easement within a minimum security prison, Geiger Corrections Center (Figure 2). The 3-inch YPL pipeline was constructed in 1968 and enters the Property near the intersection of South Spotted Road and West Will D Alton Road.

The Model Toxics Control Act (MTCA) site (Site) is defined as all affected areas from the petroleum release associated with the Property and potentially impacted adjacent parcels. Based on historical investigation results, the Site boundary is presented on Figure 2. An area map identifying surrounding property use is presented on Figure 3. A soil investigation data map is presented on Figure 4. A March 2021 groundwater contour and chemical concentration map for the shallow and deep zones are presented on Figures 5 and 6, respectively. A summary of previous investigations and remedial activities is included as Appendix A.

2.1 Site Geology and Hydrogeology

The Property is situated within the Columbia Basalt plateau at approximately 2,360 feet above mean sea level (amsl). The local topography is relatively flat with a slight slope to the northeast toward the Spokane River. The nearest surface water bodies are three unnamed ponds, which are located approximately 1,750 feet northeast of the Property.

Regional geology consists of basalt, with the immediate vicinity of the Property consisting mainly of Pleistocene aged glacial flood deposits of boulders, cobbles, pebbles, granules, and sand, containing lenses of sand and silt (Hamilton, 2004). According to historical subsurface investigations conducted at the Site, soil appears to consist of Aeolian silt and sand, and fluvial deposits of silt, sand, and gravel underlain by basalt to a maximum explored depth of approximately 101 feet below grade (fbg). Basalt has been encountered at the Site at depths ranging from 3 to 37 fbg.

Based on the results of previous investigations and groundwater monitoring conducted at the Site, there are two water-bearing zones at the Site:

- A shallow, perched, water-bearing zone with groundwater depths ranging from 2 to 6.5 fbg. Groundwater in the shallow zone is not present in all areas of the Site and is considered discontinuous. Groundwater flow direction in the shallow zone is to the east and northeast.

- A deep, water-bearing zone with groundwater depths ranging from 26 to 38.5 fbg. Groundwater flow direction in the deep zone has historically been variable.

3. Rationale for Scope of Work

In accordance with Ecology's October 2009 (revised 2016) Guidance for Evaluating Soil Vapor Intrusion in Washington State: Investigation and Remedial Action (VI Guidance), a preliminary vapor intrusion screening was completed at the Site. Previous investigations at the Site have shown that petroleum impacted soil and groundwater are present within the 30-foot lateral inclusion zone for the on-Property buildings and above a vertical separation distance of 6 fbg. In accordance with the VI guidance, a Tier 1 Vapor Intrusion Assessment must be completed to evaluate whether contaminant concentrations in shallow soil vapor are high enough to present a potential vapor intrusion concern. To evaluate shallow soil vapor concentrations, GHD is proposing installation of two shallow soil vapor probes, one near each of the two on-Property buildings (building C and building D). The locations of the proposed soil vapor probes are in the immediate vicinity of recent soil borings B-1 and B-2 where soil impacts were identified in 2019 near building C (B-1) and building D (B-2). The data from the proposed soil vapor probes will be compared to MTCA Method B shallow soil vapor screening levels to determine if a Tier 2 Vapor Intrusion Assessment is necessary.

Current conditions based on recent investigation data, indicate soil and groundwater impacts at B-1 and in monitoring well MW-2, respectively. Both locations are in the northwest area of the plume and do not have lateral delineation to the northwest. Proposed monitoring well MW-13 will provide delineation of soil and groundwater impacts to the northwest.

4. Points of Compliance

The points of compliance are the sample locations defining the extents of impacts used to determine the MTCA Site boundary. Impacts associated with the YPL release are bound by the following points of compliance:

- **Shallow Groundwater**
  - Wells MW-3 and MW-4 to the west. Wells MW-3 and MW-4 have demonstrated a minimum of four consecutive quarters with concentrations below MTCA Method A cleanup levels.
  - Well MW-5 to the south. Well MW-5 has demonstrated a minimum of four consecutive quarters with concentrations below MTCA Method A cleanup levels.
  - Lateral discontinuity to the east. Shallow perched groundwater is discontinuous to the east. Boring MW-9B, advanced to install a shallow well, did not encounter shallow groundwater.
  - Lateral discontinuity to the northeast (downgradient). Shallow perched groundwater is discontinuous to the northeast. Boring MW-9A, advanced to install a shallow well, did not encounter shallow groundwater. Monitoring well MW-11 was installed and has remained dry since installation in 2019 except for a small amount of water in March and June 2020, which allowed for collection of two grab samples. Both grab samples did not contain concentrations exceeding MTCA Method A cleanup levels.
  - Lateral discontinuity to the north. Shallow well, MW-10, was installed in 2019, has been dry since installation.
- **Deep Groundwater**
  - Well MW-1 to the north. Well MW-1 has demonstrated a minimum of four quarters with concentrations below MTCA Method A cleanup levels.
  - Well MW-12 to the west. Well MW-12 has demonstrated a minimum of four quarters with concentrations below MTCA Method A cleanup levels.
  - Well MW-6 to the south. Well MW-6 has demonstrated a minimum of four quarters with concentrations below MTCA Method A cleanup levels.

  - Well MW-7 to the east. Well MW-7 has demonstrated concentrations below MTCA Method A cleanup levels since first quarter 2020 with the exception of a TPHd exceedance of 570 µg/L, above the cleanup level of 500 µg/L. Based on recent groundwater concentration trends, GHD expects well MW-7 will be able to demonstrate a minimum of four consecutive quarters of concentrations below MTCA Method A cleanup levels in the near future. Furthermore, previously impacted deep monitoring well MW-5D, has demonstrated a minimum of four quarters with concentrations below MTCA Method A cleanup levels, indicating deep groundwater impacts have attenuated.

– **Soil**
  - Soil borings GCC-17, GCC-14, MW-1, MW-10, TP-5, MW-9A, and MW-11 to the north
  - Soil borings GCC-26, MW-8, GCC-24, GCC-27, and TP-9 to the east
  - Soil borings TP-2, GCC-23, MW-6, GCC-22, TP-10, and TP-11 to the south
  - Soil borings MW-4, GCC-31, MW-3, TP-7, GCC-16, GCC-28, and GCC-30 to the west

5. Investigation Activities

5.1 Soil Assessment

GHD proposes that one boring, to be completed as a monitoring well, be advanced along the northwestern portion of the Site to complete the delineation of soil and groundwater impacts to the northwest of well MW-2 and boring B-1. In addition, GHD proposes installation of two borings to be completed as soil vapor probes to characterize shallow soil vapor near building C and building D at the Site. The locations of the proposed borings are presented on Figure 7. The table below outlines sample location, sample depth, proposed well depth, purpose, and selected laboratory analyses per boring location.

Proposed Boring	Anticipated Soil Samples Per Boring	Anticipated Total Depth / Well Details	Purpose	Soil Analysis
MW-13	Up to 2 samples 1 sample at 6 fbg or at the water table in the absence of field indication of impacts 1 sample that provides vertical delineation of soil impacts, if observed	15 fbg Well screened from 3-15 fbg	Evaluate soil and shallow groundwater conditions northwest of MW-2 and B-1	TPHg, TPHd, TPHo, BTEX, and naphthalene
SV-1 and SV-2	Up to 2 samples 1 sample based on field screening and/or 1 sample at the bottom of the boring	5 fbg Soil vapor well screened 3 – 3.5 fbg	Evaluate the soil vapor intrusion pathway near building C and building D	TPHg, TPHd, TPHo, BTEX, and naphthalene

fbg = feet below grade
TPHg = Gasoline range organics per Method Northwest Total Petroleum Hydrocarbon Identification (NWTPH) Gx
TPHd = Diesel range organics per Method Northwest Total Petroleum Hydrocarbon Identification (NWTPH) Dx
TPHo = Oil range organics per Method Northwest Total Petroleum Hydrocarbon Identification (NWTPH) Dx
BTEX = Benzene, Toluene, Ethylbenzene and Xylenes per EPA Method 8260B
Naphthalene = per EPA Method 8260

5.2 Soil Sampling and Logging

The first 5 to 10 feet of the borings will be advanced using an air knife and vac truck or hand auger in order to further mitigate contact and damage to potential subsurface utility lines. Boring MW-13 will then be advanced using a sonic rig to the depth noted above and completed as a permanent groundwater monitoring well. Soil borings SV-1 and SV-2 will be completed as soil vapor probes at the depths noted above. Continuous soil core samples will be collected to the extent practicable. Once each boring has been advanced and samples collected, the boring will be finished to grade to match the surrounding surface. Monitoring well and soil vapor probe construction details will be as described in the following sections.

Soil will be continuously logged using the modified Unified Soil Classification System. Soil samples will be screened continuously using a PID and visual inspection. Soil samples will be collected in accordance with the table above. Soil samples submitted for chemical analyses will be labelled, entered onto a chain of custody form, packed on ice, and sent to a Phillips 66 Company-approved laboratory.

5.3 Monitoring Well Installation

Soil boring MW-13 will be completed as a permanent groundwater monitoring well. The final depth is estimated to be 15 fbg. The well will be screened from 3 to 15 feet bgs (final screening interval will be based on field observations) using 2-inch, Schedule 40 PVC, with a 0.010 slot screen and flush threaded with PVC blank well casing from the top of the screen to the top of the well. The well annulus will be backfilled with a 12/20 silica sand pack to a minimum of 1 foot above the top of the screen and sealed with a minimum of 1 foot of hydrated bentonite chips above the filter pack, then backfilled with bentonite chips up to 1-2 fbg. The surface of the well will be completed with flush mount, traffic rated well boxes set in concrete.

The well will be developed following installation by surging the well screen with a surge block for 5-10 minutes followed by pumping on the well with a monsoon style down hole pump. Grab samples will be collected and analyzed for turbidity with a calibrated field turbidity meter after each well volume. Well development will be considered complete when turbidity is below 100 NTU or when the well has pumped dry.

The new well and existing wells will be surveyed by a licensed surveyor to determine the horizontal coordinates and vertical elevation of the top of well casing.

5.4 Soil Vapor Probe Installation

Soil borings SV-1 and SV-2 will be completed as soil vapor probes consisting of permeable stainless-steel filters with a 0.25-inch fitting connected to 0.25-inch outer diameter Teflon® tubing. The soil vapor probes will be installed with a filter screen placed at approximately 3 to 3.5 fbg to ensure the screen is placed above the average high water table elevation. The soil vapor probe annulus will be backfilled with 12/20 silica sand from approximately 4 to 2.5 fbg with the sand extending no less than 6 inches above and below the screen. Each probe will be sealed using 1 foot of dry granular bentonite placed above the sand pack and will hydrate once in place. The probes will be finished at the surface with flush mount, traffic rated well boxes set in a concrete surface seal extending 1 fbg. The soil vapor probe Teflon® tubing will be fitted with an airtight stainless steel compression fitting with a valve to allow for an airtight connection to the sampling equipment.

5.5 Investigation Derived Waste

IDW will include decontamination fluids, soil from borings and purged well water. All IDW will be placed in properly labelled 55-gallon drums and stored on site pending future disposal. All IDW will be disposed of according to P66 procedures and applicable regulatory requirements. GHD assumes an existing soil profile will be utilized for future disposal processes.

5.6 Groundwater Monitoring

The newly installed monitoring well will be incorporated into the existing groundwater monitoring program for the Site. Groundwater samples will initially be sampled quarterly for a minimum of four quarters to establish points of compliance for shallow groundwater. Groundwater samples will be analyzed for total petroleum hydrocarbons as gasoline (TPHg), diesel (TPHd), and oil (TPHo), benzene, toluene, ethylbenzene and xylenes (BTEX), and naphthalene. Following four quarters of sampling, GHD will evaluate whether further quarterly groundwater sampling is necessary for the Site.

5.7 Soil Vapor Probe Sampling

Soil vapor sampling will not be performed during or within 48 hours of a significant rainfall event [e.g., ≥0.5 inch]. Samples will be collected using a closed-circuit sample train inside a shroud containing a minimum of 50 percent helium. An ambient air sample will be collected during sampling of the soil vapor probes. Samples will be collected in 6-Liter summa canisters and analyzed for petroleum related compounds by EPA TO15, Massachusetts's APH Method, and fixed gases by ASTM D1945. GHD's standard operating procedures for soil vapor sampling are provided as Appendix B. Following collection of a wet season (fourth and first quarters) and a dry season (second and third quarters) sample, GHD will evaluate the soil vapor results and determine if a Tier 2 assessment is necessary.

5.8 Reporting and Scheduling

Following completion of the above activities and receipt of laboratory analytical data, GHD will prepare a revised remedial investigation report and a feasibility study evaluating appropriate remedial alternatives.

GHD will begin the proposed work upon receipt of Phillip 66's and Ecology's approval of this work plan.

Please contact Moshghan Mansoori at (425) 563-6516 if you have any questions or require additional information.

All of Which is Respectfully Submitted,

GHD

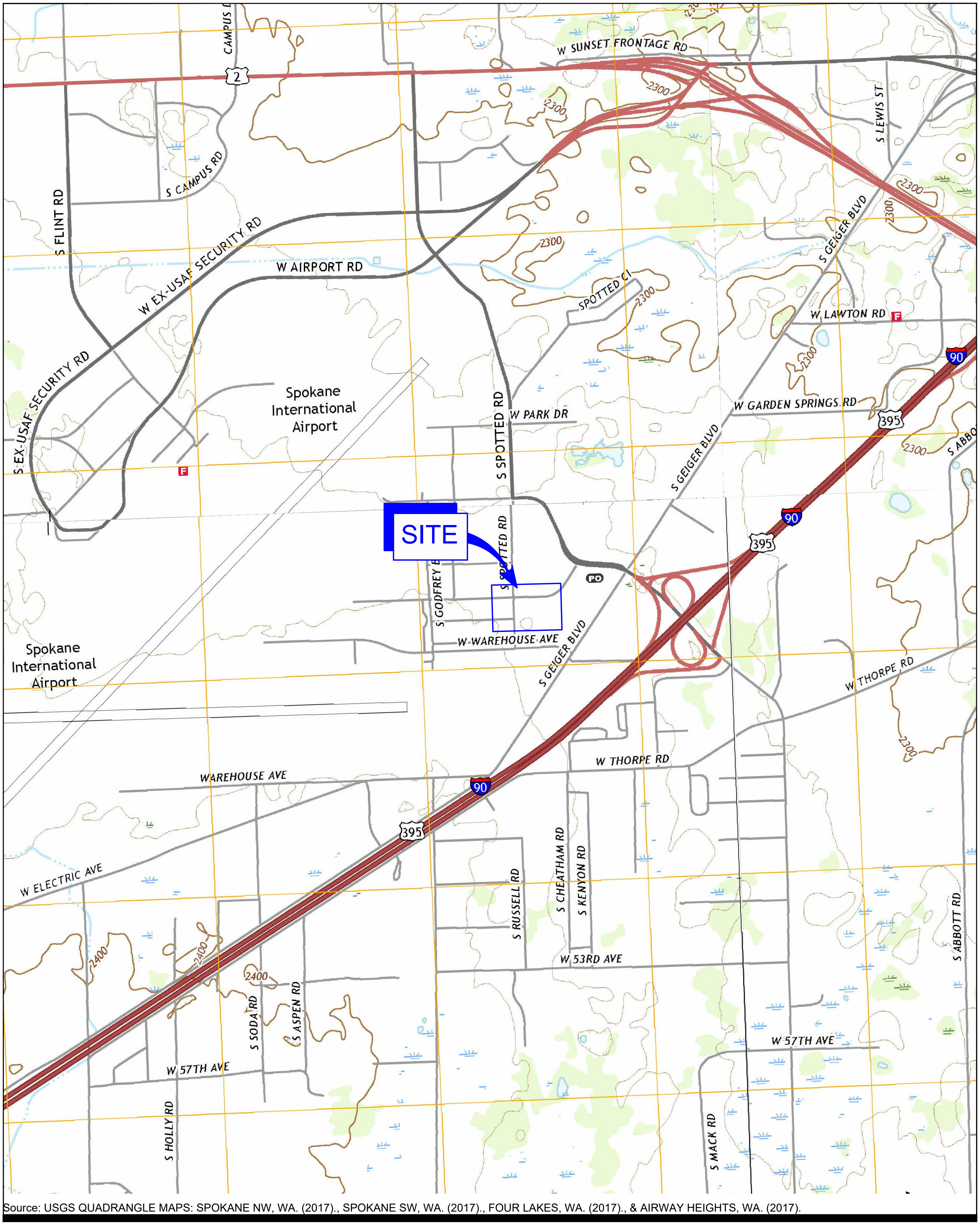
Matthew Davis

Moshghan Mansoori

Matthew Davis, LG

State of Washington Licensed Geologist
2854
MATTHEW DAVIS

Figures



Source: USGS QUADRANGLE MAPS: SPOKANE NW, WA. (2017)., SPOKANE SW, WA. (2017)., FOUR LAKES, WA. (2017)., & AIRWAY HEIGHTS, WA. (2017).

0 1000 2000 ft

1" = 2000 ft

Coordinate System:
WASHINGTON NORTH
STATE PLANE NAD83 FEET

N

GHD

PHILLIPS 66 FACILITY NO. 6880
GEIGER CORRECTIONS FACILITY
SPOKANE, WASHINGTON

VICINITY MAP

Project No. **11226610**
Date **September 2021**

FIGURE 1

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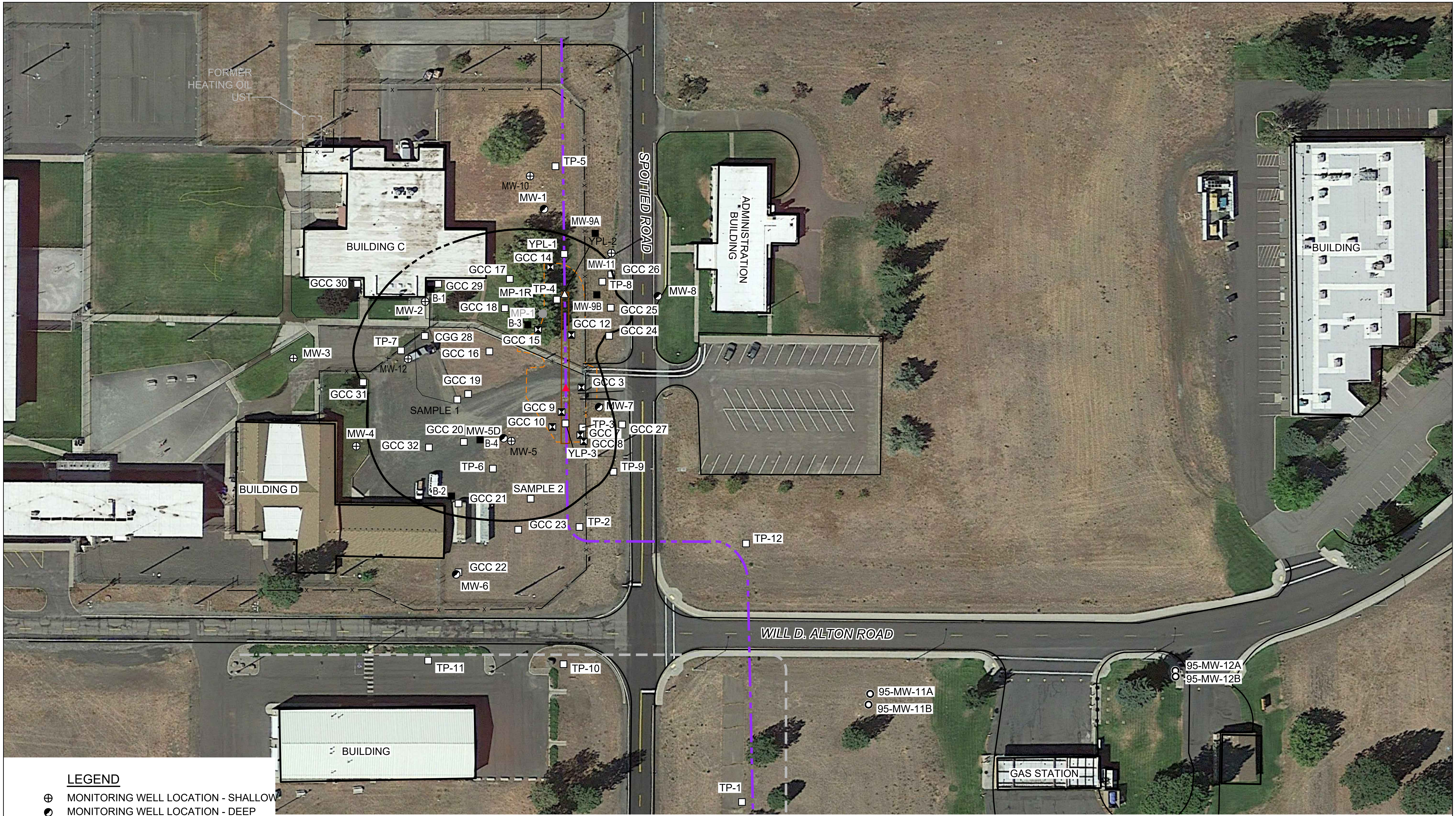

LEGEND

⊕	MONITORING WELL LOCATION - SHALLOW
◐	MONITORING WELL LOCATION - DEEP
○	OFF-SITE MONITORING WELL LOCATION
MP-1 ⊗	ABANDONED MONITORING WELL LOCATION
■	SOIL BORING 2019 (LOCATION IS APPROXIMATE)
☒	SAMPLE LOCATION
☐	TEST PIT/SAMPLE LOCATION
△	YPL STATION
▲	POINT OF 1979 JET FUEL RELEASE
⬚	SOURCE AREA EXCAVATION
- - -	ABANDONED 8-INCH DOD PIPELINE
-·-·-	ACTIVE 3-INCH YPL PIPELINE
—	TRENCH
— x —	FENCE LINE
━	MODEL TOXICS CONTROL ACT (MTCA) SITE BOUNDARY (DASHED WHERE INFERRED)

0 40 80 ft
1" = 80 ft

N

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Project No. 11226610
Date October 2021

SITE PLAN

FIGURE 2

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Data source: Google ©2021 Image(Imagery date August 2020). AECOM SITE PLAN AND WELL LOCATIONS DATED 2/7/2014. MAXIM Technologies, Inc. Figures 3 and 4 dated July 2001. AECOM Soil Analytical Results 2/7/2014.

0 60 120 ft

1" = 120 ft

Coordinate System:
WASHINGTON NORTH
STATE PLANE NAD83 FEET

N

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SPOKANE, WASHINGTON

AREA MAP

Project No. **11226610**
Date **September 2021**

FIGURE 3

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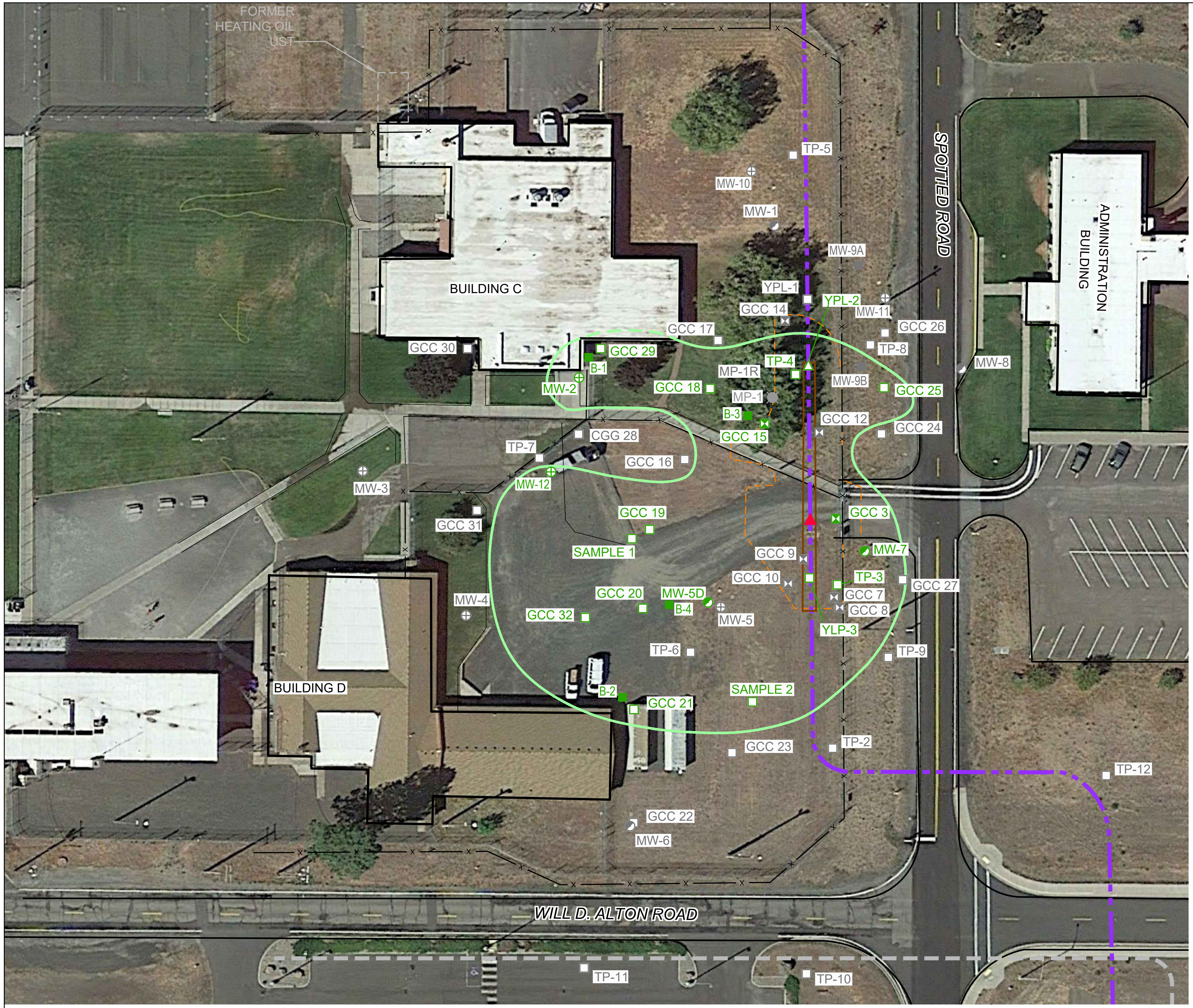
AECOM SITE PLAN AND WELL LOCATIONS DATED 2/7/2014. MAXIM Technologies, Inc. Figures 3 and 4 dated July 2001.



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LEGEND

⊕	MONITORING WELL LOCATION - SHALLOW
◐	MONITORING WELL LOCATION - DEEP
MP-1 ●	ABANDONED MONITORING WELL LOCATION
■	SOIL BORING 2019 (LOCATION IS APPROXIMATE)
☒	SAMPLE LOCATION
☐	TEST PIT/SAMPLE LOCATION
△	YPL STATION
▲	POINT OF 1979 JET FUEL RELEASE
⬚	SOURCE AREA EXCAVATION
- - -	ABANDONED 8-INCH DOD PIPELINE
— · —	ACTIVE 3-INCH YPL PIPELINE
—	TRENCH
— x —	FENCE LINE
▬	INDICATES ALL CONCENTRATIONS WERE BELOW MTCA METHOD A CLEANUP LEVELS
🟩	INDICATES AT LEAST ONE OR MORE CONSTITUENTS EXCEEDED THE RESPECTIVE MTCA METHOD A CLEANUP LEVEL; SEE ANALYTICAL TABLE FOR RESULTS
☐	HISTORICAL EXTENT OF SOIL IMPACTS (DASHED WHERE INFERRED)

Coordinate System:
WASHINGTON NORTH
STATE PLANE NAD83 FEET

0 30 60ft

N

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SOIL INVESTIGATION MAP

FIGURE 4

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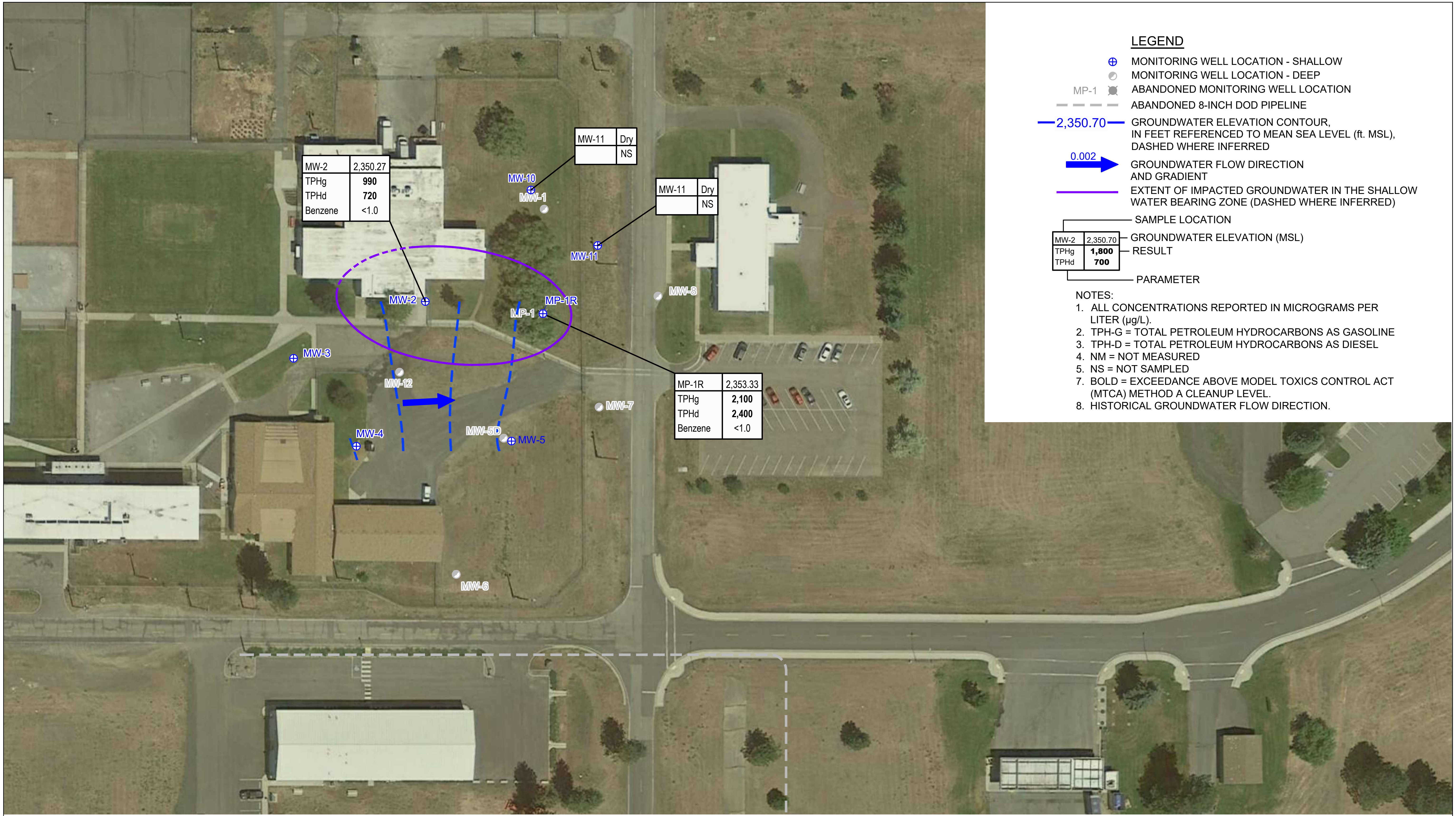

MW-2	2,350.27
TPHg	**990**
TPHd	**720**
Benzene	<1.0

MW-11	Dry
	NS

MW-11	Dry
	NS

MP-1R	2,353.33
TPHg	**2,100**
TPHd	**2,400**
Benzene	<1.0

LEGEND

⊕ MONITORING WELL LOCATION - SHALLOW
◐ MONITORING WELL LOCATION - DEEP
MP-1 ⊗ ABANDONED MONITORING WELL LOCATION
— — — — ABANDONED 8-INCH DOD PIPELINE
—2,350.70— GROUNDWATER ELEVATION CONTOUR, IN FEET REFERENCED TO MEAN SEA LEVEL (ft. MSL), DASHED WHERE INFERRED
0.002 → GROUNDWATER FLOW DIRECTION AND GRADIENT
—— EXTENT OF IMPACTED GROUNDWATER IN THE SHALLOW WATER BEARING ZONE (DASHED WHERE INFERRED)

SAMPLE LOCATION

MW-2	2,350.70
TPHg	**1,800**
TPHd	**700**

GROUNDWATER ELEVATION (MSL)
RESULT
PARAMETER

NOTES:

1. ALL CONCENTRATIONS REPORTED IN MICROGRAMS PER LITER (μg/L).
2. TPH-G = TOTAL PETROLEUM HYDROCARBONS AS GASOLINE
3. TPH-D = TOTAL PETROLEUM HYDROCARBONS AS DIESEL
4. NM = NOT MEASURED
5. NS = NOT SAMPLED
7. BOLD = EXCEEDANCE ABOVE MODEL TOXICS CONTROL ACT (MTCA) METHOD A CLEANUP LEVEL.
8. HISTORICAL GROUNDWATER FLOW DIRECTION.

Source: Microsoft Product Screen Shot(s) Reprinted with permission from Microsoft Corporation, Acquisition Date Jun/2015 - Sep/2016, Accessed: 2017. Google ©2017 Image. AECOM SITE PLAN AND WELL LOCATIONS DATED 2/7/2014. MAXIM Technologies, Inc. Figures 3 and 4 dated July 2001. AECOM Soil Analytical Results 2/7/2014. StateWide Land Surveying Inc. date 12/23/19.

0 40 80ft

N

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GROUNDWATER CONTOUR AND CHEMICAL CONCENTRATION MAP SHALLOW ZONE - MARCH 31, 2021

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Date **October 2021**

FIGURE 5

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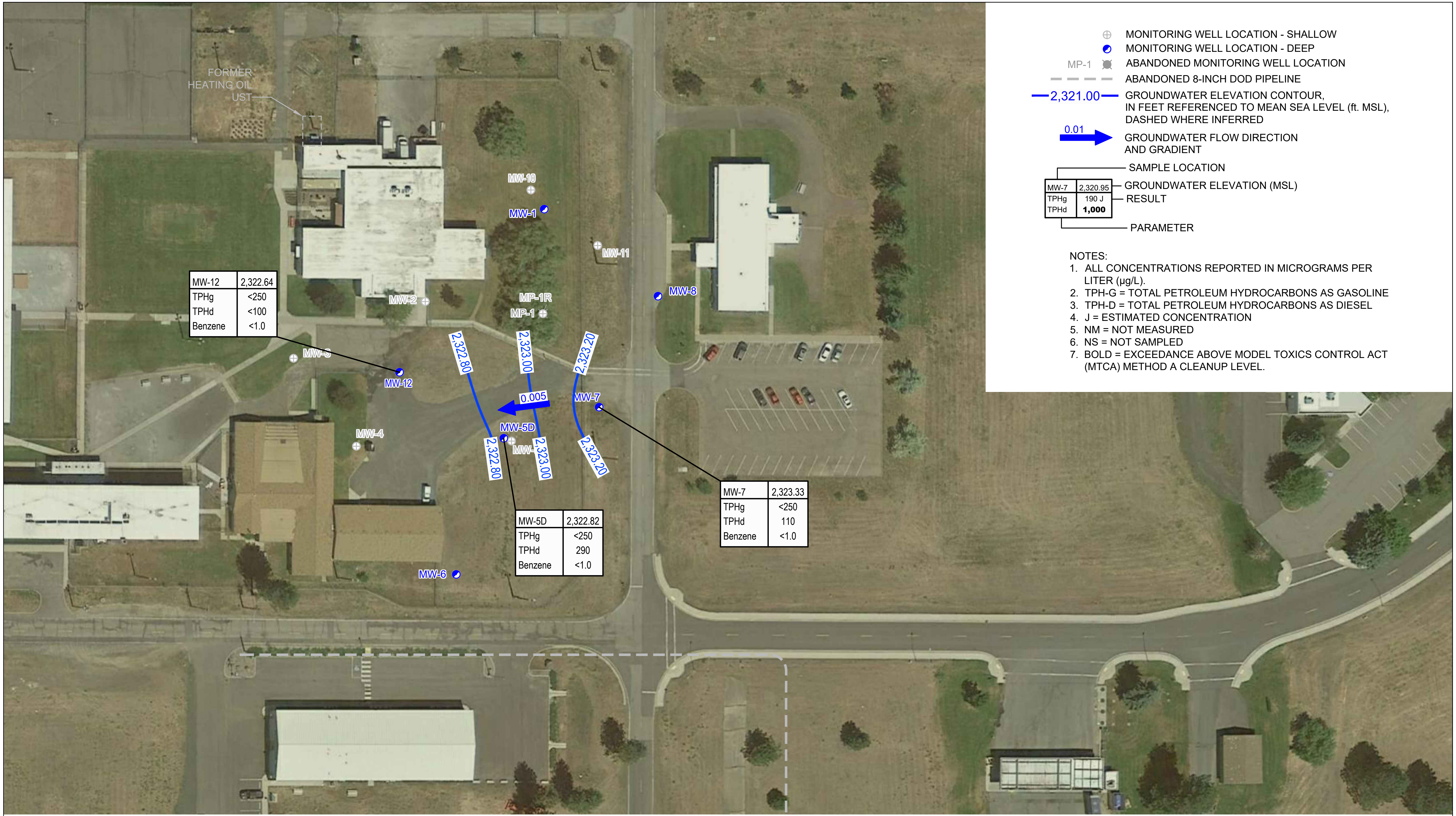

MW-12	2,322.64
TPHg	<250
TPHd	<100
Benzene	<1.0

MW-5D	2,322.82
TPHg	<250
TPHd	290
Benzene	<1.0

MW-7	2,323.33
TPHg	<250
TPHd	110
Benzene	<1.0

⊕	MONITORING WELL LOCATION - SHALLOW
◐	MONITORING WELL LOCATION - DEEP
MP-1 ✕	ABANDONED MONITORING WELL LOCATION
— — —	ABANDONED 8-INCH DOD PIPELINE
—2,321.00—	GROUNDWATER ELEVATION CONTOUR, IN FEET REFERENCED TO MEAN SEA LEVEL (ft. MSL), DASHED WHERE INFERRED
0.01 ➡	GROUNDWATER FLOW DIRECTION AND GRADIENT

SAMPLE LOCATION

MW-7	2,320.95
TPHg	190 J
TPHd	**1,000**

GROUNDWATER ELEVATION (MSL)
RESULT
PARAMETER

NOTES:
1. ALL CONCENTRATIONS REPORTED IN MICROGRAMS PER LITER (µg/L).
2. TPH-G = TOTAL PETROLEUM HYDROCARBONS AS GASOLINE
3. TPH-D = TOTAL PETROLEUM HYDROCARBONS AS DIESEL
4. J = ESTIMATED CONCENTRATION
5. NM = NOT MEASURED
6. NS = NOT SAMPLED
7. BOLD = EXCEEDANCE ABOVE MODEL TOXICS CONTROL ACT (MTCA) METHOD A CLEANUP LEVEL.

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0 40 80ft

N

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GROUNDWATER CONTOUR AND CHEMICAL CONCENTRATION MAP DEEP ZONE - MARCH 31, 2021

Project No. **11226610**
Date **October 2021**

FIGURE 6

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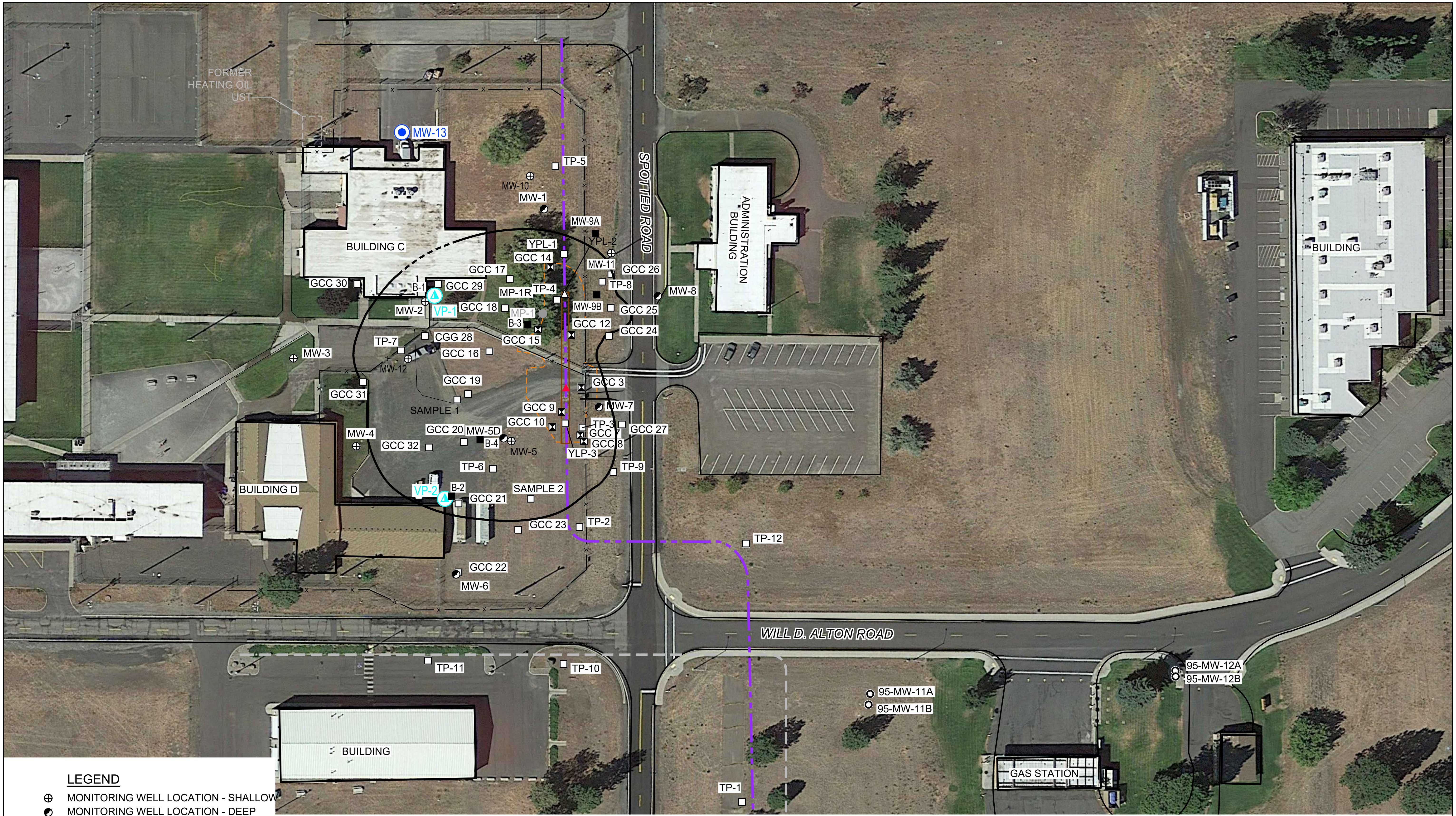

LEGEND

- ⊕ MONITORING WELL LOCATION - SHALLOW
- ◐ MONITORING WELL LOCATION - DEEP
- ○ OFF-SITE MONITORING WELL LOCATION
- MP-1 ⊛ ABANDONED MONITORING WELL LOCATION
- ■ SOIL BORING 2019 (LOCATION IS APPROXIMATE)
- ☒ SAMPLE LOCATION
- □ TEST PIT/SAMPLE LOCATION
- △ YPL STATION
- ▲ POINT OF 1979 JET FUEL RELEASE
- ⌐¬ SOURCE AREA EXCAVATION
- ◉ PROPOSED SHALLOW MONITORING WELL
- △ PROPOSED SOIL VAPOR PROBE
- – – ABANDONED 8-INCH DOD PIPELINE
- –·– ACTIVE 3-INCH YPL PIPELINE
- —— TRENCH
- —x— FENCE LINE
- ━━ MODEL TOXICS CONTROL ACT (MTCA) SITE BOUNDARY (DASHED WHERE INFERRED)

0 40 80 ft
1" = 80 ft

N

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Date **October 2021**

PROPOSED LOCATION MAP

FIGURE 7

Filename: N:\US\Lynnwood\Projects\561\11226610\Digital_Design\ACAD\Figures\RPT001-WorkPlan\11226610-GHD-0000-RPT-EN-0108_WA-001-WorkPlan.DWG
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Tables

Table 1

Summary of Soil Analytical Data
Yellowstone Pipeline
Geiger Correctional Facility
Spokane, Washington

Location I	*Sample ID*	*Sample Date*	*Sample Depth*	*TPHg*	*TPHd*	*TPHo*	*B*	*T*	*E*	*X*	*Naphthalene*
		MTCA Method A Cleanup Levels		*100*	*2,000*	*2,000*	*0.03*	*7*	*6*	*9*	*5*
			ft bgs	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*
TP-2	TP-2-3.5	03/19/01	3.5	6.98	<10	<25	<0.050	<0.100	<0.050	0.108	<0.01
TP-3	TP-3-2.0	03/19/01	2	1,460	690	<25	<0.250	<0.500	0.488	1.37	0.163
TP-3	TP-3-2.0 (dup)	03/19/01	2	699	804	<25	<0.100	<0.200	0.268	0.733	0.130
TP-4	TP-4-6.0	03/19/01	6	4,250	11,600	<275	<0.500	<1.00	1.5	7.06	9.30
TP-5	TP-5-3.5	03/19/01	3.5	<5.00	<10	<25	<0.050	<0.100	<0.050	<0.100	<0.01
TP-6	TP-6-5.5	03/19/01	5.5	44.8	69.9	<25	<0.050	<0.100	<0.050	<0.100	<0.01
TP-7	TP-7-4.0	03/19/01	4	10.3	<10	<25	<0.050	<0.100	<0.050	<0.100	<0.01
TP-8	TP-8-4.0	03/19/01	4	<5.00	<10	<25	<0.050	<0.100	<0.050	<0.100	<0.01
TP-9	TP-9-4.0	03/19/01	4	<5.00	<10	<25	<0.050	<0.100	<0.050	<0.100	<0.01
YPL#2	YPL#2-5.0[a]	03/21/01	5	1,070	5,390	<250	<0.050	<0.100	0.123	0.716	9.34
YPL#3	YPL#3-5.0[a]	03/21/01	5	414	971	<25	<0.050	<0.100	0.130	0.411	11.8
GCC-3	GCC-3	10/15/01	2-5	---	756	<25	<0.100	<0.800	<0.800	<0.800	11.2
GCC-7	GCC-7	10/15/01	4	---	343	<25	<0.0250	<0.200	<0.200	<0.200	4.12
GCC8	GCC8-3.5	10/16/01	3.5	---	<10	<25	---	---	---	---	---
GCC9	GCC9-6	10/16/01	6	---	25.4	<25	---	---	---	---	---
GCC10	GCC10-4	10/16/01	4	---	<10	<25	---	---	---	---	---
GCC12	GCC12-6	10/16/01	6	---	190	<25	<0.0250	<0.200	<0.200	<0.200	4.48
GCC14	GCC14-5	10/16/01	5	---	808	<25	---	---	---	---	---
GCC15	GCC15-5.5	10/17/01	5.5	---	**6,180**	<250	0.0128	<0.100	0.37	4.1	**70.3**
GCC16	GCC16-6	10/17/01	6	---	14.6	<25	---	---	---	---	---
GCC17	GCC17-5.5	10/17/01	5.5	---	<10	<25	---	---	---	---	---
GCC18	GCC18-5.5	10/17/01	5.5	---	**2,690**	<250	---	---	---	---	---
GCC19	GCC19-6	10/17/01	6	---	1,510	<250	<0.0250	<0.200	<0.200	0.702	**17.3**
GCC20	GCC20-6	10/17/01	6	---	**3,470**	<250	---	---	---	---	---
GCC21	GCC21-6	10/17/01	6	---	**5,780**	<250	---	---	---	---	---
GCC22	GCC22-6	10/17/01	6	---	<10	<25	---	---	---	---	---
GCC23	GCC23-7	10/17/01	7	---	57.5	<25	<0.0250	<0.200	<0.200	<0.200	<0.500
GCC24	GCC24-6.5	10/18/01	6.5	---	11	29.8	---	---	---	---	---

Table 1

Summary of Soil Analytical Data
Yellowstone Pipeline
Geiger Correctional Facility
Spokane, Washington

Location I	***Sample ID***	***Sample Date***	***Sample Depth***	***TPHg***	***TPHd***	***TPHo***	***B***	***T***	***E***	***X***	***Naphthalene***
		MTCA Method A Cleanup Levels		***100***	***2,000***	***2,000***	***0.03***	***7***	***6***	***9***	***5***
			ft bgs	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***
GCC25	GCC25-6	10/18/01	6	---	**3,940**	<250	---	---	---	---	---
GCC26	GCC26-6	10/18/01	6	---	11.3	<25	---	---	---	---	---
GCC27	GCC27-6	10/18/01	6	---	<10	<25	---	---	---	---	---
GCC28	GCC28-6	10/18/01	6	---	690	<25	---	---	---	---	---
GCC29	GCC29-6	10/18/01	6	---	**8,280**	<250	0.0205	<0.100	0.371	3.11	**25.0**
GCC30	GCC30-6	10/18/01	6	---	<10	<25	---	---	---	---	---
GCC31	GCC31-6	10/18/01	6	---	<10	<25	<0.0250	<0.200	<0.200	<0.200	<0.500
GCC32	GCC32-6	10/18/01	6	---	**2,810**	<250	<0.0125	<0.100	0.102	0.400	**40.3**
MW-1	MW-1-45	03/18/02	45	---	67.1	98.5	<0.0250	<0.200	<0.200	<0.200	<0.500
MW-2	MW-2-10-10.5	03/19/02	10-10.5	---	87.9	27	<0.0250	<0.200	<0.200	<0.200	27.8
MW-3	MW-3-4-6	03/19/02	4-6	---	<10	<25	<0.0250	<0.200	<0.200	<0.200	<0.500
MW-4	MW-4-7-9	03/19/02	7-9	---	505	40.2	<0.0250	<0.200	<0.200	<0.200	13.6
MW-4	MW-4-12-14	03/19/02	12-14	---	15.2	<25	<0.0250	<0.200	<0.200	<0.200	<0.500
MW-5	MW-5-4-6	03/19/02	4-6	---	328	<25	<0.0250	<0.200	<0.200	<0.200	16.8
MW-5	MW-5-9.5-11.5	03/19/02	9.5-11.5	---	45.4	40.3	<0.0250	<0.200	<0.200	<0.200	0.544
MW-6	MW-6-22-24	3/19/2002	22-24	---	68	<25	<0.0250	<0.200	<0.200	<0.200	1.6
MW-6	MW-6-42	3/20/2002	42	---	27.9	29.2	<0.0250	<0.200	<0.200	<0.200	<0.500
MW-7	MW-7-4-4.5	3/20/2002	4-4.5	---	301	<25	<0.0250	<0.200	<0.200	0.402	20.3
MW-7	MW-7-37	3/20/2002	37	---	87.1	47.4	<0.0250	<0.200	<0.200	<0.200	<0.500
MW-8	MW-8-4-6	3/20/2002	4-6	---	<10	<25	<0.0250	<0.200	<0.200	<0.200	<0.500
MW-8	MW-8-36	3/20/2002	36	---	26.7	35.1	<0.0250	<0.200	<0.200	<0.200	<0.500
MP-1R	MP-1R-4.5-4.6-1013	10/8/2013	4.5-4.6	<6.7	47.3	<101	<0.0274	<0.0685	<0.0685	<0.205	---
MW-5D	MW-5D-4.9-5.9-1013	10/7/2013	4.9-5.9	**412**	**2,580**	<84.9	<0.0237	<0.0592	<0.0592	<0.178	---
MW-5D	MW-5D-35-35.2-1013	10/7/2013	35-35.2	**117**	54.9	<87.8	<0.0282	<0.0706	<0.0706	<0.212	---
MW-9	MW-90-4.4-4.5-1013	10/15/2013	4.4-4.5	<4.9	<21.2	<84.2	<0.0229	<0.0573	<0.0573	<0.172	---
MW-9	MW-9-4.4-4.5-1013	10/15/2013	4.4-4.5	<8.1	<21.1	<84.4	<0.0221	<0.0553	<0.0553	<0.166	---

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Summary of Soil Analytical Data
Yellowstone Pipeline
Geiger Correctional Facility
Spokane, Washington

Location I	*Sample ID*	*Sample Date*	*Sample Depth*	*TPHg*	*TPHd*	*TPHo*	*B*	*T*	*E*	*X*	*Naphthalene*
		MTCA Method A Cleanup Levels		*100*	*2,000*	*2,000*	*0.03*	*7*	*6*	*9*	*5*
			ft bgs	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*	*(mg/kg)*
MW-10	S.11145847-101119-EM-MW-10-6.0	10/11/2019	6	<8.1	<16.8	<11.2	<0.0050	<0.010	<0.010	<0.010	---
MW-10	S.11145847-101119-EM-MW-10-15.0	10/11/2019	15	<7.3	<20.5	<13.7	<0.0050	<0.010	<0.010	<0.010	---
MW-11	S.11145847-101119-EM-MW-11-6.0	10/11/2019	6	<7.7	<18.8	<12.5	<0.0050	<0.010	<0.010	<0.010	---
MW-11	S.11145847-101119-EM-MW-11-15.0	10/11/2019	15	<5.7	<16.3	<10.8	<0.0050	<0.010	<0.010	<0.010	---
MW-12	S.11145847-100919-EM-MW-12-5.0[b]	10/9/2019	5	**320**^{1M,E,SS}	755	<11.1	<0.026	<0.015	<0.022	<0.043	0.044
MW-12	S.11145847-101019-EM-MW-12-31.0	10/10/2019	31	<5.4^{2M}	<16.3	45.2	<0.005	<0.010	<0.010	<0.010	---
MW-12	S.11145847-101019-EM-MW-12-44.0	10/10/2019	44	<6.7	<16.6	<11.1	<0.005	<0.010	<0.010	<0.010	---
B-1	S.11145847-101119-EM-B-1-6.0[b]	10/11/2019	6	**765**$^{G+}$	**2,050**	<11.4	<0.029	<0.017	<0.024	<0.030	2.08
B-1	S.11145847-101119-EM-B-1-10.0	10/11/2019	10	<7.6	<17.4	<11.6	<0.0050	<0.010	<0.010	<0.010	---
B-2	S.11145847-101119-EM-B-2-6.0[b]	10/11/2019	6	**511**$^{G+}$	1,630	11.4	<0.025	<0.015	<0.021	<0.026	0.314
B-2	S.11145847-101119-EM-B-2-10.0	10/11/2019	10	<5.5	<15.6	<10.4	<0.005	<0.010	<0.010	<0.010	---
B-3	S.11145847-101019-EM-B-3-6.0[b]	10/10/2019	6	**432**^{D6}	951	148	<0.030	<0.018	<0.025	<0.032	2.37
B-4	S.11145847-101119-EM-B-4-6.3^{G+}	10/11/2019	6.3	**116**	101	<10.9	<0.0050	<0.010	<0.010	<0.010	---
B-4	S.11145847-101119-EM-B-4-10.0	10/11/2019	10	**151**	276	<10.3	<0.023	<0.014	<0.020	<0.038	---
B-4	S.11145847-101219-DT-B-4-35.0	10/12/2019	35	51.2	<17.6	<11.7	<0.023	<0.056	<0.056	<0.017	<0.23
B-4	S.11145847-101219-DT-B-4-40.0	10/12/2019	40	<5.2	<15.6	<10.4	<0.021	<0.054	<0.054	<0.16	<0.21

Notes:

Model Toxics Control Act (MTCA) Method A cleanup level not established per Department of Ecology Cleanup Levels and Risk Calculation data tables (August 2015). Cleanup level protective of groundwater for soil within the vadose zone is utilized for comparison.

Bold values equal or exceed MTCA Method A Cleanup Level.

All results in milligrams per kilogram (mg/kg) unless otherwise indicated.
ND = Not detected above the laboratory reporting limit

-- = Not analyzed

< = Less than the stated laboratory reporting limit

ft bgs = feet below ground surface

Shading indicates the soil sample has been overexcavated.

TPH as Gasoline-range organics (TPHg) analyzed by Northwest Method NWTPH-Gx.

TPH as Diesel-range organics (TPHd) analyzed by Northwest Method NWTPH-Dx.

Table 1

Summary of Soil Analytical Data
Yellowstone Pipeline
Geiger Correctional Facility
Spokane, Washington

Location I	***Sample ID***	***Sample Date***	***Sample Depth***	***TPHg***	***TPHd***	***TPHo***	***B***	***T***	***E***	***X***	***Naphthalene***
		MTCA Method A Cleanup Levels		***100***	***2,000***	***2,000***	***0.03***	***7***	***6***	***9***	***5***
			ft bgs	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***	***(mg/kg)***

TPH as Heavy Oil-range organics (TPHo) analyzed by Northwest Method NWTPH-Dx.

Benzene, toluene, ethylbenzene, total xylenes (BTEX) analyzed by Unitied States Environmental Protection Agency (USEPA) Method 8260B or 8021B

Naphthalene analyzed by USEPA Methods 8021B, 8270D, and/or 8260.

[a] Soil sample was additionally analyzed for polycyclic aromatic hydrocarbons by EPA Method 8270D. Toxicity Equivalaency Factor (TEF) was calculated for reported concentrations over laboratory reporting limits and compared to the MTCA Method A cleanup level of 0.1 mg/kg

[b] Soil sample was additionally analyzed for hexane by USEPA method 8260, volatile petroleum hydrocarbons and extractable petroleum hydrocarbons via methods NW-VPH and NW-EPH, respectively. See laboratory report in Appendix D for results.

[1M] Result confimred by second analysis performed outside of holding time

[E] Analyte concentration exceeded the calibration range. The reported result is estimated.

[SS] This analyte did not meet the secondary source verification criteria for the initial calibration. The reported result should be considered an estimated value.

[2M] Sample preserved in lab; results are from sample aliquot taken from a glass jar with headspace.

[D6] The precision betweent eh sample and sampl duplicate exceeded laboratory control limits.

[G+] Late peacks present outside the GRO window.

Table 2A

Summary of Groundwater Monitoring Data - Shallow Wells
Yellowstone Pipeline
Geiger Correctional Facility
Spokane, Washington

							HYDROCARBONS			PRIMARY VOCs				
Sample ID	*Date*	*Sample Type*	*TOC*	*DTW*	*SPH*	*GWE*	*TPHg*	*TPHd*	*TPHo*	*B*	*T*	*E*	*X*	*Naph*
				MTCA Method A Screening Levels (Shallow GW)			800	500	500	5	1000	700	1000	160
							ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MP-1	08/20/01	NS	--	--	--	--	--	--	--	--	--	--	--	--
MP-1	11/30/01	N	--	--	--	--	--	**50,300**	<750	<0.50	<2.0	<1.0	<1.5	**990**
MP-1	03/25/02	N	--	--	--	--	--	**9,650**	<750	<0.50	<2.0	1.9	23	**599**
MP-1	06/04/02	N	--	--	--	--	--	**39,700**	<500	<0.50	<2.0	1.9	<1.5	**353**
MP-1	08/20/02	N	--	--	--	--	--	**19,100**	<500	<0.50	<2.0	1.1	13	**223**
MP-1	10/29/02	N	--	--	--	--	--	**20,900**	<500	<0.50	<2.0	1.2	13	**413**
MP-1	02/19/03	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	4.2	62
MP-1	06/05/03	N	--	--	--	--	--	**9,950**	<500	<0.50	<2.0	<1.0	<1.5	**268**
MP-1	09/09/03	N	--	--	--	--	--	**8,430**	<500	<0.50	<2.0	<1.0	17	**459**
MP-1	12/10/03	N	--	--	--	--	--	**13,600**	<500	<0.50	<2.0	<1.0	5.9	**184**
MP-1	06/03/04	N	--	--	--	--	--	**16,800**	<500	<0.50	<2.0	<1.0	9.5	**246**
MP-1	12/01/04	N	--	--	--	--	--	**14,800**	<500	<0.50	<2.0	1.7	16	**246**
MP-1	06/03/05	N	--	--	--	--	--	**17,400**	<500	<0.50	<2.0	3.1	29	**178**
MP-1	11/21/05	N	--	--	--	--	--	**9,900**	500	<0.50	<2.0	<1.0	17	32
MP-1	06/15/06	N	--	--	--	--	--	**11,200**	<500	<0.50	<2.0	<1.0	18	<20
MP-1	12/19/06	N	--	--	--	--	--	**2,700**	<500	<0.50	<2.0	<1.0	7.2	114
MP-1	05/30/07	N	--	--	--	--	--	**6,100**	<500	<0.50	<2.0	<1.0	19	120
MP-1	10/30/07	removed from sampling schedule due to well obstruction					--	--	--	--	--	--	--	--
MP-1	02/02/11	--	2,354.90	3.96	--	2350.94	--	--	--	--	--	--	--	--
MP-1	04/26/11	--	2,354.90	4.20	--	2350.70	--	--	--	--	--	--	--	--
MP-1	07/12/11	--	2,354.90	DRY	--	--	--	--	--	--	--	--	--	--
MP-1	10/28/11	--	2,354.90	Obstruction in Well at 4.59 Feet				--	--	--	--	--	--	--
MP-1	10/09/13	--	2,354.90	Well Decommissioned			--	--	--	--	--	--	--	--
MP-1R	10/12/13	N	2,354.78	4.86	--	2349.92	**3,210**	**1,200**	<400	<1.0	<1.0	<1.0	13.9	16.3
MP-1R	03/11/14	N	2,354.78	2.15	--	2352.63	**1,260**	500	500	<1.0	<1.0	<1.0	<3.0	<4.0
MP-1R	03/11/14	FD	--	--	--	--	**1,300**	**520**	**640**	<1.0	<1.0	<1.0	<3.0	<4.0
MP-1R	06/03/14	N	2,354.78	4.95	--	2349.83	**3,890**	**1,400**	<420	<1.0	<1.0	<1.0	13.5	10.6
MP-1R	04/06/17	N	2,354.78	3.58	--	2351.20	430	290	110 J	<0.5	<0.5	<0.5	<0.5	<1.0
MP-1R	04/06/17	FD	--	--	--	--	450	250	80 J	<0.5	<0.5	<0.5	<0.5	<1.0
MP-1R	09/14/17	N	2,354.78	4.79	--	2,349.99	**2,200**	**1,400**	140 J	<1	<1	<1	<1	5
MP-1R	03/21/18	N	2354.78	3.88	--	2350.90	540	280	<260	--	--	--	--	--
MP-1R	06/21/18	N	2354.78	4.79	--	2349.99	**1,900**	**1,500**	<270	--	--	--	--	--
MP-1R	06/21/18	FD	--	--	--	--	**1,900**	**1,400**	<260	--	--	--	--	--
MP-1R	09/21/18	N	2354.78	4.91	--	2349.87	**1,600**	**1,400**	<270	--	--	--	--	--
MP-1R	12/06/18	N	2354.78	4.27	--	2350.51	**2,800**	**1,400**	<260	--	--	--	--	--
MP-1R	03/06/19	N	2354.78	4.31	--	2350.47	700	360	<260	--	--	--	--	--
MP-1R	03/06/19	FD	2354.78	4.31	--	2350.47	710	380	<260	--	--	--	--	--
MP-1R	05/21/19	N	2354.78	4.20	--	2350.58	**1,200**	**1,200**	<250	--	--	--	--	--
MP-1R	05/21/19	FD	2354.78	4.20	--	2350.58	**1,300**	**1,300**	<270	--	--	--	--	--

Table 2A

Summary of Groundwater Monitoring Data - Shallow Wells
Yellowstone Pipeline
Geiger Correctional Facility
Spokane, Washington

							HYDROCARBONS			*PRIMARY VOCs*				
Sample ID	*Date*	*Sample Type*	*TOC*	*DTW*	*SPH*	*GWE*	*TPHg*	*TPHd*	*TPHo*	*B*	*T*	*E*	*X*	*Naph*
				MTCA Method A Screening Levels (Shallow GW)			800	500	500	5	1000	700	1000	160
							ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MP-1R	08/21/19	N	2354.78	4.61	--	2350.17	**2,700**	**1,200**	<270	--	--	--	--	--
MP-1R	10/30/19	N	2354.78	4.42	--	2350.36	**2,900**	**1,600**	<260	--	--	--	--	--
MP-1R	03/05/20	N	2354.78	4.21	--	2350.57	550	350	<250	<1	<1	<1	<6	--
MP-1R	06/03/20	N	2354.78	4.12	--	2350.66	2,000	2,200	170 J	<1.0	<1.0	<1.0	<6.0	--
MP-1R	09/03/20	N	2354.78	4.76	--	2350.02	**2,200**	**630**	<1,300	<1.0	<1.0	<1.0	<6.0	--
MP-1R	03/31/21	N	2357.78	4.45	--	2353.33	**2,100**	**2,400**	<260	<1.0	<1.0	<1.0	<6.0	--
MW-2	08/20/01	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-2	03/25/02	N	--	--	--	--	--	**19,800**	<750	<0.50	<2.0	<1.0	11	**216**
MW-2	06/04/02	N	--	--	--	--	--	**22,100**	<500	<0.50	<2.0	<1.0	8.2	**1,320**
MW-2	08/20/02	N	--	--	--	--	--	**4,970**	<500	<0.50	<2.0	<1.0	6.7	156
MW-2	10/29/02	N	--	--	--	--	--	**13,700**	<500	<0.50	<2.0	<1.0	6.1	**199**
MW-2	10/29/02	FD	--	--	--	--	--	**15,400**	<500	<0.50	<2.0	<1.0	9.3	**328**
MW-2	02/19/03	N	--	--	--	--	--	**10,400**	<500	<0.50	<2.0	<1.0	<1.5	140
MW-2	06/05/03	N	--	--	--	--	--	**4,570**	<500	<0.50	<2.0	<1.0	2.0	134
MW-2	06/05/03	FD	--	--	--	--	--	**4,320**	<500	<0.50	<2.0	<1.0	2.4	**182**
MW-2	09/09/03	N	--	--	--	--	--	**2,560**	<500	<0.50	<2.0	<1.0	<1.5	**203**
MW-2	09/09/03	FD	--	--	--	--	--	**2,440**	<500	<0.50	<2.0	<1.0	<1.5	**204**
MW-2	12/10/03	N	--	--	--	--	--	**42,100**	<500	<0.50	<2.0	<1.0	<1.5	**282**
MW-2	06/03/04	N	--	--	--	--	--	**6,000**	<500	<0.50	2.6	<1.0	6.0	**162**
MW-2	06/03/04	FD	--	--	--	--	--	**6,500**	<500	<0.50	2.1	<1.0	5.4	**170**
MW-2	12/01/04	N	--	--	--	--	--	**2,410**	<500	<0.50	<2.0	<1.0	5.2	38
MW-2	06/03/05	N	--	--	--	--	--	**2,810**	<500	<0.50	<2.0	<1.0	<1.5	129
MW-2	06/03/05	FD	--	--	--	--	--	**2,910**	<500	<0.50	<2.0	<1.0	5.2	129
MW-2	11/21/05	N	--	--	--	--	--	**3,440**	<500	<0.50	<2.0	<1.0	<1.5	24
MW-2	11/21/05	FD	--	--	--	--	--	**3,680**	500	<0.50	<2.0	<1.0	<1.5	23
MW-2	06/15/06	N	--	--	--	--	--	**2,750**	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-2	06/16/06	FD	--	--	--	--	--	**11,200**	<500	<0.50	<2.0	<1.0	18	<20
MW-2	12/19/06	N	--	--	--	--	--	**2,340**	<500	<0.50	<2.0	<1.0	2.6	95
MW-2	05/30/07	N	--	--	--	--	--	**2,790**	<500	<0.50	<2.0	<1.0	1.7	98
MW-2	10/30/07	N	--	--	--	--	2,600	**1,800**	140	<0.50	<0.70	<0.80	<0.80	<1.0
MW-2	06/24/08	N	--	--	--	--	1,600	**830**	<94	<0.50	<0.70	<0.80	<0.80	<1.0
MW-2	12/03/08	N	--	--	--	--	1,800	**700**	<69	<0.50	<0.70	<0.80	<0.80	<1.0
MW-2	06/03/09	N	--	--	--	--	1,730	**620**	<58	<0.12	<0.21	<0.20	<0.15	--
MW-2	11/10/09	N	--	--	--	--	2,230	**821**	<379	<1.0	<1.0	<1.0	<3.0	3.2
MW-2	02/02/10	N	--	--	--	--	1,450	**940**	<388	<1.0	<1.0	<1.0	<3.0	3.9
MW-2	05/18/10	N	--	--	--	--	1,330	**1,870**	<392	<1.0	<1.0	<1.0	<3.0	<1.0
MW-2	08/09/10	N	--	--	--	--	1,200	**831**	<396	<1.0	<1.0	<1.0	<3.0	--
MW-2	11/01/10	N	--	--	--	--	1,680	**2,080**	<388	<1.0	<1.0	<1.0	<3.0	--
MW-2	02/02/11	N	--	--	--	--	1,700	**1,170**	<385	<1.0	<1.0	<1.0	<3.0	--

Table 2A

Summary of Groundwater Monitoring Data - Shallow Wells
Yellowstone Pipeline
Geiger Correctional Facility
Spokane, Washington

							HYDROCARBONS			*PRIMARY VOCs*				
Sample ID	*Date*	*Sample Type*	*TOC*	*DTW*	*SPH*	*GWE*	*TPHg*	*TPHd*	*TPHo*	*B*	*T*	*E*	*X*	*Naph*
				MTCA Method A Screening Levels (Shallow GW)			800	500	500	5	1000	700	1000	160
							ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-2	04/26/11	N	--	--	--	--	3,280	**562**	<392	<1.0	<1.0	<1.0	<3.0	--
MW-2	07/12/11	N	--	--	--	--	1,020	**700**	<408	<1.0	<1.0	<1.0	<3.0	--
MW-2	10/27/11	N	--	--	--	--	2,000	**920**	<410	<1.0	<1.0	<1.0	<3.0	--
MW-2	07/02/12	N	2,354.55	4.83	--	2349.72	1,960	**580**	<380	<1.0	<1.0	<1.0	<3.0	<1.0
MW-2	10/10/12	N	2,354.55	5.06	--	2349.49	1,500	**680**	<840	<1.0	<1.0	<1.0	<3.0	7.4
MW-2	03/13/13	N	2,354.55	4.61	--	2349.94	1,060	**620**	<420	<1.0	<1.0	<1.0	<3.0	<4.0
MW-2	05/15/13	N	2,354.55	5.09	--	2349.46	1,220	**990**	<400	<1.0	<1.0	<1.0	<3.0	<4.0
MW-2	08/06/13	N	2,354.55	4.68	--	2350.51	924	**560**	<400	<1.0	<1.0	<1.0	<3.0	<4.0
MW-2	10/11/13	N	2,355.19	5.19	--	2350.00	833	**910**	<400	<1.0	<1.0	<1.0	<3.0	<4.0
MW-2	03/11/14	N	2,355.19	3.21	--	2351.98	1,900	**910**	<400	<1.0	<1.0	<1.0	<3.0	<4.0
MW-2	06/03/14	N	2,355.19	5.10	--	2350.09	1,870	**610**	<420	<1.0	<1.0	<1.0	<3.0	<4.0
MW-2	04/06/17	N	2,355.19	4.18	--	2351.01	1,500	**1,200**	<73	<0.5	<0.5	<0.5	<0.5	2.0
MW-2	09/14/17	N	2,355.19	4.89	--	2,350.30	1,200	**720**	<260	<1	<1	<1	<1	<4
MW-2	03/21/18	N	2355.19	4.45	--	2350.74	940	380	<250	--	--	--	--	--
MW-2	06/21/18	N	2355.19	4.78	--	2350.41	1,000	**540**	<280	--	--	--	--	--
MW-2	09/21/18	N	2355.19	5.02	--	2350.17	810	**740**	<270	--	--	--	--	--
MW-2	12/06/18	N	2355.19	4.57	--	2350.62	**1,400**	**510**	<250	--	--	--	--	--
MW-2	12/06/18	FD	2355.19	4.57	--	2350.62	**1,400**	400	<260	--	--	--	--	--
MW-2	03/06/19	N	2355.19	4.70	--	2350.49	**1,300**	410	<270	--	--	--	--	--
MW-2	05/21/19	N	2355.19	4.36	--	2350.83	**1,200**	**620**	<260	--	--	--	--	--
MW-2	08/21/19	N	2355.19	4.55	--	2350.64	**1,500**	**540**	<260	--	--	--	--	--
MW-2	10/30/19	N	2355.19	4.49	--	2350.70	**1,800**	**700**	<310	--	--	--	--	--
MW-2	10/30/19	FD	2355.19	4.49	--	2350.70	**1,700**	**690**	<280	--	--	--	--	--
MW-2	03/05/20	N	2355.19	4.65	--	2350.54	**1,200**	410	<260	<1	<1	<1	<6	--
MW-2	03/05/20	FD	2355.19	4.65	--	2350.54	**1,100**	460	<260	<1	<1	<1	<6	--
MW-2	06/03/20	N	2355.19	4.33	--	2350.86	780	710	<260	<1.0	<1.0	<1.0	<6.0	--
MW-2	09/03/20	N	2355.19	4.70	--	2350.49	**1,100**	**630**	<270	<1.0	<1.0	<1.0	<6.0	--
MW-2	03/31/21	N	2355.19	4.92	--	2350.27	**990**	**720**	<260	<1.0	<1.0	<1.0	<6.0	--
MW-3	08/20/01	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	03/25/02	N	--	--	--	--	--	<250	<750	<0.50	<2.0	<1.0	<1.5	<20
MW-3	06/04/02	N	--	--	--	--	--	267	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-3	08/02/02	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-3	10/29/02	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-3	02/19/03	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-3	06/05/03	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-3	09/09/03	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-3	12/10/03	N	--	--	--	--	--	<250	<500	<1.5	<2.0	<1.0	<1.5	<20
MW-3	06/03/04	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	12/01/04	NS	--	--	--	--	--	--	--	--	--	--	--	--

Table 2A

Summary of Groundwater Monitoring Data - Shallow Wells
Yellowstone Pipeline
Geiger Correctional Facility
Spokane, Washington

							HYDROCARBONS			*PRIMARY VOCs*				
Sample ID	*Date*	*Sample Type*	*TOC*	*DTW*	*SPH*	*GWE*	*TPHg*	*TPHd*	*TPHo*	*B*	*T*	*E*	*X*	*Naph*
				MTCA Method A Screening Levels (Shallow GW)			800	500	500	5	1000	700	1000	160
							ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-3	06/03/05	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-3	11/21/05	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	06/15/06	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-3	12/19/06	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	05/30/07	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-3	10/30/07	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	06/24/08	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	12/03/08	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	06/03/09	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	11/10/09	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	02/02/10	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	05/18/10	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	08/09/10	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	11/01/10	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	02/02/11	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	04/26/11	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	07/12/11	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	10/27/11	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-3	07/02/12	N	2,355.18	4.92	--	2350.26	NS	--	--	--	--	--	--	--
MW-3	10/11/12	N	2,355.18	5.17	--	2350.01	<50	<160	<820	<1.0	<1.0	<1.0	<3.0	<1.0
MW-3	03/13/13	NS	2,355.18	4.68	--	2350.50	--	--	--	--	--	--	--	--
MW-3	05/15/13	N	2,355.18	5.16	--	2350.02	<100	<390	<390	<1.0	<1.0	<1.0	<3.0	<4.0
MW-3	08/06/13	NS	2,355.18	4.64	--	2350.80	--	--	--	--	--	--	--	--
MW-3	10/11/13	N	2,355.44	5.28	--	2350.16	<100	<420	<420	<1.0	<1.0	<1.0	<3.0	<4.0
MW-3	03/11/14	NS	2,355.44	3.52	--	2351.92	--	--	--	--	--	--	--	--
MW-3	06/03/14	N	2,355.44	4.98	--	2350.46	<100	<400	<400	<1.0	<1.0	<1.0	<3.0	<4.0
MW-3	04/06/17	N	2,355.44	4.28	--	2351.16	<50	<28	<66	<0.5	<0.5	<0.5	<0.5	<1.0
MW-3	09/14/17	N	2,355.44	4.89	--	2,350.55	<250	<100	<260	<1	<1	<1	<1	<4
MW-3	12/06/18	NS	2355.44	--	--	--	--	--	--	--	--	--	--	--
MW-3	03/06/19	NS	2355.44	--	--	--	--	--	--	--	--	--	--	--
MW-3	05/21/19	NS	2355.44	--	--	--	--	--	--	--	--	--	--	--
MW-3	08/21/19	NS	2355.44	--	--	--	--	--	--	--	--	--	--	--
MW-3	10/30/19	NS	2355.44	--	--	--	--	--	--	--	--	--	--	--
MW-4	08/20/01	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-4	03/25/02	N	--	--	--	--	--	**10,600**	<750	1.1	3.2	<1.0	1.9	**526**
MW-4	03/26/02	N	--	--	--	--	--	**5,770**	<750	<0.50	<2.0	<1.0	<1.5	**344**
MW-4	06/04/02	N	--	--	--	--	--	**11,400**	<500	<0.50	<2.0	<1.0	<1.5	**432**
MW-4	06/05/02	N	--	--	--	--	--	**12,500**	<500	<0.50	<2.0	1.1	1.6	**278**
MW-4	08/20/02	N	--	--	--	--	--	**1,500**	<500	<0.50	<2.0	<1.0	<1.5	43

Table 2A

Summary of Groundwater Monitoring Data - Shallow Wells
Yellowstone Pipeline
Geiger Correctional Facility
Spokane, Washington

							HYDROCARBONS			*PRIMARY VOCs*				
Sample ID	*Date*	*Sample Type*	*TOC*	*DTW*	*SPH*	*GWE*	*TPHg*	*TPHd*	*TPHo*	*B*	*T*	*E*	*X*	*Naph*
				MTCA Method A Screening Levels (Shallow GW)			800	500	500	5	1000	700	1000	160
							ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-4	10/29/02	N	--	--	--	--	--	**2,220**	<500	<0.50	<2.0	<1.0	<1.5	72
MW-4	02/19/03	N	--	--	--	--	--	**1,570**	<500	<0.50	<2.0	<1.0	<1.5	22
MW-4	06/05/03	N	--	--	--	--	--	**720**	<500	<0.50	<2.0	<1.0	<1.5	40
MW-4	09/09/03	N	--	--	--	--	--	**890**	<500	<0.50	<2.0	<1.0	<1.5	61
MW-4	12/10/03	N	--	--	--	--	--	**2,750**	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-4	06/03/04	N	--	--	--	--	--	**710**	<500	<0.50	<2.0	<1.0	<1.5	41
MW-4	12/01/04	N	--	--	--	--	--	**620**	<500	0.69	<2.0	<1.0	<1.5	22
MW-4	06/03/05	N	--	--	--	--	--	370	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-4	11/21/05	N	--	--	--	--	--	**920**	<500	<0.50	<2.0	<1.0	<1.5	27
MW-4	06/15/06	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-4	12/19/06	N	--	--	--	--	--	360	<500	<0.50	<2.0	<1.0	<1.5	31
MW-4	12/19/06	FD	--	--	--	--	--	380	<500	<0.50	<2.0	<1.0	<1.5	27
MW-4	05/30/07	N	--	--	--	--	--	449	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-4	05/30/07	FD	--	--	--	--	--	445	<500	<0.50	<2.0	<1.0	<1.5	27
MW-4	10/30/07	N	--	--	--	--	700	--	--	<0.50	<0.70	<0.80	<0.80	1.0
MW-4	10/30/07	FD	--	--	--	--	660	**650**	<94	<0.50	<0.70	<0.80	<0.80	<1.0
MW-4	06/24/08	N	--	--	--	--	190	200	<94	<0.50	<0.70	<0.80	<0.80	<1.0
MW-4	12/03/08	N	--	--	--	--	330	200	<66	<0.50	<0.70	<0.80	<0.80	<1.0
MW-4	06/03/09	N	--	--	--	--	193	120	<59	<0.12	<0.21	<0.20	<0.15	--
MW-4	11/10/09	N	--	--	--	--	380	363	<381	<1.0	<1.0	<1.0	<3.0	2.9
MW-4	02/02/10	N	--	--	--	--	162	286	<388	<1.0	<1.0	<1.0	<3.0	2.7
MW-4	05/18/10	N	--	--	--	--	227	**650**	<392	<1.0	<1.0	<1.0	<3.0	<1.0
MW-4	08/09/10	N	--	--	--	--	156	123	<385	<1.0	<1.0	<1.0	<3.0	--
MW-4	11/01/10	N	--	--	--	--	374	277	<388	<1.0	<1.0	<1.0	<3.0	--
MW-4	02/02/11	N	--	--	--	--	137	201	<392	<1.0	<1.0	<1.0	<3.0	--
MW-4	04/26/11	N	--	--	--	--	**1,010**	185	<392	<1.0	<1.0	<1.0	<3.0	--
MW-4	07/12/11	N	--	--	--	--	510	210 J	<392	<1.0	<1.0	<1.0	<3.0	--
MW-4	10/27/11	N	--	--	--	--	173	340	<380	<1.0	<1.0	<1.0	<3.0	--
MW-4	07/02/12	N	2,356.37	5.85	--	2350.52	241	180	<380	<1.0	<1.0	<1.0	<3.0	<1.0
MW-4	10/09/12	N	2,356.37	6.15	--	2350.22	113	<160	<810	<1.0	<1.0	<1.0	<3.0	5.1
MW-4	03/13/13	N	2,356.37	5.62	--	2350.75	<100	<410	<410	<1.0	<1.0	<1.0	<3.0	<4.0
MW-4	05/15/13	N	2,356.37	6.05	--	2350.32	136	<390	<390	<1.0	<1.0	<1.0	<3.0	<4.0
MW-4	08/06/13	N	2,356.37	5.68	--	2350.76	120	<400	<400	<1.0	<1.0	<1.0	<3.0	<4.0
MW-4	10/09/13	N	2,356.44	6.17	--	2350.27	<100	<410	<410	<1.0	<1.0	<1.0	<3.0	<4.0
MW-4	03/11/14	N	2,356.44	4.70	--	2351.74	192	<400	<400	<1.0	<1.0	<1.0	<3.0	<4.0
MW-4	06/03/14	N	2,356.44	5.93	--	2350.51	277	<400	<400	<1.0	<1.0	<1.0	<3.0	<4.0
MW-4	04/03/17	N	2,356.44	5.09	--	2351.35	J200	190	<75	<0.5	<0.5	<0.5	<0.5	<1.0
MW-4	09/14/17	N	2,356.44	6.27	--	2,350.17	270	260	<260	<1	<1	<1	<1	<4
MW-4	03/21/18	NS	2356.44	5.47	--	2350.97	--	--	--	--	--	--	--	--
MW-4	06/21/18	NS	2356.44	5.80	--	2350.64	--	--	--	--	--	--	--	--

Table 2A

Summary of Groundwater Monitoring Data - Shallow Wells
Yellowstone Pipeline
Geiger Correctional Facility
Spokane, Washington

							HYDROCARBONS			PRIMARY VOCs				
Sample ID	*Date*	*Sample Type*	*TOC*	*DTW*	*SPH*	*GWE*	*TPHg*	*TPHd*	*TPHo*	*B*	*T*	*E*	*X*	*Naph*
				MTCA Method A Screening Levels (Shallow GW)			800	500	500	5	1000	700	1000	160
							ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-4	09/21/18	NS	2356.44	6.07	--	2350.37	--	--	--	--	--	--	--	--
MW-4	12/06/18	NS	2356.44	5.61	--	2350.83	--	--	--	--	--	--	--	--
MW-4	03/06/19	NS	2356.44	5.76	--	2350.68	--	--	--	--	--	--	--	--
MW-4	05/21/19	NS	2356.44	5.47	--	2350.97	--	--	--	--	--	--	--	--
MW-4	08/21/19	NS	2356.44	5.69	--	2350.75	--	--	--	--	--	--	--	--
MW-4	10/30/19	NS	2356.44	5.75	--	2350.69	--	--	--	--	--	--	--	--
MW-4	03/05/20	NS	2356.44	5.69	--	2350.75	--	--	--	--	--	--	--	--
MW-4	06/03/20	NS	2356.44	5.44	--	2351.00	--	--	--	--	--	--	--	--
MW-4	09/03/20	NS	2356.44	5.75	--	2350.69	--	--	--	--	--	--	--	--
MW-5	08/20/01	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-5	03/25/02	N	--	--	--	--	--	**1,360**	<750	**19.1**	121	16	123	27
MW-5	06/04/02	N	--	--	--	--	--	**2,720**	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-5	08/20/02	N	--	--	--	--	--	**774**	<500	<0.50	<2.0	<1.0	1.6	<20
MW-5	10/29/02	N	--	--	--	--	--	**2,580**	<500	<0.50	<2.0	<1.0	<1.5	56
MW-5	02/19/03	N	--	--	--	--	--	**1,510**	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-5	06/05/03	N	--	--	--	--	--	**596**	<500	<0.50	<2.0	<1.0	<1.5	28
MW-5	09/09/03	N	--	--	--	--	--	--	--	<0.50	<2.0	<1.0	<1.5	40
MW-5	12/10/03	N	--	--	--	--	--	**5,040**	**800**	<0.50	<2.0	<1.0	<1.5	<20
MW-5	06/03/04	N	--	--	--	--	--	360	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-5	12/01/04	N	--	--	--	--	--	**4,600**	<500	1.8	<2.0	<1.0	<1.5	28
MW-5	06/03/05	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-5	11/21/05	N	--	--	--	--	--	**2,150**	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-5	06/15/06	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-5	12/19/06	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-5	05/30/07	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-5	10/30/07	N	--	--	--	--	250	**2,500**	<94	<0.50	<0.70	<0.80	<0.80	<1.0
MW-5	06/24/08	N	--	--	--	--	<50	170	<94	<0.50	<0.70	<0.80	<0.80	<1.0
MW-5	12/03/08	N	--	--	--	--	240	73	<68	<0.50	<0.70	<0.80	<0.80	<1.0
MW-5	06/03/09	N	--	--	--	--	<13	<36	<59	<0.12	<0.21	<0.20	<0.15	----
MW-5	11/10/09	N	--	--	--	--	<50	315	<381	<1.0	<1.0	<1.0	<3.0	<1.0
MW-5	02/02/10	N	--	--	--	--	<50	81	<388	<1.0	<1.0	<1.0	<3.0	<1.0
MW-5	05/18/10	N	--	--	--	--	<50	126	<396	<1.0	<1.0	<1.0	<3.0	<1.0
MW-5	08/09/10	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-5	11/01/10	N	--	--	--	--	<50	<78	<388	<1.0	<1.0	<1.0	<3.0	--
MW-5	02/02/11	N	--	--	--	--	<50	<78	<388	<1.0	<1.0	<1.0	<3.0	--
MW-5	04/26/11	N	--	--	--	--	<50	<77	<385	<1.0	<1.0	<1.0	<3.0	--
MW-5	07/12/11	N	--	--	--	--	<50	<78	<392	<1.0 UJ	<1.0 UJ	<1.0 UJ	<3.0 UJ	--
MW-5	10/27/11	N	--	--	--	--	<50	**990**	<400	<1.0	<1.0	<1.0	<3.0	--
MW-5	07/02/12	N	2,354.81	4.73	--	2350.08	<50	<78	<390	<1.0	<1.0	<1.0	<3.0	<1.0

Table 2A

Summary of Groundwater Monitoring Data - Shallow Wells
Yellowstone Pipeline
Geiger Correctional Facility
Spokane, Washington

							HYDROCARBONS			PRIMARY VOCs				
Sample ID	*Date*	*Sample Type*	*TOC*	*DTW*	*SPH*	*GWE*	*TPHg*	*TPHd*	*TPHo*	*B*	*T*	*E*	*X*	*Naph*
				MTCA Method A Screening Levels (Shallow GW)			800	500	500	5	1000	700	1000	160
							ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-5	10/09/12	N	2,354.81	5.06	--	2349.75	<50	<170	<830	<1.0	<1.0	<1.0	<3.0	<1.0
MW-5	03/13/13	N	2,354.81	4.51	--	2350.30	<100	<420	<420	<1.0	<1.0	<1.0	<3.0	<4.0
MW-5	05/15/13	N	2,354.81	5.01	--	2349.80	<100	<390	<390	<1.0	<1.0	<1.0	<3.0	<4.0
MW-5	08/06/13	N	2,354.81	4.67	--	2350.44	<100	<400	<400	<1.0	<1.0	<1.0	<3.0	<4.0
MW-5	10/09/13	N	2355.11	5.05	--	2350.06	<100	<380	<380	<1.0	<1.0	<1.0	<3.0	<4.0
MW-5	03/11/14	N	2355.11	3.40	--	2351.71	<100	<400	<400	<1.0	<1.0	<1.0	<3.0	<4.0
MW-5	06/03/14	N	2355.11	5.05	--	2350.06	<100	<420	<420	<1.0	<1.0	<1.0	<3.0	<4.0
MW-5	04/03/17	N	2355.11	3.95	--	2351.16	<50	<30	<69	<0.5	<0.5	<0.5	<0.5	<1.0
MW-5	09/14/17	N	2355.11	4.89	--	2350.22	<250	<100	<260	<1	<1	<1	<1	<4
MW-5	03/21/18	NS	2355.11	4.39	--	2350.72	--	--	--	--	--	--	--	--
MW-5	06/21/18	NS	2355.11	4.84	--	2350.27	--	--	--	--	--	--	--	--
MW-5	09/21/18	NS	2355.11	4.97	--	2350.14	--	--	--	--	--	--	--	--
MW-5	12/06/18	NS	2355.11	4.55	--	2350.56	--	--	--	--	--	--	--	--
MW-5	03/06/19	NS	2355.11	--	--	--	--	--	--	--	--	--	--	--
MW-5	05/21/19	NS	2355.11	4.47	--	2350.64	--	--	--	--	--	--	--	--
MW-5	08/21/19	NS	2355.11	4.66	--	2350.45	--	--	--	--	--	--	--	--
MW-5	10/30/19	NS	2355.11	4.69	--	2350.42	--	--	--	--	--	--	--	--
MW-5	03/05/20	NS	2355.11	4.62	--	2350.49	--	--	--	--	--	--	--	--
MW-5	06/03/20	NS	2355.11	4.44	--	2350.67	--	--	--	--	--	--	--	--
MW-5	09/03/20	NS	2355.11	4.72	--	2350.39	--	--	--	--	--	--	--	--
MW-10	10/30/19	NS	2354.38	Dry	--	--	--	--	--	--	--	--	--	--
MW-10	03/05/20	NS	2354.38	Dry	--	--	--	--	--	--	--	--	--	--
MW-10	06/03/20	NS	2354.38	Dry	--	--	--	--	--	--	--	--	--	--
MW-10	09/03/20	NS	2354.38	Dry	--	--	--	--	--	--	--	--	--	--
MW-10	03/31/21	NS	2354.38	Dry	--	--	--	--	--	--	--	--	--	--
MW-11	10/30/19	NS	--	Dry	--	--	--	--	--	--	--	--	--	--
MW-11	03/05/20	N	2354.19	11.73	--	2342.46	<250	<100	<260	<1	<1	<1	<6	--
MW-11	06/03/20	N	2354.19	12.00	--	2342.19	26 J	71 J	<260	<1.0	<1.0	<1.0	<6.0	--
MW-11	09/03/20	NS	2354.19	Dry	--	--	--	--	--	--	--	--	--	--
MW-11	03/31/21	NS	2354.19	Dry	--	--	--	--	--	--	--	--	--	--

Notes:

DTW = Depth to Water in feet

GWE = Groundwater Elevation in feet above mean sea level; before August 13, 2009, relative to arbitrary benchmarks

TOC = Top of Casing in feet above mean sea level; before August 13, 2009, relative to arbitrary benchmarks

All results are in micrograms per liter (µg/L) unless otherwise indicated

TPHg = Total petroleum hydrocarbons as gasoline analyzed by NWTPH--Gx unless otherwise noted. The higher value is based on the assumption that no benzene is present in the groundwater sample. If any detectable amount of benzene is present in the groundwater sample, then the lower TPHg cleanup level is applicable.

Table 2A

Summary of Groundwater Monitoring Data - Shallow Wells
Yellowstone Pipeline
Geiger Correctional Facility
Spokane, Washington

							HYDROCARBONS			*PRIMARY VOCs*				
Sample ID	*Date*	*Sample Type*	*TOC*	*DTW*	*SPH*	*GWE*	*TPHg*	*TPHd*	*TPHo*	*B*	*T*	*E*	*X*	*Naph*
				MTCA Method A Screening Levels (Shallow GW)			800	500	500	5	1000	700	1000	160
							ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L

TPHd = Total petroleum hydrocarbons as diesel, analyzed by NWTPH--Dx with silica gel cleanup unless otherwise noted.
TPHo = Total petroleum hydrocarbons as oil, analyzed by NWTPH--Dx with silica gel cleanup unless otherwise noted.
VOCs = Volatile organic compounds
BTEX = Benzene, toluene, ethylbenzene, and xylenes analyzed by EPA Method 8260B unless otherwise noted.
Total Xylenes = o--xylene + m,p--xylene
<x = Not detected at laboratory reporting limit x
FD = Field duplicate
N = Normal
NS = Not sampled
NM = Not measured
------ = Not analyzed
Concentrations in bold type indicate the analyte was detected above the Site-specific cleanup level.
J = Concentration is between the method detection limit (MDL) and the limit of quantitation (LOQ) and is therefore estimated.
>S = The cleanup level exceeds the saturation level; therefore, the absense of separate phase hydrocarbons (SPH) indicates compliance with the TPH cleanup level.

Table 2B

Summary of Groundwater Monitoring Data - Deep Wells
Yellowstone Pipeline
Geiger Correctional Facility
Spokane, Washington

							HYDROCARBONS			*PRIMARY VOCs*				
Sample ID	*Date*	*Sample Type*	*TOC*	*DTW*	*SPH*	*GWE*	*TPHg*	*TPHd*	*TPHo*	*B*	*T*	*E*	*X*	*Naph*
		MTCA Method A Cleanup Levels (Deep GW)					800	500	500	5	1000	700	1000	160
							ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-1	08/20/01	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-1	03/25/02	N	--	--	--	--	--	274	<750	<0.50	<2.0	<1.0	<1.5	<20
MW-1	06/04/02	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-1	08/20/02	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-1	10/29/02	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-1	02/19/03	N	--	--	--	--	--	**9,310**	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-1	02/19/03	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-1	06/05/03	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-1	09/09/03	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-1	12/10/03	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-1	06/03/04	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-1	12/01/04	N	--	--	--	--	--	<250	<500	3.6	<2.0	1.5	2.0	<20
MW-1	06/03/05	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-1	11/21/05	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-1	06/15/06	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-1	12/19/06	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-1	05/30/07	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-1	10/30/07	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-1	06/24/08	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-1	12/03/08	N	--	--	--	--	<50	<29	<68	<0.50	<0.7	<0.80	<0.80	<1.0
MW-1	06/03/09	N	--	--	--	--	<13	<35	<58	<0.12	<0.21	<0.20	<0.15	--
MW-1	11/10/09	N	--	--	--	--	<50	80	<383	<1.0M0	<1.0	<1.0	<3.0	<1.0
MW-1	02/02/10	N	--	--	--	--	<50	<77	<385	<1.0	<1.0	<1.0	<3.0	<1.0
MW-1	05/18/10	N	--	--	--	--	<50	<76	<379	<1.0	<1.0	<1.0	<3.0	<1.0
MW-1	08/09/10	N	--	--	--	--	<50	<78	<392	<1.0	<1.0	<1.0	<3.0	--
MW-1	11/01/10	N	--	--	--	--	<50	<78	<388	<1.0	<1.0	<1.0	<3.0	--
MW-1	02/02/11	N	--	--	--	--	<50	<77	<385	<1.0	<1.0	<1.0	<3.0	--
MW-1	04/26/11	N	--	--	--	--	<50	<78	<388	<1.0	<1.0	<1.0	<3.0	--
MW-1	07/12/11	N	--	--	--	--	<50	<78	<392	<1.0	<1.0	<1.0	<3.0	--
MW-1	10/27/11	N	--	--	--	--	<50	<78	<390	<1.0	< 1.0	<1.0	<3.0	--

Table 2B

Summary of Groundwater Monitoring Data - Deep Wells
Yellowstone Pipeline
Geiger Correctional Facility
Spokane, Washington

							HYDROCARBONS			*PRIMARY VOCs*				
Sample ID	*Date*	*Sample Type*	*TOC*	*DTW*	*SPH*	*GWE*	*TPHg*	*TPHd*	*TPHo*	*B*	*T*	*E*	*X*	*Naph*
			MTCA Method A Cleanup Levels (Deep GW)				800	500	500	5	1000	700	1000	160
							ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-1	10/27/11	FD	--	--	--	--	<50	<78	<390	<1.0	<1.0	<1.0	<3.0	--
MW-1	07/02/12	N	2,354.55	31.90	--	2322.65	<50	<86	<430	<1.0	<1.0	<1.0	<3.0	<1.0
MW-1	07/02/12	FD	--	--	--	--	<50	<82	<410	<1.0	<1.0	<1.0	<3.0	<1.0
MW-1	10/10/12	N	2,354.55	36.02	--	2318.53	<50	<160	<810	<1.0	<1.0	<1.0	<3.0	<1.0
MW-1	10/10/12	FD	--	--	--	--	<50	<160	<800	<1.0	<1.0	<1.0	<3.0	<1.0
MW-1	03/13/13	FD	--	--	--	--	<100	<460	<460	<1.0	<1.0	<1.0	<3.0	<4.0
MW-1	05/15/13	N	2,354.55	32.62	--	2321.93	<100	<430	<430	<1.0	<1.0	<1.0	<3.0	<4.0
MW-1	05/15/13	FD	--	--	--	--	<100	<390	<400	<1.0	<1.0	<1.0	<3.0	<4.0
MW-1	08/06/13	N	2,354.55	34.22	--	2320.38	<100	<380	<380	<1.0	<1.0	<1.0	<3.0	<4.0
MW-1	08/06/13	FD	--	--	--	--	<100	<430	<430	<1.0	<1.0	<1.0	<3.0	<4.0
MW-1	10/11/13	N	2,354.60	35.79	--	2318.81	<100	<430	<430	<1.0	<1.0	<1.0	<3.0	<4.0
MW-1	10/11/13	FD	--	--	--	--	<100	<430	<430	<1.0	<1.0	<1.0	<3.0	<4.0
MW-1	03/11/14	N	2,354.60	35.45	--	2319.15	<100	<400	500	<1.0	<1.0	<1.0	<3.0	<4.0
MW-1	06/03/14	N	2,354.60	33.90	--	2320.70	<100	<400	<400	<1.0	<1.0	<1.0	<3.0	<4.0
MW-1	06/03/14	FD	--	--	--	--	<100	<400	<400	<1.0	<1.0	<1.0	<3.0	<4.0
MW-1	04/06/17	N	2,354.60	27.10	--	2327.50	<50	<29	<68	<0.5	<0.5	<0.5	<0.5	<1.0
MW-1	09/14/17	N	2,354.60	33.15	--	2,321.45	<250	<110	<270	<1	<1	<1	<1	<4
MW-1	03/21/18	NS	2354.60	29.56	--	2325.04	--	--	--	--	--	--	--	--
MW-1	06/21/18	NS	2354.60	30.57	--	2324.03	--	--	--	--	--	--	--	--
MW-1	09/21/18	NS	2354.60	33.80	--	2320.80	--	--	--	--	--	--	--	--
MW-1	12/06/18	NS	2354.60	35.37	--	2319.23	--	--	--	--	--	--	--	--
MW-1	03/06/19	NS	2354.60	32.63	--	2321.97	--	--	--	--	--	--	--	--
MW-1	05/21/19	NS	2354.60	30.75	--	2323.85	--	--	--	--	--	--	--	--
MW-1	08/21/19	NS	2354.60	33.25	--	2321.35	--	--	--	--	--	--	--	--
MW-1	10/30/19	NS	2354.60	34.69	--	2319.91	--	--	--	--	--	--	--	--
MW-1	03/05/20	NS	2354.60	31.13	--	2323.47	--	--	--	--	--	--	--	--
MW-1	06/03/20	NS	2354.60	31.99	--	2322.61	--	--	--	--	--	--	--	--
MW-1	09/03/20	NS	2354.60	33.80	--	2320.80	--	--	--	--	--	--	--	--
MW-5D	10/11/13	N	2,355.03	35.57	--	2319.46	614	**1,100**	<450	<1.0	<1.0	<1.0	<3.0	<4.0

Table 2B

Summary of Groundwater Monitoring Data - Deep Wells
Yellowstone Pipeline
Geiger Correctional Facility
Spokane, Washington

							HYDROCARBONS			*PRIMARY VOCs*				
Sample ID	*Date*	*Sample Type*	*TOC*	*DTW*	*SPH*	*GWE*	*TPHg*	*TPHd*	*TPHo*	*B*	*T*	*E*	*X*	*Naph*
			MTCA Method A Cleanup Levels (Deep GW)				800	500	500	5	1000	700	1000	160
							ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-5D	03/11/14	N	2,355.03	35.48	--	2319.55	<100	<400	**700**	<1.0	<1.0	<1.0	<3.0	<4.0
MW-5D	06/03/14	N	2,355.03	33.73	--	2321.30	128	<400	<400	<1.0	<1.0	<1.0	<3.0	<4.0
MW-5D	09/14/17	N	2,355.03	32.48	--	2,322.55	<250	**560**	<250	<1	<1	<1	<1	<4
MW-5D	03/21/18	N	2355.03	29.02	--	2326.01	69 J	370	<260	--	--	--	--	--
MW-5D	03/21/18	FD	2355.03	29.02	--	2326.01	57 J	**1,600 ***	**2,400 ***	--	--	--	--	--
MW-5D	06/21/18	N	2355.03	30.01	--	2325.02	<250	**670**	<260	--	--	--	--	--
MW-5D	09/21/18	N	2355.03	33.51	--	2321.52	81 J	160	<280	--	--	--	--	--
MW-5D	09/21/18	FD	2355.03	33.51	--	2321.52	<250	220	<270	--	--	--	--	--
MW-5D	12/06/18	N	2355.03	35.21	--	2319.82	<250	72 J	<260	--	--	--	--	--
MW-5D	03/06/19	N	2355.03	32.46	--	2322.57	<250	110	<260	--	--	--	--	--
MW-5D	05/21/19	N	2355.03	30.46	--	2324.57	--	--	--	--	--	--	--	--
MW-5D	08/21/19	N	2355.03	32.94	--	2322.09	<250	220	<260	--	--	--	--	--
MW-5D	08/21/19	FD	2355.03	32.94	--	2322.09	<250	250	<260	--	--	--	--	--
MW-5D	10/30/19	N	2355.03	34.50	--	2320.53	<250	130	<270	--	--	--	--	--
MW-5D	03/05/20	N	2355.03	30.94	--	2324.09	<250	78 J	<260	<1	<1	<1	<6	--
MW-5D	06/03/20	N	2355.03	31.80	--	2323.23	<250	390	120 J	<1.0	<1.0	<1.0	<6.0	--
MW-5D	09/03/20	N	2355.03	33.52	--	2321.51	45 J	250	<260	<1.0	<1.0	<1.0	<6.0	--
MW-5D Dup	09/03/20	FD	2355.03	33.52	--	2321.51	33 J	240	<270	<1.0	<1.0	<1.0	<6.0	--
MW-5D	03/31/21	N	2355.03	32.21	--	2322.82	<250	290	<260	<1.0	<1.0	<1.0	<6.0	--
MW-5D Dup	03/31/21	FD	2355.03	32.21	--	2322.82	<250	230	<250	<1.0	<1.0	<1.0	<6.0	--
MW-6	08/20/01	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-6	03/25/02	N	--	--	--	--	--	<250	<750	<0.50	<2.0	<1.0	<1.5	<20
MW-6	06/04/02	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-6	08/20/02	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-6	10/29/02	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-6	02/19/03	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-6	06/05/03	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-6	09/09/03	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-6	12/10/03	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20

Table 2B

Summary of Groundwater Monitoring Data - Deep Wells
Yellowstone Pipeline
Geiger Correctional Facility
Spokane, Washington

							HYDROCARBONS			*PRIMARY VOCs*				
Sample ID	*Date*	*Sample Type*	*TOC*	*DTW*	*SPH*	*GWE*	*TPHg*	*TPHd*	*TPHo*	*B*	*T*	*E*	*X*	*Naph*
		MTCA Method A Cleanup Levels (Deep GW)					800	500	500	5	1000	700	1000	160
							ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-6	06/03/04	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-6	12/01/04	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-6	06/03/05	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-6	11/21/05	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-6	06/15/06	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-6	12/19/06	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-6	05/30/07	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-6	10/30/07	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-6	06/24/08	N	--	--	--	--	<50	<75	<94	<0.50	<0.70	<0.80	<0.80	<1.0
MW-6	12/03/08	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-6	06/03/09	N	--	--	--	--	<13	<35	<58	<0.12	<0.21	<0.20	<0.15	--
MW-6	11/10/09	N	--	--	--	--	<50	135	<396	<1.0	<1.0	<1.0	<3.0	<1.0
MW-6	02/02/10	N	--	--	--	--	<50	<78	<392	<1.0	<1.0	<1.0	<3.0	<1.0
MW-6	05/18/10	N	--	--	--	--	<50	<78	<388	<1.0	<1.0	<1.0	<3.0	<1.0
MW-6	08/09/10	N	--	--	--	--	<50	<78	<392	<1.0	<1.0	<1.0	<3.0	--
MW-6	11/01/10	N	--	--	--	--	<50	<78	<388	<1.0	<1.0	<1.0	<3.0	--
MW-6	02/02/11	N	--	--	--	--	<50	<78	<392	<1.0	<1.0	<1.0	<3.0	--
MW-6	04/26/11	N	--	--	--	--	<50	<78	<388	<1.0	<1.0	<1.0	<3.0	--
MW-6	07/12/11	N	--	--	--	--	<50	<78	<392	<1.0	<1.0	<1.0	<3.0	--
MW-6	10/27/11	N	--	--	--	--	<50	<78	<390	<1.0	<1.0	<1.0	<3.0	--
MW-6	07/02/12	N	2,355.87	32.83	--	2323.04	<50	<82	<410	<1.0	<1.0	<1.0	<3.0	<1.0
MW-6	10/09/12	N	2,355.87	35.71	--	2320.16	<50	<160	<800	<1.0	<1.0	<1.0	<3.0	<1.0
MW-6	03/13/13	N	2,355.87	32.45	--	2323.42	<100	<420	<420	<1.0	<1.0	<1.0	<3.0	<4.0
MW-6	05/15/13	N	2,355.87	33.07	--	2322.80	<100	<420	<420	<1.0	<1.0	<1.0	<3.0	<4.0 UJ
MW-6	08/06/13	N	2,355.87	34.91	--	2321.02	<100	<380	<380	<1.0	<1.0	<1.0	<3.0	<4.0
MW-6	10/11/13	N	2,355.93	38.50	--	2317.43	<100	<380	<380	<1.0	<1.0	<1.0	<3.0	<4.0
MW-6	03/11/14	N	2,355.93	36.59	--	2319.34	<100	<400	<400	<1.0	<1.0	<1.0	<3.0	<4.0
MW-6	06/03/14	N	2,355.93	34.65	--	2321.28	<100	<400	<400	<1.0	<1.0	<1.0	<3.0	<4.0
MW-6	04/03/17	N	2,355.93	27.98	--	2327.95	<50	<30	<70	<0.5	<0..5	<0.5	<0.5	<1.0
MW-6	09/14/17	N	2,355.93	33.26	--	2,322.67	<250	<110	<260	<1	<1	<1	<1	<4

Table 2B

Summary of Groundwater Monitoring Data - Deep Wells
Yellowstone Pipeline
Geiger Correctional Facility
Spokane, Washington

							HYDROCARBONS			*PRIMARY VOCs*				
Sample ID	*Date*	*Sample Type*	*TOC*	*DTW*	*SPH*	*GWE*	*TPHg*	*TPHd*	*TPHo*	*B*	*T*	*E*	*X*	*Naph*
			MTCA Method A Cleanup Levels (Deep GW)				800	500	500	5	1000	700	1000	160
							ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-6	03/21/18	NS	2355.93	30.08	--	2325.85	--	--	--	--	--	--	--	--
MW-6	06/21/18	NS	2355.93	30.93	--	2325.00	--	--	--	--	--	--	--	--
MW-6	09/21/18	NS	2355.93	34.40	--	2321.53	--	--	--	--	--	--	--	--
MW-6	12/06/18	NS	2355.93	36.13	--	2319.80	--	--	--	--	--	--	--	--
MW-6	03/06/19	NS	2355.93	33.36	--	2322.57	--	--	--	--	--	--	--	--
MW-6	05/21/19	NS	2355.93	31.18	--	2324.75	--	--	--	--	--	--	--	--
MW-6	08/21/19	NS	2355.93	33.84	--	2322.09	--	--	--	--	--	--	--	--
MW-6	10/30/19	NS	2355.93	35.45	--	2320.48	--	--	--	--	--	--	--	--
MW-6	03/05/20	NS	2355.93	31.70	--	2324.23	--	--	--	--	--	--	--	--
MW-6	06/03/20	NS	2355.93	32.64	--	2323.29	--	--	--	--	--	--	--	--
MW-6	09/03/20	NS	2355.93	34.43	--	2321.50	--	--	--	--	--	--	--	--
MW-7	08/20/01	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-7	03/25/02	N	--	--	--	--	--	**6,280**	<750	<0.50	<2.0	<1.0	25	154
MW-7	06/04/02	N	--	--	--	--	--	**13,100**	<500	<0.50	<2.0	<1.0	**14**	**221**
MW-7	08/21/02	N	--	--	--	--	--	**6,850**	<500	<0.50	<2.0	<1.0	<1.5	65
MW-7	08/21/02	N	--	--	--	--	--	**6,100**	<500	0.82	4.0	1.9	13	92
MW-7	10/29/02	N	--	--	--	--	--	**5,460**	<500	0.70	<2.0	<1.0	**9**	**172**
MW-7	02/19/03	N	--	--	--	--	--	**7,390**	<500	<0.50	<2.0	<1.0	6	<20
MW-7	06/05/03	N	--	--	--	--	--	**770**	<500	0.99	<2.0	<1.0	<1.5	<20
MW-7	09/09/03	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-7	09/11/03	N	--	--	--	--	--	**1,250**	<500	<0.50	<2.0	4.7	30	81
MW-7	12/10/03	N	--	--	--	--	--	**7,120**	<500	<0.50	<2.0	1.2	15	114
MW-7	06/03/04	N	--	--	--	--	--	**1,000**	<500	<0.50	<2.0	<1.0	<1.5	48
MW-7	12/01/04	N	--	--	--	--	--	**1540**	<500	<0.50	<2.0	<1.0	<1.5	21
MW-7	06/03/05	N	--	--	--	--	--	**830**	<500	<0.50	<2.0	<1.0	<1.5	24
MW-7	11/21/05	N	--	--	--	--	--	**2,970**	<500	<0.50	<2.0	<1.0	<1.5	48
MW-7	06/15/06	N	--	--	--	--	--	**1,410**	<500	<0.50	<2.0	<1.0	<1.5	23
MW-7	12/19/06	N	--	--	--	--	--	**1,300**	<500	<0.50	6.42	2.74	9.43	24
MW-7	05/30/07	N	--	--	--	--	--	**961**	<500	0.71	<2.0	<1.0	<1.5	<20

Table 2B

Summary of Groundwater Monitoring Data - Deep Wells
Yellowstone Pipeline
Geiger Correctional Facility
Spokane, Washington

							HYDROCARBONS			*PRIMARY VOCs*				
Sample ID	*Date*	*Sample Type*	*TOC*	*DTW*	*SPH*	*GWE*	*TPHg*	*TPHd*	*TPHo*	*B*	*T*	*E*	*X*	*Naph*
			MTCA Method A Cleanup Levels (Deep GW)				800 ug/L	500 ug/L	500 ug/L	5 ug/L	1000 ug/L	700 ug/L	1000 ug/L	160 ug/L
MW-7	10/30/07	N	--	--	--	--	**2,700**	**14,000**	<4,700	<0.50	<0.70	<0.80	<0.80	<1.0
MW-7	06/24/08	N	--	--	--	--	**1,600**	**1,200**	<95	<0.50	<0.70	<0.80	<0.80	<1.0
MW-7	12/04/08	N	--	--	--	--	**1,400**	<29	<68	<0.50	<0.70	<0.80	<0.80	<1.0
MW-7	06/04/09	N	--	--	--	--	155	**560**	<58	<0.12	<0.21	<0.20	<0.15	--
MW-7	11/10/09	N	--	--	--	--	577	**7,600**	<388	<1.0	<1.0	<1.0	<3.0	2.7
MW-7	02/02/10	N	--	--	--	--	214	**2,000**	<377	<1.0	<1.0	<1.0	<3.0	2.4
MW-7	05/18/10	N	--	--	--	--	717	**16,900**	<400	<1.0	<1.0	<1.0	<3.0	<1.0
MW-7	08/09/10	N	--	--	--	--	**928**	**22,100**	<388	<1.0	<1.0	<1.0	<3.0	--
MW-7	11/01/10	N	--	--	--	--	**3,130**	**28,300**	<388	<1.0	<1.0	<1.0	<3.0	--
MW-7	02/02/11	N	--	--	--	--	704	**10,700**	<392	<1.0	<1.0	<1.0	<3.0	--
MW-7	04/26/11	N	--	--	--	--	**5,710**	**3,690**	<400	<1.0	<1.0	<1.0	<3.0	--
MW-7	07/12/11	N	--	--	--	--	278	**2,540**	<392	<1.0	<1.0	<1.0	<3.0	--
MW-7	10/26/11	N	--	--	--	--	**2,420**	**37,200**	<380	<1.0	<1.0	<1.0	<3.0	--
MW-7	07/02/12	N	2,356.25	31.84	--	2324.41	<50	78	<380	<1.0	<1.0	<1.0	<3.0	<1.0
MW-7	10/10/12	N	2,356.25	35.24	--	2321.01	207	350	<820	<1.0	<1.0	<1.0	<3.0	5.4
MW-7	03/13/13	N	2,356.25	31.94	--	2324.31	104	<440	<440	<1.0	<1.0	<1.0	<3.0	<4.0
MW-7	05/14/13	N	2,356.25	32.74	--	2323.51	< 100	<390	<400	<1.0	<1.0	<1.0	<3.0	<4.0
MW-7	08/06/13	N	2,356.25	34.54	--	2321.77	250	<420	<420	<1.0	<1.0	<1.0	<3.0	<4.0
MW-7	10/12/13	N	2,356.31	36.11	--	2320.20	410	**600**	< 450	<1.0	<1.0	<1.0	<3.0	<4.0
MW-7	03/11/14	N	2,356.31	35.62	--	2320.69	448	430	**550**	<1.0	<1.0	<1.0	<3.0	<4.0
MW-7	06/04/14	N	2,356.31	34.37	--	2321.94	201	<400	<400	<1.0	<1.0	<1.0	<3.0	<4.0
MW-7	04/05/17	NS	2,356.31	26.25	--	2330.06	ORC sock stuck in well - unable to sample				--	--	--	--
MW-7	09/14/17	NS	2,356.31	33.17	--	2,323.14	ORC sock stuck in well - unable to sample				--	--	--	--
MW-7	03/21/18	NS	2356.31	29.59	--	2326.72	ORC sock stuck in well - unable to sample				--	--	--	--
MW-7	06/21/18	NS	2356.31	30.76	--	2325.55	ORC sock stuck in well - unable to sample				--	--	--	--
MW-7	09/21/18	NS	2356.31	34.13	--	2322.18	ORC sock stuck in well - unable to sample				--	--	--	--
MW-7	12/06/18	NS	2356.31	36.09	--	2320.22	--	--	--	--	--	--	--	--
MW-7	03/06/19	NS	2356.31	33.05	--	2323.26	--	--	--	--	--	--	--	--
MW-7	05/21/19	NS	2356.31	31.00	--	2325.31	--	--	--	--	--	--	--	--
MW-7	08/21/19	N	2356.31	33.67	--	2322.64	180 J	240	<310	--	--	--	--	--

Table 2B

Summary of Groundwater Monitoring Data - Deep Wells
Yellowstone Pipeline
Geiger Correctional Facility
Spokane, Washington

							HYDROCARBONS			*PRIMARY VOCs*				
Sample ID	*Date*	*Sample Type*	*TOC*	*DTW*	*SPH*	*GWE*	*TPHg*	*TPHd*	*TPHo*	*B*	*T*	*E*	*X*	*Naph*
			MTCA Method A Cleanup Levels (Deep GW)				800	500	500	5	1000	700	1000	160
							ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-7	10/30/19	N	2356.31	35.36	--	2320.95	190 J	**1,000**	<260	--	--	--	--	--
MW-7	03/05/20	N	2356.31	31.54	--	2324.77	51 J	190	<270	<1	<1	<1	<6	--
MW-7	06/03/20	N	2356.31	32.67	--	2323.64	95 J	400	<300	<1.0	<1.0	<1.0	<6.0	--
MW-7	06/03/20	FD	2356.31	32.67	--	2323.64	60 J	270	<250	<1.0	<1.0	<1.0	<6.0	--
MW-7	09/03/20	N	2356.31	34.33	--	2321.98	89 J	**570**	<270	<1.0	<1.0	<1.0	<6.0	--
MW-7	03/31/21	N	2356.31	32.98	--	2323.33	<250	110	<250	<1.0	<1.0	<1.0	<6.0	--
MW-8	08/20/01	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-8	03/25/02	N	--	--	--	--	--	<250	<750	<0.50	<2.0	<1.0	<1.5	<20
MW-8	06/04/02	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-8	08/21/02	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-8	10/29/02	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-8	02/19/03	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-8	06/05/03	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-8	09/09/03	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-8	09/11/03	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-8	12/10/03	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-8	06/03/04	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-8	12/01/04	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-8	06/03/05	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-8	11/21/05	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-8	06/15/06	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-8	12/19/06	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-8	05/30/07	N	--	--	--	--	--	<250	<500	<0.50	<2.0	<1.0	<1.5	<20
MW-8	10/30/07	NS	--	--	--	--	--	--	--	--	--	--	--	--
MW-8	06/24/08	N	--	--	--	--	<50	<75	<94	<0.50	<0.70	<0.80	<0.80	<1.0
MW-8	12/04/08	N	--	--	--	--	<50	**35,000**	<3,500	<0.50	<0.70	<0.80	<0.80	<1.0
MW-8	06/04/09	N	--	--	--	--	<13.4	<36	<59	<0.12	<0.21	<0.20	<0.15	--
MW-8	11/10/09	N	--	--	--	--	<50	<79	<396	<1.0	<1.0	<1.0	<3.0	<1.0
MW-8	02/02/10	N	--	--	--	--	<50	<76	<381	<1.0	<1.0	<1.0	<3.0	<1.0

Table 2B

Summary of Groundwater Monitoring Data - Deep Wells
Yellowstone Pipeline
Geiger Correctional Facility
Spokane, Washington

							HYDROCARBONS			*PRIMARY VOCs*				
Sample ID	*Date*	*Sample Type*	*TOC*	*DTW*	*SPH*	*GWE*	*TPHg*	*TPHd*	*TPHo*	*B*	*T*	*E*	*X*	*Naph*
			MTCA Method A Cleanup Levels (Deep GW)				800	500	500	5	1000	700	1000	160
							ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-8	05/18/10	N	--	--	--	--	<50	<78	<388	<1.0	<1.0	<1.0	<3.0	<1.0
MW-8	08/09/10	N	--	--	--	--	<50	<79	<396	<1.0	<1.0	<1.0	<3.0	--
MW-8	11/01/10	N	--	--	--	--	<50	<78	<388	<1.0	<1.0	<1.0	<3.0	--
MW-8	02/02/11	N	--	--	--	--	<50	<78	<388	<1.0	<1.0	<1.0	<3.0	--
MW-8	04/26/11	N	--	--	--	--	<50	<80	<400	<1.0	<1.0	<1.0	<3.0	--
MW-8	07/12/11	N	--	--	--	--	<50	<77	<385	<1.0	<1.0	<1.0	<3.0	--
MW-8	10/26/11	N	--	--	--	--	<50	<76	<380	<1.0	<1.0	<1.0	<3.0	--
MW-8	07/02/12	N	2,356.57	32.36	--	2324.21	<50	<86	<430	<1.0	<1.0	<1.0	<3.0	<1.0
MW-8	10/10/12	N	2,356.57	35.56	--	2321.01	<50	<170	<830	<1.0	<1.0	<1.0	<3.0	<1.0
MW-8	03/13/13	N	2,356.57	32.66	--	2323.91	<100	<440	<440	<1.0	<1.0	<1.0	<3.0	<4.0
MW-8	05/14/13	N	2,356.57	33.12	--	2323.45	<100	<390	<400	<1.0	<1.0	<1.0	<3.0	<4.0
MW-8	08/06/13	N	2,356.57	34.83	--	2321.77	<100	<410	<410	<1.0	<1.0	<1.0	<3.0	<4.0
MW-8	10/12/13	N	2,356.60	36.36	--	2320.24	<100	<430	<430	<1.0	<1.0	<1.0	<3.0	<4.0
MW-8	03/11/14	N	2,356.60	36.98	--	2319.62	<100	<400	<400	<1.0	<1.0	<1.0	<3.0	<4.0
MW-8	06/04/14	N	2,356.60	34.75	--	2321.85	<100	<400	<400	<1.0	<1.0	<1.0	<3.0	<4.0
MW-8	04/05/17	N	2,356.60	29.20	--	2327.40	<50	<30	<69	<0.5	<0.5	<0.5	<0.5	<1.0
MW-8	09/14/17	N	2,356.60	33.04	--	2,323.56	<250	<100	<250	<1	<1	<1	<1	<4
MW-8	03/21/18	NS	2356.60	30.79	--	2325.81	--	--	--	--	--	--	--	--
MW-8	06/21/18	NS	2356.60	31.11	--	2325.49	--	--	--	--	--	--	--	--
MW-8	09/21/18	NS	2356.60	34.24	--	2322.36	--	--	--	--	--	--	--	--
MW-8	12/06/18	NS	2356.60	36.15	--	2320.45	--	--	--	--	--	--	--	--
MW-8	03/06/19	NS	2356.60	33.58	--	2323.02	--	--	--	--	--	--	--	--
MW-8	05/21/19	NS	2356.60	31.44	--	2325.16	--	--	--	--	--	--	--	--
MW-8	08/21/19	NS	2356.60	33.42	--	2323.18	--	--	--	--	--	--	--	--
MW-8	10/30/19	NS	2356.60	35.39	--	2321.21	--	--	--	--	--	--	--	--
MW-8	03/05/20	NS	2356.60	31.98	--	2324.62	--	--	--	--	--	--	--	--
MW-8	06/03/20	NS	2356.60	33.18	--	2323.42	--	--	--	--	--	--	--	--
MW-8	09/03/20	NS	2356.60	35.20	--	2321.40	--	--	--	--	--	--	--	--
MW-12	10/30/19	NS	--	34.46	--	--	--	--	--	--	--	--	--	--

Table 2B

Summary of Groundwater Monitoring Data - Deep Wells
Yellowstone Pipeline
Geiger Correctional Facility
Spokane, Washington

							HYDROCARBONS			PRIMARY VOCs				
Sample ID	*Date*	*Sample Type*	*TOC*	*DTW*	*SPH*	*GWE*	*TPHg*	*TPHd*	*TPHo*	*B*	*T*	*E*	*X*	*Naph*
			MTCA Method A Cleanup Levels (Deep GW)				800	500	500	5	1000	700	1000	160
							ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
MW-12	03/05/20	N	2354.82	10.30	--	2344.52	<250	<100	<260	<1	<1	<1	<6	--
MW-12	06/03/20	N	2354.82	31.94	--	2322.88	<250	<110	<270	<1.0	<1.0	<1.0	<6.0	--
MW-12	09/03/20	N	2354.82	33.57	--	2321.25	24 J	<110	<290	<1.0	<1.0	<1.0	<6.0	--
MW-12	03/31/21	N	2354.82	32.18	--	2322.64	<250	<100	<260	<1.0	<1.0	<1.0	<6.0	--
95-MW-11A[1]				removed from sampling schedule due to well obstruction										
95-MW-11A[1]	02/02/11	NS	2,357.25	Obstruction in Well at 3.25 Feet				--	--	--	--	--	--	--
95-MW-11A[1]	04/26/11	NS	2,357.25	Obstruction in Well at 3.25 Feet				--	--	--	--	--	--	--
95-MW-11A[1]	09/14/17	NS	2,357.25	34.47	--	2,322.78	--	--	--	--	--	--	--	--
95-MW-11A[1]	03/21/18	NS	2357.25	30.76	--	2326.49	--	--	--	--	--	--	--	--
95-MW-11A[1]	06/21/18	NS	2357.25	31.98	--	2325.27	--	--	--	--	--	--	--	--
95-MW-11A[1]	09/21/18	NS	2357.25	35.48	--	2321.77	--	--	--	--	--	--	--	--
95-MW-11A[1]	12/06/18	NS	2357.25	37.18	--	2320.07	--	--	--	--	--	--	--	--
95-MW-11A[1]	03/06/19	NS	2357.25	34.11	--	2323.14	--	--	--	--	--	--	--	--
95-MW-11A[1]	05/21/19	NS	2357.25	32.07	--	2325.18	--	--	--	--	--	--	--	--
95-MW-11A[1]	08/21/19	NS	2357.25	34.87	--	2322.38	--	--	--	--	--	--	--	--
95-MW-11A[1]	10/30/19	NS	2357.25	36.47	--	2320.78	--	--	--	--	--	--	--	--
95-MW-11B[1]	08/20/01	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-11B[1]	03/25/02	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-11B[1]	06/04/02	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-11B[1]	10/29/02	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-11B[1]	02/19/03	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-11B[1]	06/05/03	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-11B[1]	09/09/03	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-11B[1]	12/10/03	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-11B[1]	06/03/04	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-11B[1]	12/01/04	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-11B[1]	06/03/05	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-11B[1]	11/21/05	NS	--	--	--	--	--	--	--	--	--	--	--	--

Table 2B

Summary of Groundwater Monitoring Data - Deep Wells
Yellowstone Pipeline
Geiger Correctional Facility
Spokane, Washington

							HYDROCARBONS			*PRIMARY VOCs*				
Sample ID	*Date*	*Sample Type*	*TOC*	*DTW*	*SPH*	*GWE*	*TPHg*	*TPHd*	*TPHo*	*B*	*T*	*E*	*X*	*Naph*
		MTCA Method A Cleanup Levels (Deep GW)					800	500	500	5	1000	700	1000	160
							ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
95-MW-11B[1]	06/15/06	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-11B[1]	12/19/06	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-11B[1]	05/30/07	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-11B[1]	10/30/07	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-11B[1]	06/24/08	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-11B[1]	12/03/08	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-11B[1]	06/03/09	N	--	--	--	--	<13	<35	<58	<0.12	<0.21	<0.20	<0.15	--
95-MW-11B[1]	11/10/09	N	--	--	--	--	<50	144	<381	<1.0	<1.0	<1.0	<3.0	<1.0
95-MW-11B[1]	02/02/10	N	--	--	--	--	<50	<76	<381	<1.0	<1.0	<1.0	<3.0	<1.0
95-MW-11B[1]	05/18/10	N	--	--	--	--	<50	<77	<385	<1.0	<1.0	<1.0	<3.0	<1.0
95-MW-11B[1]	08/09/10	N	--	--	--	--	<50	<78	<392	<1.0	<1.0	<1.0	<3.0	--
95-MW-11B[1]	11/01/10	N	--	--	--	--	<50	<78	<388	<1.0	<1.0	<1.0	<3.0	--
95-MW-11B[1]	02/02/11	N	--	--	--	--	<50	<79	<396	<1.0	<1.0	<1.0	<3.0	--
95-MW-11B[1]	04/26/11	N	--	--	--	--	<50	<80	<400	<1.0	<1.0	<1.0	<3.0	--
95-MW-11B[1]	07/12/11	N	--	--	--	--	<50	<78	<392	<1.0	<1.0	<1.0	<3.0	--
95-MW-11B[1]	10/26/11	N	--	--	--	--	<50	<75	<380	<1.0	<1.0	<1.0	<3.0	--
95-MW-11B[1]	07/02/12	N	2,357.78	33.82	--	2323.96	<50	<77	<380	<1.0	<1.0	<1.0	<3.0	<1.0
95-MW-11B[1]	10/10/12	N	2,357.78	37.18	--	2320.60	<50	<160	<810	<1.0	<1.0	<1.0	<3.0	<1.0
95-MW-11B[1]	03/13/13	N	2,357.78	33.67	--	2324.11	<100	<410	<410	<1.0	<1.0	<1.0	<3.0	<4.0
95-MW-11B[1]	05/14/13	N	2,357.78	34.52	--	2323.26	<100	<450	<450	<1.0	<1.0	<1.0	<3.0	<4.0
95-MW-11B[1]	08/06/13	N	2,357.78	36.34	--	2321.51	<100	<380	<380	<1.0	<1.0	<1.0	<3.0	<4.0
95-MW-11B[1]	10/12/13	N	2,357.85	37.96	--	2319.89	<100	<410	<410	<1.0	<1.0	<1.0	<3.0	<4.0
95-MW-11B[1]	03/12/14	N	2,357.85	38.10	--	2319.75	<100	<400	<400	<1.0	<1.0	<1.0	<3.0	<4.0
95-MW-11B[1]	06/04/14	N	2,357.85	35.97	--	2321.88	<100	<400	<400	<1.0	<1.0	<1.0	<3.0	<4.0
95-MW-11B[1]	04/05/17	N	2,357.85	28.38	--	2329.47	<50	<30	<70	<0.5	<0.5	<0.5	<0.5	<1.0
95-MW-11B[1]	09/14/17	N	2,357.85	34.78	--	2,323.07	<250	<110	<260	<1	<1	<1	<1	<4
95-MW-11B[1]	03/21/18	NS	2357.85	31.19	--	2326.66	--	--	--	--	--	--	--	--
95-MW-11B[1]	06/21/18	NS	2357.85	32.27	--	2325.58	--	--	--	--	--	--	--	--
95-MW-11B[1]	09/21/18	NS	2357.85	34.76	--	2323.09	--	--	--	--	--	--	--	--
95-MW-11B[1]	12/06/18	NS	2356.71	36.51	--	2320.20	--	--	--	--	--	--	--	--

Table 2B

Summary of Groundwater Monitoring Data - Deep Wells
Yellowstone Pipeline
Geiger Correctional Facility
Spokane, Washington

							HYDROCARBONS			*PRIMARY VOCs*				
Sample ID	*Date*	*Sample Type*	*TOC*	*DTW*	*SPH*	*GWE*	*TPHg*	*TPHd*	*TPHo*	*B*	*T*	*E*	*X*	*Naph*
			MTCA Method A Cleanup Levels (Deep GW)				800	500	500	5	1000	700	1000	160
							ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
95-MW-11B[1]	03/06/19	NS	2356.71	33.42	--	2323.29	--	--	--	--	--	--	--	--
95-MW-11B[1]	05/21/19	NS	2356.71	31.40	--	2325.31	--	--	--	--	--	--	--	--
95-MW-11B[1]	08/21/19	NS	2356.71	34.13	--	2322.58	--	--	--	--	--	--	--	--
95-MW-11B[1]	10/30/19	NS	2356.71	35.92	--	2320.79	--	--	--	--	--	--	--	--
95-MW-12A[1]	08/20/01	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-12A[1]	03/25/02	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-12A[1]	06/04/02	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-12A[1]	10/29/02	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-12A[1]	02/19/03	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-12A[1]	06/05/03	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-12A[1]	09/09/03	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-12A[1]	12/10/03	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-12A[1]	06/03/04	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-12A[1]	12/01/04	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-12A[1]	06/03/05	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-12A[1]	11/21/05	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-12A[1]	06/15/06	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-12A[1]	12/19/06	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-12A[1]	05/30/07	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-12A[1]	10/30/07	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-12A[1]	06/24/08	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-12A[1]	12/03/08	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-12A[1]	06/03/09	N	--	--	--	--	<13	<35	<58	<0.12	<0.21	<0.20	<0.15	--
95-MW-12A[1]	07/02/12	NS	2,355.12	31.23	--	2323.89	--	--	--	--	--	--	--	--
95-MW-12A[1]	10/09/12	NS	2,355.12	34.66	--	2320.46	--	--	--	--	--	--	--	--
95-MW-12A[1]	03/12/13	NS	2,355.12	30.97	--	2324.15	--	--	--	--	--	--	--	--
95-MW-12A[1]	05/14/13	NS	2,355.12	32.00	--	2323.12	--	--	--	--	--	--	--	--
95-MW-12A[1]	08/05/13	NS	2,355.12	33.74	--	2321.48	--	--	--	--	--	--	--	--
95-MW-12A[1]	10/18/13	NS	2,355.22	35.36	--	2319.86	--	--	--	--	--	--	--	--

Table 2B

Summary of Groundwater Monitoring Data - Deep Wells
Yellowstone Pipeline
Geiger Correctional Facility
Spokane, Washington

							HYDROCARBONS			PRIMARY VOCs				
Sample ID	*Date*	*Sample Type*	*TOC*	*DTW*	*SPH*	*GWE*	*TPHg*	*TPHd*	*TPHo*	*B*	*T*	*E*	*X*	*Naph*
			MTCA Method A Cleanup Levels (Deep GW)				800	500	500	5	1000	700	1000	160
							ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L
95-MW-12A[1]	03/11/14	NS	2,355.22	35.02	--	2320.20	--	--	--	--	--	--	--	--
95-MW-12A[1]	06/02/14	NS	2,355.22	33.38	--	2321.84	--	--	--	--	--	--	--	--
95-MW-12A[1]	04/03/17	NS	2,355.22	25.76	--	2329.46	--	--	--	--	--	--	--	--
95-MW-12A[1]	09/14/17	NS	2,355.22	32.27	--	2,322.95	--	--	--	--	--	--	--	--
95-MW-12A[1]	03/21/18	NS	2355.22	23.53	--	2331.69	--	--	--	--	--	--	--	--
95-MW-12A[1]	06/21/18	NS	2355.22	29.80	--	2325.42	--	--	--	--	--	--	--	--
95-MW-12A[1]	09/21/18	NS	2355.22	33.28	--	2321.94	--	--	--	--	--	--	--	--
95-MW-12A[1]	12/06/18	NS	2355.22	34.91	--	2320.31	--	--	--	--	--	--	--	--
95-MW-12A[1]	03/06/19	NS	2355.22	31.85	--	2323.37	--	--	--	--	--	--	--	--
95-MW-12A[1]	05/21/19	NS	2355.22	29.86	--	2325.36	--	--	--	--	--	--	--	--
95-MW-12A[1]	08/21/19	NS	2355.22	32.66	--	2322.56	--	--	--	--	--	--	--	--
95-MW-12A[1]	10/30/19	NS	2355.22	34.36	--	2320.86	--	--	--	--	--	--	--	--
95-MW-12B[1]	08/20/01	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-12B[1]	03/25/02	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-12B[1]	06/04/02	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-12B[1]	10/29/02	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-12B[1]	02/19/03	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-12B[1]	06/05/03	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-12B[1]	09/09/03	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-12B[1]	12/10/03	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-12B[1]	06/03/04	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-12B[1]	12/01/04	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-12B[1]	06/03/05	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-12B[1]	11/21/05	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-12B[1]	06/15/06	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-12B[1]	12/19/06	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-12B[1]	05/30/07	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-12B[1]	10/30/07	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-12B[1]	06/24/08	NS	--	--	--	--	--	--	--	--	--	--	--	--

Table 2B

Summary of Groundwater Monitoring Data - Deep Wells
Yellowstone Pipeline
Geiger Correctional Facility
Spokane, Washington

							HYDROCARBONS			PRIMARY VOCs				
Sample ID	*Date*	*Sample Type*	*TOC*	*DTW*	*SPH*	*GWE*	*TPHg*	*TPHd*	*TPHo*	*B*	*T*	*E*	*X*	*Naph*
		MTCA Method A Cleanup Levels (Deep GW)					800 ug/L	500 ug/L	500 ug/L	5 ug/L	1000 ug/L	700 ug/L	1000 ug/L	160 ug/L
95-MW-12B[1]	12/03/08	NS	--	--	--	--	--	--	--	--	--	--	--	--
95-MW-12B[1]	06/03/09	N	--	--	--	--	<13	<35	<58	<0.12	<0.21	<0.20	<0.15	--
95-MW-12B[1]	07/02/12	NS	2,355.02	30.85	--	2324.17	--	--	--	--	--	--	--	--
95-MW-12B[1]	10/09/12	NS	2,355.02	34.24	--	2320.78	--	--	--	--	--	--	--	--
95-MW-12B[1]	03/12/13	NS	2,355.02	30.72	--	2324.30	--	--	--	--	--	--	--	--
95-MW-12B[1]	05/14/13	NS	2,355.02	31.56	--	2323.46	--	--	--	--	--	--	--	--
95-MW-12B[1]	08/05/13	NS	2,355.02	33.36	--	2321.73	--	--	--	--	--	--	--	--
95-MW-12B[1]	10/18/13	NS	2,355.09	35.00	--	2320.09	--	--	--	--	--	--	--	--
95-MW-12B[1]	03/11/14	NS	2,355.09	34.99	--	2320.10	--	--	--	--	--	--	--	--
95-MW-12B[1]	06/02/14	NS	2,355.09	33.03	--	2322.06	--	--	--	--	--	--	--	--
95-MW-12B[1]	04/03/17	NS	2,355.09	26.35	--	2328.74	--	--	--	--	--	--	--	--
95-MW-12B[1]	09/14/17	NS	2,355.09	31.76	--	2,323.33	--	--	--	--	--	--	--	--
95-MW-12B[1]	03/21/18	NS	2355.09	28.18	--	2327.91	--	--	--	--	--	--	--	--
95-MW-12B[1]	06/21/18	NS	2355.09	29.22	--	2325.87	--	--	--	--	--	--	--	--
95-MW-12B[1]	09/21/18	NS	2355.09	32.81	--	2322.28	--	--	--	--	--	--	--	--
95-MW-12B[1]	12/06/18	NS	2355.09	34.55	--	2320.54	--	--	--	--	--	--	--	--
95-MW-12B[1]	03/06/19	NS	2355.09	32.62	--	2322.47	--	--	--	--	--	--	--	--
95-MW-12B[1]	05/21/19	NS	2355.09	29.45	--	2325.64	--	--	--	--	--	--	--	--
95-MW-12B[1]	08/21/19	NS	2355.09	32.15	--	2322.94	--	--	--	--	--	--	--	--
95-MW-12B[1]	10/30/19	NS	2355.09	33.87	--	2321.22	--	--	--	--	--	--	--	--

Notes:

DTW = Depth to Water in feet

GWE = Groundwater Elevation in feet above mean sea level; before August 13, 2009, relative to arbitrary benchmarks

TOC = Top of Casing in feet above mean sea level; before August 13, 2009, relative to arbitrary benchmarks

All results are in micrograms per liter (µg/L) unless otherwise indicated

TPHg = Total petroleum hydrocarbons as gasoline analyzed by NWTPH--Gx unless otherwise noted. The higher value is based on the assumption that no benzene is present in the groundwater sample. If any detectable amount of benzene is present in the groundwater sample, then the lower TPHg cleanup level is applicable.

TPHd = Total petroleum hydrocarbons as diesel, analyzed by NWTPH--Dx with silica gel cleanup unless otherwise noted.

TPHo = Total petroleum hydrocarbons as oil, analyzed by NWTPH--Dx with silica gel cleanup unless otherwise noted.

Table 2B

Summary of Groundwater Monitoring Data - Deep Wells
Yellowstone Pipeline
Geiger Correctional Facility
Spokane, Washington

							HYDROCARBONS			*PRIMARY VOCs*				
Sample ID	*Date*	*Sample Type*	*TOC*	*DTW*	*SPH*	*GWE*	*TPHg*	*TPHd*	*TPHo*	*B*	*T*	*E*	*X*	*Naph*
MTCA Method A Cleanup Levels (Deep GW)							800	500	500	5	1000	700	1000	160
							ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L

VOCs = Volatile organic compounds

BTEX = Benzene, toluene, ethylbenzene, and xylenes analyzed by EPA Method 8260B unless otherwise noted.

Total Xylenes = o--xylene + m,p--xylene

<x = Not detected at laboratory reporting limit x

FD = Field duplicate

N = Normal

NS = Not sampled

NM = Not measured

-- = Not analyzed

Concentrations in bold type indicate the analyte was detected above the Model Toxics Control Act (MTCA) Method A cleanup level

* = Field duplicate concentration is not consistent with the "parent" sample; therefore, this data is considered anomalous.

1 = Well is associated with a nearby cleanup site southeast of the Site and installed at a depth greater than 60 fbg. Groundwater at this depth is not known to be hydraulically connected to impacted groundwater at the Site and was sampled to verify no impacts were present off-Property at that depth.

Appendices

Appendix A

Summary of Previous Investigations and Remedial Activities

Appendix A Summary of Previous Investigations and Remedial Activities

2001 Subsurface Site Characterization: Beginning in March 2001, Maxim Technologies Inc. (Maxim) conducted a subsurface site characterization to investigate whether soil and groundwater impacts on the Geiger Heights Minimum Security Correctional Facility (Geiger Corrections) were caused by a release along the adjacent Yellowstone Pipeline (YPL). According to Maxim, Geiger Corrections was constructed in 1979 from buildings formerly belonging to the Geiger Air Force Base. A small release of aviation fuel was reported along the YPL on March 30, 1979, releasing approximately 42 gallons of fuel. The spilled fuel along with 50 gallons of perched groundwater was recovered and the pipeline was patched. In 1996, petroleum impacted soil and groundwater was encountered on the Geiger Corrections property during excavation for building footings. Building construction ceased due to the discovery. In 1998, two heating oil underground storage tanks (USTs) with 8,000-10,000 gallon capacity were removed from the Geiger Corrections property. One of the two USTs had leaked from the manway cover; approximately 100 tons of petroleum impacted soil was removed from the UST excavation. At the final extent of excavation, impacted soil still remained in exceedance of cleanup levels. A concentration of greater than 10,000 milligrams per kilogram (mg/kg) of total petroleum hydrocarbons as diesel (TPHd) was detected in soil. In 2000, the Spokane Airport Business Park (SABP), which owns the Geiger Corrections property and adjacent YPL right-of-way, informed YPL that they believed the YPL pipeline was the source of significant impacts on the Geiger Corrections property. On March 19 and 20, 2001, Maxim dug 12 test pits. The test pits were advanced until bedrock was encountered at approximately 5 to 6 feet below ground surface (bgs). A total of nine soil samples (including one field duplicate) were collected and analyzed for TPH as gasoline (TPHg), TPHd, TPH as oil (TPHo), benzene, toluene, ethylbenzene and total xylenes (BTEX), methyl tertiary butyl ether (MTBE), and polyaromatic hydrocarbons (PAHs) including naphthalenes. In addition, Maxim excavated a portion of the pipeline within the Geiger Corrections property to inspect the pipeline after petroleum impacts were identified in several of the test pits. The pipeline is approximately 4 feet bgs, approximately 1-2 feet above competent bedrock. Two additional test pits were excavated as well. Non aqueous phase liquid (NAPL) was encountered within a 60-foot section of the pipeline. A sample of the NAPL was collected along with two additional soil samples. The NAPL correlated with the section of pipeline that had leaked in 1979 and had been patched. The pipeline was cut and removed, and a new section of pipe was welded into place. Line pressure testing was conducted and passed, and the trench was backfilled in March 24, 2001. Results of the NAPL sampling indicated a combination of weathered petroleum, consistent with the 1979 aviation fuel release, with a newer petroleum, consistent with the product in the pipeline at the time of the excavation. Soil analytical results indicated TPHg exceeding the Model Toxics Control Act (MTCA) Method A cleanup level in five of the samples,TPHd exceeding the MTCA Method A cleanup level in two of the samples and naphthalenes exceeding the MTCA Method A cleanup level in one of the samples. Additional information is available in Maxim's *Subsurface Site Characterization Report* dated July 23, 2001.

2001 Remedial Excavation: Based on the results of the 2001 subsurface site characterization, a remedial soil excavation was conducted by Maxim in October 2001. Approximately 400 cubic yards of soil was removed and disposed of at a licensed Class II landfill. The excavation was advanced until approximately 8 feet bgs where bedrock was encountered. The excavation revealed a larger area of soil impacts than anticipated and therefore, 17 additional test pits were advanced to the west, south, and east of the excavation. One groundwater monitoring well (MP-1) was installed. The test pits revealed a scour fill deposit within the center of the Geiger Corrections property, which appeared to act as a preferential pathway for petroleum migration. A total of 25 soil samples were collected from the pipeline excavation and the test pits. Samples were analyzed for TPHd, and TPHo; select samples were analyzed for BTEX and naphthalenes. Results indicated TPHd exceeding the MTCA Method A cleanup level in eight of the samples, and naphthalenes exceeding the MTCA Method A cleanup level in two of the samples. Additional information is available in Maxim's *Remedial Excavation and Assessment Report* dated January 2002.

2002 Additional Site Characterization: In March 2002, Maxim installed eight groundwater monitoring wells (MW-1 through MW-8). Four of the wells were installed at shallow depths within the scour fill deposit (MW-2, MW-3, MW-4, and MW-5), and four wells were installed within the deeper regional aquifer (MW-1, MW-6, MW-7, and MW-8). Soil samples were collected from each well location at varying depths and analyzed for TPHd, TPHo, BTEX, and naphthalenes. Results indicated naphthalene exceeding MTCA Method A cleanup levels in four of the thirteen samples. No other concentrations exceeded cleanup levels. Additional information is available in Maxim's *Additional Site Characterization Report* dated May 2002.

2013 Site Investigation: In October 2013, AECOM decommissioned groundwater monitoring well MP-1, installed two groundwater monitoring wells (MP-1R and MW-5D) and attempted to install a third well (MW-9) at two different locations, but terminated the locations as borings only. Well MW-1R was installed within the shallow perched groundwater, and MW-5D was installed within the deeper regional aquifer. A total of five soil samples were collected and analyzed for TPHg, TPHd, TPHo, and BTEX. Results indicated that TPHg exceeded the MTCA Method A cleanup level in two of the samples, and TPHd exceeded the MTCA Method A cleanup level in one of the samples. Additional information is available in AECOM's *Site Investigation Report* dated February 2014.

2019 Site Investigation: In October 2013, GHD oversaw installation of three monitoring wells (MW-10, MW-11, and MW-12) to assess the extents of groundwater impacts in the shallow zone (MW-10 and MW-11) and the deep zone (MW-12). GHD additionally oversaw the installation of four soil borings (B-1 through B-4 to assess current soil conditions throughout the Site. B-4 was advanced to a depth of 49 feet to assess soil conditions at depth. The other soil borings were advanced to 6 fbg. Laboratory analytical results for shallow soil samples (<10 fbg) indicated concentrations exceeding MTCA Method A Cleanup levels in soil borings B-1 through B-4 and MW-12. No deep impacts were measured above MTCA Method A Cleanup levels. Additional information is available in GHD's *Site Investigation Report* dated March 2020.

Appendix B

Soil Gas Sampling Standard Operating Procedures

Soil Gas Sampling Standard Operating Procedures

Table of Contents

Figure Index

1. Soil Gas Sampling Standard Operating Procedures

1.1 Introduction

The procedures described in this section pertain to the installation of temporary and permanent soil gas and sub-slab probes to assess the vapor intrusion pathway. Soil gas and sub-slab probes are both used to collect soil gas samples; however, soil gas probes are installed at a greater depth, often outside a building, and sub-slab probes are installed to collect soil gas samples from immediately below a slab on grade or a basement floor slab. Permanent probes are recommended when more than one sampling event is required or when assessing seasonal variations in soil gas concentrations. Temporary probes are suitable for conducting a screening level assessment of vapor intrusion where the results could assist in locating future, permanent soil gas probes. Temporary probes are also suitable for conducting a preliminary evaluation of the magnitude and extent of volatile organic compound (VOC) impacts to the subsurface (e.g., such as in the case of a soil gas survey).

1.2 Prior Planning and Preparation

When designing and constructing soil gas and sub-slab probes the following questions should be considered:

1. What is the purpose of the soil gas probes?
2. What are the potential health and safety hazards?
3. What type(s) of soil gas probe construction materials are to be used?
4. What kinds of analyses are required (e.g., VOCs, petroleum hydrocarbon fractions)?
5. What are the geologic/hydrogeologic conditions at the site?
6. What are the seasonally high water table levels?
7. Is the water table shallow, (i.e., less than 1 metre below ground surface)?
8. Do perched conditions exist at the site?
9. What is the anticipated total depth of the probes?
10. Are nested soil gas probes required for vertical delineations?
11. Does a vapor barrier already exist under the slab, if so, sub-slab sampling might puncture the barrier, so the hole must be carefully resealed after monitoring is complete?
12. If a basement exists, could the primary entry point(s) for vapor intrusion be through the sidewalls rather than from below the floor slab? If so, sub-slab samples might need to be augmented with samples through the basement walls.
13. Although sample collection and analysis are analogous to those in other types of soil gas sampling, is an analytical method with lower detection limits required?

Note: If field staff are not aware of and able to answer all of the above noted questions before undertaking work in the field, the work plan must be reviewed in detail with the Project Coordinator/Manager. The project team may also consider involving GHD's vapor intrusion and human health risk assessment team during the initial planning to streamline the data evaluation.

1.3 Safety and Health

GHD is committed to conducting field activities with sound safety and health practices. GHD adheres to high safety standards to protect the safety and health of all employees, subcontractors, customers, and communities in which they work. The safety and health of our employees takes precedence over cost and schedule considerations.

Field personnel are required to implement the Safety Means Awareness Responsibility Teamwork (SMART) program as follows:

- Assure the Health and Safety Plan (HASP) is specific to the job and approved by a Regional Safety & Health Manager.
- Confirm that all HASP elements have been implemented for the job.
- A Job Safety Analysis (JSA) for each task has been reviewed, modified for the specific site conditions and communicated to all appropriate site personnel. The JSAs are a component of the HASP.
- Incorporate Stop Work Authority; Stop, Think, Act, Review (STAR) process; Safe Task Evaluation Process (STEP) Observations process; Near Loss and Incident Management process in the day-to-day operations of the job.
- Review and implement applicable sections of the GHD Safety & Health Policy Manual.
- Confirm that all site personnel have the required training and medical surveillance, as defined in the HASP.
- Be prepared for emergency situations, locating safety showers, fire protection equipment, evacuation route, rally point, and first aid equipment before you begin working, and make sure that the equipment is in good working order.
- Maintain all required Personal Protective Equipment (PPE), safety equipment, and instrumentation necessary to perform the work effectively, efficiently and safely.
- Be prepared to call the GHD Incident Hotline at 1-866-529-4886 for all incidents involving injury/illness, property damage, and vehicle incident and/or significant Near Loss.

It is the responsibility of the Project Manager to:

- Ensure that all GHD field personnel have received the appropriate health and safety and field training and are qualified to complete the work.
- Provide subcontractors with a Job Hazard Analysis to enable them to develop their own HASP.
- Ensure that all subcontractors meet GHD's (and the Client's) safety requirements.

1.4 Quality Assurance/Quality Control

Quality assurance and quality control procedures should be implemented in every step of the assessment process to ensure the collection of data of acceptable quality. A well-designed Quality Assurance/Quality Control (QA/QC) program will:

- Ensure that data of sufficient quality are obtained in order to facilitate an efficient site investigation.
- Allow for monitoring of staff and subcontractor performance.
- Verify the quality of the data.

The QA/QC program is developed on a site-specific basis.

1.5 Design Considerations

Diameter

Soil Gas Probes

The probe casing diameter should be kept to a minimum to reduce the volume of soil gas that must be purged from the probe during sampling. A maximum casing diameter of 3/4-inch (19 mm) to 1-inch (25 mm) will be used for solid piping casing material (e.g., polyvinyl chloride [PVC]), although casing diameters this large are not recommended for deep soil gas probes (e.g., greater than 15 feet [4.6 m]) since large purge volumes (e.g., milliliters) will result. Casing diameters of 1/4 inch (6.4 mm) to 3/8-inch (9.5 mm) are typical when flexible tubing is used for the casing material (e.g., Teflon® or nylon).

Sub-Slab Probes

A typical sub-slab probe is constructed from small-diameter (e.g., 01/8- or 1/4-inch outside diameter) stainless steel or another inert material and stainless steel compression fittings. The probes are cut at a length to either float in the slab, if appropriate for your site conditions, or to extend to the base of the slab.

Screened Interval and Sand Pack Material

Soil Gas Probes

The length and depth of the perforated (screened) section should consider the desired monitoring interval as well as the geologic conditions encountered. A typical screened section would consist of a 6-inch (0.15 m) to 1-foot (0.3 m) perforated section. The use of prefabricated stainless steel screen implants is common. Alternatively, the screened interval can be created from casing material by hand-cutting slots, or hand-drilling holes, into the casing at a regular pattern. For hand-cut or hand-drilled screened intervals, the preferred sand pack material for soil gas probes is pea gravel. For prefabricated screens, the preferred sand pack material is inert 10/20 silica sand (#1 morie sand) or glass beads.

Sub-Slab Probes

A screen is not always used with sub-slab probes. When a screen is utilized, it is often pre-fabricated with a length of approximately 6 inches, due to the limited depth intervals sampled. When a screen is not utilized, the bottom of the probe is left open to facilitate sample collection. The perforated or open section should be consistent with the desired monitoring interval and sub-slab conditions encountered.

Monitoring Parts

For both soil gas and sub-slab probes, airtight stainless steel or brass compression fittings (e.g., Swagelok®) with valves should be installed at ground surface to allow for an airtight connection to sampling equipment. The valve is required to isolate the soil gas sampling assembly from the soil gas probe while sampling assembly airtightness tests are conducted prior to probe purging and sampling.

Casing Materials

Soil Gas Probes

The materials selected for soil gas probe casing construction must be compatible with the volatile chemicals anticipated to be present in soil gas. Experience has shown that PVC casing is suitable when VOCs are present. However, as described above, PVC is typically not available in small enough diameters to provide practical soil gas probe purge volumes. To minimize purge volumes, small diameter (e.g., 1/4-inch [6.4 mm] to 3/8-inch [9.5 mm]) flexible tubing (e.g., Teflon® or nylon) is more commonly applied as the soil gas probe casing. Where solid casing is used (i.e., PVC), threaded piping will be used to avoid any possible contamination from solvent cement.

Sub-Slab Probes

The materials selected for sub-slab casing construction must be compatible with the volatile chemicals anticipated to be present in soil gas. Often, 1/4-inch OD stainless steel tubing is utilized to collect sub-slab soil gas. The length of the stainless steel (or brass) tubing is cut to a desired length prior to installation.

1.6 Soil Gas and Sub-Slab Probe Installation

The information contained in this section has been compiled from existing manuals, various reference documents, and a broad range of colleagues with considerable practical and educational backgrounds. This SOP outlines the generic procedures necessary to install a soil gas/sub-slab probe. Site conditions, contaminants and geology may require modification of this procedure. Review applicable government procedures and informational documentation prior to installation.

This SOP is not intended to prohibit those conducting evaluations from using means other than those specified herein to measure soil gas concentrations; however, departures from this guidance will often need to include information for a more detailed review.

1.6.1 Installation Procedures - Soil Gas Probes

The soil gas probe is to be installed using Geoprobe® dual tube sampling system to advance a borehole to the target depth. The dual-tube sampling system consists of first advancing a 2 1/2-inch (6.4 cm) diameter inner sampling probe followed by advancing a 3 1/2-inch (8.9 cm) diameter outer casing. The outer casing should cut away disturbed soil immediately surrounding the borehole left by the inner probe. The outer casing should create a zone of reduced soil disturbance due to the inner probe having already been advanced. It is anticipated that using the dual tube system will result in a minimum amount of soil disturbance around the borehole annulus. The soil lithology should be logged during drilling activities and recorded on a field boring log along with any applicable observations. Permanent soil vapor probes can be installed with a conventional drill rig equipped with a hollow-stem auger, although increased formation disturbances would likely result. Rotosonic and mud or air rotary drilling methods are not recommended since they can influence soil vapor sample results and/or alter the physical properties of the subsurface adjacent to the borehole annulus.

The probes should be constructed with a 6-inch (15 cm) to 12-inch (30 cm) long screened interval. The screened interval can be hand-fabricated or prefabricated. The probe casing should be constructed using flexible tubing or solid casing. Flexible tubing (e.g., Teflon® or nylon) of small diameter (e.g., 1/4-inch [6.4 mm] to 3/8-inch [9.5 mm]) is most commonly used in combination with prefabricated screened intervals. Solid casing (e.g., PVC) of small diameter (e.g., 3/4-inch [19 mm] to 1-inch [25 mm]) is most commonly used with hand-fabricated screened intervals. After positioning the screened interval and casing into the borehole, the screen should be surrounded by the appropriate sand pack material (i.e., pea gravel for hand-fabricated screens and 10/20 silica sand for prefabricated screens). When placing the sand pack into the borehole, 1 inch (2.5 cm) of sand pack material should be placed under the bottom of the probe screen to provide a firm footing. The sand pack should extend to 6 inches (15 cm) above the screened interval. A bentonite pellet seal should then be installed to 1-foot (0.3 m) above the sand pack and should be hand-hydrated. For temporary probes (i.e., that will be sampled for less than a year), the remaining annulus should be backfilled with pre-hydrated bentonite cement. For permanent probes (i.e., that will be sampled for more than a year), the remaining annulus should be backfilled with neat-cement grout[1] (Cal EPA, 2015). The soil gas probe casing should extend to ground surface and should be fitted with airtight stainless steel or brass compression fittings (e.g., Swagelok®) with valves to allow for an airtight connection to soil gas sampling equipment. A flush-mount protective cover should be installed above the soil probe and cemented into place. Schematics of typical soil gas probe installation details are presented on Figures 15.1 and 15.2, respectively, where hand-fabricated and prefabricated screened intervals are applied.

1.6.2 Installation Procedures - Sub-Slab Soil Gas Probes

Sub-slab soil gas probes allow for collection of soil gas samples from directly beneath the slab of a building. Sub-slab soil gas probes are not recommended when groundwater is present directly below the slab, since the sub-slab port could allow groundwater to enter the building. Sub-slab soil

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[1] Neat-Cement Grout means a mixture in the proportion of 94 pounds of Portland cement and not more than 6 gallons (22.7 liters) of water. Bentonite up to 5 percent by weight of cement (4.7 pounds of bentonite per 94 pounds of Portland cement) may be used to reduce shrinkage.

gas probes can be installed using several different methods: (1) utilizing a small diameter hole, (2) a larger diameter hole w/ flushmount casing, and (3) a Vapor Pin^{TM}. Summaries of the steps involved are presented below:

Small Diameter Sub-Slab Soil Gas Probe:

A schematic of a typical small diameter sub-slab soil gas probe installation detail is presented on Figure 15.3.

1. Prior to drilling holes in a foundation or slab, contact local utility companies to identify and mark utilities coming into the building from the outside (e.g., gas, water, sewer, refrigerant, and electrical lines). Consult with a local electrician and plumber to identify the location of utilities inside the building.
2. Prior to fabrication of the sub-slab vapor probes, use the rotary drill and the two inch diameter drill bit to create a shallow (e.g., 1/4 to 1/2 inch in depth) outer hole that partially penetrates the slab. This outer hole will allow the protective cap to be flush with the concrete surface (Figure 15.4).
3. Use a small portable vacuum cleaner to remove cuttings from the hole.
4. Use the rotary hammer drill and a one-inch drill bit to create a smaller diameter "inner" hole through the remainder of the slab to some depth (e.g., seven to eight centimeters or three inches) into the sub-slab material. Figure 15.5 illustrates the appearance of "inner" and "outer" holes. Drilling into the sub-slab material will create an open cavity, which will prevent the obstruction of any probes during sampling.
5. Use a small portable vacuum cleaner to remove cuttings from the hole.
6. Determine the thickness of the slab and record the measurement.
7. Assemble the vapor point using the basic design of a sub-slab vapor probe illustrated on Figure 15.3.
8. Place the assembled vapor point (Figure 15.6) into the hole and ensure the screen extends beyond the concrete and that the top of the probe is flush with the slab. Also apply the tamper resistant cap so as to not interfere with day-to-day use of the buildings. Cut tubing if necessary (Figure 15.7).
9. Confirm the fit of the rubber shaft plug to the sides of the boring. It should be snug with no gaps present. If additional thickness (diameter) is necessary, non-VOC plumbers putty can be added around the rubber.
10. Mix a quick-drying Portland cement to ensure a tight seal.
11. Inject the Portland cement with a 50 cc syringe or push into the annular space between the probe and outside of the "outer" hole (Figure 15.8).
12. Complete installed vapor point (Figure 15.9) with a plug (Figure 15.10) or tamper-resistant cap (Figure 15.11).
13. Allow cement to cure for at least 24 hours prior to sampling.

Sub-slab probes constructed in the aforementioned manner may be abandoned by removing any tubing and all surface protective covers. The boring annulus can then be backfilled with uncontaminated native material or grout. Inspect/clean the work area, and return site conditions to their original state.

If the tubing cannot be removed, the tubing should be cemented in place. All surface protective covers must be removed and returned to as close as possible to original site conditions.

Larger Diameter Hole w/ Flushmount Casing:

A schematic of a typical large diameter sub-slab soil gas probe installation detail is presented on Figure 15.12.

1. Prior to drilling holes into the building floor, the location of utilities coming into the building (e.g., gas, electrical, water, and sewer lines, etc.) must be identified. Avoid installing sub-slab soil gas probes near where utilities penetrate the slab as these may be entry points for downward ambient air migration through the slab during soil gas sampling.
2. A concrete corer is used to drill a hole through the concrete floor slab. The diameter of the hole should be sufficient to allow the installation of a protective casing within the hole. A sufficient space for placement of cement is required between the outer edge of the flush-mount casing and the hole in the concrete. Smaller diameter flush-mount protective casings are not recommended as they make accessing the probe within the casing difficult.
3. Once the hole in the concrete is cored and the center core removed, the flush-mount protective casing shroud should be cut to a suitable length. Ideally, the length of the shroud should allow the flush-mount casing to be flush with the surrounding floor while resting on the bedding material beneath the slab.
4. The probe assembly, including a valve at the top of the probe, should be placed so that the tip of the probe is within the bedding material beneath the concrete slab. Care should be taken to not force the probe into the bedding so that the open end of the probe doesn't plug. Note: the probe assembly should be vacuum-tested on both sides of the valve prior to installation. A piece of ¼ inch Teflon tubing should be attached at the top of the valve prior to installation. This tubing will allow easier access for the use of compression fittings to attach purging and sampling equipment to the probe.
5. The probe should be cemented into the flush-mount casing with hydraulic cement. The hydraulic cement should form a continuous seal from the bedding material to just below the top hex nut of the probe assembly.

Vapor Pin^{TM}

This SOP describes the procedure for installing a sub-slab soil probe using a Vapor Pin™. Borings should be done through the use of a rotary hammer drill. The specific drill utilized must be capable of utilizing the drill and coring bits identified by the SOP (see below) and be of sufficient size to penetrate the expected thickness of the concrete present.

General List of Materials

This installation SOP utilizes the following products, which are available from Cox-Colvin & Associates, Inc. Equipment:

1. Silicone sleeve.
2. Hammer drill.
3. 5/8 inch diameter hammer bit (Hilti™ TEYX 5/8" x 22" #00206514 or equivalent).
4. 1½ inch diameter hammer bit (Hilti™ TEYX 1½" x 23" #00293032 or equivalent) for flush mount applications.
5. 3/4 inch diameter bottle brush.
6. Wet/dry vacuum with HEPA filter (optional).
7. Vapor Pin™ installation/extraction tool.
8. Dead blow hammer.
9. Vapor Pin™ flush mount cover, as necessary.
10. Vapor Pin™ protective cap.
11. Equipment needed for abandonment.
12. Vapor Pin™ installation/extraction tool.
13. Dead blow hammer.
14. Volatile organic compound-free hole patching material (hydraulic cement) and putty knife or trowel.

Flushmount Vapor Pin™ Installation Protocol

1. Prior to drilling holes in a foundation or slab, contact local utility companies to identify and mark utilities coming into the building from the outside (e.g., gas, water, sewer, refrigerant, and electrical lines). Consult with a local electrician and plumber to identify the location of utilities inside the building.
2. Set up wet/dry vacuum to collect drill cuttings.
3. Drill a 1½ inch diameter hole at least 1¾ inches into the slab.
4. Remove the drill bit, brush the hole with the bottle brush, and remove the loose cuttings with the vacuum.
5. Drill a 5/8 inch diameter hole through the slab and at least six inches into the underlying soil to form a void.
6. Remove the drill bit, brush the hole with the bottle brush, and remove the loose cuttings with the vacuum.
7. Assemble the Vapor Pin™ assembly (Figure 15.13) by threading the Vapor Pin™ into the extraction/installation tool and placing the silicone sleeve over the barbed end.

8. Place the lower end of the Vapor Pin™ assembly into the drilled hole. Place the small hole located in the handle of the extraction/installation tool over the Vapor Pin™ to protect the barb fitting and cap, and tap the Vapor Pin™ into place using a dead blow hammer (Figure 15.14). Make sure the extraction/installation tool is aligned parallel to the Vapor Pin™ to avoid damaging the barb fitting.
9. Unscrew the threaded coupling from the installation/extraction handle and use the hole in the end of the tool to assist with the installation (Figure 15.15). During installation, the silicone sleeve will form a slight bulge between the slab and the Vapor Pin™ shoulder.
10. Place the protective cap on the Vapor Pin™ (Figure 15.16).
11. Cover the Vapor Pin™ with a flushmount cover.
12. Allow 20 minutes or more (consult applicable guidance for your situation) for the sub-slab soil gas conditions to equilibrate prior to sampling.
13. Remove protective cap and connect sample tubing to the barb fitting of the Vapor Pin™.

Temporary Soil Gas Probes

First, a core drill should be used to remove any surface cover, as needed. The temporary soil gas probes should consist of a decontaminated hollow sampling rod driven to the target depth below ground surface. The sampling rod should consist of a decontaminated 1-inch (2.5 cm) hollow stainless steel outer rod that is retracted to expose a 1-foot (0.3 m) long stainless steel screen. The rod should be advanced by a slide hammer to the target depth, and the outer rod retracted to expose the screen at the bottom of the rod. A surface seal comprised of hydrated bentonite cement should be placed around the base of the driven rod. The sampling rod should be completed at ground surface with airtight stainless steel or brass compression fittings (e.g., Swagelok®) with valves to allow for an airtight connection to soil gas sampling equipment. A schematic of a typical temporary soil gas probe installation detail is presented on Figure 15.17.

1.6.3 Installation Documentation

Details of each soil gas probe installation should be recorded on GHD's standard Stratigraphic Log Overburden (Form SP-14), or recorded within a standard GHD field book. The Well Instrumentation Log (Form SP-15) is provided for recording the overburden well instrumentation details, and can be used for soil gas probe installations. This figure must note:

- Borehole depth
- Probe perforation intervals
- Filter pack intervals
- Plug intervals
- Grout interval
- Surface cap detail
- Soil gas probe material
- Soil gas probe instrumentation (i.e., riser and screen length)

- Soil gas probe diameter
- Filter pack material
- Backfill material detail
- Stickup/flush-mount detail
- Date installed

The soil stratigraphy encountered at soil gas probes refusal must be recorded in accordance with GHD's standard borehole advancement methods (see Section 5.0).

Each soil gas probe should be accurately located on a site sketch. An accurate field tie to the center of the gas probe from three adjacent permanent features should be completed. The field ties should be located in a different direction from the installation.

Each soil gas probe must be permanently marked to identify the soil gas probe number designation.

1.6.4 Follow-Up Activities

Once the soil gas probe(s) have been completed, the following activities need to be performed:

1. Conduct initial monitoring round of gas probes.
2. Submit all logs to the appropriate GHD hydrogeology department, who will be responsible for the generation of the final well log.
3. Survey accurate horizontal and vertical control of the soil gas borings and any pertinent structures needed to create a suitable site map.
4. Prepare an accurate soil gas probe/boring location map. Tabulate soil gas probe construction details.
5. Write-up all field activities including, but not necessarily limited to; drilling method(s), construction material, site geology.
6. Distribute all/any field book(s) to the appropriate GHD office.

1.7 Soil Gas and Sub-Slab Sampling Protocol

The following sampling protocols are for collecting a vapor sample through either a soil gas probe and/or sub-slab probe for the analysis of volatile organic compounds (VOCs) by the United States Environmental Protection Agency Method TO-15 (USEPA, 1999).

This SOP does not cover, nor is it intended to provide, a justification or rationale for where a sampling point is installed. It is assumed by using this SOP that site conditions have been fully evaluated and that the sampling location and depth meet the objectives outlined in the work plan or scope of work. Considerations must be given to the types of chemicals of concern, lithology encountered, and the depth of the vapor source. Samples collected deeper than any potential source of vapors may not fully characterize the potential risk and sampling points should never be installed or collected within the zone of saturation. The bottom of the probe should be approximately 0.5 m (1.6 ft) to 1 m (3.2 ft) above the highest water table.

Where possible, external probes should be installed at a minimum depth of 1 m (3.2 ft) to reduce the likelihood of ambient air being drawn through surficial soils (referred to as "short-circuiting"). External shallow probes less than 1 m (3.2 ft) deep may be warranted where there is a shallow water table. Good practice is to place a plastic sheet/tarp around a shallow probe to minimize atmospheric air intrusion (CCME, 2016). Recommended minimum dimensions of the plastic sheet/tarp are 1.5 m (5 ft) by 1.5 m (5 ft). The plastic/tarp should be weighted down at the edges with sand or sand bags (CCME, 2016).

Most soil gas/sub-slab probes are installed at relatively shallow depths (less than ten feet below ground surface) so minimum purge volumes and low-volume samples must be performed to minimize potential breakthrough from the surface or between sampling intervals. Tracer/leak gas is necessary to ensure breakthrough does not occur and that a leak does not occur at any fitting above grade. Sampling should not occur during a significant rain event. A significant rain event is defined as 0.5 inches or greater of rainfall during a 24-hour period by Cal EPA (2015), or 1 centimeter or greater of rainfall during a 24-hour period by MOE (2013). A period of 1 day for coarse-grained soil conditions and several days for fine-grained soil conditions after a significant rain event should occur prior to collecting soil vapor samples. This time interval is required for drainage to occur and soil conditions to return to ambient moisture conditions.

Note: The sampling interval after a significant event should be verified based on the applicable jurisdictional regulatory vapor intrusion guidance.

Samples from wells with multiple points installed must not be collected simultaneously and approximately 30 minutes must elapse between each sampled interval. Sample times should be documented on the field log. Sample flow rates are not to exceed 200 milliliters per minute (mL/min) to minimize the potential for vacuum extraction of contaminants from the soil phase. A flow rate greater than 200 mL/min may be used when purging times are excessive, such as for deep wells with larger-diameter tubing. However, a vacuum of 100 inches of water (7.4 inches of mercury [Hg]) or less must be maintained during sampling whenever a higher flow rate is used. Volumes of various tubing sizes are provided in Table 1 in order to aid in calculating purge volumes.

Table 1 Volumes for Select Tubing Sizes

Tubing Size (inches ID)	Volume/ft (liters)
3/16	0.005
¼	0.010
½	0.039

Care must be used during all aspects of sample collection to ensure that sampling error is minimized and high quality data are obtained. Care must also be taken to avoid excessive purging prior to sample collection and prevent pressure build-up in the enclosure during introduction of the tracer gas. Inspection of the installed sample probe, specifically noting the integrity of the surface seal and the porosity of the soil in which the probe is installed, will help to determine the tracer gas setup. The sampling team must avoid actions (e.g., fueling vehicles, using permanent marking pens, and wearing freshly dry-cleaned clothing or personal fragrances) which could potentially cause sample interference in the field. All data collected should be recorded on the Sub-Slab/Soil Gas Sampling Field Data Sheet (SP-30).

1.7.1 Soil Gas Collection General List of Materials

The equipment required for soil gas sample collection is as follows:

Flow Meters and Detectors

1. Flow regulator with vacuum gauge. Flow regulators provided by a qualified laboratory are pre-calibrated to a specified flow rate (e.g., 100 mL/min).
2. Photoionization detector (with appropriate lamp).
3. Helium detector (if helium is utilized as a tracer gas).
4. Methane meter for petroleum sites that is capable of also measuring percent of methane (CH4), carbon dioxide (CO2), and oxygen (O2).
5. Low flow air pump (e.g., 100 mL/min) (as appropriate)

Tooling and Supplies

1. Sampling canister, Tedlar bag, or syringe (one per location).
2. Regulated flow meter assembly set to a maximum of 200 mL/min (one per location, as appropriate).
3. 1/4 inch tubing (Teflon®, polyethylene, or similar) and assorted fittings.
4. Plastic housing for using tracer gas.
5. 50 ml syringe (for purging).
6. Camera.
7. Adjustable crescent wrenches, small to medium size, and/or open end combo wrenches 9/16 to 1/2 inch.
8. Scissors/snips to cut tubing.
9. Ballpoint pens.
10. Nitrile gloves.
11. Compound to be used as tracer gas - lab grade helium or isopropyl alcohol (IPA).
12. Tarp or plastic sheeting

1.7.2 Soil Gas Tracer Compounds

A leak in the sampling assembly may allow ambient air into the system and dilute the soil gas results (Benton and Shafer, 2007). Therefore, tracer gases must be utilized during the collection of soil gas samples to verify that the sample collected is from the installed sampling point. The presence of a tracer compound, whether liquid or gaseous, can confirm a leak in the sampling train assembly and whether the usability of the sample will need to undergo further evaluation.

Careful thought and consideration must be used when choosing a leak check compound as a tracer, since each compound can have specific benefits and drawbacks.

Helium used as a tracer gas beneath a shroud allows for the screening of the sampling train in the field. In conjunction with the use of a field meter capable of detecting helium, leaks within the sampling train could be detected prior to sampling. A retightening of all fittings prior to collecting the sample for analysis should be done. If a leak has been detected and is unable to be resolved, the sampling point may need to be decommissioned and a new one installed. Only lab-grade helium (UHP-Ultra High Purity) should be used as a tracer, since helium available at general merchandise stores may contain secondary contaminants, such as benzene.

Understanding the relationship between a leak and the concentration detected of the tracer gas used to check for leaks, the potential for absorption of the tracer gas (i.e., helium) onto sample train tubing, and the potential for interference by the tracer gas compound with VOCs is important in answering the data usability. An ambient air leak of up to five percent may be acceptable if quantitative tracer testing is performed. A soil gas vapor well should be decommissioned if the leak cannot be corrected. Any replacement vapor wells should be installed at least five feet from the location where the original vapor well was located

Note: The ambient air leak of up to five percent leak should be verified based on the applicable jurisdictional regulatory vapor intrusion guidance.

1.7.3 Soil Gas and Sub-Slab Probe Leak Testing

The use of leak testing is recommended as a quality control check to ensure ambient air has not leaked into the soil gas probe or sampling assembly, which may affect (i.e., dilute) the analytical results. Contaminants in ambient air can also enter the sampling system and be detected in a sample from a non-contaminated sampling probe resulting in a "false positive" result. The leak testing should be conducted as described in the following two steps:

- Step 1 - Vacuum Test: used to ensure that the tubing and fittings/valves that make up the sampling assembly are air-tight
- Step 2 - Tracer Test: used to ensure that ambient air during soil gas sample collection is not drawn down the soil gas probe annulus through an incomplete seal between the formation and the soil gas probe casing.

The vacuum test and tracer test are detailed below.

Step 1 - Vacuum (shut-in) Test

- The sampling assembly must be connected to the soil gas probe valve at the surface casing. Once connected, the sampling assembly will consist of the soil gas probe, the vacuum gauge supplied by the laboratory, personal sampling pump, and Summa™ canister, all connected in series (i.e., in the order of soil gas probe, vacuum gauge, pump, and canister), using tee-connectors or tee-valves.
- The personal sampling pump will be used to conduct the vacuum test. The vacuum test should consist of opening the valve to the personal sampling pump while leaving closed the valves to

the Summa™ canister and the soil gas probe. The pump should then be operated to ensure that it draws no air from the sampling assembly (i.e., creates a negative pressure, or vacuum within the sampling assembly), thus establishing that all assembly connections are air-tight. The sampling pump low-flow detect switch will likely activate within 10 to 15 seconds, turning the pump off. A negative pressure, or vacuum, should be established within the sampling assembly, and should be sustained for at least 1 minute.

- If the pump is capable of drawing flow, or if the vacuum is not sustained for at least 1 minute, all fittings and tubing will be checked for tightness (or replaced) and the vacuum test will be repeated.
- The reading from the vacuum gauge pressure should be recorded in field logbook to demonstrate that the pump is able to create a vacuum within the sampling assembly (it will also be noted whether the low-flow detect switch on the pump was activated), and that the vacuum is sustained for at least 1 minute.

Step 2 - Tracer Test

A tracer compound is released at ground surface immediately around the soil gas probe surface casing and is used to test for ambient air leakage down the annulus of the soil gas probe and into the soil gas sample. Two options are described below for the tracer test where either isopropanol (Option A) or helium (Option B) is used as the tracer compound.

Option A - Isopropanol

- For Option A, isopropanol is used as the tracer compound. It is included as an analyte in U.S. EPA's TO-15 method, it is readily available (i.e., as isopropyl rubbing alcohol), and it is safe to use.
- Approximately 1 teaspoon (approximately 4 mL) of isopropanol (rubbing alcohol) should be mixed in 1 gallon of de-ionized water to create an approximate 1/1,000 solution.
- Paper towels soaked in a dilute solution of isopropanol should then be wrapped around the soil gas probe surface casing and ground surface immediately surrounding the surface casing. Soil gas probe surface casing then should be covered over, using clear plastic sheeting that will be sealed to the ground surface. As the ground surface finish permits, sealing the plastic sheeting to ground surface should be accomplished by using tape or by weighting the edges of the plastic sheeting with dry bentonite.
- Immediately before conducting the soil gas probe purging, remove the paper towels from the solution, wringing out the towels so they are very damp, but not dripping. Place them around the vapor probe and seal them in place using the plastic sheeting.
- The isopropanol solution should be kept fresh, with new solution being made every hour. The solution should be mixed at a central location away from the sampling activities. The isopropanol should be kept tightly capped and kept away from all sampling equipment. The solution should be kept away from the sampling assembly until immediately before sample collection begins. Sampling personnel must wear latex gloves while handling the solution and soaked paper towels, and will remove the gloves while working with the sampling assembly.

- Soil gas samples with laboratory analytical results for isopropanol that are greater than 10 percent of the starting concentration of isopropanol in the vapors emitted from dilute isopropanol solution should not be considered reliable and representative of soil gas concentrations within the formation (ITRC, 2007). The starting concentration should be calculated based on the concentration of isopropanol in the dilute solution, the vapor pressure of isopropanol, and Henry's law.
- A disadvantage in using isopropanol as the tracer compound is that it will not be known whether a significant leak occurred until after the cost of analyzing the sample has been spent. Elevated levels of isopropanol can also interfere with laboratory analytical method detection limits.

Option B - Helium

- The presence of helium within the sampling assembly should be monitored during purging and soil gas sample collection using a helium meter installed in-line with the sampling assembly. The meter should be positioned along the sampling line just before the personal sampling pump.
- Helium is readily available at a variety of retail businesses, is safe to use, and does not interfere with laboratory analytical method detection limits.
- A containment unit is constructed to cover the soil gas probe surface casing. The containment unit should consist of an overturned plastic pail set into a ring of dry bentonite to create a seal between the ground surface and the rim of the pail. The pail can be set directly on top of the sampling assembly tubing connected to the soil gas probe, which when pressed into the dry bentonite, should create a sufficient seal around the tubing. The pail will have two holes: one to allow for the introduction of helium; and the other to allow for air trapped inside the pail to escape while introducing the helium. The second hole will also allow insertion of the helium meter to measure the helium content within the pail.
- Prior to soil gas probe purging, helium will be introduced into the containment unit to obtain a minimum 50 percent helium content level. The helium content within the containment unit should be confirmed using the helium meter and recorded in the field logbook. Helium should continue to be introduced to the containment unit during soil gas probe purging and sampling and care should be taken not to increase the pressure within the containment unit beyond that of atmospheric pressure.
- During soil gas probe purging and sampling, the helium meter should be connected in-line with the sampling assembly. In the event that the helium meter measures a helium content with the sampling assembly of greater than 10 percent of the source concentration (i.e., 10 percent of the helium content measured within the containment unit), the soil gas probe will be judged to permit significant leakage such that the collected soil gas sample will not be considered reliable and representative of soil gas concentrations within the formation (ITRC, 2007).
- An advantage of using helium as the tracer compound is that a significant leak can be detected in the field and the cost of analyzing the Summa™ canister can be avoided.

Note: The 10 percent of the source concentration should be verified based on the applicable jurisdictional regulatory vapor intrusion guidance.

1.7.4 Sample Collection Procedure - Canister

1. Soil gas samples for assessing the vapor intrusion pathway must be collected using an acceptable canister, including certified clean Summa™ canisters. Only canisters certified clean at the 100 percent level can be used for soil gas sampling activities (i.e., pre-cleaned at the laboratory in accordance with U.S. EPA's TO-15 method and documentation of the cleaning activities will be provided by the laboratory). Summa™ canisters typically come in 1-, 1.7-, and 6-liter capacities, depending upon laboratory availability.

2. The canisters must be fitted with a laboratory-calibrated critical orifice flow regulation device sized to restrict the maximum soil gas sample collection flow rate to approximately 100 milliliters per minute (mL/min), which corresponds to the lower end of the maximum soil gas sampling flow rate recommended by Cal EPA (2015) of 100 to 200 mL/min. The 100 mL/min maximum flow rate is equivalent to sample collection times of 10, 17, or 60 minutes, respectively, for 1, 1.7, or 6 liter canister capacities. A maximum flow rate of 100 mL/min is recommended to limit VOC stripping from soil, prevent the short-circuiting of ambient air from ground surface down the soil gas probe annulus that would dilute the soil gas sample. A maximum flow rate of 100 mL/min increases confidence that the soil gas sample is drawn from immediately surrounding the screened interval.

3. A vacuum gauge should be supplied by the laboratory and used during sample collection to measure the initial canister vacuum, canister vacuum during sample collection, and residual canister vacuum at the end of sample collection. The vacuum gauge will be returned to the laboratory and used by the laboratory to measure the residual canister vacuum upon receipt of the canisters by the laboratory.

4. The canister should be connected to the soil gas probe valve at the surface casing using the sampling assembly (see Figure 15.18). The sampling assembly is connected using short lengths (e.g., 1-foot [0.3 m]) 1/4-inch (6.4 mm) or 3/8-inch (9.5 mm) diameter tubing (the tubing material will be Teflon® or nylon) and airtight stainless steel or brass tee-connectors and tee-valves (e.g., Swagelok® type). The canister should be connected to the soil gas probe along with a vacuum gauge and a personal sampling pump, all in series, using tee-connectors or tee-valves (in the order of soil gas probe, vacuum gauge, pump, and canister). A tee-valve should be used to connect the pump, which will allow the pump to be isolated from the sampling assembly during sample collection. Fresh tubing must be used for each sample.

5. Prior to collecting a soil gas sample, the stagnant air in the sampling assembly tubes and soil gas probe casing/sand pack must be removed. The soil gas probes should be purged prior to sampling using the personal sampling pump at a flow rate of less than 200 mL/min. A flow rate greater than 200 mL/min may be used when purging times are excessive, such as for deep wells with larger-diameter tubing. However, a vacuum of 100 inches of water (7.4 inches of Hg) or less must be maintained during sampling whenever a higher flow rate is used. This ensures that the collected soil gas sample is representative of actual soil gas concentrations within the formation. Measurements of the lengths and inner diameters of the above-ground sampling assembly and below-ground gas probe casing, screen, and sand pack should be used to calculate the "purge volume" (the purge volume will consider the pore volume of the sand pack assuming a 30 percent sand pack porosity). Prior to sample

collection, two to three purge volumes should be drawn from the probe/sample assembly, unless otherwise required by the applicable regulatory guidance. The purge data (calculated purge volume, purging rate, and duration of purging) should be recorded in the field logbook.

6. Prior to purging, a vacuum, or tightness, test should be conducted on the sampling assembly as the first of two leak-testing steps, as described further in Section 15.7.3. Briefly, this first leak-testing step (the vacuum test) should consist of opening the valve to the personal sampling pump leaving the valves to the Summa™ canister and the soil gas probe closed. The pump should then be operated to ensure that it draws no air from the sampling assembly (i.e., creates a negative pressure, or vacuum within the sampling assembly), thus establishing that all assembly connections are airtight. Further details of the vacuum test are described in Section 15.7.3.

7. Prior to purging, and following the vacuum test, the set-up for the second of the two leak-testing steps should be conducted. The second leak-testing step is the tracer compound step. A tracer compound is released at ground surface immediately around the soil gas probe surface casing. The tracer test is used to test for ambient air leakage down the annulus of the soil gas probe and into the soil gas sample. The tracer compound is either monitored using a meter connected in-line to the sampling assembly (e.g., helium), or is included as an analyte in the laboratory analysis of the soil gas samples (e.g., isopropanol). The setup requirements of the tracer compound leak-testing step are described in Section 15.7.3.

8. Following the vacuum test, and the setup for the tracer compound leak-testing step, the soil gas probe purging should commence by opening the valve to the soil gas probe and activating the personal sampling pump (and leaving closed the valve to the Summa™ canister). At the start and the end of the purging period, the total concentration of volatile organic vapors of the personnel sampling pump exhaust gas should be monitored using a portable photoionization detector (PID) meter. The PID meter should be connected in series after the personal sampling pump. Since typical PID instrument flow rates vary from approximately 300 to 500 mL/min (depending on the manufacturer and model), drawing a sample into the PID meter through the personal sampling pump will likely increase the purging flow rate temporarily, until a reading from the PID meter is obtained. PID readings should be recorded and entered in the field logbook and chain of custody form. The PID readings should provide the laboratory with an indication of whether a sample could require dilution before analysis.

9. Following purging, the valve to the personal sampling pump should be closed, and the valves to the soil gas probe and Summa™ canister opened to draw the soil gas sample into the canister. This should be completed concurrent with continued application of the leak-testing tracer compound. The vacuum gauge reading must be recorded during sample collection. Should the vacuum gauge reading remain elevated above 10 inches Hg for more than 30 minutes, this will be taken to indicate that the initial vacuum in the canister has not sufficiently dissipated, and that the soil screened by the soil gas probe does not produce sufficient soil gas to permit sample collection due to low permeability soil. If low permeability conditions are encountered, the probe can be sampled using the techniques outlined in Appendix D (Soil Gas Sampling in Low Permeability Soil) of Cal EPA (2015).

10. To ensure some residual vacuum in each canister following sample collection, the canister vacuum should be recorded at approximately 80 percent through the expected sample collection duration. With a 100 mL/min maximum flow rate, the expected sample collection duration would be 10, 17, or 60 minutes, respectively, for canister capacities of 1, 1.7, or 6 liters. A maximum residual vacuum of 10-inches Hg is allowed. A canister residual vacuum above this value will require continued sampling until vacuum reading is below this threshold, unless the vacuum remains above 10-inches Hg for more than 30 minutes, as described above. A minimum 0.5 to 1-inch Hg residual vacuum will be required for the sample to be considered valid, or the sampling will be repeated using a fresh Summa™ canister. Once the vacuum is measured, the safety cap must be securely tightened on the inlet of the Summa™ canister prior to shipment to the laboratory under chain-of-custody procedures.

Note: The 0.5 to 1-inch Hg residual vacuum should be verified based on the applicable jurisdictional regulatory vapor intrusion guidance.

11. The vacuum gauge provided by laboratory must be returned with the canister samples to check residual vacuum in the laboratory prior to sample analysis and recorded on the analytical data report. This check will ensure sample integrity prior to laboratory analysis, and that the canister has not become compromised during shipment to the laboratory.
12. If the critical orifice flow regulation devices (provided by the laboratory) and sampling assembly fittings/valves are to be re-used during sampling, they must be cleaned in accordance with laboratory requirements by purging with zero air (provided by laboratory) for minimum 45 seconds at minimum 75 psi (153 inches of Hg).
13. The canisters should be labeled noting the unique sample designation number, date, time, and sampler's initials. A bound field logbook should be maintained to record all soil gas sampling data.
14. The canisters should be listed on the chain-of-custody in order of suspected highest to lowest impact, as evidenced by the recorded PID readings. Indicate on the chain-of-custody for the laboratory to analyze the canisters in order from the lowest to highest PID reading.

The soil gas samples should be analyzed for the project-specified VOCs by the project laboratory using U.S. EPA's TO-15 gas chromatograph/mass spectrometer (GC/MS) methodology, with the mass spectrometer (MS) run in full scan mode. QA/QC measures implemented during the soil gas sampling event will include the two-step leak testing procedure (see Section 15.7.3), maintaining a minimum residual vacuum in the Summa™ canisters following sample collection, collection of one duplicate per sampling event or from at least 10 percent of the samples obtained, and collection of an ambient air sample (if needed). As an additional QA/QC measure, the laboratory should conduct a duplicate analysis of the sample collected in one of the canisters.

1.7.5 Sample Collection Procedure – Tedlar Bag

1. The low flow pump should be connected to the soil gas probe valve at the surface casing and the bag should be connected to the pump. The sampling assembly is connected using short lengths (e.g., 1-foot [0.3 m]) 1/4-inch (6.4 mm) or 3/8-inch (9.5 mm) diameter tubing (the

tubing material will be Teflon® or nylon) and airtight stainless steel or brass tee-connectors and tee-valves (e.g., Swagelok® type). Fresh tubing must be used for each sample.

2. Prior to collecting a soil gas sample, the stagnant air in the sampling assembly tubes and soil gas probe casing/sand pack must be removed. The soil gas probes should be purged prior to sampling using the personal sampling pump at a flow rate of less than 200 mL/min. A flow rate greater than 200 mL/min may be used when purging times are excessive, such as for deep wells with larger-diameter tubing. However, a vacuum of 100 inches of water (7.4 inches of Hg) or less must be maintained during sampling whenever a higher flow rate is used. This ensures that the collected soil gas sample is representative of actual soil gas concentrations within the formation. Measurements of the lengths and inner diameters of the above-ground sampling assembly and below-ground gas probe casing, screen, and sand pack should be used to calculate the "purge volume" (the purge volume will consider the pore volume of the sand pack assuming a 30 percent sand pack porosity). Prior to sample collection, two to three purge volumes should be drawn from the probe/sample assembly, unless otherwise required by the applicable regulatory guidance. The purge data (calculated purge volume, purging rate, and duration of purging) should be recorded in the field logbook.

3. Prior to purging, a vacuum, or tightness, test should be conducted on the sampling assembly as the first of two leak-testing steps, as described further in Section 15.7.3. Briefly, this first leak-testing step (the vacuum test) should consist of opening the valve to the personal sampling pump leaving the valves to the bag and the soil gas probe closed. The pump should then be operated to ensure that it draws no air from the sampling assembly (i.e., creates a negative pressure, or vacuum within the sampling assembly), thus establishing that all assembly connections are airtight. Further details of the vacuum test are described in Section 15.7.3.

4. Prior to purging, and following the vacuum test, the set-up for the second of the two leak-testing steps should be conducted. The second leak-testing step is the tracer compound step. A tracer compound is released at ground surface immediately around the soil gas probe surface casing. The tracer test is used to test for ambient air leakage down the annulus of the soil gas probe and into the soil gas sample. The tracer compound is either monitored using a meter connected in-line to the sampling assembly (e.g., helium), or is included as an analyte in the laboratory analysis of the soil gas samples (e.g., isopropanol). The setup requirements of the tracer compound leak-testing step are described in Section 15.7.3.

5. Following the vacuum test, and the setup for the tracer compound leak-testing step, the soil gas probe purging should commence by opening the valve to the soil gas probe and activating the personal sampling pump (and disconnecting the bag). At the start and the end of the purging period, the total concentration of volatile organic vapors of the personnel sampling pump exhaust gas should be monitored using a portable photoionization detector (PID) meter. The PID meter should be connected in series after the personal sampling pump. Since typical PID instrument flow rates vary from approximately 300 to 500 mL/min (depending on the manufacturer and model), drawing a sample into the PID meter through the personal sampling pump will likely increase the purging flow rate temporarily, until a reading from the PID meter is obtained. PID readings should be recorded and entered in the

field logbook and chain of custody form. The PID readings should provide the laboratory with an indication of whether a sample could require dilution before analysis.

6. Following purging, the bag should be reconnected to the personal sampling pump and the valves to the soil gas probe opened to draw the soil gas sample into the bag. This should be completed concurrent with continued application of the leak-testing tracer compound. Should the bag not inflate for more than 30 minutes, this will be taken to indicate that the soil screened by the soil gas probe does not produce sufficient soil gas to permit sample collection due to low permeability soil. If low permeability conditions are encountered, the probe can be sampled using the techniques outlined in Appendix D (Soil Gas Sampling in Low Permeability Soil) of Cal EPA (2015).
7. If the pump and sampling assembly fittings/valves are to be re-used during sampling, they must be cleaned in accordance with laboratory requirements by purging with zero air (provided by laboratory) for minimum 45 seconds at minimum 75 psi (153 inches of Hg).
8. The bags should be labeled noting the unique sample designation number, date, time, and sampler's initials. A bound field logbook should be maintained to record all soil gas sampling data.
9. The bags should be listed on the chain-of-custody in order of suspected highest to lowest impact, as evidenced by the recorded PID readings. Indicate on the chain-of-custody for the laboratory to analyze the canisters in order from the lowest to highest PID reading.

The soil gas samples should be analyzed for the project-specified VOCs by the project laboratory using U.S. EPA's TO-15 gas chromatograph/mass spectrometer (GC/MS) methodology, with the mass spectrometer (MS) run in full scan mode. QA/QC measures implemented during the soil gas sampling event will include the two-step leak testing procedure (see Section 15.7.3), collection of one duplicate per sampling event or from at least 10 percent of the samples obtained, and collection of an ambient air sample (if needed). As an additional QA/QC measure, the laboratory should conduct a duplicate analysis of the sample collected in one of the bags.

1.7.6 Sample Collection Procedure – Syringe

1. The syringe should be connected to the soil gas probe valve at the surface casing. The sampling assembly is connected using short lengths (e.g., 1-foot [0.3 m]) 1/4-inch (6.4-mm) or 3/8-inch (9.5-mm) diameter tubing (the tubing material will be Teflon® or nylon) and airtight stainless steel or brass tee-connectors and tee-valves (e.g., Swagelok® type). Fresh tubing must be used for each sample.
2. Prior to collecting a soil gas sample, the stagnant air in the sampling assembly tubes and soil gas probe casing/sand pack must be removed. The soil gas probes should be purged prior to sampling using the personal sampling pump at a flow rate of less than 200 mL/min. A flow rate greater than 200 mL/min may be used when purging times are excessive, such as for deep wells with larger-diameter tubing. However, a vacuum of 100 inches of water (7.4 inches of Hg) or less must be maintained during sampling whenever a higher flow rate is used. This ensures that the collected soil gas sample is representative of actual soil gas concentrations within the formation. Measurements of the lengths and inner diameters of the above-ground sampling assembly and below-ground gas probe casing, screen, and sand

pack should be used to calculate the "purge volume" (the purge volume will consider the pore volume of the sand pack assuming a 30 percent sand pack porosity). Prior to sample collection, two to three purge volumes should be drawn from the probe/sample assembly, unless otherwise required by the applicable regulatory guidance. The purge data (calculated purge volume, purging rate, and duration of purging) should be recorded in the field logbook.

3. Prior to purging, a vacuum, or tightness, test should be conducted on the sampling assembly as the first of two leak-testing steps, as described further in Section 15.7.3. Briefly, this first leak-testing step (the vacuum test) should consist of opening the valve to the personal sampling pump leaving the valves to the syringe and the soil gas probe closed. The pump should then be operated to ensure that it draws no air from the sampling assembly (i.e., creates a negative pressure, or vacuum within the sampling assembly), thus establishing that all assembly connections are airtight. Further details of the vacuum test are described in Section 15.7.3.
4. Prior to purging, and following the vacuum test, the set-up for the second of the two leak-testing steps should be conducted. The second leak-testing step is the tracer compound step. A tracer compound is released at ground surface immediately around the soil gas probe surface casing. The tracer test is used to test for ambient air leakage down the annulus of the soil gas probe and into the soil gas sample. The tracer compound is either monitored using a meter connected in-line to the sampling assembly (e.g., helium), or is included as an analyte in the laboratory analysis of the soil gas samples (e.g., isopropanol). The setup requirements of the tracer compound leak-testing step are described in Section 15.7.3.
5. Following the vacuum test, and the setup for the tracer compound leak-testing step, the soil gas probe purging should commence by opening the valve to the soil gas probe and activating the personal sampling pump (and disconnecting the bag). At the start and the end of the purging period, the total concentration of volatile organic vapors of the personnel sampling pump exhaust gas should be monitored using a portable photoionization detector (PID) meter. The PID meter should be connected in series after the personal sampling pump. Since typical PID instrument flow rates vary from approximately 300 to 500 mL/min (depending on the manufacturer and model), drawing a sample into the PID meter through the personal sampling pump will likely increase the purging flow rate temporarily, until a reading from the PID meter is obtained. PID readings should be recorded and entered in the field logbook and chain of custody form. The PID readings should provide the laboratory with an indication of whether a sample could require dilution before analysis.
6. Following purging, the valve to the syringe should be opened and soil gas should be draw into the syringe at a rate of approximately 60 mL/min. This should be completed concurrent with continued application of the leak-testing tracer compound.
7. If the sampling assembly fittings/valves are to be re-used during sampling, they must be cleaned in accordance with laboratory requirements by purging with zero air (provided by laboratory) for minimum 45 seconds at minimum 75 psi (153 inches of Hg).
8. The syringes should be labeled noting the unique sample designation number, date, time, and sampler's initials. A bound field logbook should be maintained to record all soil gas sampling data.

9. The syringes should be listed on the chain-of-custody in order of suspected highest to lowest impact, as evidenced by the recorded PID readings. Indicate on the chain-of-custody for the laboratory to analyze the canisters in order from the lowest to highest PID reading.

The soil gas samples should be analyzed for the project-specified VOCs by the project laboratory using U.S. EPA's TO-15 gas chromatograph/mass spectrometer (GC/MS) methodology, with the mass spectrometer (MS) run in full scan mode. QA/QC measures implemented during the soil gas sampling event will include the two-step leak testing procedure (see Section 15.7.3), collection of one duplicate per sampling event or from at least 10 percent of the samples obtained, and collection of an ambient air sample (if needed). As an additional QA/QC measure, the laboratory should conduct a duplicate analysis of the sample collected in one of the syringes.

1.7.7 Follow-Up Activities

The following activities should be performed at the completion of the field work.

1. Review and compare newly obtained data with historic data and flag unusual or extreme readings for review.
2. Soil gas concentrations are reported in units of µg/m^3 or ppbv. Unlike concentration units for groundwater, these units are not directly interchangeable. The molecular weight of the compound in question is a factor in the conversion from units of mass per unit volume to parts per billion by volume.
3. Ensure site access keys are returned.
4. The equipment should be cleaned and returned to the Equipment Coordinator. All equipment should be cleaned at the site.
5. Monitoring forms and field notes should be sent to the file. The field book should be stored at the appropriate GHD office.

1.8 References

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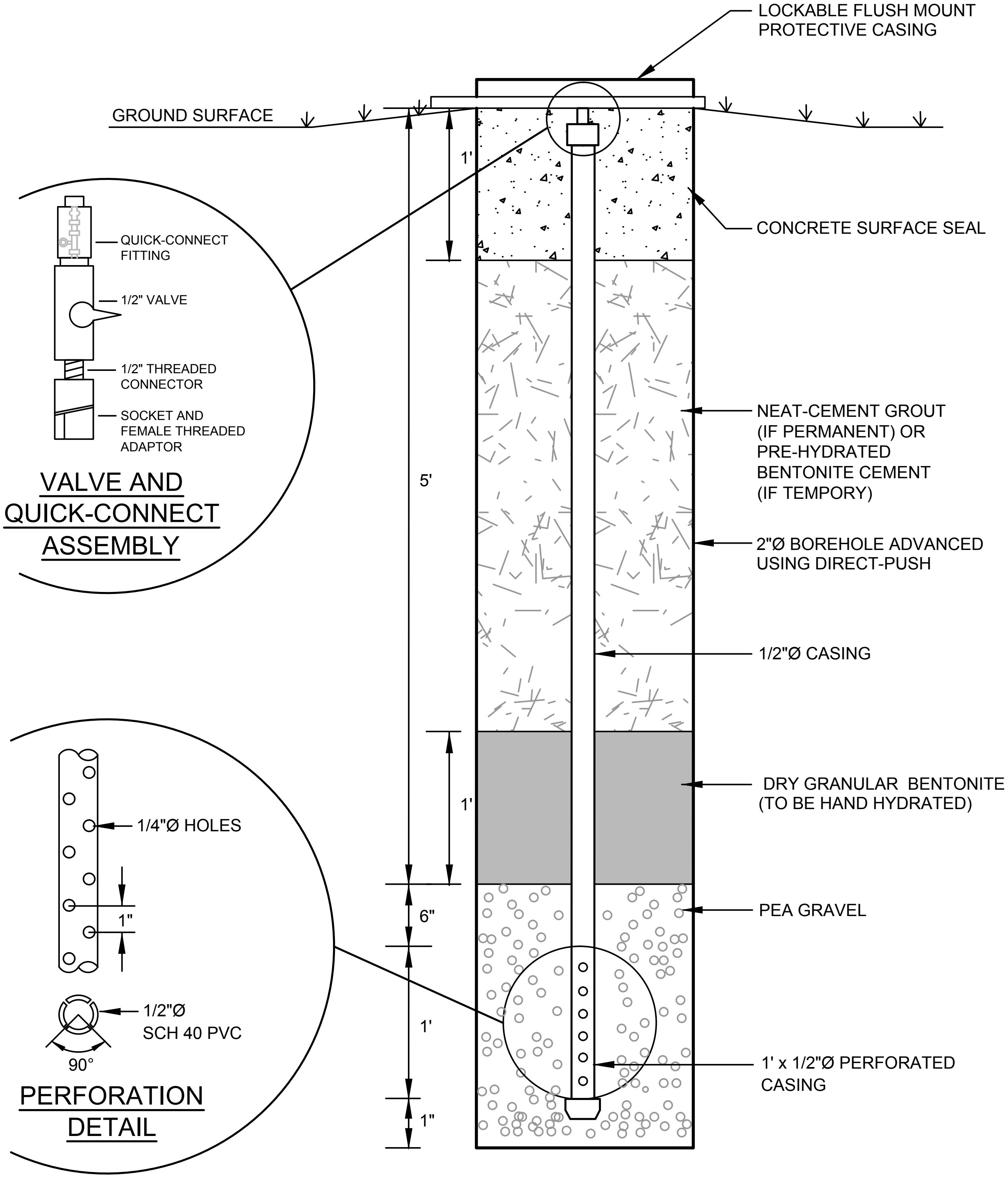
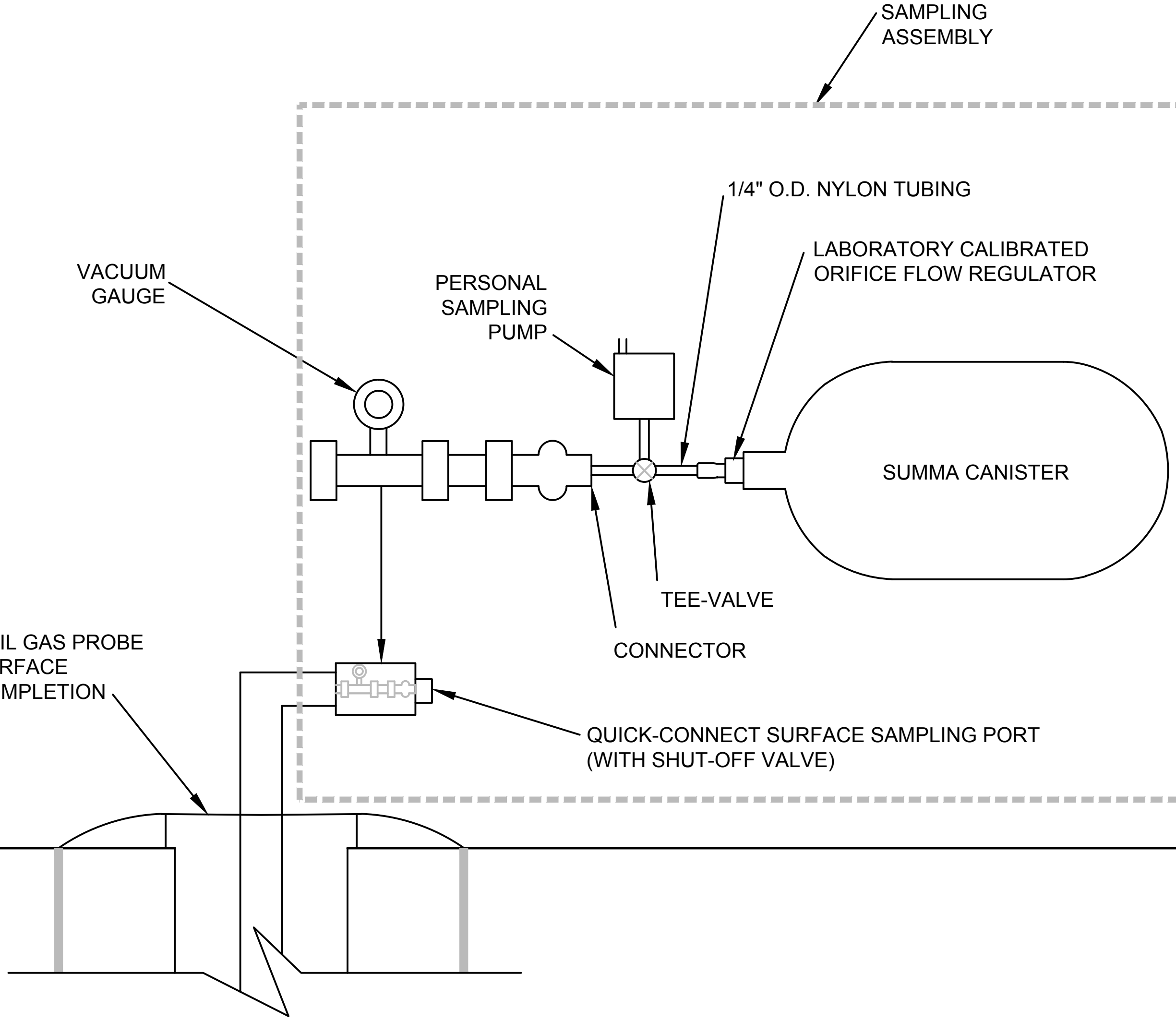


NOTE: CONNECTIONS AND ADAPTORS ARE
<u>NOT</u> TO BE GLUED

NOT TO SCALE
GENERALIZED CONSTRUCTION DIAGRAM

figure 15.1

TYPICAL SOIL GAS PROBE COMPLETION DETAIL



NOT TO SCALE

figure 15.18

TYPICAL SOIL GAS SAMPLING ASSEMBLY SCHEMATIC

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