Memo

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CC: Mike Reid (City of Olympia), Margaret Olson (USEPA), Nick Acklam (Ecology), Kim Seely (Coastline Law Group), Troy Bussey (PIONEER)

Date: March 31, 2022

Subject: RI Data Gap Report Addendum #1
Hardel Mutual Plywood Corporation Site
1210 West Bay Drive NW, Olympia, Washington
Voluntary Cleanup Program (VCP) Project ID SW1757, Cleanup Site ID 3704

Introduction

The purpose of this technical memorandum (memo) is to summarize the results for the additional Remedial Investigation (RI) data gap activities conducted at the Hardel Mutual Plywood Corporation (Hardel) site (Site) located in Olympia, Washington (see Figure 1) that were funded by the City of Olympia's United States Environmental Protection Agency (USEPA) brownfield assessment grant. This memo is an addendum to the August 2021 RI Data Gap Report submitted to the Washington State Department of Ecology's (Ecology's) VCP (PIONEER 2021b).

The objectives of the May 2021 through February 2022 investigation activities summarized in this memo were to fill the following RI gaps prior to preparing and submitting a Focused Feasibility Study (FS) report to Ecology's VCP:

- Determine if constituents of potential concern (COPCs) in groundwater (GW) are present at concentrations exceeding GW screening levels (SLs) near the downgradient upland boundary with Budd Inlet (i.e., potential point of compliance [POC] monitoring well [MW] locations).
- Verify shallow GW flow direction throughout the Site towards Budd Inlet.
- Evaluate methane concentrations in the subsurface beneath planned structures.

The work plan for these investigation activities was approved by USEPA on March 29, 2021. Minor work plan updates and clarifications for methane soil gas sampling were submitted to USEPA and Ecology for review in September 2021. The minor updates and clarifications consisted of (1) adding another soil vapor probe (SVP) location per Ecology's request, and (2) clarifying some of the standard operating procedures for collecting measurements from SVPs.

Background

Site investigation and remediation activities were previously completed between 2004 and 2012 to assess and address releases from historical operations, including the former plywood manufacturing facility operated by Hardel from 1951 through 1996 (see Figure 2). These previous MTCA investigation and remediation activities were completed pursuant to the 2007 Agreed Order #DE 4108 (AO) between Hardel and Ecology. Ecology stated in a 2012 letter that Hardel had satisfied all AO requirements and "no additional remedial action is necessary at this site unless new or different information becomes known" (Ecology 2012b).

PIONEER conducted a Phase II Environmental Site Assessment (ESA) and additional investigation activities between June 2020 and January 2021 for due diligence purposes to evaluate soil and GW constituent concentrations (PIONEER 2020,

2021b). In general, these investigation activities confirmed that the Site is relatively clean, which is expected given the size and scope of completed remediation activities (PIONEER 2021b). However, some minor SL exceedances were detected sporadically in soil and GW within the interior of the upland area. The identified COPCs for these sporadic SL exceedances are total petroleum hydrocarbons (TPH) in the gasoline range (TPH-G), TPH in the diesel range (TPH-D), TPH in the heavy oil range (TPH-HO), benzene, ethylbenzene, ethylene dibromide (EDB), acenaphthene, anthracene, fluoranthene, fluorene, pyrene, total carcinogenic polynuclear aromatic hydrocarbons (cPAHs), total naphthalenes, tetrachloroethylene (PCE), arsenic, and silver (PIONEER 2021b). Although many of the petroleum-related COPCs were detected in B202 and/or MW104 GW (and at least one petroleum constituent concentration at B202 and MW104 was greater than ten times the GW SL), the B202 and MW104 GW SL exceedances are localized and are likely associated with treated wood debris (PIONEER 2021b). The other GW SL exceedances at the Site are (1) a slight total cPAHs GW SL exceedance in a direct-push GW sample at B204, (2) a slight EDB GW SL exceedance in a direct-push GW sample at B3, (3) a slight pyrene GW SL exceedance at a previous AO confirmational monitoring location (MW-15), (4) a slight arsenic GW SL exceedance in MW101 during the August 2020 GW monitoring (GWM) event[1], and (5) the slight PCE and EDB/arsenic GW SL exceedances at B5 and B6, respectively, that are attributable to the Reliable Steel site (see Figure 2). There were no GW SL exceedances in MW102, MW103, MW105, and MW106 (potential POC MWs located downgradient of B202, MW104, B204, B3, and/or MW-15) during the August 2020, November 2020, and/or January 2021 GWM events (PIONEER 2021b). In order to confirm the sporadic GW SL exceedances at B202, MW104, B204, B3, MW-15, and MW101 are not impacting downgradient groundwater at potential POC MW locations, a few additional GWM-related activities (e.g., installing a potential POC MW downgradient of MW101, conducting additional GWM events) were proposed (PIONEER 2021a).

During the 2020 Phase II ESA, PIONEER installed and sampled two SVPs (B10 and B11). Methane soil gas concentrations (i.e., less than 30%) and pressure differentials (i.e., less than 500 pascals) in these two SVPs indicated that no further action was necessary regarding a potential methane hazard in accordance with ASTM Designation E2993-16 (Standard Guide for Evaluating Potential Methane Hazards as a Result of Methane in the Vadose Zone). However, additional methane investigation activities were proposed because of the amount of subsurface wood debris at the Site, the relatively high methane concentration in the B11 SVP (23%), and the limited nature of the 2020 methane investigation activities (PIONEER 2020).

Scope of Investigation

In accordance with the amended work plan (PIONEER 2021a, 2021c), the following investigation activities were completed between April 2021 and February 2022 (see Figures 2 and 3):

- Installing and developing one additional MW at a potential northern POC location (MW107).
- Installing three piezometers (PZ101 through PZ103).

[1] The arsenic GW SL has been increased from 5 ug/L to 8 ug/L to account for Ecology's recent establishment of a natural background arsenic concentration of 8 ug/L for Puget Sound Basin groundwater (Ecology 2022). As a result, the arsenic GW concentrations between 5 ug/L and 8 ug/L (i.e., the MW104 arsenic concentration of 5.5 ug/L during the August 2020 GWM event, the MW101 arsenic concentration of 6.2 ug/L during the November 2020 GWM event, and the MW101 arsenic concentration of 6.8 ug/L during the January 2021 GWM event) are no longer consider GW SL exceedances.

- Surveying the existing MW (MW101 through MW106), new MW (MW107), and piezometer (PZ101 through PZ103) locations.
- Advancing soil borings and installing 18 SVPs (SVP1 through SVP7, SVP9 through SVP12, SVP14, and SVP16 through SVP21).[2]
- Collecting soil samples from MW107, PZ101 through PZ103, SVP1, SVP4, SVP8, SVP10, SVP13, SVP15, SVP18, and SVP19 for visual classification, field screening, and potential laboratory analyses if evidence of impact was observed.[3]
- Completing four quarterly gauging events of the piezometers and MW network to determine the elevation of the potentiometric surface and GW flow direction. The four quarterly GWM events were conducted on May 5, 2021, August 13, 2021, November 16, 2021, and February 1, 2022.
- Collecting four total quarters of GW samples from the potential POC MW locations (MW102, MW103, MW105 through MW107) using standard low-flow methodology.[4] Field water quality parameters for each quarterly event are presented on Table 1.
- Submitting GW samples for analysis of TPH-G, TPH-D, TPH-HO, benzene, toluene, ethylbenzene, xylenes, EDB, 1,2-dichloroethane, methyl tertiary-butyl ether, PCE and its degradation byproducts, polynuclear aromatic hydrocarbons (PAHs), dissolved arsenic, and dissolved silver.
- Collecting field measurements of the pressure differential and methane, oxygen, and carbon dioxide soil gas concentrations from the installed SVPs during two different sampling events (the first on October 7, 2021 and the second on October 13, 2021).[5]
- Submitting soil gas samples collected from SVP6, SVP7, and SVP19 on October 13, 2021 to Fremont Analytical for analysis of methane, carbon dioxide, oxygen, and nitrogen.[6]
- Collecting field measurements of the pressure differential and methane, oxygen, and carbon dioxide soil gas concentrations from SVP6 at the start of purging on November 16, 2021.[7]

[2] In accordance with the work plan (PIONEER 2021a), SVP8, SVP13, and SVP15 were not installed because the depths to GW at these proposed locations were less than three feet below ground surface (bgs).

[3] In accordance with the work plan (PIONEER 2021a), nearly two-thirds of the SVPs were advanced without visual classification or field screening because the borings were blind drilled.

[4] One or more quarterly events had already been completed for MW102, MW103, MW105, and MW106 prior to the investigation activities associated with this work plan. As a result, only MW107 required four additional quarterly events. MW102 only required one additional quarterly event as it was previously sampled in August 2020, November 2020, and January 2021. MW103 only required two additional quarterly events as it was previously sampled in August 2020 and November 2020. MW105 and MW106 only required three additional quarterly events as they were previously sampled in January 2021.

[5] Field measurements were obtained at the start of purging and at the end of purging.

[6] In order to verify the accuracy of the field methane measurements, soil gas samples were collected for laboratory analysis from SVP6, SVP7, and SVP19, which were the only SVPs with a field methane concentration exceeding 30% on October 13, 2021. The laboratory analyses were not paid for by the City of Olympia's USEPA brownfield assessment grant.

[7] The objective was to collect field measurements from SVP6, SVP7, and SVP19 at the start of purging and at the end of purging to see if the October 2021 results were replicated. SVP6 could not be fully purged because groundwater was present within the SVP screen and tubing. Field measurements were not obtained from SVP7 and SVP19 because the SVP tubing had been removed (likely by an animal or trespasser) from these two SVPs.

- Collecting field measurements of methane ambient air concentrations near the end of the uncapped SVP tube and approximately four feet above ground surface at SVP3, SVP6, SVP7, SVP9, SVP16 through SVP19, and B11 on November 16, 2021.
- Collecting methane ambient air concentrations at the bottom of holes dug to a depth of approximately one foot adjacent to SVP3, SVP6, SVP7, and SVP9.[8]

The investigation activities were completed in accordance with the amended work plan (PIONEER 2021a, 2021c) with the following exceptions:

- A high tide GW gauging event and a low tide GW gauging event were conducted for the August 2021 GWM event (rather than a single gauging event for each GWM event as indicated in the work plan).
- Field measurements were not obtained from pre-existing SVP B10 as hoped because groundwater was present within the SVP screen and tubing.
- Field measurements were not obtained from pre-existing SVP B11 as hoped because the B11 SVP could not be found (e.g., the tubing and cap may have been removed by an animal or trespasser).
- Additional methane investigation activities were conducted, including (1) collecting soil gas measurements during three separate sampling events on October 7, October 13, and November 16, 2021, (2) collecting and submitting three soil gas samples for laboratory analysis, and (3) collecting ambient air measurements.

Results

Surface and Subsurface Conditions

Soil samples were visually classified in general accordance with ASTM Practice D2488. Detailed descriptions of the soil conditions encountered at each boring during the May 2021 through February 2022 investigation activities are included in Attachment 1.

The subsurface lithology encountered during the investigation activities were consistent with previous investigation activities. The subsurface consists of fill, marine sands, silt, and varying amounts of wood from 0 to 20 feet bgs. In some areas, poorly sorted gravel is present.

Shallow GW conditions encountered during the investigation activities were consistent with previous investigation activities. GW was previously observed at depths ranging from 0.4 to 12 feet bgs with an easterly GW flow direction towards Budd Inlet (Ecology 2012a, PIONEER 2020). During the May 2021 through February 2022 investigation activities, GW was encountered at depths of approximately 0.2 to 10 feet bgs. Shallow GW flow was confirmed to be flowing east towards Budd Inlet during synoptic gauging events completed near low tide in May 2021, near both low and high tide in August 2021, near low tide in November 2021, and near low tide in February 2022 (see Table 2 and Figures 4 through 8).

[8] Holes were dug with a shovel. Holes were not dug adjacent to other key locations (e.g., SVP19) due to the presence of an impervious surface (e.g., asphalt).

2021 Soil Analytical Results

No evidence of soil impact was observed at the time of MW, SVP, and piezometer installation associated with this work plan; therefore, no soil samples were collected or submitted for laboratory analysis.

2021 GW Analytical Results

All constituent concentrations in all GW samples collected from the five potential POC MWs sampled pursuant to this work plan were less than the applicable GW SLs (see Table 3). Figure 2 provides a summary of the GW sampling results for the five potential POC MWs relative to previous GW sampling results. Laboratory analytical reports are included in Attachment 2.

2021 Methane Investigation Results

The 2021 methane soil gas concentrations are presented in Table 4. The maximum methane soil gas concentrations obtained during all completed sampling events are summarized in Figure 3. The key methane soil gas results were:

- The maximum methane soil gas concentrations in SVP6, SVP7, SVP11, and SVP19 exceeded 30%.
- Methane soil gas concentrations in SVP6, SVP7, and SVP19 increased as the amount of SVP purging increased. By contrast, methane soil gas concentrations in SVP11 dramatically decreased as the amount of SVP purging increased.
- The methane concentrations in the SVP6, SVP7, and SVP19 samples analyzed by the laboratory replicated the SVP6, SVP7, and SVP19 field measurements. The associated laboratory analytical report is included in Attachment 2.
- The maximum methane soil gas concentrations in SVP1 through SVP5, SVP9, SVP10, SVP12, SVP14, SVP16 through SVP18, SVP20, and SVP21 were less than 30%. However, the methane soil gas concentrations at SVP9, SVP16, and SVP18 have the potential to exceed 30% in the future since concentrations increased as the amount of SVP purging increased, and the final concentrations were near 30%.

Methane was not detected in any of the ambient air measurements obtained on November 16, 2021 (with a detection limit of 0.05%), with the exception that a methane concentration of 0.8% was detected in the ambient air near the end of the uncapped SVP tube at SVP6. Methane was not detected at the bottom of holes dug to a depth of approximately one foot adjacent to SVP3, SVP6, SVP7, and SVP9.

The pressure differentials at all sampling locations during the October 7, 2021, October 13, 2021, and November 16, 2021 sampling events were less than 500 pascals. The maximum pressure differential at any sampling location was 40 pascals.

Conclusions and Recommendations

There were no GW SL exceedances in any of the five potential POC MWs (MW102, MW103, and MW105 through MW107) during four quarters of GWM (i.e., the results from these May 2021 through February 2022 GWM events along with previous August 2020, November 2020, and January 2021 GWM results [PIONEER 2021b]). Since the minor GW SL exceedances at B202, MW104, B204, B3, MW-15, and MW101 are not impacting downgradient groundwater at these

five potential POC MWs, no additional GW sampling activities are recommended for existing MWs prior to preparation of the Focused FS report.

The potential for subsurface methane to cause an indoor air hazard at this Site is low as discussed in PIONEER's Summary of Recent Methane Investigation memo (see Attachment 3). Nonetheless, additional methane investigation and mitigation measures are recommended to eliminate the potential methane hazard (see Attachment 3).

References

Ecology. 2012a. Final Cleanup Action Plan, Hardel Mutual Plywood, Thurston County, Washington. April.

Ecology. 2012b. Satisfaction of Agreed Order No. DE 4108: Hardel Mutual Plywood, FS #75128579. August 22.

Ecology. 2022. Natural Background Groundwater Arsenic Concentrations in Washington State, Publication No. 14-09-044. January.

PIONEER. 2020. Phase II Environmental Site Assessment, Hardel Mutual Plywood Corporation, 1210 West Bay Drive NW, Olympia, Washington. October.

PIONEER. 2021a. RI Data Gaps Investigation Work Plan, Hardel Mutual Plywood Corporation, 1210 West Bay Drive NW, Olympia, Washington. March.

PIONEER. 2021b. Remedial Investigation Data Gap Report, Hardel Mutual Plywood Corporation Site, 1210 West Bay Drive NW, Olympia, Washington. August.

PIONEER. 2021c. Minor Updates/Clarifications to the March 2021 RI Data Gaps Investigation Work Plan for Methane Soil Vapor Sampling at the Hardel Mutual Plywood Corporation Site, Olympia Washington USEPA Brownfield Assessment Grant (BF01J66201). September 28.

Enclosures

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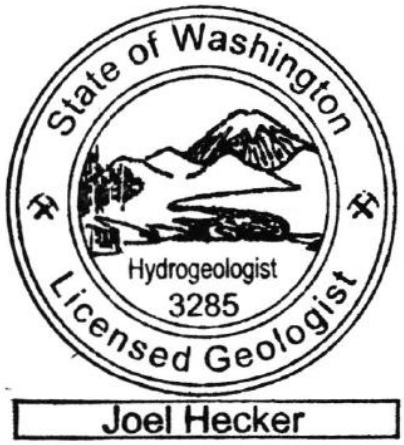
Professional Certification

This document was prepared under my direction. The information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I hereby certify that I was in responsible charge of the work performed for this document.



March 31, 2022

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Date

Figures

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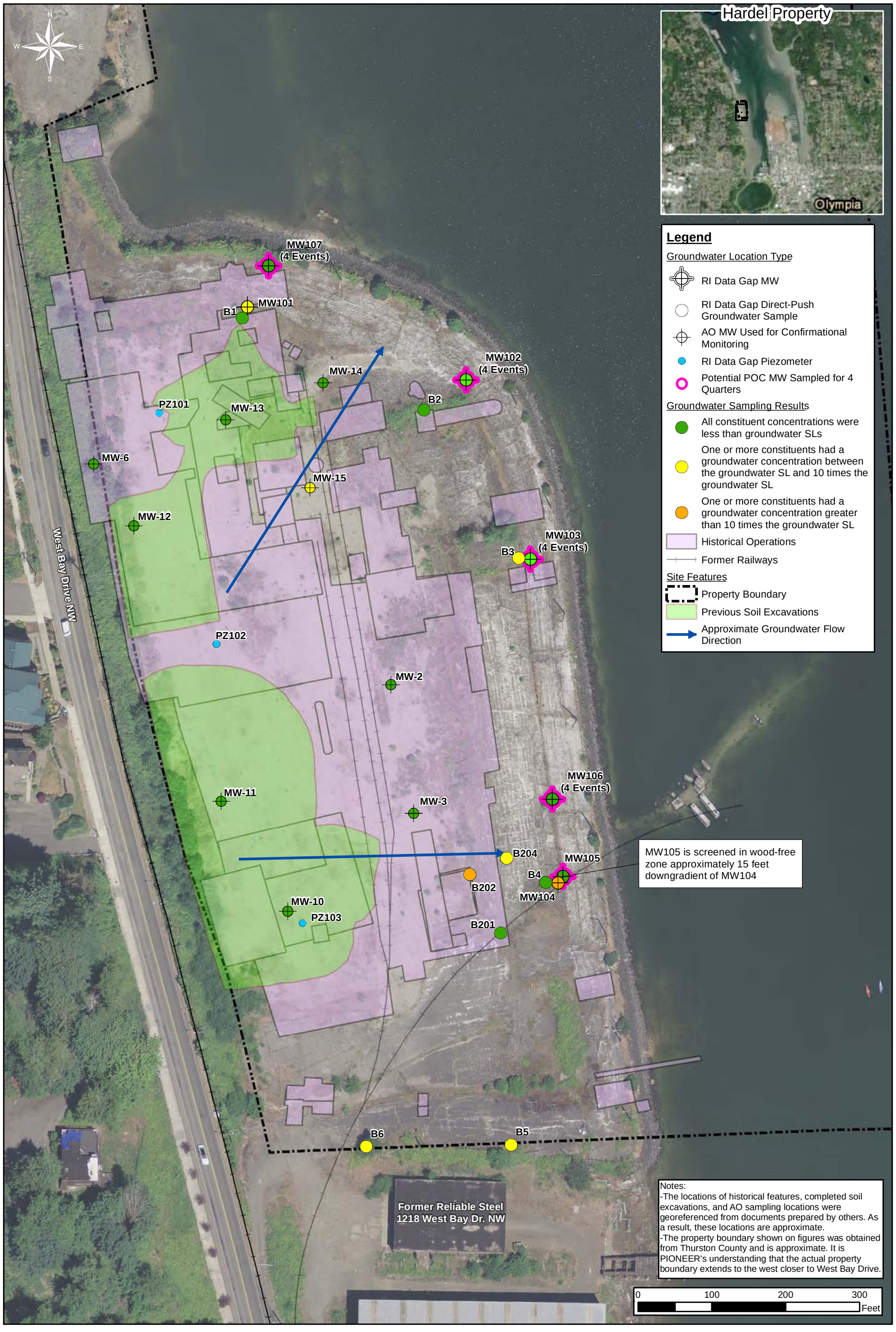
Location Map
RI Data Gap Report Addendum #1
Hardel Mutual Plywood Corporation Site
1210 West Bay Drive NW, Olympia, Washington

Figure 1

Document Path: G:\Projects\City of Olympia\GIS\Maps\2022\Hardel\RI Datagaps Investigation\Fig 1_Property Location.mxd; Author: MK; Date Saved: 3/29/2022



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Summary of Groundwater Sampling Locations and Results
RI Data Gap Report Addendum #1
Hardel Mutual Plywood Corporation Site
1210 West Bay Drive NW, Olympia, Washington

Figure 2

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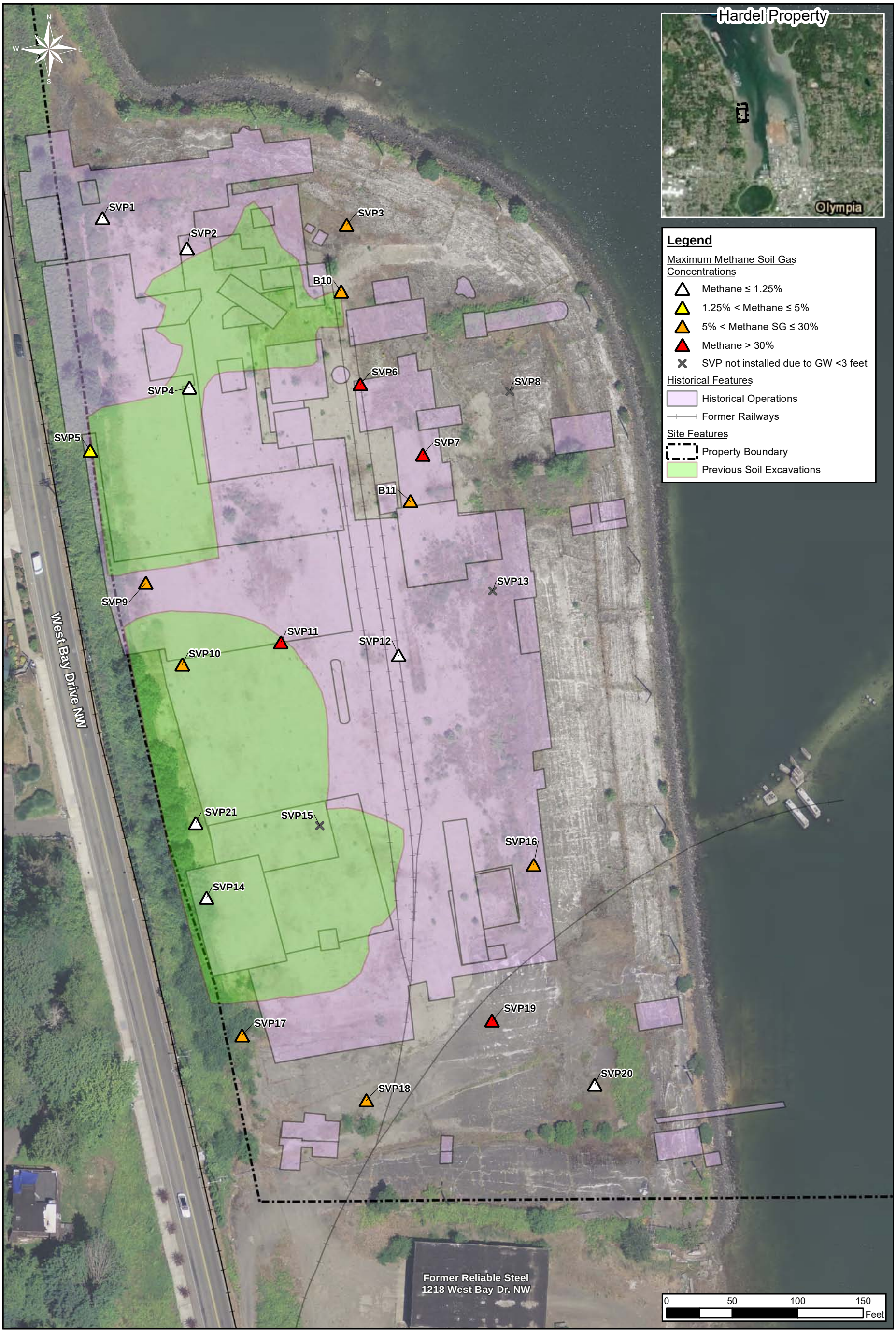

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Methane Soil Vapor Probe Results
RI Data Gap Report Addendum #1
Hardel Mutual Plywood Corporation Site
1210 West Bay Drive NW, Olympia, Washington

Figure 3

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May 2021 Groundwater Flow Map
RI Data Gap Report Addendum #1
Hardel Mutual Plywood Corporation Site
1210 West Bay Drive NW, Olympia, Washington

Figure 4

Document Path: G:\Projects\City of Olympia\GIS\Maps\2022\Hardel\RI Datagaps Investigation\Fig 4_May 2021 GW Flow Map.mxd; Author: MK; Date Saved: 3/28/2022

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August 2021 Groundwater Flow Map – High Tide
RI Data Gap Report Addendum #1
Hardel Mutual Plywood Corporation Site
1210 West Bay Drive NW, Olympia, Washington

Figure 5

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August 2021 Groundwater Flow Map – Low Tide
RI Data Gap Report Addendum #1
Hardel Mutual Plywood Corporation Site
1210 West Bay Drive NW, Olympia, Washington

Figure 6

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November 2021 Groundwater Flow Map
RI Data Gap Report Addendum #1
Hardel Mutual Plywood Corporation Site
1210 West Bay Drive NW, Olympia, Washington

Figure 7

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February 2022 Groundwater Flow Map
RI Data Gap Report Addendum #1
Hardel Mutual Plywood Corporation Site
1210 West Bay Drive NW, Olympia, Washington

Figure 8

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Tables

Table 1: May 2021-February 2022 Stabilized Water Quality Field Parameters

Location	Sample Date	pH	Specific Conductance	Turbidity	Dissolved Oxygen	Temperature	ORP	Odor	Color
		STD Units	µS/cm	NTU	mg/L	°C	mV	--	--
2Q2021 GWM Event									
MW-102	5/5/2021	6.34	230	4.9	1.19	13.9	24.0	No odor	Clear
MW-103	5/5/2021	6.20	428	28.4	0.71	12.9	18.3	No odor	Clear
MW-105	5/5/2021	6.44	1,650	25.1	1.17	14.4	49.4	No odor	Clear
MW-106	5/5/2021	6.24	562	4.3	1.20	13.0	-18.0	No odor	Clear
MW-107	5/5/2021	6.51	1,202	3.4	1.32	13.8	-33.7	Sulfur odor	Clear
3Q2021 GWM Event									
MW-103	8/13/2021	6.39	625	10.4	0.13	21.5	-40.5	No odor	Clear
MW-105	8/13/2021	6.58	3,845	13.2	0.19	15.5	-19.6	No odor	Clear
MW-106	8/13/2021	6.43	776	3.0	0.14	19.2	-55.7	No odor	Clear
MW-107	8/13/2021	6.74	1,614	4.0	0.16	17.1	-96.5	No odor	Clear
4Q2021 GWM Event									
MW-105	11/16/2021	6.03	1,063	20.0	0.13	14.0	-74.6	No odor	Clear
MW-106	11/16/2021	6.36	490	6.6	0.58	14.2	-79.7	No odor	Clear
MW-107	11/16/2021	6.72	1,562	4.2	0.29	14.7	-106.4	No odor	Clear
1Q2022 GWM Event									
MW-107	2/1/2022	6.82	1,489	4.8	0.31	12.6	-124.3	No odor	Clear

Notes:

°C: Degrees Celsius; mg/L: milligrams per liter; mV: millivolts; NM: Not measured; NTU: nephelometric turbidity units; ORP: oxidation-reduction potential; TOC: top of casing; µS/cm: microsiemens per centimeter

All results are from unfiltered field samples.

Table 2: May 2021-February 2022 Groundwater Elevations

Location ID	Northing	Easting	TOC Elevation (feet NAVD88)	May 5, 2021 Event				August 13, 2021 High Tide Event				August 13, 2021 Low Tide Event				November 16, 2021 Low Tide Event				February 01, 2022 Low Tide Event			
				Time [1] (AM)	Measured Depth to GW (feet from TOC)	Measured LNAPL Thickness (feet)	GW Elevation (feet NAVD88)	Time [2] (AM)	Measured Depth to GW (feet from TOC)	Measured LNAPL Thickness (feet)	GW Elevation (feet NAVD88)	Time [2] (AM)	Measured Depth to GW (feet from TOC)	Measured LNAPL Thickness (feet)	GW Elevation (feet NAVD88)	Time [3] (AM)	Measured Depth to GW (feet from TOC)	Measured LNAPL Thickness (feet)	GW Elevation (feet NAVD88)	Time [4] (PM)	Measured Depth to GW (feet from TOC)	Measured LNAPL Thickness (feet)	GW Elevation (feet NAVD88)
MW101	638447.57	1038803.42	15.72	9:40	4.73	--	10.99	9:28	5.62	--	10.10	15:30	5.59	--	10.13	9:00	4.04	--	11.68	12:03	4.74	--	10.98
MW102	638382.34	1039004.53	13.64	9:37	2.94	--	10.70	9:55	3.90	--	9.74	15:28	4.04	--	9.60	9:02	1.39	--	12.25	12:25	2.12	--	11.52
MW103	638216.88	1039055.58	12.80	9:34	1.49	--	11.31	9:54	2.56	--	10.24	15:27	2.65	--	10.15	9:08	0.02	--	12.78	12:23	0.55	--	12.25
MW104	637910.53	1039077.88	13.98	9:29	4.47	--	9.51	9:51	5.63	--	8.35	15:24	5.91	--	8.07	8:45	4.45	--	9.53	12:14	4.40	--	9.58
MW105	637921.74	1039086.43	14.66	9:28	9.00	--	5.66	9:52	5.94	--	8.72	15:23	8.60	--	6.06	8:45	8.55	--	6.11	12:16	8.66	--	6.00
MW106	638002.06	1039084.92	13.98	9:31	4.95	--	9.03	9:52	5.49	--	8.49	15:25	5.91	--	8.07	9:05	3.71	--	10.27	12:18	4.02	--	9.96
MW107	638493.10	1038822.85	17.02	9:39	9.39	--	7.63	9:57	9.66	--	7.36	15:29	9.72	--	7.30	8:58	7.96	--	9.06	12:30	9.00	--	8.02
PZ101	638350.02	1038734.38	16.28	9:41	4.15	--	12.13	9:30	5.13	--	11.15	15:32	5.13	--	11.15	8:56	3.09	--	13.19	12:04	3.85	--	12.43
PZ102	638125.01	1038768.84	15.40	9:43	1.77	--	13.63	9:33	2.82	--	12.58	15:33	2.73	--	12.67	8:53	0.74	--	14.66	12:08	1.01	--	14.39
PZ103	637850.42	1038817.08	15.30	9:45	2.37	--	12.93	9:36	4.34	--	10.96	15:36	4.33	--	10.97	8:50	0.11	--	15.19	12:10	0.53	--	14.77

Notes:

--: No LNAPL thickness was detected; TOC: top of casing

Northings and Eastings in Washington State Plane, South Zone, North American Datum of 1983 (2011).

Top of Casing (TOC) elevations and GW elevations are in feet via the North American Vertical Datum of 1988 (NAVD88).

[1] Monitoring wells and piezometers were gauged during a synoptic event near low tide, which was at 08:35 AM on 5/5/2021.

[2] Monitoring wells and piezometers were gauged during a synoptic events near high tide and low tide, which were at 09:32 AM and 3:43 PM on 8/13/2021, respectively.

[3] Monitoring wells and piezometers were gauged during a synoptic event near low tide, which was at 09:29 AM on 11/16/2021.

[4] Monitoring wells and piezometers were gauged during a synoptic event near low tide, which was at 12:05 PM on 02/01/2022.

Table 3: Summary of RI Data Gap Investigation Groundwater Analytical Results

Constituent Category	COPC [1,2]	Groundwater SL [3]	Sample Location and Sample Date												
			MW102	MW103		MW105			MW106			MW107			
			5/5/2021	5/5/2021	8/13/2021	5/5/2021	8/13/2021	11/16/2021	5/5/2021	8/13/2021	11/16/2021	5/5/2021	8/13/2021	11/16/2021	2/1/2022
TPH (ug/L)	TPH-D	500	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U	200 U
	TPH-G	800	100 U	100 U	**130**	100 U	**110**	**160**	100 U	100 U	100 U	100 U	100 U	100 U	100 U
	TPH-HO	500	400 U	400 U	400 U	400 U	400 U	400 U	400 U	400 U	400 U	400 U	400 U	400 U	400 U
VOCs (ug/L)	Benzene	1.6	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	Ethylbenzene	31	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
	Ethylene Dibromide (EDB)	0.050	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U	0.010 U
	Tetrachloroethylene (PCE)	2.9	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
SVOCs/ PAHs (ug/L)	Acenaphthene	30	**0.97**	**1.5**	**1.8**	**8.1**	**5.9**	**9.5**	0.10 U	0.10 U	0.098 U	**0.32**	**0.26**	**0.28**	**0.31**
	Anthracene	100	0.099 U	0.099 U	0.10 U	0.10 U	0.10 U	0.099 U	0.10 U	0.10 U	0.098 U	0.099 U	0.10 U	0.10 U	0.099 U
	Fluoranthene	6.0	0.099 U	0.099 U	0.10 U	0.10 U	0.10 U	0.099 U	0.10 U	0.10 U	0.098 U	0.099 U	0.10 U	0.10 U	0.099 U
	Fluorene	10	**0.30**	**0.20**	**0.29**	**3.0**	**1.9**	**4.2**	0.10 U	0.10 U	0.098 U	0.099 U	0.10 U	0.10 U	0.099 U
	Naphthalenes, Total [4]	160	**1.4**	0.30 U	0.30 U	**0.22**	0.30 U	**0.22**	0.30 U	0.30 U	0.29 U	0.30 U	0.30 U	0.30 U	0.30 U
	Pyrene	8.0	0.099 U	0.099 U	0.10 U	0.10 U	0.10 U	0.099 U	0.10 U	0.10 U	0.098 U	0.099 U	0.10 U	0.10 U	0.099 U
	Total cPAHs TEF [5]	0.015	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U	0.15 U
Metals (ug/L)	Arsenic	8.0	**2.9**	1.0 U	3.0 U	1.0 U	3.0 U	1.0 U	1.0 U	3.0 U	**1.7**	1.0 U	3.0 U	**2.3**	3.0 U
	Silver	1.9	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U	0.35 U

Notes:

J: estimated concentration; NA: constituent not analyzed, U: constituent not detected at the shown reporting limit

Bold font concentrations were detections.

[1] The laboratory analyzed additional VOCs (1,1-dichloroethylene, cis- and trans-1,2-dichloroethylene, ethylene dichloride, methyl-tert-butyl-ether, trichloroethylene, toluene, total xylenes, and vinyl chloride) and PAHs (acenaphthylene, benzo[g,h,i]perylene, and phenanthrene) which are not included in the table because they are not considered COPCs in groundwater. Refer to the laboratory analytical reports in Attachment 2 for the full list of analytical results.

[2] Constituent results are shown as two significant figures in standard notation, except numbers greater than 100 are rounded to a whole number. The following data reduction rules were used for duplicate samples: (a) if both samples had a detected result, then the average concentration was used, (b) if neither sample had a detected result, then the lower reporting limit was used, and (c) if only one of the two samples had a detected result, then the detected concentration was used. The following data reduction rules were used when the laboratory provided two results for the same non-duplicate sample: (a) if one or both results were a detect, then the highest detection was used, and (b) if both results were non-detects, then the lower reporting limit was used.

[3] See August 2021 Data Gap Investigation Report (PIONEER 2021) for calculation of SLs. As mentioned in the report, a non-detect result with a reporting limit greater than a SL was not considered an exceedance since the SL would technically need to be adjusted up to the reporting limit.

[4] The following data reduction rules were used for naphthalene results from USEPA Method SW846-8260 and SW846-8270: (a) if naphthalene was detected by one or both methods, then the highest detection was used, and (b) if naphthalene was not detected by either method, then the lower reporting limit was used. Additionally, the following data reduction rules were used for compound totaling of total naphthalenes: (a) if one or more individual constituent was detected in a sample, the non-detect constituents were assumed to equal one-half of the reporting limit, and (b) if no individual constituents were detected in a sample, the sum of the reporting limits for the individual constituents was used.

[5] Total cPAHs concentrations were calculated using MTCA toxicity equivalence factors (TEFs) per WAC 173-340-708(8) and data reduction rules per the 2001 MTCA Concise Explanatory Statement (Ecology 2001c). If a constituent was detected in any sample in any media, non-detect results for that constituent in other samples were assumed to equal half of the laboratory reporting limit in the TEF calculation. If a constituent was non-detect in all samples from all sampled media, non-detect results for that constituent were assumed to equal zero in the TEF calculation.

Table 4: 2021 SVP Methane Results

Location ID	10/7/21 Initial Methane Concentration	10/7/21 Final Methane Concentration	10/13/21 Initial Methane Concentration	10/13/21 Final Methane Concentration	Lab Analysis of 10/13/21 Field Sample	11/16/21 Methane Concentration	Maximum Methane Concentration
SVP B10	NM	NM	NM	NM	--	NM	NM
SVP B11	NLP	NLP	NLP	NLP	--	NLP	NM
SVP1	0.0	0.0	0.0	0.0	--	NM	0.0
SVP2	0.2	0.0	0.0	0.0	--	NM	0.2
SVP3	16.4	18.1	17.3	17.1	--	NM	18.1
SVP4	0.0	0.0	0.0	0.0	--	NM	0.0
SVP5	2.6	0.3	0.0	0.0	--	NM	2.6
SVP6	20.9	21.3	37.4	37.8	40.1	61.2	61.2
SVP7	2.2	8.5	63.6	63.7	60.4	NLP	63.7
SVP9	20.1	20.3	27.1	26.6	--	NM	27.1
SVP10	8.2	0.1	21.1	0.5	--	NM	21.1
SVP11	80.5	62.7	0.0	0.0	--	NM	80.5
SVP12	0.0	0.0	0.0	0.0	--	NM	0.0
SVP14	0.0	0.0	0.0	0.0	--	NM	0.0
SVP16	17.0	19.5	23.7	28.7	--	NM	28.7
SVP17	5.2	5.4	7.6	10.2	--	NM	10.2
SVP18	3.5	4.4	19.5	20.4	--	NM	20.4
SVP19	39.0	48.4	52.0	58.2	63.8	NLP	63.8
SVP20	0.0	0.0	0.0	0.0	--	NM	0.0
SVP21	0.0	0.0	0.0	0.0	--	NM	0.0

Notes:

--: no laboratory sample analyzed; NLP: no longer present; NM: not measured

All concentrations are shown as percent by volume.

Initial concentrations were those measured in the beginning of purging.

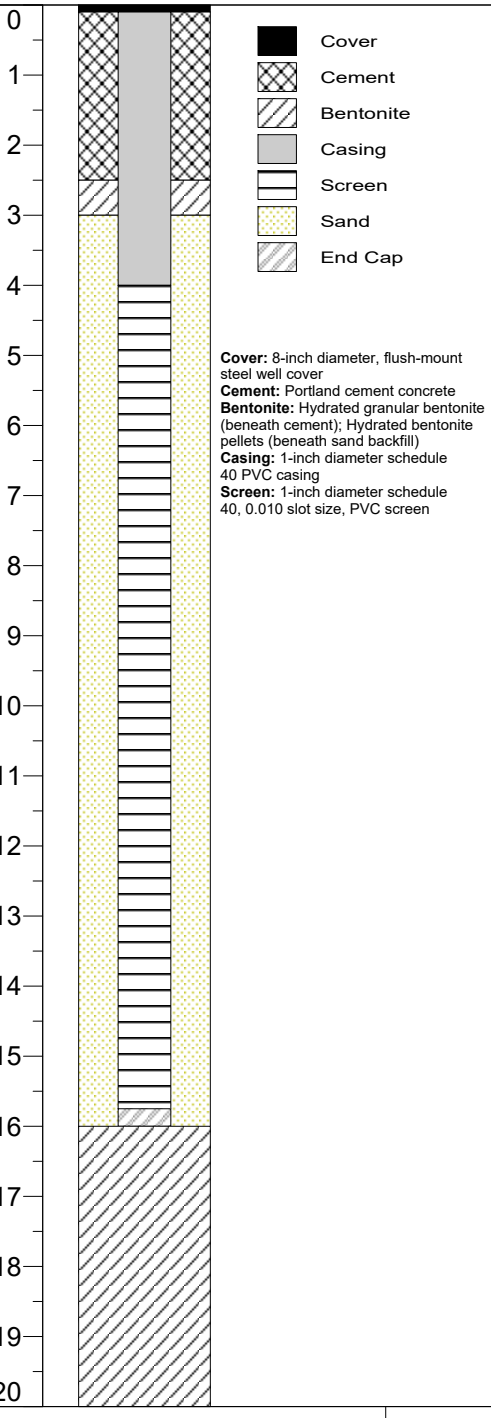
Final concentrations were those measured at the end of purging.

Attachment 1

PROJECT: Hardel, Olympia, WA	**Log of MW107**
BORING LOCATION: MW107	GROUND SURFACE ELEVATION AND DATUM: 10.5
DRILLING CONTRACTOR: ESN	DATE STARTED: 4/22/21 / DATE FINISHED: 4/22/21
DRILLING METHOD: Hollow Stem Augers	TOTAL DEPTH (ft.): 20 / MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: DT7800 Combo Rig	DEPTH TO WATER: DURING: 11 / AFTER: 10.5
LOGGED BY: Joel Hecker	SCREEN INTERVAL: 4.0-16.0 / BOREHOLE BACKFILL: See Well Construction

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Litho.	PID Reading	DESCRIPTION	BORING REMARKS
0	No Sample Collected				Asphalt	
1				0.0	FILL - Fine to Coarse SAND with gravel, gray, moist	
2						
3				0.0		
4						
5				0.0	FILL - SILTY CLAY, trace wood, trace gravel, gray	
6						
7				0.0		
8						
9				0.0		
10						
11				0.0		
12					Fine SILTY SAND with shells, gray, wet	No odors or staining noted in soil column
13				0.0		
14						
15				0.0		
16						
17				0.0	SILT, gray, wet	Seam of silty gravel 17-17.25'
18						
19				0.0	Fine to Coarse SILTY SAND with gravel, gray, wet	
20						

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



Cover: 8-inch diameter, flush-mount steel well cover
Cement: Portland cement concrete
Bentonite: Hydrated granular bentonite (beneath cement); Hydrated bentonite pellets (beneath sand backfill)
Casing: 1-inch diameter schedule 40 PVC casing
Screen: 1-inch diameter schedule 40, 0.010 slot size, PVC screen

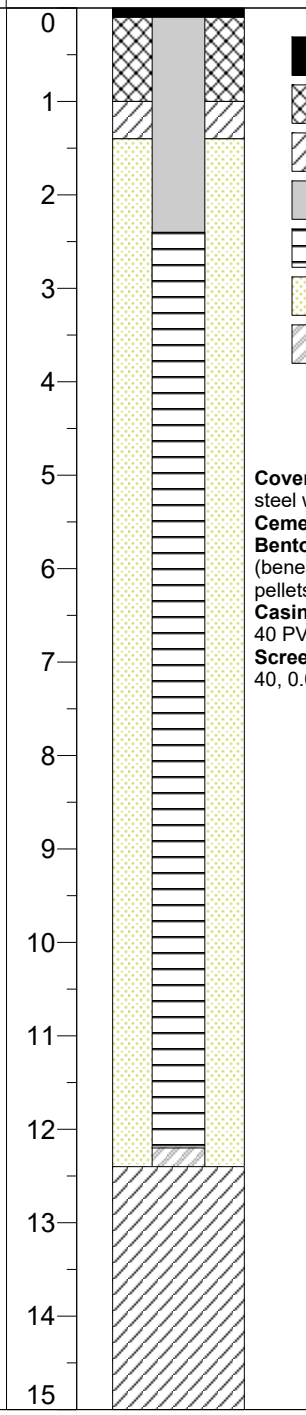
PROJECT: Hardel
Olympia, WA

Log of PZ101

BORING LOCATION: PZ101		GROUND SURFACE ELEVATION AND DATUM: 4.5	
DRILLING CONTRACTOR: ESN		DATE STARTED: 4/22/21	DATE FINISHED: 4/22/21
DRILLING METHOD: Direct Push		TOTAL DEPTH (ft.): 15	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: DT7800 Combo Rig		DEPTH TO WATER: DURING: ~5	AFTER: 4.5
LOGGED BY: Joel Hecker		SCREEN INTERVAL: 2.4-12.4	BOREHOLE BACKFILL: See Well Construction

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Litho.	PID Reading	DESCRIPTION	BORING REMARKS
0–5	No Sample Collected			--		
5–11				0.0	FILL - Fine to Coarse gravel with SAND, gray, moist-to-wet	
11–13				0.0	Fine to Coarse SILTY SAND with shells, gray, wet	No odors or staining noted in soil column
13–15				0.0	SILTY CLAYEY SAND with wood, brown, wet	

WELL CONSTRUCTION DETAILS AND/OR DRILLING REMARKS

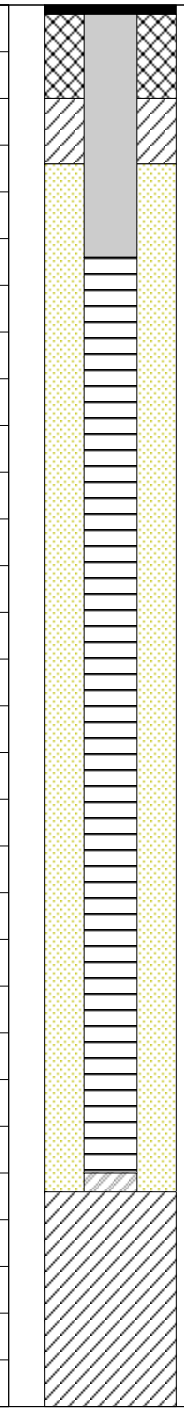


Cover
Cement
Bentonite
Casing
Screen
Sand
End Cap

Cover: 8-inch diameter, flush-mount steel well cover
Cement: Portland cement concrete
Bentonite: Hydrated granular bentonite (beneath cement); Hydrated bentonite pellets (beneath sand backfill)
Casing: 1-inch diameter schedule 40 PVC casing
Screen: 1-inch diameter schedule 40, 0.010 slot size, PVC screen

PROJECT: Hardel, Olympia, WA	**Log of PZ102**
BORING LOCATION: PZ102	GROUND SURFACE ELEVATION AND DATUM: 2.7
DRILLING CONTRACTOR: ESN	DATE STARTED: 4/22/21 / DATE FINISHED: 4/22/21
DRILLING METHOD: Direct Push	TOTAL DEPTH (ft.): 15 / MEASURING POINT: Ground Surface
DRILLING EQUIPMENT: DT7800 Combo Rig	DEPTH TO WATER: DURING: 4 / AFTER: 2.7
LOGGED BY: Joel Hecker	SCREEN INTERVAL: 2.7-12.7 / BOREHOLE BACKFILL: See Well Construction

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Litho.	PID Reading	DESCRIPTION	BORING REMARKS
0–4.5	No Sample Collected			0.0	FILL - Fine to Coarse SILTY SAND with gravel, gray, moist-to-wet	No odors or staining noted in soil column
4.5–5				0.0	FILL - SILTY CLAY, gray	
5–12				0.0	FILL - CLAYEY SAND with wood, brown, wet	
12–15				--	WOOD	

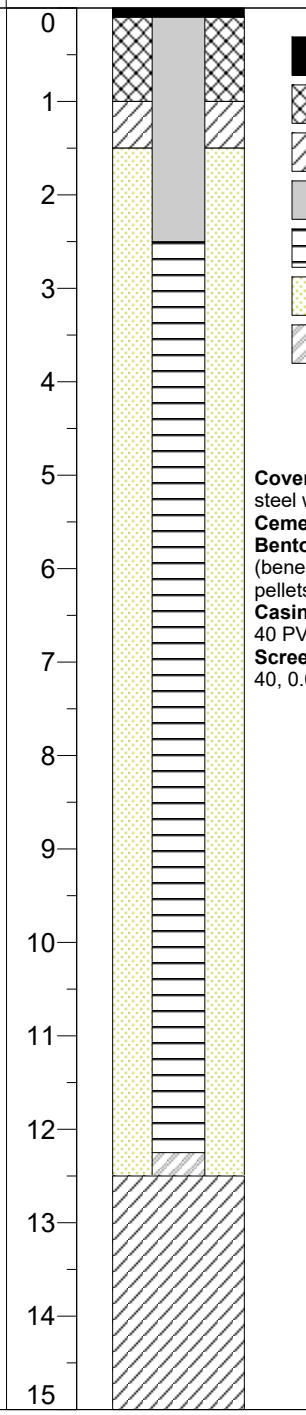


Cover
Cement
Bentonite
Casing
Screen
Sand
End Cap

Cover: 8-inch diameter, flush-mount steel well cover
Cement: Portland cement concrete
Bentonite: Hydrated granular bentonite (beneath cement); Hydrated bentonite pellets (beneath sand backfill)
Casing: 1-inch diameter schedule 40 PVC casing
Screen: 1-inch diameter schedule 40, 0.010 slot size, PVC screen

PROJECT:	Hardel Olympia, WA	Log of PZ103	
BORING LOCATION:	PZ103	GROUND SURFACE ELEVATION AND DATUM: 2.5	
DRILLING CONTRACTOR:	ESN	DATE STARTED: 4/22/21	DATE FINISHED: 4/22/21
DRILLING METHOD:	Direct Push	TOTAL DEPTH (ft.): 15	MEASURING POINT: Ground Surface
DRILLING EQUIPMENT:	DT7800 Combo Rig	DEPTH TO WATER: DURING: 3	AFTER: 2.5
LOGGED BY:	Joel Hecker	SCREEN INTERVAL: 2.5-12.5	BOREHOLE BACKFILL: See Well Construction

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Litho.	PID Reading	DESCRIPTION	BORING REMARKS
0	No Sample Collected			0.0	FILL - Fine to Coarse SAND with gravel, gray, moist-to-wet	No odors or staining noted in soil column
1				0.0		
2				0.0		
3				0.0		
4				0.0		
5				0.0		
6				0.0		
7				0.0		
8				0.0		
9				0.0	Fine SILTY SAND with shells, gray, wet	
10				0.0		
11				0.0		
12				0.0		
13				0.0		
14				0.0	Ground WOOD fibers	
15				0.0		



Cover
Cement
Bentonite
Casing
Screen
Sand
End Cap

Cover: 8-inch diameter, flush-mount steel well cover
Cement: Portland cement concrete
Bentonite: Hydrated granular bentonite (beneath cement); Hydrated bentonite pellets (beneath sand backfill)
Casing: 1-inch diameter schedule 40 PVC casing
Screen: 1-inch diameter schedule 40, 0.010 slot size, PVC screen

Hardel

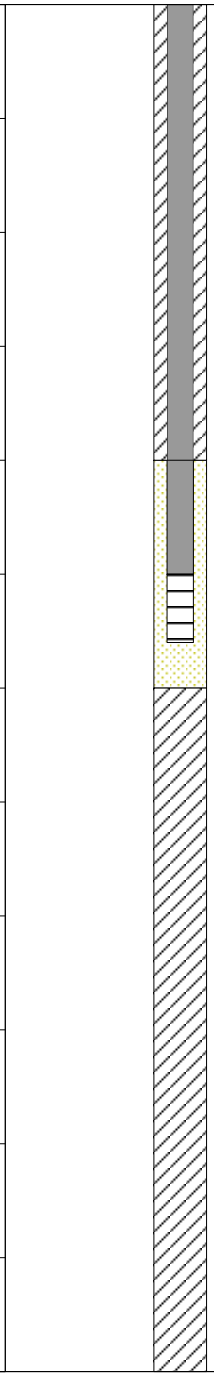
Olympia, WA

SVP LOCATION: 1	DATE STARTED: 10/7/2121
DRILLING CONTRACTOR: ESN	
DRILLING METHOD: Direct Push	**Log of SVP No. 1**
DRILLING EQUIPMENT: Geoprobe	DEPTH TO WATER (ft.): 4.5 / TOTAL DEPTH (ft.): 6
LOGGED BY: JH/AR	SCREEN INTERVAL: -- / BOREHOLE BACKFILL: See Below

PIONEER TECHNOLOGIES CORPORATION

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Litho.	PID Reading	DESCRIPTION	BORING REMARKS
0					TOPSOIL	
1					FILL - Fine to Coarse SILTY SAND, brown, moist	
2						
3					FILL - SAND with gravel, brown	
4						
5						Gravel at 5'
6					WOOD	

PROBE CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



Hydrated bentonite was placed from the base of the borehole to depths of six inches below the desired depth of the SVP. Six inches of sand was placed above and below the SVP and 1/4" diameter HDPE tubing was installed from the top of the SVP to approximately two feet above the ground surface.

Hardel

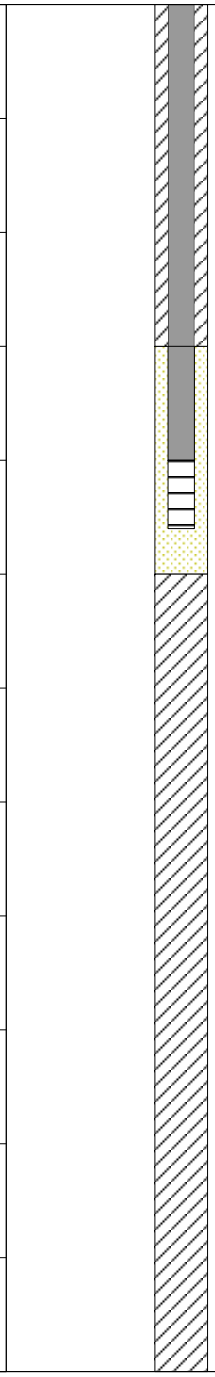
Olympia, WA

SVP LOCATION: 4	DATE STARTED: 10/7/2121
DRILLING CONTRACTOR: ESN	
DRILLING METHOD: Direct Push	**Log of SVP No. 4**
DRILLING EQUIPMENT: Geoprobe	DEPTH TO WATER (ft.): 3.8 / TOTAL DEPTH (ft.): 6
LOGGED BY: JH/AR	SCREEN INTERVAL: -- / BOREHOLE BACKFILL: See Below

PIONEER TECHNOLOGIES CORPORATION

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Litho.	PID Reading	DESCRIPTION	BORING REMARKS
0					FILL - Fine to Coarse SAND with gravel, gray, moist to wet	
1						
2						
3						
4						
5						
6						

PROBE CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



Hydrated bentonite was placed from the base of the borehole to depths of six inches below the desired depth of the SVP. Six inches of sand was placed above and below the SVP and 1/4" diameter HDPE tubing was installed from the top of the SVP to approximately two feet above the ground surface.

Hardel

Olympia, WA

SVP LOCATION: 8	DATE STARTED: 10/7/2121
DRILLING CONTRACTOR: ESN	
DRILLING METHOD: Direct Push	**Log of SVP No. 8**
DRILLING EQUIPMENT: Geoprobe	DEPTH TO WATER (ft.): 2.3 / TOTAL DEPTH (ft.): 6
LOGGED BY: JH/AR	SCREEN INTERVAL: -- / BOREHOLE BACKFILL: See Below

PIONEER TECHNOLOGIES CORPORATION

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Litho.	PID Reading	DESCRIPTION	BORING REMARKS	PROBE CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0					CRUSHED CONCRETE		
1							SVP not installed due to shallow groundwater conditions.
2							
3					FILL - Fine to Coarse SAND with gravel, trace asphalt, trace concrete, gray, moist to wet		
4							
5							
6							

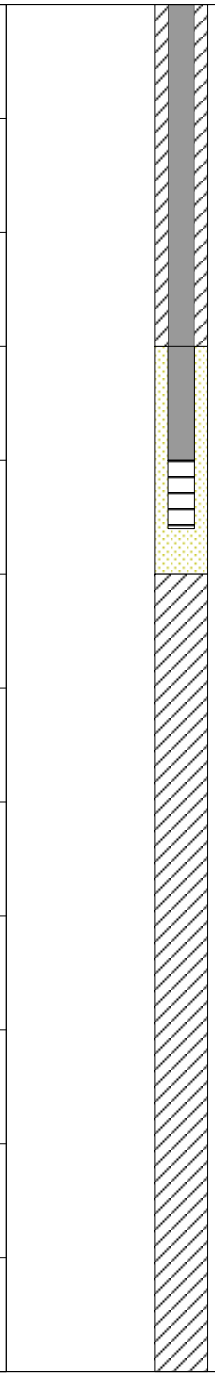
Hardel

Olympia, WA

PIONEER TECHNOLOGIES CORPORATION

SVP LOCATION: 10	DATE STARTED: 10/7/2121
DRILLING CONTRACTOR: ESN	
DRILLING METHOD: Direct Push	**Log of SVP No. 10**
DRILLING EQUIPMENT: Geoprobe	DEPTH TO WATER (ft.): 3.6 / TOTAL DEPTH (ft.): 6
LOGGED BY: JH/AR	SCREEN INTERVAL: -- / BOREHOLE BACKFILL: See Below

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Litho.	PID Reading	DESCRIPTION	BORING REMARKS
0						
1					FILL - Fine to Coarse SAND with gravel, brown, moist	
2						
3					Fine to Coarse SILTY SAND with gravel, gray, moist to wet	
4						
5						
6						



PROBE CONSTRUCTION DETAILS AND/OR DRILLING REMARKS

Hydrated bentonite was placed from the base of the borehole to depths of six inches below the desired depth of the SVP. Six inches of sand was placed above and below the SVP and 1/4" diameter HDPE tubing was installed from the top of the SVP to approximately two feet above the ground surface.

Hardel

Olympia, WA

SVP LOCATION: 13	DATE STARTED: 10/7/2121
DRILLING CONTRACTOR: ESN	
DRILLING METHOD: Direct Push	**Log of SVP No. 13**
DRILLING EQUIPMENT: Geoprobe	DEPTH TO WATER (ft.): 2.6 / TOTAL DEPTH (ft.): 6
LOGGED BY: JH/AR	SCREEN INTERVAL: -- / BOREHOLE BACKFILL: See Below

PIONEER TECHNOLOGIES CORPORATION

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Litho.	PID Reading	DESCRIPTION	BORING REMARKS	PROBE CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0							
1					FILL - Fine to Coarse SAND with gravel, trace concrete, gray, moist		SVP not installed due to shallow groundwater conditions.
2							
3							
4					FILL - Lean CLAY, gray		
5					WOOD		
6							

Hardel

Olympia, WA

SVP LOCATION: 15	DATE STARTED: 10/7/2121
DRILLING CONTRACTOR: ESN	
DRILLING METHOD: Direct Push	**Log of SVP No. 15**
DRILLING EQUIPMENT: Geoprobe	DEPTH TO WATER (ft.): 2.2 / TOTAL DEPTH (ft.): 6
LOGGED BY: JH/AR	SCREEN INTERVAL: -- / BOREHOLE BACKFILL: See Below

PIONEER TECHNOLOGIES CORPORATION

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Litho.	PID Reading	DESCRIPTION	BORING REMARKS	PROBE CONSTRUCTION DETAILS AND/OR DRILLING REMARKS
0					Crushed Concrete		
1							SVP not installed due to shallow groundwater conditions.
2					FILL - Fine to Coarse SAND with gravel, brown, moist to wet		
3							
4							
5					FILL - GRAVEL, gray, wet		
6							

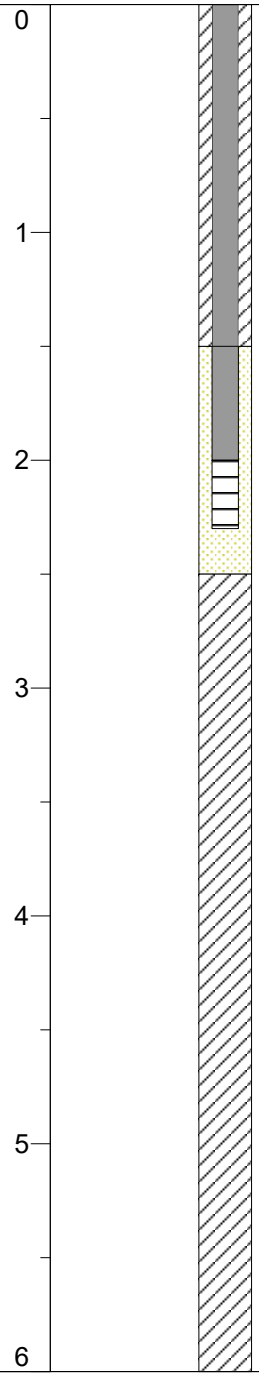
Hardel

Olympia, WA

SVP LOCATION: 18	DATE STARTED: 10/7/2121
DRILLING CONTRACTOR: ESN	
DRILLING METHOD: Direct Push	**Log of SVP No. 18**
DRILLING EQUIPMENT: Geoprobe	DEPTH TO WATER (ft.): 3.2 / TOTAL DEPTH (ft.): 6
LOGGED BY: JH/AR	SCREEN INTERVAL: -- / BOREHOLE BACKFILL: See Below

PIONEER TECHNOLOGIES CORPORATION

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Litho.	PID Reading	DESCRIPTION	BORING REMARKS
0					ASPHALT	
					Aggregate Base	
1						
2					FILL - Fine to Coarse SAND with shells, gray, moist	
3						
4						
5					Fine SILTY SAND with shells, gray, wet	
6						



PROBE CONSTRUCTION DETAILS AND/OR DRILLING REMARKS

Hydrated bentonite was placed from the base of the borehole to depths of six inches below the desired depth of the SVP. Six inches of sand was placed above and below the SVP and 1/4" diameter HDPE tubing was installed from the top of the SVP to approximately two feet above the ground surface.

Hardel

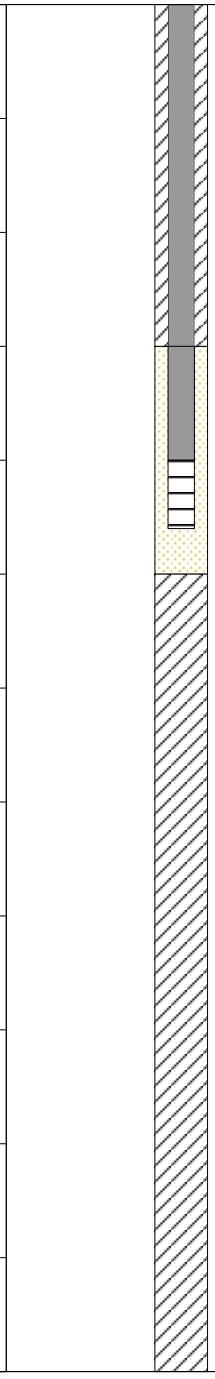
Olympia, WA

SVP LOCATION: 19	DATE STARTED: 10/7/2121
DRILLING CONTRACTOR: ESN	
DRILLING METHOD: Direct Push	**Log of SVP No. 19**
DRILLING EQUIPMENT: Geoprobe	DEPTH TO WATER (ft.): 4 / TOTAL DEPTH (ft.): 6
LOGGED BY: JH/AR	SCREEN INTERVAL: -- / BOREHOLE BACKFILL: See Below

PIONEER TECHNOLOGIES CORPORATION

DEPTH (feet)	SAMPLES: Sample No.	SAMPLES: Sample	SAMPLES: Litho.	PID Reading	DESCRIPTION	BORING REMARKS
0					ASPHALT	
					Aggregate Base	
1					FILL - Fine to Coarse SAND with gravel, gray, moist	
2						
3					Fine SILTY SAND, trace shells increasing with depth, gray, moist to wet	
4						
5						
6						

PROBE CONSTRUCTION DETAILS AND/OR DRILLING REMARKS



Hydrated bentonite was placed from the base of the borehole to depths of six inches below the desired depth of the SVP. Six inches of sand was placed above and below the SVP and 1/4" diameter HDPE tubing was installed from the top of the SVP to approximately two feet above the ground surface.

Attachment 2

Libby Environmental, Inc.

3322 South Bay Road NE • Olympia, WA 98506-2957

June 9, 2021

Joel Hecker
Pioneer Technologies Corporation
5205 Corporate Center Ct SE, Suite C
Lacey, WA 98503

Dear Mr. Hecker:

Please find enclosed the analytical data report for the Hardel Data Gap Investigation Project located in Olympia, Washington.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. The sample(s) will be disposed of within 30 days unless we are contacted to arrange long term storage.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Sherry L. Chilcutt
Senior Chemist
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@gmail.com

Libby Environmental, Inc.

Chain of Custody Record

www.LibbyEnvironmental.com

3322 South Bay Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Date: 5/5/21 Page: 1 of 1

Client: Pioneer Technological Corp.
Project Manager: Joel Hecker

Address: 5205 Corporate Cntr Ct. SE
Project Name: Hardel Data Gaps Investigation

City: Olympia State: WA Zip: 98503
Location: Hardel Site City, State: Oly, WA

Phone: 360-570-1700 Fax:
Collector: JH Date of Collection: 5/5/21

Client Project # Hardel Data Gaps Inv.
Email: Hecker-j@usploneer.com

Sample Number	Depth	Time	Sample Type	Container Type	VOC 8260	PCE & Daughter Prod.	NWTPH-Gx	BTEX (8260) / (8021)	NWTPH-HCID	NWTPH-Dx / Dx	PCB 8082	MTCA 5 Metals	RCRA 8 Metals	c PAH 8270	PAH 8270	Semi Vol 8270	As + Ag (Diss.)	MTCA VOCs	Field Notes
1 GW-MW102-0521		1300	GW	multiple	X	X			X					X		X	X		
2 GW-MW103-0521		1215			X	X			X					X		X	X		
3 GW-MW105-0521		1055			X	X			X					X		X	X		
4 GW-MW106-0521		1135			X	X			X					X		X	X		
5 GW-MW107-0521		1350			X	X			X					X		X	X		
6 GW-MW107-0521-01		1350												X		X			
7 TB-050521	—	—			X												X		
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			
16																			
17																			

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	5/5/21 1458	[signature]	5.5.21 1458
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt

Good Condition?	Y	N
Cooler Temp.		°C
Sample Temp.		°C
Total Number of Containers		

Remarks:
- If possible, please run internal duplicates from MW107 sample.
- Metals are Field Filtered

TAT: 24HR 48HR (5-DAY)

Distribution: White - Lab, Yellow - Originator

Libby Environmental, Inc.

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HARDEL DATA GAPS INVESTIGATION PROJECT
Pioneer Technologies
Olympia, Washington
Libby Project # L210505-1

Volatile Organic Compounds by EPA Method 8260D in Water

Sample Description		Method Blank	GW-MW102-0521	GW-MW103-0521	GW-MW105-0521	GW-MW106-0521	GW-MW107-0521
Date Sampled	Reporting	N/A	5/5/2021	5/5/2021	5/5/2021	5/5/2021	5/5/2021
Date Analyzed	Limits	5/7/2021	5/7/2021	5/7/2021	5/7/2021	5/7/2021	5/7/2021
	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
Vinyl chloride	0.2	nd	nd	nd	nd	nd	nd
1,1-Dichloroethene	0.5	nd	nd	nd	nd	nd	nd
Methyl *tert*- Butyl Ether (MTBE)	5.0	nd	nd	nd	nd	nd	nd
trans -1,2-Dichloroethene	1.0	nd	nd	nd	nd	nd	nd
cis -1,2-Dichloroethene	1.0	nd	nd	nd	nd	nd	nd
Benzene	1.0	nd	nd	nd	nd	nd	nd
1,2-Dichloroethane (EDC)	1.0	nd	nd	nd	nd	nd	nd
Trichloroethene (TCE)	0.4	nd	nd	nd	nd	nd	nd
Toluene	2.0	nd	nd	nd	nd	nd	nd
Tetrachloroethene (PCE)	1.0	nd	nd	nd	nd	nd	nd
1,2-Dibromoethane (EDB) *	0.01	nd	nd	nd	nd	nd	nd
Ethylbenzene	1.0	nd	nd	nd	nd	nd	nd
Total Xylenes	2.0	nd	nd	nd	nd	nd	nd
Naphthalene	5.0	nd	nd	nd	nd	nd	nd
1-Methylnaphthalene	5.0	nd	nd	nd	nd	nd	nd
2-Methylnaphthalene	5.0	nd	nd	nd	nd	nd	nd
Surrogate Recovery							
Dibromofluoromethane		108	111	110	108	108	108
1,2-Dichloroethane-d4		96	101	97	91	94	96
Toluene-d8		99	99	100	99	99	98
4-Bromofluorobenzene		102	102	99	101	101	98

"nd" Indicates not detected at listed detection limit.
"int" Indicates that interference prevents determination.

* ANALYZED BY SIM
ACCEPTABLE RECOVERY LIMITS FOR SURROGATE 65% TO 135%

ANALYSES PERFORMED BY: Sherry Chilcutt

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HARDEL DATA GAPS INVESTIGATION PROJECT
Pioneer Technologies
Olympia, Washington
Libby Project # L210505-1

Volatile Organic Compounds by EPA Method 8260D in Water

Sample Description		GW-MW107-0521 Dup	TB-050521
Date Sampled	Reporting	5/5/2021	5/5/2021
Date Analyzed	Limits	5/7/2021	5/7/2021
	(µg/L)	(µg/L)	(µg/L)
Vinyl chloride	0.2	nd	nd
1,1-Dichloroethene	0.5	nd	nd
Methyl *tert*- Butyl Ether (MTBE)	5.0	nd	nd
trans -1,2-Dichloroethene	1.0	nd	nd
cis -1,2-Dichloroethene	1.0	nd	nd
Benzene	1.0	nd	nd
1,2-Dichloroethane (EDC)	1.0	nd	nd
Trichloroethene (TCE)	0.4	nd	nd
Toluene	2.0	nd	nd
Tetrachloroethene (PCE)	1.0	nd	nd
1,2-Dibromoethane (EDB) *	0.01	nd	nd
Ethylbenzene	1.0	nd	nd
Total Xylenes	2.0	nd	nd
Naphthalene	5.0	nd	nd
1-Methylnaphthalene	5.0	nd	nd
2-Methylnaphthalene	5.0	nd	nd
Surrogate Recovery			
Dibromofluoromethane		110	111
1,2-Dichloroethane-d4		96	104
Toluene-d8		98	97
4-Bromofluorobenzene		100	98

"nd" Indicates not detected at listed detection limit.
"int" Indicates that interference prevents determination.

* ANALYZED BY SIM
ACCEPTABLE RECOVERY LIMITS FOR SURROGATE 65% TO 135%

ANALYSES PERFORMED BY: Sherry Chilcutt

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HARDEL DATA GAPS INVESTIGATION PROJECT
Pioneer Technologies
Olympia, Washington
Libby Project # L210505-1

Gasoline by NWTPH-Gx in Water

Sample Number	Date Analyzed	Surrogate Recovery (%)	Gasoline (µg/L)
Method Blank	5/7/2021	99%	nd
GW-MW102-0521	5/7/2021	99%	nd
GW-MW103-0521	5/7/2021	100%	nd
GW-MW105-0521	5/7/2021	99%	nd
GW-MW106-0521	5/7/2021	99%	nd
GW-MW107-0521	5/7/2021	98%	nd
GW-MW107-0521 Dup	5/7/2021	98%	nd
Practical Quantitation Limit			100

"nd" Indicates not detected at the listed detection limits.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (Toluene-d8): 65% TO 135%

ANALYSES PERFORMED BY: Sherry Chilcutt

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HARDEL DATA GAPS INVESTIGATION PROJECT
Pioneer Technologies
Olympia, Washington
Libby Project # L210505-1

Diesel & Oil by NWTPH-Dx/Dx Extended in Water

Sample Number	Date Analyzed	Surrogate Recovery (%)	Diesel (µg/L)	Oil (µg/L)
Method Blank	5/6/2021	95%	nd	nd
GW-MW102-0521	5/6/2021	94%	nd	nd
GW-MW103-0521	5/6/2021	91%	nd	nd
GW-MW105-0521	5/6/2021	86%	nd	nd
GW-MW106-0521	5/6/2021	93%	nd	nd
GW-MW107-0521	5/6/2021	92%	nd	nd
GW-MW107-0521 Dup	5/6/2021	90%	nd	nd
Practical Quantitation Limit			200	400

"nd" Indicates not detected at the listed detection limits.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (2-F Biphenyl): 65% TO 135%

ANALYSES PERFORMED BY: Kory Dixon

Libby Environmental, Inc.

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HARDEL DATA GAPS INVESTIGATION PROJECT
Pioneer Technologies
Olympia, Washington
Libby Project # L210505-1

QA/QC Data - Volatile Organic Compounds by EPA 8260D in Water

Matrix Spike Sample Identification: GW-MW107-0521

	Spiked Conc. (µg/L)	MS Response (µg/L)	MSD Response (µg/L)	MS Recovery (%)	MSD Recovery (%)	RPD (%)	Limits Recovery (%)	Data Flag
Vinyl chloride	5.0	4.3	4.5	87	90	3.6	65-135	
1,1-Dichloroethene	5.0	4.7	5.1	95	102	7.7	65-135	
Methyl *tert*- Butyl Ether (MTBE)	5.0	5.3	5.0	105	101	4.3	65-135	
trans -1,2-Dichloroethene	5.0	5.4	5.6	109	113	3.6	65-135	
cis -1,2-Dichloroethene	5.0	4.9	4.9	98	99	1.0	65-135	
Benzene	5.0	4.4	4.5	88	89	1.1	65-135	
1,2-Dichloroethane (EDC)	5.0	4.7	4.8	95	96	1.9	65-135	
Trichloroethene (TCE)	5.0	4.8	4.8	95	95	0.2	65-135	
Toluene	5.0	4.2	4.4	84	87	3.5	65-135	
Tetrachloroethene (PCE)	5.0	5.8	4.9	115	98	15.9	65-135	
1,2-Dibromoethane (EDB) *	5.0	4.4	4.4	87	88	1.1	65-135	
Ethylbenzene	5.0	4.6	4.4	91	88	3.6	65-135	
Total Xylenes	15.0	13.0	12.7	87	85	2.3	65-135	
Naphthalene	5.0	3.8	4.0	75	79	5.2	65-135	
1-Methylnaphthalene	5.0	5.9	5.1	119	103	14.3	65-135	
2-Methylnaphthalene	5.0	6.4	5.1	128	102	23.0	65-135	

Surrogate Recovery (%)	MS	MSD	
Dibromofluoromethane	113	113	65-135
1,2-Dichloroethane-d4	106	106	65-135
Toluene-d8	100	100	65-135
4-Bromofluorobenzene	105	103	65-135

ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Sherry Chilcutt

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HARDEL DATA GAPS INVESTIGATION PROJECT
Pioneer Technologies
Olympia, Washington
Libby Project # L210505-1

Laboratory Control Sample

	Spiked Conc. (µg/L)	LCS Response (µg/L)	LCS Recovery (%)	LCS Recovery Limits (%)	Data Flag
Vinyl chloride	5.0	5.2	103	80-120	
1,1-Dichloroethene	5.0	5.5	110	80-120	
Methyl *tert*- Butyl Ether (MTBE)	5.0	5.6	112	80-120	
trans -1,2-Dichloroethene	5.0	4.9	97	80-120	
cis -1,2-Dichloroethene	5.0	5.6	112	80-120	
Benzene	5.0	5.3	107	80-120	
1,2-Dichloroethane (EDC)	5.0	5.3	106	80-120	
Trichloroethene (TCE)	5.0	5.5	111	80-120	
Toluene	5.0	5.3	105	80-120	
Tetrachloroethene (PCE)	5.0	4.9	97	80-120	
1,2-Dibromoethane (EDB) *	5.0	5.9	117	80-120	
Ethylbenzene	5.0	5.9	119	80-120	
Total Xylenes	15.0	17.4	116	80-120	
Naphthalene	5.0	5.5	109	80-120	
1-Methylnaphthalene	10.0	8.0	80	80-120	
2-Methylnaphthalene	10.0	8.5	85	80-120	
Surrogate Recovery					
Dibromofluoromethane			92	65-135	
1,2-Dichloroethane-d4			73	65-135	
Toluene-d8			69	65-135	
4-Bromofluorobenzene			103	65-135	

ANALYSES PERFORMED BY: Sherry Chilcutt

Libby Environmental, Inc.

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HARDEL DATA GAPS INVESTIGATION PROJECT
Pioneer Technologies
Olympia, Washington
Libby Project # L210505-1

CCV 5/7/2021

	Spiked Conc. (µg/L)	CCV Response (µg/L)	CCV Recovery (%)	CCV Recovery Limits (%)
Vinyl chloride	10.0	9.8	98	80-120
1,1-Dichloroethene	10.0	10.4	104	80-120
Methyl *tert*- Butyl Ether (MTBE)	10.0	11.8	118	80-120
trans -1,2-Dichloroethene	10.0	11.9	119	80-120
cis -1,2-Dichloroethene	10.0	10.7	107	80-120
Benzene	10.0	10.1	101	80-120
1,2-Dichloroethane (EDC)	10.0	10.0	100	80-120
Trichloroethene (TCE)	10.0	10.9	109	80-120
Toluene	10.0	10.0	100	80-120
Tetrachloroethene (PCE)	10.0	12.0	120	80-120
1,2-Dibromoethane (EDB) *	10.0	11.3	113	80-120
Ethylbenzene	10.0	11.5	115	80-120
Total Xylenes	30.0	34.2	114	80-120
Naphthalene	10.0	9.2	92	80-120
1-Methylnaphthalene	10.0	11.0	110	80-120
2-Methylnaphthalene	10.0	11.3	113	80-120
Surrogate Recovery				
Dibromofluoromethane			94	65-135
1,2-Dichloroethane-d4			73	65-135
Toluene-d8			70	65-135
4-Bromofluorobenzene			105	65-135

ANALYSES PERFORMED BY: Sherry Chilcutt

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HARDEL DATA GAPS INVESTIGATION PROJECT
Pioneer Technologies
Olympia, Washington
Libby Project # L210505-1

QA/QC Gasoline by NWTPH-Gx in Water

Sample Number	Date Analyzed	Gasoline (µg/L)	Gasoline (% Recovery)	CCV Recovery Limits (%)
500 ppb LCS	5/7/2021	543	109%	70-130%
500 ppb LCSD	5/7/2021	582	116%	70-130%
RPD			6%	30%
Practical Quantitation Limit		100		

CCV Gasoline by NWTPH-Gx in Water

Sample Number	Date Analyzed	Gasoline (µg/L)	CCV Recovery (%)	CCV Recovery Limits (%)
1000 ppb CCV	5/7/2021	1076	108%	80-120%
Practical Quantitation Limit		100		

ANALYSES PERFORMED BY: Sherry Chilcutt

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HARDEL DATA GAPS INVESTIGATION PROJECT
Pioneer Technologies
Olympia, Washington
Libby Project # L210505-1

QA/QC Diesel by NWTPH-Dx in Water

Sample Number	Date Analyzed	Diesel (µg/L)	Diesel (% Recovery)	CCV Recovery Limits (%)
400 ppb LCS	5/6/2021	370	93%	70-130%
400 ppb LCSD	5/6/2021	370	93%	70-130%
RPD			0%	30%
Practical Quantitation Limit		50		

CCV Diesel by NWTPH-Dx in Water

Sample Number	Date Analyzed	Diesel (µg/L)	CCV (%)	CCV Recovery Limits (%)
CCV Kilvan FID 1 500 ppm	5/6/2021	430	86%	85-115%
CCV Kilvan FID 1 500 ppm	5/6/2021	440	88%	85-115%
Practical Quantitation Limit		50		

ANALYSES PERFORMED BY: Sherry Chilcutt

Libby Environmental, Inc.

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HARDEL DATA GAPS INVESTIGATION PROJECT
Pioneer Technologies
Libby Project # L210505-1
Date Received 5/5/2021
Time Received 2:58 PM

Received By RJK

Sample Receipt Checklist

Chain of Custody

1. Is the Chain of Custody complete?	☑ Yes	☐ No	
2. How was the sample delivered?	☑ Hand Delivered	☐ Picked Up	☐ Shipped

Log In

3. Cooler or Shipping Container is present.	☑ Yes	☐ No	☐ N/A
4. Cooler or Shipping Container is in good condition.	☑ Yes	☐ No	☐ N/A
5. Cooler or Shipping Container has Custody Seals present.	☐ Yes	☑ No	☐ N/A
6. Was an attempt made to cool the samples?	☑ Yes	☐ No	☐ N/A
7. Temperature of cooler (0°C to 8°C recommended)	0.3 °C		
8. Temperature of sample(s) (0°C to 8°C recommended)	2.3 °C		
9. Did all containers arrive in good condition (unbroken)?	☑ Yes	☐ No	
10. Is it clear what analyses were requested?	☑ Yes	☐ No	
11. Did container labels match Chain of Custody?	☑ Yes	☐ No	
12. Are matrices correctly identified on Chain of Custody?	☑ Yes	☐ No	
13. Are correct containers used for the analysis indicated?	☑ Yes	☐ No	
14. Is there sufficient sample volume for indicated analysis?	☑ Yes	☐ No	
15. Were all containers properly preserved per each analysis?	☑ Yes	☐ No	
16. Were VOA vials collected correctly (no headspace)?	☑ Yes	☐ No	☐ N/A
17. Were all holding times able to be met?	☑ Yes	☐ No	

Discrepancies/ Notes

18. Was client notified of all discrepancies? ☐ Yes ☐ No ☑ N/A

Person Notified: _____ Date: _____

By Whom: _____ Via: _____

Regarding: _____

19. Comments. _____

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Libby Environmental
Kodey Eley
3322 South Bay Road NE
Olympia, WA 98506

RE: Hardel Data Gaps Investigation
Work Order Number: 2105070

May 28, 2021

Attention Kodey Eley:

Fremont Analytical, Inc. received 6 sample(s) on 5/6/2021 for the analyses presented in the following report.

Dissolved Metals by EPA Method 200.8
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

CLIENT: Libby Environmental
Project: Hardel Data Gaps Investigation
Work Order: 2105070

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2105070-001	GW-MW102-0521	05/05/2021 1:00 PM	05/06/2021 10:27 AM
2105070-002	GW-MW103-0521	05/05/2021 12:15 PM	05/06/2021 10:27 AM
2105070-003	GW-MW105-0521	05/05/2021 10:55 AM	05/06/2021 10:27 AM
2105070-004	GW-MW106-0521	05/05/2021 11:35 AM	05/06/2021 10:27 AM
2105070-005	GW-MW107-0521	05/05/2021 1:50 PM	05/06/2021 10:27 AM
2105070-006	GW-MW107-0521-01	05/05/2021 1:50 PM	05/06/2021 10:27 AM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Case Narrative

WO#: **2105070**
Date: **5/28/2021**

CLIENT: Libby Environmental
Project: Hardel Data Gaps Investigation

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

* - Flagged value is not within established control limits
B - Analyte detected in the associated Method Blank
D - Dilution was required
E - Value above quantitation range
H - Holding times for preparation or analysis exceeded
I - Analyte with an internal standard that does not meet established acceptance criteria
J - Analyte detected below Reporting Limit
N - Tentatively Identified Compound (TIC)
Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria
S - Spike recovery outside accepted recovery limits
ND - Not detected at the Reporting Limit
R - High relative percent difference observed

Acronyms:

%Rec - Percent Recovery
CCB - Continued Calibration Blank
CCV - Continued Calibration Verification
DF - Dilution Factor
DUP - Sample Duplicate
HEM - Hexane Extractable Material
ICV - Initial Calibration Verification
LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
MCL - Maximum Contaminant Level
MB or MBLANK - Method Blank
MDL - Method Detection Limit
MS/MSD - Matrix Spike / Matrix Spike Duplicate
PDS - Post Digestion Spike
Ref Val - Reference Value
REP - Sample Replicate
RL - Reporting Limit
RPD - Relative Percent Difference
SD - Serial Dilution
SGT - Silica Gel Treatment
SPK - Spike
Surr - Surrogate

Client: Libby Environmental
Collection Date: 5/5/2021 1:00:00 PM
Project: Hardel Data Gaps Investigation
Lab ID: 2105070-001
Matrix: Water
Client Sample ID: **GW-MW102-0521**

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 32250		Analyst: IH
Naphthalene	0.927	0.0993		µg/L	1	5/11/2021 1:05:07 PM
2-Methylnaphthalene	0.144	0.0993		µg/L	1	5/11/2021 1:05:07 PM
1-Methylnaphthalene	0.330	0.0993		µg/L	1	5/11/2021 1:05:07 PM
Acenaphthylene	ND	0.0993		µg/L	1	5/11/2021 1:05:07 PM
Acenaphthene	0.968	0.0993		µg/L	1	5/11/2021 1:05:07 PM
Fluorene	0.298	0.0993		µg/L	1	5/11/2021 1:05:07 PM
Phenanthrene	ND	0.0993		µg/L	1	5/11/2021 1:05:07 PM
Anthracene	ND	0.0993		µg/L	1	5/11/2021 1:05:07 PM
Fluoranthene	ND	0.0993		µg/L	1	5/11/2021 1:05:07 PM
Pyrene	ND	0.0993		µg/L	1	5/11/2021 1:05:07 PM
Benz(a)anthracene	ND	0.0993		µg/L	1	5/11/2021 1:05:07 PM
Chrysene	ND	0.0993		µg/L	1	5/11/2021 1:05:07 PM
Benzo(b)fluoranthene	ND	0.0993		µg/L	1	5/11/2021 1:05:07 PM
Benzo(k)fluoranthene	ND	0.0993		µg/L	1	5/11/2021 1:05:07 PM
Benzo(a)pyrene	ND	0.0993		µg/L	1	5/11/2021 1:05:07 PM
Indeno(1,2,3-cd)pyrene	ND	0.0993		µg/L	1	5/11/2021 1:05:07 PM
Dibenz(a,h)anthracene	ND	0.0993		µg/L	1	5/11/2021 1:05:07 PM
Benzo(g,h,i)perylene	ND	0.0993		µg/L	1	5/11/2021 1:05:07 PM
Surr: 2-Fluorobiphenyl	84.2	33.2 - 139		%Rec	1	5/11/2021 1:05:07 PM
Surr: Terphenyl-d14	94.3	24.6 - 136		%Rec	1	5/11/2021 1:05:07 PM
Dissolved Metals by EPA Method 200.8				Batch ID: 32446		Analyst: EH
Arsenic	2.91	1.00		µg/L	1	5/26/2021 11:01:53 PM
Silver	ND	0.350		µg/L	1	5/11/2021 2:03:29 AM

Client: Libby Environmental
Collection Date: 5/5/2021 12:15:00 PM
Project: Hardel Data Gaps Investigation
Lab ID: 2105070-002
Matrix: Water
Client Sample ID: GW-MW103-0521

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 32250		Analyst: IH
Naphthalene	ND	0.0991		µg/L	1	5/11/2021 1:48:18 PM
2-Methylnaphthalene	ND	0.0991		µg/L	1	5/11/2021 1:48:18 PM
1-Methylnaphthalene	ND	0.0991		µg/L	1	5/11/2021 1:48:18 PM
Acenaphthylene	ND	0.0991		µg/L	1	5/11/2021 1:48:18 PM
Acenaphthene	1.51	0.0991		µg/L	1	5/11/2021 1:48:18 PM
Fluorene	0.200	0.0991		µg/L	1	5/11/2021 1:48:18 PM
Phenanthrene	ND	0.0991		µg/L	1	5/11/2021 1:48:18 PM
Anthracene	ND	0.0991		µg/L	1	5/11/2021 1:48:18 PM
Fluoranthene	ND	0.0991		µg/L	1	5/11/2021 1:48:18 PM
Pyrene	ND	0.0991		µg/L	1	5/11/2021 1:48:18 PM
Benz(a)anthracene	ND	0.0991		µg/L	1	5/11/2021 1:48:18 PM
Chrysene	ND	0.0991		µg/L	1	5/11/2021 1:48:18 PM
Benzo(b)fluoranthene	ND	0.0991		µg/L	1	5/11/2021 1:48:18 PM
Benzo(k)fluoranthene	ND	0.0991		µg/L	1	5/11/2021 1:48:18 PM
Benzo(a)pyrene	ND	0.0991		µg/L	1	5/11/2021 1:48:18 PM
Indeno(1,2,3-cd)pyrene	ND	0.0991		µg/L	1	5/11/2021 1:48:18 PM
Dibenz(a,h)anthracene	ND	0.0991		µg/L	1	5/11/2021 1:48:18 PM
Benzo(g,h,i)perylene	ND	0.0991		µg/L	1	5/11/2021 1:48:18 PM
Surr: 2-Fluorobiphenyl	81.0	33.2 - 139		%Rec	1	5/11/2021 1:48:18 PM
Surr: Terphenyl-d14	89.5	24.6 - 136		%Rec	1	5/11/2021 1:48:18 PM
Dissolved Metals by EPA Method 200.8				Batch ID: 32239		Analyst: EH
Arsenic	ND	1.00		µg/L	1	5/11/2021 2:08:03 AM
Silver	ND	0.350		µg/L	1	5/11/2021 2:08:03 AM

Analytical Report

Work Order: **2105070**
Date Reported: **5/28/2021**

Client: Libby Environmental
Collection Date: 5/5/2021 10:55:00 AM
Project: Hardel Data Gaps Investigation
Lab ID: 2105070-003
Matrix: Water
Client Sample ID: GW-MW105-0521

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 32250		Analyst: IH
Naphthalene	0.119	0.0997		µg/L	1	5/11/2021 2:09:56 PM
2-Methylnaphthalene	ND	0.0997		µg/L	1	5/11/2021 2:09:56 PM
1-Methylnaphthalene	ND	0.0997		µg/L	1	5/11/2021 2:09:56 PM
Acenaphthylene	ND	0.0997		µg/L	1	5/11/2021 2:09:56 PM
Acenaphthene	8.05	0.0997		µg/L	1	5/11/2021 2:09:56 PM
Fluorene	3.04	0.0997		µg/L	1	5/11/2021 2:09:56 PM
Phenanthrene	0.557	0.0997		µg/L	1	5/11/2021 2:09:56 PM
Anthracene	ND	0.0997		µg/L	1	5/11/2021 2:09:56 PM
Fluoranthene	ND	0.0997		µg/L	1	5/11/2021 2:09:56 PM
Pyrene	ND	0.0997		µg/L	1	5/11/2021 2:09:56 PM
Benz(a)anthracene	ND	0.0997		µg/L	1	5/11/2021 2:09:56 PM
Chrysene	ND	0.0997		µg/L	1	5/11/2021 2:09:56 PM
Benzo(b)fluoranthene	ND	0.0997		µg/L	1	5/11/2021 2:09:56 PM
Benzo(k)fluoranthene	ND	0.0997		µg/L	1	5/11/2021 2:09:56 PM
Benzo(a)pyrene	ND	0.0997		µg/L	1	5/11/2021 2:09:56 PM
Indeno(1,2,3-cd)pyrene	ND	0.0997		µg/L	1	5/11/2021 2:09:56 PM
Dibenz(a,h)anthracene	ND	0.0997		µg/L	1	5/11/2021 2:09:56 PM
Benzo(g,h,i)perylene	ND	0.0997		µg/L	1	5/11/2021 2:09:56 PM
Surr: 2-Fluorobiphenyl	85.7	33.2 - 139		%Rec	1	5/11/2021 2:09:56 PM
Surr: Terphenyl-d14	106	24.6 - 136		%Rec	1	5/11/2021 2:09:56 PM
Dissolved Metals by EPA Method 200.8				Batch ID: 32239		Analyst: EH
Arsenic	ND	1.00		µg/L	1	5/11/2021 2:12:37 AM
Silver	ND	0.350		µg/L	1	5/11/2021 2:12:37 AM

Analytical Report

Work Order: **2105070**
Date Reported: **5/28/2021**

Client: Libby Environmental
Collection Date: 5/5/2021 11:35:00 AM
Project: Hardel Data Gaps Investigation
Lab ID: 2105070-004
Matrix: Water
Client Sample ID: GW-MW106-0521

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 32250		Analyst: IH
Naphthalene	ND	0.0999		µg/L	1	5/11/2021 2:31:32 PM
2-Methylnaphthalene	ND	0.0999		µg/L	1	5/11/2021 2:31:32 PM
1-Methylnaphthalene	ND	0.0999		µg/L	1	5/11/2021 2:31:32 PM
Acenaphthylene	ND	0.0999		µg/L	1	5/11/2021 2:31:32 PM
Acenaphthene	ND	0.0999		µg/L	1	5/11/2021 2:31:32 PM
Fluorene	ND	0.0999		µg/L	1	5/11/2021 2:31:32 PM
Phenanthrene	ND	0.0999		µg/L	1	5/11/2021 2:31:32 PM
Anthracene	ND	0.0999		µg/L	1	5/11/2021 2:31:32 PM
Fluoranthene	ND	0.0999		µg/L	1	5/11/2021 2:31:32 PM
Pyrene	ND	0.0999		µg/L	1	5/11/2021 2:31:32 PM
Benz(a)anthracene	ND	0.0999		µg/L	1	5/11/2021 2:31:32 PM
Chrysene	ND	0.0999		µg/L	1	5/11/2021 2:31:32 PM
Benzo(b)fluoranthene	ND	0.0999		µg/L	1	5/11/2021 2:31:32 PM
Benzo(k)fluoranthene	ND	0.0999		µg/L	1	5/11/2021 2:31:32 PM
Benzo(a)pyrene	ND	0.0999		µg/L	1	5/11/2021 2:31:32 PM
Indeno(1,2,3-cd)pyrene	ND	0.0999		µg/L	1	5/11/2021 2:31:32 PM
Dibenz(a,h)anthracene	ND	0.0999		µg/L	1	5/11/2021 2:31:32 PM
Benzo(g,h,i)perylene	ND	0.0999		µg/L	1	5/11/2021 2:31:32 PM
Surr: 2-Fluorobiphenyl	78.7	33.2 - 139		%Rec	1	5/11/2021 2:31:32 PM
Surr: Terphenyl-d14	89.9	24.6 - 136		%Rec	1	5/11/2021 2:31:32 PM
Dissolved Metals by EPA Method 200.8				Batch ID: 32239		Analyst: EH
Arsenic	ND	1.00		µg/L	1	5/11/2021 2:17:10 AM
Silver	ND	0.350		µg/L	1	5/11/2021 2:17:10 AM

Client: Libby Environmental
Collection Date: 5/5/2021 1:50:00 PM
Project: Hardel Data Gaps Investigation
Lab ID: 2105070-005
Matrix: Water
Client Sample ID: GW-MW107-0521

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 32250		Analyst: IH
Naphthalene	ND	0.0984		µg/L	1	5/11/2021 2:53:20 PM
2-Methylnaphthalene	ND	0.0984		µg/L	1	5/11/2021 2:53:20 PM
1-Methylnaphthalene	ND	0.0984		µg/L	1	5/11/2021 2:53:20 PM
Acenaphthylene	ND	0.0984		µg/L	1	5/11/2021 2:53:20 PM
Acenaphthene	0.316	0.0984		µg/L	1	5/11/2021 2:53:20 PM
Fluorene	ND	0.0984		µg/L	1	5/11/2021 2:53:20 PM
Phenanthrene	ND	0.0984		µg/L	1	5/11/2021 2:53:20 PM
Anthracene	ND	0.0984		µg/L	1	5/11/2021 2:53:20 PM
Fluoranthene	ND	0.0984		µg/L	1	5/11/2021 2:53:20 PM
Pyrene	ND	0.0984		µg/L	1	5/11/2021 2:53:20 PM
Benz(a)anthracene	ND	0.0984		µg/L	1	5/11/2021 2:53:20 PM
Chrysene	ND	0.0984		µg/L	1	5/11/2021 2:53:20 PM
Benzo(b)fluoranthene	ND	0.0984		µg/L	1	5/11/2021 2:53:20 PM
Benzo(k)fluoranthene	ND	0.0984		µg/L	1	5/11/2021 2:53:20 PM
Benzo(a)pyrene	ND	0.0984		µg/L	1	5/11/2021 2:53:20 PM
Indeno(1,2,3-cd)pyrene	ND	0.0984		µg/L	1	5/11/2021 2:53:20 PM
Dibenz(a,h)anthracene	ND	0.0984		µg/L	1	5/11/2021 2:53:20 PM
Benzo(g,h,i)perylene	ND	0.0984		µg/L	1	5/11/2021 2:53:20 PM
Surr: 2-Fluorobiphenyl	89.4	33.2 - 139		%Rec	1	5/11/2021 2:53:20 PM
Surr: Terphenyl-d14	103	24.6 - 136		%Rec	1	5/11/2021 2:53:20 PM
Dissolved Metals by EPA Method 200.8				Batch ID: 32365		Analyst: EH
Arsenic	ND	1.00		µg/L	1	5/21/2021 11:22:06 PM
Silver	ND	0.350		µg/L	1	5/21/2021 11:22:06 PM

Analytical Report

Work Order: **2105070**
Date Reported: **5/28/2021**

Client: Libby Environmental
Collection Date: 5/5/2021 1:50:00 PM
Project: Hardel Data Gaps Investigation
Lab ID: 2105070-006
Matrix: Water
Client Sample ID: GW-MW107-0521-01

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 32250		Analyst: IH
Naphthalene	ND	0.0994		µg/L	1	5/11/2021 3:15:02 PM
2-Methylnaphthalene	ND	0.0994		µg/L	1	5/11/2021 3:15:02 PM
1-Methylnaphthalene	ND	0.0994		µg/L	1	5/11/2021 3:15:02 PM
Acenaphthylene	ND	0.0994		µg/L	1	5/11/2021 3:15:02 PM
Acenaphthene	0.317	0.0994		µg/L	1	5/11/2021 3:15:02 PM
Fluorene	ND	0.0994		µg/L	1	5/11/2021 3:15:02 PM
Phenanthrene	ND	0.0994		µg/L	1	5/11/2021 3:15:02 PM
Anthracene	ND	0.0994		µg/L	1	5/11/2021 3:15:02 PM
Fluoranthene	ND	0.0994		µg/L	1	5/11/2021 3:15:02 PM
Pyrene	ND	0.0994		µg/L	1	5/11/2021 3:15:02 PM
Benz(a)anthracene	ND	0.0994		µg/L	1	5/11/2021 3:15:02 PM
Chrysene	ND	0.0994		µg/L	1	5/11/2021 3:15:02 PM
Benzo(b)fluoranthene	ND	0.0994		µg/L	1	5/11/2021 3:15:02 PM
Benzo(k)fluoranthene	ND	0.0994		µg/L	1	5/11/2021 3:15:02 PM
Benzo(a)pyrene	ND	0.0994		µg/L	1	5/11/2021 3:15:02 PM
Indeno(1,2,3-cd)pyrene	ND	0.0994		µg/L	1	5/11/2021 3:15:02 PM
Dibenz(a,h)anthracene	ND	0.0994		µg/L	1	5/11/2021 3:15:02 PM
Benzo(g,h,i)perylene	ND	0.0994		µg/L	1	5/11/2021 3:15:02 PM
Surr: 2-Fluorobiphenyl	84.9	33.2 - 139		%Rec	1	5/11/2021 3:15:02 PM
Surr: Terphenyl-d14	101	24.6 - 136		%Rec	1	5/11/2021 3:15:02 PM
Dissolved Metals by EPA Method 200.8				Batch ID: 32365		Analyst: EH
Arsenic	ND	1.00		µg/L	1	5/21/2021 11:40:19 PM
Silver	ND	0.350		µg/L	1	5/21/2021 11:40:19 PM

Work Order: 2105070
CLIENT: Libby Environmental
Project: Hardel Data Gaps Investigation

QC SUMMARY REPORT

Dissolved Metals by EPA Method 200.8

Sample ID: **ICB-32239**	SampType: **ICB**	Units: **µg/L**	Prep Date: **5/10/2021**	RunNo: **67151**
Client ID: **ICB**	Batch ID: **32239**		Analysis Date: **5/10/2021**	SeqNo: **1353206**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1.00									
Silver	ND	0.350									

Sample ID: **ICV-32239**	SampType: **ICV**	Units: **µg/L**	Prep Date: **5/10/2021**	RunNo: **67151**
Client ID: **ICV**	Batch ID: **32239**		Analysis Date: **5/10/2021**	SeqNo: **1353208**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	107	1.00	100.0	0	107	90	110				
Silver	4.94	0.350	5.000	0	98.8	90	110				

Sample ID: **CCV-32239A**	SampType: **CCV**	Units: **µg/L**	Prep Date: **5/11/2021**	RunNo: **67151**
Client ID: **CCV**	Batch ID: **32239**		Analysis Date: **5/11/2021**	SeqNo: **1353209**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	119	1.00	100.0	0	119	85	115				S
Silver	5.68	0.350	5.000	0	114	85	115				

NOTES:
S - Outlying spike recovery observed (high bias). Detections will be qualified with a Q.

Sample ID: **CCB-32239A**	SampType: **CCB**	Units: **µg/L**	Prep Date: **5/11/2021**	RunNo: **67151**
Client ID: **CCB**	Batch ID: **32239**		Analysis Date: **5/11/2021**	SeqNo: **1353210**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1.00									
Silver	ND	0.350									

Work Order: 2105070
CLIENT: Libby Environmental
Project: Hardel Data Gaps Investigation

QC SUMMARY REPORT

Dissolved Metals by EPA Method 200.8

Sample ID: **MB-32239FB** SampType: **MBLK** Units: **µg/L** Prep Date: **5/7/2021** RunNo: **67151**
Client ID: **MBLKW** Batch ID: **32239** Analysis Date: **5/11/2021** SeqNo: **1353211**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1.00									
Silver	ND	0.350									

NOTES:
Filter Blank

Sample ID: **MB-32239** SampType: **MBLK** Units: **µg/L** Prep Date: **5/7/2021** RunNo: **67151**
Client ID: **MBLKW** Batch ID: **32239** Analysis Date: **5/11/2021** SeqNo: **1353212**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1.00									
Silver	ND	0.350									

Sample ID: **2105045-002CDUP** SampType: **DUP** Units: **µg/L** Prep Date: **5/7/2021** RunNo: **67151**
Client ID: **BATCH** Batch ID: **32239** Analysis Date: **5/11/2021** SeqNo: **1353215**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Silver	ND	0.350						0		30	

Sample ID: **CCV-32239B** SampType: **CCV** Units: **µg/L** Prep Date: **5/11/2021** RunNo: **67151**
Client ID: **CCV** Batch ID: **32239** Analysis Date: **5/11/2021** SeqNo: **1353221**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	125	1.00	100.0	0	125	85	115				S
Silver	6.20	0.350	5.000	0	124	85	115				S

NOTES:
S - Outlying spike recovery observed (high bias). Detections will be qualified with a Q.

Work Order: 2105070
CLIENT: Libby Environmental
Project: Hardel Data Gaps Investigation

QC SUMMARY REPORT

Dissolved Metals by EPA Method 200.8

Sample ID: **CCB-32239B**	SampType: **CCB**	Units: **µg/L**	Prep Date: **5/11/2021**	RunNo: **67151**
Client ID: **CCB**	Batch ID: **32239**		Analysis Date: **5/11/2021**	SeqNo: **1353222**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1.00									
Silver	ND	0.350									

Sample ID: **CCV-32239C**	SampType: **CCV**	Units: **µg/L**	Prep Date: **5/11/2021**	RunNo: **67151**
Client ID: **CCV**	Batch ID: **32239**		Analysis Date: **5/11/2021**	SeqNo: **1353232**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	124	1.00	100.0	0	124	85	115				S
Silver	6.04	0.350	5.000	0	121	85	115				S

NOTES:
S - Outlying spike recovery observed (high bias). Detections will be qualified with a Q.

Sample ID: **CCB-32239C**	SampType: **CCB**	Units: **µg/L**	Prep Date: **5/11/2021**	RunNo: **67151**
Client ID: **CCB**	Batch ID: **32239**		Analysis Date: **5/11/2021**	SeqNo: **1353233**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1.00									
Silver	ND	0.350									

Sample ID: **ICB-32239A**	SampType: **ICB**	Units: **µg/L**	Prep Date: **5/12/2021**	RunNo: **67151**
Client ID: **ICB**	Batch ID: **32239**		Analysis Date: **5/12/2021**	SeqNo: **1354320**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1.00									
Silver	ND	0.350									

Work Order: 2105070
CLIENT: Libby Environmental
Project: Hardel Data Gaps Investigation

QC SUMMARY REPORT

Dissolved Metals by EPA Method 200.8

Sample ID: **ICV-32239A** SampType: **ICV** Units: **µg/L** Prep Date: **5/12/2021** RunNo: **67151**
Client ID: **ICV** Batch ID: **32239** Analysis Date: **5/12/2021** SeqNo: **1354322**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	108	1.00	100.0	0	108	90	110				
Silver	4.79	0.350	5.000	0	95.9	90	110				

Sample ID: **CCV-32239D** SampType: **CCV** Units: **µg/L** Prep Date: **5/12/2021** RunNo: **67151**
Client ID: **CCV** Batch ID: **32239** Analysis Date: **5/12/2021** SeqNo: **1354323**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	106	1.00	100.0	0	106	85	115				
Silver	5.10	0.350	5.000	0	102	85	115				

Sample ID: **CCB-32239D** SampType: **CCB** Units: **µg/L** Prep Date: **5/12/2021** RunNo: **67151**
Client ID: **CCB** Batch ID: **32239** Analysis Date: **5/12/2021** SeqNo: **1354324**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1.00									
Silver	ND	0.350									

Sample ID: **LCS-32239** SampType: **LCS** Units: **µg/L** Prep Date: **5/7/2021** RunNo: **67151**
Client ID: **LCSW** Batch ID: **32239** Analysis Date: **5/12/2021** SeqNo: **1354326**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	111	1.00	100.0	0	111	85	115				
Silver	5.29	0.350	5.000	0	106	85	115				

Work Order: 2105070
CLIENT: Libby Environmental
Project: Hardel Data Gaps Investigation

QC SUMMARY REPORT

Dissolved Metals by EPA Method 200.8

Sample ID: **2105045-002CDUP** SampType: **DUP** Units: **µg/L** Prep Date: **5/7/2021** RunNo: **67151**
Client ID: **BATCH** Batch ID: **32239** Analysis Date: **5/12/2021** SeqNo: **1354328**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	6.46	1.00						19.22	99.4	30	R

NOTES:
R - High RPD observed.

Sample ID: **2105045-002CMS** SampType: **MS** Units: **µg/L** Prep Date: **5/7/2021** RunNo: **67151**
Client ID: **BATCH** Batch ID: **32239** Analysis Date: **5/12/2021** SeqNo: **1354329**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	550	1.00	500.0	8.022	108	70	130				
Silver	25.4	0.350	25.00	0	102	70	130				

Sample ID: **2105045-002CMSD** SampType: **MSD** Units: **µg/L** Prep Date: **5/7/2021** RunNo: **67151**
Client ID: **BATCH** Batch ID: **32239** Analysis Date: **5/12/2021** SeqNo: **1354330**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	518	1.00	500.0	8.022	102	70	130	633.8	20.1	30	
Silver	26.7	0.350	25.00	0	107	70	130	29.21	8.82	30	

Sample ID: **CCV-32239E** SampType: **CCV** Units: **µg/L** Prep Date: **5/12/2021** RunNo: **67151**
Client ID: **CCV** Batch ID: **32239** Analysis Date: **5/12/2021** SeqNo: **1354333**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	103	1.00	100.0	0	103	85	115				
Silver	4.75	0.350	5.000	0	95.0	85	115				

Work Order: 2105070
CLIENT: Libby Environmental
Project: Hardel Data Gaps Investigation

QC SUMMARY REPORT

Dissolved Metals by EPA Method 200.8

Sample ID: **CCB-32239E** SampType: **CCB** Units: **µg/L** Prep Date: **5/12/2021** RunNo: **67151**
Client ID: **CCB** Batch ID: **32239** Analysis Date: **5/12/2021** SeqNo: **1354334**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1.00									
Silver	ND	0.350									

Sample ID: **2105070-005BDUP** SampType: **DUP** Units: **µg/L** Prep Date: **5/7/2021** RunNo: **67151**
Client ID: **GW-MW107-0521** Batch ID: **32239** Analysis Date: **5/12/2021** SeqNo: **1354338**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	35.1	1.00						20.51	52.6	30	R
Silver	ND	0.350						0		30	

NOTES:
R - High RPD observed.

Sample ID: **CCV-32239F** SampType: **CCV** Units: **µg/L** Prep Date: **5/13/2021** RunNo: **67151**
Client ID: **CCV** Batch ID: **32239** Analysis Date: **5/13/2021** SeqNo: **1354339**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	107	1.00	100.0	0	107	85	115				
Silver	5.02	0.350	5.000	0	100	85	115				

Sample ID: **CCB-32239F** SampType: **CCB** Units: **µg/L** Prep Date: **5/13/2021** RunNo: **67151**
Client ID: **CCB** Batch ID: **32239** Analysis Date: **5/13/2021** SeqNo: **1354340**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1.00									
Silver	ND	0.350									

Work Order: 2105070
CLIENT: Libby Environmental
Project: Hardel Data Gaps Investigation

QC SUMMARY REPORT

Dissolved Metals by EPA Method 200.8

Sample ID: ICB-32365	SampType: ICB	Units: µg/L	Prep Date: 5/21/2021	RunNo: 67425
Client ID: ICB	Batch ID: 32365		Analysis Date: 5/21/2021	SeqNo: 1359607

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1.00									
Silver	ND	0.350									

Sample ID: ICV-32365	SampType: ICV	Units: µg/L	Prep Date: 5/21/2021	RunNo: 67425
Client ID: ICV	Batch ID: 32365		Analysis Date: 5/21/2021	SeqNo: 1359609

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	105	1.00	100.0	0	105	90	110				
Silver	5.13	0.350	5.000	0	103	90	110				

Sample ID: CCV-32365A	SampType: CCV	Units: µg/L	Prep Date: 5/21/2021	RunNo: 67425
Client ID: CCV	Batch ID: 32365		Analysis Date: 5/21/2021	SeqNo: 1359610

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	100	1.00	100.0	0	100	85	115				
Silver	5.18	0.350	5.000	0	104	85	115				

Sample ID: CCB-32365A	SampType: CCB	Units: µg/L	Prep Date: 5/21/2021	RunNo: 67425
Client ID: CCB	Batch ID: 32365		Analysis Date: 5/21/2021	SeqNo: 1359611

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1.00									
Silver	ND	0.350									

Work Order: 2105070
CLIENT: Libby Environmental
Project: Hardel Data Gaps Investigation

QC SUMMARY REPORT

Dissolved Metals by EPA Method 200.8

Sample ID: **MB-32365**	SampType: **MBLK**	Units: **µg/L**	Prep Date: **5/20/2021**	RunNo: **67425**
Client ID: **MBLKW**	Batch ID: **32365**		Analysis Date: **5/21/2021**	SeqNo: **1359612**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1.00									
Silver	ND	0.350									

Sample ID: **LCS-32365**	SampType: **LCS**	Units: **µg/L**	Prep Date: **5/20/2021**	RunNo: **67425**
Client ID: **LCSW**	Batch ID: **32365**		Analysis Date: **5/21/2021**	SeqNo: **1359613**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	103	1.00	100.0	0	103	85	115				
Silver	4.95	0.350	5.000	0	98.9	85	115				

Sample ID: **2105070-005BDUP**	SampType: **DUP**	Units: **µg/L**	Prep Date: **5/20/2021**	RunNo: **67425**
Client ID: **GW-MW107-0521**	Batch ID: **32365**		Analysis Date: **5/21/2021**	SeqNo: **1359615**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1.00						0		30	
Silver	ND	0.350						0		30	

Sample ID: **2105070-005BMS**	SampType: **MS**	Units: **µg/L**	Prep Date: **5/20/2021**	RunNo: **67425**
Client ID: **GW-MW107-0521**	Batch ID: **32365**		Analysis Date: **5/21/2021**	SeqNo: **1359616**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	499	1.00	500.0	0.5810	99.6	70	130				
Silver	23.8	0.350	25.00	0	95.4	70	130				

Work Order: 2105070
CLIENT: Libby Environmental
Project: Hardel Data Gaps Investigation

QC SUMMARY REPORT

Dissolved Metals by EPA Method 200.8

Sample ID: **2105070-005BMSD**	SampType: **MSD**	Units: **µg/L**	Prep Date: **5/20/2021**	RunNo: **67425**
Client ID: **GW-MW107-0521**	Batch ID: **32365**		Analysis Date: **5/21/2021**	SeqNo: **1359617**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	508	1.00	500.0	0.5810	102	70	130	498.6	1.92	30	
Silver	24.1	0.350	25.00	0	96.6	70	130	23.84	1.25	30	

Sample ID: **CCV-32365B**	SampType: **CCV**	Units: **µg/L**	Prep Date: **5/21/2021**	RunNo: **67425**
Client ID: **CCV**	Batch ID: **32365**		Analysis Date: **5/21/2021**	SeqNo: **1359620**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	96.6	1.00	100.0	0	96.6	85	115				
Silver	5.16	0.350	5.000	0	103	85	115				

Sample ID: **CCB-32365B**	SampType: **CCB**	Units: **µg/L**	Prep Date: **5/21/2021**	RunNo: **67425**
Client ID: **CCB**	Batch ID: **32365**		Analysis Date: **5/21/2021**	SeqNo: **1359621**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1.00									
Silver	ND	0.350									

Sample ID: **ICB-32446**	SampType: **ICB**	Units: **µg/L**	Prep Date: **5/26/2021**	RunNo: **67575**
Client ID: **ICB**	Batch ID: **32446**		Analysis Date: **5/26/2021**	SeqNo: **1362848**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1.00									

Sample ID: **ICV-32446**	SampType: **ICV**	Units: **µg/L**	Prep Date: **5/26/2021**	RunNo: **67575**
Client ID: **ICV**	Batch ID: **32446**		Analysis Date: **5/26/2021**	SeqNo: **1362850**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	108	1.00	100.0	0	108	90	110				

Work Order: 2105070
CLIENT: Libby Environmental
Project: Hardel Data Gaps Investigation

QC SUMMARY REPORT

Dissolved Metals by EPA Method 200.8

Sample ID: **ICV-32446**	SampType: **ICV**			Units: **µg/L**		Prep Date: **5/26/2021**		RunNo: **67575**	
Client ID: **ICV**	Batch ID: **32446**					Analysis Date: **5/26/2021**		SeqNo: **1362850**	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sample ID: **CCV-32446A**	SampType: **CCV**			Units: **µg/L**		Prep Date: **5/26/2021**		RunNo: **67575**	
Client ID: **CCV**	Batch ID: **32446**					Analysis Date: **5/26/2021**		SeqNo: **1362851**	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	96.8	1.00	100.0	0	96.8	85	115				

Sample ID: **CCB-32446A**	SampType: **CCB**			Units: **µg/L**		Prep Date: **5/26/2021**		RunNo: **67575**	
Client ID: **CCB**	Batch ID: **32446**					Analysis Date: **5/26/2021**		SeqNo: **1362852**	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1.00									

Sample ID: **MB-32446**	SampType: **MBLK**			Units: **µg/L**		Prep Date: **5/26/2021**		RunNo: **67575**	
Client ID: **MBLKW**	Batch ID: **32446**					Analysis Date: **5/26/2021**		SeqNo: **1362853**	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1.00									

Sample ID: **LCS-32446**	SampType: **LCS**			Units: **µg/L**		Prep Date: **5/26/2021**		RunNo: **67575**	
Client ID: **LCSW**	Batch ID: **32446**					Analysis Date: **5/26/2021**		SeqNo: **1362854**	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	102	1.00	100.0	0	102	85	115				

Work Order: 2105070
CLIENT: Libby Environmental
Project: Hardel Data Gaps Investigation

QC SUMMARY REPORT

Dissolved Metals by EPA Method 200.8

Sample ID: **2105070-001BDUP**	SampType: **DUP**	Units: **µg/L**	Prep Date: **5/26/2021**	RunNo: **67575**
Client ID: **GW-MW102-0521**	Batch ID: **32446**		Analysis Date: **5/26/2021**	SeqNo: **1362856**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	2.60	1.00						2.912	11.4	30	

Sample ID: **2105070-001BMS**	SampType: **MS**	Units: **µg/L**	Prep Date: **5/26/2021**	RunNo: **67575**
Client ID: **GW-MW102-0521**	Batch ID: **32446**		Analysis Date: **5/26/2021**	SeqNo: **1362857**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	476	1.00	500.0	2.006	94.8	70	130				

Sample ID: **CCV-32446B**	SampType: **CCV**	Units: **µg/L**	Prep Date: **5/26/2021**	RunNo: **67575**
Client ID: **CCV**	Batch ID: **32446**		Analysis Date: **5/26/2021**	SeqNo: **1362858**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	98.9	1.00	100.0	0	98.9	85	115				

Sample ID: **CCB-32446B**	SampType: **CCB**	Units: **µg/L**	Prep Date: **5/26/2021**	RunNo: **67575**
Client ID: **CCB**	Batch ID: **32446**		Analysis Date: **5/26/2021**	SeqNo: **1362859**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1.00									

Sample ID: **2105070-001BMSD**	SampType: **MSD**	Units: **µg/L**	Prep Date: **5/26/2021**	RunNo: **67575**
Client ID: **GW-MW102-0521**	Batch ID: **32446**		Analysis Date: **5/26/2021**	SeqNo: **1362860**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	490	1.00	500.0	2.006	97.6	70	130	476.2	2.86	30	

Work Order: 2105070
CLIENT: Libby Environmental
Project: Hardel Data Gaps Investigation

QC SUMMARY REPORT

Dissolved Metals by EPA Method 200.8

Sample ID: **CCV-32446C** SampType: **CCV** Units: **µg/L** Prep Date: **5/27/2021** RunNo: **67575**
Client ID: **CCV** Batch ID: **32446** Analysis Date: **5/27/2021** SeqNo: **1362865**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	101	1.00	100.0	0	101	85	115				

Sample ID: **CCB-32446C** SampType: **CCB** Units: **µg/L** Prep Date: **5/27/2021** RunNo: **67575**
Client ID: **CCB** Batch ID: **32446** Analysis Date: **5/27/2021** SeqNo: **1362866**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1.00									

Work Order: 2105070
CLIENT: Libby Environmental
Project: Hardel Data Gaps Investigation

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **PAH ICB**	SampType: **ICB**	Units: **µg/L**	Prep Date: **4/2/2021**	RunNo: **66329**
Client ID: **ICB**	Batch ID: **32250**		Analysis Date: **4/2/2021**	SeqNo: **1356895**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	ND	0.100									
2-Methylnaphthalene	ND	0.100									
1-Methylnaphthalene	ND	0.100									
Acenaphthylene	ND	0.100									
Acenaphthene	ND	0.100									
Fluorene	ND	0.100									
Phenanthrene	ND	0.100									
Anthracene	ND	0.100									
Fluoranthene	ND	0.100									
Pyrene	ND	0.100									
Benz(a)anthracene	ND	0.100									
Chrysene	ND	0.100									
Benzo(b)fluoranthene	ND	0.100									
Benzo(k)fluoranthene	ND	0.100									
Benzo(a)pyrene	ND	0.100									
Indeno(1,2,3-cd)pyrene	ND	0.100									
Dibenz(a,h)anthracene	ND	0.100									
Benzo(g,h,i)perylene	ND	0.100									
Surr: 2-Fluorobiphenyl	495		500.0		99.0	72.7	131				
Surr: Terphenyl-d14	562		500.0		112	74.6	134				

Sample ID: **PAH ICV**	SampType: **ICV**	Units: **µg/L**	Prep Date: **4/2/2021**	RunNo: **66329**
Client ID: **ICV**	Batch ID: **32250**		Analysis Date: **4/2/2021**	SeqNo: **1356896**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	1,050	0.100	1,000	0	105	70	130				
2-Methylnaphthalene	1,050	0.100	1,000	0	105	70	130				
1-Methylnaphthalene	1,080	0.100	1,000	0	108	70	130				
Acenaphthylene	1,090	0.100	1,000	0	109	70	130				
Acenaphthene	1,050	0.100	1,000	0	105	70	130				

Work Order: 2105070
CLIENT: Libby Environmental
Project: Hardel Data Gaps Investigation

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **PAH ICV** SampType: **ICV** Units: **µg/L** Prep Date: **4/2/2021** RunNo: **66329**
Client ID: **ICV** Batch ID: **32250** Analysis Date: **4/2/2021** SeqNo: **1356896**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluorene	1,090	0.100	1,000	0	109	70	130				
Phenanthrene	1,080	0.100	1,000	0	108	70	130				
Anthracene	1,060	0.100	1,000	0	106	70	130				
Fluoranthene	1,090	0.100	1,000	0	109	70	130				
Pyrene	1,100	0.100	1,000	0	110	70	130				
Benz(a)anthracene	1,070	0.100	1,000	0	107	70	130				
Chrysene	1,080	0.100	1,000	0	108	70	130				
Benzo(b)fluoranthene	1,020	0.100	1,000	0	102	70	130				
Benzo(k)fluoranthene	1,200	0.100	1,000	0	120	70	130				
Benzo(a)pyrene	1,210	0.100	1,000	0	121	70	130				
Indeno(1,2,3-cd)pyrene	1,080	0.100	1,000	0	108	70	130				
Dibenz(a,h)anthracene	1,100	0.100	1,000	0	110	70	130				
Benzo(g,h,i)perylene	1,090	0.100	1,000	0	109	70	130				
Surr: 2-Fluorobiphenyl	524		500.0		105	70.2	145				
Surr: Terphenyl-d14	574		500.0		115	71.3	142				

Sample ID: **CCV-32251B** SampType: **CCV** Units: **µg/L** Prep Date: **5/11/2021** RunNo: **67194**
Client ID: **CCV** Batch ID: **32250** Analysis Date: **5/11/2021** SeqNo: **1356911**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	849	0.100	1,000	0	84.9	80	120				
2-Methylnaphthalene	859	0.100	1,000	0	85.9	80	120				
1-Methylnaphthalene	895	0.100	1,000	0	89.5	80	120				
Acenaphthylene	873	0.100	1,000	0	87.3	80	120				
Acenaphthene	877	0.100	1,000	0	87.7	80	120				
Fluorene	881	0.100	1,000	0	88.1	80	120				
Phenanthrene	860	0.100	1,000	0	86.0	80	120				
Anthracene	854	0.100	1,000	0	85.4	80	120				
Fluoranthene	874	0.100	1,000	0	87.4	80	120				
Pyrene	846	0.100	1,000	0	84.6	80	120				

Work Order: 2105070
CLIENT: Libby Environmental
Project: Hardel Data Gaps Investigation

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **CCV-32251B**	SampType: **CCV**	Units: **µg/L**	Prep Date: **5/11/2021**	RunNo: **67194**
Client ID: **CCV**	Batch ID: **32250**		Analysis Date: **5/11/2021**	SeqNo: **1356911**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benz(a)anthracene	897	0.100	1,000	0	89.7	80	120				
Chrysene	832	0.100	1,000	0	83.2	80	120				
Benzo(b)fluoranthene	914	0.100	1,000	0	91.4	80	120				
Benzo(k)fluoranthene	801	0.100	1,000	0	80.1	80	120				
Benzo(a)pyrene	877	0.100	1,000	0	87.7	80	120				
Indeno(1,2,3-cd)pyrene	913	0.100	1,000	0	91.3	80	120				
Dibenz(a,h)anthracene	934	0.100	1,000	0	93.4	80	120				
Benzo(g,h,i)perylene	842	0.100	1,000	0	84.2	80	120				
Surr: 2-Fluorobiphenyl	425		500.0		85.0	70.2	145				
Surr: Terphenyl-d14	473		500.0		94.7	71.3	142				

Sample ID: **MB-32250**	SampType: **MBLK**	Units: **µg/L**	Prep Date: **5/10/2021**	RunNo: **67194**
Client ID: **MBLKW**	Batch ID: **32250**		Analysis Date: **5/11/2021**	SeqNo: **1353957**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	ND	0.0986									
2-Methylnaphthalene	ND	0.0986									
1-Methylnaphthalene	ND	0.0986									
Acenaphthylene	ND	0.0986									
Acenaphthene	ND	0.0986									
Fluorene	ND	0.0986									
Phenanthrene	ND	0.0986									
Anthracene	ND	0.0986									
Fluoranthene	ND	0.0986									
Pyrene	ND	0.0986									
Benz(a)anthracene	ND	0.0986									
Chrysene	ND	0.0986									
Benzo(b)fluoranthene	ND	0.0986									
Benzo(k)fluoranthene	ND	0.0986									
Benzo(a)pyrene	ND	0.0986									

Work Order: 2105070
CLIENT: Libby Environmental
Project: Hardel Data Gaps Investigation

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **MB-32250**	SampType: **MBLK**	Units: **µg/L**	Prep Date: **5/10/2021**	RunNo: **67194**
Client ID: **MBLKW**	Batch ID: **32250**		Analysis Date: **5/11/2021**	SeqNo: **1353957**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Indeno(1,2,3-cd)pyrene	ND	0.0986									
Dibenz(a,h)anthracene	ND	0.0986									
Benzo(g,h,i)perylene	ND	0.0986									
Surr: 2-Fluorobiphenyl	1.51		1.972		76.7	33.2	139				
Surr: Terphenyl-d14	1.89		1.972		95.7	24.6	136				

Sample ID: **LCS-32250**	SampType: **LCS**	Units: **µg/L**	Prep Date: **5/10/2021**	RunNo: **67194**
Client ID: **LCSW**	Batch ID: **32250**		Analysis Date: **5/11/2021**	SeqNo: **1353958**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	2.76	0.0987	3.949	0	69.9	24.1	124				
2-Methylnaphthalene	2.92	0.0987	3.949	0	73.9	32	129				
1-Methylnaphthalene	3.00	0.0987	3.949	0	76.0	30.4	125				
Acenaphthylene	3.02	0.0987	3.949	0	76.4	34.5	130				
Acenaphthene	3.07	0.0987	3.949	0	77.7	33.1	126				
Fluorene	3.37	0.0987	3.949	0	85.2	34.4	134				
Phenanthrene	3.40	0.0987	3.949	0	86.1	41.2	130				
Anthracene	3.29	0.0987	3.949	0	83.4	34.3	127				
Fluoranthene	3.48	0.0987	3.949	0	88.0	42.2	135				
Pyrene	3.33	0.0987	3.949	0	84.4	40.9	133				
Benz(a)anthracene	3.34	0.0987	3.949	0	84.5	33.1	130				
Chrysene	3.07	0.0987	3.949	0	77.7	34.7	113				
Benzo(b)fluoranthene	3.10	0.0987	3.949	0	78.6	24.9	128				
Benzo(k)fluoranthene	2.95	0.0987	3.949	0	74.7	21.3	131				
Benzo(a)pyrene	3.27	0.0987	3.949	0	82.8	23.2	139				
Indeno(1,2,3-cd)pyrene	2.88	0.0987	3.949	0	72.8	14.9	123				
Dibenz(a,h)anthracene	2.96	0.0987	3.949	0	75.0	12.2	125				
Benzo(g,h,i)perylene	2.68	0.0987	3.949	0	67.7	11.8	122				
Surr: 2-Fluorobiphenyl	1.56		1.974		79.1	33.2	139				
Surr: Terphenyl-d14	1.88		1.974		95.0	24.6	136				

Work Order: 2105070
CLIENT: Libby Environmental
Project: Hardel Data Gaps Investigation

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **LCS-32250**	SampType: **LCS**			Units: **µg/L**		Prep Date: **5/10/2021**			RunNo: **67194**		
Client ID: **LCSW**	Batch ID: **32250**					Analysis Date: **5/11/2021**			SeqNo: **1353958**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sample ID: **LCSD-32250**	SampType: **LCSD**			Units: **µg/L**		Prep Date: **5/10/2021**			RunNo: **67194**		
Client ID: **LCSW02**	Batch ID: **32250**					Analysis Date: **5/11/2021**			SeqNo: **1353959**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	1.76	0.0990	3.962	0	44.5	24.1	124	2.762	44.2	30	R
2-Methylnaphthalene	1.88	0.0990	3.962	0	47.3	32	129	2.916	43.5	30	R
1-Methylnaphthalene	1.95	0.0990	3.962	0	49.3	30.4	125	3.003	42.4	30	R
Acenaphthylene	1.96	0.0990	3.962	0	49.6	34.5	130	3.016	42.2	30	R
Acenaphthene	2.02	0.0990	3.962	0	51.1	33.1	126	3.067	41.0	30	R
Fluorene	2.21	0.0990	3.962	0	55.7	34.4	134	3.366	41.6	30	R
Phenanthrene	2.30	0.0990	3.962	0	58.1	41.2	130	3.402	38.6	30	R
Anthracene	2.28	0.0990	3.962	0	57.5	34.3	127	3.294	36.5	30	R
Fluoranthene	2.45	0.0990	3.962	0	61.8	42.2	135	3.476	34.7	30	R
Pyrene	2.33	0.0990	3.962	0	58.9	40.9	133	3.335	35.3	30	R
Benz(a)anthracene	2.40	0.0990	3.962	0	60.5	33.1	130	3.338	32.9	30	R
Chrysene	2.18	0.0990	3.962	0	55.0	34.7	113	3.068	33.9	30	R
Benzo(b)fluoranthene	2.24	0.0990	3.962	0	56.6	24.9	128	3.103	32.2	30	R
Benzo(k)fluoranthene	2.10	0.0990	3.962	0	53.1	21.3	131	2.948	33.5	30	R
Benzo(a)pyrene	2.35	0.0990	3.962	0	59.4	23.2	139	3.271	32.7	30	R
Indeno(1,2,3-cd)pyrene	2.08	0.0990	3.962	0	52.6	14.9	123	2.876	32.0	30	R
Dibenz(a,h)anthracene	2.14	0.0990	3.962	0	54.1	12.2	125	2.963	32.1	30	R
Benzo(g,h,i)perylene	1.92	0.0990	3.962	0	48.5	11.8	122	2.675	32.7	30	R
Surr: 2-Fluorobiphenyl	0.998		1.981		50.4	33.2	139		0	0	
Surr: Terphenyl-d14	1.35		1.981		68.0	24.6	136		0	0	

NOTES:
R - High RPD observed, spike recovery is within range.

Work Order: 2105070
CLIENT: Libby Environmental
Project: Hardel Data Gaps Investigation

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **2105070-001AMS** SampType: **MS** Units: **µg/L** Prep Date: **5/10/2021** RunNo: **67194**
Client ID: **GW-MW102-0521** Batch ID: **32250** Analysis Date: **5/11/2021** SeqNo: **1353961**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	3.92	0.101	4.042	0.9274	74.1	25.1	120				
2-Methylnaphthalene	3.33	0.101	4.042	0.1436	78.9	20.4	134				
1-Methylnaphthalene	3.58	0.101	4.042	0.3296	80.5	31.5	122				
Acenaphthylene	3.22	0.101	4.042	0	79.6	34.9	125				
Acenaphthene	4.19	0.101	4.042	0.9678	79.7	33.2	123				
Fluorene	3.81	0.101	4.042	0.2982	86.8	41.1	127				
Phenanthrene	3.52	0.101	4.042	0.08083	85.1	41.6	126				
Anthracene	3.46	0.101	4.042	0	85.5	34.1	123				
Fluoranthene	3.56	0.101	4.042	0	88.2	50	126				
Pyrene	3.40	0.101	4.042	0	84.2	46.7	125				
Benz(a)anthracene	3.38	0.101	4.042	0	83.6	25.3	122				
Chrysene	3.15	0.101	4.042	0	77.9	22.8	111				
Benzo(b)fluoranthene	3.16	0.101	4.042	0	78.1	8.57	125				
Benzo(k)fluoranthene	3.24	0.101	4.042	0	80.1	7.05	124				
Benzo(a)pyrene	3.50	0.101	4.042	0	86.6	9.61	130				
Indeno(1,2,3-cd)pyrene	3.14	0.101	4.042	0	77.7	5	120				
Dibenz(a,h)anthracene	3.22	0.101	4.042	0	79.7	5	122				
Benzo(g,h,i)perylene	2.93	0.101	4.042	0	72.6	5	114				
Surr: 2-Fluorobiphenyl	1.71		2.021		84.8	33.2	139				
Surr: Terphenyl-d14	1.95		2.021		96.4	24.6	136				

Sample ID: **QCS-32251B** SampType: **QCS** Units: **µg/L** Prep Date: **5/11/2021** RunNo: **67194**
Client ID: **BATCH** Batch ID: **32250** Analysis Date: **5/11/2021** SeqNo: **1356912**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	852	0.100	1,000	0	85.2	50	150				
2-Methylnaphthalene	859	0.100	1,000	0	85.9	50	150				
1-Methylnaphthalene	891	0.100	1,000	0	89.1	50	150				
Acenaphthylene	880	0.100	1,000	0	88.0	50	150				
Acenaphthene	877	0.100	1,000	0	87.7	50	150				

Work Order: 2105070
CLIENT: Libby Environmental
Project: Hardel Data Gaps Investigation

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **QCS-32251B** SampType: **QCS** Units: **µg/L** Prep Date: **5/11/2021** RunNo: **67194**
Client ID: **BATCH** Batch ID: **32250** Analysis Date: **5/11/2021** SeqNo: **1356912**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluorene	876	0.100	1,000	0	87.6	50	150				
Phenanthrene	845	0.100	1,000	0	84.5	50	150				
Anthracene	843	0.100	1,000	0	84.3	50	150				
Fluoranthene	874	0.100	1,000	0	87.4	50	150				
Pyrene	843	0.100	1,000	0	84.3	50	150				
Benz(a)anthracene	901	0.100	1,000	0	90.1	50	150				
Chrysene	809	0.100	1,000	0	80.9	50	150				
Benzo(b)fluoranthene	876	0.100	1,000	0	87.6	50	150				
Benzo(k)fluoranthene	864	0.100	1,000	0	86.4	50	150				
Benzo(a)pyrene	886	0.100	1,000	0	88.6	50	150				
Indeno(1,2,3-cd)pyrene	921	0.100	1,000	0	92.1	50	150				
Dibenz(a,h)anthracene	944	0.100	1,000	0	94.4	50	150				
Benzo(g,h,i)perylene	838	0.100	1,000	0	83.8	50	150				
Surr: 2-Fluorobiphenyl	427		500.0		85.4	50	150				
Surr: Terphenyl-d14	478		500.0		95.5	50	150				

Sample Log-In Check List

Client Name:	**LIBBY**	Work Order Number:	**2105070**
Logged by:	**Gabrielle Coeuille**	Date Received:	**5/6/2021 10:27:00 AM**

Chain of Custody

1.	Is Chain of Custody complete?	Yes	☑	No	☐	Not Present ☐
2.	How was the sample delivered?	UPS				

Log In

3.	Coolers are present?	Yes	☑	No	☐	NA ☐
4.	Shipping container/cooler in good condition?	Yes	☑	No	☐	
5.	Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact)	Yes	☐	No	☐	Not Present ☑
6.	Was an attempt made to cool the samples?	Yes	☑	No	☐	NA ☐
7.	Were all items received at a temperature of >2°C to 6°C *	Yes	☑	No	☐	NA ☐
8.	Sample(s) in proper container(s)?	Yes	☑	No	☐	
9.	Sufficient sample volume for indicated test(s)?	Yes	☑	No	☐	
10.	Are samples properly preserved?	Yes	☑	No	☐	
11.	Was preservative added to bottles?	Yes	☐	No	☑	NA ☐
12.	Is there headspace in the VOA vials?	Yes	☐	No	☐	NA ☑
13.	Did all samples containers arrive in good condition(unbroken)?	Yes	☑	No	☐	
14.	Does paperwork match bottle labels?	Yes	☑	No	☐	
15.	Are matrices correctly identified on Chain of Custody?	Yes	☑	No	☐	
16.	Is it clear what analyses were requested?	Yes	☑	No	☐	
17.	Were all holding times able to be met?	Yes	☑	No	☐	

Special Handling (if applicable)

18.	Was client notified of all discrepancies with this order?	Yes	☑	No	☐	NA ☐

Person Notified:	Kristina Ikerd	Date:	5/6/2021
By Whom:	Gabrielle Coeuille	Via:	☑ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:	Which sample should be duplicate?		
Client Instructions:	Please run the duplicate for GW-MW107-0521		

19. Additional remarks:

Item Information

Item #	Temp ºC
Sample 1	1.3

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

Libby Environmental, Inc.

3322 South Bay Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Chain of Custody Record

L105070

www.LibbyEnvironmental.com

Date: 5-5-2021 Page: 1 of 1

Client: Libby Environmental, Inc.
Address: (see above)
City: State: Zip:
Phone: Fax:
Client Project # L210505-1

Project Manager: Kodey Eley
Project Name: Hardel Data Gaps Investigation
Location: City, State: Olympia, WA
Collector: JH Date of Collection: 5-5-2021
Email: libbyenv@gmail.com

Sample Number	Depth	Time	Sample Type	Container Type	VOC 8260	PCE & Daughter Prod.	NWTPH-Gx	BTEX (8260) / (8021)	NWTPH-HCID	NWTPH-Dx / Dx	PCB 8082	MTCA 5 Metals	RCRA 8 Metals	c PAH 8270	PAH 8270	Semi Vol 8270	Dissolved As, Ag		Field Notes
1 GW-MW102-0521		1300	Water	Amber/Poly										X		X			
2 GW-MW103-0521		1215												X		X			
3 GW-MW105-0521		1055												X		X			
4 GW-MW106-0521		1135												X		X			
5 GW-MW107-0521		1350												X		X			
6 GW-MW107-0521-01		1350												X		X			
7																			
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			
16																			
17																			

Relinquished by: Date / Time
Received by: Date / Time 5/6/21@1027

Relinquished by: Date / Time
Received by: Date / Time

Relinquished by: Date / Time
Received by: Date / Time

Sample Receipt

Good Condition?	Y	N
Cooler Temp.		°C
Sample Temp.		°C
Total Number of Containers		

Remarks: If possible, please run internal duplicates from MW107 sample. Metals are field filtered.

TAT: 24HR 48HR (5-DAY)

Distribution: White - Lab, Yellow - Originator

Libby Environmental, Inc.
3322 South Bay Road NE • Olympia, WA 98506-2957

August 24, 2021

Joel Hecker
Pioneer Technologies Corporation
5205 Corporate Center Ct SE, Suite C
Lacey, WA 98503

Dear Mr. Hecker:

Please find enclosed the analytical data report for the Hardel GWM Project located in Olympia, Washington.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. The sample(s) will be disposed of within 30 days unless we are contacted to arrange long term storage.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Sherry L. Chilcutt
Senior Chemist
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@gmail.com

Libby Environmental, Inc.

Chain of Custody Record

www.LibbyEnvironmental.com

3322 South Bay Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Date: 8/13/21 Page: 1 of 1

Client: Pioneer Technologies
Project Manager: Joel Hecht
Address: 5205 Corporate Cente Ct.
Project Name: Hardel GWM
City: Lacey State: WA Zip:
Location: Hardel City, State: Olq WA
Phone: 360-570-1700 Fax:
Collector: JH Date of Collection: 8/13/21
Client Project # Hardel GWM
Email: Hecterj@uspioneer.com

Sample Number	Depth	Time	Sample Type	Container Type	VOC 8260	PCE & Daughter Prod.	NWTPH-Gx	BTEX (8260) / (8021)	NWTPH-HCID	NWTPH-Dx / Dx	PCB 8082	MTCA 5 Metals	RCRA 8 Metals	c PAH 8270	PAH 8270	Semi Vol 8270	MTCA VOCs	As + Ag (dissolved)	Field Notes
1 GW-MW103-0813		845	GW	Mult.	X	X			X					X		X	X		
2 GW-MW105-0813		705			X	X			X					X		X	X		
3 GW-MW106-0813		745			X	X			X					X		X	X		Dup volume collected @ MW106 - please run dup for all analytes here, some for PAHs w/ Freeman
4 GW-MW107-0813		915			X	X			X					X		X	X		
5 TB-081321		—			X											X			
6																			
7																			
8																			
9																			
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Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	8/13/21 1026	[signature] CMA	8-13-21 1026
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt

Good Condition?	Y	N
Cooler Temp.		°C
Sample Temp.		°C
Total Number of Containers		

Remarks:

TAT: 24HR 48HR (5-DAY)

Distribution: White - Lab, Yellow - Originator

Libby Environmental, Inc.

3322 South Bay Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@gmail.com

HARDEL GWM PROJECT
Pioneer Technologies Corp.
Olympia, Washington
Libby Project # L210813-1

Volatile Organic Compounds by EPA Method 8260D in Water

Sample Description		Method Blank	GW-MW103-0813	GW-MW105-0813	GW-MW106-0813	GW-MW106-0813 Dup	GW-MW107-0813
Date Sampled	Reporting	N/A	8/13/2021	8/13/2021	8/13/2021	8/13/2021	8/13/2021
Date Analyzed	Limits	8/13/2021	8/13/2021	8/13/2021	8/13/2021	8/13/2021	8/13/2021
	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
Vinyl chloride	0.2	nd	nd	nd	nd	nd	nd
1,1-Dichloroethene	0.5	nd	nd	nd	nd	nd	nd
Methyl *tert*- Butyl Ether (MTBE)	5.0	nd	nd	nd	nd	nd	nd
trans -1,2-Dichloroethene	1.0	nd	nd	nd	nd	nd	nd
cis -1,2-Dichloroethene	1.0	nd	nd	nd	nd	nd	nd
Benzene	1.0	nd	nd	nd	nd	nd	nd
1,2-Dichloroethane (EDC)	1.0	nd	nd	nd	nd	nd	nd
Trichloroethene (TCE)	0.4	nd	nd	nd	nd	nd	nd
Toluene	2.0	nd	nd	nd	nd	nd	nd
Tetrachloroethene (PCE)	1.0	nd	nd	nd	nd	nd	nd
1,2-Dibromoethane (EDB) *	0.01	nd	nd	nd	nd	nd	nd
Ethylbenzene	1.0	nd	nd	nd	nd	nd	nd
Total Xylenes	2.0	nd	nd	nd	nd	nd	nd
n-Butylbenzene	1.0	nd	nd	nd	nd	nd	nd
1,2-Dibromo-3-Chloropropane	1.0	nd	nd	nd	nd	nd	nd
1,2,4-Trichlorolbenzene	2.0	nd	nd	nd	nd	nd	nd
Naphthalene	5.0	nd	nd	nd	nd	nd	nd
1-Methylnaphthalene	5.0	nd	nd	nd	nd	nd	nd
2-Methylnaphthalene	5.0	nd	nd	nd	nd	nd	nd
Surrogate Recovery							
Dibromofluoromethane		80	105	102	87	111	86
1,2-Dichloroethane-d4		102	107	113	131	117	125
Toluene-d8		95	87	84	69	88	66
4-Bromofluorobenzene		91	129	98	100	99	98

"nd" Indicates not detected at listed detection limit.
"int" Indicates that interference prevents determination.

* ANALYZED BY SIM
ACCEPTABLE RECOVERY LIMITS FOR SURROGATE 65% TO 135%

ANALYSES PERFORMED BY: Melissa Harrington

Libby Environmental, Inc.

3322 South Bay Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@gmail.com

HARDEL GWM PROJECT
Pioneer Technologies Corp.
Olympia, Washington
Libby Project # L210813-1

Volatile Organic Compounds by EPA Method 8260D in Water

Sample Description		TB-081321
Date Sampled	Reporting	8/13/2021
Date Analyzed	Limits	8/13/2021
	(µg/L)	(µg/L)
Vinyl chloride	0.2	nd
1,1-Dichloroethene	0.5	nd
Methyl *tert*- Butyl Ether (MTBE)	5.0	nd
trans -1,2-Dichloroethene	1.0	nd
cis -1,2-Dichloroethene	1.0	nd
Benzene	1.0	nd
1,2-Dichloroethane (EDC)	1.0	nd
Trichloroethene (TCE)	0.4	nd
Toluene	2.0	nd
Tetrachloroethene (PCE)	1.0	nd
1,2-Dibromoethane (EDB) *	0.01	nd
Ethylbenzene	1.0	nd
Total Xylenes	2.0	nd
Naphthalene	5.0	nd
1-Methylnaphthalene	5.0	nd
2-Methylnaphthalene	5.0	nd
Surrogate Recovery		
Dibromofluoromethane		118
1,2-Dichloroethane-d4		115
Toluene-d8		93
4-Bromofluorobenzene		96

"nd" Indicates not detected at listed detection limit.
"int" Indicates that interference prevents determination.

* ANALYZED BY SIM
ACCEPTABLE RECOVERY LIMITS FOR SURROGATE 65% TO 135%

ANALYSES PERFORMED BY: Melissa Harrington

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HARDEL GWM PROJECT
Pioneer Technologies Corp.
Olympia, Washington
Libby Project # L210813-1

Gasoline by NWTPH-Gx in Water

Sample Number	Date Analyzed	Surrogate Recovery (%)	Gasoline (µg/L)
Method Blank	8/13/2021	95%	nd
GW-MW103-0813	8/13/2021	87%	130
GW-MW105-0813	8/13/2021	84%	110
GW-MW106-0813	8/13/2021	69%	nd
GW-MW106-0813 Dup	8/13/2021	88%	nd
GW-MW107-0813	8/13/2021	66%	nd
Practical Quantitation Limit			100

"nd" Indicates not detected at the listed detection limits.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (Toluene-d8): 65% TO 135%

ANALYSES PERFORMED BY: Melissa Harrington

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HARDEL GWM PROJECT
Pioneer Technologies Corp.
Olympia, Washington
Libby Project # L210813-1

Diesel & Oil by NWTPH-Dx/Dx Extended in Water

Sample Number	Date Analyzed	Surrogate Recovery (%)	Diesel (µg/L)	Oil (µg/L)
Method Blank	8/17/2021	75%	nd	nd
GW-MW103-0813	8/17/2021	81%	nd	nd
GW-MW105-0813	8/17/2021	79%	nd	nd
GW-MW106-0813	8/17/2021	75%	nd	nd
GW-MW106-0813 Dup	8/17/2021	81%	nd	nd
GW-MW107-0813	8/17/2021	77%	nd	nd
Practical Quantitation Limit			200	400

"nd" Indicates not detected at the listed detection limits.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (2-F Biphenyl): 42% TO 150%

ANALYSES PERFORMED BY: Randolph Kraus

Libby Environmental, Inc.

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HARDEL GWM PROJECT
Pioneer Technologies Corp.
Olympia, Washington
Libby Project # L210813-1

Analyses of Dissolved Arsenic in Water by EPA 7010 Series

Sample Number	Date Analyzed	Arsenic (µg/L)
Method Blank	8/17/2021	nd
GW-MW103-0813	8/17/2021	nd
GW-MW105-0813	8/17/2021	nd
GW-MW106-0813	8/17/2021	nd
GW-MW106-0813 Dup	8/17/2021	nd
GW-MW107-0813	8/17/2021	nd
Practical Quantitation Limit		3.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Eric Welte

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HARDEL GWM PROJECT
Pioneer Technologies Corp.
Olympia, Washington
Libby Project # L210813-1

QA/QC Data - Volatile Organic Compounds by EPA 8260D in Water

Matrix Spike Sample Identification: GW-MW106-0813

	Spiked Conc. (µg/L)	MS Response (µg/L)	MSD Response (µg/L)	MS Recovery (%)	MSD Recovery (%)	RPD (%)	Limits Recovery (%)	Data Flag
Vinyl chloride	5.0	6.2	6.0	124	120	3.3	65-135	
1,1-Dichloroethene	5.0	5.5	5.6	109	112	2.5	65-135	
Methyl *tert*- Butyl Ether (MTBE)	5.0	5.2	5.8	104	115	10.0	65-135	
trans -1,2-Dichloroethene	5.0	5.5	5.8	111	117	5.1	65-135	
cis -1,2-Dichloroethene	5.0	5.3	5.4	105	108	2.8	65-135	
Benzene	5.0	3.5	3.9	69	77	10.9	65-135	
1,2-Dichloroethane (EDC)	5.0	4.3	4.8	86	95	10.4	65-135	
Trichloroethene (TCE)	5.0	4.1	4.6	81	92	12.7	65-135	
Toluene	5.0	3.5	4.3	71	86	19.2	65-135	
Tetrachloroethene (PCE)	5.0	3.8	4.2	76	83	8.3	65-135	
1,2-Dibromoethane (EDB) *	5.0	4.5	4.7	91	95	4.5	65-135	
Ethylbenzene	5.0	3.3	3.9	67	79	16.5	65-135	
Total Xylenes	15.0	9.2	10.7	61	72	15.4	65-135	S
Naphthalene	5.0	4.6	4.2	91	83	9.4	65-135	
1-Methylnaphthalene	10.0	8.1	6.3	81	63	25.7	65-135	S
2-Methylnaphthalene	10.0	7.7	5.8	77	58	27.1	65-135	S

Surrogate Recovery (%)	MS	MSD	
Dibromofluoromethane	112	112	65-135
1,2-Dichloroethane-d4	109	106	65-135
Toluene-d8	93	98	65-135
4-Bromofluorobenzene	123	119	65-135

* ANALYZED BY SIM
"S" Spike recovery outside accepted recovery limits.
ACCEPTABLE RPD IS 35%

ANALYSES PERFORMED BY: Melissa Harrington

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HARDEL GWM PROJECT
Pioneer Technologies Corp.
Olympia, Washington
Libby Project # L210813-1

Laboratory Control Sample

	Spiked Conc. (µg/L)	LCS Response (µg/L)	LCS Recovery (%)	LCS Recovery Limits (%)	Data Flag
Vinyl chloride	5.0	5.8	117	80-120	
1,1-Dichloroethene	5.0	6.0	119	80-120	
Methyl *tert*- Butyl Ether (MTBE)	5.0	5.4	108	80-120	
trans -1,2-Dichloroethene	5.0	5.8	116	80-120	
cis -1,2-Dichloroethene	5.0	4.1	81	80-120	
Benzene	5.0	4.6	92	80-120	
1,2-Dichloroethane (EDC)	5.0	5.3	107	80-120	
Trichloroethene (TCE)	5.0	5.7	114	80-120	
Toluene	5.0	5.1	102	80-120	
Tetrachloroethene (PCE)	5.0	5.6	112	80-120	
1,2-Dibromoethane (EDB) *	5.0	4.7	94	80-120	
Ethylbenzene	5.0	4.7	94	80-120	
Total Xylenes	15.0	13.6	91	80-120	
Naphthalene	5.0	5.1	103	80-120	
1-Methylnaphthalene	5.0	4.3	86	80-120	
2-Methylnaphthalene	5.0	4.4	87	80-120	
Surrogate Recovery					
Dibromofluoromethane			77	65-135	
1,2-Dichloroethane-d4			100	65-135	
Toluene-d8			105	65-135	
4-Bromofluorobenzene			115	65-135	

* ANALYZED BY SIM

ANALYSES PERFORMED BY: Melissa Harrington

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HARDEL GWM PROJECT
Pioneer Technologies Corp.
Olympia, Washington
Libby Project # L210813-1

QA/QC Dissolved Arsenic by EPA Method 7010 Series in Water

Sample Number	Date Analyzed	Arsenic (% Recovery)
LCS 081721	8/17/2021	93%
GW-MW106-0813 MS	8/17/2021	100%
GW-MW106-0813 MSD	8/17/2021	96%
RPD	8/17/2021	4%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

QA/QC Dissolved Arsenic by EPA Method 7010 Series in Water

Sample Number	Date Analyzed	Arsenic (ug/l)
Spike Concentration		20.0
LCS	8/17/2021	18.6
Spike Concentration		20.0
GW-MW106-0813 MS	8/17/2021	20.05
GW-MW106-0813 MSD	8/17/2021	19.10
RPD	8/17/2021	5%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Eric Welte

Libby Environmental, Inc.

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HARDEL GWM PROJECT
Pioneer Technologies Corp.
Libby Project # L210813-1
Date Received 8/13/2021
Time Received 10:26 AM

Received By SC

Sample Receipt Checklist

Chain of Custody

1. Is the Chain of Custody complete?	☑ Yes	☐ No	
2. How was the sample delivered?	☑ Hand Delivered	☐ Picked Up	☐ Shipped

Log In

3. Cooler or Shipping Container is present.	☑ Yes	☐ No	☐ N/A
4. Cooler or Shipping Container is in good condition.	☑ Yes	☐ No	☐ N/A
5. Cooler or Shipping Container has Custody Seals present.	☐ Yes	☑ No	☐ N/A
6. Was an attempt made to cool the samples?	☑ Yes	☐ No	☐ N/A
7. Temperature of cooler (0°C to 8°C recommended)	-1.2 °C		
8. Temperature of sample(s) (0°C to 8°C recommended)	1.9 °C		
9. Did all containers arrive in good condition (unbroken)?	☑ Yes	☐ No	
10. Is it clear what analyses were requested?	☑ Yes	☐ No	
11. Did container labels match Chain of Custody?	☑ Yes	☐ No	
12. Are matrices correctly identified on Chain of Custody?	☑ Yes	☐ No	
13. Are correct containers used for the analysis indicated?	☑ Yes	☐ No	
14. Is there sufficient sample volume for indicated analysis?	☑ Yes	☐ No	
15. Were all containers properly preserved per each analysis?	☑ Yes	☐ No	
16. Were VOA vials collected correctly (no headspace)?	☑ Yes	☐ No	☐ N/A
17. Were all holding times able to be met?	☑ Yes	☐ No	

Discrepancies/ Notes

18. Was client notified of all discrepancies? ☐ Yes ☐ No ☑ N/A

Person Notified: _____ Date: _____

By Whom: _____ Via: _____

Regarding: _____

19. Comments. _____

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Seattle, WA 98103
T: (206) 352-3790
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info@fremontanalytical.com

Libby Environmental
Kodey Eley
3322 South Bay Road NE
Olympia, WA 98506

RE: Hardel GWM
Work Order Number: 2108200

August 20, 2021

Attention Kodey Eley:

Fremont Analytical, Inc. received 4 sample(s) on 8/13/2021 for the analyses presented in the following report.

Dissolved Metals by EPA Method 200.8
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

Date: *08/20/2021*

CLIENT: Libby Environmental
Project: Hardel GWM
Work Order: 2108200

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2108200-001	GW-MW103-0813	08/12/2021 8:45 AM	08/13/2021 3:02 PM
2108200-002	GW-MW105-0813	08/12/2021 7:05 AM	08/13/2021 3:02 PM
2108200-003	GW-MW106-0813	08/12/2021 7:45 AM	08/13/2021 3:02 PM
2108200-004	GW-MW107-0813	08/12/2021 9:15 AM	08/13/2021 3:02 PM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Case Narrative

WO#: **2108200**
Date: **8/20/2021**

CLIENT: Libby Environmental
Project: Hardel GWM

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Rev 1: Report has been revised to report silver, as requested by the client.

Qualifiers:

* - Flagged value is not within established control limits
B - Analyte detected in the associated Method Blank
D - Dilution was required
E - Value above quantitation range
H - Holding times for preparation or analysis exceeded
I - Analyte with an internal standard that does not meet established acceptance criteria
J - Analyte detected below Reporting Limit
N - Tentatively Identified Compound (TIC)
Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria
S - Spike recovery outside accepted recovery limits
ND - Not detected at the Reporting Limit
R - High relative percent difference observed

Acronyms:

%Rec - Percent Recovery
CCB - Continued Calibration Blank
CCV - Continued Calibration Verification
DF - Dilution Factor
DUP - Sample Duplicate
HEM - Hexane Extractable Material
ICV - Initial Calibration Verification
LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
MCL - Maximum Contaminant Level
MB or MBLANK - Method Blank
MDL - Method Detection Limit
MS/MSD - Matrix Spike / Matrix Spike Duplicate
PDS - Post Digestion Spike
Ref Val - Reference Value
REP - Sample Replicate
RL - Reporting Limit
RPD - Relative Percent Difference
SD - Serial Dilution
SGT - Silica Gel Treatment
SPK - Spike
Surr - Surrogate

Analytical Report

Work Order: **2108200**
Date Reported: **8/20/2021**

Client: Libby Environmental
Collection Date: 8/12/2021 8:45:00 AM
Project: Hardel GWM
Lab ID: 2108200-001
Matrix: Water
Client Sample ID: GW-MW103-0813

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 33403		Analyst: SB
Naphthalene	ND	0.0995		µg/L	1	8/20/2021 11:07:38 AM
2-Methylnaphthalene	ND	0.0995		µg/L	1	8/20/2021 11:07:38 AM
1-Methylnaphthalene	ND	0.0995		µg/L	1	8/20/2021 11:07:38 AM
Acenaphthylene	ND	0.0995		µg/L	1	8/20/2021 11:07:38 AM
Acenaphthene	1.84	0.0995		µg/L	1	8/20/2021 11:07:38 AM
Fluorene	0.287	0.0995		µg/L	1	8/20/2021 11:07:38 AM
Phenanthrene	ND	0.0995		µg/L	1	8/20/2021 11:07:38 AM
Anthracene	ND	0.0995		µg/L	1	8/20/2021 11:07:38 AM
Fluoranthene	ND	0.0995		µg/L	1	8/20/2021 11:07:38 AM
Pyrene	ND	0.0995		µg/L	1	8/20/2021 11:07:38 AM
Benz(a)anthracene	ND	0.0995		µg/L	1	8/20/2021 11:07:38 AM
Chrysene	ND	0.0995		µg/L	1	8/20/2021 11:07:38 AM
Benzo(b)fluoranthene	ND	0.0995		µg/L	1	8/20/2021 11:07:38 AM
Benzo(k)fluoranthene	ND	0.0995		µg/L	1	8/20/2021 11:07:38 AM
Benzo(a)pyrene	ND	0.0995		µg/L	1	8/20/2021 11:07:38 AM
Indeno(1,2,3-cd)pyrene	ND	0.0995		µg/L	1	8/20/2021 11:07:38 AM
Dibenz(a,h)anthracene	ND	0.0995		µg/L	1	8/20/2021 11:07:38 AM
Benzo(g,h,i)perylene	ND	0.0995		µg/L	1	8/20/2021 11:07:38 AM
Surr: 2-Fluorobiphenyl	86.5	34.2 - 137		%Rec	1	8/20/2021 11:07:38 AM
Surr: Terphenyl-d14	92.4	37.3 - 150		%Rec	1	8/20/2021 11:07:38 AM
Dissolved Metals by EPA Method 200.8				Batch ID: 33376		Analyst: EH
Silver	ND	0.350		µg/L	1	8/17/2021 11:55:20 PM

Analytical Report

Work Order: **2108200**
Date Reported: **8/20/2021**

Client: Libby Environmental
Collection Date: 8/12/2021 7:05:00 AM
Project: Hardel GWM
Lab ID: 2108200-002
Matrix: Water
Client Sample ID: GW-MW105-0813

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 33403		Analyst: SB
Naphthalene	ND	0.0998		µg/L	1	8/20/2021 11:51:01 AM
2-Methylnaphthalene	ND	0.0998		µg/L	1	8/20/2021 11:51:01 AM
1-Methylnaphthalene	ND	0.0998		µg/L	1	8/20/2021 11:51:01 AM
Acenaphthylene	ND	0.0998		µg/L	1	8/20/2021 11:51:01 AM
Acenaphthene	5.88	0.0998		µg/L	1	8/20/2021 11:51:01 AM
Fluorene	1.90	0.0998		µg/L	1	8/20/2021 11:51:01 AM
Phenanthrene	0.332	0.0998		µg/L	1	8/20/2021 11:51:01 AM
Anthracene	ND	0.0998		µg/L	1	8/20/2021 11:51:01 AM
Fluoranthene	ND	0.0998		µg/L	1	8/20/2021 11:51:01 AM
Pyrene	ND	0.0998		µg/L	1	8/20/2021 11:51:01 AM
Benz(a)anthracene	ND	0.0998		µg/L	1	8/20/2021 11:51:01 AM
Chrysene	ND	0.0998		µg/L	1	8/20/2021 11:51:01 AM
Benzo(b)fluoranthene	ND	0.0998		µg/L	1	8/20/2021 11:51:01 AM
Benzo(k)fluoranthene	ND	0.0998		µg/L	1	8/20/2021 11:51:01 AM
Benzo(a)pyrene	ND	0.0998		µg/L	1	8/20/2021 11:51:01 AM
Indeno(1,2,3-cd)pyrene	ND	0.0998		µg/L	1	8/20/2021 11:51:01 AM
Dibenz(a,h)anthracene	ND	0.0998		µg/L	1	8/20/2021 11:51:01 AM
Benzo(g,h,i)perylene	ND	0.0998		µg/L	1	8/20/2021 11:51:01 AM
Surr: 2-Fluorobiphenyl	89.2	34.2 - 137		%Rec	1	8/20/2021 11:51:01 AM
Surr: Terphenyl-d14	90.4	37.3 - 150		%Rec	1	8/20/2021 11:51:01 AM
Dissolved Metals by EPA Method 200.8				Batch ID: 33376		Analyst: EH
Silver	ND	0.350		µg/L	1	8/18/2021 12:12:04 AM

Analytical Report

Work Order: **2108200**
Date Reported: **8/20/2021**

Client: Libby Environmental
Collection Date: 8/12/2021 7:45:00 AM
Project: Hardel GWM
Lab ID: 2108200-003
Matrix: Water
Client Sample ID: GW-MW106-0813

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 33403		Analyst: SB
Naphthalene	ND	0.0999		µg/L	1	8/20/2021 12:12:37 PM
2-Methylnaphthalene	ND	0.0999		µg/L	1	8/20/2021 12:12:37 PM
1-Methylnaphthalene	ND	0.0999		µg/L	1	8/20/2021 12:12:37 PM
Acenaphthylene	ND	0.0999		µg/L	1	8/20/2021 12:12:37 PM
Acenaphthene	ND	0.0999		µg/L	1	8/20/2021 12:12:37 PM
Fluorene	ND	0.0999		µg/L	1	8/20/2021 12:12:37 PM
Phenanthrene	ND	0.0999		µg/L	1	8/20/2021 12:12:37 PM
Anthracene	ND	0.0999		µg/L	1	8/20/2021 12:12:37 PM
Fluoranthene	ND	0.0999		µg/L	1	8/20/2021 12:12:37 PM
Pyrene	ND	0.0999		µg/L	1	8/20/2021 12:12:37 PM
Benz(a)anthracene	ND	0.0999		µg/L	1	8/20/2021 12:12:37 PM
Chrysene	ND	0.0999		µg/L	1	8/20/2021 12:12:37 PM
Benzo(b)fluoranthene	ND	0.0999		µg/L	1	8/20/2021 12:12:37 PM
Benzo(k)fluoranthene	ND	0.0999		µg/L	1	8/20/2021 12:12:37 PM
Benzo(a)pyrene	ND	0.0999		µg/L	1	8/20/2021 12:12:37 PM
Indeno(1,2,3-cd)pyrene	ND	0.0999		µg/L	1	8/20/2021 12:12:37 PM
Dibenz(a,h)anthracene	ND	0.0999		µg/L	1	8/20/2021 12:12:37 PM
Benzo(g,h,i)perylene	ND	0.0999		µg/L	1	8/20/2021 12:12:37 PM
Surr: 2-Fluorobiphenyl	96.1	34.2 - 137		%Rec	1	8/20/2021 12:12:37 PM
Surr: Terphenyl-d14	89.2	37.3 - 150		%Rec	1	8/20/2021 12:12:37 PM
Dissolved Metals by EPA Method 200.8				Batch ID: 33376		Analyst: EH
Silver	ND	0.350		µg/L	1	8/17/2021 11:33:04 PM

Analytical Report

Work Order: **2108200**
Date Reported: **8/20/2021**

Client: Libby Environmental
Collection Date: 8/12/2021 9:15:00 AM
Project: Hardel GWM
Lab ID: 2108200-004
Matrix: Water
Client Sample ID: GW-MW107-0813

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 33403		Analyst: SB
Naphthalene	ND	0.0995		µg/L	1	8/20/2021 12:55:36 PM
2-Methylnaphthalene	ND	0.0995		µg/L	1	8/20/2021 12:55:36 PM
1-Methylnaphthalene	ND	0.0995		µg/L	1	8/20/2021 12:55:36 PM
Acenaphthylene	ND	0.0995		µg/L	1	8/20/2021 12:55:36 PM
Acenaphthene	0.256	0.0995		µg/L	1	8/20/2021 12:55:36 PM
Fluorene	ND	0.0995		µg/L	1	8/20/2021 12:55:36 PM
Phenanthrene	ND	0.0995		µg/L	1	8/20/2021 12:55:36 PM
Anthracene	ND	0.0995		µg/L	1	8/20/2021 12:55:36 PM
Fluoranthene	ND	0.0995		µg/L	1	8/20/2021 12:55:36 PM
Pyrene	ND	0.0995		µg/L	1	8/20/2021 12:55:36 PM
Benz(a)anthracene	ND	0.0995		µg/L	1	8/20/2021 12:55:36 PM
Chrysene	ND	0.0995		µg/L	1	8/20/2021 12:55:36 PM
Benzo(b)fluoranthene	ND	0.0995		µg/L	1	8/20/2021 12:55:36 PM
Benzo(k)fluoranthene	ND	0.0995		µg/L	1	8/20/2021 12:55:36 PM
Benzo(a)pyrene	ND	0.0995		µg/L	1	8/20/2021 12:55:36 PM
Indeno(1,2,3-cd)pyrene	ND	0.0995		µg/L	1	8/20/2021 12:55:36 PM
Dibenz(a,h)anthracene	ND	0.0995		µg/L	1	8/20/2021 12:55:36 PM
Benzo(g,h,i)perylene	ND	0.0995		µg/L	1	8/20/2021 12:55:36 PM
Surr: 2-Fluorobiphenyl	89.5	34.2 - 137		%Rec	1	8/20/2021 12:55:36 PM
Surr: Terphenyl-d14	84.1	37.3 - 150		%Rec	1	8/20/2021 12:55:36 PM
Dissolved Metals by EPA Method 200.8				Batch ID: 33376		Analyst: EH
Silver	ND	0.350		µg/L	1	8/18/2021 12:17:38 AM

Work Order: 2108200
CLIENT: Libby Environmental
Project: Hardel GWM

QC SUMMARY REPORT

Dissolved Metals by EPA Method 200.8

Sample ID: **MB-33376**	SampType: **MBLK**	Units: **µg/L**	Prep Date: **8/17/2021**	RunNo: **69306**
Client ID: **MBLKW**	Batch ID: **33376**		Analysis Date: **8/17/2021**	SeqNo: **1404331**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Silver	ND	0.350									

Sample ID: **LCS-33376**	SampType: **LCS**	Units: **µg/L**	Prep Date: **8/17/2021**	RunNo: **69306**
Client ID: **LCSW**	Batch ID: **33376**		Analysis Date: **8/17/2021**	SeqNo: **1404332**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Silver	5.23	0.350	5.000	0	105	85	115				

Sample ID: **2108200-003BDUP**	SampType: **DUP**	Units: **µg/L**	Prep Date: **8/17/2021**	RunNo: **69306**
Client ID: **GW-MW106-0813**	Batch ID: **33376**		Analysis Date: **8/17/2021**	SeqNo: **1404335**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Silver	ND	0.350						0		30	

Sample ID: **2108200-003BMS**	SampType: **MS**	Units: **µg/L**	Prep Date: **8/17/2021**	RunNo: **69306**
Client ID: **GW-MW106-0813**	Batch ID: **33376**		Analysis Date: **8/17/2021**	SeqNo: **1404337**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Silver	25.9	0.350	25.00	0	104	70	130				

Sample ID: **2108200-003BMSD**	SampType: **MSD**	Units: **µg/L**	Prep Date: **8/17/2021**	RunNo: **69306**
Client ID: **GW-MW106-0813**	Batch ID: **33376**		Analysis Date: **8/17/2021**	SeqNo: **1404339**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Silver	26.5	0.350	25.00	0	106	70	130	25.93	2.09	30	

Work Order: 2108200
CLIENT: Libby Environmental
Project: Hardel GWM

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **MB-33403** SampType: **MBLK** Units: **µg/L** Prep Date: **8/18/2021** RunNo: **69367**
Client ID: **MBLKW** Batch ID: **33403** Analysis Date: **8/20/2021** SeqNo: **1405809**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	ND	0.0981									
2-Methylnaphthalene	ND	0.0981									
1-Methylnaphthalene	ND	0.0981									
Acenaphthylene	ND	0.0981									
Acenaphthene	ND	0.0981									
Fluorene	ND	0.0981									
Phenanthrene	ND	0.0981									
Anthracene	ND	0.0981									
Fluoranthene	ND	0.0981									
Pyrene	ND	0.0981									
Benz(a)anthracene	ND	0.0981									
Chrysene	ND	0.0981									
Benzo(b)fluoranthene	ND	0.0981									
Benzo(k)fluoranthene	ND	0.0981									
Benzo(a)pyrene	ND	0.0981									
Indeno(1,2,3-cd)pyrene	ND	0.0981									
Dibenz(a,h)anthracene	ND	0.0981									
Benzo(g,h,i)perylene	ND	0.0981									
Surr: 2-Fluorobiphenyl	1.74		1.961		88.6	34.2	137				
Surr: Terphenyl-d14	1.81		1.961		92.4	37.3	150				

Sample ID: **LCS-33403** SampType: **LCS** Units: **µg/L** Prep Date: **8/18/2021** RunNo: **69367**
Client ID: **LCSW** Batch ID: **33403** Analysis Date: **8/20/2021** SeqNo: **1405810**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	3.03	0.0994	3.976	0	76.2	32.5	104				
2-Methylnaphthalene	3.11	0.0994	3.976	0	78.3	32.4	112				
1-Methylnaphthalene	3.08	0.0994	3.976	0	77.4	34.8	111				
Acenaphthylene	3.03	0.0994	3.976	0	76.2	37.5	110				
Acenaphthene	2.93	0.0994	3.976	0	73.6	39.5	106				

Work Order: 2108200
CLIENT: Libby Environmental
Project: Hardel GWM

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **LCS-33403** SampType: **LCS** Units: **µg/L** Prep Date: **8/18/2021** RunNo: **69367**
Client ID: **LCSW** Batch ID: **33403** Analysis Date: **8/20/2021** SeqNo: **1405810**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluorene	3.12	0.0994	3.976	0	78.5	45.7	111				
Phenanthrene	3.01	0.0994	3.976	0	75.6	49.5	109				
Anthracene	2.94	0.0994	3.976	0	74.0	52.2	104				
Fluoranthene	3.14	0.0994	3.976	0	78.8	51.9	113				
Pyrene	3.12	0.0994	3.976	0	78.5	49.2	111				
Benz(a)anthracene	3.04	0.0994	3.976	0	76.3	52.2	108				
Chrysene	2.92	0.0994	3.976	0	73.5	44.5	106				
Benzo(b)fluoranthene	2.62	0.0994	3.976	0	65.8	41.3	109				
Benzo(k)fluoranthene	3.00	0.0994	3.976	0	75.4	38.8	112				
Benzo(a)pyrene	2.91	0.0994	3.976	0	73.1	48.2	115				
Indeno(1,2,3-cd)pyrene	2.47	0.0994	3.976	0	62.2	35	111				
Dibenz(a,h)anthracene	2.56	0.0994	3.976	0	64.4	36.4	113				
Benzo(g,h,i)perylene	2.40	0.0994	3.976	0	60.4	28.9	108				
Surr: 2-Fluorobiphenyl	1.90		1.988		95.6	34.2	137				
Surr: Terphenyl-d14	1.90		1.988		95.7	37.3	150				

Sample ID: **LCSD-33403** SampType: **LCSD** Units: **µg/L** Prep Date: **8/18/2021** RunNo: **69367**
Client ID: **LCSW02** Batch ID: **33403** Analysis Date: **8/20/2021** SeqNo: **1405811**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	2.45	0.0983	3.930	0	62.3	32.5	104	3.032	21.2	30	
2-Methylnaphthalene	2.55	0.0983	3.930	0	64.9	32.4	112	3.114	19.9	30	
1-Methylnaphthalene	2.52	0.0983	3.930	0	64.2	34.8	111	3.076	19.8	30	
Acenaphthylene	2.50	0.0983	3.930	0	63.6	37.5	110	3.030	19.1	30	
Acenaphthene	2.39	0.0983	3.930	0	60.7	39.5	106	2.926	20.4	30	
Fluorene	2.57	0.0983	3.930	0	65.4	45.7	111	3.121	19.3	30	
Phenanthrene	2.55	0.0983	3.930	0	64.8	49.5	109	3.005	16.5	30	
Anthracene	2.48	0.0983	3.930	0	63.1	52.2	104	2.942	17.0	30	
Fluoranthene	2.71	0.0983	3.930	0	68.9	51.9	113	3.135	14.6	30	
Pyrene	2.72	0.0983	3.930	0	69.2	49.2	111	3.121	13.7	30	

Work Order: 2108200
CLIENT: Libby Environmental
Project: Hardel GWM

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **LCSD-33403** SampType: **LCSD** Units: **µg/L** Prep Date: **8/18/2021** RunNo: **69367**
Client ID: **LCSW02** Batch ID: **33403** Analysis Date: **8/20/2021** SeqNo: **1405811**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benz(a)anthracene	2.71	0.0983	3.930	0	68.9	52.2	108	3.036	11.4	30	
Chrysene	2.60	0.0983	3.930	0	66.1	44.5	106	2.924	11.8	30	
Benzo(b)fluoranthene	2.54	0.0983	3.930	0	64.5	41.3	109	2.616	3.13	30	
Benzo(k)fluoranthene	2.63	0.0983	3.930	0	66.9	38.8	112	2.997	13.1	30	
Benzo(a)pyrene	2.72	0.0983	3.930	0	69.1	48.2	115	2.906	6.75	30	
Indeno(1,2,3-cd)pyrene	2.33	0.0983	3.930	0	59.2	35	111	2.473	6.11	30	
Dibenz(a,h)anthracene	2.42	0.0983	3.930	0	61.6	36.4	113	2.559	5.46	30	
Benzo(g,h,i)perylene	2.24	0.0983	3.930	0	57.0	28.9	108	2.402	6.89	30	
Surr: 2-Fluorobiphenyl	1.58		1.965		80.3	34.2	137		0	0	
Surr: Terphenyl-d14	1.69		1.965		86.2	37.3	150		0	0	

Sample ID: **2108200-001AMS** SampType: **MS** Units: **µg/L** Prep Date: **8/18/2021** RunNo: **69367**
Client ID: **GW-MW103-0813** Batch ID: **33403** Analysis Date: **8/20/2021** SeqNo: **1405814**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	2.98	0.103	4.114	0	72.5	34	110				
2-Methylnaphthalene	3.09	0.103	4.114	0	75.2	14.8	131				
1-Methylnaphthalene	3.11	0.103	4.114	0	75.7	25.1	123				
Acenaphthylene	2.93	0.103	4.114	0	71.3	35.6	115				
Acenaphthene	4.96	0.103	4.114	1.844	75.8	39.2	111				
Fluorene	3.40	0.103	4.114	0.2870	75.8	46.9	113				
Phenanthrene	3.04	0.103	4.114	0	73.9	52.5	107				
Anthracene	3.03	0.103	4.114	0	73.6	49.3	104				
Fluoranthene	3.15	0.103	4.114	0	76.5	53.2	110				
Pyrene	3.14	0.103	4.114	0	76.3	50.5	107				
Benz(a)anthracene	3.03	0.103	4.114	0	73.7	48.3	104				
Chrysene	2.84	0.103	4.114	0	69.1	41.7	105				
Benzo(b)fluoranthene	2.79	0.103	4.114	0	67.7	34.4	109				
Benzo(k)fluoranthene	2.72	0.103	4.114	0	66.1	29.2	111				
Benzo(a)pyrene	3.02	0.103	4.114	0	73.3	34.8	114				

Work Order: 2108200
CLIENT: Libby Environmental
Project: Hardel GWM

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **2108200-001AMS** SampType: **MS** Units: **µg/L** Prep Date: **8/18/2021** RunNo: **69367**
Client ID: **GW-MW103-0813** Batch ID: **33403** Analysis Date: **8/20/2021** SeqNo: **1405814**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Indeno(1,2,3-cd)pyrene	2.46	0.103	4.114	0	59.9	8.88	117				
Dibenz(a,h)anthracene	2.53	0.103	4.114	0	61.5	9.16	119				
Benzo(g,h,i)perylene	2.40	0.103	4.114	0.03639	57.4	7.67	110				
Surr: 2-Fluorobiphenyl	1.86		2.057		90.7	34.2	137				
Surr: Terphenyl-d14	1.84		2.057		89.5	37.3	150				

Sample ID: **2108200-003ADUP** SampType: **DUP** Units: **µg/L** Prep Date: **8/18/2021** RunNo: **69367**
Client ID: **GW-MW106-0813** Batch ID: **33403** Analysis Date: **8/20/2021** SeqNo: **1405819**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	ND	0.0998						0		30	
2-Methylnaphthalene	ND	0.0998						0		30	
1-Methylnaphthalene	ND	0.0998						0		30	
Acenaphthylene	ND	0.0998						0		30	
Acenaphthene	ND	0.0998						0		30	
Fluorene	ND	0.0998						0		30	
Phenanthrene	ND	0.0998						0		30	
Anthracene	ND	0.0998						0		30	
Fluoranthene	ND	0.0998						0		30	
Pyrene	ND	0.0998						0		30	
Benz(a)anthracene	ND	0.0998						0		30	
Chrysene	ND	0.0998						0		30	
Benzo(b)fluoranthene	ND	0.0998						0		30	
Benzo(k)fluoranthene	ND	0.0998						0		30	
Benzo(a)pyrene	ND	0.0998						0		30	
Indeno(1,2,3-cd)pyrene	ND	0.0998						0		30	
Dibenz(a,h)anthracene	ND	0.0998						0		30	
Benzo(g,h,i)perylene	ND	0.0998						0		30	
Surr: 2-Fluorobiphenyl	1.88		1.996		94.2	34.2	137		0		
Surr: Terphenyl-d14	1.80		1.996		90.0	37.3	150		0		

Work Order: 2108200
CLIENT: Libby Environmental
Project: Hardel GWM

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **2108200-003ADUP** SampType: **DUP** Units: **µg/L** Prep Date: **8/18/2021** RunNo: **69367**
Client ID: **GW-MW106-0813** Batch ID: **33403** Analysis Date: **8/20/2021** SeqNo: **1405819**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sample Log-In Check List

Client Name:	**LIBBY**	Work Order Number:	**2108200**
Logged by:	**Clare Griggs**	Date Received:	**8/13/2021 3:02:00 PM**

Chain of Custody

1.	Is Chain of Custody complete?	Yes	☑	No	☐	Not Present ☐
2.	How was the sample delivered?	Client				

Log In

3.	Coolers are present?	Yes	☑	No	☐	NA ☐
4.	Shipping container/cooler in good condition?	Yes	☑	No	☐	
5.	Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact)	Yes	☐	No	☐	Not Present ☑
6.	Was an attempt made to cool the samples?	Yes	☐	No	☐	NA ☑
7.	Were all items received at a temperature of >2°C to 6°C *	Yes	☐	No	☐	NA ☑
8.	Sample(s) in proper container(s)?	Yes	☑	No	☐	
9.	Sufficient sample volume for indicated test(s)?	Yes	☑	No	☐	
10.	Are samples properly preserved?	Yes	☑	No	☐	
11.	Was preservative added to bottles?	Yes	☐	No	☑	NA ☐
12.	Is there headspace in the VOA vials?	Yes	☐	No	☐	NA ☑
13.	Did all samples containers arrive in good condition(unbroken)?	Yes	☑	No	☐	
14.	Does paperwork match bottle labels?	Yes	☑	No	☐	
15.	Are matrices correctly identified on Chain of Custody?	Yes	☑	No	☐	
16.	Is it clear what analyses were requested?	Yes	☑	No	☐	
17.	Were all holding times able to be met?	Yes	☑	No	☐	

Special Handling (if applicable)

18.	Was client notified of all discrepancies with this order?	Yes	☑	No	☐	NA ☐

Person Notified:	Kodev Elev	Date:	8/16/2021
By Whom:	Clare Griggs	Via:	☑ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:	Confirming whether or not the Dissolved Metals volume was field filtered.		
Client Instructions:	Volume was field filtered.		

19. Additional remarks:

Item Information

Item #	Temp ºC
Sample	2.6

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

Libby Environmental, Inc.

3322 South Bay Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Chain of Custody Record

2108200

www.LibbyEnvironmental.com

Date: 8/13/21 Page: 1 of 1

Client: Libby Environmental, Inc.
Address: (SEE ABOVE)
City: State: Zip:
Phone: Fax:
Client Project # L210813-1

Project Manager: Rodney Eley
Project Name: Hardel GWM
Location: City, State: Olympia, WA
Collector: Date of Collection: 8/12/21
Email: libbyenv@gmail.com

Sample Number	Depth	Time	Sample Type	Container Type	VOC 8260	PCE & Daughter Prod.	NWTPH-Gx	BTEX (8260) / (8021)	NWTPH-HCID	NWTPH-Dx / Dx	PCB 8082	MTCA 5 Metals	RCRA 8 Metals	c PAH 8270	PAH 8270	Semi Vol 8270	Ag (Dissolved)		Field Notes
1 GW-MW103-0813	—	845	H_2O	multi										X		X			
2 GW-MW105-0813	—	705												X		X			
3 GW-MW106-0813	—	745												X		X			Extra Volume for Duplicates
4 GW-MW107-0813	—	915	—	—										X		X			
5																			
6																			
7																			
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			
16																			
17																			

Relinquished by:	Date / Time	Received by:	Date / Time
	8/13/21	Addie Childers	8/13/21 1459
Addie Childers	8/13/21 1459	Christine Mosby	8/13/21 1515
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt

Good Condition?	Y	N
Cooler Temp.		°C
Sample Temp.		°C
Total Number of Containers		

Remarks:
STD TAT
Please run Dups on GW-MW106-0813

TAT: 24HR 48HR 5-DAY

Distribution: White - Lab, Yellow - Originator

Libby Environmental, Inc.
3322 South Bay Road NE • Olympia, WA 98506-2957

December 20, 2021

Joel Hecker
Pioneer Technologies Corporation
5205 Corporate Center Ct SE, Suite C
Lacey, WA 98503

Dear Mr. Hecker:

Please find enclosed the analytical data report for the Hardel Project located in Olympia, Washington.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. The sample(s) will be disposed of within 30 days unless we are contacted to arrange long term storage.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Sherry L. Chilcutt
Senior Chemist
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@gmail.com

Libby Environmental, Inc.

Chain of Custody Record

www.LibbyEnvironmental.com

3322 South Bay Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Date: 11/16/21 Page: 1 of 1

Client: Pioneer
Project Manager: Joel Hecker
Address: 5205 Corporate Landing Ct. SE, Ste A
Project Name: Hordel
City: Olympia State: WA Zip: 98503
Location: OLY City, State: WA
Phone: Fax:
Collector: Amy Rosenbalm Date of Collection: 11/16/21
Client Project # Hordel
Email: HeckerJ@uspioneer.com

Sample Number	Depth	Time	Sample Type	Container Type	VOC 8260	PCE & Daughter Prod.	NWTPH-Gx	BTEX (8260) / (8021)	NWTPH-HCID	NWTPH-Dx / Dx	PCB 8082	MTCA 5 Metals	RCRA 8 Metals	c PAH 8270	PAH 8270	Semi Vol 8270	MTCA VOCs	Dissolved As/Ag	Field Notes
1 GW-MW105-111621	—	9:11	G	mult	⊗	X			X					X		X	X		
2 GW-MW106-111621	—	10:00	G	mult	⊗	X			X					X		X	X		
3 GW-MW107-111621	—	10:55	G	mult	⊗	X			X					X		X	X		Run dup on 107
4 TB-111621					⊗											X			
5																			
6																			
7																			
8																			
9																			
10																			
11																			
12																			
13																			
14																			11-22-21 ANALYSIS
15																			ADDED PER JOEL
16																			VIA EMAIL.
17																			

Relinquished by:	Date / Time	Received by:	Date / Time
Amy Rosenbalm	11/16/21 11:55		11/16/21 11:55
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt

Good Condition?	Y	N
Cooler Temp.		°C
Sample Temp.		°C
Total Number of Containers		

Remarks: run dup analyses for all analytes including fremont PAHs

TAT: 24HR 48HR (5-DAY)

Distribution: White - Lab, Yellow - Originator

Libby Environmental, Inc.

3322 South Bay Road NE
Olympia, WA 98506
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Email: libbyenv@gmail.com

HARDEL PROJECT
Pioneer Technologies
Olympia, Washington
Libby Project # L211116-4

Volatile Organic Compounds by EPA Method 8260D in Water

Sample Description		Method Blank	GW-MW105-111621	GW-MW106-111621	GW-MW107-111621	GW-MW107-111621 Dup	TB-111621
Date Sampled		N/A	11/16/2021	11/16/2021	11/16/2021	11/16/2021	11/16/2021
Date Analyzed	PQL (µg/L)	11/18/2021 (µg/L)	11/18/2021 (µg/L)	11/18/2021 (µg/L)	11/18/2021 (µg/L)	11/18/2021 (µg/L)	11/18/2021 (µg/L)
Benzene	1.0	nd	nd	nd	nd	nd	nd
Toluene	1.0	nd	nd	nd	nd	nd	nd
Ethylbenzene	1.0	nd	nd	nd	nd	nd	nd
Total Xylenes	2.0	nd	nd	nd	nd	nd	nd
1,2-Dichloroethane (EDC)	1.0	nd	nd	nd	nd	nd	nd
1,2-Dibromoethane (EDB) *	0.01	nd	nd	nd	nd	nd	nd
Naphthalene	5.0	nd	nd	nd	nd	nd	nd
1-Methylnaphthalene	5.0	nd	nd	nd	nd	nd	nd
2-Methylnaphthalene	5.0	nd	nd	nd	nd	nd	nd
Methyl *tert*- Butyl Ether (MTBE)	5.0	nd	nd	nd	nd	nd	nd
Vinyl Chloride (VC)	0.2	nd	nd	nd	nd	nd	nd
1,1-Dichloroethene	0.5	nd	nd	nd	nd	nd	nd
trans-1,2-Dichloroethene	1.0	nd	nd	nd	nd	nd	nd
cis -1,2-Dichloroethene	1.0	nd	nd	nd	nd	nd	nd
Trichloroethene (TCE)	0.4	nd	nd	nd	nd	nd	nd
Tetrachloroethene (PCE)	1.0	nd	nd	nd	nd	nd	nd
Surrogate Recovery							
Dibromofluoromethane		117	116	119	117	118	116
1,2-Dichloroethane-d4		108	102	106	105	110	103
Toluene-d8		100	101	100	101	101	100
4-Bromofluorobenzene		95	103	96	100	99	97

"nd" Indicates not detected at listed detection limit.
"int" Indicates that interference prevents determination.

* ANALYZED BY SIM
ACCEPTABLE RECOVERY LIMITS FOR SURROGATE : 65% TO 135%

ANALYSES PERFORMED BY: Sherry Chilcutt

Libby Environmental, Inc.

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HARDEL PROJECT
Pioneer Technologies
Olympia, Washington
Libby Project # L211116-4

Gasoline by NWTPH-Gx in Water

Sample Number	Date Analyzed	Surrogate Recovery (%)	Gasoline (µg/L)
Method Blank	11/18/2021	100	nd
GW-MW105-111621	11/18/2021	101	160
GW-MW106-111621	11/18/2021	100	nd
GW-MW107-111621	11/18/2021	101	nd
GW-MW107-111621 Dup	11/18/2021	101	nd
Practical Quantitation Limit			100

"nd" Indicates not detected at the listed detection limits.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (Toluene-d8): 65% TO 135%

ANALYSES PERFORMED BY: Sherry Chilcutt

Libby Environmental, Inc.

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Olympia, WA 98506
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HARDEL PROJECT
Pioneer Technologies
Olympia, Washington
Libby Project # L211116-4

Diesel & Oil by NWTPH-Dx/Dx Extended in Water

Sample Number	Date Analyzed	Surrogate Recovery (%)	Diesel (µg/L)	Oil (µg/L)
Method Blank	11/16/2021	88%	nd	nd
GW-MW105-111621	11/16/2021	80%	nd	nd
GW-MW106-111621	11/16/2021	78%	nd	nd
GW-MW107-111621	11/16/2021	83%	nd	nd
GW-MW107-111621 Dup	11/16/2021	65%	nd	nd
Practical Quantitation Limit			200	400

"nd" Indicates not detected at the listed detection limits.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (2-F Biphenyl): 65% TO 135%

ANALYSES PERFORMED BY: Randolph Kraus

Libby Environmental, Inc.

3322 South Bay Road NE
Olympia, WA 98506
Phone: (360) 352-2110
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Email: libbyenv@gmail.com

HARDEL PROJECT
Pioneer Technologies
Libby Project # L211116-4
Date Received 11/16/2021
Time Received 11:55 AM

Received By KD

Sample Receipt Checklist

Chain of Custody

1. Is the Chain of Custody complete?	☑ Yes	☐ No	
2. How was the sample delivered?	☑ Hand Delivered	☐ Picked Up	☐ Shipped

Log In

3. Cooler or Shipping Container is present.	☑ Yes	☐ No	☐ N/A
4. Cooler or Shipping Container is in good condition.	☑ Yes	☐ No	☐ N/A
5. Cooler or Shipping Container has Custody Seals present.	☐ Yes	☑ No	☐ N/A
6. Was an attempt made to cool the samples?	☑ Yes	☐ No	☐ N/A
7. Temperature of cooler (0°C to 8°C recommended)	-2.0 °C		
8. Temperature of sample(s) (0°C to 8°C recommended)	6.6 °C		
9. Did all containers arrive in good condition (unbroken)?	☑ Yes	☐ No	
10. Is it clear what analyses were requested?	☑ Yes	☐ No	
11. Did container labels match Chain of Custody?	☑ Yes	☐ No	
12. Are matrices correctly identified on Chain of Custody?	☑ Yes	☐ No	
13. Are correct containers used for the analysis indicated?	☑ Yes	☐ No	
14. Is there sufficient sample volume for indicated analysis?	☑ Yes	☐ No	
15. Were all containers properly preserved per each analysis?	☑ Yes	☐ No	
16. Were VOA vials collected correctly (no headspace)?	☑ Yes	☐ No	☐ N/A
17. Were all holding times able to be met?	☑ Yes	☐ No	

Discrepancies/ Notes

18. Was client notified of all discrepancies? ☐ Yes ☐ No ☑ N/A

Person Notified: _____ Date: _____

By Whom: _____ Via: _____

Regarding: _____

19. Comments. _____

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Libby Environmental
Kodey Eley
3322 South Bay Road NE
Olympia, WA 98506

RE: Hardel
Work Order Number: 2111363

December 16, 2021

Attention Kodey Eley:

Fremont Analytical, Inc. received 3 sample(s) on 11/17/2021 for the analyses presented in the following report.

Dissolved Metals by EPA Method 200.8
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

Date: *12/17/2021*

CLIENT: Libby Environmental
Project: Hardel
Work Order: 2111363

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2111363-001	GW-MW105-111621	11/16/2021 9:11 AM	11/17/2021 10:00 AM
2111363-001	GW-MW105-111621	11/16/2021 9:11 AM	11/17/2021 10:00 AM
2111363-002	GW-MW106-111621	11/16/2021 10:00 AM	11/17/2021 10:00 AM
2111363-002	GW-MW106-111621	11/16/2021 10:00 AM	11/17/2021 10:00 AM
2111363-003	GW-MW107-111621	11/16/2021 10:53 AM	11/17/2021 10:00 AM
2111363-003	GW-MW107-111621	11/16/2021 10:53 AM	11/17/2021 10:00 AM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Case Narrative

WO#: **2111363**
Date: **12/16/2021**

CLIENT: Libby Environmental
Project: Hardel

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

12/16/21: Revision 1 includes re-analysis of Silver per client request.
12/17/21: Revision 2 includes re-analysis of Silver per client request.

Qualifiers:

* - Flagged value is not within established control limits
B - Analyte detected in the associated Method Blank
D - Dilution was required
E - Value above quantitation range
H - Holding times for preparation or analysis exceeded
I - Analyte with an internal standard that does not meet established acceptance criteria
J - Analyte detected below Reporting Limit
N - Tentatively Identified Compound (TIC)
Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria
S - Spike recovery outside accepted recovery limits
ND - Not detected at the Reporting Limit
R - High relative percent difference observed

Acronyms:

%Rec - Percent Recovery
CCB - Continued Calibration Blank
CCV - Continued Calibration Verification
DF - Dilution Factor
DUP - Sample Duplicate
HEM - Hexane Extractable Material
ICV - Initial Calibration Verification
LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
MCL - Maximum Contaminant Level
MB or MBLANK - Method Blank
MDL - Method Detection Limit
MS/MSD - Matrix Spike / Matrix Spike Duplicate
PDS - Post Digestion Spike
Ref Val - Reference Value
REP - Sample Replicate
RL - Reporting Limit
RPD - Relative Percent Difference
SD - Serial Dilution
SGT - Silica Gel Treatment
SPK - Spike
Surr - Surrogate

Analytical Report

Work Order: **2111363**
Date Reported: **12/16/2021**

Client: Libby Environmental
Collection Date: 11/16/2021 9:11:00 AM
Project: Hardel
Lab ID: 2111363-001
Matrix: Water
Client Sample ID: **GW-MW105-111621**

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 34512		Analyst: SB
Naphthalene	0.115	0.0994		µg/L	1	11/22/2021 4:20:29 PM
2-Methylnaphthalene	ND	0.0994		µg/L	1	11/22/2021 4:20:29 PM
1-Methylnaphthalene	ND	0.0994		µg/L	1	11/22/2021 4:20:29 PM
Acenaphthylene	ND	0.0994		µg/L	1	11/22/2021 4:20:29 PM
Acenaphthene	9.48	0.994	D	µg/L	10	11/23/2021 10:50:08 AM
Fluorene	4.18	0.0994		µg/L	1	11/22/2021 4:20:29 PM
Phenanthrene	1.16	0.0994		µg/L	1	11/22/2021 4:20:29 PM
Anthracene	ND	0.0994		µg/L	1	11/22/2021 4:20:29 PM
Fluoranthene	ND	0.0994		µg/L	1	11/22/2021 4:20:29 PM
Pyrene	ND	0.0994		µg/L	1	11/22/2021 4:20:29 PM
Benz(a)anthracene	ND	0.0994		µg/L	1	11/22/2021 4:20:29 PM
Chrysene	ND	0.0994		µg/L	1	11/22/2021 4:20:29 PM
Benzo(b)fluoranthene	ND	0.0994		µg/L	1	11/22/2021 4:20:29 PM
Benzo(k)fluoranthene	ND	0.0994		µg/L	1	11/22/2021 4:20:29 PM
Benzo(a)pyrene	ND	0.0994		µg/L	1	11/22/2021 4:20:29 PM
Indeno(1,2,3-cd)pyrene	ND	0.0994		µg/L	1	11/22/2021 4:20:29 PM
Dibenz(a,h)anthracene	ND	0.0994		µg/L	1	11/22/2021 4:20:29 PM
Benzo(g,h,i)perylene	ND	0.0994		µg/L	1	11/22/2021 4:20:29 PM
Surr: 2-Fluorobiphenyl	97.5	49.6 - 128		%Rec	1	11/22/2021 4:20:29 PM
Surr: Terphenyl-d14	97.0	38.2 - 138		%Rec	1	11/22/2021 4:20:29 PM
Dissolved Metals by EPA Method 200.8				Batch ID: 34564		Analyst: EH
Arsenic	ND	1.00		µg/L	1	12/6/2021 1:17:56 PM
Silver	ND	0.350		µg/L	1	12/15/2021 5:21:01 PM

Client: Libby Environmental
Collection Date: 11/16/2021 10:00:00 AM
Project: Hardel
Lab ID: 2111363-002
Matrix: Water
Client Sample ID: **GW-MW106-111621**

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 34512		Analyst: SB
Naphthalene	ND	0.0984		µg/L	1	11/22/2021 4:42:03 PM
2-Methylnaphthalene	ND	0.0984		µg/L	1	11/22/2021 4:42:03 PM
1-Methylnaphthalene	ND	0.0984		µg/L	1	11/22/2021 4:42:03 PM
Acenaphthylene	ND	0.0984		µg/L	1	11/22/2021 4:42:03 PM
Acenaphthene	ND	0.0984		µg/L	1	11/22/2021 4:42:03 PM
Fluorene	ND	0.0984		µg/L	1	11/22/2021 4:42:03 PM
Phenanthrene	ND	0.0984		µg/L	1	11/22/2021 4:42:03 PM
Anthracene	ND	0.0984		µg/L	1	11/22/2021 4:42:03 PM
Fluoranthene	ND	0.0984		µg/L	1	11/22/2021 4:42:03 PM
Pyrene	ND	0.0984		µg/L	1	11/22/2021 4:42:03 PM
Benz(a)anthracene	ND	0.0984		µg/L	1	11/22/2021 4:42:03 PM
Chrysene	ND	0.0984		µg/L	1	11/22/2021 4:42:03 PM
Benzo(b)fluoranthene	ND	0.0984		µg/L	1	11/22/2021 4:42:03 PM
Benzo(k)fluoranthene	ND	0.0984		µg/L	1	11/22/2021 4:42:03 PM
Benzo(a)pyrene	ND	0.0984		µg/L	1	11/22/2021 4:42:03 PM
Indeno(1,2,3-cd)pyrene	ND	0.0984		µg/L	1	11/22/2021 4:42:03 PM
Dibenz(a,h)anthracene	ND	0.0984		µg/L	1	11/22/2021 4:42:03 PM
Benzo(g,h,i)perylene	ND	0.0984		µg/L	1	11/22/2021 4:42:03 PM
Surr: 2-Fluorobiphenyl	99.9	49.6 - 128		%Rec	1	11/22/2021 4:42:03 PM
Surr: Terphenyl-d14	96.9	38.2 - 138		%Rec	1	11/22/2021 4:42:03 PM
Dissolved Metals by EPA Method 200.8				Batch ID: 34564		Analyst: EH
Arsenic	1.72	1.00		µg/L	1	12/6/2021 1:20:16 PM
Silver	ND	0.350		µg/L	1	12/16/2021 2:40:56 PM

Analytical Report

Work Order: **2111363**
Date Reported: **12/16/2021**

Client: Libby Environmental
Collection Date: 11/16/2021 10:53:00 AM
Project: Hardel
Lab ID: 2111363-003
Matrix: Water
Client Sample ID: **GW-MW107-111621**

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 34512		Analyst: SB
Naphthalene	ND	0.100		µg/L	1	11/22/2021 2:11:22 PM
2-Methylnaphthalene	ND	0.100		µg/L	1	11/22/2021 2:11:22 PM
1-Methylnaphthalene	ND	0.100		µg/L	1	11/22/2021 2:11:22 PM
Acenaphthylene	ND	0.100		µg/L	1	11/22/2021 2:11:22 PM
Acenaphthene	0.287	0.100		µg/L	1	11/22/2021 2:11:22 PM
Fluorene	ND	0.100		µg/L	1	11/22/2021 2:11:22 PM
Phenanthrene	ND	0.100		µg/L	1	11/22/2021 2:11:22 PM
Anthracene	ND	0.100		µg/L	1	11/22/2021 2:11:22 PM
Fluoranthene	ND	0.100		µg/L	1	11/22/2021 2:11:22 PM
Pyrene	ND	0.100		µg/L	1	11/22/2021 2:11:22 PM
Benz(a)anthracene	ND	0.100		µg/L	1	11/22/2021 2:11:22 PM
Chrysene	ND	0.100		µg/L	1	11/22/2021 2:11:22 PM
Benzo(b)fluoranthene	ND	0.100		µg/L	1	11/22/2021 2:11:22 PM
Benzo(k)fluoranthene	ND	0.100		µg/L	1	11/22/2021 2:11:22 PM
Benzo(a)pyrene	ND	0.100		µg/L	1	11/22/2021 2:11:22 PM
Indeno(1,2,3-cd)pyrene	ND	0.100		µg/L	1	11/22/2021 2:11:22 PM
Dibenz(a,h)anthracene	ND	0.100		µg/L	1	11/22/2021 2:11:22 PM
Benzo(g,h,i)perylene	ND	0.100		µg/L	1	11/22/2021 2:11:22 PM
Surr: 2-Fluorobiphenyl	100	49.6 - 128		%Rec	1	11/22/2021 2:11:22 PM
Surr: Terphenyl-d14	90.8	38.2 - 138		%Rec	1	11/22/2021 2:11:22 PM
Dissolved Metals by EPA Method 200.8				Batch ID: 34657		Analyst: EH
Arsenic	2.37	1.00		µg/L	1	12/8/2021 12:02:58 PM
Silver	ND	0.350		µg/L	1	12/15/2021 5:54:27 PM

Work Order: 2111363
CLIENT: Libby Environmental
Project: Hardel

QC SUMMARY REPORT

Dissolved Metals by EPA Method 200.8

Sample ID: **MB-34564**	SampType: **MBLK**	Units: **µg/L**	Prep Date: **11/29/2021**	RunNo: **71713**
Client ID: **MBLKW**	Batch ID: **34564**		Analysis Date: **12/3/2021**	SeqNo: **1461811**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1.00									Q

NOTES:
Q - Initial calibration verification for this analyte exceeds acceptance criteria.

Sample ID: **LCS-34564**	SampType: **LCS**	Units: **µg/L**	Prep Date: **11/29/2021**	RunNo: **71713**
Client ID: **LCSW**	Batch ID: **34564**		Analysis Date: **12/3/2021**	SeqNo: **1461812**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	112	1.00	100.0	0	112	85	115				

Sample ID: **2111296-002BDUP**	SampType: **DUP**	Units: **µg/L**	Prep Date: **11/29/2021**	RunNo: **71713**
Client ID: **BATCH**	Batch ID: **34564**		Analysis Date: **12/3/2021**	SeqNo: **1461814**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1.00						0		30	Q

NOTES:
Q - Initial calibration verification for this analyte exceeds acceptance criteria.

Sample ID: **2111296-002BMS**	SampType: **MS**	Units: **µg/L**	Prep Date: **11/29/2021**	RunNo: **71713**
Client ID: **BATCH**	Batch ID: **34564**		Analysis Date: **12/3/2021**	SeqNo: **1461815**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	556	1.00	500.0	0	111	70	130				

Sample ID: **2111296-002BMSD**	SampType: **MSD**	Units: **µg/L**	Prep Date: **11/29/2021**	RunNo: **71713**
Client ID: **BATCH**	Batch ID: **34564**		Analysis Date: **12/3/2021**	SeqNo: **1461816**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	543	1.00	500.0	0	109	70	130	556.0	2.45	30	

Work Order: 2111363
CLIENT: Libby Environmental
Project: Hardel

QC SUMMARY REPORT

Dissolved Metals by EPA Method 200.8

Sample ID: **MB-34563FB**	SampType: **MBLK**			Units: **µg/L**		Prep Date: **11/29/2021**		RunNo: **71713**	
Client ID: **MBLKW**	Batch ID: **34564**					Analysis Date: **12/3/2021**		SeqNo: **1461922**	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1.00									Q

NOTES:
Q - Initial calibration verification for this analyte exceeds acceptance criteria.

Sample ID: **MB-34658FB**	SampType: **MBLK**			Units: **µg/L**		Prep Date: **12/7/2021**		RunNo: **71811**	
Client ID: **MBLKW**	Batch ID: **34657**					Analysis Date: **12/8/2021**		SeqNo: **1464193**	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1.00									
Silver	ND	0.350									

Sample ID: **MB-34657**	SampType: **MBLK**			Units: **µg/L**		Prep Date: **12/7/2021**		RunNo: **71811**	
Client ID: **MBLKW**	Batch ID: **34657**					Analysis Date: **12/8/2021**		SeqNo: **1464194**	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	1.00									
Silver	ND	0.350									

Sample ID: **LCS-34657**	SampType: **LCS**			Units: **µg/L**		Prep Date: **12/7/2021**		RunNo: **71811**	
Client ID: **LCSW**	Batch ID: **34657**					Analysis Date: **12/8/2021**		SeqNo: **1464195**	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	525	1.00	500.0	0	105	85	115				
Silver	25.6	0.350	25.00	0	102	85	115				

Work Order: 2111363
CLIENT: Libby Environmental
Project: Hardel

QC SUMMARY REPORT

Dissolved Metals by EPA Method 200.8

Sample ID: **2111363-003BDUP** SampType: **DUP** Units: **µg/L** Prep Date: **12/7/2021** RunNo: **71811**
Client ID: **GW-MW107-111621** Batch ID: **34657** Analysis Date: **12/8/2021** SeqNo: **1464199**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	2.31	1.00						1.361	51.8	30	
Silver	ND	0.350						0		30	

Sample ID: **2111363-003BMS** SampType: **MS** Units: **µg/L** Prep Date: **12/7/2021** RunNo: **71811**
Client ID: **GW-MW107-111621** Batch ID: **34657** Analysis Date: **12/8/2021** SeqNo: **1464200**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	528	1.00	500.0	1.361	105	70	130				
Silver	9.94	0.350	25.00	0.2910	38.6	70	130				S

NOTES:
S - Spike recovery indicates a possible matrix effect.

Sample ID: **MB-34742FB** SampType: **MBLK** Units: **µg/L** Prep Date: **12/14/2021** RunNo: **71986**
Client ID: **MBLKW** Batch ID: **34743** Analysis Date: **12/15/2021** SeqNo: **1468646**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Silver	ND	0.350									

NOTES:
Filter Blank

Sample ID: **MB-34743** SampType: **MBLK** Units: **µg/L** Prep Date: **12/14/2021** RunNo: **71986**
Client ID: **MBLKW** Batch ID: **34743** Analysis Date: **12/15/2021** SeqNo: **1468647**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Silver	ND	0.350									

Work Order: 2111363
CLIENT: Libby Environmental
Project: Hardel

QC SUMMARY REPORT

Dissolved Metals by EPA Method 200.8

Sample ID: **LCS-34743**	SampType: **LCS**	Units: **µg/L**	Prep Date: **12/14/2021**	RunNo: **71986**
Client ID: **LCSW**	Batch ID: **34743**		Analysis Date: **12/15/2021**	SeqNo: **1468648**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Silver	25.2	0.350	25.00	0	101	85	115				

Sample ID: **2111363-001BDUP**	SampType: **DUP**	Units: **µg/L**	Prep Date: **12/14/2021**	RunNo: **71986**
Client ID: **GW-MW105-111621**	Batch ID: **34743**		Analysis Date: **12/15/2021**	SeqNo: **1468650**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Silver	ND	0.350						3.372	200	30	R

Sample ID: **2111363-001BMS**	SampType: **MS**	Units: **µg/L**	Prep Date: **12/14/2021**	RunNo: **71986**
Client ID: **GW-MW105-111621**	Batch ID: **34743**		Analysis Date: **12/15/2021**	SeqNo: **1468651**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Silver	26.7	0.350	25.00	3.372	93.2	70	130				

Sample ID: **2111363-001BMSD**	SampType: **MSD**	Units: **µg/L**	Prep Date: **12/14/2021**	RunNo: **71986**
Client ID: **GW-MW105-111621**	Batch ID: **34743**		Analysis Date: **12/15/2021**	SeqNo: **1468654**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Silver	25.2	0.350	25.00	3.372	87.3	70	130	26.66	5.69	30	

Sample ID: **MB-34755FB**	SampType: **MBLK**	Units: **µg/L**	Prep Date: **12/16/2021**	RunNo: **72019**
Client ID: **MBLKW**	Batch ID: **34783**		Analysis Date: **12/16/2021**	SeqNo: **1469222**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Silver	ND	0.350									

Work Order: 2111363
CLIENT: Libby Environmental
Project: Hardel

QC SUMMARY REPORT

Dissolved Metals by EPA Method 200.8

Sample ID: **MB-34783**	SampType: **MBLK**			Units: **µg/L**		Prep Date: **12/16/2021**		RunNo: **72019**		
Client ID: **MBLKW**	Batch ID: **34783**					Analysis Date: **12/16/2021**		SeqNo: **1469223**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Silver	ND	0.350									

Sample ID: **LCS-34783**	SampType: **LCS**			Units: **µg/L**		Prep Date: **12/16/2021**		RunNo: **72019**		
Client ID: **LCSW**	Batch ID: **34783**					Analysis Date: **12/16/2021**		SeqNo: **1469224**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Silver	26.2	0.350	25.00	0	105	85	115				

Sample ID: **2112195-002DDUP**	SampType: **DUP**			Units: **µg/L**		Prep Date: **12/16/2021**		RunNo: **72019**		
Client ID: **BATCH**	Batch ID: **34783**					Analysis Date: **12/16/2021**		SeqNo: **1469226**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Silver	ND	0.350						0		30	

Sample ID: **2112195-002DMS**	SampType: **MS**			Units: **µg/L**		Prep Date: **12/16/2021**		RunNo: **72019**		
Client ID: **BATCH**	Batch ID: **34783**					Analysis Date: **12/16/2021**		SeqNo: **1469227**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Silver	25.9	0.350	25.00	0	104	70	130				

Sample ID: **2112195-002DMSD**	SampType: **MSD**			Units: **µg/L**		Prep Date: **12/16/2021**		RunNo: **72019**		
Client ID: **BATCH**	Batch ID: **34783**					Analysis Date: **12/16/2021**		SeqNo: **1469228**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Silver	26.6	0.350	25.00	0	106	70	130	25.94	2.54	30	

Work Order: 2111363
CLIENT: Libby Environmental
Project: Hardel

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **MB-34512** SampType: **MBLK** Units: **µg/L** Prep Date: **11/19/2021** RunNo: **71505**
Client ID: **MBLKW** Batch ID: **34512** Analysis Date: **11/22/2021** SeqNo: **1456425**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	ND	0.0990									
2-Methylnaphthalene	ND	0.0990									
1-Methylnaphthalene	ND	0.0990									
Acenaphthylene	ND	0.0990									
Acenaphthene	ND	0.0990									
Fluorene	ND	0.0990									
Phenanthrene	ND	0.0990									
Anthracene	ND	0.0990									
Fluoranthene	ND	0.0990									
Pyrene	ND	0.0990									
Benz(a)anthracene	ND	0.0990									
Chrysene	ND	0.0990									
Benzo(b)fluoranthene	ND	0.0990									
Benzo(k)fluoranthene	ND	0.0990									
Benzo(a)pyrene	ND	0.0990									
Indeno(1,2,3-cd)pyrene	ND	0.0990									
Dibenz(a,h)anthracene	ND	0.0990									
Benzo(g,h,i)perylene	ND	0.0990									
Surr: 2-Fluorobiphenyl	1.99		1.980		101	49.6	128				
Surr: Terphenyl-d14	2.14		1.980		108	38.2	138				

Sample ID: **LCS-34512** SampType: **LCS** Units: **µg/L** Prep Date: **11/19/2021** RunNo: **71505**
Client ID: **LCSW** Batch ID: **34512** Analysis Date: **11/22/2021** SeqNo: **1456426**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	3.37	0.0981	3.923	0	86.0	52.2	104				
2-Methylnaphthalene	3.34	0.0981	3.923	0	85.0	51.9	109				
1-Methylnaphthalene	3.23	0.0981	3.923	0	82.4	54.3	107				
Acenaphthylene	3.24	0.0981	3.923	0	82.5	55.5	110				
Acenaphthene	3.16	0.0981	3.923	0	80.4	54.3	105				

Work Order: 2111363
CLIENT: Libby Environmental
Project: Hardel

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **LCS-34512** SampType: **LCS** Units: **µg/L** Prep Date: **11/19/2021** RunNo: **71505**
Client ID: **LCSW** Batch ID: **34512** Analysis Date: **11/22/2021** SeqNo: **1456426**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluorene	3.27	0.0981	3.923	0	83.4	60.5	110				
Phenanthrene	3.34	0.0981	3.923	0	85.1	57.8	110				
Anthracene	3.17	0.0981	3.923	0	80.7	56.4	109				
Fluoranthene	3.36	0.0981	3.923	0	85.6	58.9	114				
Pyrene	3.35	0.0981	3.923	0	85.5	56.7	115				
Benz(a)anthracene	3.24	0.0981	3.923	0	82.6	53.4	115				
Chrysene	3.27	0.0981	3.923	0	83.3	52	111				
Benzo(b)fluoranthene	3.43	0.0981	3.923	0	87.3	45.3	109				
Benzo(k)fluoranthene	3.34	0.0981	3.923	0	85.2	40	117				
Benzo(a)pyrene	3.43	0.0981	3.923	0	87.4	49.1	115				
Indeno(1,2,3-cd)pyrene	3.08	0.0981	3.923	0	78.5	35.7	108				
Dibenz(a,h)anthracene	3.20	0.0981	3.923	0	81.5	36.9	111				
Benzo(g,h,i)perylene	3.19	0.0981	3.923	0	81.4	35.5	110				
Surr: 2-Fluorobiphenyl	1.99		1.962		102	49.6	128				
Surr: Terphenyl-d14	2.05		1.962		104	38.2	138				

Sample ID: **LCSD-34512** SampType: **LCSD** Units: **µg/L** Prep Date: **11/19/2021** RunNo: **71505**
Client ID: **LCSW02** Batch ID: **34512** Analysis Date: **11/22/2021** SeqNo: **1456427**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	3.27	0.0993	3.971	0	82.5	52.2	104	3.372	2.93	30	
2-Methylnaphthalene	3.32	0.0993	3.971	0	83.6	51.9	109	3.336	0.532	30	
1-Methylnaphthalene	3.20	0.0993	3.971	0	80.6	54.3	107	3.234	1.02	30	
Acenaphthylene	3.22	0.0993	3.971	0	81.2	55.5	110	3.237	0.457	30	
Acenaphthene	3.16	0.0993	3.971	0	79.6	54.3	105	3.155	0.198	30	
Fluorene	3.32	0.0993	3.971	0	83.7	60.5	110	3.273	1.57	30	
Phenanthrene	3.38	0.0993	3.971	0	85.1	57.8	110	3.339	1.15	30	
Anthracene	3.19	0.0993	3.971	0	80.3	56.4	109	3.168	0.713	30	
Fluoranthene	3.39	0.0993	3.971	0	85.4	58.9	114	3.358	0.956	30	
Pyrene	3.44	0.0993	3.971	0	86.5	56.7	115	3.353	2.43	30	

Work Order: 2111363
CLIENT: Libby Environmental
Project: Hardel

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **LCSD-34512** SampType: **LCSD** Units: **µg/L** Prep Date: **11/19/2021** RunNo: **71505**
Client ID: **LCSW02** Batch ID: **34512** Analysis Date: **11/22/2021** SeqNo: **1456427**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benz(a)anthracene	3.35	0.0993	3.971	0	84.4	53.4	115	3.242	3.25	30	
Chrysene	3.25	0.0993	3.971	0	81.9	52	111	3.266	0.398	30	
Benzo(b)fluoranthene	3.03	0.0993	3.971	0	76.2	45.3	109	3.426	12.4	30	
Benzo(k)fluoranthene	3.84	0.0993	3.971	0	96.8	40	117	3.343	14.0	30	
Benzo(a)pyrene	3.41	0.0993	3.971	0	85.8	49.1	115	3.428	0.666	30	
Indeno(1,2,3-cd)pyrene	3.05	0.0993	3.971	0	76.9	35.7	108	3.079	0.879	30	
Dibenz(a,h)anthracene	3.19	0.0993	3.971	0	80.2	36.9	111	3.196	0.341	30	
Benzo(g,h,i)perylene	3.22	0.0993	3.971	0	81.1	35.5	110	3.194	0.785	30	
Surr: 2-Fluorobiphenyl	1.95		1.985		98.2	49.6	128		0	0	
Surr: Terphenyl-d14	2.03		1.985		102	38.2	138		0	0	

Sample ID: **2111363-003ADUP** SampType: **DUP** Units: **µg/L** Prep Date: **11/19/2021** RunNo: **71505**
Client ID: **GW-MW107-111621** Batch ID: **34512** Analysis Date: **11/22/2021** SeqNo: **1456429**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	ND	0.105						0		30	
2-Methylnaphthalene	ND	0.105						0		30	
1-Methylnaphthalene	ND	0.105						0		30	
Acenaphthylene	ND	0.105						0		30	
Acenaphthene	0.278	0.105						0.2866	2.96	30	
Fluorene	ND	0.105						0		30	
Phenanthrene	ND	0.105						0		30	
Anthracene	ND	0.105						0		30	
Fluoranthene	ND	0.105						0		30	
Pyrene	ND	0.105						0		30	
Benz(a)anthracene	ND	0.105						0		30	
Chrysene	ND	0.105						0		30	
Benzo(b)fluoranthene	ND	0.105						0		30	
Benzo(k)fluoranthene	ND	0.105						0		30	
Benzo(a)pyrene	ND	0.105						0		30	

Work Order: 2111363
CLIENT: Libby Environmental
Project: Hardel

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **2111363-003ADUP** SampType: **DUP** Units: **µg/L** Prep Date: **11/19/2021** RunNo: **71505**
Client ID: **GW-MW107-111621** Batch ID: **34512** Analysis Date: **11/22/2021** SeqNo: **1456429**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Indeno(1,2,3-cd)pyrene	ND	0.105						0		30	
Dibenz(a,h)anthracene	ND	0.105						0		30	
Benzo(g,h,i)perylene	ND	0.105						0		30	
Surr: 2-Fluorobiphenyl	2.18		2.090		104	49.6	128		0		
Surr: Terphenyl-d14	2.02		2.090		96.5	38.2	138		0		

Sample ID: **2111360-001AMS** SampType: **MS** Units: **µg/L** Prep Date: **11/19/2021** RunNo: **71505**
Client ID: **BATCH** Batch ID: **34512** Analysis Date: **11/22/2021** SeqNo: **1456431**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	2.74	0.0983	3.933	0	69.6	40.8	115				
2-Methylnaphthalene	2.73	0.0983	3.933	0	69.4	41.8	118				
1-Methylnaphthalene	2.68	0.0983	3.933	0	68.2	44.9	116				
Acenaphthylene	2.77	0.0983	3.933	0	70.4	46.9	115				
Acenaphthene	2.62	0.0983	3.933	0	66.7	47.3	112				
Fluorene	2.82	0.0983	3.933	0	71.6	54	113				
Phenanthrene	2.81	0.0983	3.933	0	71.5	46.5	120				
Anthracene	2.76	0.0983	3.933	0	70.1	42.3	118				
Fluoranthene	2.85	0.0983	3.933	0.04680	71.4	41.4	127				
Pyrene	2.80	0.0983	3.933	0	71.2	34.1	128				
Benz(a)anthracene	2.75	0.0983	3.933	0	69.8	35.4	124				
Chrysene	2.68	0.0983	3.933	0	68.1	36.1	120				
Benzo(b)fluoranthene	2.78	0.0983	3.933	0	70.6	24.3	119				
Benzo(k)fluoranthene	2.77	0.0983	3.933	0	70.5	20.5	134				
Benzo(a)pyrene	2.84	0.0983	3.933	0	72.2	22.3	130				
Indeno(1,2,3-cd)pyrene	2.51	0.0983	3.933	0	63.7	19.3	118				
Dibenz(a,h)anthracene	2.62	0.0983	3.933	0	66.7	19.5	122				
Benzo(g,h,i)perylene	2.67	0.0983	3.933	0.03799	67.0	9.14	124				
Surr: 2-Fluorobiphenyl	1.67		1.967		84.8	49.6	128				
Surr: Terphenyl-d14	1.63		1.967		83.0	38.2	138				

Work Order: 2111363
CLIENT: Libby Environmental
Project: Hardel

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **2111360-001AMS** SampType: **MS** Units: **µg/L** Prep Date: **11/19/2021** RunNo: **71505**
Client ID: **BATCH** Batch ID: **34512** Analysis Date: **11/22/2021** SeqNo: **1456431**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sample Log-In Check List

Client Name:	**LIBBY**	Work Order Number:	**2111363**
Logged by:	**Clare Griggs**	Date Received:	**11/17/2021 10:00:00 AM**

Chain of Custody

1.	Is Chain of Custody complete?	Yes	☑	No ☐	Not Present	☐
2.	How was the sample delivered?	UPS				

Log In

3.	Coolers are present?	Yes	☑	No ☐	NA	☐
4.	Shipping container/cooler in good condition?	Yes	☑	No ☐		
5.	Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact)	Yes	☐	No ☐	Not Present	☑
6.	Was an attempt made to cool the samples?	Yes	☐	No ☑	NA	☐
		Unknown prior to receipt.				
7.	Were all items received at a temperature of >2°C to 6°C *	Yes	☐	No ☐	NA	☑
8.	Sample(s) in proper container(s)?	Yes	☑	No ☐		
9.	Sufficient sample volume for indicated test(s)?	Yes	☑	No ☐		
10.	Are samples properly preserved?	Yes	☑	No ☐		
11.	Was preservative added to bottles?	Yes	☑	No ☐	NA	☐
						HNO3
12.	Is there headspace in the VOA vials?	Yes	☐	No ☐	NA	☑
13.	Did all samples containers arrive in good condition(unbroken)?	Yes	☑	No ☐		
14.	Does paperwork match bottle labels?	Yes	☑	No ☐		
15.	Are matrices correctly identified on Chain of Custody?	Yes	☑	No ☐		
16.	Is it clear what analyses were requested?	Yes	☑	No ☐		
17.	Were all holding times able to be met?	Yes	☑	No ☐		

Special Handling (if applicable)

18.	Was client notified of all discrepancies with this order?	Yes	☑	No ☐	NA	☐

Person Notified:	Korv Dixon	Date:	11/17/2021
By Whom:	Clare Griggs	Via:	☑ eMail ☐ Phone ☐ Fax ☐ In Person
Regarding:	Dissolved metals volume.		
Client Instructions:	Volume was field filtered.		

19. Additional remarks:

Item Information

Item #	Temp ºC
Sample	7.2

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

Libby Environmental, Inc.

3322 South Bay Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Chain of Custody Record

2111363

www.LibbyEnvironmental.com

Date: 11/16/21 Page: 1 of 1

Client: Libby Environmental, Inc.
Address: (SEE ABOVE)
City: State: Zip:
Phone: Fax:
Client Project # L211116-4

Project Manager: Kodey Eley
Project Name: Hardel
Location: City, State: Olympia, WA
Collector: AR Date of Collection: 11/16/21
Email: libbyenve@gmail.com

	Sample Number	Depth	Time	Sample Type	Container Type	VOC 8260	PCE & Daughter Prod.	NWTPH-Gx	BTEX (8260) / (8021)	NWTPH-HCID	NWTPH-Dx / Dx	PCB 8082	MTCA 5 Metals	RCRA 8 Metals	c PAH 8270	PAH 8270	Semi Vol 8270	Dissolved As, Ag		Field Notes
1	GW-MW103-111621	—	9:11	grab											X		X			
2	GW-MW106-111621	—	10:06	1											X		X			
3	GW-MW107-11-1621	—	10:33	1											X		X			run dup on 107
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				

Relinquished by:	Date / Time	Received by:	Date / Time
	11/16/21	Justine Martin	11/17 10:00
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt

Good Condition?	Y	N
Cooler Temp.		°C
Sample Temp.		°C
Total Number of Containers		

Remarks: STD TAT
Please run Dup on GW-MW107-111621 for all analyses

TAT: 24HR 48HR 5-DAY

Distribution: White - Lab, Yellow - Originator

Libby Environmental, Inc.

3322 South Bay Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Chain of Custody Record

2111363

www.LibbyEnvironmental.com

Date: 11/16/21 Page: 1 of 1

Client: Libby Environmental, Inc.
Address: (SEE ABOVE)
City: State: Zip:
Phone: Fax:
Client Project # L211116-4

Project Manager: Kodey Eley
Project Name: Hardel
Location: City, State: Olympia, WA
Collector: AR Date of Collection: 11/16/21
Email: libbyenve@gmail.com

	Sample Number	Depth	Time	Sample Type	Container Type	VOC 8260	PCE & Daughter Prod.	NWTPH-Gx	BTEX (8260) / (8021)	NWTPH-HCID	NWTPH-Dx / Dx	PCB 8082	MTCA 5 Metals	RCRA 8 Metals	c PAH 8270	PAH 8270	Semi Vol 8270	Dissolved As, Ag		Field Notes
1	GW-MW103-111621	—	9:11	grab											X		X			
2	GW-MW106-111621	—	10:06	1											X		X			
3	GW-MW107-11-1621	—	10:33	1											X		X			run dup on 107
4																				Rerun Diss Ag per KI Std TAT, 12/9/21 -CG
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				

Relinquished by:	Date / Time	Received by:	Date / Time
	11/16/21	Justine Martin	11/17 10:00
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt

Good Condition?	Y	N
Cooler Temp.		°C
Sample Temp.		°C
Total Number of Containers		

Remarks: STD TAT
Please run Dup on GW-MW107-111621 for all analyses

TAT: 24HR 48HR 5-DAY

Distribution: White - Lab, Yellow - Originator

Libby Environmental, Inc.
3322 South Bay Road NE • Olympia, WA 98506-2957

February 9, 2022

Joel Hecker
Pioneer Technologies Corporation
5205 Corporate Center Ct SE, Suite C
Lacey, WA 98503

Dear Mr. Hecker:

Please find enclosed the analytical data report for the Hardel Project located in Olympia, Washington.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. The sample(s) will be disposed of within 30 days unless we are contacted to arrange long term storage.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Sherry L. Chilcutt
Senior Chemist
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@gmail.com

Libby Environmental, Inc.

Chain of Custody Record

www.LibbyEnvironmental.com

3322 South Bay Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Client: ~~Hardel~~ Pioneer Tech.
Address: 5205 Corporate Center Ct. SE
City: Olympia State: WA Zip: 98503
Phone: 360-828-3739 Fax:
Client Project # Hardel

Date: 2/1/22 Page: 1 of 1
Project Manager: Joel Hecker
Project Name: Hardel
Location: Hardel City, State: Oly, WA
Collector: JH Date of Collection: 2/1/22
Email: Heckerj@uspioneer.com

Sample Number	Depth	Time	Sample Type	Container Type	VOC 8260	PCE & Daughter Prod.	NWTPH-Gx	BTEX (8260) / (8021)	NWTPH-HCID	NWTPH-Dx / Dx	PCB 8082	MTCA 5 Metals	RCRA 8 Metals	c PAH 8270	PAH 8270	Semi Vol 8270	MTCA VOCs	Dissolved As/Ag	Field Notes
1 GW-MW07-020122	3-18	11:42	G	mult		X	X			X					X		X	X	
2 TB-020122						X											X		
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			
11																			
12																			
13																			
14																			
15																			
16																			
17																			

Relinquished by:	Date / Time	Received by:	Date / Time
[signature]	2/1/22 1301	[signature]	2/1/22 1301
Relinquished by:	Date / Time	Received by:	Date / Time
Relinquished by:	Date / Time	Received by:	Date / Time

Sample Receipt

Good Condition?	Y	N
Cooler Temp.		°C
Sample Temp.		°C
Total Number of Containers		

Remarks:

TAT: 24HR 48HR 5-DAY

Distribution: White - Lab, Yellow - Originator

Libby Environmental, Inc.

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Olympia, WA 98506
Phone: (360) 352-2110
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Email: libbyenv@gmail.com

HARDEL PROJECT
Pioneer Technologies
Olympia, Washington
Libby Project # L22B004

Volatile Organic Compounds by EPA Method 8260D in Water

Sample Description		Method Blank	GW-MW107-020122	GW-MW107-020122 Dup	TB-020122
Date Sampled		N/A	2/1/2022	2/1/2022	2/1/2022
Date Analyzed	PQL (µg/L)	2/3/2022 (µg/L)	2/3/2022 (µg/L)	2/3/2022 (µg/L)	2/3/2022 (µg/L)
Vinyl Chloride (VC)	0.2	nd	nd	nd	nd
1,1-Dichloroethene	0.5	nd	nd	nd	nd
trans-1,2-Dichloroethene	1.0	nd	nd	nd	nd
cis-1,2-Dichloroethene	1.0	nd	nd	nd	nd
Trichloroethene (TCE)	0.4	nd	nd	nd	nd
Tetrachloroethene (PCE)	1.0	nd	nd	nd	nd
Benzene	1.0	nd	nd	nd	nd
Toluene	1.0	nd	nd	nd	nd
Ethylbenzene	1.0	nd	nd	nd	nd
Total Xylenes	2.0	nd	nd	nd	nd
1,2-Dichloroethane (EDC)	1.0	nd	nd	nd	nd
1,2-Dibromoethane (EDB)	0.01	nd	nd	nd	nd
Naphthalene	5.0	nd	nd	nd	nd
1-Methylnaphthalene	5.0	nd	nd	nd	nd
2-Methylnaphthalene	5.0	nd	nd	nd	nd
Methyl *tert*-Butyl Ether (MTBE)	5.0	nd	nd	nd	nd
Surrogate Recovery					
Dibromofluoromethane		129	138 S	128	132
1,2-Dichloroethane-d4		133	146 S	136 S	132
Toluene-d8		99	96	89	94
4-Bromofluorobenzene		92	101	96	91

"nd" Indicates not detected at listed detection limit.
"S" Spike compound recovery is outside acceptance limits (High Bias). Sample is nd, no further action required.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE : 65% TO 135%

ANALYSES PERFORMED BY: Sherry Chilcutt

Libby Environmental, Inc.

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Email: libbyenv@gmail.com

HARDEL PROJECT
Pioneer Technologies
Olympia, Washington
Libby Project # L22B004

QA/QC for Volatile Organic Compounds by EPA Method 8260D in Water

Matrix Spike Sample Identification: GW-MW107-020122
Date Analyzed: 2/3/2022

	Spiked Conc. (µg/L)	MS Response (µg/L)	MSD Response (µg/L)	MS Recovery (%)	MSD Recovery (%)	RPD (%)	Limits Recovery (%)	Data Flag
Vinyl Chloride (VC)	5.0	4.7	6.2	94	125	28.2	65-135	
1,1-Dichloroethene	5.0	5.7	6.7	114	133	15.7	65-135	
trans-1,2-Dichloroethene	5.0	6.1	7.5	122	150	20.3	65-135	S
cis-1,2-Dichloroethene	5.0	3.3	3.9	66	79	17.7	65-135	
Trichloroethene (TCE)	5.0	4.0	4.8	80	96	18.2	65-135	
Tetrachloroethene (PCE)	5.0	4.1	5.4	83	109	27.4	65-135	
Methyl *tert*- Butyl Ether (MTBE)	5.0	4.2	4.5	84	91	7.8	65-135	
Benzene	5.0	3.7	4.6	75	93	21.5	65-135	
1,2-Dichloroethane (EDC)	5.0	5.1	5.8	102	115	11.8	65-135	
Toluene	5.0	3.7	4.5	74	89	18.7	65-135	
1,2-Dibromoethane (EDB)	5.0	4.6	4.4	92	88	4.2	65-135	
Ethylbenzene	5.0	3.7	4.7	74	95	24.6	65-135	
Total Xylenes	15.0	10.3	13.2	69	88	24.7	65-135	
Naphthalene	5.0	3.5	3.5	71	69	2.6	65-135	
1-Methylnaphthalene	5.0	4.5	3.4	89	68	26.5	65-135	
2-Methylnaphthalene	5.0	3.5	3.2	71	65	8.6	65-135	

Surrogate Recovery (%)	MS	MSD	
Dibromofluoromethane	119	114	65-135
1,2-Dichloroethane-d4	126	110	65-135
Toluene-d8	91	87	65-135
4-Bromofluorobenzene	99	97	65-135

ACCEPTABLE RPD IS 35%
"S" Spike compound recovery is outside acceptance limits. A duplicate analysis was performed with acceptable recovery.

ANALYSES PERFORMED BY: Sherry Chilcutt

Libby Environmental, Inc.

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HARDEL PROJECT
Pioneer Technologies
Olympia, Washington
Libby Project # L22B004

Laboratory Control Sample

Date Analyzed: 2/3/2022

	Spiked Conc. (µg/L)	LCS Response (µg/L)	LCS Recovery (%)	LCS Recovery Limits (%)	Data Flag
Vinyl Chloride (VC)	5.0	4.5	90	80-120	
1,1-Dichloroethene	5.0	5.3	106	80-120	
trans-1,2-Dichloroethene	5.0	5.8	117	80-120	
cis-1,2-Dichloroethene	5.0	4.1	83	80-120	
Trichloroethene (TCE)	5.0	4.4	88	80-120	
Tetrachloroethene (PCE)	5.0	5.3	106	80-120	
Methyl *tert*- Butyl Ether (MTBE)	5.0	5.9	117	80-120	
Benzene	5.0	4.2	84	80-120	
1,2-Dichloroethane (EDC)	5.0	5.0	99	80-120	
Toluene	5.0	4.5	90	80-120	
1,2-Dibromoethane (EDB)	5.0	5.0	99	80-120	
Ethylbenzene	5.0	4.5	89	80-120	
Total Xylenes	15.0	13.1	88	80-120	
Naphthalene	5.0	5.5	110	80-120	
1-Methylnaphthalene	5.0	5.4	108	80-120	
2-Methylnaphthalene	5.0	4.6	92	80-120	
Surrogate Recovery					
Dibromofluoromethane			108	65-135	
1,2-Dichloroethane-d4			110	65-135	
Toluene-d8			88	65-135	
4-Bromofluorobenzene			99	65-135	

ANALYSES PERFORMED BY: Sherry Chilcutt

Libby Environmental, Inc.

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Email: libbyenv@gmail.com

HARDEL PROJECT
Pioneer Technologies
Olympia, Washington
Libby Project # L22B004

Analyses of Gasoline (NWTPH-Gx) in Water

Sample Number	Date Analyzed	Surrogate Recovery (%)	Gasoline (µg/L)
Method Blank	2/3/2022	99	nd
GW-MW107-020122	2/3/2022	96	nd
GW-MW107-020122 Dup	2/3/2022	89	nd
Practical Quantitation Limit			100

"nd" Indicates not detected at the listed detection limits.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (Toluene-d8): 65% TO 135%

ANALYSES PERFORMED BY: Sherry Chilcutt

Libby Environmental, Inc.

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HARDEL PROJECT
Pioneer Technologies
Olympia, Washington
Libby Project # L22B004

Analyses of Diesel & Oil (NWTPH-Dx/Dx Extended) in Water

Sample Number	Date Analyzed	Surrogate Recovery (%)	Diesel (µg/L)	Oil (µg/L)
Method Blank	2/3/2022	81	nd	nd
GW-MW107-020122	2/3/2022	67	nd	nd
Practical Quantitation Limit			200	400

"nd" Indicates not detected at the listed detection limits.
"int" Indicates that interference prevents determination.

ACCEPTABLE RECOVERY LIMITS FOR SURROGATE (2-F Biphenyl): 42% TO 150%

ANALYSES PERFORMED BY: Randolph Kraus

Libby Environmental, Inc.

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HARDEL PROJECT
Pioneer Technologies
Olympia, Washington
Libby Project # L22B004

Analyses of Dissolved Arsenic in Water by EPA Method 7010 Series

Sample Number	Date Analyzed	Arsenic (µg/L)
Method Blank	2/3/2022	nd
GW-MW107-020122	2/3/2022	nd
GW-MW107-020122 Dup	2/3/2022	nd
Practical Quantitation Limit		3.0

"nd" Indicates not detected at the listed detection limits.

ANALYSES PERFORMED BY: Eric Welte

Libby Environmental, Inc.

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Olympia, WA 98506
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FAX: (360) 352-4154
Email: libbyenv@gmail.com

HARDEL PROJECT
Pioneer Technologies
Olympia, Washington
Libby Project # L22B004

QA/QC Dissolved Arsenic by EPA Method 7010 Series in Water

Sample Number	Date Analyzed	Arsenic (% Recovery)
LCS	2/3/2022	97%
LCS Dup	2/3/2022	104%
RPD	2/3/2022	7%
GW-MW107-020122 MS	2/3/2022	112%
GW-MW107-020122 MSD	2/3/2022	107%
RPD	2/3/2022	5%

ACCEPTABLE RECOVERY LIMITS FOR MATRIX SPIKES: 75%-125%
ACCEPTABLE RPD IS 20%

ANALYSES PERFORMED BY: Eric Welte

Libby Environmental, Inc.

3322 South Bay Road NE
Olympia, WA 98506
Phone: (360) 352-2110
FAX: (360) 352-4154
Email: libbyenv@gmail.com

HARDEL PROJECT
Pioneer Technologies
Libby Project # L22B004
Date Received 2/1/22 13:01

Received By RJK

Sample Receipt Checklist

Chain of Custody

1. Is the Chain of Custody complete?	☑ Yes	☐ No	
2. How was the sample delivered?	☑ Hand Delivered	☐ Picked Up	☐ Shipped

Log In

3. Cooler or Shipping Container is present.	☑ Yes	☐ No	☐ N/A
4. Cooler or Shipping Container is in good condition.	☑ Yes	☐ No	☐ N/A
5. Cooler or Shipping Container has Custody Seals present.	☐ Yes	☑ No	☐ N/A
6. Was an attempt made to cool the samples?	☑ Yes	☐ No	☐ N/A
7. Temperature of cooler (0°C to 8°C recommended)	-6.3 °C		
8. Temperature of sample(s) (0°C to 8°C recommended)	0.6 °C		
9. Did all containers arrive in good condition (unbroken)?	☑ Yes	☐ No	
10. Is it clear what analyses were requested?	☑ Yes	☐ No	
11. Did container labels match Chain of Custody?	☑ Yes	☐ No	
12. Are matrices correctly identified on Chain of Custody?	☑ Yes	☐ No	
13. Are correct containers used for the analysis indicated?	☑ Yes	☐ No	
14. Is there sufficient sample volume for indicated analysis?	☑ Yes	☐ No	
15. Were all containers properly preserved per each analysis?	☑ Yes	☐ No	
16. Were VOA vials collected correctly (no headspace)?	☑ Yes	☐ No	☐ N/A
17. Were all holding times able to be met?	☑ Yes	☐ No	

Discrepancies/ Notes

18. Was client notified of all discrepancies? ☐ Yes ☐ No ☑ N/A

Person Notified: _____ Date: _____

By Whom: _____ Via: _____

Regarding: _____

19. Comments. _____

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Libby Environmental
Sherry Chilcutt
3322 South Bay Road NE
Olympia, WA 98506

RE: Hardel
Work Order Number: 2202030

February 09, 2022

Attention Sherry Chilcutt:

Fremont Analytical, Inc. received 1 sample(s) on 2/2/2022 for the analyses presented in the following report.

Dissolved Metals by EPA Method 200.8
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

Date: *02/09/2022*

CLIENT: Libby Environmental
Project: Hardel
Work Order: 2202030

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2202030-001	GW-MW107-020122	02/01/2022 11:42 AM	02/02/2022 9:14 AM
2202030-001	GW-MW107-020122	02/01/2022 11:42 AM	02/02/2022 9:14 AM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Case Narrative

WO#: **2202030**
Date: **2/9/2022**

CLIENT: Libby Environmental
Project: Hardel

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

* - Flagged value is not within established control limits
B - Analyte detected in the associated Method Blank
D - Dilution was required
E - Value above quantitation range
H - Holding times for preparation or analysis exceeded
I - Analyte with an internal standard that does not meet established acceptance criteria
J - Analyte detected below Reporting Limit
N - Tentatively Identified Compound (TIC)
Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria
S - Spike recovery outside accepted recovery limits
ND - Not detected at the Reporting Limit
R - High relative percent difference observed

Acronyms:

%Rec - Percent Recovery
CCB - Continued Calibration Blank
CCV - Continued Calibration Verification
DF - Dilution Factor
DUP - Sample Duplicate
HEM - Hexane Extractable Material
ICV - Initial Calibration Verification
LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
MCL - Maximum Contaminant Level
MB or MBLANK - Method Blank
MDL - Method Detection Limit
MS/MSD - Matrix Spike / Matrix Spike Duplicate
PDS - Post Digestion Spike
Ref Val - Reference Value
REP - Sample Replicate
RL - Reporting Limit
RPD - Relative Percent Difference
SD - Serial Dilution
SGT - Silica Gel Treatment
SPK - Spike
Surr - Surrogate

Analytical Report

Work Order: **2202030**
Date Reported: **2/9/2022**

Client: Libby Environmental
Collection Date: 2/1/2022 11:42:00 AM
Project: Hardel
Lab ID: 2202030-001
Matrix: Water
Client Sample ID: **GW-MW107-020122**

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)				Batch ID: 35281		Analyst: SB
Naphthalene	ND	0.0992		µg/L	1	2/8/2022 4:31:56 PM
2-Methylnaphthalene	ND	0.0992		µg/L	1	2/8/2022 4:31:56 PM
1-Methylnaphthalene	ND	0.0992		µg/L	1	2/8/2022 4:31:56 PM
Acenaphthylene	ND	0.0992		µg/L	1	2/8/2022 4:31:56 PM
Acenaphthene	0.305	0.0992		µg/L	1	2/8/2022 4:31:56 PM
Fluorene	ND	0.0992		µg/L	1	2/8/2022 4:31:56 PM
Phenanthrene	ND	0.0992		µg/L	1	2/8/2022 4:31:56 PM
Anthracene	ND	0.0992		µg/L	1	2/8/2022 4:31:56 PM
Fluoranthene	ND	0.0992		µg/L	1	2/8/2022 4:31:56 PM
Pyrene	ND	0.0992		µg/L	1	2/8/2022 4:31:56 PM
Benz(a)anthracene	ND	0.0992		µg/L	1	2/8/2022 4:31:56 PM
Chrysene	ND	0.0992		µg/L	1	2/8/2022 4:31:56 PM
Benzo(b)fluoranthene	ND	0.0992		µg/L	1	2/8/2022 4:31:56 PM
Benzo(k)fluoranthene	ND	0.0992		µg/L	1	2/8/2022 4:31:56 PM
Benzo(a)pyrene	ND	0.0992		µg/L	1	2/8/2022 4:31:56 PM
Indeno(1,2,3-cd)pyrene	ND	0.0992		µg/L	1	2/8/2022 4:31:56 PM
Dibenz(a,h)anthracene	ND	0.0992		µg/L	1	2/8/2022 4:31:56 PM
Benzo(g,h,i)perylene	ND	0.0992		µg/L	1	2/8/2022 4:31:56 PM
Surr: 2-Fluorobiphenyl	93.5	49.6 - 128		%Rec	1	2/8/2022 4:31:56 PM
Surr: Terphenyl-d14	97.9	38.2 - 138		%Rec	1	2/8/2022 4:31:56 PM
Dissolved Metals by EPA Method 200.8				Batch ID: 35273		Analyst: EH
Silver	ND	0.350		µg/L	1	2/7/2022 12:47:15 PM

Work Order: 2202030
CLIENT: Libby Environmental
Project: Hardel

QC SUMMARY REPORT

Dissolved Metals by EPA Method 200.8

Sample ID: **MB-35272FB**	SampType: **MBLK**	Units: **µg/L**	Prep Date: **2/7/2022**	RunNo: **73092**
Client ID: **MBLKW**	Batch ID: **35273**		Analysis Date: **2/7/2022**	SeqNo: **1492419**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Silver	ND	0.350									

NOTES:
Filter Blank

Sample ID: **MB-35273**	SampType: **MBLK**	Units: **µg/L**	Prep Date: **2/7/2022**	RunNo: **73092**
Client ID: **MBLKW**	Batch ID: **35273**		Analysis Date: **2/7/2022**	SeqNo: **1492420**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Silver	ND	0.350									

Sample ID: **LCS-35273**	SampType: **LCS**	Units: **µg/L**	Prep Date: **2/7/2022**	RunNo: **73092**
Client ID: **LCSW**	Batch ID: **35273**		Analysis Date: **2/7/2022**	SeqNo: **1492421**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Silver	25.5	0.350	25.00	0	102	85	115				

Sample ID: **2201550-001BDUP**	SampType: **DUP**	Units: **µg/L**	Prep Date: **2/7/2022**	RunNo: **73092**
Client ID: **BATCH**	Batch ID: **35273**		Analysis Date: **2/7/2022**	SeqNo: **1492423**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Silver	ND	0.350						0		30	

Sample ID: **2201550-001BMS**	SampType: **MS**	Units: **µg/L**	Prep Date: **2/7/2022**	RunNo: **73092**
Client ID: **BATCH**	Batch ID: **35273**		Analysis Date: **2/7/2022**	SeqNo: **1492426**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Silver	24.9	0.350	25.00	0	99.6	70	130				

Work Order: 2202030
CLIENT: Libby Environmental
Project: Hardel

QC SUMMARY REPORT

Dissolved Metals by EPA Method 200.8

Sample ID: **2201550-001BMSD** SampType: **MSD** Units: **µg/L** Prep Date: **2/7/2022** RunNo: **73092**
Client ID: **BATCH** Batch ID: **35273** Analysis Date: **2/7/2022** SeqNo: **1492427**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Silver	23.3	0.350	25.00	0	93.2	70	130	24.91	6.69	30	

Work Order: 2202030
CLIENT: Libby Environmental
Project: Hardel

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **MB-35281** SampType: **MBLK** Units: **µg/L** Prep Date: **2/7/2022** RunNo: **73156**
Client ID: **MBLKW** Batch ID: **35281** Analysis Date: **2/8/2022** SeqNo: **1494220**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	ND	0.100									
2-Methylnaphthalene	ND	0.100									
1-Methylnaphthalene	ND	0.100									
Acenaphthylene	ND	0.100									
Acenaphthene	ND	0.100									
Fluorene	ND	0.100									
Phenanthrene	ND	0.100									
Anthracene	ND	0.100									
Fluoranthene	ND	0.100									
Pyrene	ND	0.100									
Benz(a)anthracene	ND	0.100									
Chrysene	ND	0.100									
Benzo(b)fluoranthene	ND	0.100									
Benzo(k)fluoranthene	ND	0.100									
Benzo(a)pyrene	ND	0.100									
Indeno(1,2,3-cd)pyrene	ND	0.100									
Dibenz(a,h)anthracene	ND	0.100									
Benzo(g,h,i)perylene	ND	0.100									
Surr: 2-Fluorobiphenyl	1.54		2.000		76.9	49.6	128				
Surr: Terphenyl-d14	1.94		2.000		97.1	38.2	138				

Sample ID: **LCS-35281** SampType: **LCS** Units: **µg/L** Prep Date: **2/7/2022** RunNo: **73156**
Client ID: **LCSW** Batch ID: **35281** Analysis Date: **2/8/2022** SeqNo: **1494221**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	2.69	0.100	4.000	0	67.1	52.2	104				
2-Methylnaphthalene	2.79	0.100	4.000	0	69.7	51.9	109				
1-Methylnaphthalene	2.81	0.100	4.000	0	70.2	54.3	107				
Acenaphthylene	2.62	0.100	4.000	0	65.4	55.5	110				
Acenaphthene	2.98	0.100	4.000	0	74.4	54.3	105				

Work Order: 2202030
CLIENT: Libby Environmental
Project: Hardel

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **LCS-35281** SampType: **LCS** Units: **µg/L** Prep Date: **2/7/2022** RunNo: **73156**
Client ID: **LCSW** Batch ID: **35281** Analysis Date: **2/8/2022** SeqNo: **1494221**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluorene	3.24	0.100	4.000	0	81.0	60.5	110				
Phenanthrene	3.25	0.100	4.000	0	81.4	57.8	110				
Anthracene	3.19	0.100	4.000	0	79.7	56.4	109				
Fluoranthene	3.21	0.100	4.000	0	80.3	58.9	114				
Pyrene	3.13	0.100	4.000	0	78.1	56.7	115				
Benz(a)anthracene	2.93	0.100	4.000	0	73.2	53.4	115				
Chrysene	3.42	0.100	4.000	0	85.4	52	111				
Benzo(b)fluoranthene	3.44	0.100	4.000	0	86.0	45.3	109				
Benzo(k)fluoranthene	3.07	0.100	4.000	0	76.9	40	117				
Benzo(a)pyrene	2.79	0.100	4.000	0	69.7	49.1	115				
Indeno(1,2,3-cd)pyrene	3.07	0.100	4.000	0	76.9	35.7	108				
Dibenz(a,h)anthracene	3.11	0.100	4.000	0	77.8	36.9	111				
Benzo(g,h,i)perylene	3.06	0.100	4.000	0	76.4	35.5	110				
Surr: 2-Fluorobiphenyl	1.51		2.000		75.7	49.6	128				
Surr: Terphenyl-d14	1.69		2.000		84.5	38.2	138				

Sample ID: **LCSD-35281** SampType: **LCSD** Units: **µg/L** Prep Date: **2/7/2022** RunNo: **73156**
Client ID: **LCSW02** Batch ID: **35281** Analysis Date: **2/8/2022** SeqNo: **1494222**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	3.42	0.100	4.000	0	85.4	52.2	104	2.686	24.0	30	
2-Methylnaphthalene	3.72	0.100	4.000	0	93.1	51.9	109	2.790	28.7	30	
1-Methylnaphthalene	3.77	0.100	4.000	0	94.1	54.3	107	2.809	29.1	30	
Acenaphthylene	3.50	0.100	4.000	0	87.5	55.5	110	2.617	28.9	30	
Acenaphthene	3.64	0.100	4.000	0	90.9	54.3	105	2.977	20.0	30	
Fluorene	3.59	0.100	4.000	0	89.8	60.5	110	3.239	10.3	30	
Phenanthrene	3.65	0.100	4.000	0	91.3	57.8	110	3.254	11.5	30	
Anthracene	3.50	0.100	4.000	0	87.5	56.4	109	3.189	9.32	30	
Fluoranthene	3.63	0.100	4.000	0	90.8	58.9	114	3.210	12.4	30	
Pyrene	3.62	0.100	4.000	0	90.5	56.7	115	3.126	14.7	30	

Work Order: 2202030
CLIENT: Libby Environmental
Project: Hardel

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **LCSD-35281** SampType: **LCSD** Units: **µg/L** Prep Date: **2/7/2022** RunNo: **73156**
Client ID: **LCSW02** Batch ID: **35281** Analysis Date: **2/8/2022** SeqNo: **1494222**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benz(a)anthracene	3.56	0.100	4.000	0	88.9	53.4	115	2.929	19.4	30	
Chrysene	3.91	0.100	4.000	0	97.7	52	111	3.416	13.4	30	
Benzo(b)fluoranthene	3.82	0.100	4.000	0	95.5	45.3	109	3.441	10.4	30	
Benzo(k)fluoranthene	3.13	0.100	4.000	0	78.2	40	117	3.074	1.73	30	
Benzo(a)pyrene	2.92	0.100	4.000	0	73.0	49.1	115	2.789	4.62	30	
Indeno(1,2,3-cd)pyrene	3.50	0.100	4.000	0	87.4	35.7	108	3.074	12.8	30	
Dibenz(a,h)anthracene	3.56	0.100	4.000	0	89.1	36.9	111	3.113	13.5	30	
Benzo(g,h,i)perylene	3.38	0.100	4.000	0	84.5	35.5	110	3.055	10.2	30	
Surr: 2-Fluorobiphenyl	1.95		2.000		97.7	49.6	128		0	0	
Surr: Terphenyl-d14	1.95		2.000		97.3	38.2	138		0	0	

Sample ID: **2202027-002AMS** SampType: **MS** Units: **µg/L** Prep Date: **2/7/2022** RunNo: **73156**
Client ID: **BATCH** Batch ID: **35281** Analysis Date: **2/8/2022** SeqNo: **1494225**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	2.89	0.103	4.133	0	69.9	40.8	115				
2-Methylnaphthalene	3.21	0.103	4.133	0	77.6	41.8	118				
1-Methylnaphthalene	3.26	0.103	4.133	0	78.9	44.9	116				
Acenaphthylene	3.29	0.103	4.133	0	79.6	46.9	115				
Acenaphthene	3.38	0.103	4.133	0	81.7	47.3	112				
Fluorene	3.60	0.103	4.133	0	87.0	54	113				
Phenanthrene	3.60	0.103	4.133	0	87.1	46.5	120				
Anthracene	3.58	0.103	4.133	0	86.7	42.3	118				
Fluoranthene	3.55	0.103	4.133	0	85.8	41.4	127				
Pyrene	3.55	0.103	4.133	0	85.9	34.1	128				
Benz(a)anthracene	3.38	0.103	4.133	0	81.8	35.4	124				
Chrysene	3.52	0.103	4.133	0	85.2	36.1	120				
Benzo(b)fluoranthene	2.99	0.103	4.133	0	72.3	24.3	119				
Benzo(k)fluoranthene	3.19	0.103	4.133	0	77.2	20.5	134				
Benzo(a)pyrene	2.78	0.103	4.133	0	67.3	22.3	130				

Work Order: 2202030
CLIENT: Libby Environmental
Project: Hardel

QC SUMMARY REPORT

Polyaromatic Hydrocarbons by EPA Method 8270 (SIM)

Sample ID: **2202027-002AMS** SampType: **MS** Units: **µg/L** Prep Date: **2/7/2022** RunNo: **73156**
Client ID: **BATCH** Batch ID: **35281** Analysis Date: **2/8/2022** SeqNo: **1494225**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Indeno(1,2,3-cd)pyrene	2.59	0.103	4.133	0	62.6	19.3	118				
Dibenz(a,h)anthracene	2.66	0.103	4.133	0	64.4	19.5	122				
Benzo(g,h,i)perylene	2.51	0.103	4.133	0	60.8	9.14	124				
Surr: 2-Fluorobiphenyl	1.81		2.066		87.4	49.6	128				
Surr: Terphenyl-d14	1.80		2.066		86.9	38.2	138				

Sample Log-In Check List

Client Name:	**LIBBY**	Work Order Number:	**2202030**
Logged by:	**Gabrielle Coeuille**	Date Received:	**2/2/2022 9:14:00 AM**

Chain of Custody

1.	Is Chain of Custody complete?	Yes	☑	No ☐	Not Present	☐
2.	How was the sample delivered?	UPS				

Log In

3.	Coolers are present?	Yes	☑	No ☐	NA	☐
4.	Shipping container/cooler in good condition?	Yes	☑	No ☐		
5.	Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact)	Yes	☐	No ☐	Not Present	☑
6.	Was an attempt made to cool the samples?	Yes	☑	No ☐	NA	☐
7.	Were all items received at a temperature of >2°C to 6°C *	Yes	☑	No ☐	NA	☐
8.	Sample(s) in proper container(s)?	Yes	☑	No ☐		
9.	Sufficient sample volume for indicated test(s)?	Yes	☑	No ☐		
10.	Are samples properly preserved?	Yes	☑	No ☐		
11.	Was preservative added to bottles?	Yes	☐	No ☑	NA	☐
12.	Is there headspace in the VOA vials?	Yes	☐	No ☐	NA	☑
13.	Did all samples containers arrive in good condition(unbroken)?	Yes	☑	No ☐		
14.	Does paperwork match bottle labels?	Yes	☑	No ☐		
15.	Are matrices correctly identified on Chain of Custody?	Yes	☑	No ☐		
16.	Is it clear what analyses were requested?	Yes	☑	No ☐		
17.	Were all holding times able to be met?	Yes	☑	No ☐		

Special Handling (if applicable)

18.	Was client notified of all discrepancies with this order?	Yes	☐	No ☐	NA	☑

Person Notified: _____ Date: _____

By Whom: _____ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding: _____

Client Instructions: _____

19. Additional remarks:

Item Information

Item #	Temp ºC
Sample 1	3.7

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

F

Libby Environmental, Inc.

3322 South Bay Road NE
Olympia, WA 98506
Ph: 360-352-2110
Fax: 360-352-4154

Chain of Custody Record

www.LibbyEnvironmental.com

2202030

Date: 2-1-22 Page: 1 of 1

Client: Libby Environmental, Inc
Address: (See Above)
City: State: Zip:
Phone: Fax:
Client Project # L22Bec04

Project Manager: Sherry Chikutt
Project Name: Hardel
Location: City, State: Olympia, WA
Collector: JH Date of Collection: 2-1-22
Email: libbyenv@gmail.com

	Sample Number	Depth	Time	Sample Type	Container Type	VOC 8260	PCE & Daughter Prod.	NWTPH-Gx	BTEX (8260) / (8021)	NWTPH-HCID	NWTPH-Dx / Dx	PCB 8082	MTCA 5 Metals	RCRA 8 Metals	c PAH 8270	PAH 8270	Semi Vol 8270	Diss Ag		Field Notes
1	GW-MW107-020122	3-18	1142	Grab	Amber/Poly										X		X			
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				
13																				
14																				
15																				
16																				
17																				

Relinquished by: Date / Time 2-1-22
Received by: UPS Date / Time

Relinquished by: UPS Date / Time
Received by: Alex Trejo 2-2-22 9:14 Date / Time

Relinquished by: Date / Time
Received by: Date / Time

Sample Receipt

Good Condition?	Y	N
Cooler Temp.		°C
Sample Temp.		°C
Total Number of Containers		

Remarks: STD TAT

TAT: 24HR 48HR 5-DAY

Distribution: White - Lab, Yellow - Originator

Libby Environmental, Inc.
3322 South Bay Road NE • Olympia, WA 98506-2957

October 19, 2021

Joel Hecker
Pioneer Technologies Corporation
5205 Corporate Center Ct SE, Suite A
Lacey, WA 98503

Dear Mr. Hecker:

Please find enclosed the analytical data report for the Hardel Project located in Olympia, Washington.

The results of the analyses are summarized in the attached tables. Applicable detection limits and QA/QC data are included. The sample(s) will be disposed of within 30 days unless we are contacted to arrange long term storage.

Libby Environmental, Inc. appreciates the opportunity to have provided analytical services for this project. If you have any further questions about the data report, please give me a call. It was a pleasure working with you on this project, and we are looking forward to the next opportunity to work together.

Sincerely,

Sherry L. Chilcutt
Senior Chemist
Libby Environmental, Inc.

Phone (360) 352-2110 • Fax (360) 352-4154 • libbyenv@gmail.com

Air Chain of Custody Record & Laboratory Services Agreement

Fremont Analytical
3600 Fremont Ave N.
Seattle, WA 98103
Tel: 206-352-3790
Fax: 206-352-7178

Date: 10/13/21 Page: 1 of: 1

Project Name: Hardel

Laboratory Project No (Internal):

Special Remarks:

Client: Libby / Pioneer

Project No:

Address: 5205 Corporate Cnte ct. SE

Location: 1210 West Bay Drive, Olympia

City, State, Zip: Lacey WA

Collected by: Pioneer

Telephone: 360-828-3739

Reports to (PM): Joel Hecker

Air samples are disposed of one week after report is submitted to client unless otherwise requested. ☒ OK to Dispose ☐ Hold (fees may apply)

Fax:

Email (PM): Heckerj@cspioneer.com

	Sample Name	Canister / Flow Reg Serial #	Sample Type (Matrix) *	Container Type **	Expected Fill Time / Flow Rate	Sample Start Date & Time	Field Initial Sample Pressure (" Hg)	Sample End Date & Time	Field Final Sample Pressure (" Hg)	Analysis: Full list VOCs TO15	Select VOCs TO15 ***	APH TO15	Siloxanes TO15	Sulfur TO15	Major Gases 3C	Helium 3C Mod	VOCs 8260	GX/BTEX 8260		Comments	Internal: Final Pressure ("Hg)
1	SVP 6	11409 Canister / 1EE Flow Reg	SG	1L	~200ml/min	10/13 Date / 1119 Time	-30 Pressure	10/13 Date / 1125 Time	-4 Pressure						X					methane, CO_2, O_2 on all	
2	SVP 7	10376 Canister / FF1 Flow Reg.	SG	1L	~200ml/min	10/13 Date / 1110 Time	-30 Pressure	10/13 Date / 1118 Time	-3 Pressure						X						
3	SVP 19	11026 Canister / F11 Flow Reg	SG	1L	~200ml/min	10/13 Date / 1050 Time	-30 Pressure	10/13 Date / 1104 Time	-4 Pressure						X						
4		Canister / Flow Reg.				Date / Time	Pressure	Date / Time	Pressure												
5		Canister / Flow Reg.				Date / Time	Pressure	Date / Time	Pressure												

* Matrix Codes: AA = Ambient Air OA = Outdoor Air IA = Indoor Air S = Subslab / Soil Gas SVE = SVE L = Landfill D = Digester

** Container Codes: BV = 1 Liter Bottle Vac 6L = 6L Canister 1L = 1L Canister CYL = High Pressure Cylinder F = Filter S = Sorbent Tube TB = Tedlar Bag

*** Select one: ☐ BTEXN & APH ☐ PCE & Breakdown ☐ Other, specify in comments

I represent that I am authorized to enter into this Agreement with Fremont Analytical on behalf of the Client named above, that I have verified Client's agreement to each of the terms on the front and backside of this Agreement.

Turn-Around Time:
☒ Standard ☐ Next Day ☐ 3 Day ☐ Same Day ☐ 2 Day ____ specify

Relinquished (Signature)	Print Name	Date/Time	Received (Signature)	Print Name	Date/Time
x [signature]	JOEL HECKER	10/13 1200	x [signature]	Rory Dixon	10/13 1200
Relinquished (Signature)	Print Name	Date/Time	Received (Signature)	Print Name	Date/Time
x			x		

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Libby Environmental
Sherry Chilcutt
3322 South Bay Road NE
Olympia, WA 98506

RE: Hardel
Work Order Number: 2110199

October 19, 2021

Attention Sherry Chilcutt:

Fremont Analytical, Inc. received 3 sample(s) on 10/14/2021 for the analyses presented in the following report.

Major Gases by EPA Method 3C

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Brianna Barnes
Project Manager

Date: *10/19/2021*

CLIENT: Libby Environmental
Project: Hardel
Work Order: 2110199

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
2110199-001	SVP 6	10/13/2021 11:19 AM	10/14/2021 10:19 AM
2110199-002	SVP 7	10/13/2021 11:10 AM	10/14/2021 10:19 AM
2110199-003	SVP 19	10/13/2021 10:50 AM	10/14/2021 10:19 AM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Case Narrative

WO#: **2110199**
Date: **10/19/2021**

CLIENT: Libby Environmental
Project: Hardel

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Major gases are reported as % ratio of the Major Gases analyzed (Carbon dioxide, Carbon Monoxide, Methane, Nitrogen, Oxygen and Hydrogen).

The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS). The LCS is processed with the samples to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

* - Flagged value is not within established control limits
B - Analyte detected in the associated Method Blank
D - Dilution was required
E - Value above quantitation range
H - Holding times for preparation or analysis exceeded
I - Analyte with an internal standard that does not meet established acceptance criteria
J - Analyte detected below Reporting Limit
N - Tentatively Identified Compound (TIC)
Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria
S - Spike recovery outside accepted recovery limits
ND - Not detected at the Reporting Limit
R - High relative percent difference observed

Acronyms:

%Rec - Percent Recovery
CCB - Continued Calibration Blank
CCV - Continued Calibration Verification
DF - Dilution Factor
DUP - Sample Duplicate
HEM - Hexane Extractable Material
ICV - Initial Calibration Verification
LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
MCL - Maximum Contaminant Level
MB or MBLANK - Method Blank
MDL - Method Detection Limit
MS/MSD - Matrix Spike / Matrix Spike Duplicate
PDS - Post Digestion Spike
Ref Val - Reference Value
REP - Sample Replicate
RL - Reporting Limit
RPD - Relative Percent Difference
SD - Serial Dilution
SGT - Silica Gel Treatment
SPK - Spike
Surr - Surrogate

Analytical Report

Work Order: **2110199**
Date Reported: **10/19/2021**

CLIENT: Libby Environmental
Project: Hardel

Lab ID: 2110199-001 **Collection Date:** 10/13/2021 11:19:00 AM
Client Sample ID: **SVP 6** **Matrix:** Soil Gas

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Major Gases by EPA Method 3C				Batch ID: R70611		Analyst: SLL
Carbon Dioxide	16.2	0.0500		%	1	10/15/2021 4:57:00 PM
Methane	40.1	0.0500		%	1	10/15/2021 4:57:00 PM
Nitrogen	42.2	0.0500		%	1	10/15/2021 4:57:00 PM
Oxygen	1.53	0.0500		%	1	10/15/2021 4:57:00 PM

Lab ID: 2110199-002 **Collection Date:** 10/13/2021 11:10:00 AM
Client Sample ID: **SVP 7** **Matrix:** Soil Gas

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Major Gases by EPA Method 3C				Batch ID: R70611		Analyst: SLL
Carbon Dioxide	25.8	0.0500		%	1	10/15/2021 5:14:00 PM
Methane	60.4	0.0500		%	1	10/15/2021 5:14:00 PM
Nitrogen	12.4	0.0500		%	1	10/15/2021 5:14:00 PM
Oxygen	1.42	0.0500		%	1	10/15/2021 5:14:00 PM

Lab ID: 2110199-003 **Collection Date:** 10/13/2021 10:50:00 AM
Client Sample ID: **SVP 19** **Matrix:** Soil Gas

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Major Gases by EPA Method 3C				Batch ID: R70611		Analyst: SLL
Carbon Dioxide	5.64	0.0500		%	1	10/15/2021 5:35:00 PM
Methane	63.8	0.0500		%	1	10/15/2021 5:35:00 PM
Nitrogen	28.5	0.0500		%	1	10/15/2021 5:35:00 PM
Oxygen	2.03	0.0500		%	1	10/15/2021 5:35:00 PM

Work Order: 2110199
CLIENT: Libby Environmental
Project: Hardel

QC SUMMARY REPORT

Major Gases by EPA Method 3C

Sample ID: **LCS-R70611**	SampType: **LCS**	Units: **%**	Prep Date: **10/15/2021**	RunNo: **70611**
Client ID: **LCSW**	Batch ID: **R70611**		Analysis Date: **10/15/2021**	SeqNo: **1435214**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Carbon Dioxide	99.3	0.0500	100.0	0	99.3	70	130				
Methane	99.4	0.0500	100.0	0	99.4	70	130				
Nitrogen	103	0.0500	100.0	0	103	70	130				
Oxygen	103	0.0500	100.0	0	103	70	130				

Sample ID: **2110199-002AREP**	SampType: **REP**	Units: **%**	Prep Date: **10/15/2021**	RunNo: **70611**
Client ID: **SVP 7**	Batch ID: **R70611**		Analysis Date: **10/15/2021**	SeqNo: **1435211**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Carbon Dioxide	25.8	0.0500						25.78	0.0146	30	
Methane	60.4	0.0500						60.44	0.0587	30	
Nitrogen	12.4	0.0500						12.36	0.0981	30	
Oxygen	1.43	0.0500						1.415	1.37	30	

Sample Log-In Check List

Client Name:	**LIBBY**	Work Order Number:	**2110199**
Logged by:	**Gabrielle Coeuille**	Date Received:	**10/14/2021 10:19:00 AM**

Chain of Custody

1.	Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
2.	How was the sample delivered?	UPS		

Log In

3.	Coolers are present?	Yes ☐	No ☑	NA ☐
		Air samples		
4.	Shipping container/cooler in good condition?	Yes ☑	No ☐	
5.	Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact)	Yes ☐	No ☐	Not Present ☑
6.	Was an attempt made to cool the samples?	Yes ☐	No ☐	NA ☑
7.	Were all items received at a temperature of >2°C to 6°C *	Yes ☐	No ☐	NA ☑
8.	Sample(s) in proper container(s)?	Yes ☑	No ☐	
9.	Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
10.	Are samples properly preserved?	Yes ☑	No ☐	
11.	Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
12.	Is there headspace in the VOA vials?	Yes ☐	No ☐	NA ☑
13.	Did all samples containers arrive in good condition(unbroken)?	Yes ☑	No ☐	
14.	Does paperwork match bottle labels?	Yes ☑	No ☐	
15.	Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
16.	Is it clear what analyses were requested?	Yes ☑	No ☐	
17.	Were all holding times able to be met?	Yes ☑	No ☐	

Special Handling (if applicable)

18.	Was client notified of all discrepancies with this order?	Yes ☐	No ☐	NA ☑

Person Notified: _____ Date: _____

By Whom: _____ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding: _____

Client Instructions: _____

19. Additional remarks:

Item Information

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

Air Chain of Custody Record & Laboratory Services Agreement

Fremont Analytical
3600 Fremont Ave N.
Seattle, WA 98103
Tel: 206-352-3790
Fax: 206-352-7178

Date: 10/13/21 Page: 1 of: 1

Laboratory Project No (Internal): 2110199

Project Name: Hardel

Special Remarks:

Project No:

Client: Libby / Pioneer

Address: 5205 Corporate Cute ct. SE

Location: 1210 West Bay Drive Olympia

City, State, Zip: Lacey WA

Collected by: Pioneer

Telephone: 360-828-3739

Reports to (PM): Joel Hecker

Air samples are disposed of one week after report is submitted to client unless otherwise requested. ☒ OK to Dispose ☐ Hold (fees may apply)

Fax:

Email (PM): Heckerj@uspioneer.com

	Sample Name	Canister / Flow Reg Serial #	Sample Type (Matrix) *	Container Type **	Expected Fill Time / Flow Rate	Sample Start Date & Time	Field Initial Sample Pressure (" Hg)	Sample End Date & Time	Field Final Sample Pressure (" Hg)	Analysis: Full list VOCs TO15	Select VOCs TO15 ***	APH TO15	Siloxanes TO15	Sulfur TO15	Major Gases 3C	Helium 3C Mod	VOCs 8260	GX/BTEX 8260		Comments	Internal: Final Pressure ("Hg)
1	SVP 6	11409 Canister / 1EE Flow Reg	SG	1L	~200ml/min	10/13 Date / 1119 Time	-30 Pressure	10/13 Date / 1125 Time	-4 Pressure						X					methane CO2 O2 N2 on all	-3
2	SVP 7	10376 Canister / FF1 Flow Reg	SG	1L	~200ml/min	10/13 Date / 1110 Time	-30 Pressure	10/13 Date / 1119 Time	-3 Pressure						X						-2
3	SVP 19	11026 Canister / F11 Flow Reg	SG	1L	~200ml/min	10/13 Date / 1050 Time	-30 Pressure	10/13 Date / 1104 Time	-4 Pressure						X						-2
4		Canister / Flow Reg				Date / Time	Pressure	Date / Time	Pressure												
5		Canister / Flow Reg				Date / Time	Pressure	Date / Time	Pressure												

* Matrix Codes: AA = Ambient Air OA = Outdoor Air IA = Indoor Air S = Subslab / Soil Gas SVE = SVE L = Landfill D = Digester

** Container Codes: BV = 1 Liter Bottle Vac 6L = 6L Canister 1L = 1L Canister CYL = High Pressure Cylinder F = Filter S = Sorbent Tube TB = Tedlar Bag

*** Select one: ☐ BTEXN & APH ☐ PCE & Breakdown ☐ Other, specify in comments

I represent that I am authorized to enter into this Agreement with Fremont Analytical on behalf of the Client named above, that I have verified Client's agreement to each of the terms on the front and backside of this Agreement.

Turn-Around Time:
☒ Standard ☐ Next Day ☐ 3 Day ☐ Same Day ☐ 2 Day specify

Relinquished (Signature)	Print Name	Date/Time	Received (Signature)	Print Name	Date/Time
x [signature]	Joel Hecker	10/13 1200	x [signature]	Rory Dixon	10/13 1200
x [signature]	Rory Dixon	10/13 1630	x [signature]	Alex Trejo	10/14/21 10:19

Attachment 3

Memo

PIONEER TECHNOLOGIES CORPORATION
5205 Corporate Ctr. Ct. SE, Ste. A
Olympia, WA 98503-5901
Phone: 360.570.1700
Fax: 360.570.1777
www.uspioneer.com

To: Brandon Smith (West Bay Development Group, LLC)

From: Troy Bussey, P.E., L.G., L.HG. and Joel Hecker, L.G., L.HG. (PIONEER Technologies Corporation [PIONEER])

cc: Heather Burgess (Phillips Burgess Law), Kim Seely (Coastline Law Group)

Date: February 14, 2022

Subject: Summary of Recent Methane Investigation
Hardel Mutual Plywood Corporation Site
1210 West Bay Drive NW, Olympia, Washington
Voluntary Cleanup Program (VCP) Project ID SW1757, Cleanup Site ID 3704

This memo summarizes (1) subsurface methane results obtained during October and November 2021 remedial investigation (RI) data gap activities conducted at the Hardel Mutual Plywood Corporation (Hardel) Site (Site) in support of the planned West Bay Yards brownfield redevelopment project, and (2) the recommended path forward based on these results. PIONEER and Coastline Law Group are working closely with the Washington State Department of Ecology (Ecology) under the VCP to ensure that all Model Toxics Control Act (MTCA) requirements for the Site, including any requirements related to the presence of subsurface methane, are satisfactorily addressed (Ecology 2021). Methane soil gas and pressure differential measurements collected from two soil vapor probes (SVPs) in June 2020 indicated that no further action was necessary regarding a potential methane hazard in accordance with ASTM International Designation E2993-16 (Standard Guide for Evaluating Potential Methane Hazards as a Result of Methane in the Vadose Zone). However, additional methane investigation activities were conducted in October and November 2021 because of the amount of subsurface wood debris at the Site, the relatively high methane concentration in one of the June 2020 SVPs (23%), and the limited nature of the June 2020 methane investigation activities (PIONEER 2020, 2021a, 2021b, 2021c).

Investigation Activities

In accordance with the amended work plan (PIONEER 2021a, 2021c), 18 additional SVPs were installed in October 2021, and methane sampling events were conducted in October and November 2021.[1] Field measurements of the pressure differentials and methane, oxygen, and carbon dioxide soil gas concentrations were obtained from all 18 installed SVPs during at least two different sampling events. In addition, soil gas samples were collected from the three SVPs with the highest field methane concentrations and submitted to Fremont Analytical for analysis of methane, oxygen, carbon dioxide, and nitrogen by USEPA Method 3C.[2] Supporting details for the 2021 methane investigation activities and results will be presented in a forthcoming report prepared for the USEPA brownfield assessment grant.

[1] In accordance with the amended work plan, three of the 21 proposed SVPs were not installed because the depths to groundwater at these proposed locations were less than three feet below ground surface.

[2] Apart from the laboratory analyses of these three soil gas samples, the 2021 investigation activities were funded by the City of Olympia's United States Environmental Protection Agency (USEPA) brownfield assessment grant.

Investigation Results

At most SVP locations, the October and November 2021 methane investigation results replicated the June 2020 methane investigation results. In accordance with ASTM International Designation E2993-16, no further action is necessary at 14 of the 18 SVPs sampled in 2021 based on the maximum methane soil gas concentrations and measured pressure differentials at those 14 locations. However, further investigation activities and methane mitigation measures are recommended for the other four SVP locations since the maximum methane soil gas concentrations exceeded 30%. The methane soil gas concentrations at these four locations (and the methane soil gas detections throughout the Site) are most likely caused by bacteria decomposing subsurface wood debris. The presence of elevated methane soil gas concentrations is a common occurrence at MTCA sites containing subsurface wood debris or petroleum contamination.

Project Implications and Recommendations

The potential for subsurface methane to cause an indoor air hazard at this Site is low for several key reasons. First, there are no current buildings on the Site. Second, the proposed development includes the addition of clean soil fill material, which will raise the ground surface of the upland area from the current elevations of 13 to 16 feet North American Vertical Datum of 1988 (NAVD88) to a final elevation of 17 feet NAVD88 (PIONEER 2021b). For instance, approximately two feet of clean fill will be added during the planned development in the vicinity of the four SVPs with maximum methane soil gas concentrations exceeding 30% (PIONEER 2021b). This added soil will provide additional attenuation of methane between subsurface soil gas and indoor air. Third, the only indoor air space in the proposed development below an elevation of 26 feet NAVD88 will be a large subsurface parking garage underneath the buildings. In other words, there is a limited indoor air space for potential methane transport. Finally, in accordance with building, mechanical, and fire code requirements, the subsurface parking garage will have a mechanical ventilation system that satisfies code-required air exchange requirements for an enclosed structure and satisfies code-required vertical and horizontal separation distances between the exhaust and fresh air intakes.[3] In other words, the ventilation system will prevent methane from accumulating within indoor air.

Although the potential for an indoor air methane hazard is low, additional methane investigation activities and methane mitigation measures are recommended to eliminate this potential pathway. Additional methane soil gas investigation activities are recommended to (1) define the extent of the four locations where maximum methane soil gas concentrations exceed 30%, and (2) confirm that methane concentrations at three SVPs remain less than 30% (since methane concentrations at these three SVPs increased over time as the amount of SVP purging increased, with a final concentration between 20% and 29%). The results from these additional methane investigation activities would define the areas where specific components of the MTCA methane remedy (e.g., long-term methane indoor air monitoring) would apply. The recommended methane mitigation measures are (1) implementing engineering controls for worker safety during all intrusive subsurface work, (2) installing a passive convertible venting system under the proposed parking garage, (3) installing an impervious vapor barrier under the parking garage between the passive convertible venting system and the garage slab, and (4) collecting indoor air samples following garage construction. Ecology was supportive of the recommended mitigation measures during an informal technical consultation call on January 11, 2022.

[3] Personal correspondence between Josh Gobel of Thomas Architecture Studios and Troy Bussey of PIONEER.

References

Ecology. 2021. Letter from Nicholas Acklam to Kimberly Seely with the subject of "Application Acceptance – Voluntary Cleanup Program" for Hardel Mutual Plywood, 1210 West Bay Drive NW, Olympia, Thurston County, WA 98502. September 30.

PIONEER. 2020. Phase II Environmental Site Assessment, Hardel Mutual Plywood Corporation, 1210 West Bay Drive NW, Olympia, Washington. October.

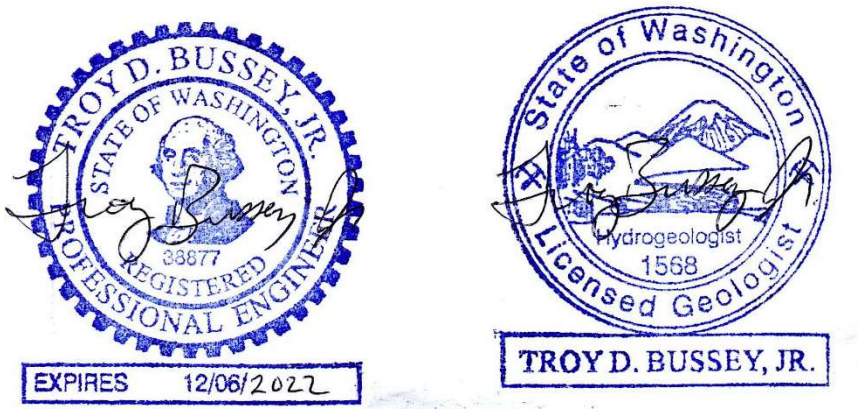
PIONEER. 2021a. RI Data Gaps Investigation Work Plan, Hardel Mutual Plywood Corporation, 1210 West Bay Drive NW, Olympia, Washington. March.

PIONEER. 2021b. Remedial Investigation Data Gap Report, Hardel Mutual Plywood Corporation Site, 1210 West Bay Drive NW, Olympia, Washington. August.

PIONEER. 2021c. Minor Updates/Clarifications to the March 2021 RI Data Gaps Investigation Work Plan for Methane Soil Vapor Sampling at the Hardel Mutual Plywood Corporation Site, Olympia Washington USEPA Brownfield Assessment Grant (BF01J66201). September 28.

Professional Certification

This document was prepared under my direction. The information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I hereby certify that I was in responsible charge of the work performed for this document.



February 14, 2022

Troy D. Bussey Jr.
Principal Engineer
PIONEER Technologies Corporation
Washington P.E. Registration No. 38877
Washington L.G. and L.HG. Registration No. 1568

Date