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Technical Memorandum

Date:	January 17, 2023	**From:**	Kellie M. Miller, L.G.
To:	Washington State Department of Ecology	**Project Manager:**	Timothy S. Brown, L.Hg.
	15700 Dayton Avenue North	**Principal/Associate:**	Timothy S. Brown, L.Hg.
	Shoreline, Washington 98133	**Project Name:**	Former Mill E/Koppers Facility
Attn:	Ms. Sandra Matthews	**Project No:**	20050654V001
Subject:	2022 Annual Performance and Compliance Monitoring Report		

Associated Earth Sciences, Inc. (AESI) performed the 2022 annual performance and compliance monitoring for the Former Mill E/Koppers Facility (Site) in Everett, Washington on October 7, 2022 in accordance with the "Performance and Compliance Monitoring Plan" (PCMP; EMCON, 1998) and the "Performance and Compliance Monitoring Plan Addendum" (PCMP Addendum; Floyd|Snider, 2017).

Based on recommendations in the Former Mill E/Koppers Facility "2020 Annual Performance and Compliance Monitoring Report" dated November 11, 2020 (2020 Annual Monitoring Report; Floyd|Snider, 2020), and communications with Pacific Topsoils, Inc., the annual monitoring was performed in October instead of September to increase the likelihood that monitored piezometers will have measurable water. Additional water level measurements were collected on November 4, 2022 and December 28, 2022. Additional Site background information is provided in the "Final Supplemental Remedial Investigation Report" dated February 8, 2016 (GeoEngineers, 2016) and "2003 Annual Groundwater Compliance Monitoring and Five-Year Data Review Report" dated November 10, 2003 (Shaw, 2003).

The Site is located on the east side of Riverside Road in Everett, Washington as shown on Figure 1. Site features, including piezometers and monitoring wells, are shown on Figure 2.

Monitoring activities performed during the 2022 annual performance and compliance monitoring included annual groundwater quality monitoring of PZ-3A, annual groundwater level monitoring, and annual asphalt and soil cap inspection. The following sections present the groundwater monitoring and cap inspection results.

GROUNDWATER LEVEL MONITORING

AESI performed annual groundwater monitoring at the Site on October 7, 2022. During the October 2022 monitoring event, water levels were measured in the three Upper Sand Aquifer piezometers inside the barrier wall (PZ-1A, PZ-2A, and PZ-3A), the three piezometers outside the barrier wall screened in the Upper Sand Aquifer (PZ-1B, PZ-2B, and PZ-3B), and the three wells/piezometers

located outside the barrier wall and screened in the Lower Sand Aquifer (MW-10D, PZ-2D, and LLMW-20D). A site plan showing the approximate well locations, groundwater elevations measured on October 7, 2022, and the approximate timing of the measurements relative to the 24-hour tidal cycle is presented as Figure 2. Due to the results of the hydraulic head difference discussed below, and an atypical dry summer, additional water level measurements were collected from the PZ-3 piezometer pair (PZ-3A and PZ-3B) and associated Lower Sand Aquifer piezometer (LLMW-20D) in November and December 2022.

The groundwater levels were collected within 2 hours of the daytime low tide, consistent with Section 2.1 of the PCMP Addendum. A summary of groundwater elevation measurements for October, November, and December 2022 are presented in Table 1.

Daytime low tide (0.58 feet elevation) was at 9:32 am on October 7, 2022 based on the National Oceanic and Atmospheric Administration tide chart for Everett, Washington (Station 9447659). AESI personnel opened the piezometers/wells to provide for water levels to equilibrate with atmospheric pressure before obtaining depth-to-water measurements. Water levels were measured relative to the top of casing to an accuracy of 0.01 feet using an electronic water level indicator. The electronic water level indicator was cleaned using an Alconox® wash and potable water rinse prior to each groundwater level measurement. Groundwater level measurements were collected between 8:51 am and 9:38 am, before and right after the daytime low tide.

Daytime low tide (2.28 feet elevation) was at 8:07 am on November 4, 2022 and the daytime low tide (5.56 feet elevation) was at 3:38 pm on December 28, 2022 based on the National Oceanic and Atmospheric Administration tide chart for Everett, Washington (Station 9447659). Groundwater level measurements were collected within 15 minutes of the daytime low tide.

Elevations for the top of well casing for the six Upper Sand Aquifer piezometers and three Lower Sand Aquifer wells were referenced from the 2020 Annual Monitoring Report (Floyd|Snider, 2020). The 2020 Annual Monitoring Report states the monitoring wells and piezometers were surveyed by ASPI, LLC, with a Washington State Licensed Surveyor.

HYDRAULIC HEAD DIFFERENCE COMPARISON

Groundwater elevations were used to calculate vertical and horizontal hydraulic head differences inside and outside the barrier wall as the primary indicator of the barrier wall's performance to control the hydraulic movement of contaminants. As indicated in the PCMP Addendum, the Site's piezometers are referred to as pairs and triplets (PCMP Addendum; Floyd|Snider, 2017). The piezometer pairs consist of one piezometer inside the barrier wall (PZ-#A) and one piezometer outside the barrier wall (PZ-#B), both in the Upper Sand Aquifer, in the same vicinity. The piezometer triplets consist of one piezometer pair and one well or piezometer outside the barrier wall (MW-#D, LLMW-#D or PZ-#D) representative of the Lower Sand Aquifer for that vicinity.

Horizontal head differences were calculated by taking the Upper Sand Aquifer piezometer groundwater elevation from inside the barrier wall and comparing to the Upper Sand Aquifer

piezometer groundwater elevation from outside the barrier wall within the same vicinity. Horizontal head differences for October 2022 are presented in Table 2. The groundwater elevation of the Upper Sand Aquifer inside the barrier wall was lower than the groundwater elevation outside the barrier wall for the PZ-1 and PZ-2 piezometer pairs; however, the groundwater elevation of the Upper Sand Aquifer inside the barrier wall was higher than the groundwater elevation outside the barrier wall for the PZ-3 piezometer pair. The lower groundwater elevation inside the barrier wall indicates a positive horizontal head difference with groundwater fluxing inward through the barrier wall. The higher groundwater elevation inside the barrier wall potentially indicates a negative horizontal head difference with groundwater fluxing outwards through the barrier wall. Due to the atypical dry summer months, additional groundwater level measurements were collected in November and December for the PZ-3 piezometer pair and associated Lower Sand Aquifer piezometer. The November groundwater elevations for the PZ-3 piezometer pair were consistent with the October results; however, the December groundwater elevations indicated the Upper Sand Aquifer inside the barrier wall was lower than the groundwater elevation outside the barrier wall. The 2022 December groundwater elevations for PZ-3 piezometer pair indicate groundwater is fluxing inward through the barrier wall.

Vertical head differences were calculated by taking the Upper Sand Aquifer groundwater elevations from both inside and outside of the barrier wall and comparing to the Lower Sand Aquifer groundwater elevations for each piezometer triplet. Vertical head differences for October 2022 are presented in Table 3. The vertical head difference inside the barrier wall was lower than the vertical head difference outside the barrier wall at the PZ-1 and PZ-2 piezometer pair locations; however, the vertical head difference inside the barrier wall was higher than the vertical head difference outside the barrier wall at the PZ-3 piezometer pair locations. The lower vertical head inside the barrier wall indicates the barrier wall and asphalt cap are functioning as intended by limiting the downward flux of groundwater inside the barrier wall through the Upper Silt Aquitard. The higher vertical head inside the barrier wall may potentially indicate the barrier wall and asphalt cap are not operating as intended. Due to the atypical dry summer months, additional groundwater level measurements were collected in November and December 2022 for the PZ-3 piezometer pair and associated Lower Sand Aquifer piezometer. The November groundwater elevations were similar with the October results; however, the December groundwater elevations indicated the vertical head difference inside the barrier wall was lower than the vertical head difference outside the barrier wall and the barrier wall and asphalt cap are functioning as intended.

Groundwater elevation trends for each piezometer pair are presented on Figures 3 through 5 and show a comparison of historical groundwater elevation data over time obtained for the Site. Groundwater elevations obtained in December 2022 from the PZ-3 piezometer pair were included on Figure 5. Review of the data indicates that consistently the groundwater elevations outside of the barrier wall are higher than inside the barrier wall with the exception for piezometer PZ-1A in 2007 and PZ-3B in October and November 2022. The higher than expected water level in piezometer PZ-1A in 2007 was assessed and it was determined to be a result of surface water collecting in the well monument. After this observation, the top of the well monument was raised to prevent surface water from seeping into the monument (AESI; Technical Memorandum dated

December 17, 2009). The slightly lower than expected groundwater elevations in piezometer PZ-3B in October and November 2022 may be the results from the atypical dry summer months in 2022.

The groundwater elevation data for the piezometers suggests the barrier wall is performing as intended and isolating groundwater inside the barrier from that outside the barrier.

GROUNDWATER QUALITY MONITORING

AESI performed annual groundwater quality monitoring at the Site on October 7, 2022. A groundwater sample was collected from piezometer PZ-3A inside the barrier wall for chemical analysis. Sampling was performed in general accordance with Environmental Protection Agency (EPA) low-flow sampling protocols. Following stabilization, the groundwater sample was collected from the pump outlet tubing and placed directly into laboratory-prepared glass sample containers and labeled with a unique sample identification. Sample containers were placed in a chilled cooler immediately following sampling, and subsequently transported to the analytical laboratory under standard chain of custody protocols. The groundwater sample was analyzed for gasoline-range petroleum hydrocarbons (GRPH) using the Northwest Total Petroleum Hydrocarbon (NWTPH) Method NWTPH-Gx, diesel- and heavy oil-range petroleum hydrocarbons (DRPH and ORPH) using the NWTPH Method NWTPH-Dx, arsenic using EPA Method 200.8, and pentachlorophenol (PCP) using EPA Method 8270E SIM.

Groundwater analytical results are presented in Table 4 and a copy of the analytical laboratory report and chain of custody is included as Attachment 1. The results are compared to the Washington State Model Toxics Control Act (MTCA) Method A and Method C cleanup levels that were established for the Site during the 1998 Consent Decree (Washington State Department of Ecology [Ecology], 1998). GRPH and DRPH were detected at concentrations below the established MTCA cleanup level of 10,000 micrograms per Liter (µg/L). PCP was not detected at a concentration exceeding the laboratory reporting limit. Total arsenic was detected at a concentration of 461 µg/L, which exceeds the established MTCA cleanup level of 5 µg/L. Groundwater quality concentration trend (time-concentration) graphs over the past several years for total petroleum hydrocarbons (TPH), PCP, and arsenic are presented on Figures 6 through 8, respectively.

QUALITY ASSURANCE/QUALITY CONTROL

Laboratory quality assurance/quality control (QA/QC) analyses were performed in conjunction with the October 2022 groundwater quality monitoring event. Laboratory results were evaluated by Friedman & Bruya, Inc. against analysis of the method blank, matrix spike, matrix spike duplicates, laboratory duplicates, and calibrations as required by the specific analytical methods. The Lab Control Spike percent recovery for both the neutral blank and the samples analyzed are within the QC limits. All other QA/QC results were acceptable for their intended use. The laboratory analytical report is included as Attachment 1.

After the data were received from the laboratory, data validation QC procedures were followed to provide an accurate evaluation of the data quality and usability. The analytical holding times were

met, and the method blanks had no detections. The laboratory analytical report indicates that all quality control requirements were acceptable. Detections of DRPH and ORPH were flagged by the laboratory for their sample chromatograph pattern not resembling the fuel standard used for quantitation. No other qualifiers were added to the analytical laboratory report.

ASPHALT CAP AND SOIL COVER

An asphalt cap and soil cover inspection was performed on October 7, 2022 by AESI personnel. The Site is currently occupied by an Amazon delivery service and several vehicles were parked at the time of our visit. The majority of the cap, approximately 90 to 95 percent, was visible at the time of the Site visit. A copy of the field report from the Site visit is attached as Attachment 2. Where observed, the asphalt cap was observed to be in serviceable condition with no obvious signs of major cracking, fissures, or signs of excessive settlement. Small shallow depressions in the cover were observed in some places. Minor cracking was observed on the south portion of the asphalt cap with minor amounts of vegetation growing through the cracks. Some cracking appeared to be formerly repaired on the northern portion of the asphalt cap. Photos taken at the time of the Site visit are included in the attached field report.

The areas to the south of the asphalt cap are covered with an approximate 1-foot-thick soil cover with grass and some scattered brush. The soil cap appeared intact and was performing as intended.

PERFORMANCE AND COMPLIANCE MONITORING SCHEDULE

Annual groundwater monitoring and cap inspection will continue in October of 2023 and the results will be reported as part of the annual PCMP summary report to Ecology. Ecology will be notified if monitoring and inspection results indicate significant deviations from recent performance and compliance monitoring results observed over the last 10 years.

Attachments:

Figure 1:	Vicinity Map
Figure 2:	Site Plan and Groundwater Elevations
Figure 3:	Groundwater Elevation Trends, PZ-1A and PZ-1B
Figure 4:	Groundwater Elevation Trends, PZ-2A and PZ-2B
Figure 5:	Groundwater Elevation Trends, PZ-3A and PZ-3B
Figure 6:	Groundwater Quality Trends, Total Petroleum Hydrocarbon
Figure 7:	Groundwater Quality Trends, Pentachlorophenol
Figure 8:	Groundwater Quality Trends, Total Arsenic
Table 1:	Groundwater Elevation Measurements
Table 2:	Horizontal Hydraulic Head Difference Comparisons
Table 3:	Vertical Hydraulic Head Difference Comparisons
Table 4:	Summary of Groundwater Analytical Results
Table 5:	Summary of Water Quality Field Parameters
Attachment 1:	Laboratory Test Certificates and Chain of Custody
Attachment 2:	Field Report of Cap Inspection

Cc: Janusz Bajsarowics, Pacific Topsoils, Inc. (email)
Luke Thies, Weyerhaeuser (email)

KMM/ld - 20050654V001-005

REFERENCES

Associated Earth Sciences, Inc., 2009, Technical memorandum: Mill E 2009 ground water monitoring summary: Prepared for Pacific Topsoils, Inc.

EMCON, 1998, Performance and compliance monitoring plan, Former Mill E/Koppers Facility, Everett, Washington: Prepared for Weyerhaeuser Company, October 8, 1998.

Floyd|Snider, 2017, Former Mill E/Koppers Facility, Performance and compliance monitoring plan addendum: Prepared for The Weyerhaeuser Company, August 2017.

Floyd|Snider, 2020, Former Mill E/Koppers Site 2020 annual performance and compliance monitoring report: Prepared for Washington State Department of Ecology, November 11, 2020.

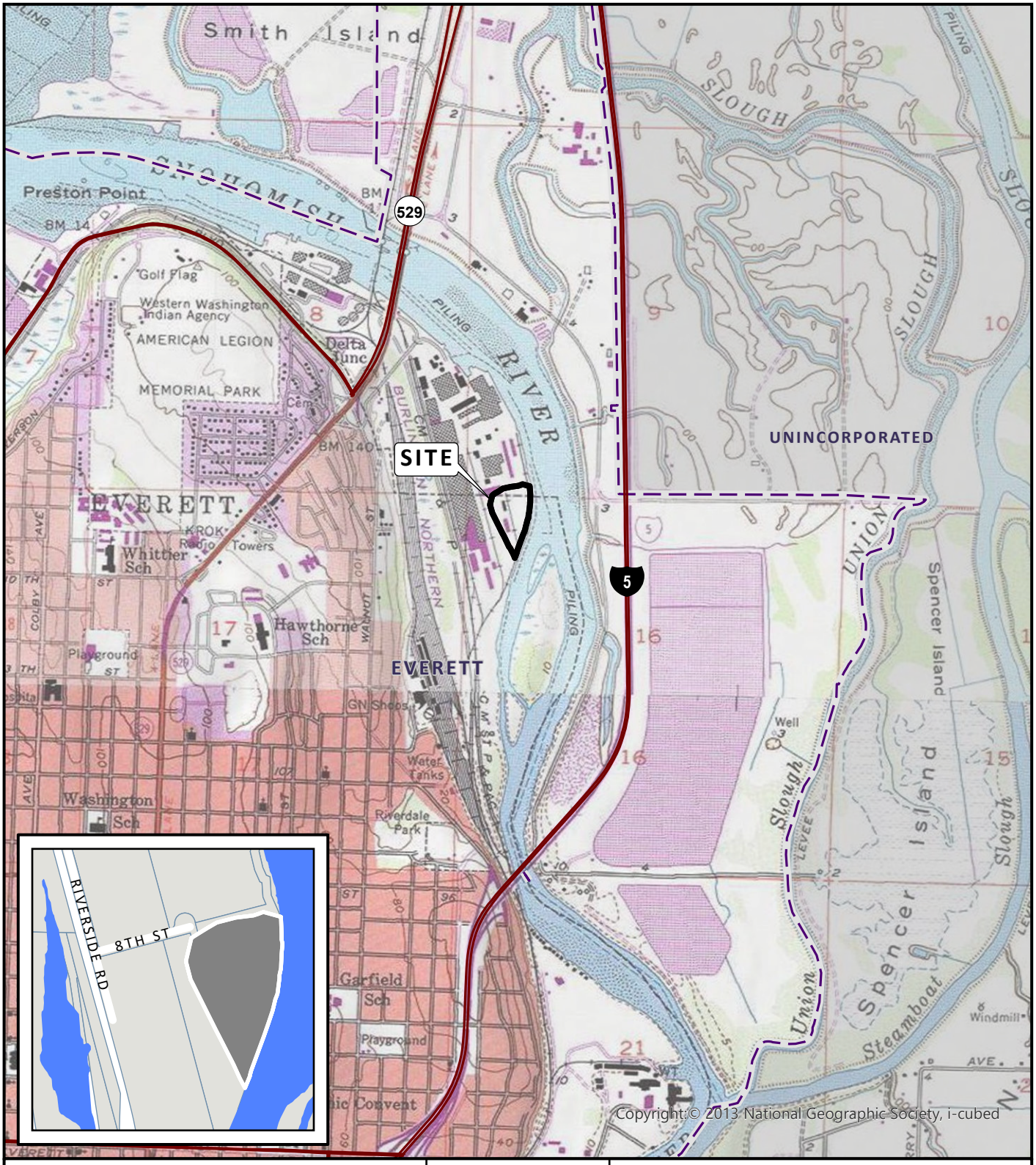
GeoEngineers, 2016, Final supplemental remedial investigation report: Everett smelter lowland area, Everett, Washington: Prepared for the Washington State Department of Ecology, February 8, 2016.

Shaw Environmental, Inc., 2003, 2003 annual groundwater compliance monitoring and five-year data review report, Weyerhaeuser Everett Former Mill E/Koppers Site, Everett, Washington: Prepared for the Weyerhaeuser Company, November 10, 2003.

Washington State Department of Ecology, 1998, Consent decree: Weyerhaeuser Mill E/Koppers Site, Everett, Washington, October 8, 1998.

KMM/ld - 20050654V001-005

FIGURES



DATA SOURCES / REFERENCES:
USGS: 7.5' SERIES TOPOGRAPHIC MAPS, ESRI/I-CUBED/NATIONAL GEOGRAPHIC SOCIETY 2013
SNOHOMISH CO: STREETS, CITY LIMITS, PARCELS, 2/19
LOCATIONS AND DISTANCES SHOWN ARE APPROXIMATE

NOTE: BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION

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VICINITY MAP

FORMER MILL E / KOPPERS FACILITY
EVERETT, WASHINGTON

PROJ NO.	DATE:	FIGURE:
20050654V001	12/22	1

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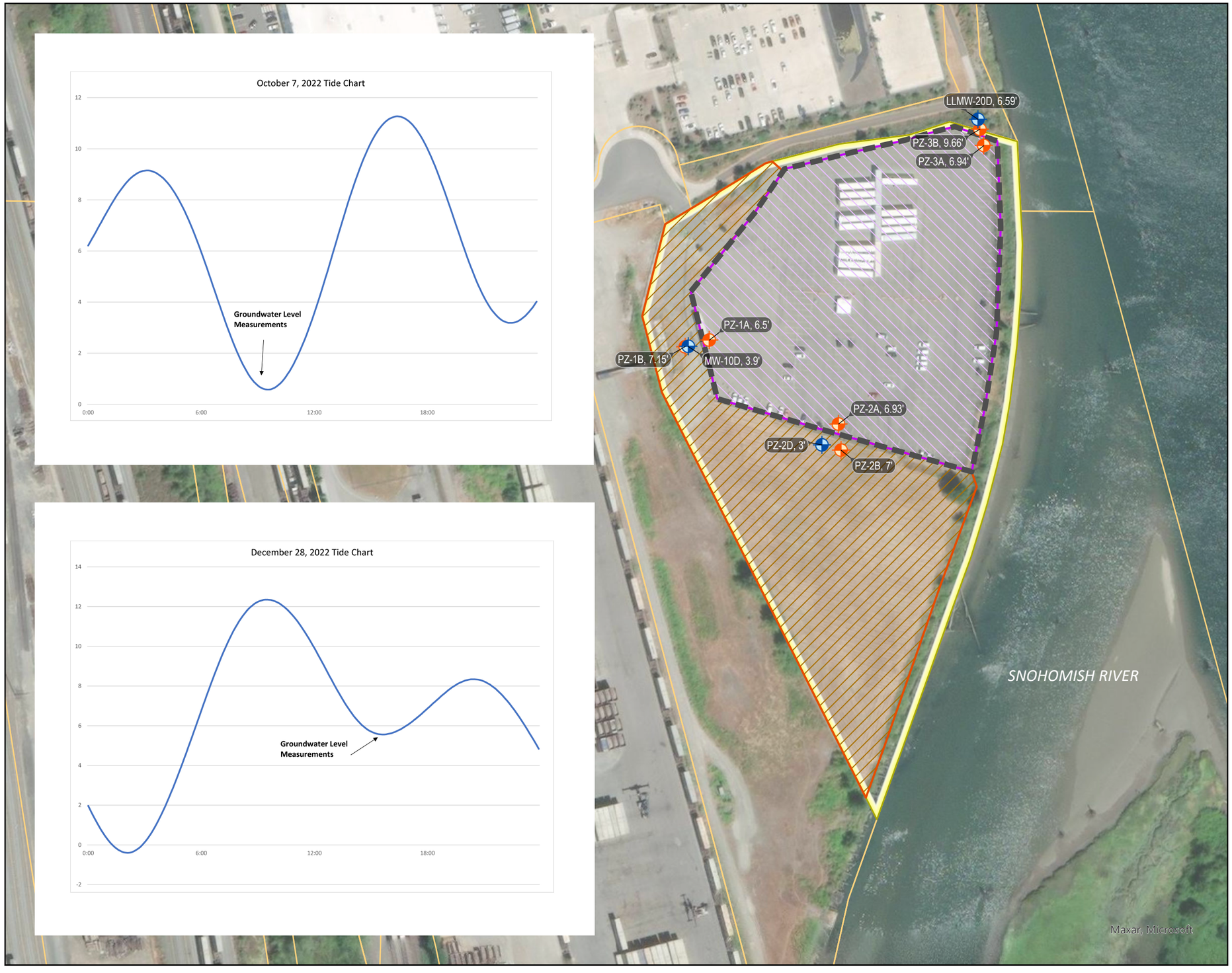

LEGEND

- SITE
- LOWER SAND AQUIFER PIEZOMETER/WELL
- UPPER SAND AQUIFER PIEZOMETER
- BARRIER WALL
- ASPHALT CAP AREA
- SOIL CAP AREA
- PARCEL

NOTE:
GROUNDWATER ELEVATIONS MEASURED FROM PZ-1 AND PZ-2 PIEZOMETER TRIPLETS ON 10/7/2022. GROUNDWATER ELEVATIONS MEASURED FROM PZ-3 PIEZOMETER TRIPLET ON 12/28/2022.

DATA SOURCES / REFERENCES:
TIDE CHART DATA ACQUIRED FROM THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION STATION ID #9447659, EVERETT WA

SITE DATA PROVIDED BY FLOYD|SNIDER
2020 ANNUAL PERFORMANCE AND COMPLIANCE MONITORING REPORT, SITE FEATURES AND MONITORING NETWORK,FIGURE 2, 11/10/20

SNOHOMISH CO: STREETS, 2/19, PARCELS 7/22
AERIAL: ESRI WORLD IMAGERY 3/21

LOCATIONS AND DISTANCES SHOWN ARE APPROXIMATE

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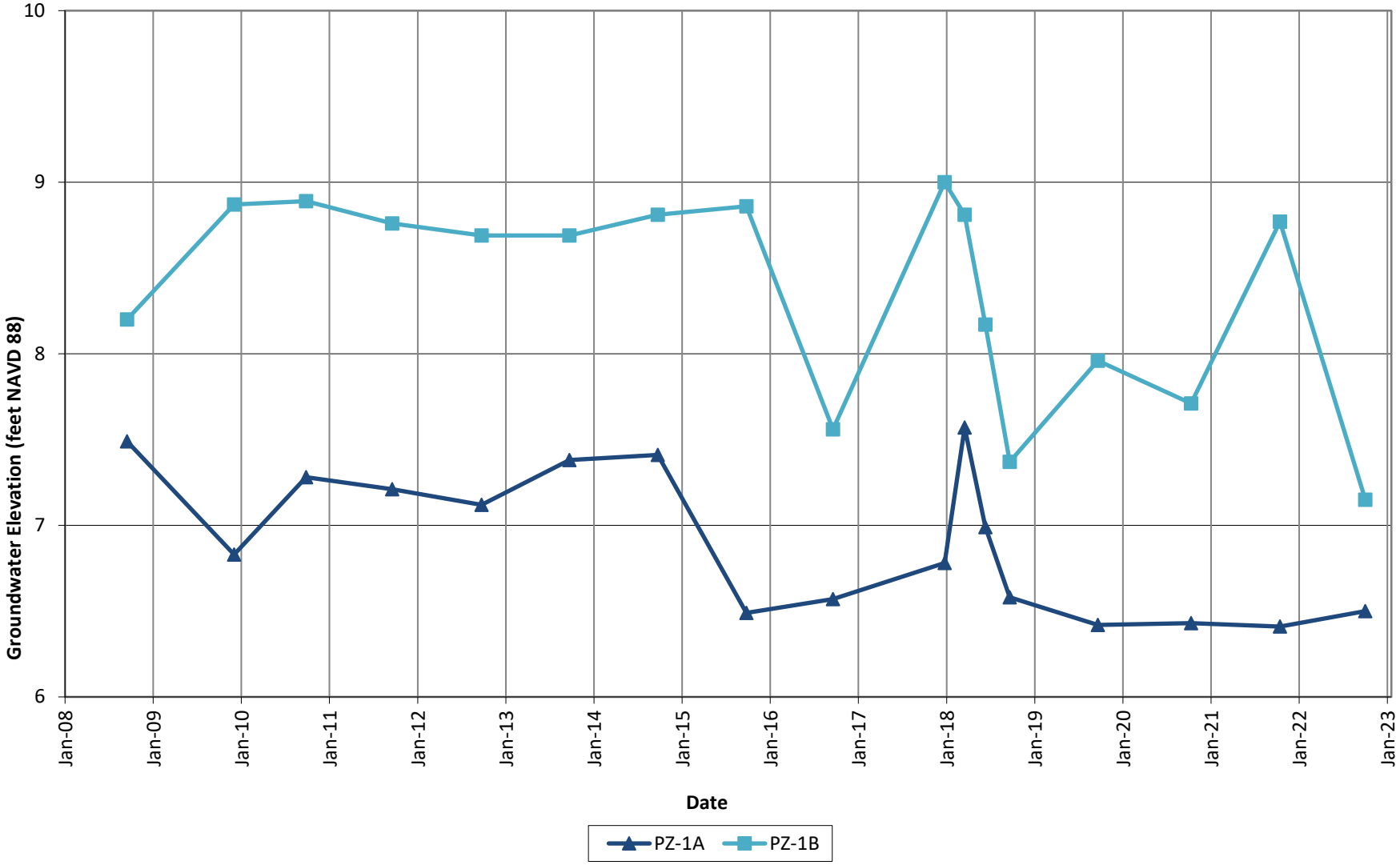
SITE PLAN AND 2022 GROUNDWATER ELEVATIONS

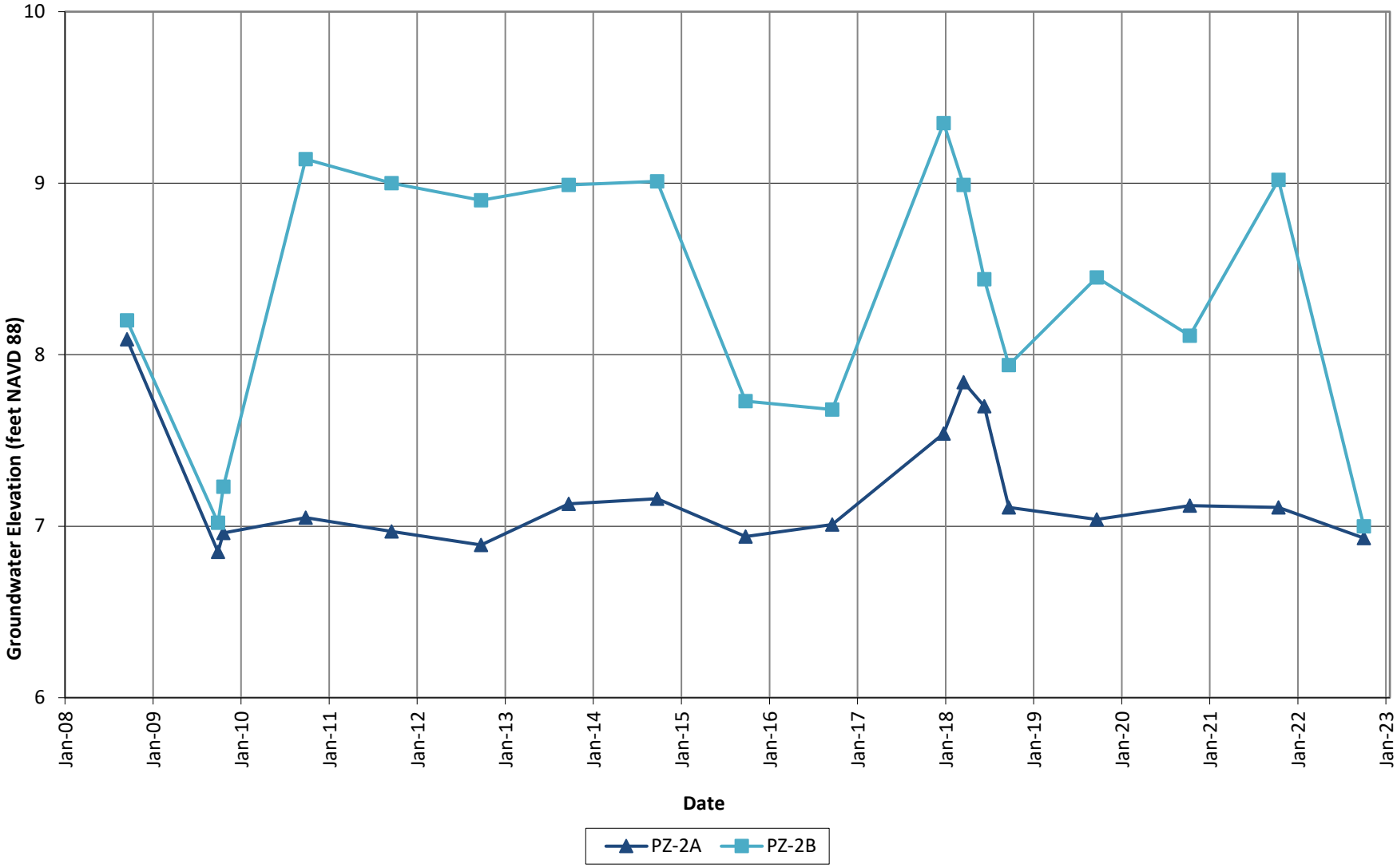
FORMER MILL E / KOPPERS FACILITY
EVERETT, WASHINGTON

PROJ NO.	DATE:	FIGURE:
20050654V001	12/22	2

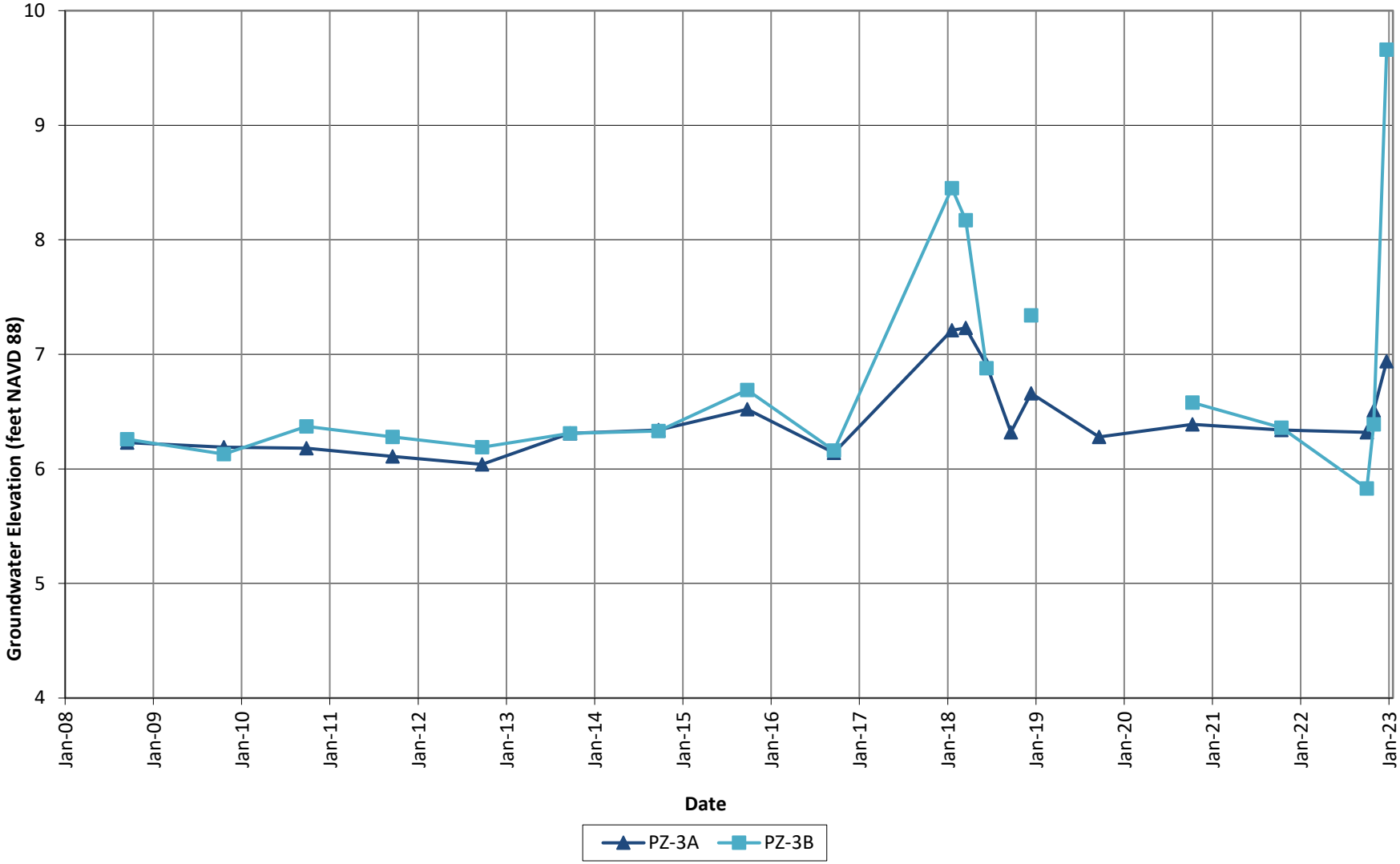
Groundwater Elevation Trends
PZ-1A and PZ-1B
Former Mill E / Koppers Facility
Everett, Washington



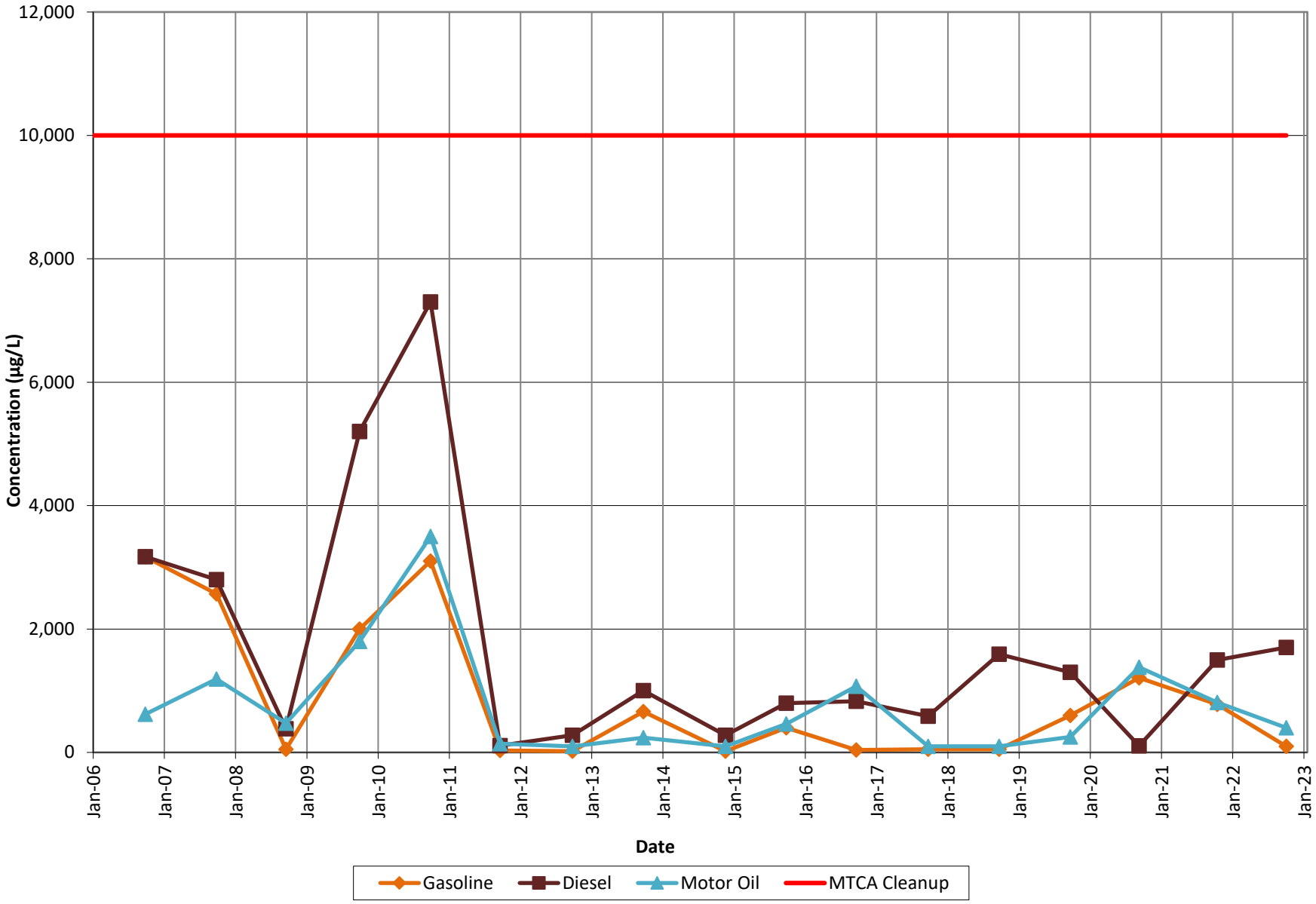
Groundwater Elevation Trends
PZ-2A and PZ-2B
Former Mill E / Koppers Facility
Everett, Washington



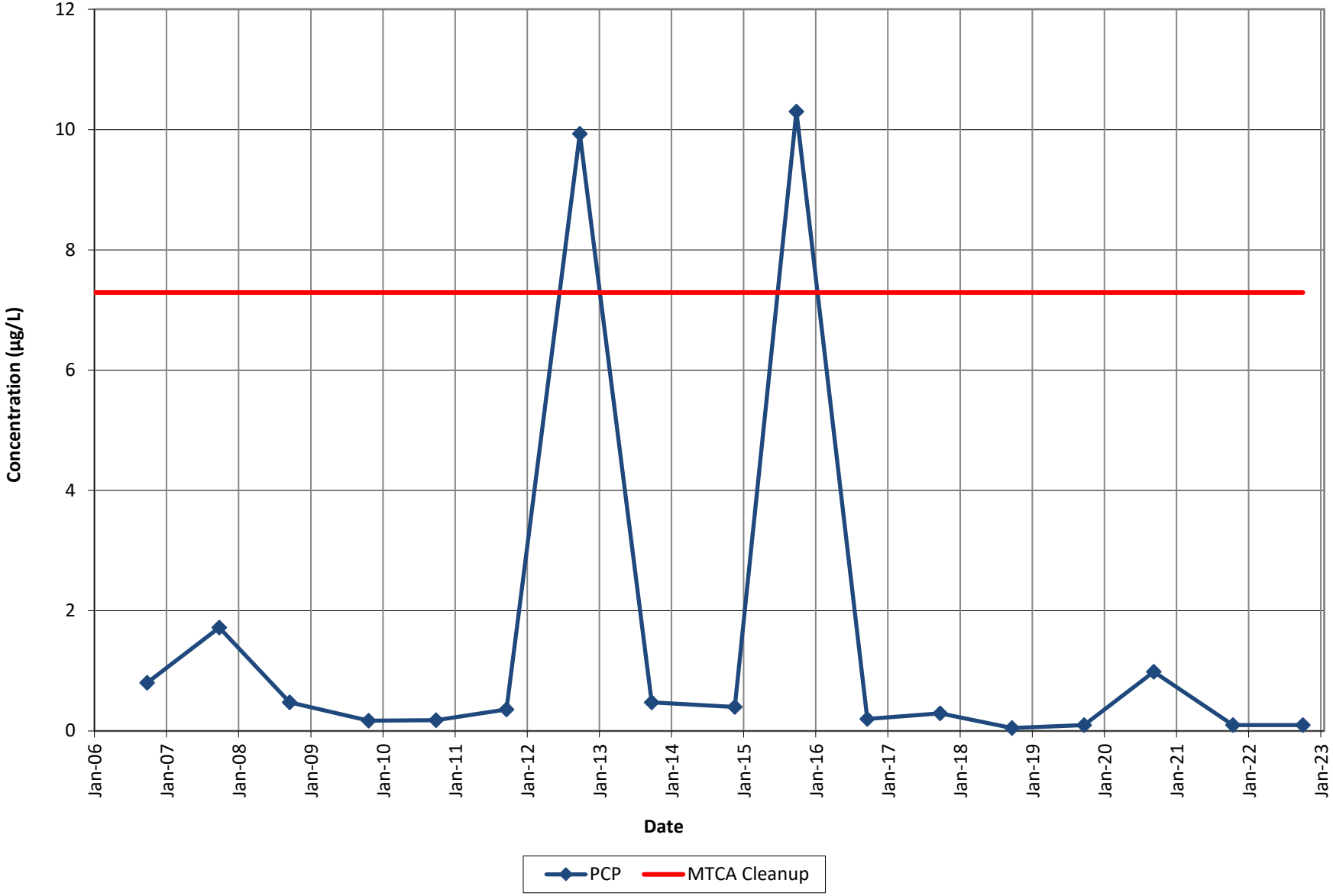
Groundwater Elevation Trends
PZ-3A and PZ-3B
Former Mill E / Koppers Facility
Everett, Washington



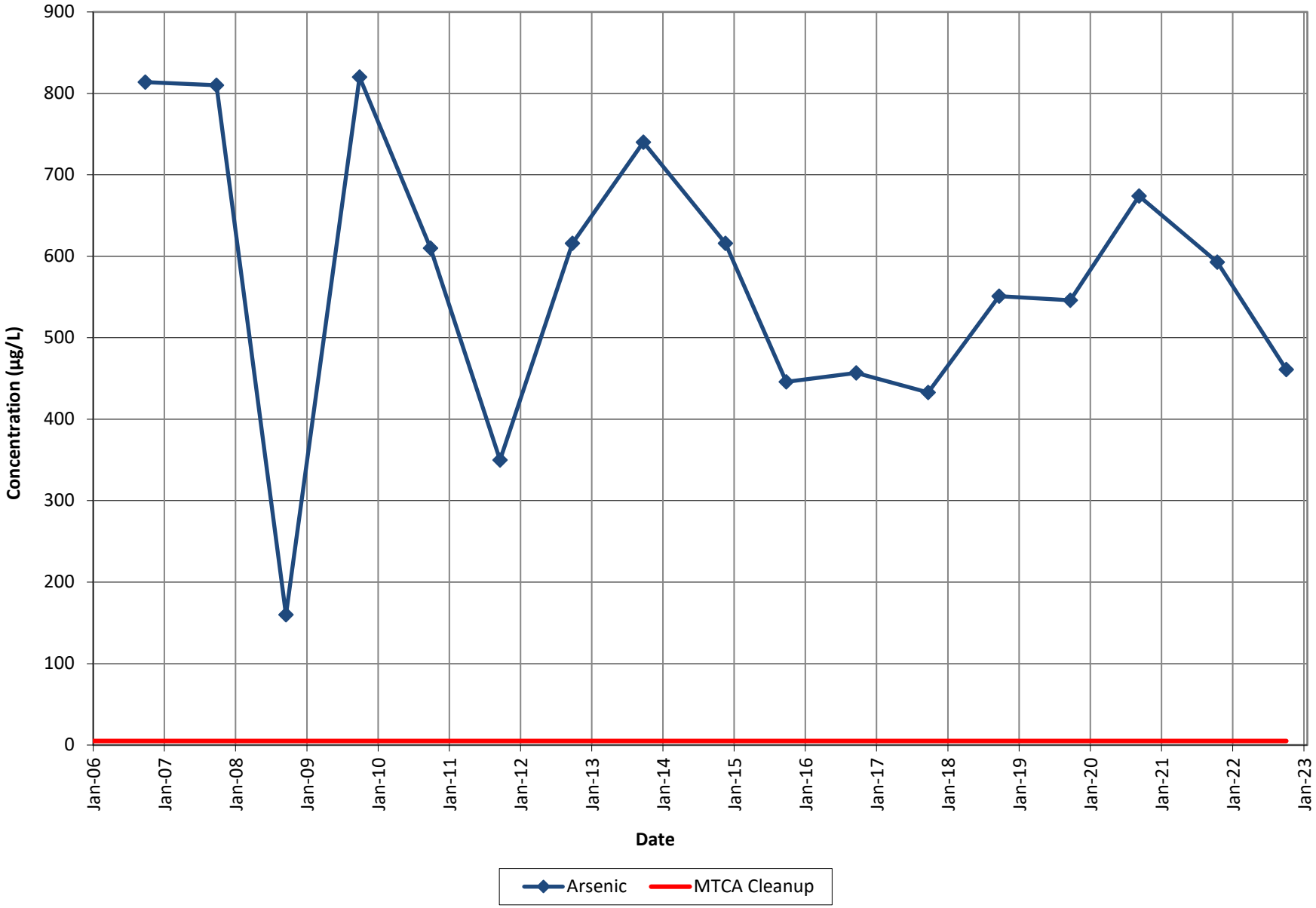
Groundwater Quality Trends
Total Petroleum Hydrocarbons
Former Mill E / Koppers Facility
Everett, Washington



Groundwater Quality Trends
Pentachlorophenol
Former Mill E / Koppers Facility
Everett, Washington



Groundwater Quality Trends
Arsenic
Former Mill E / Koppers Facility
Everett, Washington



TABLES

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Table 1
Summary of Groundwater Elevation Measurements
Former Mill E/Koppers Facility
Everett, Washington

Piezometer / Well Location [1]	Sampled By	Date	Time Measured [2]	Top of Casing Elevation [3]	Depth to Water (feet btoc)	Groundwater Elevation [3]
PZ-1A	AESI	10/7/2022	9:25	13.18	6.68	6.50
PZ-1B	AESI	10/7/2022	9:06	13.10	5.95	7.15
MW-10D[4]	AESI	10/7/2022	9:04	13.44	9.54	3.90
PZ-2A	AESI	10/7/2022	9:32	12.90	5.97	6.93
PZ-2B	AESI	10/7/2022	9:08	11.93	4.93	7.00
PZ-2D	AESI	10/7/2022	9:12	12.60	9.60	3.00
PZ-3A	AESI	10/7/2022	9:38	14.06	7.74	6.32
	AESI	11/4/2022	7:55		7.55	6.51
	AESI	12/28/2022	15:28		7.12	6.94
PZ-3B	AESI	10/7/2022	8:54	14.44	8.61	5.83
	AESI	11/4/2022	7:59		8.05	6.39
	AESI	12/28/2022	15:33		4.78	9.66
LLMW-20D	AESI	10/7/2022	8:51	14.86	12.75	2.11
	AESI	11/4/2022	8:01		12.04	2.82
	AESI	12/28/2022	15:32		8.27	6.59

NOTES:

(1) "A" wells are located inside the barrier wall in the Upper Sand Aquifer; "B" wells are located outside the barrier wall in the Upper Sand Aquifer; "D" wells are located outside the barrier wall in the Lower Sand Aquifer.

(2) Time measued is in the 24 hour format.

(3) Top of well casing and groundwater elevations are presented in NAVD88. Wells and piezometers were surveyed on 9/10/2020 by ASPI, LLC.

(4) MW-10D replaces LLMW-19D as the Deep Sand Aquifer paired with PZ1-A and PZ-1B.

AESI = Associated Earth Sciences, Inc.

btoc = below top of casing

Dry = no measurable groundwater was observed.

NA = not applicable, well PZ-3B was dry during monitoring event.

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Table 2
Horizontal Hydraulic Head Difference Comparisons
Former Mill E/Koppers Facility
Everett, Washington

Piezometer / Well Pair [(1)]	Date	"B" Piezometer Upper Sand Aquifer Elevation	"A" Piezometer Upper Sand Aquifer Elevation	Horizontal Head Difference
PZ-1A/PZ-1B	10/7/2022	7.15	6.50	0.65
PZ-2A/PZ-2B	10/7/2022	7.00	6.93	0.07
PZ-3A/PZ-3B	10/7/2022	5.83	6.32	-0.49
	11/4/2022	6.39	6.51	-0.12
	12/28/2022	9.66	6.94	2.72

NOTES:

(1) "A" wells are located inside the barrier wall in the Upper Sand Aquifer; "B" wells are located outside the barrier wall in the Upper Sand Aquifer.

(2) Elevations are presented in feet above or below mean sea level (MSL)

Dry = no measurable groundwater was observed.

NA = not applicable, peizometer PZ-3B was dry during monitoring event.

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Table 3
Vertical Hydraulic Head Difference Comparisons
Former Mill E/Koppers Facility
Everett, Washington

Piezometer / Well Pair [(1)]	Date	Location Relative to Barrier Wall	Upper Sand Aquifer Elevation	Lower Sand Aquifer Elevation	Vertical Head Difference
PZ-1A/MW-10D	10/7/2022	Inside	6.50	3.90	2.60
PZ-1B/MW-10D	10/7/2022	Outside	7.15	3.90	3.25
PZ-2A/PZ-2D	10/7/2022	Inside	6.93	3.00	3.93
PZ-2B/PZ-2D	10/7/2022	Outside	7.00	3.00	4.00
PZ-3A/LLMW-20D	10/7/2022	Inside	6.32	2.11	4.21
	11/4/2022	Inside	6.51	2.82	3.69
	12/28/2022	Inside	6.94	6.59	0.35
PZ-3B/LLMW-20D	10/7/2022	Outside	5.83	2.11	3.72
	11/4/2022	Outside	6.39	2.82	3.57
	12/28/2022	Outside	9.66	6.59	3.07

NOTES:

(1) "A" wells are located inside the barrier wall in the Upper Sand Aquifer; "B" wells are located outside the barrier wall in the Upper Sand Aquifer.

(2) Elevations are presented in feet above or below mean sea level (MSL)

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Table 4
Summary of Groundwater Analytical Results
SVOCs, Total Petroleum Hydrocarbons, and Metals
Former Mill E/Koppers Facility
Everett, Washington

Piezometer	Sample ID	Sample Date	Analytical Results [1] (micrograms per Liter)				
			Total Petroleum Hydrocarbons			SVOCs	Metals
			Gasoline Range Hydrocarbons [2]	Diesel Range Hydrocarbons [3]	Heavy Oil Range Hydrocarbons [3]	PCP [4]	Total Arsenic [5]
PZ-3A	PZ-3A-20221007	10/7/2022	< 100	1,700 x	400 x	< 0.2	**461**
Criteria [6]			10,000	10,000	10,000	7.29	5

NOTES:

(1) Samples were analyzed by Friedman & Bruya, Inc. of Seattle, Washington.

(2) Sample analyzed by NWTPH Method NWTPH-Gx

(3) Sample analyzed by NWTPH Method NWTPH-Dx

(4) Sample analyzed by EPA Method 8270D SIM

(5) Sample analyzed by EPA Method 200.8

(6) Criteria are from the cleanup levels established in the 1998 Consent Decree based on MTCA Method A and C.

< = not detected at concentration exceeding the laboratory reporting limit.

Red = concentration exceeds Criteria.

EPA = Environmental Protection Agency

MTCA = Washingston State Model Toxics Control Act

NWTPH = Northwest Total Petroleum Hydrocarbon

SVOCs = Semivolatile organic compounds

PCP = pentachlorophenol

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Table 5
Summary of October 2022
Water Quality Field Parameters
Former Mill E/Koppers Facility
Everett, Washington

Piezometer	Sample ID	Sample Date	Stabilization Parameters				
			pH	Specific Conductivity	Temperature	Dissolved Oxygen	Oxidation-Reduction Potential
			s.u.	µS/cm	°C	mg/L	mV
PZ-3A	PZ-3A-20221007	10/7/2022	6.29	741	18.4	0.16	-56.7

Notes:

s.u = standard unit

µS/cm = microSiemens/centimeter

°C = degrees Celsius

mg/L = milligrams/liter

mV = millivolts

ATTACHMENT 1

Laboratory Test Certificates and Chain of Custody

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

James E. Bruya, Ph.D.
Yelena Aravkina, M.S.
Michael Erdahl, B.S.
Vineta Mills, M.S.
Eric Young, B.S.

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October 19, 2022

Tim Brown, Project Manager
Associated Earth Sciences, Inc.
911 5th Avenue, Suite 100
Kirkland, WA 98033

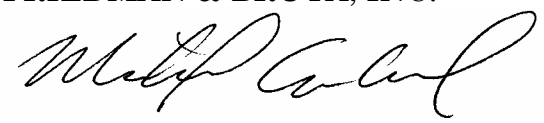
Dear Mr Brown:

Included are the results from the testing of material submitted on October 7, 2022 from the Mill E 20050654, F&BI 210099 project. There are 12 pages included in this report. Any samples that may remain are currently scheduled for disposal in 30 days, or as directed by the Chain of Custody document. If you would like us to return your samples or arrange for long term storage at our offices, please contact us as soon as possible.

We appreciate this opportunity to be of service to you and hope you will call if you have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
c: Kellie Miller
AE11019R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on October 7, 2022 by Friedman & Bruya, Inc. from the Associated Earth Sciences Mill E 20050654, F&BI 210099 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	Associated Earth Sciences
210099 -01	PZ-3A-20221007

All quality control requirements were acceptable.

Date of Report: 10/19/22
Date Received: 10/07/22
Project: Mill E 20050654, F&BI 210099
Date Extracted: 10/11/22
Date Analyzed: 10/11/22

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS GASOLINE USING METHOD NWTPH-Gx

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Gasoline Range	Surrogate (% Recovery) (Limit 51-134)
PZ-3A-20221007 210099-01	<100	95
Method Blank 02-2353 MB	<100	92

Date of Report: 10/19/22
Date Received: 10/07/22
Project: Mill E 20050654, F&BI 210099
Date Extracted: 10/10/22
Date Analyzed: 10/10/22

RESULTS FROM THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL AND MOTOR OIL USING METHOD NWTPH-Dx

Results Reported as ug/L (ppb)

Sample ID Laboratory ID	Diesel Range (C_{10}-C_{25})	Motor Oil Range (C_{25}-C_{36})	Surrogate (% Recovery) (Limit 41-152)
PZ-3A-20221007 210099-01	1,700 x	400 x	149
Method Blank 02-2444 MB	<50	<250	109

Analysis For Total Metals By EPA Method 200.8

Client ID:	PZ-3A-20221007	Client:	Associated Earth Sciences
Date Received:	10/07/22	Project:	Mill E 20050654, F&BI 210099
Date Extracted:	10/07/22	Lab ID:	210099-01
Date Analyzed:	10/07/22	Data File:	210099-01.168
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	461

Analysis For Total Metals By EPA Method 200.8

Client ID:	Method Blank	Client:	Associated Earth Sciences
Date Received:	NA	Project:	Mill E 20050654, F&BI 210099
Date Extracted:	10/07/22	Lab ID:	I2-717 mb
Date Analyzed:	10/07/22	Data File:	I2-717 mb.092
Matrix:	Water	Instrument:	ICPMS2
Units:	ug/L (ppb)	Operator:	SP

Analyte:	Concentration ug/L (ppb)
Arsenic	<1

Analysis for Semivolatile Phenols By EPA Method 8270E SIM

Client Sample ID:	PZ-3A-20221007	Client:	Associated Earth Sciences
Date Received:	10/07/22	Project:	Mill E 20050654, F&BI 210099
Date Extracted:	10/13/22	Lab ID:	210099-01
Date Analyzed:	10/14/22	Data File:	101407.D
Matrix:	Water	Instrument:	GCMS12
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2,4,6-Tribromophenol	104	50	150

Compounds:	Concentration ug/L (ppb)
Pentachlorophenol	<0.2

Analysis for Semivolatile Phenols By EPA Method 8270E SIM

Client Sample ID:	Method Blank	Client:	Associated Earth Sciences
Date Received:	Not Applicable	Project:	Mill E 20050654, F&BI 210099
Date Extracted:	10/13/22	Lab ID:	02-2520 mb
Date Analyzed:	10/14/22	Data File:	101406.D
Matrix:	Water	Instrument:	GCMS12
Units:	ug/L (ppb)	Operator:	JCM

Surrogates:	% Recovery:	Lower Limit:	Upper Limit:
2,4,6-Tribromophenol	87	50	150

Compounds:	Concentration ug/L (ppb)
Pentachlorophenol	<0.2

Date of Report: 10/19/22
Date Received: 10/07/22
Project: Mill E 20050654, F&BI 210099

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TPH AS GASOLINE USING METHOD NWTPH-Gx

Laboratory Code: 210115-01 (Duplicate)

Analyte	Reporting Units	Sample Result	Duplicate Result	RPD (Limit 20)
Gasoline	ug/L (ppb)	<100	<100	nm

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Gasoline	ug/L (ppb)	1,000	102	69-134

Date of Report: 10/19/22
Date Received: 10/07/22
Project: Mill E 20050654, F&BI 210099

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TOTAL PETROLEUM HYDROCARBONS AS DIESEL EXTENDED USING METHOD NWTPH-Dx

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 20)
Diesel Extended	ug/L (ppb)	2,500	76	92	63-142	19

Date of Report: 10/19/22
Date Received: 10/07/22
Project: Mill E 20050654, F&BI 210099

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR TOTAL METALS USING EPA METHOD 200.8

Laboratory Code: 210094-08 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	ug/L (ppb)	10	1.92	102	101	70-130	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	ug/L (ppb)	10	103	85-115

Date of Report: 10/19/22
Date Received: 10/07/22
Project: Mill E 20050654, F&BI 210099

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF WATER SAMPLES FOR SEMIVOLATILE PHENOLS BY EPA METHOD 8270E SIM

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Percent Recovery LCSD	Acceptance Criteria	RPD (Limit 30)
Pentachlorophenol	ug/L (ppb)	2.5	82	85	70-130	4

Data Qualifiers & Definitions

a - The analyte was detected at a level less than five times the reporting limit. The RPD results may not provide reliable information on the variability of the analysis.

b - The analyte was spiked at a level that was less than five times that present in the sample. Matrix spike recoveries may not be meaningful.

ca - The calibration results for the analyte were outside of acceptance criteria. The value reported is an estimate.

c - The presence of the analyte may be due to carryover from previous sample injections.

cf - The sample was centrifuged prior to analysis.

d - The sample was diluted. Detection limits were raised and surrogate recoveries may not be meaningful.

dv - Insufficient sample volume was available to achieve normal reporting limits.

f - The sample was laboratory filtered prior to analysis.

fb - The analyte was detected in the method blank.

fc - The analyte is a common laboratory and field contaminant.

hr - The sample and duplicate were reextracted and reanalyzed. RPD results were still outside of control limits. Variability is attributed to sample inhomogeneity.

hs - Headspace was present in the container used for analysis.

ht – The analysis was performed outside the method or client-specified holding time requirement.

ip - Recovery fell outside of control limits due to sample matrix effects.

j - The analyte concentration is reported below the lowest calibration standard. The value reported is an estimate.

J - The internal standard associated with the analyte is out of control limits. The reported concentration is an estimate.

jl - The laboratory control sample(s) percent recovery and/or RPD were out of control limits. The reported concentration should be considered an estimate.

js - The surrogate associated with the analyte is out of control limits. The reported concentration should be considered an estimate.

lc - The presence of the analyte is likely due to laboratory contamination.

L - The reported concentration was generated from a library search.

nm - The analyte was not detected in one or more of the duplicate analyses. Therefore, calculation of the RPD is not applicable.

pc - The sample was received with incorrect preservation or in a container not approved by the method. The value reported should be considered an estimate.

ve - The analyte response exceeded the valid instrument calibration range. The value reported is an estimate.

vo - The value reported fell outside the control limits established for this analyte.

x - The sample chromatographic pattern does not resemble the fuel standard used for quantitation.

210099

SAMPLE CHAIN OF CUSTODY

10/07/22 VW1/AT1/E03

Page # 1 of 1

Send Report To Tim Brown, Kellie Miller

Company AESI

Address 911 5th Ave

City, State, ZIP Kirkland WA

Phone # 425 827 7701 Fax #

Email Address

SAMPLERS (signature) Kellie Miller

PROJECT NAME/NO. Mill E

PO # 20050654

PROJECT ADDRESS

· ELECTRONIC DATA REQUESTED

TURNAROUND TIME
- (•) Standard Turnaround
- · RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- · Dispose after 30 days
- · Return samples
- · Will call with instructions

Samples Received at ____ °C

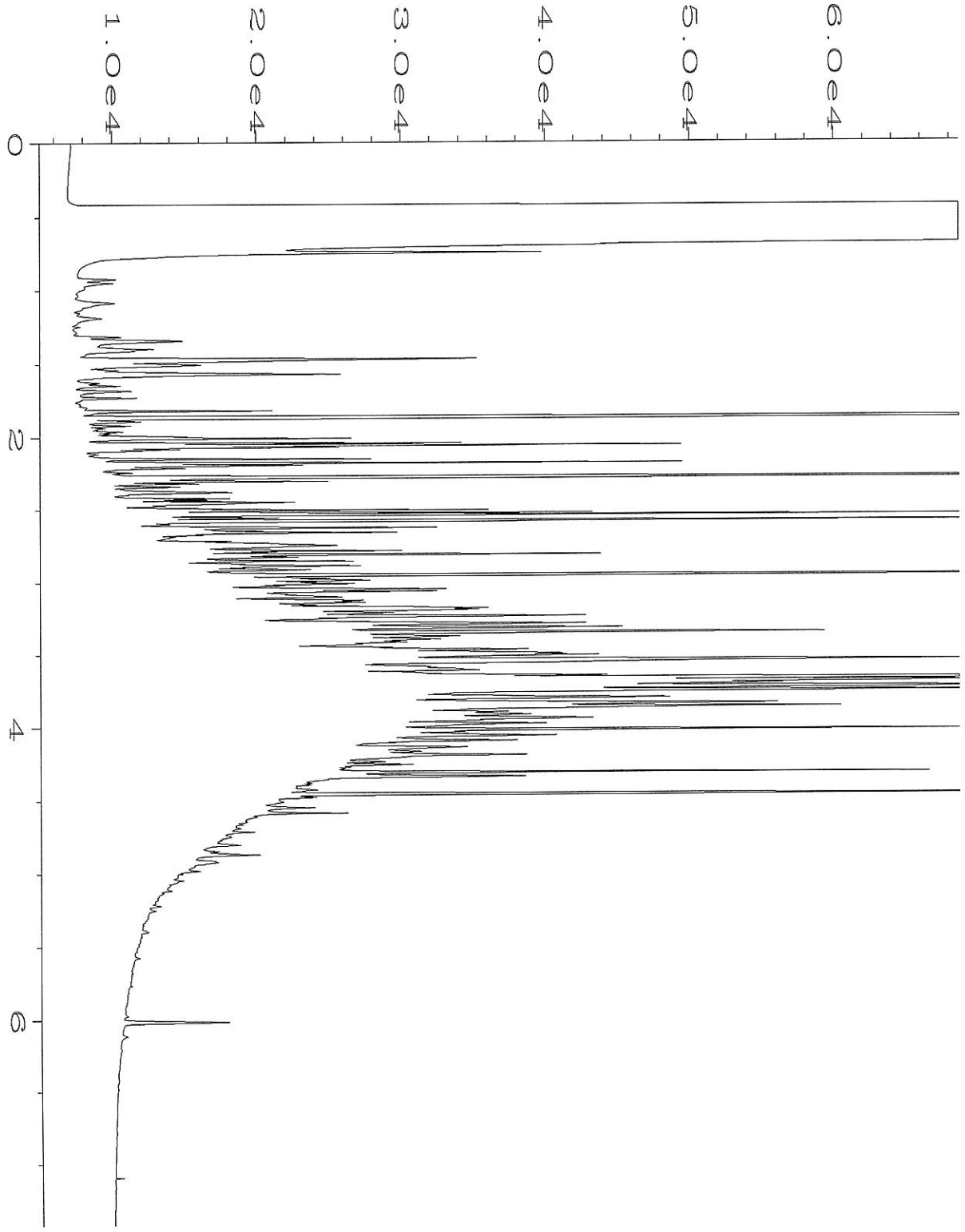
Sample ID	Lab ID	Date	Time	Sample Type	# of containers	TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by 8260	SVOCs by 8270	HFS	TOTAL AS 200.8	Pentachlorophenol 8270D				Notes
						ANALYSES REQUESTED											
PZ-3A-20221007	01A-G	10/7	1030	gw	7	X	X					X	X				

	SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Kellie Miller	Kellie Miller	AESI	10/7	1155
Received by:		ANH PHAN	FSB	10/07/22	13:47
Relinquished by:					
Received by:					

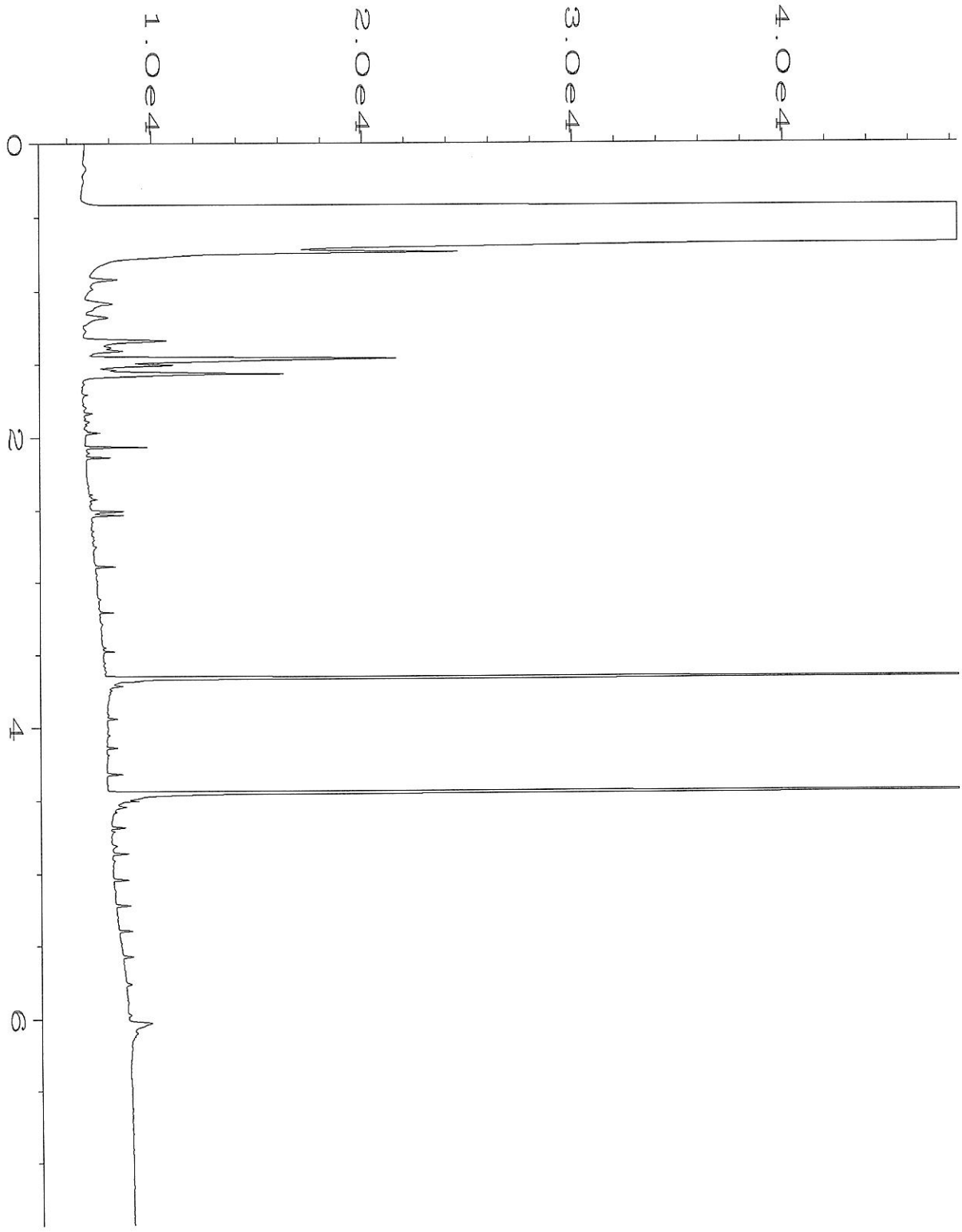
Samples received at 2 °C

Friedman & Bruya, Inc.
3012 16th Avenue West
Seattle, WA 98119-2029
Ph. (206) 285-8282
Fax (206) 283-5044

FORMS\COC\COC.DOC

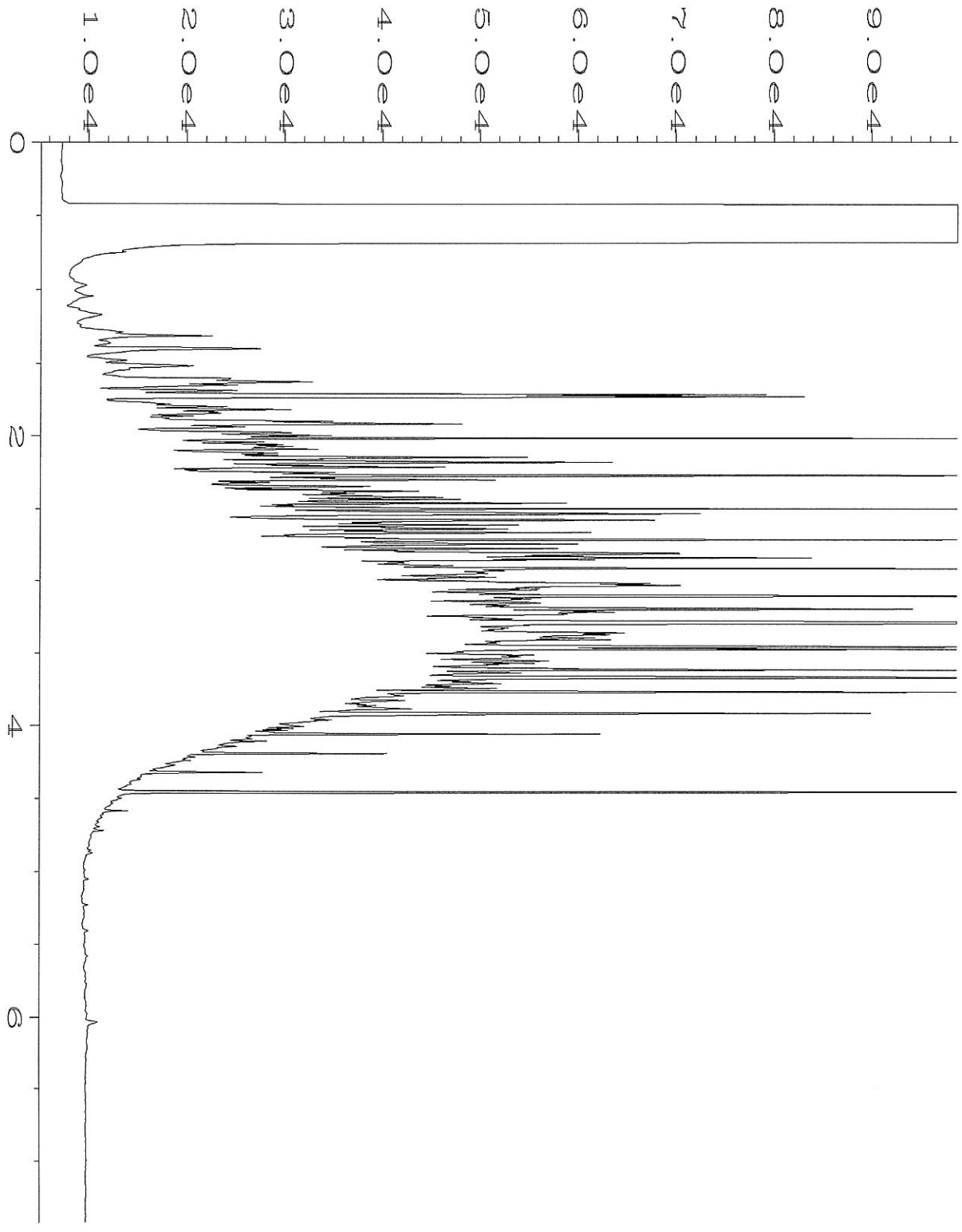


Data File Name	: C:\HPCHEM\1\DATA\10-10-22\051F1301.D		
Operator	: TL	Page Number	: 1
Instrument	: GC1	Vial Number	: 51
Sample Name	: 210099-01	Injection Number	: 1
Run Time Bar Code:		Sequence Line	: 13
Acquired on	: 10 Oct 22 10:18 PM	Instrument Method	: DX.MTH
Report Created on	: 11 Oct 22 10:47 AM	Analysis Method	: DEFAULT.MTH



Data File Name : C:\HPCHEM\1\DATA\10-10-22\081F0601.D
Operator : TL
Instrument : GC1
Sample Name : 02-2444 mb
Run Time Bar Code:
Acquired on : 10 Oct 22 11:38 AM
Report Created on: 11 Oct 22 10:47 AM

Page Number : 1
Vial Number : 81
Injection Number : 1
Sequence Line : 6
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH



Data File Name : C:\HPCHEM\1\DATA\10-10-22\003F0201.D
Operator : TL
Instrument : GC1
Sample Name : 500 Dx 66-186F
Run Time Bar Code:
Acquired on : 10 Oct 22 06:06 AM
Report Created on: 11 Oct 22 10:41 AM

Page Number : 1
Vial Number : 3
Injection Number : 1
Sequence Line : 2
Instrument Method: DX.MTH
Analysis Method : DEFAULT.MTH

ATTACHMENT 2

Field Report of Cap Inspection

FIELD REPORT

AESI
Associated Earth Sciences
Kirkland | Tacoma | Mount Vernon
425-827-7701| www.aesgeo.com

Date	**Project Name**	**Project No.**	**Report No.**
10/7/2022	Former Mill E/Koppers Facility	20050654V001	001
Location	**Municipality**	**AESI Project Manager**	**AESI Field Rep**
Riverside Business Park	Everett	Matt Miller, P.E.	Kellie Miller, L.G.
Permit No.	**Client/Owner**	**Attn**	**Requested By**
--	Pacific Topsoils, Inc.	Janusz Bajsarowicz	--
Engineer/Architect	**General Contractor**	**Grading Contractor**	**Weather**
--	--	—	P. Cloudy, 50s

THE FOLLOWING WAS NOTED:

As part of the Performance and Compliance Monitoring Plan (EMCON 1998), an inspection of the Asphalt Cap and Soil Cover is to be conducted annually. Associated Earth Sciences Inc. (AESI) personnel arrived on site to observe the existing asphalt cap and fill soil covering previously identified contaminated soils on site.

Kellie Miller with AESI was onsite to perform visual site observations. The property is currently occupied by Amazon service vehicles, several which were parked at the time of our visit. White paint marked parking spaces on the site. Majority of the cap, approximately 90 to 95 percent was visible at the time of the site visit. The asphalt cap was observed to be in serviceable condition. The northeast portion of the cap was observed to have repair work done on the cracks (photo 1). An abundant amount of minor cracking was observed on the southern portion of the cap (photo 2). No obvious sings of major cracking, fissures, or pumping were observed. There are areas where shallow depressions were observed, which were less than 2-inches in depth from recent rainfall. These shallow depressions were less than 10 feet in diameter. Drainage ditches had minimal accumulated sediment, less than 1-inch. Minor cracks with vegetation growing through were observed along the southern drainage ditch (photo 3). A newly installed raised asphalt patch was installed surrounding PZ-1A, on the west portion of the cap (photo 4). To maintain the cap in serviceable condition, and to meet the performance objectives to prevent direct contact with contaminated soil and prevent infiltration, AESI recommends removing all visible vegetation from the minor cracks in the drainage ditches and subsequently sealing the cracks.

The soil cap to the south of the asphalt cap appeared intact and is performing as intended. No major ponding or erosion was observed. Photographs of general observations are provided below.

Date Mailed: _____ Principal / PM: Matt Miller

FIELD REPORT

Date	Project Name	Project No.	Report No.

Photo 1. Looking west at the northern portion of the cap. Many cracks are observed to be repaired.

Photo 2. Looking north-northeast at the southern portion of the asphalt cap, observing minor cracking.

Photo 3. Looking west at the south drainage ditch. Less than 1 inch of accumulated sediment was observed. Vegetation was observed to be growing through minor cracks.

Photo 4. Observing minor cracking on the surface of the asphalt cap in the south portion of the asphalt cap.

FIELD REPORT

Date	Project Name	Project No.	Report No.

Photo 5. Facing southeast at the western and southern portions of the asphalt cap. Minor ponding is observed after a rainfall event.