



Technical Memorandum

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|-----------------|--|-----------------------------|------------------------------------|
| Date: | December 8, 2021 | From: | Kellie M. Andrews <i>KMA</i> |
| To: | Washington State Department of Ecology | Project Manager: | Timothy S. Brown <i>TSB</i> |
| | 3190 160 th Avenue SE | Principal/Associate: | Timothy S. Brown, L.Hg. |
| | Bellevue, Washington 98008 | Project Name: | Former Mill E/ Koppers Facility |
| Attn: | Ms. Sandra Matthews | Project No: | 20050654V001 |
| Subject: | 2021 Annual Performance and Compliance Monitoring Report | | |

Associated Earth Sciences, Inc. (AESI) performed the 2021 annual performance and compliance monitoring for the Former Mill E/Koppers Facility (Site) in Everett, Washington on October 18, 2021 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). The most recent monitoring report titled “Former Mill E/Koppers Facility 2020 Annual Performance and Compliance Monitoring Report” prepared by Floyd|Snider in November 2020 (2020 Annual Monitoring Report; Floyd|Snider, 2020) provided a summary of monitoring activities completed in September 2020 and October 2020. Based on recommendations in the 2020 Annual Monitoring Report, 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.

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 2021 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 18, 2021. During the October 2021 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 18, 2021, and the approximate timing of the measurements relative to the 24-hour tidal cycle is presented as Figure 2.

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 2021 are presented in Table 1.

Daytime low tide (2.25 feet elevation) was at 10:02 am on October 18, 2021 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 9:19 am and 9:41 am, before 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 2021 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 three piezometer pairs. The lower groundwater elevation inside the barrier wall indicates a positive horizontal head difference with groundwater 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 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 three 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.

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. 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. 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 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 18, 2021. 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 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 ($\mu\text{g}/\text{L}$). PCP was not detected at a concentration exceeding the laboratory reporting limit. Total arsenic was detected at a concentration of 546 $\mu\text{g}/\text{L}$,

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 2021 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 18, 2021 by AESI personnel. The Site is currently occupied by an Amazon delivery service and several vehicles were parked at the time of our visit; however, no activity was observed. The majority of the cap, approximately 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 and some cracking appeared to be formerly repaired. 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 2022 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 - TPH |
| | Figure 7: | Groundwater Quality Trends - PCP |
| | Figure 8: | Groundwater Quality Trends - 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 |
| | Attachment 1: | Laboratory Test Certificates and Chain of Custody |
| | Attachment 2: | Field Report of Cap Inspection |

Cc: Janusz Bajsarowics, Pacific Topsoils, Inc. (email)
Carol Wiseman, Weyerhaeuser (email)

REFERENCES

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

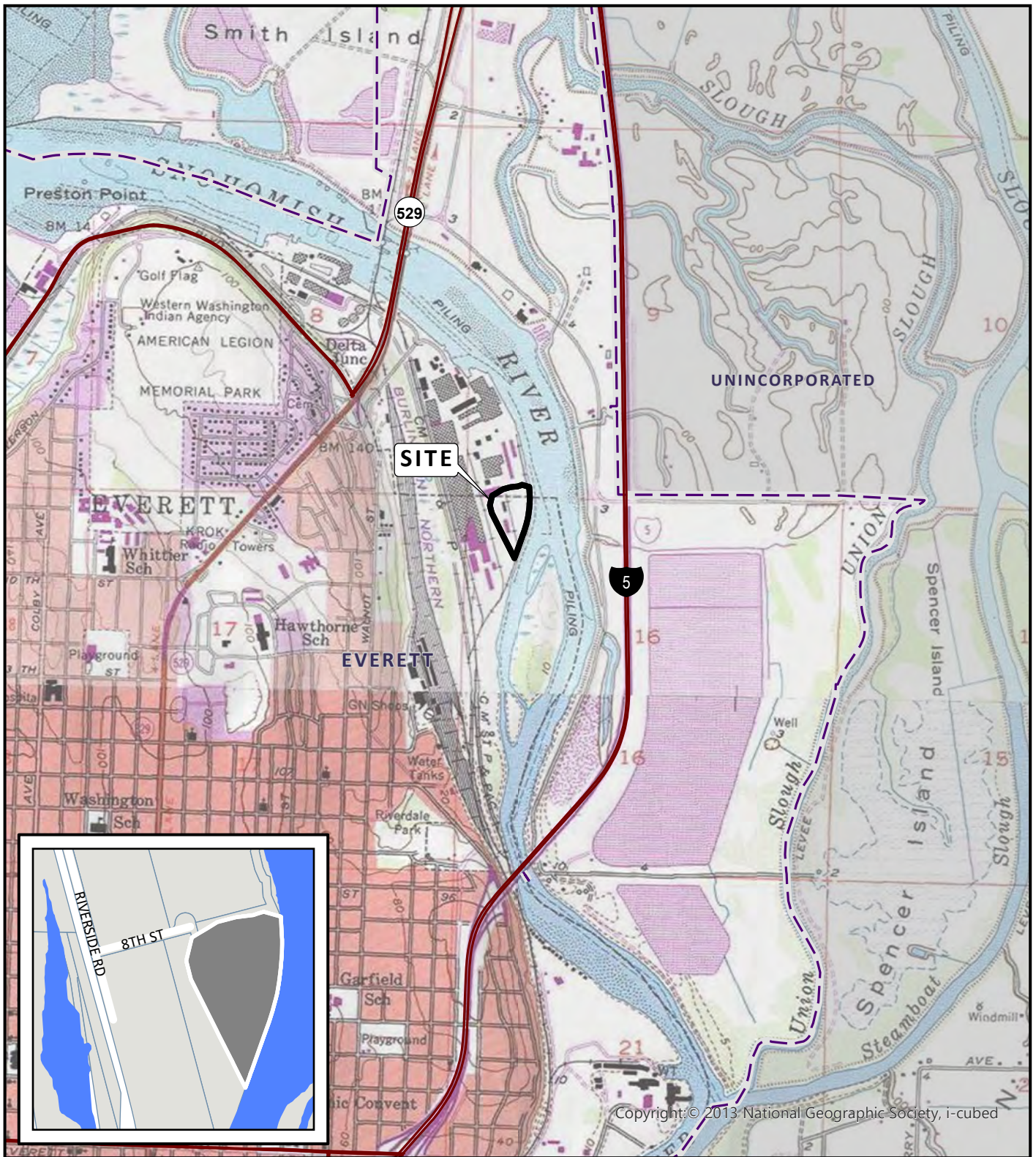
EMCON, 1998, Performance and compliance monitoring plan, Former Mill E/Koppers Facility, Everett, Washington: Prepared for Weyerhaeuser Company, October 8, 1998.

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 Facility 2020 annual performance and compliance monitoring report: Prepared for Washington State Department of Ecology, November 2020.

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

FIGURES

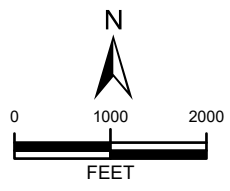


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DATA SOURCES / REFERENCES:
 USGS: 7.5' SERIES TOPOGRAPHIC MAPS, ESRI/I-CUBED/NATIONAL GEOGRAPHIC SOCIETY 2013
 SNOHOMISH CO: STREETS, CITY LIMITS, PARCELS, 2/19
 LOCATIONS AND DISTANCES SHOWN ARE APPROXIMATE



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

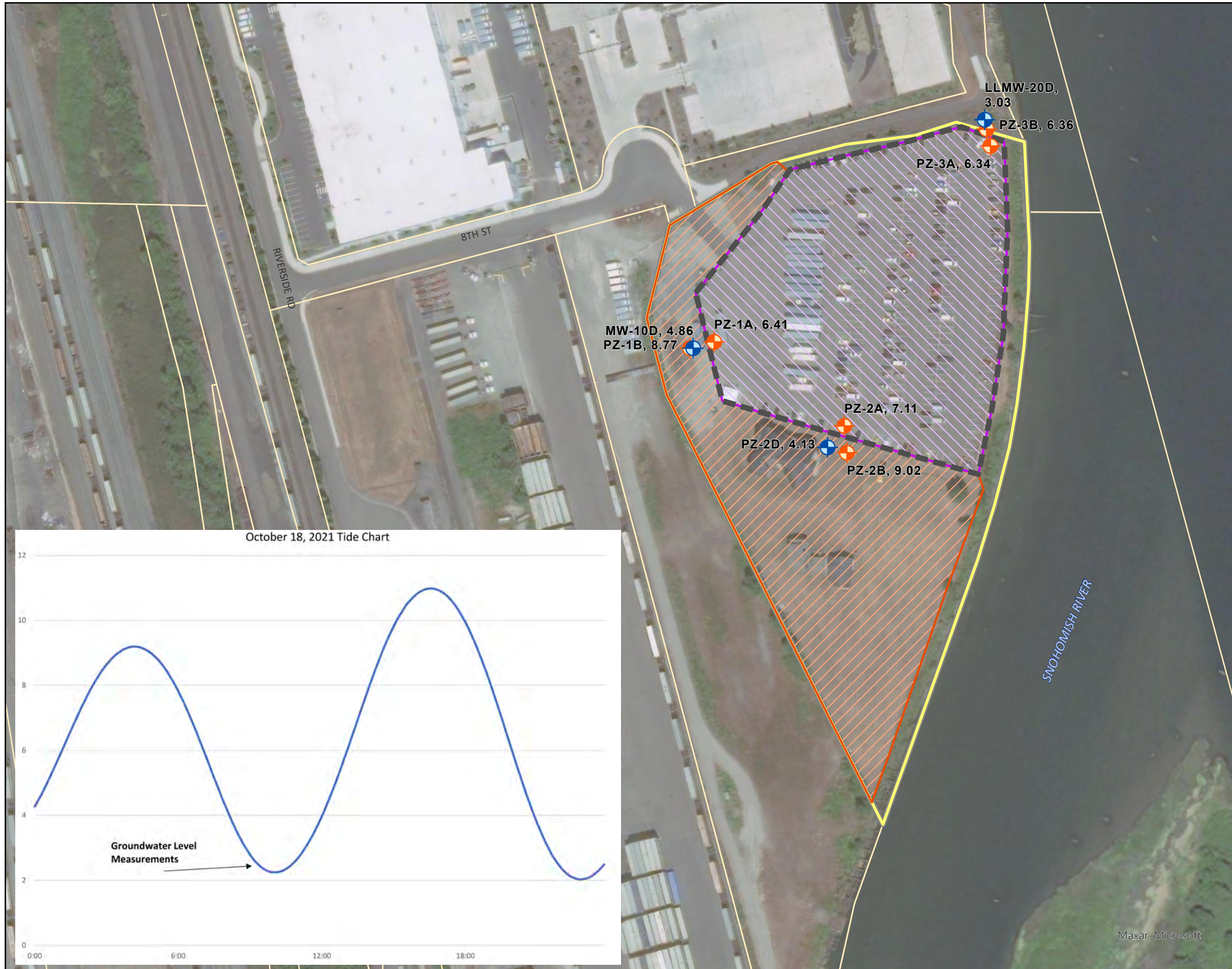


VICINITY MAP

FORMER MILL E/KOPPERS FACILITY
 EVERETT, WASHINGTON

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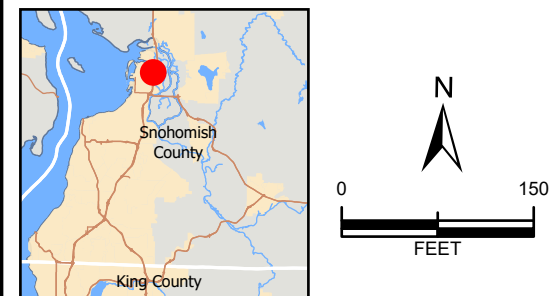
- LEGEND**
- SITE
 - LOWER SAND AQUIFER PIEZOMETER/WELL, GW ELEVATION MEASURED 10/18/21
 - UPPER SAND AQUIFER PIEZOMETER, GW ELEVATION MEASURED 10/18/21
 - BARRIER WALL
 - ASPHALT CAP AREA
 - SOIL CAP AREA
 - PARCEL

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, PARCELS 1/18
 AERIAL: ESRI WORLD IMAGERY 7/20

LOCATIONS AND DISTANCES SHOWN ARE APPROXIMATE

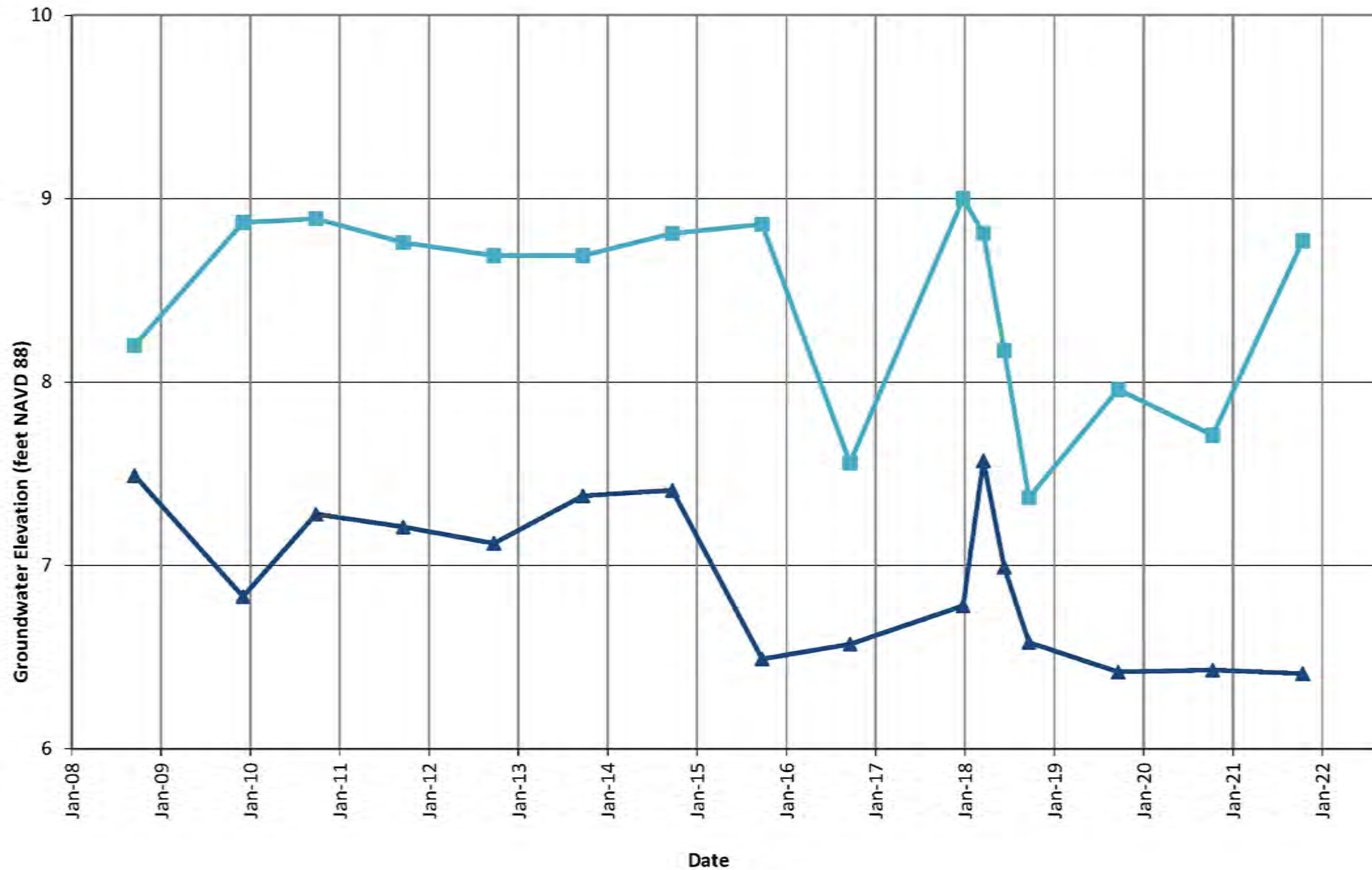


BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION



SITE PLAN AND OCTOBER GROUNDWATER ELEVATIONS
 FORMER MILL E/KOPPERS FACILITY
 EVERETT, WASHINGTON

| | | |
|--------------------------|----------------|--------------|
| PROJ NO. 20050654V001 | DATE: 11/21 | FIGURE: 2 |
|--------------------------|----------------|--------------|



LEGEND:

NAVD88 NORTH AMERICAN VERTICAL DATUM OF 1988

- PZ-1A
- PZ-1B

NOTE: LOCATION AND DISTANCES SHOWN ARE APPROXIMATE

NOTES:

- "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).

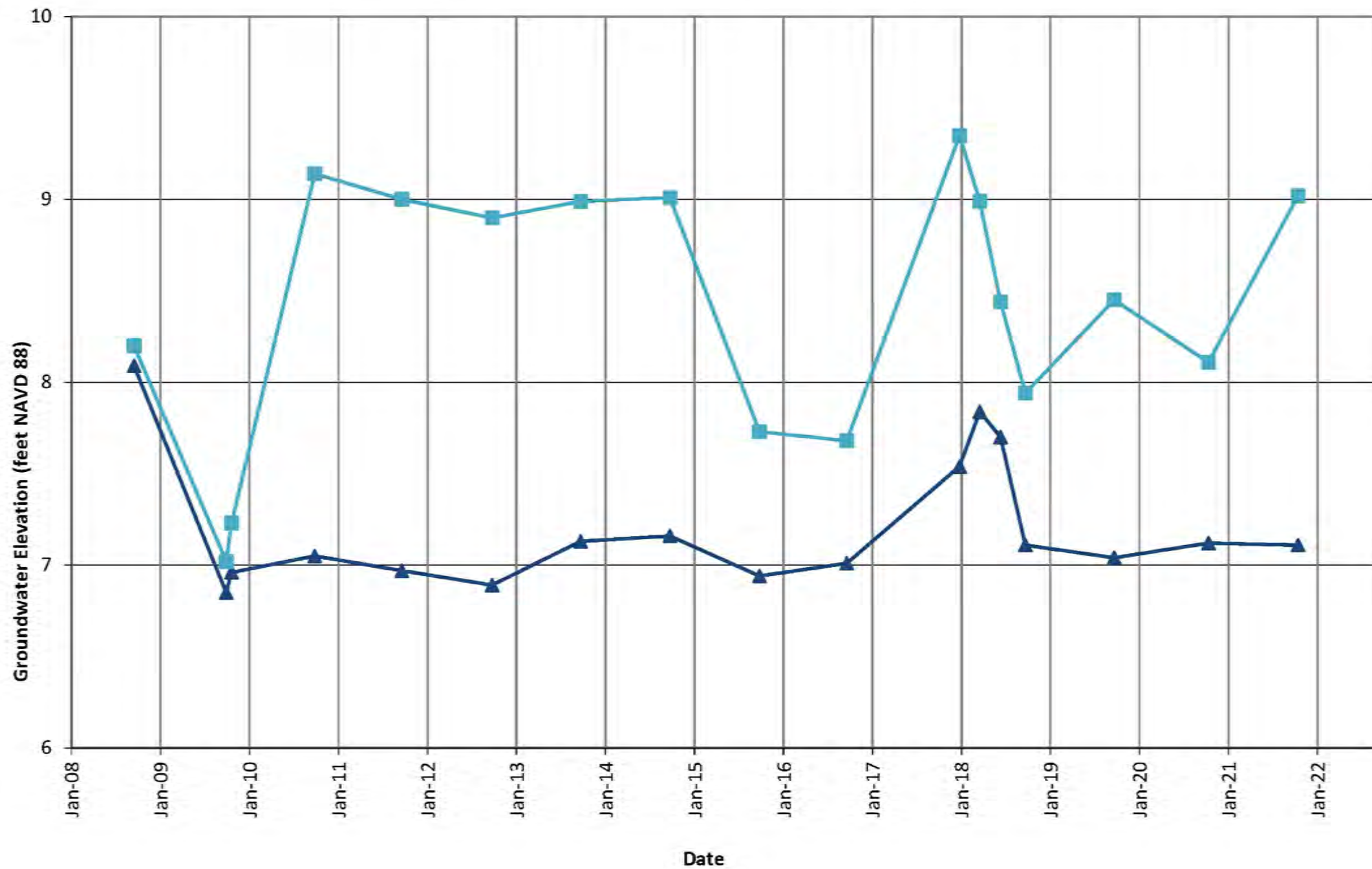
BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION



**GROUNDWATER ELEVATION TRENDS
PZ-1A AND PZ-1B
FORMER MILL E / KOPPERS FACILITY
EVERETT, WASHINGTON**

| | | |
|------------|-------|---------|
| PROJ NO. | DATE: | FIGURE: |
| 050654V001 | 11/21 | 3 |

060654V001 F3-8.dwg LAYOUT: GW PZ-2



LEGEND:

NAVD88 NORTH AMERICAN VERTICAL DATUM OF 1988

- ▲ PZ-2A
- PZ-2B

NOTE: LOCATION AND DISTANCES SHOWN ARE APPROXIMATE

NOTES:

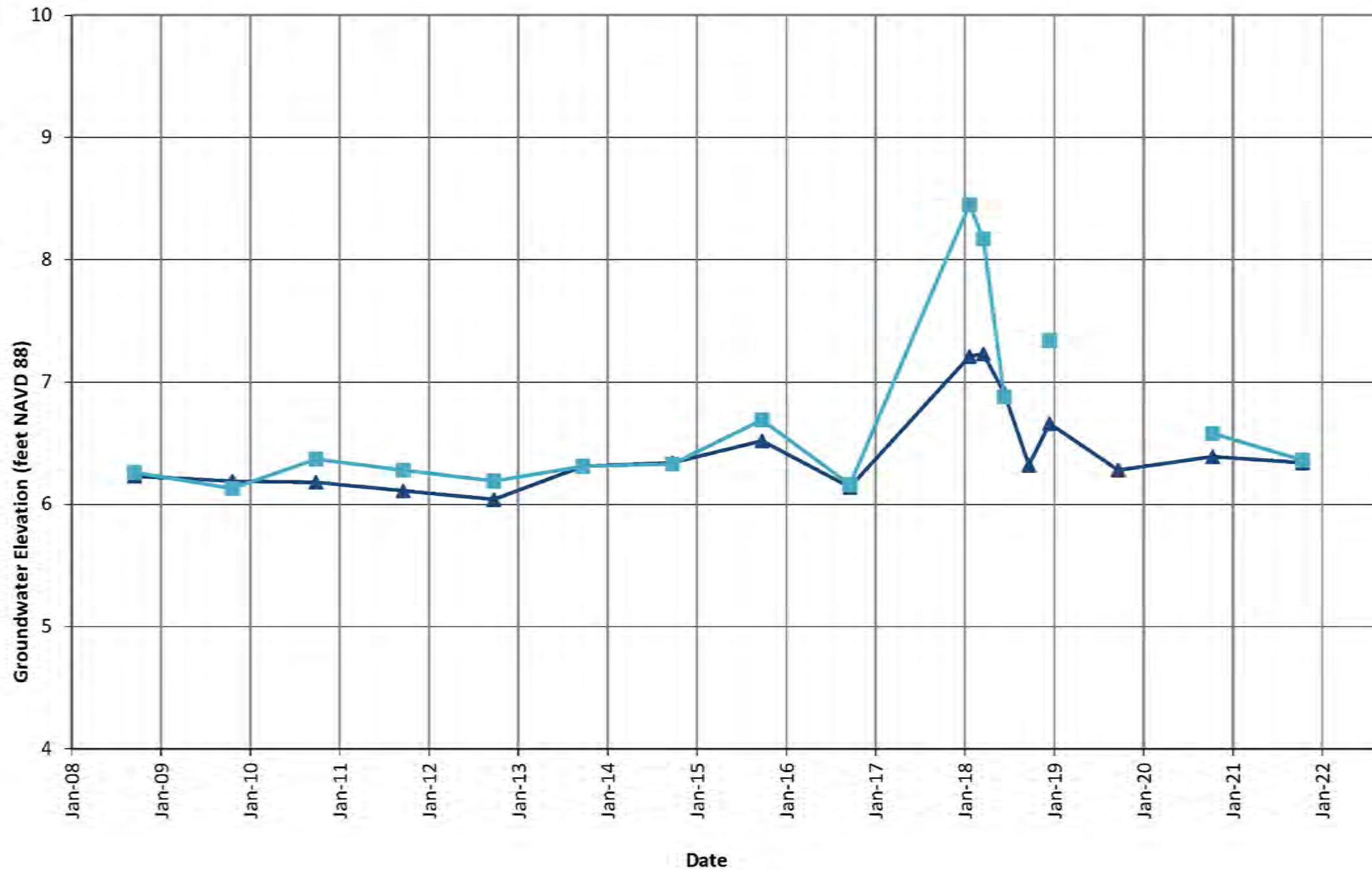
1. "A" WELLS ARE LOCATED INSIDE THE BARRIER WALL (IN THE UPPER SAND AQUIFER);
2. "B" WELLS ARE LOCATED OUTSIDE THE BARRIER WALL (IN THE UPPER SAND AQUIFER).

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



**GROUNDWATER ELEVATION TRENDS
PZ-2A AND PZ-2B
FORMER MILL E / KOPPERS FACILITY
EVERETT, WASHINGTON**

| | | |
|------------|-------|---------|
| PROJ NO. | DATE: | FIGURE: |
| 050654V001 | 11/21 | 4 |



LEGEND:

NAVD88 NORTH AMERICAN VERTICAL DATUM OF 1988

- ▲ PZ-3A
- PZ-3B

NOTE: LOCATION AND DISTANCES SHOWN ARE APPROXIMATE

NOTES:

1. "A" WELLS ARE LOCATED INSIDE THE BARRIER WALL (IN THE UPPER SAND AQUIFER);
2. "B" WELLS ARE LOCATED OUTSIDE THE BARRIER WALL (IN THE UPPER SAND AQUIFER).
3. PZ-3B WAS DRY DURING THE SEPTEMBER 2018 AND 2019 EVENTS.

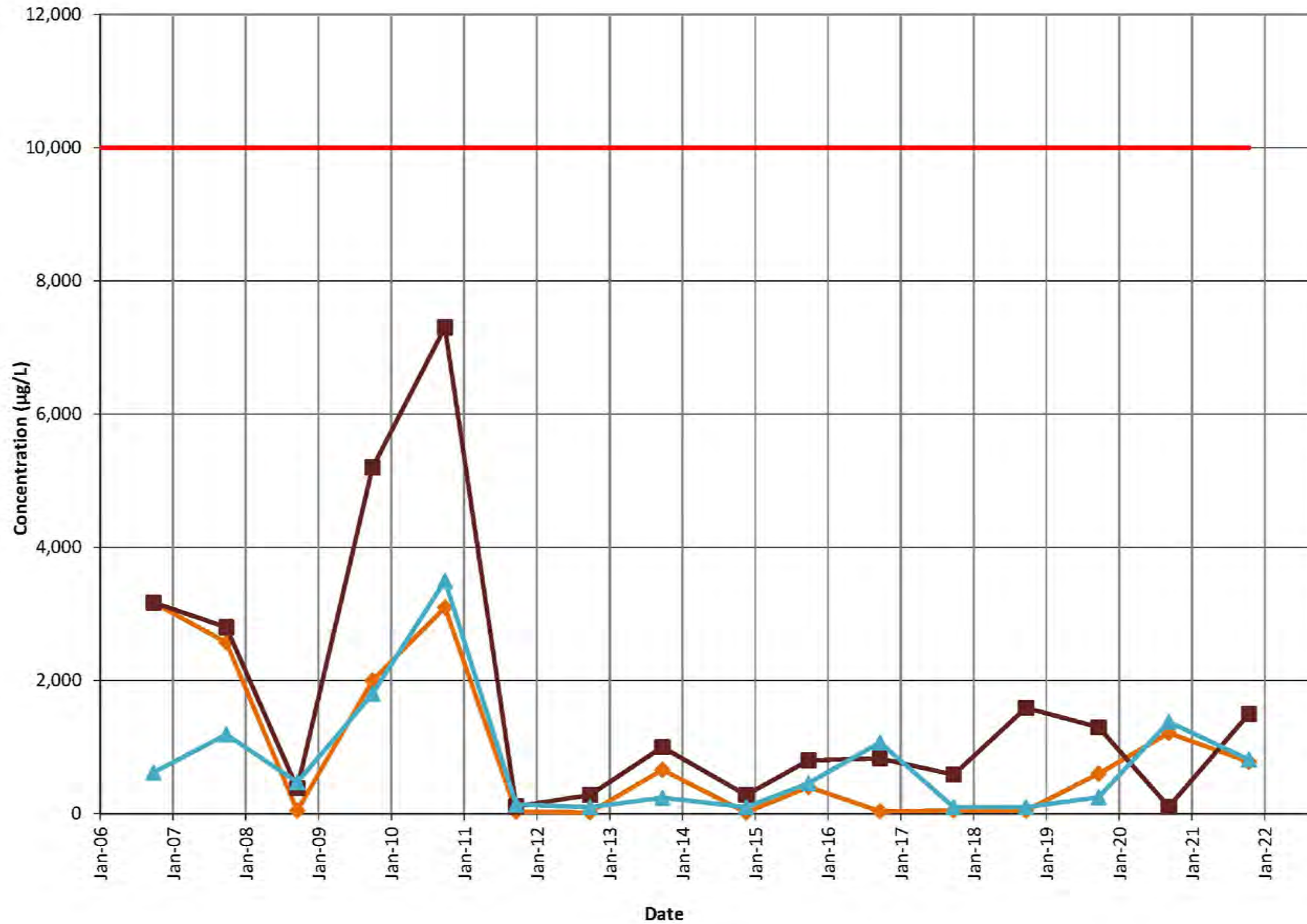
BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION



**GROUNDWATER ELEVATION TRENDS
PZ-3A AND PZ-3B
FORMER MILL E / KOPPERS FACILITY
EVERETT, WASHINGTON**

| | | |
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| PROJ NO. | DATE: | FIGURE: |
| 050654V001 | 11/21 | 5 |

Total Petroleum Hydrocarbon Concentrations



LEGEND:

- MTCA CLEANUP (10,000 ug/L)
- GASOLINE
- DIESEL
- MOTOR OIL
- MTCA MODEL TOXICS CONTROL ACT
- ug/L MICROGRAMS PER LITER
- TPH TOTAL PETROLEUM HYDROCARBONS

NOTE: LOCATION AND DISTANCES SHOWN ARE APPROXIMATE

NOTES:

1. MTCA CLEANUP LEVELS ESTABLISHED IN THE 1998 CONSENT DECREE.

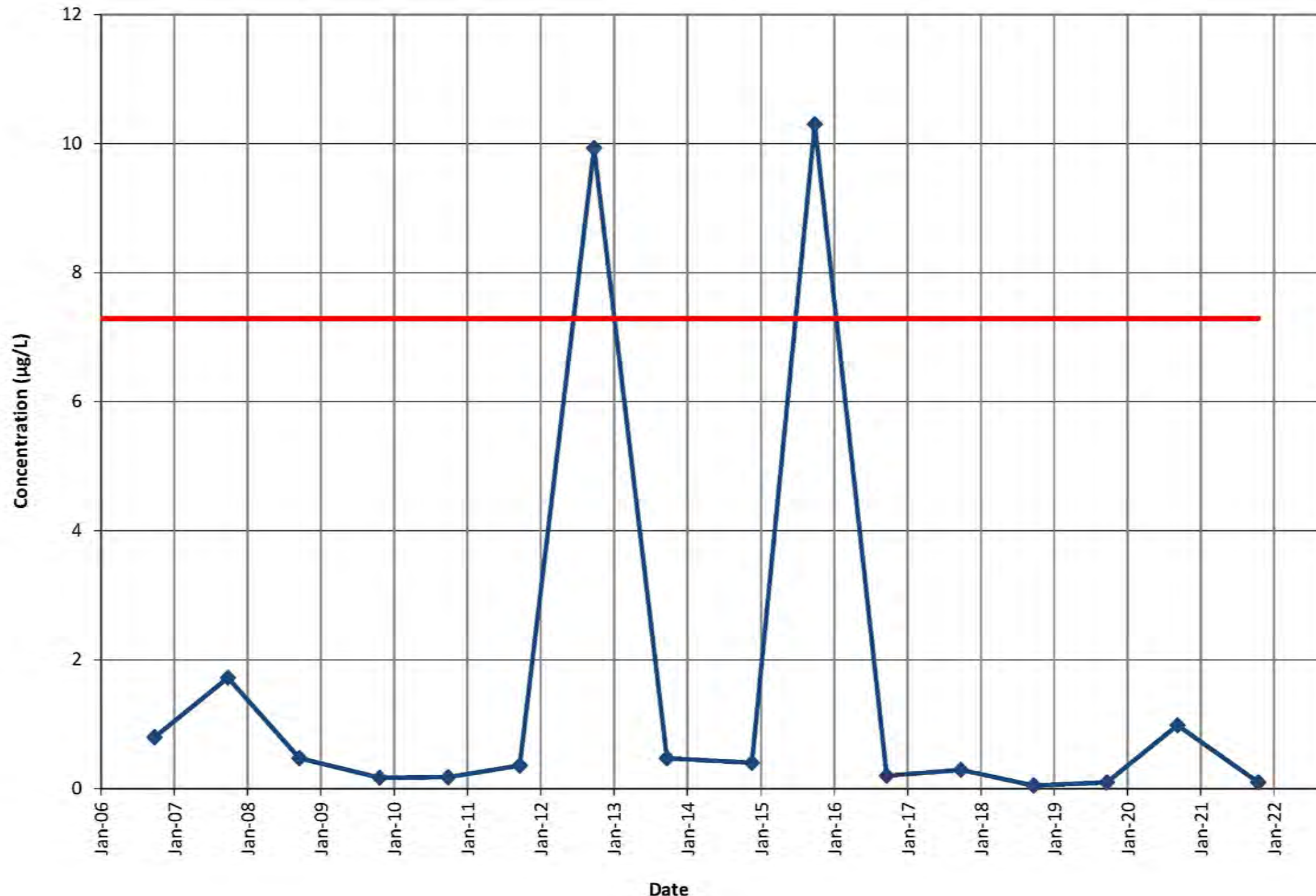
BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION



**GROUNDWATER QUALITY TRENDS
TPH
FORMER MILL E / KOPPERS FACILITY
EVERETT, WASHINGTON**

| | | |
|------------|-------|---------|
| PROJ NO. | DATE: | FIGURE: |
| 050654V001 | 11/21 | 6 |

Pentachlorophenol Concentrations



LEGEND:
— MTCA CLEANUP (7.29 ug/L)
◆ PCP
 MTCA MODEL TOXICS CONTROL ACT
 ug/L MICROGRAMS PER LITER
 PCP PENTACHLOROPHENOL

NOTE: LOCATION AND DISTANCES SHOWN ARE APPROXIMATE

- NOTES:**
1. MTCA CLEANUP LEVELS ESTABLISHED IN THE 1998 CONSENT DECREE.
 2. NON-DETECTABLE CONCENTRATIONS OF PCP ARE PLOTTED AS HALF THE REPORTING LIMIT.

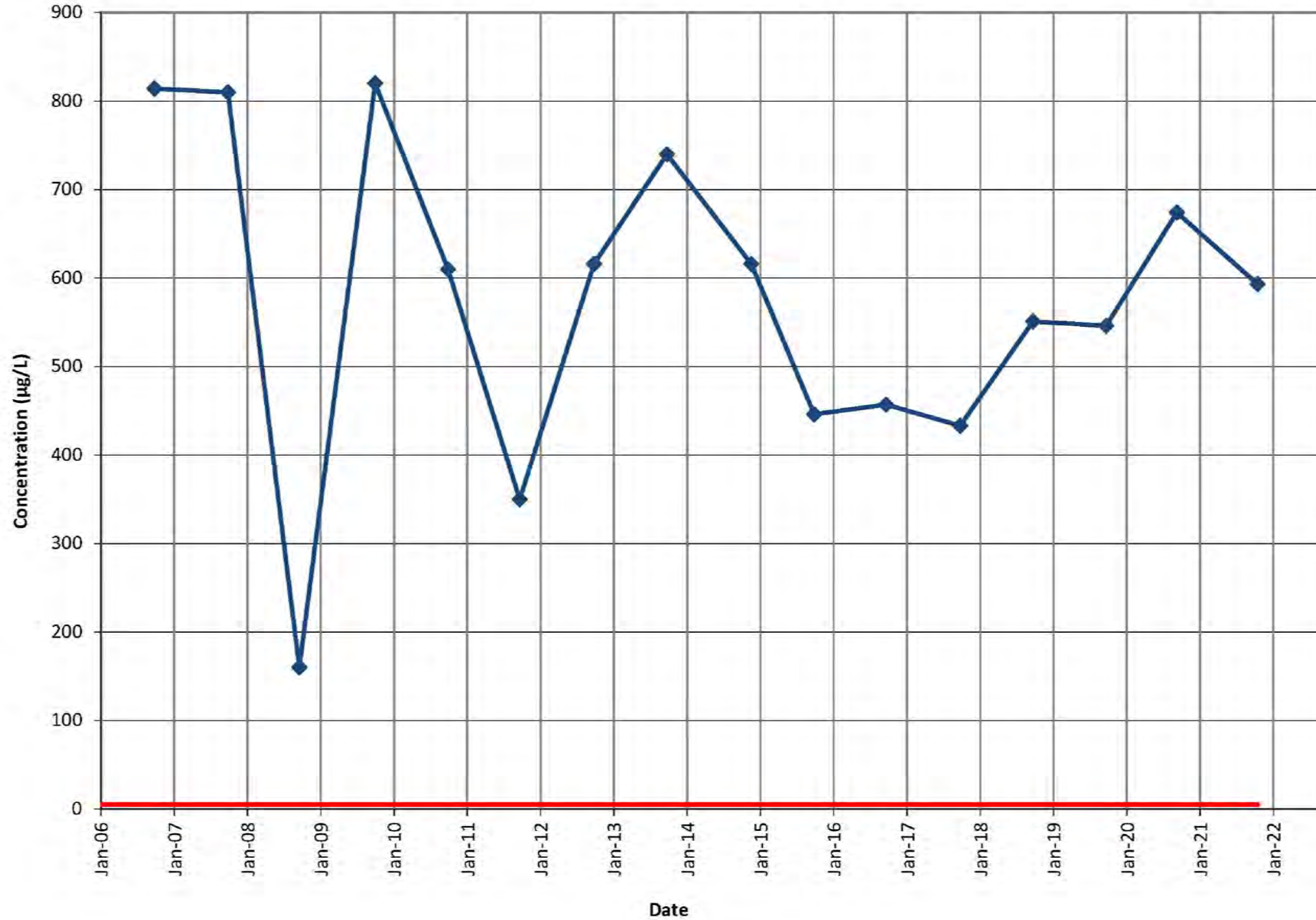
BLACK AND WHITE REPRODUCTION OF THIS COLOR ORIGINAL MAY REDUCE ITS EFFECTIVENESS AND LEAD TO INCORRECT INTERPRETATION



GROUNDWATER QUALITY TRENDS
PCP
 FORMER MILL E / KOPPERS FACILITY
 EVERETT, WASHINGTON

| | | |
|------------|-------|---------|
| PROJ NO. | DATE: | FIGURE: |
| 050654V001 | 11/21 | 7 |

Arsenic Concentrations



LEGEND:

- MTCA CLEANUP (5 ug/L)
- ◆— ARSENIC
- MTCA MODEL TOXICS CONTROL ACT
- ug/L MICROGRAMS PER LITER

NOTE: LOCATION AND DISTANCES SHOWN ARE APPROXIMATE

NOTES:

1. MTCA CLEANUP LEVELS ESTABLISHED IN THE 1998 CONSENT DECREE.

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



**GROUNDWATER QUALITY TRENDS
ARSENIC**
FORMER MILL E / KOPPERS FACILITY
EVERETT, WASHINGTON

| | | |
|---------------------|-------------|-----------|
| PROJ NO. 050654V001 | DATE: 11/21 | FIGURE: 8 |
|---------------------|-------------|-----------|

TABLES

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 | 10/18/2021 | 9:19 | 13.18 | 6.77 | 6.41 |
| PZ-1B | AESI | 10/18/2021 | 9:23 | 13.10 | 4.33 | 8.77 |
| MW-10D ⁽⁴⁾ | AESI | 10/18/2021 | 9:21 | 13.44 | 8.58 | 4.86 |
| PZ-2A | AESI | 10/18/2021 | 9:25 | 12.90 | 5.79 | 7.11 |
| PZ-2B | AESI | 10/18/2021 | 9:28 | 11.93 | 2.91 | 9.02 |
| PZ-2D | AESI | 10/18/2021 | 9:30 | 12.60 | 8.47 | 4.13 |
| PZ-3A | AESI | 10/18/2021 | 9:41 | 14.06 | 7.72 | 6.34 |
| PZ-3B | AESI | 10/18/2021 | 9:38 | 14.44 | 8.08 | 6.36 |
| LLMW-20D | AESI | 10/18/2021 | 9:37 | 14.86 | 11.83 | 3.03 |

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 measured 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.

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 | 10/18/2021 | 8.77 | 6.41 | 2.36 |
| PZ-2A/PZ-2B | 10/18/2021 | 9.02 | 7.11 | 1.91 |
| PZ-3A/PZ-3B | 10/18/2021 | 6.36 | 6.34 | 0.02 |

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, piezometer PZ-3B was dry during monitoring event.

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/LLMW-19D | 10/18/2021 | Inside | 6.41 | 4.86 | 1.55 |
| PZ-1B/LLMW-19D | 10/18/2021 | Outside | 8.77 | 4.86 | 3.91 |
| PZ-2A/PZ-2D | 10/18/2021 | Inside | 7.11 | 4.13 | 2.98 |
| PZ-2B/PZ-2D | 10/18/2021 | Outside | 9.02 | 4.13 | 4.89 |
| PZ-3A/LLMW-20D | 10/18/2021 | Inside | 6.34 | 3.03 | 3.31 |
| PZ-3B/LLMW-20D | 10/18/2021 | Outside | 6.36 | 3.03 | 3.33 |

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, well PZ-3B was dry during monitoring event.

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-20211018 | 10/18/2021 | 780 | 1,500 x | 810 x | < 0.2 | 593 |
| 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 = Washington State Model Toxics Control Act

NWTPH = Northwest Total Petroleum Hydrocarbon

SVOCs = Semivolatile organic compounds

PCP = pentachlorophenol

Table 4
Summary of September 2021
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. | $\mu\text{S}/\text{cm}$ | $^{\circ}\text{C}$ | mg/L | mV |
| PZ-3A | PZ-3A-20190924 | 9/24/2019 | 6.06 | 717 | 16.1 | 0.35 | 104.1 |

Notes:

s.u = standard unit

$\mu\text{S}/\text{cm}$ = microSiemens/centimeter

$^{\circ}\text{C}$ = degrees Celsius

mg/L = milligrams/liter

mV = millivolts



Table 4
Summary of September 2021
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. | $\mu\text{S/cm}$ | $^{\circ}\text{C}$ | mg/L | mV |
| PZ-3A | PZ-3A-20190924 | 9/24/2019 | 6.06 | 717 | 16.1 | 0.35 | 104.1 |

Notes:

s.u = standard unit

$\mu\text{S/cm}$ = microSiemens/centimeter

$^{\circ}\text{C}$ = 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.
Arina Podnozova, B.S.
Eric Young, B.S.

3012 16th Avenue West
Seattle, WA 98119-2029
(206) 285-8282
fbi@isomedia.com
www.friedmanandbruya.com

October 27, 2021

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 18, 2021 from the Mill E 20050654, F&BI 110335 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 Andrews
AE11027R.DOC

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

CASE NARRATIVE

This case narrative encompasses samples received on October 18, 2021 by Friedman & Bruya, Inc. from the Associated Earth Sciences Mill E 20050654, F&BI 110335 project. Samples were logged in under the laboratory ID's listed below.

| <u>Laboratory ID</u> | <u>Associated Earth Sciences</u> |
|----------------------|----------------------------------|
| 110335 -01 | PZ-3A-20211018 |

All quality control requirements were acceptable.

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 10/27/21
Date Received: 10/18/21
Project: Mill E 20050654, F&BI 110335
Date Extracted: 10/20/21
Date Analyzed: 10/20/21

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS GASOLINE
USING METHOD NWTPH-Gx**
Results Reported as ug/L (ppb)

| <u>Sample ID</u> Laboratory ID | <u>Gasoline Range</u> | <u>Surrogate</u> <u>(% Recovery)</u> (Limit 51-134) |
|-----------------------------------|-----------------------|---|
| PZ-3A-20211018 110335-01 | 780 | 102 |
| Method Blank 01-2309 MB | <100 | 99 |

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 10/27/21
Date Received: 10/18/21
Project: Mill E 20050654, F&BI 110335
Date Extracted: 10/18/21
Date Analyzed: 10/18/21

**RESULTS FROM THE ANALYSIS OF WATER SAMPLES
FOR TOTAL PETROLEUM HYDROCARBONS AS
DIESEL AND MOTOR OIL
USING METHOD NWTPH-D_x**
Results Reported as ug/L (ppb)

| <u>Sample ID</u> Laboratory ID | <u>Diesel Range</u> (C ₁₀ -C ₂₅) | <u>Motor Oil Range</u> (C ₂₅ -C ₃₆) | <u>Surrogate</u> (% Recovery) (Limit 47-140) |
|-----------------------------------|--|---|--|
| PZ-3A-20211018 110335-01 | 1,500 x | 810 x | 66 |
| Method Blank 01-2422 MB | <50 | <250 | 116 |

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis For Total Metals By EPA Method 200.8

| | | | |
|-----------------|----------------|-------------|------------------------------|
| Client ID: | PZ-3A-20211018 | Client: | Associated Earth Sciences |
| Date Received: | 10/18/21 | Project: | Mill E 20050654, F&BI 110335 |
| Date Extracted: | 10/21/21 | Lab ID: | 110335-01 |
| Date Analyzed: | 10/21/21 | Data File: | 110335-01.129 |
| Matrix: | Water | Instrument: | ICPMS2 |
| Units: | ug/L (ppb) | Operator: | SP |

| Analyte: | Concentration ug/L (ppb) |
|----------|-----------------------------|
|----------|-----------------------------|

| | |
|---------|-----|
| Arsenic | 593 |
|---------|-----|

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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 110335 |
| Date Extracted: | 10/21/21 | Lab ID: | I1-673 mb |
| Date Analyzed: | 10/21/21 | Data File: | I1-673 mb.127 |
| Matrix: | Water | Instrument: | ICPMS2 |
| Units: | ug/L (ppb) | Operator: | SP |

| Analyte: | Concentration ug/L (ppb) |
|----------|-----------------------------|
|----------|-----------------------------|

| | |
|---------|----|
| Arsenic | <1 |
|---------|----|

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Analysis for Semivolatile Phenols By EPA Method 8270E SIM

| | | | |
|-------------------|----------------|-------------|------------------------------|
| Client Sample ID: | PZ-3A-20211018 | Client: | Associated Earth Sciences |
| Date Received: | 10/18/21 | Project: | Mill E 20050654, F&BI 110335 |
| Date Extracted: | 10/25/21 | Lab ID: | 110335-01 1/0.5 |
| Date Analyzed: | 10/25/21 | Data File: | 102507.D |
| Matrix: | Water | Instrument: | GCMS6 |
| Units: | ug/L (ppb) | Operator: | VM |

| Surrogates: | % Recovery: | Lower Limit: | Upper Limit: |
|----------------------|-------------|--------------|--------------|
| 2-Fluorophenol | 17 vo | 50 | 150 |
| Phenol-d6 | 10 vo | 50 | 150 |
| 2,4,6-Tribromophenol | 114 | 50 | 150 |

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

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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 110335 |
| Date Extracted: | 10/25/21 | Lab ID: | 01-2455 mb 1/0.5 |
| Date Analyzed: | 10/25/21 | Data File: | 102506.D |
| Matrix: | Water | Instrument: | GCMS6 |
| Units: | ug/L (ppb) | Operator: | VM |

| Surrogates: | % Recovery: | Lower Limit: | Upper Limit: |
|----------------------|-------------|--------------|--------------|
| 2-Fluorophenol | 17 vo | 50 | 150 |
| Phenol-d6 | 9 vo | 50 | 150 |
| 2,4,6-Tribromophenol | 88 | 50 | 150 |

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

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 10/27/21

Date Received: 10/18/21

Project: Mill E 20050654, F&BI 110335

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

Laboratory Code: 110357-01 (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 | 103 | 69-134 |

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 10/27/21

Date Received: 10/18/21

Project: Mill E 20050654, F&BI 110335

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

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 | 112 | 108 | 61-133 | 4 |

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 10/27/21

Date Received: 10/18/21

Project: Mill E 20050654, F&BI 110335

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

Laboratory Code: 110335-01 x10 (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 | 567 | 0 b | 0 b | 70-130 | 0 b |

Laboratory Code: Laboratory Control Sample

| Analyte | Reporting Units | Spike Level | Percent Recovery LCS | Acceptance Criteria |
|---------|-----------------|-------------|----------------------|---------------------|
| Arsenic | ug/L (ppb) | 10 | 93 | 85-115 |

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: 10/27/21

Date Received: 10/18/21

Project: Mill E 20050654, F&BI 110335

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

Laboratory Code: Laboratory Control Sample 1/0.5

| Analyte | Reporting Units | Spike Level | Percent Recovery LCS | Percent Recovery LCSD | Acceptance Criteria | RPD (Limit 30) |
|-------------------|--------------------|----------------|----------------------------|-----------------------------|------------------------|-------------------|
| Pentachlorophenol | ug/L (ppb) | 2.5 | 102 | 105 | 70-130 | 3 |

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

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.

110335

SAMPLE CHAIN OF CUSTODY

ME 10/18/21 10/21/21 11/4/21 / E03

Report To Jim Brown, Kellie Andrews

Company AESI

Address 411 5th Ave

City, State, ZIP Kirkland WA

Phone 425 807 7701 Email kandrews@aesig.com

| | |
|----------------------|------------------|
| SAMPLERS (signature) | |
| PROJECT NAME | <u>Mill E</u> |
| PO # | <u>200501054</u> |
| REMARKS | |
| INVOICE TO | |

Page # 1 of 1

PURNAROUND TIME

Standard turnaround

RUSH

Rush charges authorized by:

SAMPLE DISPOSAL

Archive samples

Other

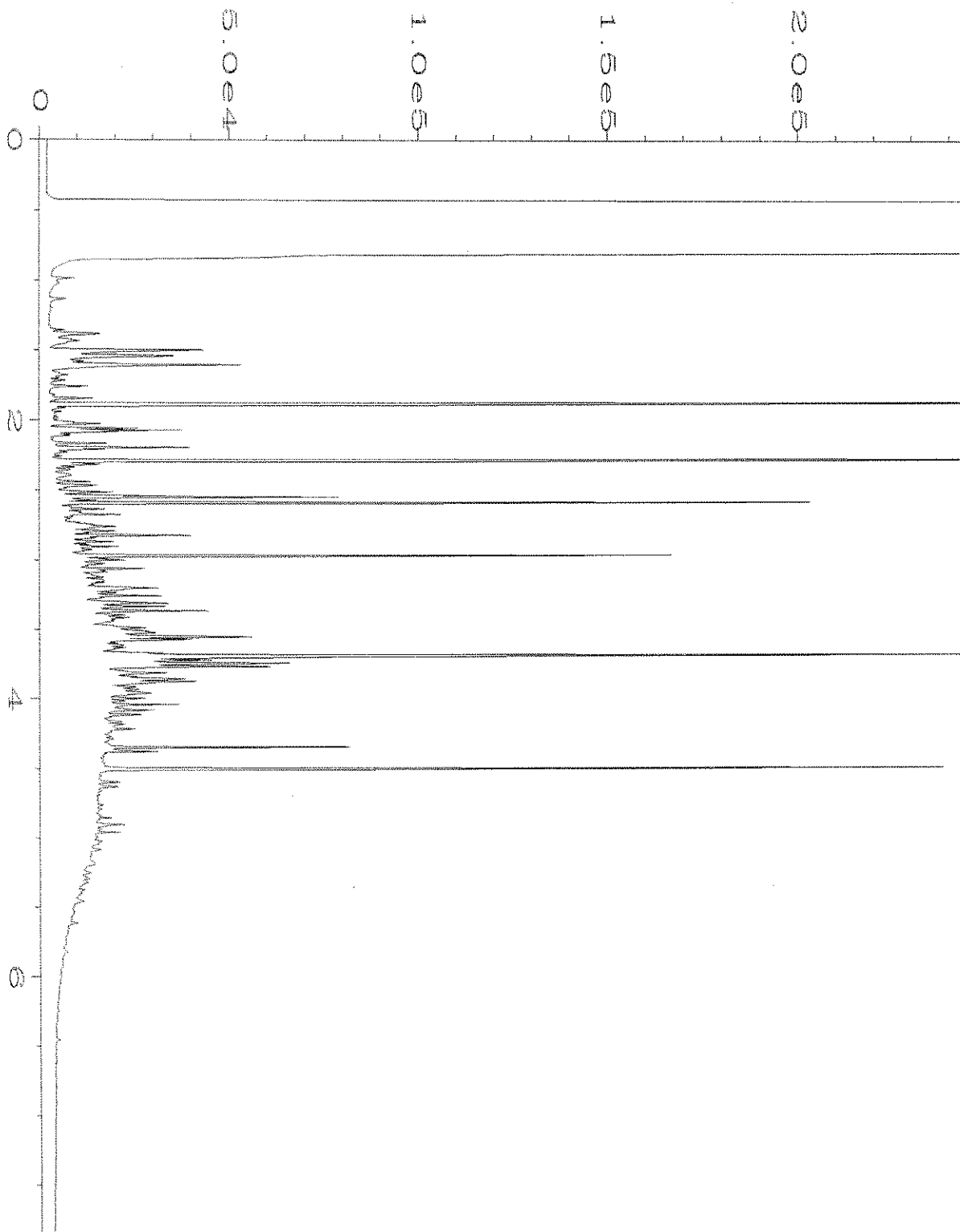
Default: Dispose after 30 days

ANALYSES REQUESTED

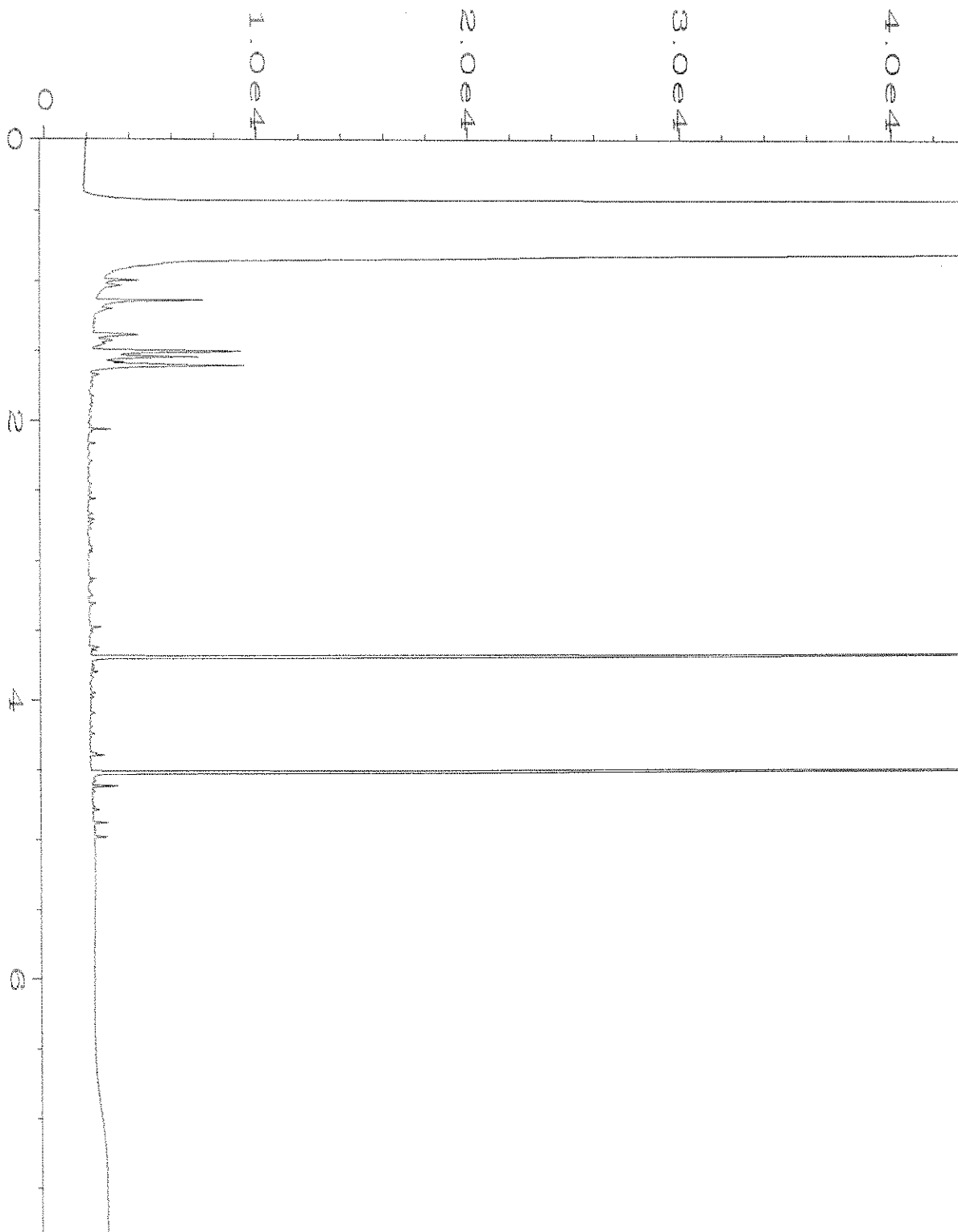
| Sample ID | Lab ID | Date Sampled | Time Sampled | Sample Type | # of Jars | NWTPH-Dx | NWTPH-Gx | BTEX EPA 8021 | NWTPH-HCID | VOCs EPA 8260 | PAHs EPA 8270 | PCBs EPA 8082 | TOTAL As 200.0 | Pentachloroph 2220 | Notes |
|---|--------------|-----------------|--------------|-------------|-----------|----------|----------|---------------|------------|---------------|---------------|---------------|----------------|--------------------|-------|
| <u>P7-3A-20211019</u> | <u>01A-G</u> | <u>10/19/21</u> | <u>1045</u> | <u>g.w.</u> | <u>7</u> | <u>X</u> | <u>X</u> | | | | | | <u>X</u> | <u>X</u> | |
| <i>[Handwritten signature across the table]</i> | | | | | | | | | | | | | | | |
| <u>Samples received at 4 °C.</u> | | | | | | | | | | | | | | | |

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

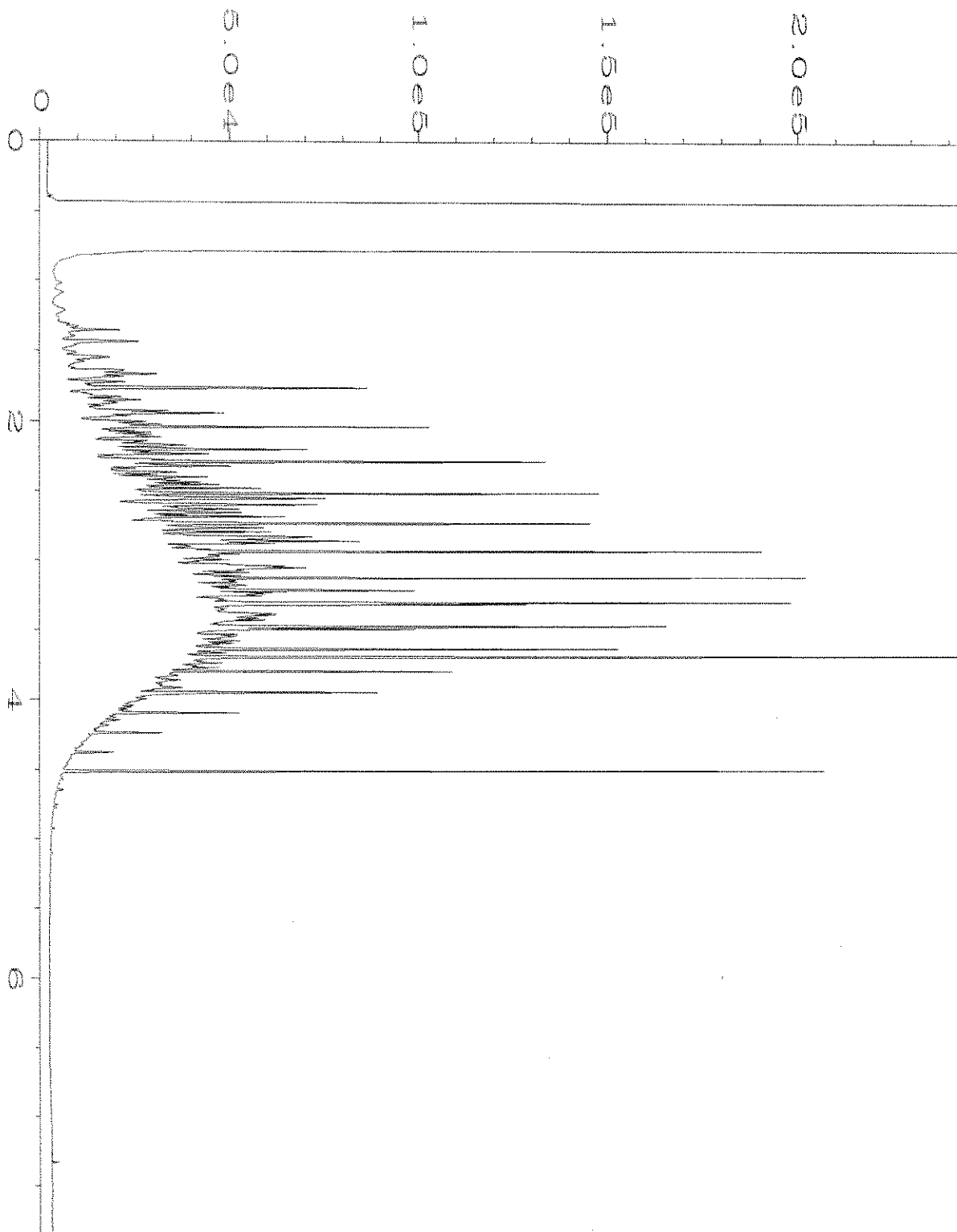
| SIGNATURE | PRINT NAME | COMPANY | DATE | TIME |
|--------------|-----------------------|-------------|-----------------|--------------|
| | <u>Kellie Andrews</u> | <u>AESI</u> | <u>10/19/21</u> | <u>11:42</u> |
| | <u>HERB STAWEL</u> | <u>FBI</u> | <u>10/18/21</u> | <u>11:45</u> |
| Received by: | | | | |



| | | | |
|--------------------|--|--------------------|---------------|
| Data File Name | : C:\HPCHEM\4\DATA\10-18-21\044F1101.D | Page Number | : 1 |
| Operator | : TL | Vial Number | : 44 |
| Instrument | : GC#4 | Injection Number | : 1 |
| Sample Name | : 110335-01 | Sequence Line | : 11 |
| Run Time Bar Code: | | Instrument Method: | DX.MTH |
| Acquired on | : 18 Oct 21 07:13 PM | Analysis Method | : DEFAULT.MTH |
| Report Created on: | 19 Oct 21 09:03 AM | | |



| | | | |
|--------------------|--|--------------------|---------------|
| Data File Name | : C:\HPCHEM\4\DATA\10-18-21\032F0901.D | Page Number | : 1 |
| Operator | : TL | Vial Number | : 32 |
| Instrument | : GC#4 | Injection Number | : 1 |
| Sample Name | : 01-2422 mb | Sequence Line | : 9 |
| Run Time Bar Code: | | Instrument Method: | DX.MTH |
| Acquired on | : 18 Oct 21 04:16 PM | Analysis Method | : DEFAULT.MTH |
| Report Created on: | 19 Oct 21 08:58 AM | | |

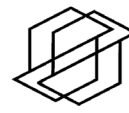


| | | | |
|--------------------|--|--------------------|---------------|
| Data File Name | : C:\HPCHEM\4\DATA\10-18-21\003F0201.D | Page Number | : 1 |
| Operator | : TL | Vial Number | : 3 |
| Instrument | : GC#4 | Injection Number | : 1 |
| Sample Name | : 500 Dx 63-79C | Sequence Line | : 2 |
| Run Time Bar Code: | | Instrument Method: | DX.MTH |
| Acquired on | : 18 Oct 21 04:48 AM | Analysis Method | : DEFAULT.MTH |
| Report Created on: | 19 Oct 21 09:00 AM | | |

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. |
|-------------------------|--------------------------------|----------------------|----------------------|
| 10/18/2021 | Former Mill E/Koppers Facility | 20050654V001 | 001 |
| Location | Municipality | AESI Project Manager | AESI Field Rep |
| Riverside Business Park | Everett | Matt Miller, P.E. | Kellie Andrews, 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 Andrews 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 with no obvious signs of major cracking, fissures, or pumping; however, minor cracking was observed on the south portion of the asphalt cap and some cracking appeared to be formerly repaired. 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, and no major cracks or vegetation was observed in the drainage ditches.

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 north-northwest at the west portion of the asphalt cap.



Photo 2. Looking south at the southwest portion of the asphalt cap and soil cover.

FIELD REPORT

| Date | Project Name | Project No. | Report No. |
|------|--------------|-------------|------------|
| | | | |



Photo 3. Looking east at the south drainage ditch. Less than 1 inch of accumulated sediment was observed.



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 northeast at the east portion of the asphalt cap. Repaired cracks are observed here.



Photo 6. Observing the central portion of the asphalt cap.