Lead and Arsenic Contaminated Soil Closure Report

Star Lake Elementary School and Totem Middle School
4014 S 270th Street, Kent, Washington
Kent, Washington

VCP Project ID: NW3271

Prepared for:
Federal Way Public Schools
33330 8th Avenue South
Federal Way, WA 98003

May 12, 2023
PBS Project No. 41519.001

PBS
214 E GALER STREET
SUITE 300
SEATTLE, WA 98102
206.233.9639 MAIN
866.727.0140 FAX
PBSUSA.COM

TABLE OF CONTENTS

SUPPORTING DATA

Tables:

Figures:

Appendices:

1 INTRODUCTION

PBS Engineering and Environmental, Inc. (PBS) provided remediation oversight and confirmation sampling for arsenic impacted soil at Star Lake Elementary School and Totem Middle School (the site). It is noted that Totem Middle School has been renamed as Evergreen Middle School. The Site is located at 4014 S 270th Street in Federal Way, Washington (see Figure 1). The work was completed on behalf of Federal Way Public Schools (FWPS) in conjunction with the redevelopment of the Site as a new school.

2 BACKGROUND

The site is located within the widespread soil contamination plume of the former Asarco smelter operation. The Asarco Company operated a copper smelter in Tacoma from 1890 to 1985. Smelter operations emitted an airborne plume of particulates with arsenic, lead, and other heavy metals that were distributed over a wide region of the Puget Sound. As a result, these metals have been found in near surface soils at concentrations which may pose a threat to human health and/or the environment. The Washington State Department of Ecology's (Ecology's) "Everett and Tacoma Smelter Search" website[1] maps the site as being within a zone of potential arsenic concentrations ranging from 20 milligrams per kilogram (mg/kg) to 40 mg/kg[2]. Thus, the 20 mg/kg to 40 mg/kg range can be considered the "baseline" for arsenic concentrations in near surface soils expected on site.

PBS completed soil characterization sampling at the Site. Soil characterization sampling was conducted in accordance with Ecology's *Tacoma Smelter Plume Model Remedies Guidance* (Smelter Plume Guidance)[3]. The purpose of the soil characterization sampling was to determine if there are areas of elevated arsenic or lead concentrations in shallow soil at the site which would require remediation during redevelopment. Ecology's Guidance defines elevated concentrations as:

- Average arsenic concentration > 20 parts per million (ppm, equivalent to milligrams per kilogram, mg/kg) or average lead concentration > 250 ppm; or
- Maximum (any one sample) arsenic concentration > 40 ppm or maximum lead concentration > 500 ppm.

2.1 Initial Soil Characterization – November 2018

In November 2018 PBS performed soil characterization sampling to evaluate concentrations of arsenic and lead in shallow soil at the site. Findings of the sampling activities were presented in the *Star Lake Elementary School and Totem Middle School - Arsenic and Lead Soil Sampling Reports*. The reports were originally issued in November 2018 and were revised in May 2020 based on communication between FWPS, Ecology and PBS. The reports identified six locations across the site where arsenic concentrations exceeded Ecology's Model Toxics Control Act (MTCA) Method A

[1] https://apps.ecology.wa.gov/dirtalert/
[2] https://fortress.wa.gov/ecy/smeltersearch/
[3] "*Tacoma Smelter Plume Model Remedies Guidance – Sampling and Cleanup of Arsenic and Lead Contaminated Soils*", Washington State Department of Ecology, July 2019, Publication No. 19-19-101.

cleanup level (CUL) for unrestricted land use. Of the sample locations exceeding CULs, one location at Star Lake had an arsenic concentration defined as elevated per the Smelter Plume Guidance. The 2018 soil characterization reports are included in Appendix A.

2.2 Supplemental Arsenic and Lead Soil Sampling – October 2019

In October 2019, PBS performed supplemental soil sampling to further delineate the extent of arsenic impacted soil surrounding the locations identified in 2018. The goal of the supplemental sampling was primarily to identify which trees within the proposed remediation area could be retained, and which trees required removal to facilitate remediation. Results of supplemental sampling were presented in the *Star Lake Elementary School – Supplemental Arsenic and Lead Soil Sampling Report* dated November 15, 2019 (Appendix A).

2.3 Remedial Action Work Plan and VCP Enrollment – May 2020

PBS prepared a *Remedial Action Work Plan for Tacoma Smelter Plume Impacts* (RAWP) for the Site dated May 4, 2020 (Appendix A). The RAWP detailed proposed cleanup actions to be implemented at the Site to address areas of arsenic impacted soil identified by soil characterization. Additionally, the RAWP requested a No Further Action (NFA) likely opinion from Ecology based on the proposed cleanup actions.

The RAWP and associated request for opinion were submitted to Ecology along with a Voluntary Cleanup Program (VCP) enrollment application. The Site was accepted into the VCP on May 28, 2020 (Appendix B).

2.4 NFA Likely Opinion – July 2020

Ecology responded to the request for opinion in a July 6, 2020 opinion letter. The letter offered the following opinions regarding smelter plume impacts:

- Ecology has determined that no further remedial action will likely be necessary at the Property to clean up contamination associated with the Asarco Site.
- Ecology has determined that further remedial action will likely still be necessary elsewhere at the Asarco Site, but no further remediation will be necessary for the Property.

The July 6, 2020 opinion letter is included in Appendix B.

3 SOIL REMEDIATION VIA IMPLEMENTATION OF MODEL REMEDY

Mixing in place was implemented per the work plan within the three remediation areas as described below.

3.1 Model Remedy Means and Methods

Mixing in place of soils within remediation areas identified in the work plan was performed with a track-mounted excavator. The excavator bucket was used to mix soils to the prescribed depth as well as laterally with surrounding soils within the mixing interval. Following implementation of the model remedy, PBS established a sampling grid based on the dimensions of the remediation area and prescribed number of confirmation samples as established in the RAWP. Confirmation soil samples were collected from grid centers within each remediation area at the depths specified in

Table 1. Samples were collected directly into laboratory provided containers. PBS staff wore new disposable nitrile gloves for the collection of each sample to avoid cross contamination.

In the event that a confirmation soil sample result exceeded the CUL for arsenic or lead, additional mixing in place was performed within that sample grid to a greater depth, and the area was resampled in the same manner described above. In one circumstance, as described in section 3.3 below, clean soil was imported from elsewhere onsite for mixture with impacted soils within the remediation area.

3.2 Remediation Area 1

On June 9, 2020, Iliad Construction Inc (Iliad), a subcontractor to BNB Construction (BNB, site general contractor) performed soil remediation in Remediation Area 1 (RA1) by mixing in place to a depth of 12 inches below ground surface (bgs).

Laboratory analysis of confirmation soil samples collected from RA1 indicated that arsenic concentrations in grid sections R1-1, R1-7, and R1-12 remained above the CUL.

Based on the results of the confirmation soil sampling, Iliad performed additional mixing in place to a depth of 18 inches bgs in grid sections R1-1, R1-7, and R1-12. Analysis of confirmation soil samples collected from these grid sections following the second remediation event indicated that arsenic concentrations were successfully reduced to below the CUL.

RA1 and the associated confirmation sampling grid are depicted in Figure 2. Analytical results of confirmation soil samples are presented in Table 1. Laboratory reports are included as Appendix C.

3.3 Remediation Area 2

On June 15, 2020, Iliad performed soil remediation on the eastern half of Remediation Area 2 (RA2) by mixing in place to a depth of six inches bgs. The presence of portable classrooms on the western half of RA2 prevented remediation of these soils at the time.

Laboratory analysis of confirmation soil samples collected from the eastern half of RA2 indicated that arsenic concentrations in grid sections R2-3 and R2-7 remained above the CUL.

Based on the results of the confirmation soil sampling, Iliad performed additional mixing in place to a depth of 12 inches bgs in grid sections R2-3 and R2-7. Analysis of confirmation soil samples collected from these grid sections following the second remediation event indicated that arsenic concentrations remained above the CUL in grid section R2-7. As such, grid section R2-7 was mixed in place to a depth of 18 inches bgs on June 23, 2020, and additional confirmation sampling was performed. Additional confirmation soil sampling indicated that arsenic concentrations remained in grid section R2-7 following mixing in place to a depth of 18 inches.

By October 15, 2020, the portable classrooms within the western portion of RA2 had been removed, and Iliad performed mixing in place of grid sections R2-1, R2-2, R2-5 and R2-6 to a depth of 6 inches bgs.

Confirmation soil sampling conducted on October 15, 2020 indicated that concentrations of arsenic in grid section R2-6 remained above the CUL. As such, additional mixing in place in this grid section was performed to a depth of 12 inches bgs. Additionally, approximately 12 inches of clean soil was imported to grid section R2-7 from the central portion of the site, and mixed to a depth of 24 inches bgs. The soil was generated from an area determined to be clean based on initial soil characterization sampling performed in 2018.

Confirmation soil sampling on November 10, 2020 indicated that arsenic concentrations in all grid sections within RA2 had been reduced to below the CUL.

RA2 and associated confirmation sampling grid are depicted in Figure 2. Analytical results of confirmation soil samples are presented in Table 1. Laboratory reports are included as Appendix C.

3.4 Remediation Area 3

The total area of Remediation Area 3 (RA3) was reduced from the area proposed in the work plan. A portion of the area on the west side within the 40th Avenue S right of way was eliminated as project plans were changed to exclude redevelopment of public right of way. As such, soil remediation was only performed on private property up to the western parcel boundary and eastern sidewalk edge.

On June 11, 2020 Iliad performed soil remediation in the southern portion of RA3. The northern portion of the area remained paved and inaccessible at that time. Mixing in place to a depth of 6 inches bgs was completed in grid sections R3-1 through R3-12. Confirmation soil sampling following mixing in place indicated that arsenic concentrations in these grid sections were successfully reduced to below the CUL.

On February 7, 2022 the parking lot area previously preventing access to the northern portion of RA3 had been demolished, and Iliad performed soil remediation by mixing in place to a depth of six inches bgs in grid sections R3-12 through R3-16. Confirmation soil sampling following soil remediation indicated that mixing in place successfully reduced arsenic concentrations to below the CUL.

RA3 and associated confirmation sampling grid are depicted in Figure 3. Analytical results of confirmation soil samples are presented in Table 1. Laboratory reports are included as Appendix C.

4 ANALYTICAL RESULTS

Analytical results for final confirmation soil samples collected from each remediation area grid section indicate that soil remaining in place at the site does not contain arsenic or lead at concentrations exceeding the MTCA Method A CULs.

Confirmation soil sample locations are depicted in Figures 2 and 3. The confirmation sample analytical results are summarized in Table 1. Laboratory reports for soil sample analysis are presented as Appendix C.

5 CONCLUSIONS

Soil characterization sampling at the site conducted in 2018 and 2019 identified several areas where arsenic concentrations in soil exceeded the CUL (remediation areas 1, 2 and 3). No areas were identified where lead concentrations exceeded the CUL. Implementation of the model remedy has successfully reduced arsenic concentrations in soil to below the CUL in these areas.

Based on the above conclusions and Ecology's July 6, 2020 opinion letter, PBS requests a No Further Action (NFA) determination for the site on behalf of FWPS.

6 LIMITATIONS

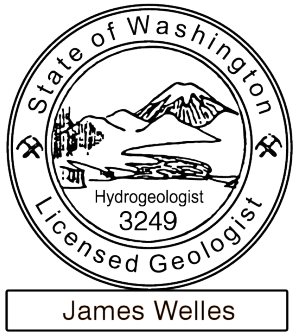
PBS has prepared this report for use by Federal Way Public Schools. This report is for the exclusive use of the client and is not to be relied upon by other parties. It is not to be photographed, photocopied, or similarly reproduced, in total or in part, without the expressed written consent of the client and PBS.

This study was limited to the tests, locations, and depths, as indicated, to determine the absence or presence of certain contaminants. The Site may have other contamination that was not characterized by this study. The findings and conclusions of this report are not scientific certainties but, rather, are probabilities based on professional judgment concerning the significance of the data gathered during this investigation. PBS is not able to represent that the site or adjoining land contain no hazardous waste, oil, or other latent conditions beyond that detected or observed by PBS.

Sincerely,
PBS Engineering and Environmental Inc.

Digitally signed by James Welles
Date: 2023.05.12 12:47:14 -07'00'

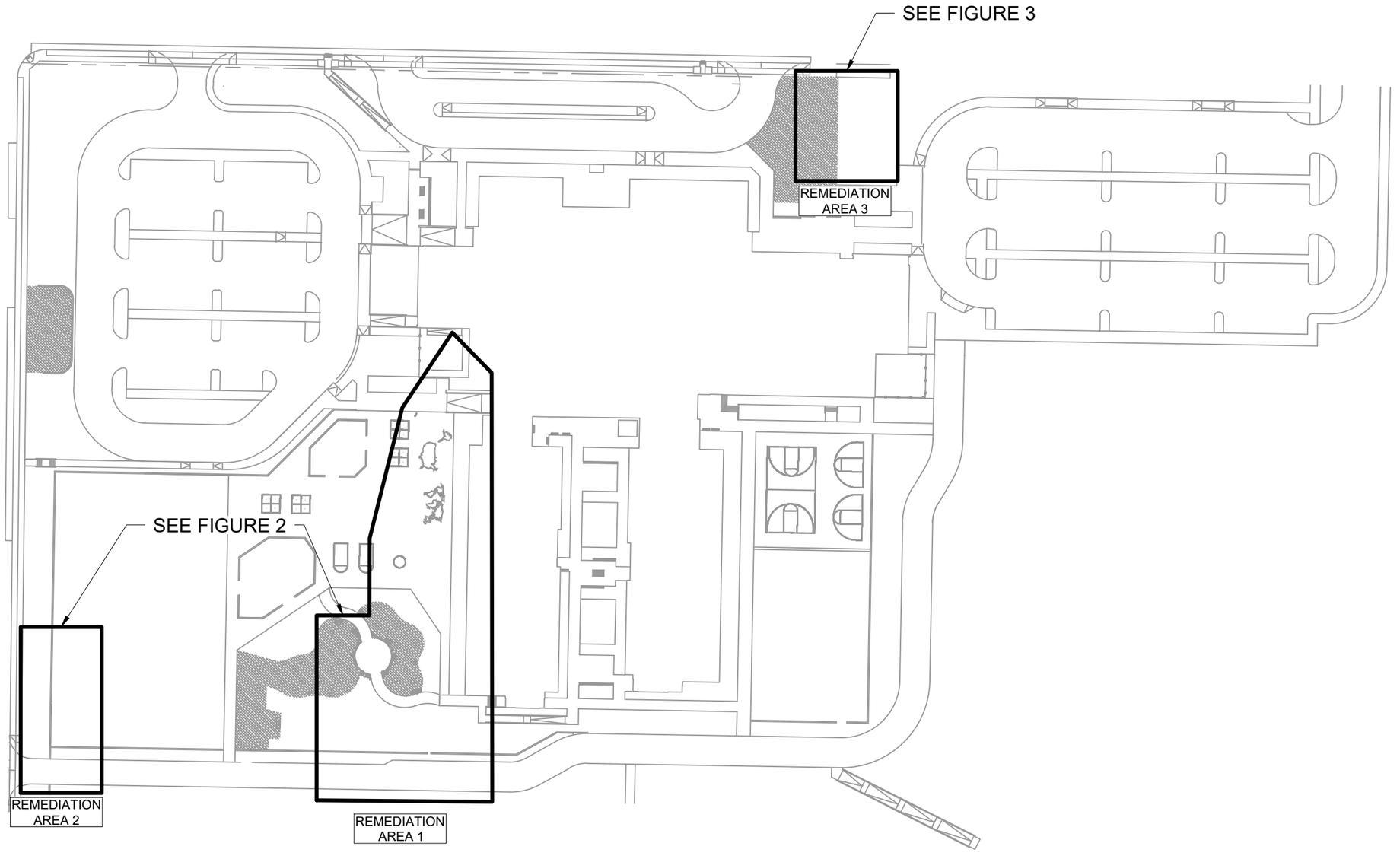
James Welles, LHG
Senior Hydrogeologist



Melanie L. Young
Digitally signed by Melanie L. Young
Date: 2023.05.12 13:22:31 -07'00'

Melanie Young, PE
Senior Environmental Engineer

FIGURES



SCALE 1" = 100'

0' 50' 100' 200'

PREPARED FOR: FWPS

PBS Engineering and Environmental Inc.
214 East Galer Street, Ste 300
Seattle, WA 98102
206.233.9639
pbsusa.com

PBS

SITE PLAN

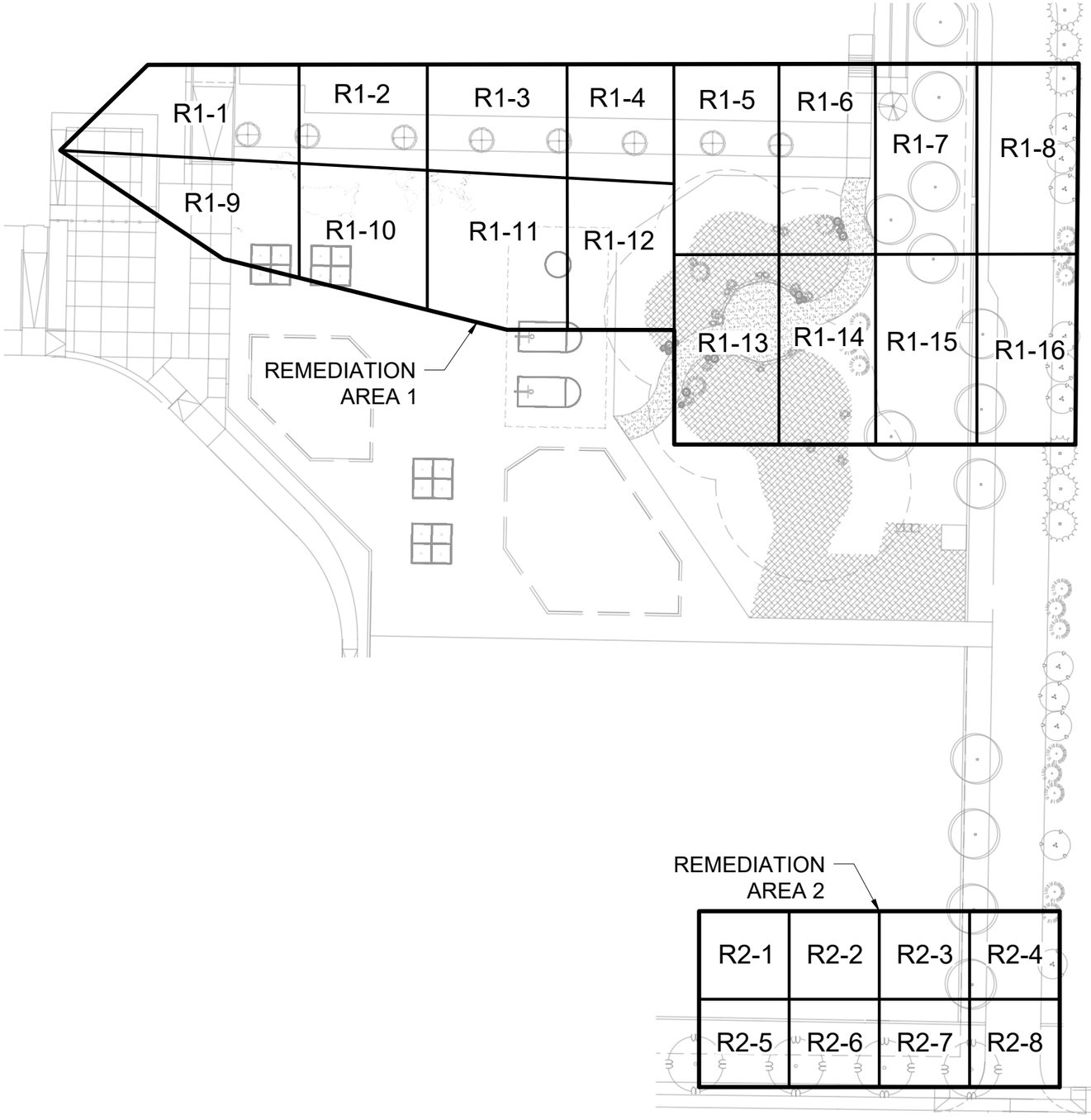
STAR LAKE ELEMENTARY SCHOOL

4104 SOUTH 270TH STREET, KENT, WASHINGTON

PROJECT
41519.001
DATE
MAY 2023
FIGURE
1

Full Size Sheet Format Is 11x17; If Printed Size Is Not 11x17, Then This Sheet Format Has Been Modified & Indicated Drawing Scale Is Not Accurate.

Filename: L:\Projects\41000\41519 Federal Way Public Schools\41519.001 Star Lake ES\Phase 0004 As-Pb\CAD\May 2022 Figures\41519.001_Fig_2-3.dwg Layout Tab: FIG 2 User: Katie Breyman CAD Plot Date/Time: 6/1/2022 10:02:22 AM



SCALE 1" = 50'

0' 25' 50' 100'

PREPARED FOR: FWPS

PBS Engineering and Environmental Inc.
214 East Galer Street, Ste 300
Seattle, WA 98102
206.233.9639
pbsusa.com

SITE PLAN: REMEDIATION AREAS 1 & 2

STAR LAKE ELEMENTARY SCHOOL

4104 SOUTH 270TH STREET, KENT, WASHINGTON

PROJECT
41519.001
DATE
MAY 2023
FIGURE
2

Filename: L:\Projects\41000\41519 Federal Way Public Schools\41519.001 Star Lake ES\Phase 0004 As-Pb\CAD\May 2022 Figures\41519.001_Fig_2-3.dwg Layout Tab: FIG 3 User: Katie Breyman CAD Plot Date/Time: 6/1/2022 10:01:19 AM

Full Size Sheet Format Is 11x17; If Printed Size Is Not 11x17, Then This Sheet Format Has Been Modified & Indicated Drawing Scale Is Not Accurate.

SCALE 1" = 25'

0' 12.5' 25' 50'

PREPARED FOR: FWPS

PBS Engineering and Environmental Inc.
214 East Galer Street, Ste 300
Seattle, WA 98102
206.233.9639
pbsusa.com

SITE PLAN: REMEDIATION AREA 3

STAR LAKE ELEMENTARY SCHOOL

4104 SOUTH 270TH STREET, KENT, WASHINGTON

PROJECT
41519.001
DATE
MAY 2023
FIGURE
3

Filename: L:\Projects\41000\41519 Federal Way Public Schools\41519.001 Star Lake ES\Phase 0004 As-Pb\CAD\May 2022 Figures\41519.001_Fig_2-3.dwg Layout Tab: FIG 4 User: Katie Breyman CAD Plot Date/Time: 6/1/2022 10:01:32 AM

Full Size Sheet Format Is 11x17; If Printed Size Is Not 11x17, Then This Sheet Format Has Been Modified & Indicated Drawing Scale Is Not Accurate.

TABLES

Table 1 — Confirmation Soil Samples Analytical Results

TABLE 1

Confirmation Soil Sample Analytical Results

Star Lake Elementary School

4014 S 270th Street, Kent, Washington

PBS Project No. 41519.001

Sample Identification	Sampling Date	Sample Depth (inches below original grade)	Metals	
			Arsenic	Lead
Adopted Criteria		**MTCA Method A Cleanup Levels For Soil[a]**	20	250
Remediation Area 1				
			Results in mg/kg	
~~R1-1a~~	~~6/9/20~~	~~6~~	~~16.5~~	~~5.66~~
R1-1aa	6/12/20	6	14.9	11.6
~~R1-1b~~	~~6/9/20~~	~~12~~	~~**25.1**~~	~~6.47~~
R1-1bb	6/12/20	12	16.5	13.9
R1-2a	6/9/20	6	6.63	6.97
R1-2b	6/9/20	12	3.92	3.25
R1-3a	6/9/20	6	4.56	4.85
R1-3b	6/9/20	12	9.52	8.92
R1-4a	6/9/20	6	4.01	4.12
R1-4b	6/9/20	12	3.13	3
R1-5a	6/9/20	6	11.5	13.9
R1-5b	6/9/20	12	17.2	31.6
R1-6a	6/9/20	6	3	4.51
R1-6b	6/9/20	12	12.6	19
~~R1-7a~~	~~6/9/20~~	~~6~~	~~**25.4**~~	~~28.9~~
R1-7aa	6/12/20	6	14.5	19.5
~~R1-7b~~	~~6/9/20~~	~~12~~	~~**44.4**~~	~~41.4~~
R1-7bb	6/12/20	12	16.2	24.5
R1-8a	6/9/20	6	11.3	10.4
R1-8b	6/9/20	12	14.6	30.1
R1-9a	6/9/20	6	2.6	3.31
R1-9b	6/9/20	12	3.25	4.98
R1-10a	6/9/20	6	5.28	3.17
R1-10b	6/9/20	12	8.04	7.49
R1-11a	6/9/20	6	6.82	11.2
R1-11b	6/9/20	12	7.28	13.6
~~R1-12a~~	~~6/9/20~~	~~6~~	~~18.9~~	~~3.85~~
R1-12aa	6/12/20	6	15.2	7.01
~~R1-12b~~	~~6/9/20~~	~~12~~	~~**71.3**~~	~~15.1~~
R1-12bb	6/12/20	12	13.3	7.94
R1-13a	6/9/20	6	10.8	9.05
R1-13b	6/9/20	12	13.8	10.8
R1-14a	6/9/20	6	14	24.8
R1-14b	6/9/20	12	15.4	26
R1-15a	6/9/20	6	17.8	34.7
R1-15b	6/9/20	12	9.39	4.46
R1-16a	6/9/20	6	11.4	12.2
R1-16b	6/9/20	12	17.4	28.3

TABLE 1

Confirmation Soil Sample Analytical Results

Star Lake Elementary School

4014 S 270th Street, Kent, Washington

PBS Project No. 41519.001

Remediation Area 2				
R2-1a	10/15/20	6	12.7	19.1
R2-2a	10/15/20	6	9.86	14.5
~~R2-3a~~	~~6/15/20~~	~~6~~	~~**20.4**~~	~~23.6~~
R2-3aa	6/17/20	6	17.9	24.3
R2-4a	6/15/20	6	14.8	28.8
R2-5a	10/15/20	6	9.55	10.1
~~R2-6a~~	~~10/15/20~~	~~6~~	~~**51.9**~~	~~24~~
R2-6aa	11/10/20	6	7.54	11.1
~~R2-7a~~	~~6/15/20~~	~~6~~	~~**24.9**~~	~~27.8~~
~~R2-7aa~~	~~6/17/20~~	~~6~~	~~**30.5**~~	~~24.8~~
~~R2-7aaa~~	~~6/23/20~~	~~6~~	~~**31.8**~~	~~20.6~~
R2-7aaaa	11/10/20	6	8.16	10.3
R2-8a	6/15/20	6	14.8	26.7
Remediation Area 3				
R3-1a	6/11/20	6	11.3	37.1
R3-2a	6/11/20	6	9.6	32.1
R3-3a	6/11/20	6	8.51	16.7
R3-4a	6/11/20	6	7.63	14.7
R3-7a	6/11/20	6	13.1	30
R3-8a	6/11/20	6	8.87	25.2
R3-9a	6/11/20	6	6.31	35.7
R3-10a	6/11/20	6	9.13	20.5
R3-11a	6/11/20	6	10.8	25
R3-12a	6/11/20	6	7.98	20.8
RA-3-13a	2/7/22	6	6.88	6.36
RA-3-14a	2/7/22	6	3.29	4.99
RA-3-15a	2/7/22	6	4.33	4.88
RA-3-16a	2/7/22	6	4.11	5.46

Notes:

BOLD indicates concentration exceeding MTCA Method A Cleanup Levels for Soil

~~strikethrough~~ indicates soil represented by this sample was remediated by mixing in place after receipt of sample results.

Analytical Methods:

Metals analyzed by Environmental Protection Agency Method 6020A

Footnotes:

[a] Washington State Department of Ecology Model Toxics Control Act Method A Cleanup Level for Unrestricted Land Use as established in WAC 173-340-900

Abbreviations & Acronyms:

mg/kg - milligrams per kilogram

APPENDIX A

Soil Characterization Reports and Remedial Action Work Plan

May 4, 2020

Federal Way Public Schools
Capital Projects
1211 S 232nd St
Federal Way, WA 98004
Email: fwpscp18@fwps.org

RE: Star Lake Elementary School – Arsenic and Lead Soil Sampling
4014 S 270th Street, Kent, Washington
PBS Project #41519.001

Federal Way Public Schools (FWPS) contracted PBS Engineering and Environmental Inc. (PBS) to evaluate the potential for arsenic and lead contaminants in near surface soils at the site of Star Lake Elementary School (SLES) prior to site redevelopment as part of the Star Lake Elementary School Replacement Project. This report was originally issued on November 30, 2018. The regulatory criteria and report conclusions have been revised in May 2020 based on communication between FWPS, PBS and the Washington State Department of Ecology (Ecology).

On November 5, 2018 PBS performed soil sampling activities to determine the levels of arsenic and lead in shallow soil at SLES in Kent, Washington (Figure 1). This report presents the findings of the sampling activities and provides recommendations for regulatory compliance as well as for the handling and management of impacted soils during future redevelopment. The scope of services was presented in the Proposal for Arsenic and Lead Soil Testing (WA28800) by PBS, dated August 2, 2018.

BACKGROUND

SLES is located within the widespread soil contamination plume of the former Asarco smelter operation. The Asarco Company operated a copper smelter in Tacoma from 1890 to 1985. Smelter operations emitted an airborne plume of particulates with arsenic, lead, and other heavy metals that were distributed over a wide region of the Puget Sound. As a result, these metals have been found in near surface soils at concentrations which may pose a threat to human health and/or the environment.

Ecology's Tacoma Smelter Plume Model Remedies Guidance (Smelter Plume Guidance) recommends soil sampling at properties in areas with estimated arsenic levels above the state cleanup level of 20 ppm[1]. Ecology's "Everett and Tacoma Smelter Search" web page https://fortress.wa.gov/ecy/smeltersearch/ maps the SLES site within a zone of potential arsenic concentrations ranging from 40 milligram per kilogram (mg/kg) to 100 mg/kg. Thus, the 40mg/kg to 100 mg/kg range can be considered the "baseline" for arsenic concentrations in near surface soils expected on site.

[1] *"Tacoma Smelter Plume Model Remedies Guidance: Sampling and cleanup of arsenic and lead contaminated soils"*, Washington State Department of Ecology, June 2012, Publication No. 12-09-086-A

REGULATORY CRITERIA

Per the Smelter Plume Guidance *"if arsenic or lead levels are elevated for any decision unit on the property, that decision unit needs cleanup."* Per the Smelter Plume Guidance, elevated is defined as:

- Average arsenic > 20 parts per million (ppm, equivalent to mg/kg) or average lead > 250 ppm; **or**
- Maximum (any one sample) arsenic >40 ppm or maximum lead > 500 ppm.

Ecology's Model Toxics Control Act (MTCA) has established cleanup levels for arsenic and lead for unrestricted land use that are protective of human health and the environment[2]. Results of soil sampling will be compared to the applicable MTCA standards.

Ecology's MTCA Method A cleanup levels (CULs) for unrestricted land use for arsenic and lead are applicable for comparison to any single soil sample concentration. The CULs for arsenic and lead are presented below:

- The CUL for arsenic is 20 milligrams per kilogram (mg/kg)
- The CUL for lead is 250 mg/kg.

For reference, Ecology conducted a study to determine natural background concentrations of metals in soil for the Puget Sound area[3]. The study found that the natural background concentration for arsenic in soil is 7.0 parts per million (ppm) and 24 ppm for lead. Parts per million is roughly equivalent to mg/kg.

Based on the land use as a school, FWPS has elected to clean up site soils found to be in exceedance of CULs, even if the soils are not defined as elevated per the Smelter Plume Guidance.

CHARACTERIZATION SOIL SAMPLING

On November 5, 2018, sixty (60) discrete soil samples were collected from forty-eight (48) locations around the building landscaping and playfields of SLES. Following Ecology guidance, the property was divided into two decision units (DUs) based on current use as playfield or landscape area. Decision units and sample locations are shown on Figure 2. A summary of the decision units is provided below. The number of samples screened and collected for analysis per DU for this project is based on the Ecology guidance.

Decision Units

Decision Unit ID	Soil disturbance planned?	Number of samples collected (0-6")	Number of samples collected (6-12")	Acres (approximate)	Total Number of Samples
1	unknown	27	7	4.3	34
2	unknown	21	5	4.2	26

0-6" = Soil samples were collected from the 0-6 inch depth interval
6-12" = Soil samples were collected from the 6-12 inch depth interval

[2] *"Model Toxics Control Act Regulation and Statute"*, Washington State Department of Ecology, 2013 Revision, Publication No. 94-06

[3] "*Natural Background Soil Metals Concentrations in Washington State*", Washington State Department of Ecology, October 1994, Publication No. 94-115

One (1) discrete sample was collected at each sample location from a depth interval of zero to six inches below ground surface (bgs). A second discrete sample was collected at every fourth location from a depth interval of six to twelve inches bgs. Sample locations were chosen in a manner that maximized coverage of the decision units and did not contain areas with surface cover or buildings during the sampling activities.

Soil sample collection started just below any surface cover layer (e.g., sod or grass). A hand spade and a hand auger were used to complete 6-inch deep test holes. A soil sample was collected at a depth of less than 6 inches below ground surface at each location. At every fourth location, upon collection of the zero to six-inch sample, the hole was advanced to a depth of twelve inches, and a second sample was collected from the six to twelve-inch depth interval using the same methods described above.

PBS personnel wore disposable nitrile gloves to protect against cross-contamination between samples. Soil retained for analysis was packed into laboratory-provided containers, labeled and transported on ice under chain of custody documentation to Friedman and Bruya, Inc. in Seattle, an Ecology accredited analytical laboratory.

Samples were analyzed for total arsenic and lead using EPA Method 6020. Total arsenic and lead results were reported on a dry weight basis.

ANALYTIC RESULTS

Analytical results from soil samples collected on site are below MTCA Method A CULs for arsenic, except for five (5) samples from five different locations. Arsenic was detected in exceedance of the CUL in samples SL1-18a, SL1-20, SL1-24 and SL1-25 within DU1; and SL2-15 within DU2 at a maximum concentration of 72.7 mg/kg. All other sample results for arsenic were below the MTCA Method A cleanup level of 20 mg/kg.

All analytical results for lead from soil samples collected on-site are below the MTCA Method A cleanup level of 250 mg/kg.

Based on the analytical results of soil samples collected on-site, average arsenic and lead concentrations were calculated for each decision unit and are presented below.

Average Concentrations per Decision Unit

Decision Unit ID	Mean Concentration (0-6″)		Mean Concentration (6-12″)	
	As	Pb	As	Pb
1	12.5	21.7	6.1	9.0
2	9.9	16.9	8.5	14.5
MTCA A Cleanup Level	20	250	20	250

(0-6″) (Pb / As) = Average Concentration at the zero to six-inch interval for arsenic (As) and lead (Pb) in mg/kg
(6-12″) (Pb / As) = Average Concentration at the six to twelve-inch interval for arsenic (As) and lead (Pb) in mg/kg

Analytical results from soil samples collected on-site are summarized in Table 1. Figure 2 depicts the decision unit boundaries and the locations where analytical results indicated lead or arsenic concentrations above MTCA Method A CULs. Laboratory reports are provided in Attachment A.

CONCLUSIONS

Based on the analytical results of the soil sampling, and using Ecology's *Tacoma Smelter Plume Model Remedy Guidance, June 2012*[1], the following conclusion and recommendations were made regarding the handling and management of project site soils.

Decision Units 1 and 2

Analytical results from discrete soil samples collected within both decision units 1 and 2 of the SLES site identified four (4) locations within decision unit 1 (SL1-18, SL1-20, SL1-24 and SL1-25) and one (1) location within decision unit 2 (SL2-15) where arsenic concentrations are above MTCA Method A CULs in the top 6" bgs.

Further action will be required to address the arsenic concentrations in soil at the above referenced locations and achieve compliance with Ecology regulations. According to Ecology's Model Remedies Guidance, the impacted soil can be managed in-place or removed by excavation. Strategies for management of impacted soil in-place include dilution of arsenic concentrations via mixing of impacted soil with clean imported soil or capping of soil in place with clean soil and a geotextile or a hard cap. Mixing of soils is accepted for arsenic-impacted soil with an average concentration less than 40 ppm. Ecology does not consider capping in-place a permanent remediation strategy given the potential for exposure if the cap is removed. Capping in-place may require annual inspection of the cap's integrity, as well as the filing of an environmental land covenant for the property. Based on communication between FWPS, Ecology and PBS, mixing in place has been selected as the preferred model remedy at the site.

Remediation of impacted soils can be conducted by the contractor as part of the Star Lake Elementary School Replacement Project under PBS's supervision, but must be completed prior to any grading, excavation or earthwork activities that disturb on-site soil. The construction design and specifications for remediation of the arsenic-impacted soil as part of the Star Lake Elementary School Replacement Project shall incorporate health and safety requirements, methods for soil removal, disposal and confirmation sampling and soil management strategies.

LIMITATIONS

This investigation was conducted to characterize lead and arsenic distributions in shallow soils on-site, with a focus on protection of human health and the environment. The data collected in this investigation are not intended for the purposes of waste profiling for offsite disposal, or for estimation of volume or tonnage of soil requiring disposal.

PBS has prepared this report for use by FWPS. This report is not intended for use by others without the written consent of the FWPS. Our interpretation of soil conditions in this study was based on field observations and

analytical data from the indicated explorations. Regulated substances may exist in portions of the site that were not explored or analyzed. The conclusions in this report are not to be considered a legal opinion as the client's duty concerning due diligence relating to potential liabilities in leasing, owning, or purchasing real estate.

PBS ENGINEERING AND ENVIRONMENTAL INC.

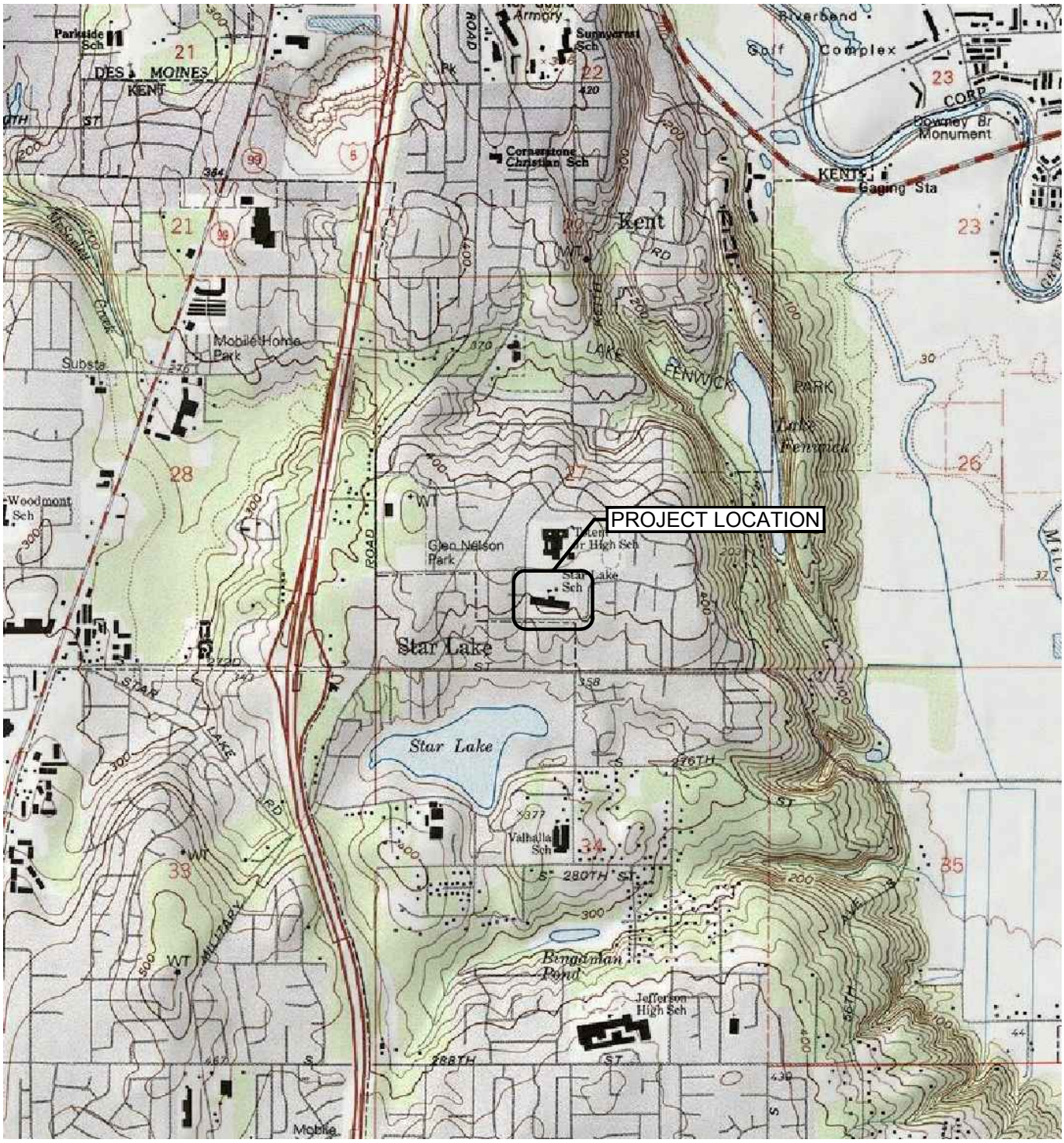
James Welles, LG
Project Geologist

Reviewed By:

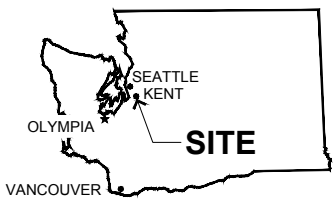
Thomas Mergy, LHG
Environmental Services Manager

Attachments:
Figure 1: Vicinity Map
Figure 2: Sample Location Map
Table 1: Laboratory Data Summary Table
Attachment A: Laboratory Data

Figures



SOURCE: USGS POVERTY BAY, WA QUADRANGLE 1990, PHOTO REVISED 1994.



WASHINGTON

SCALE 1" = 2000'

0' 1,000' 2,000' 4,000'

PREPARED FOR: FEDERAL WAY PUBLIC SCHOOLS

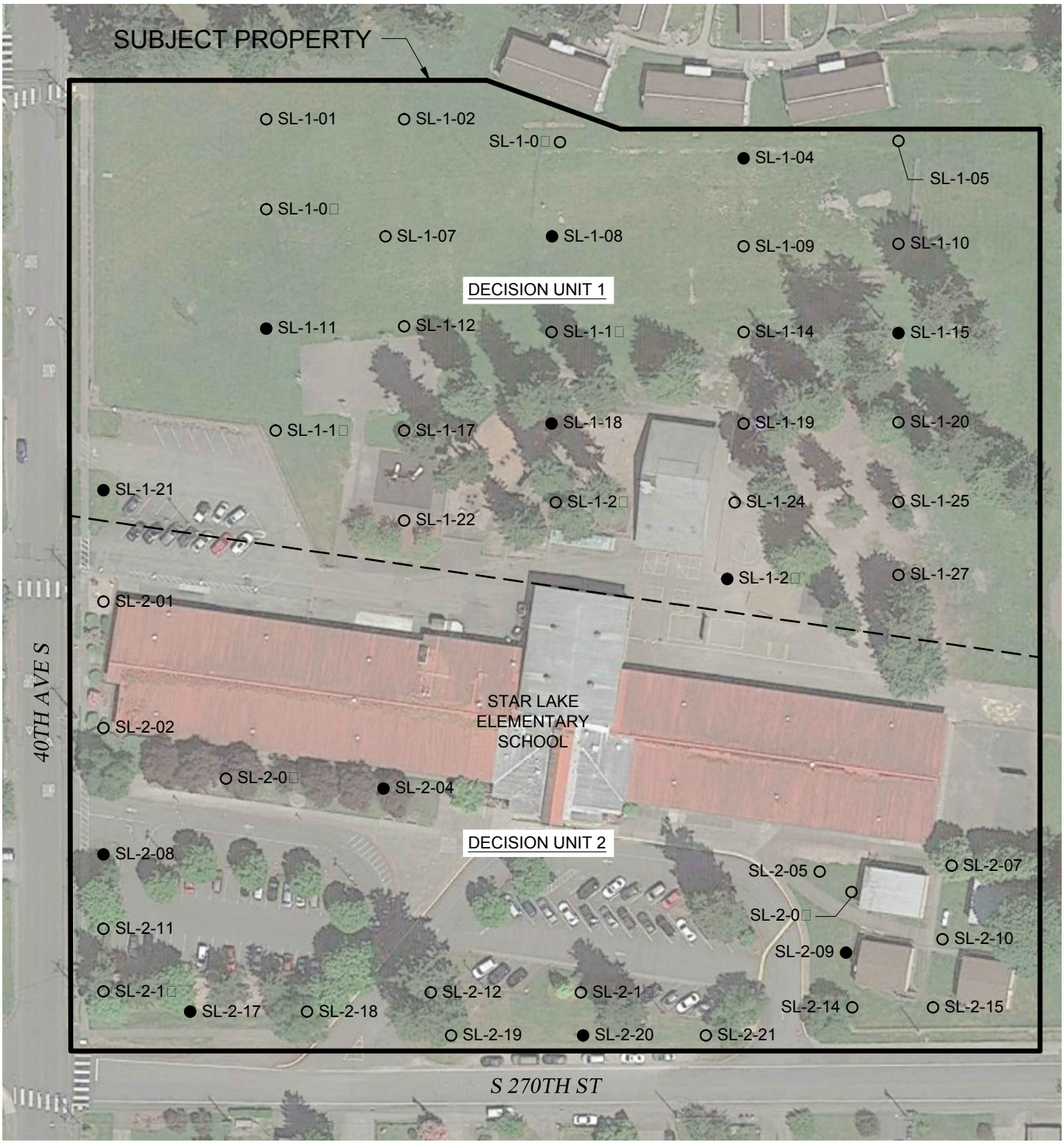
PBS

VICINITY MAP

STAR LAKE ELEMENTARY SCHOOL
4014 SOUTH 270TH STREET
KENT, WASHINGTON

MAY 2020
41519.001

FIGURE
1



SOURCE: © 2018 GOOGLE EARTH PRO

LEGEND

○ SL-1-01	SOIL SAMPLE LOCATION, DECISION UNIT AND IDENTIFICATION □-□"□
● SL-2-04	SOIL SAMPLE LOCATION, DECISION UNIT AND IDENTIFICATION □-□", □-12"□

SCALE 1" = 125'

0' □2'-□" 125' 250'

PREPARED FOR: FEDERAL WAY PUBLIC SCHOOLS

PBS

As / Pb SOIL SAMPLE LOCATION MAP

STAR LAKE ELEMENTARY SCHOOL
4014 SOUTH 270TH STREET
KENT, WASHINGTON

MAY 2020
41519.001

FIGURE
2

Tables

Table 1 - Soil Sample Analytical Results

Site: Star Lake Elementary School
Address: 4014 S 270th Street, Kent, WA
PBS Project No. 41519.001

Location / Sample Identification	Sample Depth (inches bgs)	Metals	
		Arsenic (mg/kg)	Lead (mg/kg)
Regulatory Criteria	**MTCA Method A Cleanup Level**	**20**	**250**
Decision Unit 1 (~4.3 acres)			
SL1-01	0-6	6.37	8.35
SL1-02	0-6	6.21	6.61
SL1-03	0-6	4.73	5.32
SL1-04a	0-6	7.43	7.09
SL1-05	0-6	4.73	4.86
SL1-06	0-6	6.96	10.8
SL1-07	0-6	6.33	10.8
SL1-08a	0-6	7.45	10.2
SL1-09	0-6	8.31	17.2
SL1-10	0-6	17	28.7
SL1-11a	0-6	13.2	23.2
SL1-12	0-6	13.8	17.5
SL1-13	0-6	5.64	19.4
SL1-14	0-6	5.66	21.3
SL1-15a	0-6	4.99	16.9
SL1-16	0-6	10.6	12.2
SL1-17	0-6	6.49	18.8
SL1-18a	0-6	**26.6**	11.3
SL1-19	0-6	7.84	21.8
SL1-20	0-6	**22.6**	51.1
SL1-21a	0-6	12.5	27.4
SL1-22	0-6	5.83	18.2
SL1-23	0-6	7.69	17.6
SL1-24	0-6	**72.7**	122
SL1-25	0-6	**25.1**	39.8
SL1-26a	0-6	9.38	17.3
SL1-27	0-6	12.5	21
Average		12.5	21.7
SL1-04b	6-12	4.36	4.9
SL1-08b	6-12	5.39	4.9
SL1-11b	6-12	11.3	17.1
SL1-15b	6-12	4.35	15.9
SL1-18b	6-12	6.88	5.4
SL1-21b	6-12	6.5	11.3
SL1-26b	6-12	4.13	3.9
Average		6.1	9.0

Table 1 - Soil Sample Analytical Results

Site: Star Lake Elementary School
Address: 4014 S 270th Street, Kent, WA
PBS Project No. 41519.001

Location / Sample Identification	Sample Depth (inches bgs)	Metals	
		Arsenic (mg/kg)	Lead (mg/kg)
Regulatory Criteria	**MTCA Method A Cleanup Level**	**20**	**250**
Decision Unit 2 (~4.2 acres)			
SL2-01	0-6	5.9	19.4
SL2-02	0-6	6.7	12.1
SL2-03	0-6	5.1	10.2
SL2-04a	0-6	11.4	15.5
SL2-05	0-6	15.4	29.2
SL2-06	0-6	11.5	18.4
SL2-07	0-6	4.73	5.98
SL2-08a	0-6	4.96	13.4
SL2-09a	0-6	13.5	27.8
SL2-10	0-6	19.1	26.8
SL2-11	0-6	5.58	9.42
SL2-12	0-6	17.5	15.7
SL2-13	0-6	8.11	21.1
SL2-14	0-6	17.50	35.6
SL2-15	0-6	**22.6**	29.2
SL2-16	0-6	9.33	11.9
SL2-17a	0-6	4.53	8.7
SL2-18	0-6	4.7	13
SL2-19	0-6	5.93	10.6
SL2-20	0-6	6.32	7.84
SL2-21	0-6	8.23	13.4
Average		9.9	16.9
SL2-04b	6-12	11.3	23.4
SL2-08b	6-12	5.57	9.66
SL2-09b	6-12	11.7	19
SL2-17b	6-12	3.77	7.6
SL2-20b	6-12	9.95	13.1
Average		8.5	14.5

Arsenic and lead analyzed by US EPA Method 6020
mg/kg - milligrams per kilogram
bold = concentration exceeds adopted criteria
bgs = below ground surface

November 15, 2019

Jannine McDonald
Federal Way Public Schools
Capital Projects
1211 S 232nd St
Federal Way, WA 98004
Email: jmcdonald@fwps.org
fwpscp18@fwps.org

RE: Star Lake Elementary School – Supplemental Arsenic and Lead Soil Sampling Report
4014 S 270th Street, Kent, Washington
PBS Project #41519.001

Federal Way Public Schools (FWPS) has contracted PBS Engineering and Environmental Inc. (PBS) to evaluate the potential for arsenic and lead contaminants in near surface soils at the site of Star Lake Elementary School (SLES) prior to site redevelopment as part of the SLES Replacement Project. A Site Vicinity Map is presented as Figure 1.

This *Supplemental Arsenic and Lead Soil Sampling Report* presents the findings of supplemental sampling performed in October 2019 surrounding locations with arsenic concentrations in exceedance of the Washington State Department of Ecology's (Ecology's) Model Toxics Control Act (MTCA) Method A cleanup level for arsenic. The purpose of supplemental sampling was to better define the extent of arsenic impacted soils to determine which trees in the remediation area can be retained at the site and which trees will require removal to facilitate soil remediation.

Results of initial and supplemental soil sampling will provide basis for areas requiring soil remediation and associated trees for removal. Based on conversations with Ecology and FWPS, mixing with clean soils is expected to be the chosen model remedy for the site. Based on conversations with FWPS and the project arborist, mixing of soils within approximately 50 feet of the base of the tree will disturb the trees roots, and render survival of the tree unlikely. The remediation area requirements and details about remedial methods will be outlined in Specification 02 61 00 Contaminated Soil Management which will be included in the bid package for construction of the new school.

The scope of services for supplemental sampling was presented in the Proposal for Additional Soil Sampling, Contract Document Development and Construction Period Services (WA29088) by PBS, dated June 7, 2019.

BACKGROUND

On November 5, 2018 PBS performed soil sampling activities to determine the levels of arsenic and lead in shallow soil at SLES in accordance with Ecology's *2019 Tacoma Smelter Plume Model Remedies Guidance*[1]. Findings of the sampling activities and recommendations for regulatory compliance of impacted soils were presented in the Star Lake Elementary School Arsenic and Lead Soil Sampling Report dated November 30, 2018[2]. The report identified

[1] *Tacoma Smelter Plume Model Remedies Guidance,* Department of Ecology, July, 2019.
[2] *Star Lake Elementary School – Arsenic and Lead Soil Sampling Report*, PBS Engineering and Environmental, November 30, 2018.

five locations where arsenic concentrations exceeded Ecology's MTCA Method A cleanup level (CUL) criteria for unrestricted land use.
On October 25, 2019, Mr. James Welles of PBS met with Ms. Jannine McDonald of FWPS Capital Projects and Mr. Zeb Haney of Tree Resource to evaluate which trees FWPS would like to retain and determine additional soil sample locations required to determine if the trees would fall within the soil remediation area.

SUPPLEMENTAL SOIL SAMPLING

Additional soil samples were collected in October 2019 to delineate the extent of impacted soil in select areas. Supplemental sampling focused on the area surrounding sample locations SL-1-24 and SL-1-25 in attempts to retain trees in the remediation area as discussed during the October 25 site visit. Additional samples were not collected surrounding original sample locations SL1-20, SL-1-18 or SL-2-15 as the areas surrounding these sample locations do not contain trees proposed for retention. As such, existing sample data is sufficient to design the remediation effort. Supplemental and select original soil sample locations in areas with tree retention concerns are presented in Figure 2.

Soil sample collection started just below any surface cover layer (e.g., sod or grass). A hand spade and a hand auger were used to complete 6-inch deep test holes. A soil sample was collected at a depth of less than six inches below ground surface at each location.

PBS personnel wore disposable nitrile gloves to protect against cross-contamination between samples. Soil retained for analysis was packed into laboratory-provided containers, labeled and transported on ice under chain of custody documentation to Friedman and Bruya, Inc. in Seattle, an Ecology-accredited analytical laboratory.

Samples were analyzed for total arsenic and lead using EPA Method 6020. Total arsenic and lead results were reported on a dry weight basis.

ANALYTIC RESULTS

Analytical results from two out of five soil samples collected on site in October 2019 exceeded MTCA Method A CULs for arsenic. Detected arsenic concentrations did not exceed two times the CUL and are thus not considered "elevated" per the Smelter Plume Guidance. However, because the land is used as an elementary school, FWPS has elected to remediate soils in exceedance of the CUL, even if they are not considered elevated per the guidance.

CONCLUSIONS

Based on the analytical results of the supplemental soil sampling, the following conclusion and recommendations were made regarding the handling and management of project site soils.

The area surrounding sample locations SL-1-15, SL-1-19, SL-1-20, SL-1-24, SL-1-25, and SL-1-26 will require soil remediation. Currently, the proposed remedial method is mixing in place.

Based on analytical results of soil sampling to date, the area delineated for remediation by mixing in place will disturb the roots of trees 2572, 2573, 2574, 2575, 2578 and 2579 (see Figure 2). As such, these trees will require

removal prior to soil remediation. Trees 2570 and 2571 may be retained at the site, at the discretion of the project arborist. Action regarding trees previously slated for removal in the Tree Retention Plan for the project have not changed as a result of soil remediation, and are thus not discussed further herein.

The proposed remediation area is depicted on Figure 2. Please note that Figure 2 only depicts the remediation area in which further sampling was required to determine trees for retention versus removal. Additional remediation by mixing in place will be required at former sample location SL-1-18 to the west of the remediation area depicted in Figure 2 and at former sample location SL-2-15 in the southeast corner of the site. Total area for soil remediation at SLES is estimated at approximately 1.5 acres. Final remediation area boundaries, area, and associated survey coordinates will be provided in Specification 02 61 00 – Contaminated Soil Management.

LIMITATIONS

This investigation was conducted to characterize lead and arsenic distributions in shallow soils surrounding previously identified arsenic and lead contaminated locations on-site, with a focus on protection of human health and the environment. The data collected in this investigation are not intended for the purposes waste profiling for offsite disposal, or for estimation of volume or tonnage of soil requiring disposal.

PBS has prepared this report for use by FWPS. This report is not intended for use by others without the written consent of the FWPS. Our interpretation of soil conditions in this study was based on field observations and analytical data from the indicated explorations. Regulated substances may exist in portions of the site that were not explored or analyzed.

PBS ENGINEERING AND ENVIRONMENTAL INC.

James Welles, LG
Project Geologist

Reviewed By:

Melanie Young

Melanie Young, PE
Senior Environmental Engineer

Attachments:
Table 1: Laboratory Data Summary Table
Figure 1: Site Vicinity Map
Figure 2: As/Pb Supplemental Soil Sample Location Map
Attachment A: Laboratory Data

Tables

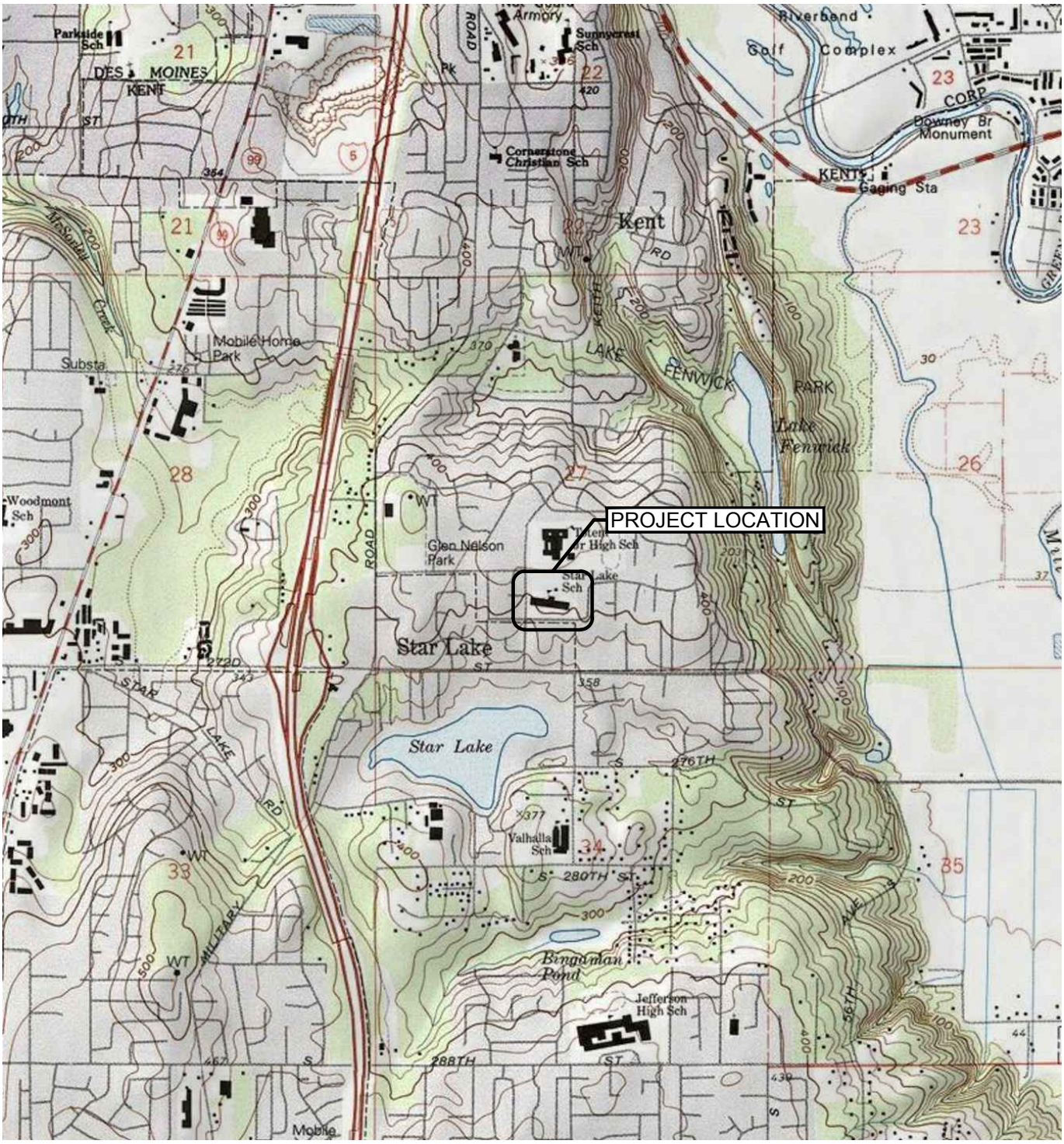
Table 1 - Soil Sample Analytical Results

Site: Star Lake Elementary School
Address: 4014 S 270th Street, Kent, WA
PBS Project No. 41519.001

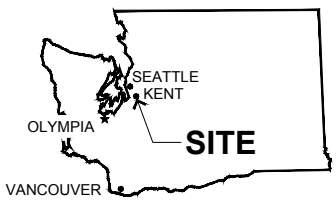
Location / Sample Identification	Description	Sample Depth (inches bgs)	Metals	
			Arsenic (mg/kg)	Lead (mg/kg)
	Regulatory Criteria	**MTCA Method A Cleanup Level**	**20**	**250**
Supplemental Samples Surrounding Trees 2575, 2578 and 2579				
SL-1-28a	35' NW of 2575, 32' W of 2578	0-6	3.25	6.10
SL-1-29a	25' N of 2575, 8' W of 2578	0-6	7.55	6.88
SL-1-30a	16' E of 2578, 15' W of 2579	0-6	**24.5**	51.6
SL-1-31a	50' E of 2579	0-6	**24.9**	49.6
SL-1-32a	40' NW of 2575, 40' W of 2578	0-6	8.41	5.75
Original Samples Used to Delineate Remediation Boundary				
SL-1-15a	Grid Sample	0-6	4.99	16.9
SL-1-18a	Grid Sample	0-6	**26.6**	11.3
SL-1-19	Grid Sample	0-6	7.84	21.8
SL-1-20	Grid Sample	0-6	**22.6**	51.1
SL-1-24	Grid Sample	0-6	**72.7**	122
SL-1-25	Grid Sample	0-6	**25.1**	39.8
SL-1-26a	Grid Sample	0-6	9.38	17.3
SL-1-27	Grid Sample	0-6	12.5	21
Average			19.3	32.4

Arsenic and lead analyzed by US EPA Method 6020
mg/kg - milligrams per kilogram
bold = concentration exceeds adopted criteria
bgs = below ground surface

Figures



SOURCE: USGS POVERTY BAY, WA QUADRANGLE 1990, PHOTO REVISED 1994.



WASHINGTON

SCALE 1" = 2000'

0' 1,000' 2,000' 4,000'

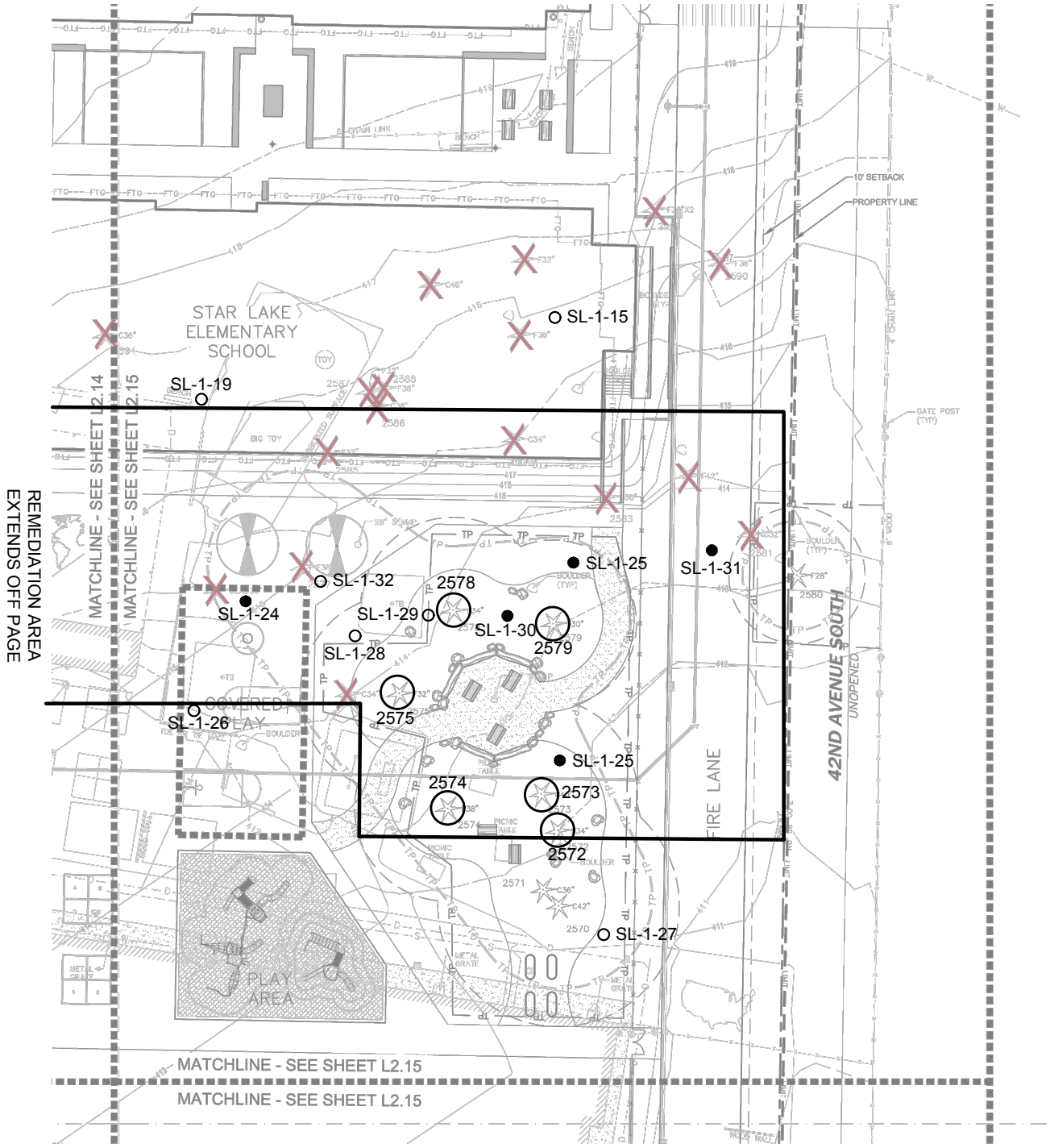
PREPARED FOR: FEDERAL WAY PUBLIC SCHOOLS

VICINITY MAP

STAR LAKE ELEMENTARY SCHOOL
4014 SOUTH 270TH STREET
KENT, WASHINGTON

NOV 2019
41519.001

FIGURE
1



SOURCE: © 2018 GOOGLE EARTH PRO

LEGEND

- ○ SL-1-28 — SOIL SAMPLE LOCATION As, Pb < MTCA METHOD A
- ● SL-1-24 — SOIL SAMPLE LOCATION As, Pb > MTCA METHOD A
- ——— PROPOSED BOUNDARY FOR SOIL REMEDIATION
- ✳ — TREE SELECTED FOR REMOVAL TO FACILITATE SOIL REMEDIATION
- 2574 — TREE ID

SCALE 1" = 50'

0' 25' 50' 100'

PREPARED FOR: FEDERAL WAY PUBLIC SCHOOLS

PBS

As / Pb SUPPLEMENTAL SOIL SAMPLE LOCATION MAP

STAR LAKE ELEMENTARY SCHOOL
4014 SOUTH 270TH STREET
KENT, WASHINGTON

NOV 2019
41519.001

FIGURE
2

Remedial Action Work Plan for Tacoma Smelter Plume Impacts

Star Lake Elementary School (and Totem Middle School)
4014 S 270th Street
Kent, Washington

Prepared for:
Jannine McDonald
Federal Way Public Schools
Capital Projects
1211 S. 232nd Street
Federal Way, Washington 98004

May 4, 2020
Project No. 41519.001

PBS
214 E GALER STREET
SUITE 300
SEATTLE, WA 98102
206.233.9639 MAIN
866.727.0140 FAX
PBSUSA.COM

TABLE OF CONTENTS

SUPPORTING DATA

1.0 INTRODUCTION

This Remedial Action Work Plan (work plan) was prepared on behalf of Federal Way Public Schools (FWPS) to guide the remediation of arsenic and lead impacted soils at Star Lake Elementary and Totem Middle Schools (the Project / site). The site is located at 4014 South 270th Street in Kent, Washington (see Site Vicinity Map, Figure 1). The work plan is intended to outline the approach and potential actions needed to address the soil contamination at the project site during a planned construction project. It is noted in this report that one area at Star Lake Elementary School requires remediation to comply with state regulations. FWPS has elected to remediate other areas at Star Lake Elementary and Totem Middle Schools based on the proposed land use as a school site. For the purposes of regulatory compliance, the site is referred to as the Star Lake Elementary Site. For the sake of simplicity in communication between FWPS, their contractors, state agencies and PBS, remedial efforts proposed for Totem Middle School area also described herein.

1.1 Project Location

The site consists of two tax lots (King County Assessor Parcels 2722049112 and 2722049152) comprising approximately 28 acres of land in a residential neighborhood. The Site is bounded to the north and east by residential lots, to the west by 40th Avenue S, and to the south by S 270th Street. (see Figure 2 – Site Plan).

2.0 BACKGROUND

2.1 Site History

The site is located within the widespread soil contamination plume of the former Asarco smelter operation. The Asarco Company operated a copper smelter in Tacoma from 1890 to 1985. Smelter operations emitted an airborne plume of particulates with arsenic, lead, and other heavy metals that were distributed over a wide region of the Puget Sound. As a result, these metals have been found in near surface soils at concentrations which may pose a threat to human health and/or the environment.

The Washington State Department of Ecology (Ecology) recommends soil sampling at properties in areas with estimated arsenic levels above the state cleanup level of 20 mg/kg. Ecology's "Everett and Tacoma Smelter Search" web page https://fortress.wa.gov/ecy/smeltersearch/ maps the site within a zone of potential arsenic concentrations ranging from 40 milligram per kilogram (mg/kg) to 100 mg/kg. Thus, the 40 mg/kg to 100 mg/kg range is considered the "baseline" for arsenic concentrations in near surface soils expected on site.

2.2 Regulatory Criteria

Ecology's Model Toxics Control Act (MTCA) has established cleanup levels for arsenic and lead for unrestricted land use that are protective of human health and the environment. Ecology's MTCA Method A cleanup levels (CULs) for unrestricted land use for arsenic and lead are:

- The CUL for arsenic is 20 milligrams per kilogram (mg/kg)
- The CUL for lead is 250 mg/kg.

Per Ecology's Tacoma Smelter Plume Model Remedies Guidance[1] (Smelter Plume Guidance), *"if arsenic or lead levels are elevated for any decision unit on the property, that decision unit needs cleanup."* Per the Smelter Plume Guidance, elevated is defined as:

- Average arsenic > 20 parts per million (ppm, equivalent to mg/kg) or average lead > 250 ppm; **or**
- Maximum (any one sample) arsenic >40 ppm or maximum lead > 500 ppm.

2.3 Initial Soil Characterization - 2018

Arsenic and Lead Soil Sampling, PBS, October 2018
In November 2018 PBS performed soil characterization sampling at the site to determine the levels of arsenic and lead in shallow soil. Soil characterization was conducted in accordance with the Smelter Plume Guidance. Findings of the sampling activities were presented in the Star Lake Elementary School and Totem Middle School - Arsenic and Lead Soil Sampling Reports. The reports were originally issued in November 2018 and were revised in May 2020 based on communication between FWPS, Ecology and PBS. Both reports are presented in Appendix A. The reports identified five locations at Star Lake Elementary and one location at Totem Middle where arsenic concentrations exceeded Washington State Department of Ecology's Model Toxics Control Act[2] (MTCA) Method A cleanup level (CUL) criteria for unrestricted land use. Of the sample locations exceeding CULs, one location at Star Lake had an arsenic concentration defined as elevated per the Ecology Guidance (See Section 2.3).

2.4 Remediation Goals

FWPS intends to remediate sample locations with elevated concentrations of arsenic or lead as directed by the Smelter Plume Guidance. Based on the intended land use as a school, FWPS has also elected to remediate areas where single sample locations contained concentrations of arsenic or lead exceeding the CUL, even if average concentrations within the decision unit are below the cleanup level, and as such are not defined as elevated per the Smelter Plume Guidance.

[1] "*Tacoma Smelter Plume Model Remedies Guidance: Sampling and Cleanup of Arsenic and Lead Contaminated Soils",* Washington State Department of Ecology, July 2019, Publication No. 19-09-101.
[2] "*Model Toxics Control Act Regulation and Statute",* Washington State Department of Ecology Toxics Cleanup Program, 2013, Publication No. 94-06.

Supplemental Arsenic and Lead Soil Sampling, PBS, June 2019
In October 2019, PBS performed supplemental soil sampling to further delineate the extent of arsenic and lead impacted soil surrounding the locations with concentrations of arsenic exceeding CULs as identified in 2018. The goal of the supplemental sampling was primarily to identify which trees within the proposed remediation area could be retained, and which trees required removal to facilitate remediation.

3.0 SOIL REMEDIATION PLAN

3.1 Remediation Areas

Based on the results of soil characterization sampling conducted at the site, and FWPS's goal of remediating any sample location where soil concentrations exceeded the CUL, three remediation areas were identified at the site based on detected arsenic concentrations. The remediation areas are presented in Drawing Sheets HM500 and HM600 presented in the figures section of this report.

3.2 Proposed Model Remedy – Mixing in Place

The Smelter Plume Guidance presents four model remedies for arsenic and lead contaminated soils based on concentrations detected at the site. Mixing in place had been selected as the model remedy for the site. The Smelter Plume Guidance considers mixing a permanent remedy that is acceptable for sites that meet the following criteria:

- Average arsenic concentrations less than 40 ppm and average lead concentrations less than 500 ppm
- Contamination is not deeper than 12 inches
- Arsenic and lead levels in deeper soils (12-18" and 18-24") have low enough arsenic and lead levels to dilute surface soils.

Based on soil characterization conducted in 2018 and 2019, the site meets all of the above criteria, and mixing in place is considered an acceptable and permanent remediation technique for the site.

3.3 Implementation of Model Remedy

Chapter Four of the Smelter Plume Guidance provides a worksheet to calculate the depth of mixing required to achieve CULs. Because the site surface consists of relatively undisturbed soils, Example B of the worksheet was used to calculate mixing depth for the three remediation areas. Below is the equation presented in Example B:

$$\frac{(\text{Surface Soil Arsenic Concentration} \times \text{depth}) + (\text{Deeper Soil Arsenic Concentration} \times \text{depth})}{\text{Surface depth} + \text{deeper depth}}$$

The equation is applied to the three remediation areas as follows:

Remediation area 1 (Star Lake):
Average arsenic concentration in top 6 inches as represented by samples SL-1-18a, SL-1-24, SL-1-25, SL-1-28a, SL-1-29a, SL-1-30a, SL-1-31a, and SL-1-32a is calculated below:

$Arsenic_{(Ave)}$ 0-6 inch = (26.6 ppm + 72.7 ppm + 25.1 ppm + 3.25 ppm + 7.55 ppm + 24.5 ppm +24.9 ppm + 8.41 ppm) / 7 samples
$Arsenic_{(Ave)}$ 0-6 inch = 24.1 ppm

Average arsenic concentration from 6 – 12 inches as represented by sample SL-1-18b
$Arsenic_{(Ave)}$ 6-12 inch = 6.88 ppm

Thus, using the equation from Example B in the Chapter Four worksheet:

$$Arsenic_{(Ave)}\ Mixed = \frac{(24.1\ ppm \times 6'') + (6.88 \times 6'')}{(6'' + 6'')}$$

$Arsenic_{(Ave)}$ Mixed = 15.5 ppm

Because 15.5 ppm meets the CUL for arsenic, mixing to a depth of 12 inches in Remediation Area 1 is expected to be enough to achieve the CUL.

Remediation area 2 (Star Lake):
Average arsenic concentration in top 6 inches as represented by samples SL-2-09a, SL-2-10, SL-2-14 and SL-2-15 is calculated below:

$Arsenic_{(Ave)}$ 0-6 inch = (13.5 ppm + 19.1 ppm + 17.5 ppm + 22.6 ppm) / 4 samples
$Arsenic_{(Ave)}$ 0-6 inch = 18.2 ppm

Because the average arsenic concentration in the top 6 inches of soil within Remediation Area 2 is below the CUL, mixing with deeper soils is not expected to be required to achieve CULs. As such, mixing to a depth of 6 inches within Remediation Area 2 is expected to be enough to achieve the CUL.

Remediation area 3 (Totem):
Average arsenic concentration in top 6 inches as represented by samples TM-1-22, TM-1-25a, TM-1-26 and TM-1-27 is calculated below:
$Arsenic_{(Ave)}$ 0-6 inch = (4.78 ppm + 16.1 ppm + 26 ppm + 4.67 ppm) / 4 samples
$Arsenic_{(Ave)}$ 0-6 inch = 12.9 ppm

Because the average arsenic concentration in the top 6 inches of soil within Remediation Area 3 is below the CUL, mixing with deeper soils is not expected to be required to achieve CULs. As such, mixing to a depth of 6 inches within Remediation Area 3 is expected to be enough to achieve the CUL.

3.4 Means and Methods for Remediation

Means and methods for soil remediation by mixing in place will be determined by the contractor selected by FWPS to perform the remediation based on project specifications prepared by PBS and presented to the contractor by FWPS in the bid package for the project. Means and methods include equipment to be used, as well as mixing techniques such as mixing in place, piling into rows or stockpiles for mixing and spreading back out, or other methods determined to be efficient and cost effective for the contractor and FWPS. The contractor will be required to follow the health and safety procedures outlined in Section 3.5.

3.5 Protection of Human Health and the Environment During Remediation

The contractor selected by FWPS to perform the remediation of soils at the site will be responsible for the health and safety of its own personnel and employees, as well as that of any subcontractors hired to perform the work. The contractor will follow the requirements of the Washington State Department of Labor and Industries Safety Standards for Arsenic[3]

Work will be performed with the periodic wetting of soils to prevent the generation of fugitive dust. Wetting of soils will be conducted such that surface runoff of water and/or sediment from the remediation area is prevented in accordance with the contractor's Construction Storm Water Pollution Prevention Plan specific to the project.

PBS will perform air monitoring at the perimeter of remediation areas while mixing activities are taking place. Air samples will be analyzed for particulate arsenic and lead to ensure that contaminants are not escaping the remediation area during the work.

4.0 POST-REMOVAL COMPLIANCE SOIL SAMPLING

Chapter Seven of the Smelter Plume Guidance specifies that compliance samples be collected after mixing is complete to determine if mixing worked, and that concentrations of arsenic and/or lead within the remediated area meet CULs.

[3] "*Safety Standards for Arsenic",* Washington Department of Labor and Industries, Chapter 296-848 WAC.

Chapter Seven Table 4 of the Smelter Plume Guidance presents the number of compliance samples required for each remediation area based on acreage and mapped arsenic concentrations. The number of compliance samples required for each remediation area based on the table is presented below:

- Remediation Area 1 (1.25 acres, mapped arsenic concentration <100 ppm) = 16 samples
- Remediation Area 2 (0.25 acres, mapped arsenic concentration <100 ppm) = 8 samples
- Remediation Area 3 (1 acre, mapped arsenic concentration <100 ppm) = 16 samples

Following the completion of mixing in soils in place, each remediation area will be divided into an evenly spaced grid based on the number of compliance samples required, as outlined above, and in accordance with Chapter Seven of the Smelter Plume Guidance. Soil samples will be collected at each grid point at depths of 0-6 inches and 6-12 inches in Remediation Area 1. Soil samples will be collected at each grid point at a depth of 0-6 inches in Remediation Areas 2 and 3. Soil samples will be collected and analyzed following the Smelter Plume Guidance Sampling Process as outlined in Chapter Seven of the guidance. Compliance soil samples will be analyzed for total arsenic and lead by EPA Method 6010/6020 at an Ecology accredited laboratory.

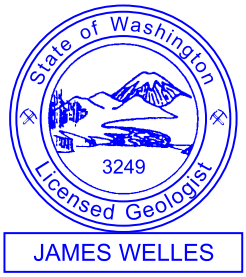
5.0 INTERPRETATION OF SAMPLING RESULTS

Concentrations of arsenic and lead in soil samples as determined by laboratory analysis will be compared to arsenic and lead CULs. If all concentrations meet CULs, remediation will be considered complete. If concentrations of either arsenic or lead in compliance samples exceed CULs, the area represented by the compliance samples in exceedance of CULs will be mixed in place to a depth 6 to 12 inches below the maximum mixing depth achieved in the prior remediation effort. Additional remediation by mixing in place will be conducted following the same procedures outlined in Section 3 and as specified in Chapter 4 of the Smelter Plume Guidance.

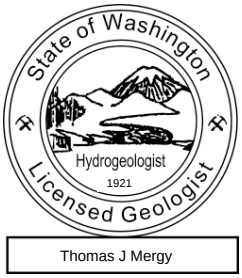
6.0 REPORTING

Upon completion of the soil removal and compliance sampling, a project completion report will be prepared that documents the specific depths and locations of the mixing of arsenic-impacted soil, locations and results of compliance soil samples, and evaluation of the lab results with respect to cleanup levels. An accompanying narrative will describe the sampling operations, and any deviations to the procedures that occurred. Corrective actions will be identified as needed, and the resolution of any discrepancies will be reported.

7.0 SIGNATURES



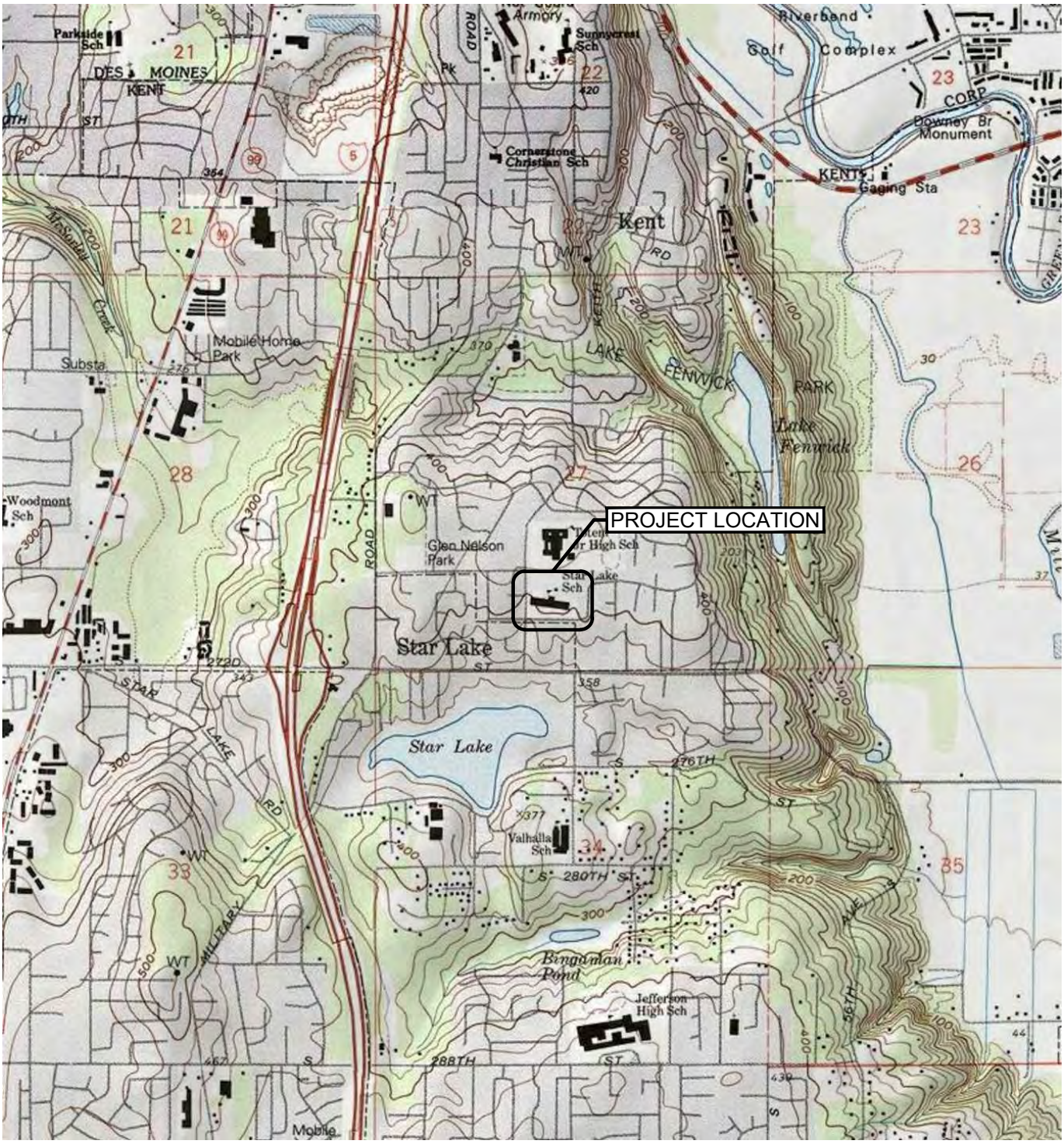
James Welles, LG
Project Geologist



Thomas Mergy, LHG
Principal Hydrogeologist

FIGURES

Figure 1 — Vicinity Map
Sheet HM500 – Star Lake ES Arsenic Contaminated Soil Remediation Plan
Sheet HM600 – Totem MS Arsenic Contaminated Soil Remediation Plan



SOURCE: USGS POVERTY BAY, WA QUADRANGLE 1990, PHOTO REVISED 1994.

WASHINGTON

SCALE 1" = 2000'

0' 1,000' 2,000' 4,000'

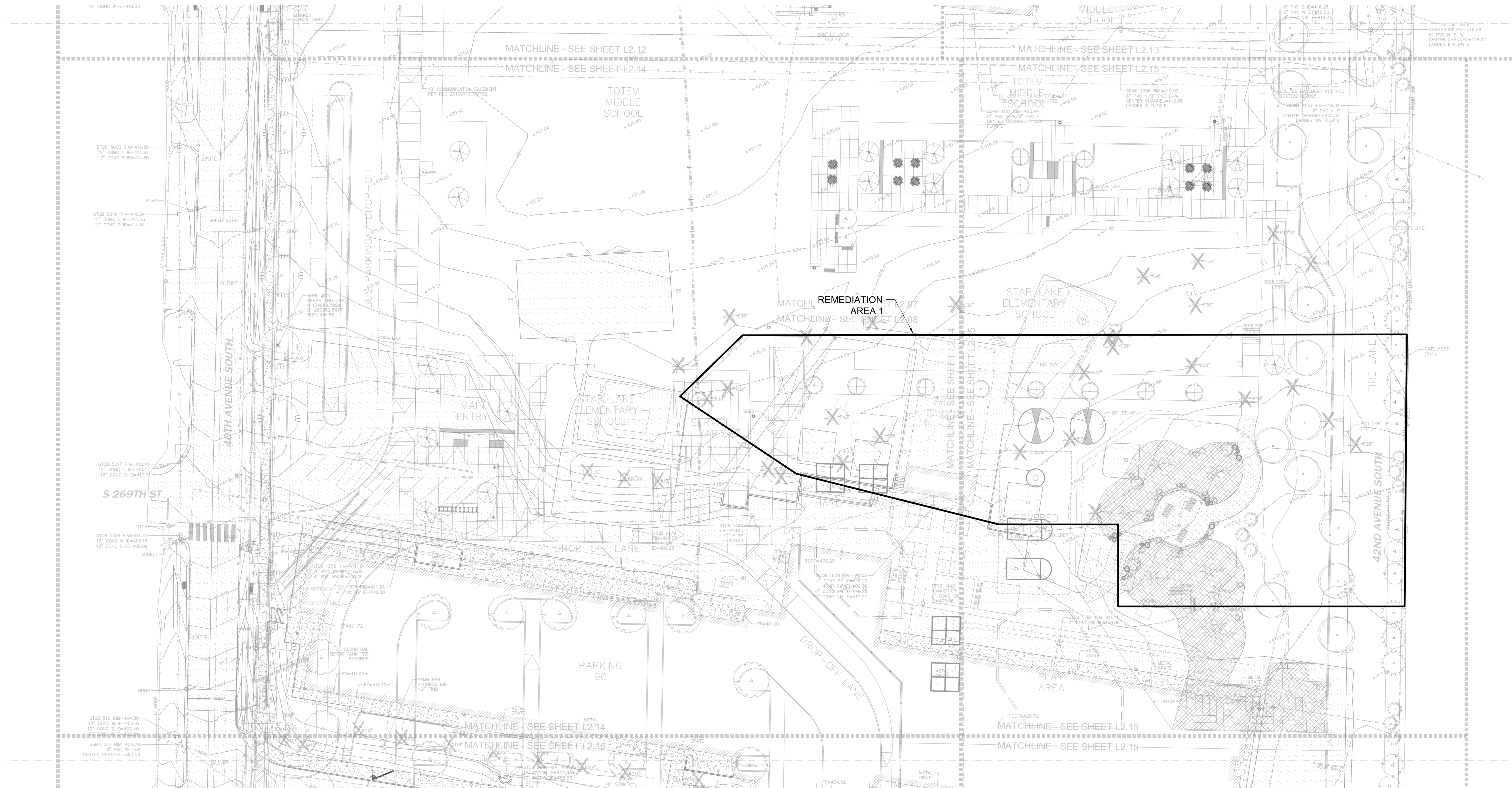
PREPARED FOR: FEDERAL WAY PUBLIC SCHOOLS

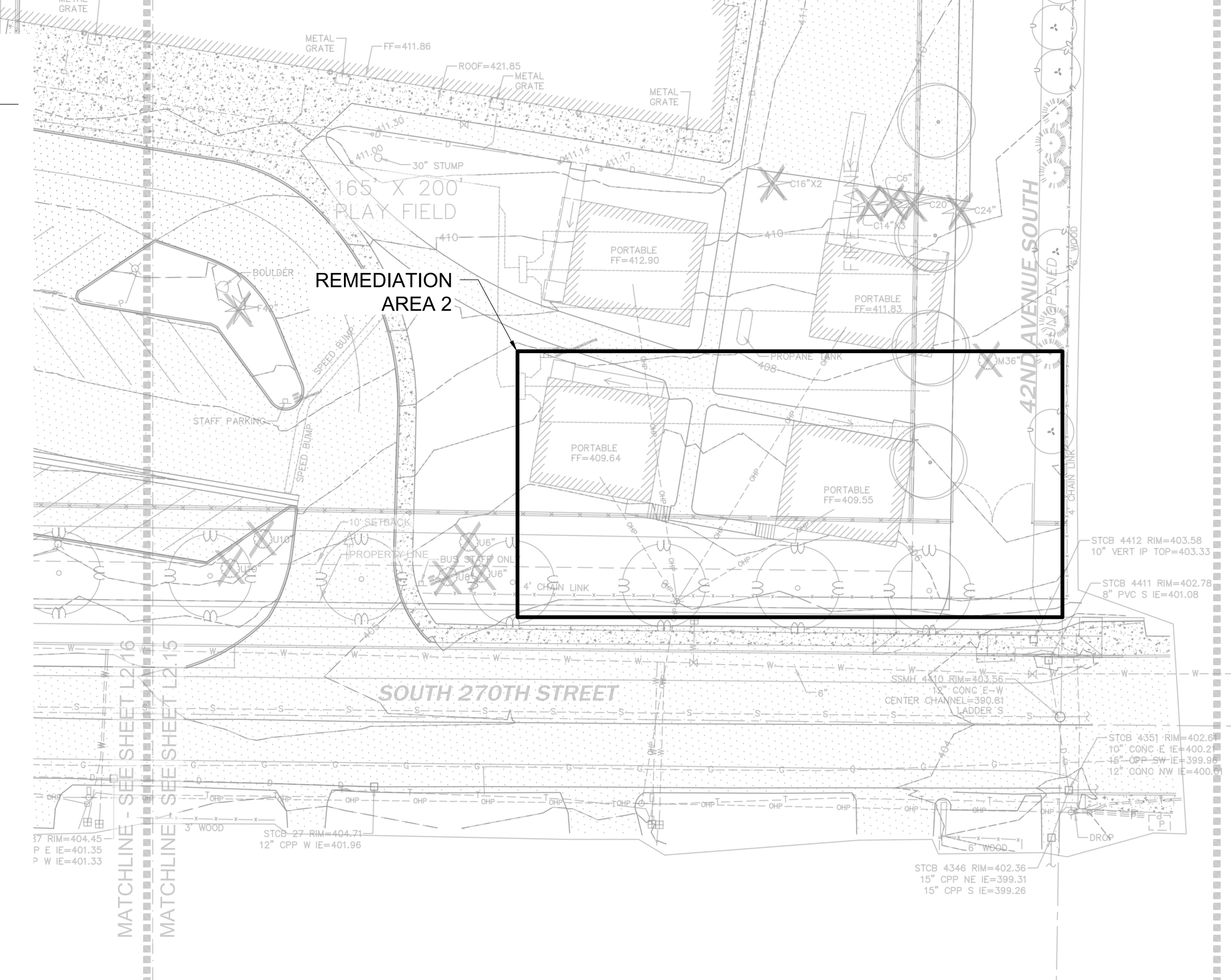
VICINITY MAP

STAR LAKE ELEMENTARY SCHOOL
4014 SOUTH 270TH STREET
KENT, WASHINGTON

MAY 2020
41519.001

FIGURE
1





GENERAL NOTES

1. A COPY OF THE APPROVED PLAN MUST BE ON SITE WHENEVER CONSTRUCTION IS IN PROGRESS.
2. PRIOR TO ANY CONSTRUCTION ACTIVITY, THE CONTRACTOR SHALL SCHEDULE AND ATTEND A PRE-CONSTRUCTION CONFERENCE WITH THE OWNER.
3. PAVED SURFACES INCLUDING ROADWAYS, SIDEWALKS, AND CURBS THAT ARE DAMAGED BY NEW CONSTRUCTION SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.
4. ALL LOCATIONS OF EXISTING UTILITIES SHOWN HEREON HAVE BEEN OBTAINED FROM AVAILABLE RECORDS AND SHOULD THEREFORE BE CONSIDERED APPROXIMATE ONLY AND NOT NECESSARILY COMPLETE. IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO INDEPENDENTLY VERIFY THE ACCURACY OF ALL UTILITY LOCATIONS SHOWN AND TO FURTHER DISCOVER AND AVOID ANY OTHER UTILITIES NOT SHOWN HEREON WHICH MAY BE AFFECTED BY THE IMPLEMENTATION OF THIS PLAN. NOTIFY ENGINEER OF UNFORESEEN UTILITY IMPEDIMENTS.
5. THE CONTRACTOR SHALL LOCATE AND PROTECT ALL CASTINGS AND UTILITIES DURING CONSTRUCTION AND SHALL CONTACT THE UNDERGROUND UTILITIES LOCATOR SERVICE (1-800-424-5555). AT LEAST 48 HOURS PRIOR TO CONSTRUCTION.
6. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN TEMPORARY SEDIMENTATION COLLECTION FACILITIES TO ENSURE THAT SEDIMENT-LADEN WATER DOES NOT ENTER THE NATURAL OR PUBLIC DRAINAGE SYSTEM. AS CONSTRUCTION PROGRESSES AND UNEXPECTED (SEASONAL) CONDITIONS DICTATE, MORE SILTATION CONTROL FACILITIES MAY BE REQUIRED TO ENSURE COMPLETE SILTATION CONTROL OF THE PROJECT. THEREFORE, DURING THE COURSE OF CONSTRUCTION IT SHALL BE THE OBLIGATION AND RESPONSIBILITY OF THE CONTRACTOR TO ADDRESS ANY NEW CONDITIONS THAT MAY BE CREATED BY THEIR ACTIVITIES AND TO PROVIDE ADDITIONAL FACILITIES THAT MAY BE NEEDED TO PROTECT ADJACENT PROPERTIES.
7. THE CONTRACTOR SHALL KEEP OFF-SITE STREETS CLEAN AT ALL TIMES BY SWEEPING.
8. ANY DAMAGE TO EXISTING FACILITIES DURING COURSE OF WORK SHALL BE RESTORED OR REPLACED AT CONTRACTOR'S EXPENSE.
9. PERFORM ALL ARSENIC CONTAMINATED SOIL REMEDIATION IN ACCORDANCE WITH SPECIFICATION SECTION 026100.

PROJECT NOTES

1. MIX SOIL IN PLACE WITHIN REMEDIATION AREA FROM GROUND SURFACE TO 12" BELOW GROUND SURFACE IN AREA 1 AND 6" BELOW GROUND SURFACE IN AREA 2. ESTIMATED VOLUME OF SOIL FOR MIXING IN PLACE IS 2,060 CUBIC BANK YARDS.
2. REMOVE ALL SURFACE IMPROVEMENTS WITHIN REMEDIATION AREA.
3. SURFACE IMPROVEMENT REMOVED FROM REMEDIATION AREA, SUCH AS CONCRETE OR ASPHALT, MAY BE RECYCLED OR DISPOSED OF AT AN ACCEPTING FACILITY AFTER REMOVAL OF ANY RESIDUAL SOIL VIA DRY METHODS (EG. SWEEPING).

ORIGINAL SHEET IS 30" x 42"

mcg-ARC

architect_
MCGRANAHAN ARCHITECTS

civil engineer_
COUGHLIN PORTER LUNDEEN

landscape architect_
WEISMAN DESIGN GROUP

structural engineer_
PCS STRUCTURAL SOLUTIONS

mechanical engineer_
BCE ENGINEERS

electrical engineer_
BCE ENGINEERS

food service_
STAFFORD DESIGN GROUP

hazardous materials_
PBS ENGINEERING

surveyor_
AHBL

project_
STAR LAKE ES & TOTEM MS

client_
FEDERAL WAY PUBLIC SCHOOLS

location_
KENT, WA

Project No.1804

STAR LAKE ES - ARSENIC CONTAMINATED SOIL REMEDIATION PLAN

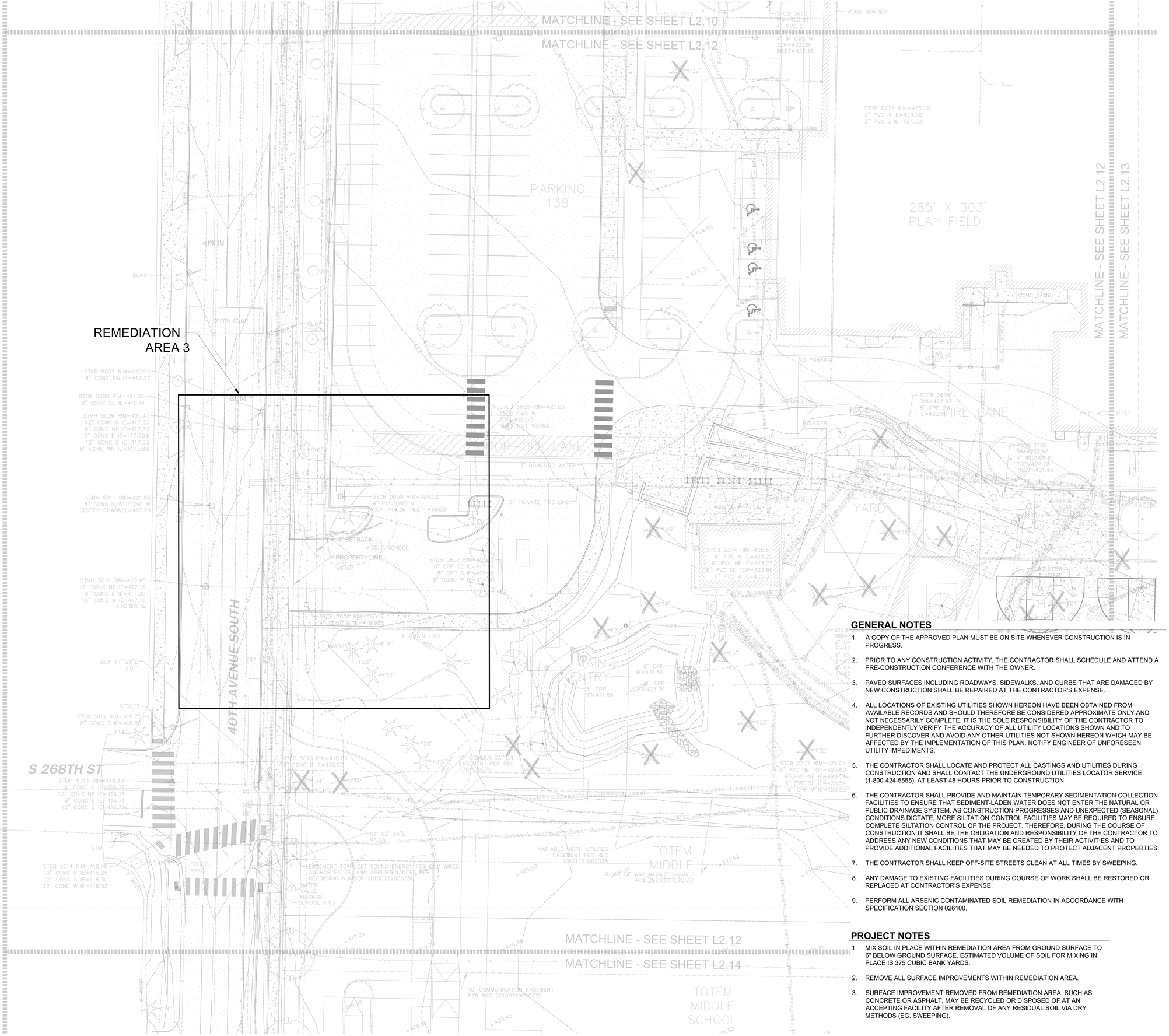
issued_
BID SET #1 14 FEB 20

revision_

drawn_
KJB

checked_
JW

sheet_
HM 500



GENERAL NOTES

1. A COPY OF THE APPROVED PLAN MUST BE ON SITE WHENEVER CONSTRUCTION IS IN PROGRESS.
2. PRIOR TO ANY CONSTRUCTION ACTIVITY, THE CONTRACTOR SHALL SCHEDULE AND ATTEND A PRE-CONSTRUCTION CONFERENCE WITH THE OWNER.
3. PAVED SURFACES INCLUDING ROADWAYS, SIDEWALKS, AND CURBS THAT ARE DAMAGED BY NEW CONSTRUCTION SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE.
4. ALL LOCATIONS OF EXISTING UTILITIES SHOWN HEREON HAVE BEEN OBTAINED FROM AVAILABLE RECORDS AND SHOULD THEREFORE BE CONSIDERED APPROXIMATE ONLY AND NOT NECESSARILY COMPLETE. IT IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR TO INDEPENDENTLY VERIFY THE ACCURACY OF ALL UTILITY LOCATIONS SHOWN AND TO FURTHER DISCOVER AND AVOID ANY OTHER UTILITIES NOT SHOWN HEREON WHICH MAY BE AFFECTED BY THE IMPLEMENTATION OF THIS PLAN. NOTIFY ENGINEER OF UNFORESEEN UTILITY IMPEDIMENTS.
5. THE CONTRACTOR SHALL LOCATE AND PROTECT ALL CASTINGS AND UTILITIES DURING CONSTRUCTION AND SHALL CONTACT THE UNDERGROUND UTILITIES LOCATOR SERVICE (1-800-424-5555). AT LEAST 48 HOURS PRIOR TO CONSTRUCTION.
6. THE CONTRACTOR SHALL PROVIDE AND MAINTAIN TEMPORARY SEDIMENTATION COLLECTION FACILITIES TO ENSURE THAT SEDIMENT-LADEN WATER DOES NOT ENTER THE NATURAL OR PUBLIC DRAINAGE SYSTEM. AS CONSTRUCTION PROGRESSES AND UNEXPECTED (SEASONAL) CONDITIONS DICTATE, MORE SILTATION CONTROL FACILITIES MAY BE REQUIRED TO ENSURE COMPLETE SILTATION CONTROL OF THE PROJECT. THEREFORE, DURING THE COURSE OF CONSTRUCTION IT SHALL BE THE OBLIGATION AND RESPONSIBILITY OF THE CONTRACTOR TO ADDRESS ANY NEW CONDITIONS THAT MAY BE CREATED BY THEIR ACTIVITIES AND TO PROVIDE ADDITIONAL FACILITIES THAT MAY BE NEEDED TO PROTECT ADJACENT PROPERTIES.
7. THE CONTRACTOR SHALL KEEP OFF-SITE STREETS CLEAN AT ALL TIMES BY SWEEPING.
8. ANY DAMAGE TO EXISTING FACILITIES DURING COURSE OF WORK SHALL BE RESTORED OR REPLACED AT CONTRACTOR'S EXPENSE.
9. PERFORM ALL ARSENIC CONTAMINATED SOIL REMEDIATION IN ACCORDANCE WITH SPECIFICATION SECTION 026100.

PROJECT NOTES

1. MIX SOIL IN PLACE WITHIN REMEDIATION AREA FROM GROUND SURFACE TO 6" BELOW GROUND SURFACE. ESTIMATED VOLUME OF SOIL FOR MIXING IN PLACE IS 375 CUBIC BANK YARDS.
2. REMOVE ALL SURFACE IMPROVEMENTS WITHIN REMEDIATION AREA.
3. SURFACE IMPROVEMENT REMOVED FROM REMEDIATION AREA, SUCH AS CONCRETE OR ASPHALT, MAY BE RECYCLED OR DISPOSED OF AT AN ACCEPTING FACILITY AFTER REMOVAL OF ANY RESIDUAL SOIL VIA DRY METHODS (EG. SWEEPING).

mcg-ARC

architect_
MCGRANAHAN ARCHITECTS

civil engineer_
COUGHLIN PORTER LUNDEEN

landscape architect_
WEISMAN DESIGN GROUP

structural engineer_
PCS STRUCTURAL SOLUTIONS

mechanical engineer_
BCE ENGINEERS

electrical engineer_
BCE ENGINEERS

food service_
STAFFORD DESIGN GROUP

hazardous materials_
PBS ENGINEERING

surveyor_
AHBL

project_
STAR LAKE ES & TOTEM MS

client_
FEDERAL WAY PUBLIC SCHOOLS

location_
KENT, WA

Project No.1804

TOTEM MS - ARSENIC CONTAMINATED SOIL REMEDIATION PLAN

issued_
BID SET #1 14 FEB 20

revision_

drawn_
KJB

checked_
JW

sheet_
HM 600

APPENDIX B

VCP Acceptance Letter and Ecology Opinion Letter

Electronic Copy

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47775 • Olympia, Washington 98504-7775 • 360-407-6300
Call 711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

May 28, 2020

Michael Swartz
Federal Way Public Schools
33330 8th Ave S
Federal Way, WA 98003
mswartz@fwps.org

Re: Acceptance of VCP Application for the following Contaminated Site:

- **Site Name:** Star Lake Elementary School
- **Site Address:** 4014 S 270th St., Kent, King County, WA 98032
- **Facility/Site ID:** 7890
- **Cleanup Site ID:** 13055
- **VCP Project ID:** NW3271

Dear Michael Swartz:

The Department of Ecology (Ecology) has accepted your Voluntary Cleanup Program (VCP) application for the Star Lake Elementary School facility (Site). We applaud your initiative and welcome your interest in the VCP. This letter confirms your entry into the VCP and provides important information on how we will manage the VCP Cleanup Project (Project) and the Site.

Agreement

Ecology has completed our review of your VCP application and signed the VCP Agreement governing the Project on **May 19, 2020**. This is the effective date of the Agreement. **Enclosure A** includes a copy of the Agreement. Please review it carefully.

Identification

Ecology has assigned a unique name and number to the **Site**. We have also assigned a unique number to your **Project** at the Site. You can find this information in the box at the bottom of the first page of the Agreement. When contacting us, please use this information to identify your Project.

Designated Managers

Please direct communications between Ecology and Federal Way Public Schools through the designated managers to the maximum extent possible.

- **Ecology**

  We have designated the following site manager to respond to your requests:

  Eva Barber
  Department of Ecology
  Toxic Cleanup Program
  Southwest Regional Office
  PO Box 47775
  Olympia, WA 98504-7775
  Phone: (360) 407-7094
  E-mail: eva.barber@ecy.wa.gov

- **Federal Way Public Schools**

  The application designated you, Michael Swartz, as the project manager for this Site. We will therefore respond only to your requests. If someone replaces you as the project manager or your contact information changes, please submit a Change of Contact Form.[1]

Requests for Written Opinions

In your application, you requested a written opinion on the sufficiency of your Remedial Action Work Plan. Ecology will review the documents you submitted and provide you a written response within about 90 days.

As the cleanup of the Site progresses, you may request written opinions on your planned or completed remedial actions by submitting to Ecology the following:

- Voluntary Cleanup Program Request for Opinion[2] form, which you can download from our VCP web site.[3]

- Plans and reports documenting the remedial action.

[1] https://fortress.wa.gov/ecy/publications/SummaryPages/ECY070218.html
[2] https://fortress.wa.gov/ecy/publications/SummaryPages/ecy070219.html
[3] https://ecology.wa.gov/vcp

Reporting Requirements

When requesting written opinions on planned or completed remedial actions, please comply with the following reporting requirements:

- **Licensing.** You must submit documents containing geologic and hydrogeologic work conducted under the seal of an appropriately licensed professional, as required by chapter 18.220 RCW,[4] and engineering work conducted under the seal of an appropriately licensed professional, as required by chapter 18.43 RCW.[5]

- **Data Submittal.** You must submit environmental sampling data in both a printed form and an electronic form capable of being transferred into our Environmental Information Management (EIM) system. For an overview of data submittal requirements, please refer to **Enclosure B**, which includes a copy of Toxics Cleanup Program Policy 840. For instructions on how to submit data, please refer to our EIM Submit Data web page.[6]

Failure to comply with these requirements may result in unnecessary delays.

Payment

Ecology will send monthly invoices to the billing contact designated in the Application Form. If someone replaces the billing contact or their contact information changes, please submit a Change of Contact Form.[1]

Our invoice will include a summary of the costs incurred, payments received, identity of staff involved, and the amount of time spent on the Project during the previous month. Payment is due within thirty days of the invoice date. For more information on the billing system, please refer to the VCP web site.

Independent Remedial Action Grants and Cultural Resource Compliance Review

As a local government, you may qualify for an Independent Remedial Action Grant[7] from Ecology, after completing your independent cleanup and receiving a no further action determination under the VCP. Grant applications are accepted on an ongoing basis. For more information about the grant program and how to apply, visit Ecology's Independent Remedial Action Grants[7] web page.

For ground-disturbing remedial actions to be eligible for grant funding, Ecology or another state or federal agency must consult with the Washington State Department of Archaeology and Historic Preservation[8] and affected Tribes to identify potential cultural resource impacts, **before** any ground-disturbing remedial actions are performed.

---

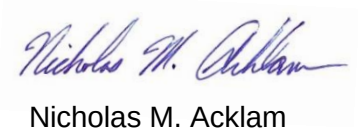
[4] https://apps.leg.wa.gov/RCW/default.aspx?cite=18.220
[5] https://apps.leg.wa.gov/RCW/default.aspx?cite=18.43
[6] https://ecology.wa.gov/Research-Data/Data-resources/Environmental-Information-Management-database/EIM-submit-data
[7] https://www.ecology.wa.gov/grants-IRAG
[8] https://dahp.wa.gov/

This funding condition is required by Executive Order 05-05. You may request a consultation from Ecology, under the VCP, by completing and submitting the "Executive Order 05-05, Section 106 NHPA Project Review Form."[9] For more information about Washington's cultural resource laws and regulations, see "Washington Cultural Resource Regulations: Summary for Independent Cleanup Sites."[10]

Contact Information

We are committed to working with you to accomplish the prompt and effective cleanup of the Site. Again, if you have any questions about the VCP or your Project, please contact Eva Barber at (360) 407-7094 or eva.barber@ecy.wa.gov.

Sincerely,



Nicholas M. Acklam
VCP Unit Manager
Toxics Cleanup Program
Southwest Regional Office

NMA/tam

Enclosures (2): A – Copy of VCP Agreement
B – Toxics Cleanup Program Policy 840: Data Submittal Requirements

cc by email: Sally McLean, Federal Way Public Schools, smclean@fwps.org
James Welles, PBS Engineering and Environmental, james.welles@pbsusa.com
Eva Barber, Ecology, eva.barber@ecy.wa.gov
Ecology Fiscal – VCP Rev/Rec
Ecology Site File

[9] https://fortress.wa.gov/ecy/publications/documents/ecy070537.pdf
[10] https://fortress.wa.gov/ecy/publications/SummaryPages/1909059.html

Enclosure A

Copy of VCP Agreement

This page intentionally left blank
for double-sided copying.

VCP AGREEMENT

DEPARTMENT OF ECOLOGY
State of Washington

INSTRUCTIONS: Submit this Agreement (original) to Ecology as part of your Application. Before submitting, enter the Customer's name and the Site's address on the first page and sign the Agreement on the second page. If your Application is accepted, then Ecology will do the following: 1) identify the Site and VCP project in the box below; 2) sign the Agreement; and 3) send you a copy of the completed Agreement.

This document constitutes an Agreement between the State of Washington Department of Ecology (Ecology) and Federal Way Public Schools (Customer) to provide informal site-specific technical consultations under the Voluntary Cleanup Program (VCP) for the Site identified below and associated with the following address:
Star Lake Elementary School - 4014 S 270th Street, Kent, WA, 98032 .

The purpose of this Agreement is to facilitate independent remedial action at the Site. Ecology is entering into this Agreement under the authority of the Model Toxics Control Act (MTCA), Chapter 70.105D RCW, and its implementing regulations, Chapter 173-340 WAC. If a term in this Agreement is defined in MTCA or Chapter 173-340 WAC, then that definition shall govern.

Services Provided by Ecology

Upon request, Ecology agrees to provide the Customer informal site-specific technical consultations on the independent remedial actions proposed for or performed at the Site consistent with WAC 173-340-515(5). Those consultations may include assistance in identifying applicable regulatory requirements and opinions on whether the remedial actions proposed for or conducted at the Site meet those requirements.

Ecology may use any appropriate resource to provide the Customer with the requested consultative services. Those resources may include, but shall not be limited to, those of Ecology and the Office of the Attorney General. However, Ecology shall not use independent contractors unless the Customer provides Ecology with prior written authorization.

In accordance with RCW 70.105D.030(1)(i), any opinions provided by Ecology under this Agreement are advisory only and not binding on Ecology. Ecology, the state, and officers and employees of the state are immune from all liability. Furthermore, no cause of action of any nature may arise from any act or omission in providing, or failing to provide, informal advice and assistance under the VCP.

Payment for Services by Customer

The Customer agrees to pay all costs incurred by Ecology in providing the informal site-specific technical consultations requested by the Customer consistent with WAC 173-340-515(6) and 173-340-550(6). Those costs may include the costs incurred by attorneys or independent contractors used by Ecology to provide the requested consultative services. Ecology's hourly costs shall be determined based on the method in WAC 173-340-550(2).

Ecology shall mail the Customer a monthly itemized statement of costs (invoice) by the tenth day of each month (invoice date) that there is a balance on the account. The invoice shall include a summary of the costs incurred, payments received, identity of staff involved, and amount of time staff spent on the project.

The Customer shall pay the required amount by the due date, which shall be thirty (30) calendar days after the invoice date. If payment has not been received by the due date, then Ecology shall withhold

FOR COMPLETION BY ECOLOGY ONLY	
	Facility / Site Name: Star Lake Elementary
	Facility / Site No.: 7890
	VCP Project No.: NW3271

any requested opinions and notify the Customer by certified mail that the debt is past due. If payment has not been received within sixty (60) calendar days of the invoice date, then Ecology shall stop all work under the Agreement and may, as appropriate, assign the debt to a collection agency under Chapter 19.16 RCW. The Customer agrees to pay the collection agency fee incurred by Ecology in the course of debt collection.

Reservation of Rights / No Settlement

This Agreement does not constitute a settlement of liability to the state under MTCA. This Agreement also does not protect a liable person from contribution claims by third parties for matters addressed by the Agreement. The state does not have the authority to settle with any person potentially liable under MTCA except in accordance with RCW 70.105D.040(4). Ecology's signature on this Agreement in no way constitutes a covenant not to sue or a compromise of any Ecology rights or authority.

Ecology reserves all rights under MTCA, including the right to require additional or different remedial actions at the Site should it deem such actions necessary to protect human health and the environment, and to issue orders requiring such remedial actions. Ecology also reserves all rights regarding the injury to, destruction of, or loss of natural resources resulting from the release or threatened release of hazardous substances at the Site.

Effective Date, Modifications, and Severability

The effective date of this Agreement shall be the date on which this Agreement is signed by the Toxics Cleanup Program's Section Manager or delegated representative. This Agreement may be amended by mutual agreement of Ecology and the Customer. Amendments shall be in writing and shall be effective when signed by the Toxics Cleanup Program's Section Manager or delegated representative. If any provision of this Agreement proves to be void, it shall in no way invalidate any other provision of this Agreement.

Termination of Agreement

Either party may terminate this Agreement without cause by sending written notice by U.S. mail to the other party. The effective date of termination shall be the date Ecology sends notice to the Customer or the date Ecology receives notice from the Customer, whichever occurs first. Unless otherwise directed, issuance of a No Further Action opinion, either for the Site as a whole or for a portion of the real property located within the Site, shall constitute notice of termination by Ecology.

Under this Agreement, the Customer is only responsible for costs incurred by Ecology before the effective date of termination. However, termination of this Agreement shall not affect any right Ecology may have to recover its costs under MTCA or any other provision of law.

Representations and Signatures

The undersigned representative of the Customer hereby certifies that he or she is fully authorized to enter into this Agreement and to execute and legally bind the Customer to comply with the Agreement.

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY

Marian L. Abbett

Signature

Marian L. Abbett for Rebecca Lawson

Printed Name

Section Manager, SWRO

Toxics Cleanup Program *Section*

Date: 5/19/20

Federal Way Public Schools

Name of Customer

DocuSigned by:
Michael Swartz
F61817957CB04E4...

Signature

Michael Swartz

Printed Name of Signatory

Capital Projects Director

Title of Signatory

Date: 5/12/2020

If you need this document in an alternative format, please call the Toxics Cleanup Program at 360-407-7170. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.

Enclosure B

Toxics Cleanup Program Policy 840 Data Submittal Requirements

This page intentionally left blank
for double-sided copying.

Toxics Cleanup Program

Policy 840: Data Submittal Requirements

Established: August 1, 2005

Revised: April 12, 2016

Contact: Policy & Technical Support Unit, Headquarters

Purpose: This Policy provides guidance on the submission of environmental monitoring data generated or collected during the investigation or cleanup of contaminated sites under the Model Toxics Control Act.

References: WAC 173-340-840 (5)
Chapter 173-204 WAC
Environmental Information Management System Database
Sediment Cleanup Users Manual II

Attachments: A - Model Grant and Permit Condition

Disclaimer: This Policy is intended solely for the guidance of Ecology staff. It is not intended, and cannot be relied on, to create rights, substantive or procedural, enforceable by any party in litigation with the state of Washington. Ecology may act at variance with this Policy depending on site-specific circumstances, or modify or withdraw this Policy at any time.

Approved by:

James J. Pendowski, Program Manager
Toxics Cleanup Program

Accommodation Requests: To request ADA accommodation, including materials in a format for the visually impaired, call Ecology's Toxics Cleanup Program at 360-407-7170. Persons with impaired hearing may call Washington Relay Service at 711. Persons with speech disability may call TTY at 877-833-6341.

Purpose and Applicability

The investigation and cleanup of contaminated sites generate a large volume of environmental monitoring data that need to be properly managed to facilitate regulatory decisions. The data also need to be accessible by Ecology staff, site owners, consultants, and the general public.

This Policy describes the requirements for submitting environmental monitoring data generated or collected during the investigation and cleanup of contaminated sites under Chapter 70.105D RCW, Model Toxics Control Act (MTCA).

This Policy applies to Ecology staff and any person who investigates or cleans up contaminated sites and submits related environmental sampling data to Ecology, including potentially liable persons, Voluntary Cleanup Program (VCP) customers, prospective purchasers, government agencies, and Ecology contractors.

1. Unless otherwise specified by Ecology, all environmental monitoring data generated during contaminated site investigations and cleanups are required to be submitted to Ecology in both written format and electronically through EIM.

Environmental monitoring data include biological, chemical, physical, and radiological data generated during site investigations and cleanups under the Model Toxics Control Act Cleanup Regulation (Chapter 173-340 WAC) and the Sediment Management Standards (Chapter 173-204 WAC).

The Environmental Information Management System (EIM) is a searchable database that contains data collected by Ecology (or by environmental contractors on behalf of Ecology), and by Ecology grant recipients, local governments, the regulated community, and volunteers.

Under this Policy, data are considered to be "environmental monitoring data" if generated or collected during:

a. Site investigations and cleanups conducted under an order, agreed order or consent decree, permit, grant, loan, contract, interagency agreement, memorandum of understanding; or
b. An independent remedial action.

Under this Policy, data are not considered to be environmental monitoring data if generated or collected for the following studies. This means that entering data into EIM, while encouraged, is optional for:

a. Non site-specific studies;
b. Site hazard assessments that result in no further action; and
c. All initial site investigations.

2. Orders, agreed orders, consent decrees, or permits must include a condition that site-specific environmental sampling data be submitted in compliance with this Policy.

For those reports prepared and submitted for review under an order, agreed order, consent decree, or permit, the environmental sampling data must be entered into EIM at the time of report submittal. If reports for such work do not include documentation that data was submitted in compliance with this Policy, the reports shall be deemed incomplete and a notice will be provided to the submitter.

Generally, Ecology should not review such reports until that documentation is provided. The assistant attorney general assigned to the site should be consulted for an appropriate response when Ecology's review is delayed due to failure of data entry into EIM.

3. Site-specific environmental sampling data must be entered into EIM before Ecology will review independent remedial action reports under the Voluntary Cleanup Program.

For independent remedial action reports prepared and submitted under Ecology's Voluntary Cleanup Program (VCP), environmental sampling data must be entered into EIM at the time any report is submitted requesting an opinion on the sufficiency of the action under the VCP.

However, Ecology may establish an alternate deadline for entering data into EIM if this Policy creates undue hardship on the VCP customer and Ecology does not need the data in EIM to begin the review.[1] But in no case will Ecology issue a No Further Action (NFA) opinion letter under the VCP—either for the whole site or a property located within the site—until the data has been entered into EIM.

If sampling data has not been entered into EIM, Ecology may still review the report for the limited purpose of determining whether it contains sufficient information to provide an opinion. If the report is incomplete, Ecology may also respond to the VCP customer's request for an opinion by issuing an administrative letter rejecting the report and requesting additional information.

[1] For example, when a site has multiple groundwater sampling events over time, it may be more efficient to enter the data into EIM at one time after monitoring is completed, rather than for each monitoring event. Another example would be where a VCP consultant is using EIM for the first time and needs additional time to learn how to use the system.

4. Grants, contracts, interagency agreements or memoranda of understanding issued after the effective date of this Policy must include a condition that site-specific data be submitted in compliance with this Policy.

Reports on such work will not be accepted as complete until the data have been submitted in compliance with this Policy. If a payment or transfer of funds is involved in the transaction, the relevant payment or transfer shall be withheld until this requirement has been met. Attachment A contains example language to include in these documents.

5. Data generated during upland investigations and cleanups must be submitted electronically using Ecology's EIM.

The Environmental Information Management System is Ecology's main database for environmental monitoring data. Proper submission of data through this system meets the requirement of submitting such data in an electronic format.

Additional information about EIM, including instructions for data submittal, can be found on Ecology's EIM website at http://www.ecy.wa.gov/eim/. The Toxic Cleanup Program's (TCP) EIM Coordinator can also provide technical assistance to site managers and consultants who use EIM.

6. Data generated during sediment investigations and cleanups must be submitted electronically using Ecology's EIM.

Effective March 1, 2008, EIM is Ecology's data management system for sediment-related data. Proper submission of data through EIM meets the requirement of submitting such data in an electronic format. Electronic data must be submitted to Ecology simultaneously with the accompanying report.

For additional information on sediment sampling and analysis plan requirements, see Ecology's *Sediment Cleanup Users Manual (SCUM II)* Publication No. 12-09-057, available at: https://fortress.wa.gov/ecy/publications/summarypages/1209057.html

The Sediment Data Coordinator in TCP's Aquatic Land Cleanup Unit (ALCU) can also provide technical assistance with EIM.

7. Data submitted electronically using EIM must be checked by the Toxics Cleanup Program's EIM Coordinator before the data will be officially loaded into EIM.

Normally, TCP's EIM Coordinator will receive a notice that data have been submitted through EIM. Upon receipt of the notice, the EIM Coordinator should notify the Cleanup Project Manager. The EIM Coordinator then reviews the submittal for quality control and officially loads the data into the system.

Attachment A

Model Grant and Permit Condition

This page left intentionally blank.

Model Grant and Permit Condition

The following condition is to be inserted in grants, loans, contracts, interagency agreements, and memoranda of understandings where site-specific environmental monitoring data is expected to be generated:

> All sampling data shall be submitted to Ecology in both printed and electronic formats in accordance with WAC 173-340-840(5) and Ecology Toxics Cleanup Program Policy 840: Data Submittal Requirements. Electronic submittal of data is not required for site hazard assessments that result in no further action and initial site investigations. (FOR GRANTS, AND LOANS ADD: Failure to properly submit sampling data will result in Ecology withholding payment and could jeopardize future funding.)

This page left intentionally blank.

Electronic Copy

STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
PO Box 47775 • Olympia, Washington 98504-7775 • 360-407-6300
Call 711 for Washington Relay Service • Persons with a speech disability can call 877-833-6341

July 6, 2020

Michael Swartz, Capital Projects Director
Federal Way Public Schools
33330 8th Avenue South
Federal Way, WA 98003
mswartz@fwps.org

Re: Opinion on the Proposed Cleanup of a Property associated with the Asarco Tacoma Smelter Site

- **Property Name:** Star Lake Elementary
- **Property Address:** 4014 S 270th St S and 26630 40th Ave S, Kent, King County WA 98032
- **Facility/Site ID:** 7890
- **Cleanup Site ID:** 13055
- **VCP Project No.:** NW3271

Dear Michael Swartz:

The Washington State Department of Ecology (Ecology) received your request for an opinion on your proposed independent cleanup of a Property associated with the Asarco Tacoma Smelter Site (Asarco Site). This letter provides our opinion. We are providing this opinion under the authority of the Model Toxics Control Act (MTCA),[1] chapter 70.105D Revised Code of Washington (RCW).

Issues Presented and Opinion

Ecology has determined that no further remedial action will likely be necessary at the Property to clean up contamination associated with the Asarco Site.

Ecology has determined that further remedial action will likely still be necessary elsewhere at the Asarco Site, but no further remediation will be necessary for the Property.

This opinion is based on an analysis of whether the remedial action meets the substantive requirements of MTCA, chapter 70.105D RCW, and its implementing regulations, Washington Administrative Code (WAC) chapter 173-340 (collectively "substantive requirements of MTCA"). The analysis is provided below.

[1] https://app.leg.wa.gov/RCW/default.aspx?cite=70.105D.

Description of the Property and the Asarco Site

This opinion applies only to the Property described below within Asarco Site. This opinion does not apply to any other sites that may affect the Property. Any such sites, if known, are identified separately below.

1. Description of the Property.

The Property includes the following tax parcels in King County, which were affected by the Asarco Site and will be addressed by your cleanup:

- 2722049112 (7.89 acres).
- 2722049152 (20.2 acres).

Enclosure A includes a legal description of the Property and details of the Property as currently known to Ecology.

2. Description of the Asarco Site.

The Asarco Site is defined by the nature and extent of contamination associated with the following releases:

- Arsenic into the Soil.
- Lead into the Soil.

Those releases have affected more than one parcel of real property, including the parcels identified above.

Enclosure B includes a detailed description and diagram of the Asarco Site, as currently known to Ecology.

3. Identification of Other Sites that may affect the Property.

A parcel of real property can be affected by multiple sites. At this time, we have no information that the Property is affected by other sites.

Basis for the Opinion

This opinion is based on the information contained in the following documents:

1. PBS Engineering and Environmental (PBS), *Remedial Action Work Plan for Tacoma Smelter Plume Impact Star Lake Elementary School, 4014 S 270th Street, Kent Washington*, May 4, 2020.

2. PBS, *Star Lake Elementary School – Arsenic and Lead Soil Sampling*, February 14, 2020.

3. Kent Economic and Community Development, *Mitigated Determination of Nonsignificance*, June 25, 2019.

4. PBS, *Totem Middle School – Arsenic and Lead Soil Sampling*, November 30, 2018.

5. Ecology, *Initial Investigation: No Further Action (NFA) Determination Star Lake Elementary, 4014 @ 270th St, Kent, WA 98032, Facility Site ID: 7890, Cleanup Site ID: 13055.* June 9, 2016.

These documents are kept in the Central Files of the Southwest Regional Office of Ecology (SWRO) for review by appointment only. Information on viewing these records can be found on Ecology's public records requests web page.[2] Some site documents may be available on Ecology's Cleanup Site Search web page[3].

This opinion is void if any of the information contained in those documents is materially false or misleading.

Analysis of the Cleanup

1. Cleanup of the Property located within the Asarco Site.

Ecology has concluded that, upon completion of your proposed cleanup, **no further remedial action** will likely be necessary at the Property to clean up contamination associated with the Asarco Site. That conclusion is based on the following analysis:

a. Characterization of the Asarco Site.

The Asarco Site is described in **Enclosure B**.

Star Lake Elementary School is located east of the Interstate 5 in a residential area of Kent, Washington (Figure 1). The school is situated on one King County parcel that encompasses 7.89 acres. The Star Lake Elementary School is bordered to the west by 40th Avenue South, to the south by South 270th Street (Figure1), and to the north by Totem Middle School. Federal Way Public Schools (FWPS) plan to redevelop this school.

[2] https://ecology.wa.gov/About-us/Accountability-transparency/Public-records-requests.
[3] https://apps.ecology.wa.gov/gsp/Sitepage.aspx?csid=13055.

They plan to construct a new building that will combine two schools: the Star Lake Elementary school and the Totem Middle school. The Totem Middle school is situated on one King County parcel that encompasses 20.2 acres. The Star Lake Elementary and the Totem Middle schools will be referred in this opinion letter as the Property.

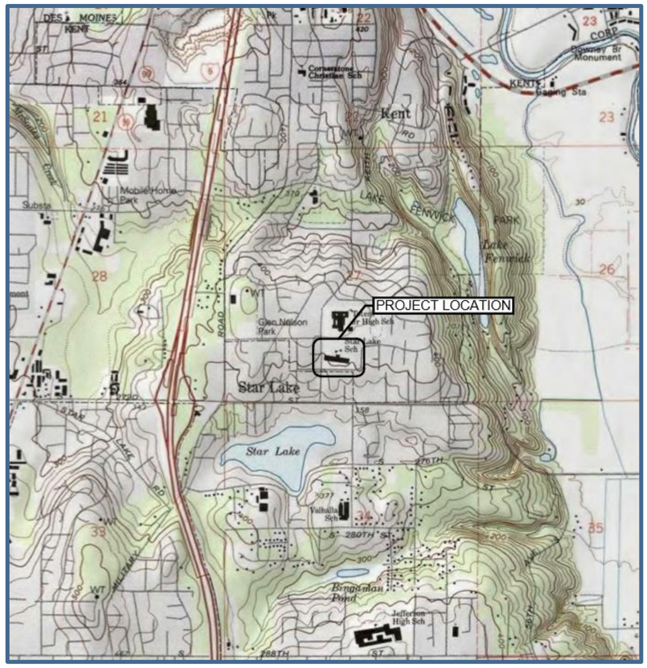


Figure 1. Vicinity map

The new school building will be situated between the two existing schools, which will be demolished once the new school is built. FWPS will retain the existing athletic fields, but will improve current parking, landscaping, and stormwater facilities on the Property.

As part of the planned redevelopment, FWPS contracted PBS to characterize the Tacoma Smelter Plume contamination on the Property. On November 5, 2018, PBS collected 60 discrete soil samples from 48 sampling locations within the Star Lake Elementary School (Figure 2). They collected 48 soil samples from 0 to 6 inches below ground surface (bgs) and 12 soil samples from 6 to 12 inches bgs.

On November 6, 2018, PBS collected 75 discrete samples from 61 locations within the Totem Middle School. They collected 61 samples from 0 to 6 inches bgs and 14 samples from 6 to 12 inches bgs.

PBS submitted all the samples to Friedman & Bruya Inc. laboratory in Seattle, WA for arsenic and lead analysis with Environmental Protection Agency (EPA) Method 6020B.

There have been previous partial characterization events at the Star Lake Elementary school. Ecology sampled children play areas at the Star Lake Elementary School in 2003 as part of the Soil Safety Program (SSP) with Ecology. Ecology found elevated arsenic concentrations in several play areas and consequently conducted remedial action in those areas. The remedial action consisted of removing the top six inches of contaminated soil and replacing it with clean soil or a layer of wood chips. For more information on the SSP cleanup action, refer to Enclosure D.

On behalf of Ecology, GeoEngineers collected additional soil samples north of the SSP cleanup action in May 2007 to identify more play areas needing cleanup actions. They collected nine soil samples from 0 to 6 inches bgs (Figure 2).

The concentrations of arsenic and lead were below the MTCA Method A cleanup level of 20 milligrams per kilogram (mg/kg) for arsenic and 250 mg/kg for lead. Ecology determined that no remedial actions were necessary in the play areas sampled.

The results of the 2007 soil sampling were included in calculating the average concentrations for arsenic and lead on the Property.

Altogether, 118 samples were collected from 0 to 6 inches bgs and 26 samples from 6 to 12 inches bgs. For a summary of sampling results, refer to Table 1. For the comprehensive results of the characterization sampling on the Property, refer to Enclosure C.

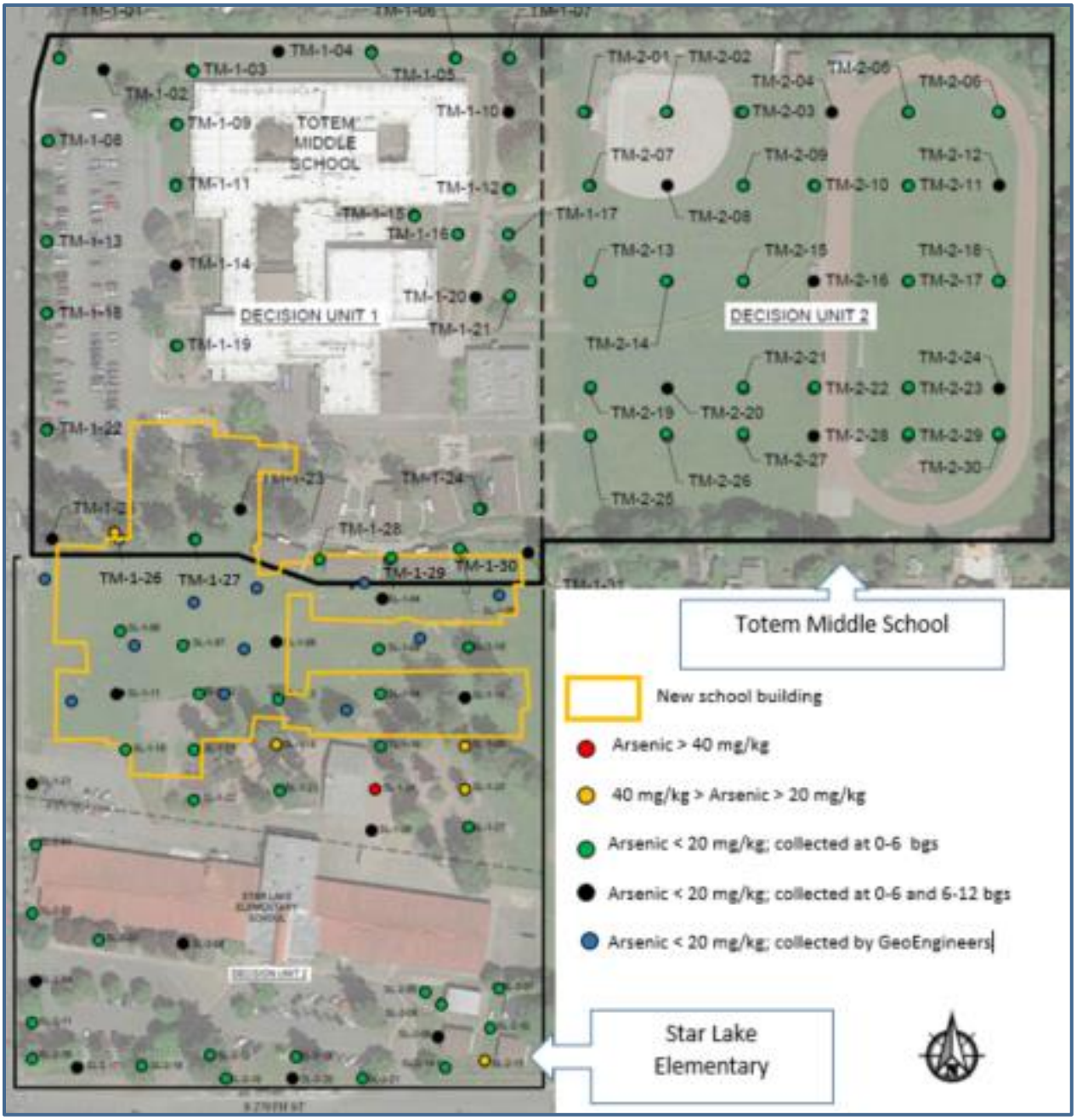


Figure 2. Approximate locations of soil samples.

Results of Soil Sampling

Samples collected at 0 to 6 inches bgs: Arsenic exceeded the MTCA Method A cleanup level of 20 (mg/kg) in six samples, with one exceeding the maximum allowable concentration for a single soil sample (40 mg/kg). Arsenic concentrations ranged from 1.91 mg/kg to 72.7 mg/kg. The average arsenic concentration was 8.99 mg/kg. None of the lead concentrations exceeded the MTCA Method A cleanup level of 250 mg/kg for lead. Lead concentrations ranged from 3.53 mg/kg to 122 mg/kg. The average lead concentration was 16.43 mg/kg (Table 1 and Enclosure C).

Samples collected at 6 to 12 inches bgs: None of the soil samples exceeded the cleanup level of 20 mg/kg for arsenic. The arsenic concentrations ranged from 2.23 mg/kg to 13.8 mg/kg. The average arsenic concentration was 7.63 mg/kg. None of the lead concentrations in this depth interval exceeded the cleanup level of 250 mg/kg for lead. Lead concentrations ranged from 2.54 mg/kg to 42.5 mg/kg. The average lead concentration was 13.8 mg/kg.

Table 1. Summary of the 2008 and 2018 characterization sampling on the Property

	Arsenic (mg/kg)			Lead (mg/kg)		
Depth (inches)	**Minimum**	**Maximum**	**Average**	**Minimum**	**Maximum**	**Average**
0-6	1.91	**72.7**	8.99	3.53	122	16.43
6-12	2.23	13.8	7.63	2.54	42.5	13.08
MTCA Cleanup Level		40	20		500	250

Bold values represent concentrations above the MTCA Method A cleanup level.
Bold red values represent concentrations twice the MTCA Method A cleanup level

In October 2019, PBS conducted supplemental soil sampling to delineate the extent of arsenic and lead concentrations in two tree retention areas that exceeded the cleanup levels of 20 mg/kg for arsenic. PBS sampled five additional samples from 0 to 6 inches bgs in the vicinity of the three trees in the tree retention area (Figure 3). Two samples exceeded the cleanup level of 20 mg/kg, but none exceeded the maximum allowable concentration for a single soil sample of 40 mg/kg. All the lead concentrations were below the cleanup level of 250 mg/kg (Table 2).

Table 2. Supplemental soil sampling

Supplemental Samples Surrounding Trees 2575, 2578, and 2579					
Sample ID	**Sample Location**	**Sample Date**	**Sample Depth (inches)**	**Arsenic (mg/kg)**	**Lead (mg/kg)**
SL-1-28a	35' NW of 2575, 32' W of 2578	10/31/2019	0-6	3.25	6.10
SL-1-29a	25' N of 2575, 8' W of 2578	10/31/2019	0-6	7.55	6.88
SL-1-30a	16' E of 2578, 15' W of 2579	10/31/2019	0-6	**24.5**	51.6
SL-1-31a	50' E of 2579	10/31/2019	0-6	**24.9**	49.6
SL-1-32a	40' NW of 2575, 40' W of 2578	10/31/2019	0-6	8.41	5.75
MTCA Cleanup Level				40	500

Bold values represent concentrations above the MTCA Method A cleanup level.

In August 2015, two underground storage tanks were removed from the school's property. The contaminated soil detected after the removal of tanks was excavated and disposed off-Property. The Star Lake Elementary School obtained an NFA determination from Ecology on June 9, 2016, under a Facility Site ID 7890.

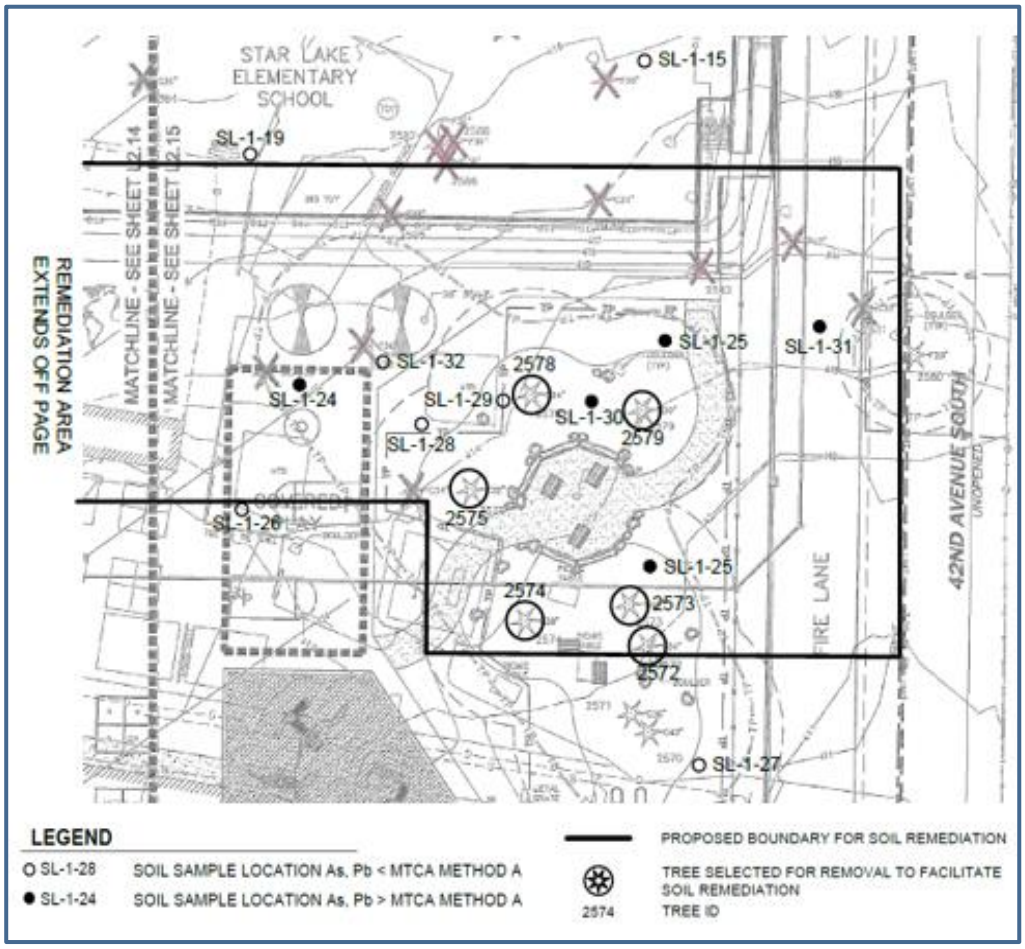


Figure 3. Supplemental soil sampling in the tree retention areas

b. Establishment of Cleanup Standards for the Asarco Site.

Ecology has determined the cleanup levels and points of compliance established for the Asarco Site will likely meet the substantive requirements of MTCA.

As part of the Interim Action Plan for the Asarco Tacoma Smelter Site (June 2012) (IAP), Ecology completed a terrestrial ecological evaluation for properties with only Tacoma Smelter Plume contamination. Ecology determined the MTCA Method A cleanup levels for both arsenic and lead were protective of both human health and the environment. The MTCA Method A cleanup levels for soil are as follows:

- Arsenic is 20 mg/kg.
- Lead is 250 mg/kg.

The IAP determined that the soil and duff cleanup levels are protective of human health and the environment for properties within the Asarco Tacoma Smelter Site are the following:

- Average arsenic detected in the soil is less than 20 mg/kg.
- Average lead detected in the soil is less than 250 mg/kg.
- Duff composite sample is less than 20 mg/kg for arsenic.
- Duff composite sample is less than 250 mg/kg for lead.
- No single soil sample has arsenic above 40 mg/kg.
- No single soil sample has lead above 500 mg/kg.

c. Selection of Cleanup for the Property.

Ecology has determined the cleanup you proposed for the Property will likely meet the substantive requirements of MTCA and the IAP. Your proposed cleanup meets the minimum cleanup requirements and will not exacerbate conditions or preclude reasonable cleanup alternatives elsewhere at the Asarco Site.

Ecology proposed four model remedies in the IAP:

- Excavation and removal.
- Mixing.
- Capping in place.
- Consolidation and capping.

FWPS decided to use mixing on the Property.

Property Cleanup: FWPS will conduct the soil cleanup at the Property in conjunction with its redevelopment. On May 4, 2020, on behalf of FWPS, PBS developed a Cleanup Action Plan (CAP). The CAP described the use the selected model remedy—mixing as a way to remediate the contamination associated with the Tacoma Smelter Plume on the Property. Ecology based this opinion letter on the information provided in this CAP.

The average arsenic concentration on the Property was below the cleanup level of 20 mg/kg. All lead concentrations were below cleanup level. Only one location on the Property exceed the maximum allowable concentration for a single soil sample for arsenic (40 mg/kg), requiring cleanup. FWPS, however, decided to remediate all the areas that exceeded the MTCA Method A cleanup level of 20 mg/kg for arsenic because of the future use of the areas by children.

PBS divided the Property into three remedial areas encompassing all the six locations that exceeded the MTCA Method A cleanup level of 20 mg/kg for arsenic (Figure 4). The contractor, Iliad, Inc., will mix the soil in place to a depth of at least six inches bgs. All the arsenic concentrations in the 6 to 12 inches bgs depth interval were below the cleanup level of 20 mg/kg for arsenic. The total area of soil mixing is approximately 1.5 acres. The contractor will mix the soil in place in the three remedial areas as follows:

Remedial area 1: The average arsenic in this area was 24.1 mg/kg; the contractor will mix soil in place to a depth of 12 inches bgs.

Remedial area 2: The average arsenic in this area was 18.2 mg/kg; the contractor will mix the soil in place to a depth of 6 inches bgs.

Remedial area 3: The average arsenic in this area was 12.9 mg/kg; the contractor will mix the soil in place to a depth of 6 inches bgs.

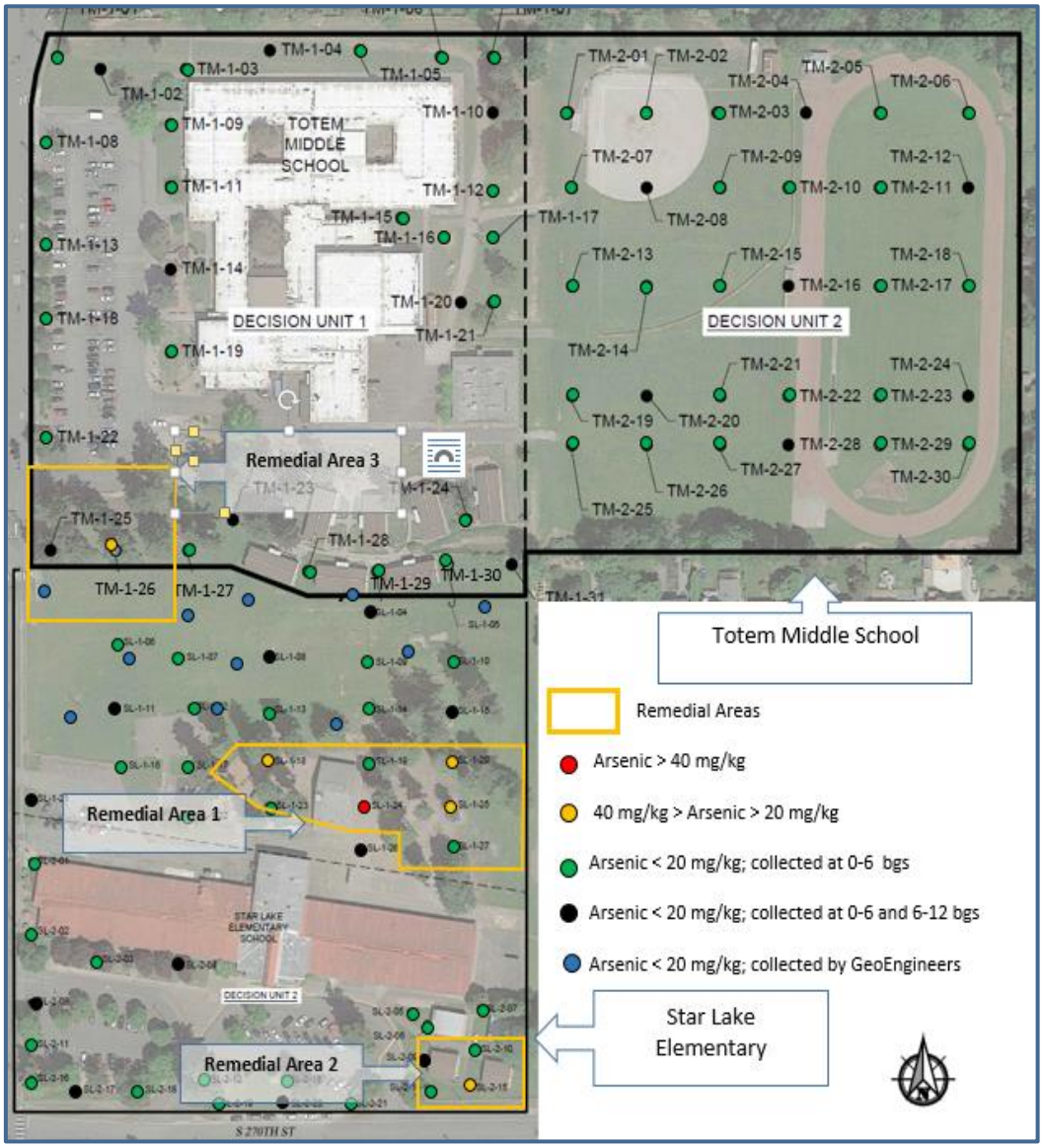


Figure 4. Proposed remedial areas

Confirmational Sampling: PBS will conduct confirmational sampling following soil mixing in three remedial areas. They will collect confirmational soil samples at six-inch depth intervals throughout the mixing depth. They will collect:

In Remedial area 1: This area is approximately 1.25 acres. PBS will collect 16 samples at 0 to 6 inches bgs and 16 samples at 6 to 12 inches bgs.

In Remedial area 2: This area is approximately 0.25 acres. PBS will collect 8 samples at 0 to 6 inches bgs.

In Remedial area 3: This area is approximately 1 acre. PBS will collect 16 samples at 0 to 6 inches bgs.

PBS will submit the samples to an analytical laboratory for an analysis of arsenic concentrations. All the lead concentrations were below the cleanup level 250 mg/kg, therefore no analysis is needed for lead.

If the confirmational soil sampling and analysis shows the average arsenic exceeding 20 mg/kg or any single soil sample exceeding 40 mg/kg, the contractor will conduct additional soil mixing. PBS will conduct additional confirmational sampling and analysis as described above.

As a reminder, in accordance with WAC 173-340-840(5) and Ecology Toxics Cleanup Program Policy 840[4] (Data Submittal Requirements), data generated for Independent Remedial Actions shall be submitted simultaneously in both a written and electronic format. For additional information regarding electronic format requirements, see the website http://www.ecy.wa.gov/eim.

Be advised that according to the policy, any reports containing sampling data that are submitted for Ecology review are considered incomplete until the electronic data has been entered. Please ensure that data generated during on-site activities is submitted pursuant to this policy.

Data must be submitted to Ecology in this format for Ecology to issue a No Further Action determination. Please be sure to submit all soil data collected to date, as well as any future data, in this format. Be advised that Ecology requires up to two weeks to process the data once it is received.

2. Cleanup of the Asarco Site as a Whole.

Ecology has concluded that **further remedial action** will still be necessary elsewhere within the ASARCO Site (Asarco Tacoma Smelter Site) upon completion of your proposed cleanup. In other words, while your proposed cleanup may constitute the final action for the Property, it will constitute only an **"interim action"** for the Asarco Site as a whole.

[4] https://fortress.wa.gov/ecy/publications/SummaryPages/1609050.html.

Limitations of the Opinion

1. Opinion does not Settle Liability with the State.

Liable persons are strictly liable, jointly and severally, for all remedial action costs and for all natural resource damages resulting from the release or releases of hazardous substances at the Property. This opinion **does not**:

- Change the boundaries of the Asarco Site.
- Resolve or alter a person's liability to the state.
- Protect liable persons from contribution claims by third parties.

To settle liability with the state and obtain protection from contribution claims, a person must enter into a consent decree with Ecology under RCW 70.105D.040(4).

2. Opinion does not Constitute a Determination of Substantial Equivalence.

To recover remedial action costs from other liable persons under MTCA, one must demonstrate that the action is the substantial equivalent of an Ecology-conducted or Ecology-supervised action. This opinion does not determine whether the action you performed is substantially equivalent. Courts make that determination.
See RCW 70.105D.080 and WAC 173-340-545.

3. Opinion is Limited to Proposed Cleanup.

This letter does not provide an opinion on whether further remedial action will actually be necessary at the Property upon completion of your proposed cleanup. To obtain such an opinion, you must submit a report to Ecology upon completion of your cleanup and request an opinion under the Voluntary Cleanup Program (VCP).

4. State is Immune from Liability.

The state, Ecology, and its officers and employees are immune from all liability, and no cause of action of any nature may arise from any act or omission in providing this opinion. *See* RCW 70.105D.180.

Contact Information

Thank you for choosing to clean up your Property under the VCP. As you conduct your cleanup, please do not hesitate to request additional services. We look forward to working with you.

For more information about the VCP and the cleanup process, please visit our website: Voluntary Cleanup Program.[5] If you have any questions about this opinion, please contact me by phone at (360) 407-7094 or by e-mail at eva.barber@ecy.wa.gov.

Sincerely,

Eva Barber
Technical Assistance Coordinator
Toxics Cleanup Program
Southwest Regional Office

EB/tm

Enclosures:
A – Legal Description and General Description of the Property
B – Site Description of the Asarco Tacoma Smelter Site
C – Results of the Soil Characterization Sampling on the Property
D – Soil Safety Program Cleanup Action at Star Lake Elementary

cc by email:
James Welles, PBS Engineering and Environmental, james.welles@pbsusa.com
Sally McLean, Federal Way Public Schools, smclean@fwps.org
David Dorland, Iliad, david@iliadnw.com
Jannine McDonald, Federal Way Public Schools, jmcdonald@fwps.org
Amy Jankowiak, WQ – NWRO, amy.jankowiak@ecy.wa.gov
Mathew Kwartin, WQ – NWRO, mathew.kwartin@ecy.wa.gov
Nick Acklam, Ecology, nicholas.acklam@ecy.wa.gov
Connie Groven, Ecology, connie.groven@ecy.wa.gov
Ecology Site File

[5] http://www.ecy.wa.gov/vcp.

Enclosure A

Legal Description and General Description of the Property

This page intentionally left blank
for double-sided copying.

Legal Description of the Property

Parcel 2722049112: LOTS "Y" AND "Z" CITY OF KENT LOT LINE ADJUSTMENT NO LL-2010-5 RECORDING NO 20100922900001 (BEING A PORTION OF SW QTR AND SE QTR STR 27-22-04)

Parcel 2722049152: LOT "X" CITY OF KENT LOT LINE ADJUSTMENT NO LL-2010-5 RECORDING NO 20100922900001 (BEING A PORTION OF SW QTR AND SE QTR STR 27-22-04)

General Description of the Property

Star Lake Elementary School is located east of the Interstate 5 in a residential area of Kent, Washington. The Property consists of two schools that are situated on two King County parcels that encompass 28 acres. The Property is bordered to the north and east by residential properties, to the west by 40th Avenue South and to the south by South 270th Street. The existing Star Lake Elementary School was built in 1957, while the Totem Middle School was built in 1964.

The dominant geological feature of the landscape in this portion of King County is Vashon till (Pleistocene). The Vashon till is made up of predominantly fine-grained deposits consisting of unsorted and unstratified glacial sediments from clay to boulder in size that vary in compaction and composition throughout Puget Sound (Booth, 2004).

Based on surface topography, the likely direction of groundwater flow is interpreted to be south, following the Property and surrounding area topographic slope.

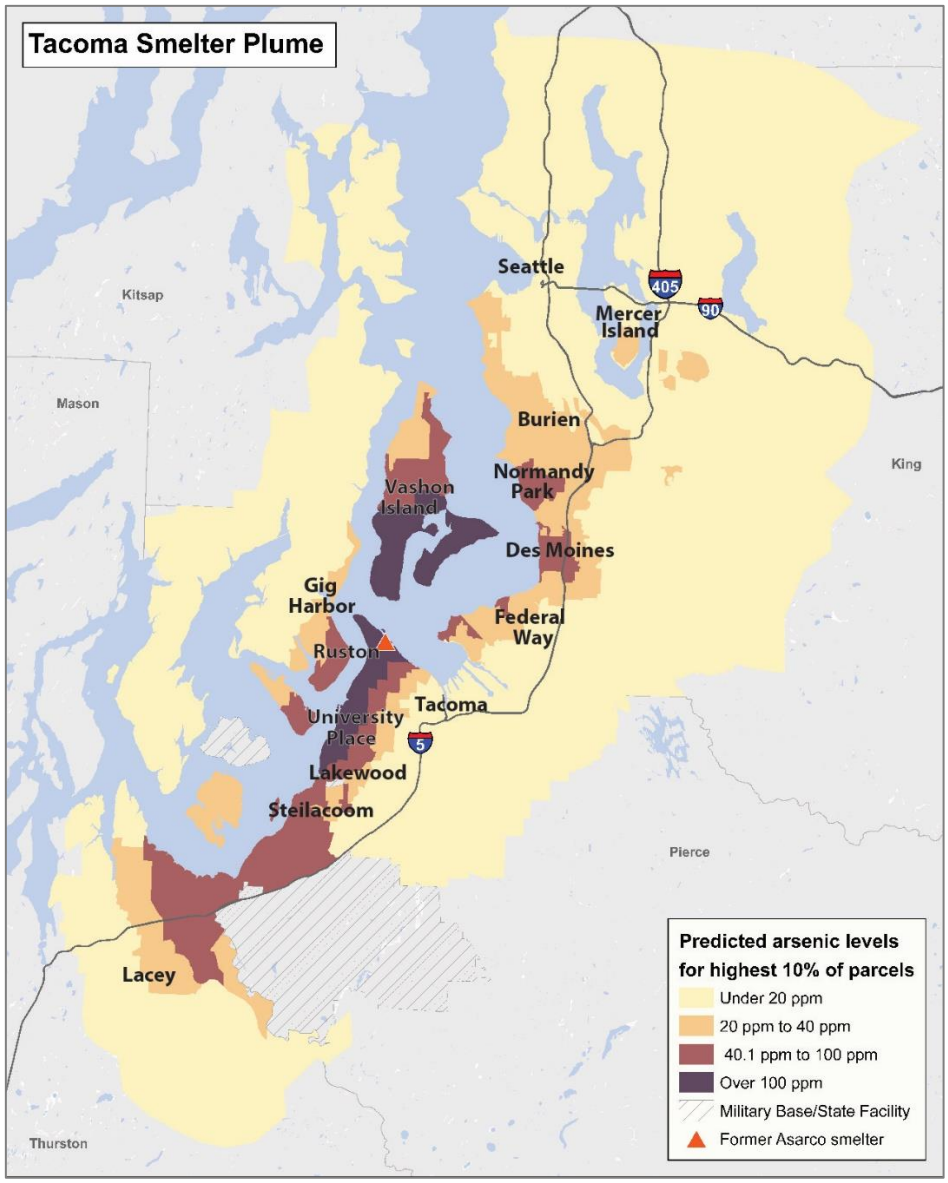
This page intentionally left blank
for double-sided copying.

Enclosure B

Site Description of the Asarco Tacoma Smelter Site

This page intentionally left blank
for double-sided copying.

Asarco Tacoma Smelter Site



An interactive color map can be found at: https://dirtalert.info/

For almost 100 years, the Asarco Company operated a copper smelter in Tacoma. Air pollution from the smelter settled on the surface soil over a vast region—more than 1,000 square miles of the Puget Sound basin. Elevated levels of contamination are found as far south as the Nisqually Ridge and as far north as Seattle (West Seattle). Additionally, elevated levels of contamination are found as far west as the Kitsap Peninsula and as far east as Kent and Bellevue. Arsenic, lead, cadmium, and other heavy metals are still in the soil as a result of this pollution. The area has elevated levels of arsenic, lead, and cadmium in the soil due to air emissions from the Asarco smelter.

This page intentionally left blank
for double-sided copying.

Enclosure C

Results of the Soil Characterization on the Property

This page intentionally left blank
for double-sided copying.

Results of the Soil Characterization on the Property

Sample No.	Sample Date	Sample Depth (inches)	Arsenic (mg/kg)	Lead (mg/kg)
1	5/30/2007	0-6	9	16
2	5/30/2007	0-6	9.4	16
3	5/30/2007	0-6	7.7	13
4	5/30/2007	0-6	13	29
5	5/30/2007	0-6	13	30
6	5/30/2007	0-6	8.7	14
7	5/30/2007	0-6	4.9	4.8
8	5/30/2007	0-6	17	42
9	5/30/2007	0-6	6.9	9.1
SL1-01	11/5/2018	0-6	6.37	8.35
SL1-02	11/5/2018	0-6	6.21	6.61
SL1-03	11/5/2018	0-6	4.73	5.32
SL1-04a	11/5/2018	0-6	7.43	7.09
SL1-05	11/5/2018	0-6	4.73	4.86
SL1-06	11/5/2018	0-6	6.96	10.8
SL1-07	11/5/2018	0-6	6.33	10.8
SL1-08a	11/5/2018	0-6	7.45	10.2
SL1-09	11/5/2018	0-6	8.31	17.2
SL1-10	11/5/2018	0-6	17	28.7
SL1-11a	11/5/2018	0-6	13.2	23.2
SL1-12	11/5/2018	0-6	13.8	17.5
SL1-13	11/5/2018	0-6	5.64	19.4
SL1-14	11/5/2018	0-6	5.66	21.3
SL1-15a	11/5/2018	0-6	4.99	16.9
SL1-16	11/5/2018	0-6	10.6	12.2
SL1-17	11/5/2018	0-6	6.49	18.8
SL1-18a	11/5/2018	0-6	**26.6**	11.3
SL1-19	11/5/2018	0-6	7.84	21.8
SL1-20	11/5/2018	0-6	**22.6**	51.1
SL1-21a	11/5/2018	0-6	12.5	27.4
SL1-22	11/5/2018	0-6	5.83	18.2
SL1-23	11/5/2018	0-6	7.69	17.6
SL1-24	11/5/2018	0-6	**72.7**	122
SL1-25	11/5/2018	0-6	**25.1**	39.8
SL1-26a	11/5/2018	0-6	9.38	17.3
SL1-27	11/5/2018	0-6	12.5	21
SL2-01	11/5/2018	0-6	5.9	19.4
SL2-02	11/5/2018	0-6	6.7	12.1
SL2-03	11/5/2018	0-6	5.1	10.2
SL2-04a	11/5/2018	0-6	11.4	15.5
SL2-05	11/5/2018	0-6	15.4	29.2

Sample No.	Sample Date	Sample Depth (inches)	Arsenic (mg/kg)	Lead (mg/kg)
SL2-06	11/5/2018	0-6	11.5	18.4
SL2-07	11/5/2018	0-6	4.73	5.98
SL2-08a	11/5/2018	0-6	4.96	13.4
SL2-09a	11/5/2018	0-6	13.5	27.8
SL2-10	11/5/2018	0-6	19.1	26.8
SL2-11	11/5/2018	0-6	5.58	9.42
SL2-12	11/5/2018	0-6	17.5	15.7
SL2-13	11/5/2018	0-6	8.11	21.1
SL2-14	11/5/2018	0-6	17.50	35.6
SL2-15	11/5/2018	0-6	**22.6**	29.2
SL2-16	11/5/2018	0-6	9.33	11.9
SL2-17a	11/5/2018	0-6	4.53	8.7
SL2-18	11/5/2018	0-6	4.7	13
SL2-19	11/5/2018	0-6	5.93	10.6
SL2-20	11/5/2018	0-6	6.32	7.84
SL2-21	11/5/2018	0-6	8.23	13.4
TM1-01	11/6/2018	0-6	11.4	17.4
TM1-02a	11/6/2018	0-6	13.6	25.7
TM1-03	11/6/2018	0-6	7.1	11.1
TM1-04	11/6/2018	0-6	6.67	9.7
TM1-05	11/6/2018	0-6	9.21	21.3
TM1-06	11/6/2018	0-6	6.5	17.1
TM1-07	11/6/2018	0-6	11.4	15.9
TM1-08	11/6/2018	0-6	6.51	19.9
TM1-09	11/6/2018	0-6	10	26.3
TM1-10a	11/6/2018	0-6	13.5	20.7
TM1-11	11/6/2018	0-6	9.78	20.3
TM1-12	11/6/2018	0-6	7.71	14.0
TM1-13	11/6/2018	0-6	4.6	15.2
TM1-14a	11/6/2018	0-6	8.98	20.6
TM1-15	11/6/2018	0-6	8.99	18.6
TM1-16	11/6/2018	0-6	3.92	7.5
TM1-17	11/6/2018	0-6	6.09	10.8
TM1-18	11/6/2018	0-6	5.7	17.4
TM1-19	11/6/2018	0-6	8.78	20.3
TM1-20a	11/6/2018	0-6	6.42	15.6
TM1-21	11/6/2018	0-6	13.5	20
TM1-22	11/6/2018	0-6	4.78	12.5
TM1-23a	11/6/2018	0-6	8.99	24.8
TM1-24	11/6/2018	0-6	4.53	9.2
TM1-25a	11/6/2018	0-6	16.1	61.8
TM1-26	11/6/2018	0-6	**26**	48.8
TM1-27	11/6/2018	0-6	4.67	5.9
TM1-28	11/6/2018	0-6	5.66	5.4

Sample No.	Sample Date	Sample Depth (inches)	Arsenic (mg/kg)	Lead (mg/kg)
TM1-29	11/6/2018	0-6	5.82	8.7
TM1-30	11/6/2018	0-6	7.84	11
TM1-31a	11/6/2018	0-6	5.96	12.1
TM2-01	11/6/2018	0-6	11.3	17.3
TM2-02	11/6/2018	0-6	11.5	16.4
TM2-03	11/6/2018	0-6	5.4	11.9
TM2-04a	11/6/2018	0-6	2.70	4.18
TM2-05	11/6/2018	0-6	7.95	6.25
TM2-06	11/6/2018	0-6	3.53	4.69
TM2-07	11/6/2018	0-6	5.98	9.75
TM2-08a	11/6/2018	0-6	11.1	15.6
TM2-09	11/6/2018	0-6	5.87	9.89
TM2-10	11/6/2018	0-6	6.45	11.1
TM2-11	11/6/2018	0-6	3.22	5.57
TM2-12a	11/6/2018	0-6	3.58	7.56
TM2-13	11/6/2018	0-6	5.79	12.3
TM2-14	11/6/2018	0-6	4.58	10.2
TM2-15	11/6/2018	0-6	2.76	3.53
TM2-16a	11/6/2018	0-6	4.50	7.39
TM2-17	11/6/2018	0-6	2.49	5.11
TM2-18	11/6/2018	0-6	2.11	3.75
TM2-19	11/6/2018	0-6	4.58	10.4
TM2-20a	11/6/2018	0-6	3.61	8.33
TM2-21	11/6/2018	0-6	4.50	8.73
TM2-22	11/6/2018	0-6	6.28	9.91
TM2-23	11/6/2018	0-6	1.91	4.42
TM2-24a	11/6/2018	0-6	3.19	5.93
TM2-25	11/6/2018	0-6	3.50	8.50
TM2-26	11/6/2018	0-6	4.69	5.36
TM2-27	11/6/2018	0-6	4.65	10.7
TM2-28a	11/6/2018	0-6	7.59	11.9
TM2-29	11/6/2018	0-6	3.75	6.83
TM2-30	11/6/2018	0-6	4.26	3.68
TM2-24b	11/6/2018	6-12	2.23	2.54
TM2-12b	11/6/2018	6-12	2.78	2.90
SL1-26b	11/5/2018	6-12	4.13	3.9
SL1-04b	11/5/2018	6-12	4.36	4.9
SL1-08b	11/5/2018	6-12	5.39	4.9
SL1-18b	11/5/2018	6-12	6.88	5.4
TM2-16b	11/6/2018	6-12	5.38	5.67
TM2-04b	11/6/2018	6-12	7.19	6.55
TM2-20b	11/6/2018	6-12	4.28	6.63
SL2-17b	11/5/2018	6-12	3.77	7.6
TM1-31b	11/6/2018	6-12	5.51	8.7
SL2-08b	11/5/2018	6-12	5.57	9.66

Sample No.	Sample Date	Sample Depth (inches)	Arsenic (mg/kg)	Lead (mg/kg)
SL1-21b	11/5/2018	6-12	6.5	11.3
TM2-28b	11/6/2018	6-12	9.41	11.4
SL2-20b	11/5/2018	6-12	9.95	13.1
TM2-08b	11/6/2018	6-12	10.4	14.6
SL1-15b	11/5/2018	6-12	4.35	15.9
TM1-14b	11/6/2018	6-12	9.68	16.4
SL1-11b	11/5/2018	6-12	11.3	17.1
TM1-02b	11/6/2018	6-12	10.9	17.3
TM-10b	11/6/2018	6-12	12	18.1
TM1-20b	11/6/2018	6-12	7.4	18.2
SL2-09b	11/5/2018	6-12	11.7	19
SL2-04b	11/5/2018	6-12	11.3	23.4
TM1-23b	11/6/2018	6-12	12.2	32.5
TM1-25b	11/6/2018	6-12	13.8	42.5

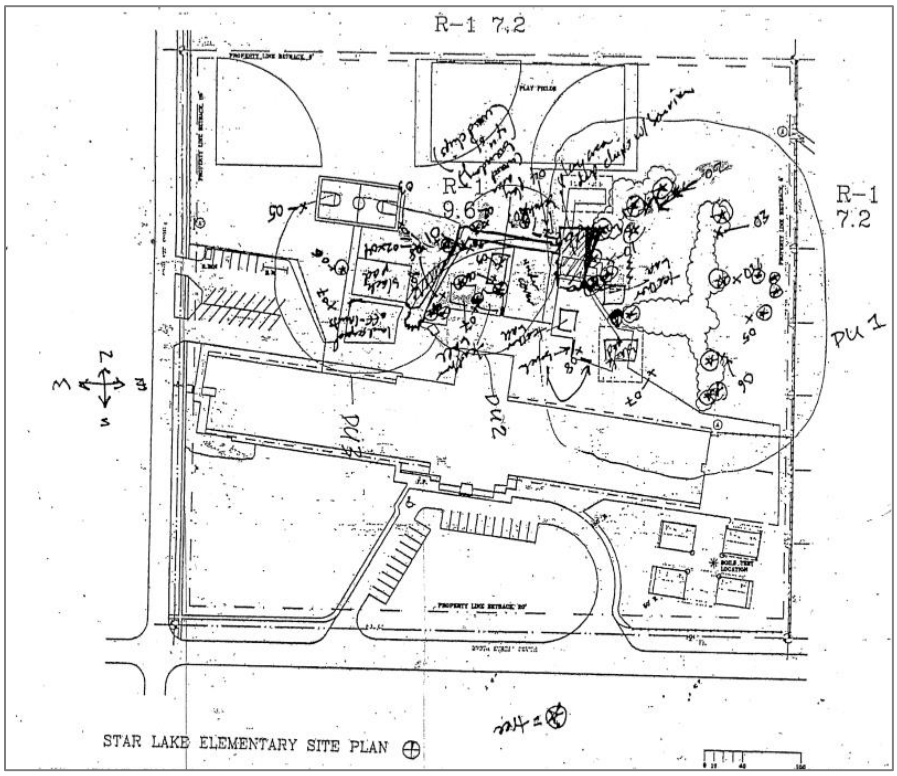
Concentrations in **bold** represent values above the MTCA Method A cleanup level for unrestricted land use.
Concentrations in **bold red** represent values that are twice the cleanup level.

Enclosure D

Soil Safety Program Cleanup Action at Star Lake Elementary

This page intentionally left blank
for double-sided copying.

Characterization Sampling



Federal Way School District

513 Star Lake Elementary

Arsenic Results

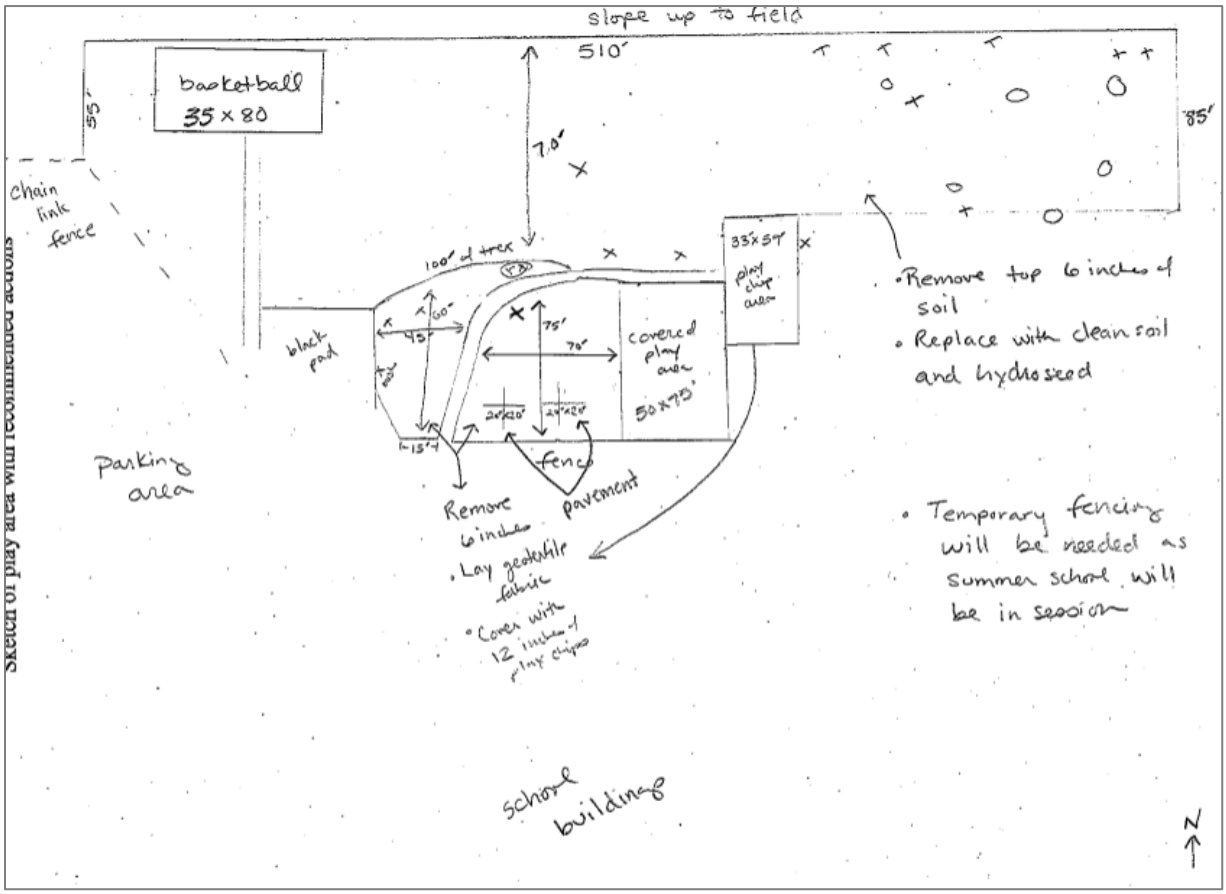
	DU 1		DU 2		DU 3	
Boring	0-2	2-6	0-2	2-6	0-2	2-6
1	18.50	17.20	20.50	22.00	13.80	59.70
2	51.20	42.30	133.00	83.40	14.30	8.21
3	7.11	3.59	44.20	46.60	27.70	14.50
4	16.40	16.40	43.30	70.60	9.83	22.80
5	24.90	14.10	28.60	7.04	24.60	23.80
6	7.16	4.16	27.10	19.70	24.00	11.50
7	11.80	13.00	6.71	7.84	7.72	6.96
8	12.50	21.80	11.10	10.10	11.60	9.57
Average	18.70	16.57	39.31	33.41	16.69	19.63
Max	51.20	42.30	133.00	83.40	27.70	59.70

Lead Results

	DU 1		DU 2		DU 3	
Boring	0-2	2-6	0-2	2-6	0-2	2-6
1	38.70	43.10	29.10	43.80	25.90	152.00
2	116.00	102.00	252.00	183.00	29.80	15.50
3	11.00	6.66	111.00	77.10	70.20	29.40
4	29.80	24.70	93.80	63.50	8.13	14.70
5	58.30	24.10	61.00	10.40	42.50	42.00
6	13.40	7.86	63.50	32.30	62.50	22.90
7	18.80	14.70	12.30	13.60	26.10	23.80
8	63.10	18.80	21.80	19.20	40.60	23.00
Average	43.64	30.24	80.56	55.36	38.22	40.41
Max	116.00	102.00	252.00	183.00	70.20	152.00

This page intentionally left blank
for double-sided copying.

Completed Cleanup Action



APPENDIX C

Laboratory Reports and Chain of Custody Documentation

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.

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

February 11, 2022

James Welles, Project Manager
PBS Engineering and Environmental, Inc.
214 E. Galer St, Suite 300
Seattle, WA 98102

Dear Mr Welles:

Included are the results from the testing of material submitted on February 7, 2022 from the JLE 81519.001, F&BI 202105 project. There are 8 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 should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
c: Natasha.Peterson@PBSusa.com
PBS0211R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on February 7, 2022 by Friedman & Bruya, Inc. from the PBS Engineering and Environmental JLE 81519.001, F&BI 202105 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	PBS Engineering and Environmental
202105 -01	RA-3-13a
202105 -02	RA-3-14a
202105 -03	RA-3-15a
202105 -04	RA-3-16a

All quality control requirements were acceptable.

Analysis For Total Metals By EPA Method 6020B

Client ID:	RA-3-13a	Client:	PBS Engineering and Environmental
Date Received:	02/07/22	Project:	JLE 81519.001, F&BI 202105
Date Extracted:	02/08/22	Lab ID:	202105-01
Date Analyzed:	02/08/22	Data File:	202105-01.035
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	6.88
Lead	6.36

Analysis For Total Metals By EPA Method 6020B

Client ID:	RA-3-14a	Client:	PBS Engineering and Environmental
Date Received:	02/07/22	Project:	JLE 81519.001, F&BI 202105
Date Extracted:	02/08/22	Lab ID:	202105-02
Date Analyzed:	02/08/22	Data File:	202105-02.036
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	3.29
Lead	4.99

Analysis For Total Metals By EPA Method 6020B

Client ID:	RA-3-15a	Client:	PBS Engineering and Environmental
Date Received:	02/07/22	Project:	JLE 81519.001, F&BI 202105
Date Extracted:	02/08/22	Lab ID:	202105-03
Date Analyzed:	02/08/22	Data File:	202105-03.037
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	4.33
Lead	4.88

Analysis For Total Metals By EPA Method 6020B

Client ID:	RA-3-16a	Client:	PBS Engineering and Environmental
Date Received:	02/07/22	Project:	JLE 81519.001, F&BI 202105
Date Extracted:	02/08/22	Lab ID:	202105-04
Date Analyzed:	02/08/22	Data File:	202105-04.038
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	4.11
Lead	5.46

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	PBS Engineering and Environmental
Date Received:	Not Applicable	Project:	JLE 81519.001, F&BI 202105
Date Extracted:	02/08/22	Lab ID:	I2-107 mb2
Date Analyzed:	02/08/22	Data File:	I2-107 mb2.034
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	<1
Lead	<1

Date of Report: 02/11/22
Date Received: 02/07/22
Project: JLE 81519.001, F&BI 202105

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES FOR TOTAL METALS USING EPA METHOD 6020B

Laboratory Code: 202055-01 x5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	mg/kg (ppm)	10	<5	97	93	75-125	4
Lead	mg/kg (ppm)	50	5.26	95	92	75-125	3

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	mg/kg (ppm)	10	87	80-120
Lead	mg/kg (ppm)	50	93	80-120

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.

202105

SAMPLE CHAIN OF CUSTODY 02.07.22

BI1

Page # 1 of 1

Report To James Welles, Natasha Peterson

Company PBS

Address Seattle

City, State, ZIP

Phone ______ Email james.welles@pbsusa.com natasha.peterson@pbsusa

SAMPLERS (signature)	
PROJECT NAME: JLE	PO #: 41519.001
REMARKS	INVOICE TO
Project specific RLs? - Yes / No	

TURNAROUND TIME
- ☐ Standard turnaround
- ☒ RUSH next day
- Rush charges authorized by:

SAMPLE DISPOSAL
- ☐ Archive samples
- ☐ Other
- Default: Dispose after 30 days

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	(6020) Total Metals Pb/As (Lead Arsenic)			Notes
RA-3-13a	01	2/7/22	1215	S	1											
RA-3-14a	02	↓	1040	S	1											
RA-3-15a	03	↓	1101	S	1											
RA-3-16a	04	↓	1207	S	1											

Friedman & Bruya, Inc.
Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Natasha Peterson	PBS	2/7/22	1340
Received by:	Tokala Christensen	F+B	2/7/22	13:40
Relinquished by:				
Received by:		Samples received at 1 °C		

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 22, 2020

James Welles, Project Manager
PBS Engineering and Environmental, Inc.
214 E. Galer St, Suite 300
Seattle, WA 98102

Dear Mr Welles:

Included are the results from the testing of material submitted on October 15, 2020 from the Star Lake Elementary PO 41519.001, F&BI 010264 project. There are 8 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 should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
PBS1022R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on October 15, 2020 by Friedman & Bruya, Inc. from the PBS Engineering and Environmental Star Lake Elementary PO 41519.001, F&BI 010264 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	PBS Engineering and Environmental
010264 -01	R2-1a
010264 -02	R2-2a
010264 -03	R2-5a
010264 -04	R2-6a

All quality control requirements were acceptable.

Analysis For Total Metals By EPA Method 6020B

Client ID:	R2-1a	Client:	PBS Engineering and Environmental
Date Received:	10/15/20	Project:	Star Lake Elementary PO 41519.001
Date Extracted:	10/20/20	Lab ID:	010264-01
Date Analyzed:	10/20/20	Data File:	010264-01.096
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	12.7
Lead	19.1

Analysis For Total Metals By EPA Method 6020B

Client ID:	R2-2a	Client:	PBS Engineering and Environmental
Date Received:	10/15/20	Project:	Star Lake Elementary PO 41519.001
Date Extracted:	10/20/20	Lab ID:	010264-02
Date Analyzed:	10/20/20	Data File:	010264-02.162
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	9.86
Lead	14.5

Analysis For Total Metals By EPA Method 6020B

Client ID:	R2-5a	Client:	PBS Engineering and Environmental
Date Received:	10/15/20	Project:	Star Lake Elementary PO 41519.001
Date Extracted:	10/20/20	Lab ID:	010264-03
Date Analyzed:	10/20/20	Data File:	010264-03.163
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	9.55
Lead	10.1

Analysis For Total Metals By EPA Method 6020B

Client ID:	R2-6a	Client:	PBS Engineering and Environmental
Date Received:	10/15/20	Project:	Star Lake Elementary PO 41519.001
Date Extracted:	10/20/20	Lab ID:	010264-04
Date Analyzed:	10/20/20	Data File:	010264-04.164
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	51.9
Lead	24.0

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	PBS Engineering and Environmental
Date Received:	Not Applicable	Project:	Star Lake Elementary PO 41519.001
Date Extracted:	10/20/20	Lab ID:	I0-648 mb
Date Analyzed:	10/20/20	Data File:	I0-648 mb.092
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	<1
Lead	<1

Date of Report: 10/22/20
Date Received: 10/15/20
Project: Star Lake Elementary PO 41519.001, F&BI 010264

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES FOR TOTAL METALS USING EPA METHOD 6020B

Laboratory Code: 010264-01 x5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	mg/kg (ppm)	10	9.08	72 b	89 b	75-125	21 b
Lead	mg/kg (ppm)	50	15.1	77	86	75-125	11

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	mg/kg (ppm)	10	103	80-120
Lead	mg/kg (ppm)	50	100	80-120

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.

ME 10-15-20 [redacted]

BI1

010264

[redacted] Report To: J Welles

Company: PBS

Address:

City, State, ZIP: Seattle

Phone: 206 348 6317 Email: james.welles@pbsenv.com

SAMPLERS (signature): [signature]

PROJECT NAME	PO #
Star Lake Elementary	41519.001
REMARKS	INVOICE TO
Project specific RLs? - Yes / No	

TURNAROUND TIME
- [x] Standard turnaround
- [ ] RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- [ ] Archive samples
- [ ] Other
- Default: Dispose after 30 days

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	As/Pb (6020)				Notes
R2-1a	01	10/15/20	1120	SOIL	1								X				
R2-2a	02	↓	1125	↓	1								X				
R2-5a	03	↓	1110	↓	1								X				
R2-6a	04	↓	1113	↓	1								X				

Samples received at 19 °C

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: [signature]	J Welles	PBS	10/15/20	12:11
Received by: [signature]	Khoi Hoang	FBI	10/15/20	12:11
Relinquished by:				
Received by:				

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

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

June 25, 2020

James Welles, Project Manager
PBS Engineering and Environmental, Inc.
214 E. Galer St, Suite 300
Seattle, WA 98102

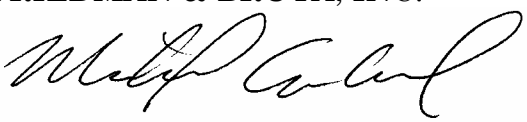
Dear Mr Welles:

Included are the results from the testing of material submitted on June 23, 2020 from the Star Lake ES PO 41519.001, F&BI 006390 project. There are 5 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 should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
PBS0625R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on June 23, 2020 by Friedman & Bruya, Inc. from the PBS Engineering and Environmental Star Lake ES PO 41519.001, F&BI 006390 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	PBS Engineering and Environmental
006390 -01	R2-7aaa

Arsenic in the 6020B matrix spike and matrix spike duplicate did not pass the acceptance criteria. The laboratory control sample passed the acceptance criteria, therefore the results were due to matrix effect.

All other quality control requirements were acceptable.

Analysis For Total Metals By EPA Method 6020B

Client ID:	R2-7aaa	Client:	PBS Engineering and Environmental
Date Received:	06/23/20	Project:	Star Lake ES PO 41519.001
Date Extracted:	06/24/20	Lab ID:	006390-01
Date Analyzed:	06/24/20	Data File:	006390-01.042
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	31.8
Lead	20.6

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	PBS Engineering and Environmental
Date Received:	Not Applicable	Project:	Star Lake ES PO 41519.001
Date Extracted:	06/24/20	Lab ID:	I0-364 mb2
Date Analyzed:	06/24/20	Data File:	I0-364 mb2.041
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	<1
Lead	<1

Date of Report: 06/25/20
Date Received: 06/23/20
Project: Star Lake ES PO 41519.001, F&BI 006390

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES FOR TOTAL METALS USING EPA METHOD 6020B

Laboratory Code: 006358-01 x5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	mg/kg (ppm)	10	<5	64 vo	70 vo	75-125	9
Lead	mg/kg (ppm)	50	34.1	72 b	79 b	75-125	9 b

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	mg/kg (ppm)	10	90	80-120
Lead	mg/kg (ppm)	50	100	80-120

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.

SAMPLE CHAIN OF CUSTODY

006390 ~~006389~~ KR 6/23

ME 06/23/20

Page # 1 of 1

Send Report To James Welles

Company PBS

Address

City, State, ZIP Seattle

Phone # Fax #

Email Address

SAMPLERS (signature)

PROJECT NAME/NO.: Star Lake ES

PO #: 41519.001

PROJECT ADDRESS

• ELECTRONIC DATA REQUESTED

TURNAROUND TIME
- Standard Turnaround
- RUSH (24 hr)

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	Pb & As					Notes
R2-7aaa	01	6/23/20	1140	S	1							X					

Samples received at 25 °C

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Kyle Johnson	PBS	6/23/20	1634
Received by:	Isaac Leslie	FBI	6/23/20	16:34
Relinquished by:				
Received by:				

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

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

November 16, 2020

James Welles, Project Manager
PBS Engineering and Environmental, Inc.
214 E. Galer St, Suite 300
Seattle, WA 98102

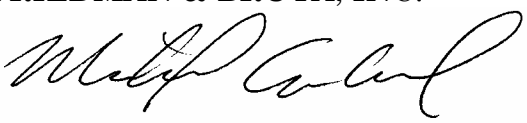
Dear Mr Welles:

Included are the results from the testing of material submitted on November 10, 2020 from the Star Lake PO 41519.001, F&BI 011178 project. There are 6 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 should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
PBS1116R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on November 10, 2020 by Friedman & Bruya, Inc. from the PBS Engineering and Environmental Star Lake PO 41519.001, F&BI 011178 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	PBS Engineering and Environmental
011178 -01	R2-6aa
011178 -02	R2-6b
011178 -03	R2-7aaaa
011178 -04	R2-7b

All quality control requirements were acceptable.

Analysis For Total Metals By EPA Method 6020B

Client ID:	R2-6aa	Client:	PBS Engineering and Environmental
Date Received:	11/10/20	Project:	Star Lake PO 41519.001
Date Extracted:	11/12/20	Lab ID:	011178-01
Date Analyzed:	11/12/20	Data File:	011178-01.130
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	7.54
Lead	11.1

Analysis For Total Metals By EPA Method 6020B

Client ID:	R2-7aaaa	Client:	PBS Engineering and Environmental
Date Received:	11/10/20	Project:	Star Lake PO 41519.001
Date Extracted:	11/12/20	Lab ID:	011178-03
Date Analyzed:	11/12/20	Data File:	011178-03.131
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	8.16
Lead	10.3

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	PBS Engineering and Environmental
Date Received:	Not Applicable	Project:	Star Lake PO 41519.001
Date Extracted:	11/12/20	Lab ID:	I0-703 mb
Date Analyzed:	11/12/20	Data File:	I0-703 mb.094
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	<1
Lead	<1

Date of Report: 11/16/20
Date Received: 11/10/20
Project: Star Lake PO 41519.001, F&BI 011178

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES FOR TOTAL METALS USING EPA METHOD 6020B

Laboratory Code: 011183-01 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	mg/kg (ppm)	10	6.67	94 b	63 b	75-125	39 b
Lead	mg/kg (ppm)	50	3.47	84	86	75-125	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	mg/kg (ppm)	10	97	80-120
Lead	mg/kg (ppm)	50	95	80-120

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.

SAMPLE CHAIN OF CUSTODY

011178 ME 11-10-20 BT1

Page # 1 of 1

Report To J. Welles

Company PBS

Address

City, State, ZIP Seattle

Phone (206) 348 6317 Email james.welles@pbsusa.com

SAMPLERS (signature)

PROJECT NAME	PO #
STAR LAKE	41519.001
REMARKS	INVOICE TO
Project specific RLs? - Yes / No	

TURNAROUND TIME
- ☒ Standard turnaround
- ☐ RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- ☐ Archive samples
- ☐ Other
- Default: Dispose after 30 days

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	As/Pb (6020)				Notes
R2-6aa	01	11/10/20	1206										X				
R2-6b	02		1208														HOLD
R2-7aaaa	03		1211										X				HOLD
R2-7b	04		1216														HOLD
													Samples received at 13°C				

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	J. Welles	PBS	11/10/20	1306
Received by:	HONG NGUYEN	FBI	✓	✓
Relinquished by:				
Received by:				

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

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

June 11, 2020

James Welles, Project Manager
PBS Engineering and Environmental, Inc.
214 E. Galer St, Suite 300
Seattle, WA 98102

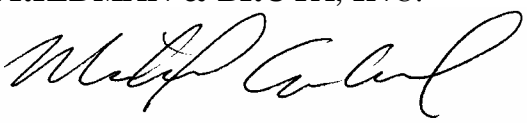
Dear Mr Welles:

Included are the results from the testing of material submitted on June 9, 2020 from the Star Lake Soil Remediation PO 41519.001, F&BI 006138 project. There are 38 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 should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
PBS0611R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on June 9, 2020 by Friedman & Bruya, Inc. from the PBS Engineering and Environmental Star Lake Soil Remediation PO 41519.001, F&BI 006138 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	PBS Engineering and Environmental
006138 -01	R1-1a
006138 -02	R1-1b
006138 -03	R1-2a
006138 -04	R1-2b
006138 -05	R1-3a
006138 -06	R1-3b
006138 -07	R1-4a
006138 -08	R1-4b
006138 -09	R1-5a
006138 -10	R1-5b
006138 -11	R1-6a
006138 -12	R1-6b
006138 -13	R1-7a
006138 -14	R1-7b
006138 -15	R1-8a
006138 -16	R1-8b
006138 -17	R1-9a
006138 -18	R1-9b
006138 -19	R1-10a
006138 -20	R1-10b
006138 -21	R1-11a
006138 -22	R1-11b
006138 -23	R1-12a
006138 -24	R1-12b
006138 -25	R1-13a
006138 -26	R1-13b
006138 -27	R1-14a
006138 -28	R1-14b
006138 -29	R1-15a
006138 -30	R1-15b
006138 -31	R1-16a
006138 -32	R1-16b

All quality control requirements were acceptable.

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-1a	Client:	PBS Engineering and Environmental
Date Received:	06/09/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/09/20	Lab ID:	006138-01
Date Analyzed:	06/09/20	Data File:	006138-01.052
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	16.5
Lead	5.66

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-1b	Client:	PBS Engineering and Environmental
Date Received:	06/09/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/09/20	Lab ID:	006138-02
Date Analyzed:	06/09/20	Data File:	006138-02.057
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	25.1
Lead	6.47

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-2a	Client:	PBS Engineering and Environmental
Date Received:	06/09/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/09/20	Lab ID:	006138-03
Date Analyzed:	06/09/20	Data File:	006138-03.061
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	6.63
Lead	6.97

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-2b	Client:	PBS Engineering and Environmental
Date Received:	06/09/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/09/20	Lab ID:	006138-04
Date Analyzed:	06/09/20	Data File:	006138-04.062
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	3.92
Lead	3.25

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-3a	Client:	PBS Engineering and Environmental
Date Received:	06/09/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/09/20	Lab ID:	006138-05
Date Analyzed:	06/09/20	Data File:	006138-05.063
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	4.56
Lead	4.85

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-3b	Client:	PBS Engineering and Environmental
Date Received:	06/09/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/09/20	Lab ID:	006138-06
Date Analyzed:	06/09/20	Data File:	006138-06.064
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	9.52
Lead	8.92

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-4a	Client:	PBS Engineering and Environmental
Date Received:	06/09/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/09/20	Lab ID:	006138-07
Date Analyzed:	06/09/20	Data File:	006138-07.065
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	4.01
Lead	4.12

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-4b	Client:	PBS Engineering and Environmental
Date Received:	06/09/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/09/20	Lab ID:	006138-08
Date Analyzed:	06/09/20	Data File:	006138-08.066
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	3.13
Lead	3.00

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-5a	Client:	PBS Engineering and Environmental
Date Received:	06/09/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/09/20	Lab ID:	006138-09
Date Analyzed:	06/09/20	Data File:	006138-09.069
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	11.5
Lead	13.9

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-5b	Client:	PBS Engineering and Environmental
Date Received:	06/09/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/09/20	Lab ID:	006138-10
Date Analyzed:	06/09/20	Data File:	006138-10.070
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	17.2
Lead	31.6

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-6a	Client:	PBS Engineering and Environmental
Date Received:	06/09/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/09/20	Lab ID:	006138-11
Date Analyzed:	06/09/20	Data File:	006138-11.071
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	3.00
Lead	4.51

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-6b	Client:	PBS Engineering and Environmental
Date Received:	06/09/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/09/20	Lab ID:	006138-12
Date Analyzed:	06/09/20	Data File:	006138-12.072
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	12.6
Lead	19.0

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-7a	Client:	PBS Engineering and Environmental
Date Received:	06/09/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/09/20	Lab ID:	006138-13
Date Analyzed:	06/09/20	Data File:	006138-13.101
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	25.4
Lead	28.9

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-7b	Client:	PBS Engineering and Environmental
Date Received:	06/09/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/09/20	Lab ID:	006138-14
Date Analyzed:	06/09/20	Data File:	006138-14.102
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	44.4
Lead	41.4

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-8a	Client:	PBS Engineering and Environmental
Date Received:	06/09/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/09/20	Lab ID:	006138-15
Date Analyzed:	06/09/20	Data File:	006138-15.103
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	11.3
Lead	10.4

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-8b	Client:	PBS Engineering and Environmental
Date Received:	06/09/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/09/20	Lab ID:	006138-16
Date Analyzed:	06/09/20	Data File:	006138-16.104
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	14.6
Lead	30.1

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-9a	Client:	PBS Engineering and Environmental
Date Received:	06/09/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/09/20	Lab ID:	006138-17
Date Analyzed:	06/09/20	Data File:	006138-17.107
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	2.60
Lead	3.31

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-9b	Client:	PBS Engineering and Environmental
Date Received:	06/09/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/09/20	Lab ID:	006138-18
Date Analyzed:	06/09/20	Data File:	006138-18.108
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	3.25
Lead	4.98

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-10a	Client:	PBS Engineering and Environmental
Date Received:	06/09/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/09/20	Lab ID:	006138-19
Date Analyzed:	06/09/20	Data File:	006138-19.109
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	5.28
Lead	3.17

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-10b	Client:	PBS Engineering and Environmental
Date Received:	06/09/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/09/20	Lab ID:	006138-20
Date Analyzed:	06/09/20	Data File:	006138-20.110
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	8.04
Lead	7.49

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-11a	Client:	PBS Engineering and Environmental
Date Received:	06/09/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/09/20	Lab ID:	006138-21
Date Analyzed:	06/09/20	Data File:	006138-21.113
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	6.82
Lead	11.2

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-11b	Client:	PBS Engineering and Environmental
Date Received:	06/09/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/09/20	Lab ID:	006138-22
Date Analyzed:	06/09/20	Data File:	006138-22.114
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	7.28
Lead	13.6

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-12a	Client:	PBS Engineering and Environmental
Date Received:	06/09/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/09/20	Lab ID:	006138-23
Date Analyzed:	06/09/20	Data File:	006138-23.115
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	18.9
Lead	3.85

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-12b	Client:	PBS Engineering and Environmental
Date Received:	06/09/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/09/20	Lab ID:	006138-24
Date Analyzed:	06/09/20	Data File:	006138-24.116
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	71.3
Lead	15.1

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-13a	Client:	PBS Engineering and Environmental
Date Received:	06/09/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/09/20	Lab ID:	006138-25
Date Analyzed:	06/09/20	Data File:	006138-25.119
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	10.8
Lead	9.05

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-13b	Client:	PBS Engineering and Environmental
Date Received:	06/09/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/09/20	Lab ID:	006138-26
Date Analyzed:	06/09/20	Data File:	006138-26.120
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	13.8
Lead	10.8

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-14a	Client:	PBS Engineering and Environmental
Date Received:	06/09/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/09/20	Lab ID:	006138-27
Date Analyzed:	06/09/20	Data File:	006138-27.121
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	14.0
Lead	24.8

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-14b	Client:	PBS Engineering and Environmental
Date Received:	06/09/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/09/20	Lab ID:	006138-28
Date Analyzed:	06/09/20	Data File:	006138-28.122
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	15.4
Lead	26.0

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-15a	Client:	PBS Engineering and Environmental
Date Received:	06/09/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/09/20	Lab ID:	006138-29
Date Analyzed:	06/09/20	Data File:	006138-29.123
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	17.8
Lead	34.7

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-15b	Client:	PBS Engineering and Environmental
Date Received:	06/09/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/09/20	Lab ID:	006138-30
Date Analyzed:	06/09/20	Data File:	006138-30.124
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	9.39
Lead	4.46

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-16a	Client:	PBS Engineering and Environmental
Date Received:	06/09/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/09/20	Lab ID:	006138-31
Date Analyzed:	06/09/20	Data File:	006138-31.125
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	11.4
Lead	12.2

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-16b	Client:	PBS Engineering and Environmental
Date Received:	06/09/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/09/20	Lab ID:	006138-32
Date Analyzed:	06/09/20	Data File:	006138-32.126
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	17.4
Lead	28.3

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	PBS Engineering and Environmental
Date Received:	Not Applicable	Project:	Star Lake Soil Remediation
Date Extracted:	06/09/20	Lab ID:	I0-331 mb
Date Analyzed:	06/09/20	Data File:	I0-331 mb.050
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	<1
Lead	<1

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	PBS Engineering and Environmental
Date Received:	Not Applicable	Project:	Star Lake Soil Remediation
Date Extracted:	06/09/20	Lab ID:	I0-332 mb
Date Analyzed:	06/09/20	Data File:	I0-332 mb.111
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	<1
Lead	<1

Date of Report: 06/11/20
Date Received: 06/09/20
Project: Star Lake Soil Remediation PO 41519.001, F&BI 006138

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES FOR TOTAL METALS USING EPA METHOD 6020B

Laboratory Code: 006138-01 x5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	mg/kg (ppm)	10	12.8	280 b	122 b	75-125	79 b
Lead	mg/kg (ppm)	50	5.11	96	97	75-125	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	mg/kg (ppm)	10	86	80-120
Lead	mg/kg (ppm)	50	99	80-120

Date of Report: 06/11/20
Date Received: 06/09/20
Project: Star Lake Soil Remediation PO 41519.001, F&BI 006138

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES FOR TOTAL METALS USING EPA METHOD 6020B

Laboratory Code: 006138-32 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	mg/kg (ppm)	10	13.6	78	84	75-125	7
Lead	mg/kg (ppm)	50	22.1	85	87	75-125	2

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	mg/kg (ppm)	10	92	80-120
Lead	mg/kg (ppm)	50	99	80-120

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.

006138

SAMPLE CHAIN OF CUSTODY

ME 06/09/20

BTU

Page # 1 of 4

Report To James Welles

Company PBS

Address

City, State, ZIP Seattle

Phone (206) 348 6317 Email james.welles@pbsusa.com

SAMPLERS (*signature*)

PROJECT NAME: STAR LAKE SOIL Remediation

PO #: 41519.001

REMARKS: Project specific RLs? - Yes / No

INVOICE TO

TURNAROUND TIME
- ☐ Standard turnaround
- ☒ RUSH Next day
- Rush charges authorized by:

SAMPLE DISPOSAL
- ☐ Archive samples
- ☐ Other
- Default: Dispose after 30 days

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	As/Pb (6020)				Notes
R1-1a	01	6/9/20	0845	SOIL	1								X				
R1-1b	02		0846		1								X				
R1-2a	03		0855		1								X				
R1-2b	04		0851		1								X				
R1-3a	05		0855		1								X				
R1-3b	06		0856		1								X				
R1-4a	07		0858		1								X				
R1-4b	08		0859		1								X				
R1-5a	09		0905		1								X				
R1-5b	10		0906		1								X				

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	J. Welles	PBS	6/9/20	1025
Received by:	Michael Eccles	FGB	6/9/20	1025
Relinquished by:				
Received by:		Samples received at 18 °C		

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

006138

SAMPLE CHAIN OF CUSTODY ME 06/09/20

BTY

Page # 2 of 4

Report To: James Welles

Company: PBS

Address:

City, State, ZIP: Seattle

Phone: (206) 3486317 Email: james.welles@pbsusa.com

SAMPLERS (signature)	
[signature]	
PROJECT NAME	PO #
STAR LAKE SOIL REMEDIATION	41519.001
REMARKS	INVOICE TO
Project specific RLs? - Yes / No (No circled)	

TURNAROUND TIME
- ☐ Standard turnaround
- ☒ RUSH Next day
- Rush charges authorized by:

SAMPLE DISPOSAL
- ☐ Archive samples
- ☐ Other
- Default: Dispose after 30 days

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	(As/Pb) (6020)				Notes
R1-6a	11	6/9/20	0910	soil	1								X				
R1-6b	12	↓	0911	↓	1								X				
R1-7a	13		0914		1								X				
R1-7b	14		0915		1								X				
R1-8a	15		0918		1								X				
R1-8b	16		0919		1								X				
R1-9a	17		0840		1								X				
R1-9b	18		0841		1								X				
R1-10a	19		0835		1								X				
R1-10b	20	↓	0836	↓	1								X				

Friedman & Bruya, Inc.

3012 16th Avenue West

Seattle, WA 98119-2029

Ph. (206) 285-8282

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by: [signature]	J Welles	PBS	6/9/20	1025
Received by: [signature]	Michael Erdahl	FeBm	6/9/20	1030
Relinquished by:		Samples received at 18 °C		
Received by:				

006138

SAMPLE CHAIN OF CUSTODY ME 06/09/20

BTY

Report To James Welles

Company PBS

Address

City, State, ZIP Seattle

Phone (206) 348 6317 Email james.welles@pbsusa.com

SAMPLERS (*signature*)

PROJECT NAME	PO #
STAR LAKE SOIL REMEDIATION	41519.001
REMARKS	INVOICE TO
Project specific RLs? - Yes / No	

TURNAROUND TIME
- ☐ Standard turnaround
- ☒ RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- ☐ Archive samples
- ☐ Other
- Default: Dispose after 30 days

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	Pb (6020)				Notes
						ANALYSES REQUESTED											
R1-11a	21	6/9/20	0831	SOIL	1								X				
R1-11b	22		0832		1								X				
R1-12a	23		0825		1								X				
R1-12b	24		0826		1								X				
R1-13a	25		0818		1								X				
R1-13b	26		0819		1								X				
R1-14a	27		0813		1								X				
R1-14b	28		0814		1								X				
R1-15a	29		0809		1								X				
R1-15b	30	↓	0810	↓	1								X				

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	J. Welles	PBS	6/9/20	1025
Received by:	Michael Eakle	FEBm	6/9/20	064030
Relinquished by:				
Received by:		Samples received at 18 °C		

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

006138

SAMPLE CHAIN OF CUSTODY ME 06/09/20

BTY

Page # 4 of 4

Report To James Welles

Company PBS

Address

City, State, ZIP Seattle

Phone (206) 348-6317 Email james.welles@pbsusa.com

SAMPLERS (*signature*)

PROJECT NAME: STAR LAKE SOIL REMEDIATION

PO #: 4/519.001

REMARKS: Project specific RLs? - Yes / No

INVOICE TO

TURNAROUND TIME
- ☐ Standard turnaround
- ☒ RUSH
- Rush charges authorized by:

SAMPLE DISPOSAL
- ☐ Archive samples
- ☐ Other
- Default: Dispose after 30 days

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	As/Pb (6020)				Notes
R1-16a	31	6/9/20	0805	SOIL	1								⊗				⊗ - per JW
R1-16b	32	↓	0806	↓	1								⊗				6/9/20 ME

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	J Welles	PBS	6/9/20	1025
Received by:	Michael Erdahl	FCBm	6/9/20	1030
Relinquished by:				
Received by:		Samples received at 18 °C		

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

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

June 16, 2020

James Welles, Project Manager
PBS Engineering and Environmental, Inc.
214 E. Galer St, Suite 300
Seattle, WA 98102

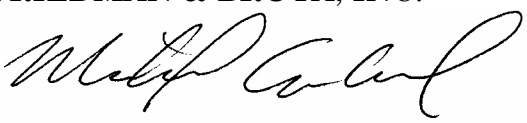
Dear Mr Welles:

Included are the results from the testing of material submitted on June 11, 2020 from the Star Lake Soil Remediation PO 41519.001, F&BI 006175 project. There are 16 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 should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
PBS0616R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on June 11, 2020 by Friedman & Bruya, Inc. from the PBS Engineering and Environmental Star Lake Soil Remediation PO 41519.001, F&BI 006175 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	PBS Engineering and Environmental
006175 -01	R3-1a
006175 -02	R3-2a
006175 -03	R3-3a
006175 -04	R3-4a
006175 -05	R3-5a
006175 -06	R3-6a
006175 -07	R3-7a
006175 -08	R3-8a
006175 -09	R3-9a
006175 -10	R3-10a
006175 -11	R3-11a
006175 -12	R3-12a

All quality control requirements were acceptable.

Analysis For Total Metals By EPA Method 6020B

Client ID:	R3-1a	Client:	PBS Engineering and Environmental
Date Received:	06/11/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/11/20	Lab ID:	006175-01
Date Analyzed:	06/11/20	Data File:	006175-01.060
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	11.3
Lead	37.1

Analysis For Total Metals By EPA Method 6020B

Client ID:	R3-2a	Client:	PBS Engineering and Environmental
Date Received:	06/11/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/11/20	Lab ID:	006175-02
Date Analyzed:	06/11/20	Data File:	006175-02.061
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	9.60
Lead	32.1

Analysis For Total Metals By EPA Method 6020B

Client ID:	R3-3a	Client:	PBS Engineering and Environmental
Date Received:	06/11/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/11/20	Lab ID:	006175-03
Date Analyzed:	06/11/20	Data File:	006175-03.062
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	8.51
Lead	16.7

Analysis For Total Metals By EPA Method 6020B

Client ID:	R3-4a	Client:	PBS Engineering and Environmental
Date Received:	06/11/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/11/20	Lab ID:	006175-04
Date Analyzed:	06/11/20	Data File:	006175-04.063
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	7.63
Lead	14.7

Analysis For Total Metals By EPA Method 6020B

Client ID:	R3-5a	Client:	PBS Engineering and Environmental
Date Received:	06/11/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/11/20	Lab ID:	006175-05
Date Analyzed:	06/11/20	Data File:	006175-05.064
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	10.7
Lead	31.4

Analysis For Total Metals By EPA Method 6020B

Client ID:	R3-6a	Client:	PBS Engineering and Environmental
Date Received:	06/11/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/11/20	Lab ID:	006175-06
Date Analyzed:	06/11/20	Data File:	006175-06.067
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	9.86
Lead	36.4

Analysis For Total Metals By EPA Method 6020B

Client ID:	R3-7a	Client:	PBS Engineering and Environmental
Date Received:	06/11/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/11/20	Lab ID:	006175-07
Date Analyzed:	06/11/20	Data File:	006175-07.068
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	13.1
Lead	30.0

Analysis For Total Metals By EPA Method 6020B

Client ID:	R3-8a	Client:	PBS Engineering and Environmental
Date Received:	06/11/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/11/20	Lab ID:	006175-08
Date Analyzed:	06/11/20	Data File:	006175-08.069
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	8.87
Lead	25.2

Analysis For Total Metals By EPA Method 6020B

Client ID:	R3-9a	Client:	PBS Engineering and Environmental
Date Received:	06/11/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/11/20	Lab ID:	006175-09
Date Analyzed:	06/11/20	Data File:	006175-09.070
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	6.31
Lead	35.7

Analysis For Total Metals By EPA Method 6020B

Client ID:	R3-10a	Client:	PBS Engineering and Environmental
Date Received:	06/11/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/11/20	Lab ID:	006175-10
Date Analyzed:	06/11/20	Data File:	006175-10.071
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	9.13
Lead	20.5

Analysis For Total Metals By EPA Method 6020B

Client ID:	R3-11a	Client:	PBS Engineering and Environmental
Date Received:	06/11/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/11/20	Lab ID:	006175-11
Date Analyzed:	06/11/20	Data File:	006175-11.072
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	10.8
Lead	25.0

Analysis For Total Metals By EPA Method 6020B

Client ID:	R3-12a	Client:	PBS Engineering and Environmental
Date Received:	06/11/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/11/20	Lab ID:	006175-12
Date Analyzed:	06/11/20	Data File:	006175-12.073
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	7.98
Lead	20.8

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	PBS Engineering and Environmental
Date Received:	Not Applicable	Project:	Star Lake Soil Remediation
Date Extracted:	06/11/20	Lab ID:	I0-337 mb
Date Analyzed:	06/11/20	Data File:	I0-337 mb.058
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	<1
Lead	<1

Date of Report: 06/16/20
Date Received: 06/11/20
Project: Star Lake Soil Remediation PO 41519.001, F&BI 006175

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES FOR TOTAL METALS USING EPA METHOD 6020B

Laboratory Code: 006175-12 x5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	mg/kg (ppm)	10	7.84	106	89	75-125	17
Lead	mg/kg (ppm)	50	20.6	110	100	75-125	10

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	mg/kg (ppm)	10	89	80-120
Lead	mg/kg (ppm)	50	102	80-120

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.

006175

SAMPLE CHAIN OF CUSTODY

ME 06/11/20

DC2

Page # 1 of 2

Report To James Welles

Company PBS

Address

City, State, ZIP Seattle

Phone (206) 348 6317 Email james.welles@pbsusa.com

SAMPLERS (*signature*)

PROJECT NAME: STAR LAKE SOIL REMEDIATION

PO #: 41519.001

REMARKS

Project specific RLs? - Yes / No

INVOICE TO

TURNAROUND TIME
- ☐ Standard turnaround
- ☒ RUSH next day
- Rush charges authorized by:

SAMPLE DISPOSAL
- ☐ Archive samples
- ☐ Other
- Default: Dispose after 30 days

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	As/Pb (6020)				Notes
R3-1a	01	6/11/20	0927	SOIL	1								X				
R3-2a	02		0930		1								X				
R3-3a	03		0934		1								X				
R3-4a	04		0938		1								X				
R3-5a	05		0941		1								X				
R3-6a	06		0945		1								X				
R3-7a	07		0948		1								X				
R3-8a	08		0950		1								X				
R3-9a	09		0953		1								X				
R3-10a	10	↓	0955	↓	1								X				

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	J Welles	PBS	6/11/20	1045
Received by:	Nhan Phan	FEBT	6/11/20	1045
Relinquished by:				
Received by:		Samples received at 21 °C		

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

006175

SAMPLE CHAIN OF CUSTODY

ME 06/11/20

Page # 2 of 2

Report To James Welles

Company PBS

Address

City, State, ZIP Seattle

Phone (206) 348 6317 Email james.welles@pbsusa.com

SAMPLERS (*signature*)

PROJECT NAME: STAR LAKE SOIL REMEDIATION

PO #: 41519.001

REMARKS

INVOICE TO

Project specific RLs? - Yes / No

TURNAROUND TIME
- ☐ Standard turnaround
- ☒ RUSH Next Day
- Rush charges authorized by:

SAMPLE DISPOSAL
- ☐ Archive samples
- ☐ Other
- Default: Dispose after 30 days

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	As/Pb (6020)				Notes
R3-11a	0957-11	6/11/20	0957	SOIL	1								X				
R3-12a	1000-12	↓	1000	↓	1								X				

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	J Welles	PBS	6/11/20	1045
Received by:	Nhan Phan	FCBT	6/11/20	1045
Relinquished by:				
Received by:		Samples received at 21 °C		

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

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

June 17, 2020

James Welles, Project Manager
PBS Engineering and Environmental, Inc.
214 E. Galer St, Suite 300
Seattle, WA 98102

Dear Mr Welles:

Included are the results from the testing of material submitted on June 12, 2020 from the Star Lake Soil Remediation PO 41519.001, F&BI 006198 project. There are 10 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 should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
PBS0617R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on June 12, 2020 by Friedman & Bruya, Inc. from the PBS Engineering and Environmental Star Lake Soil Remediation PO 41519.001, F&BI 006198 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	PBS Engineering and Environmental
006198 -01	R1-1aa
006198 -02	R1-1bb
006198 -03	R1-7aa
006198 -04	R1-7bb
006198 -05	R1-12aa
006198 -06	R1-12bb

All quality control requirements were acceptable.

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-1aa	Client:	PBS Engineering and Environmental
Date Received:	06/12/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/12/20	Lab ID:	006198-01
Date Analyzed:	06/12/20	Data File:	006198-01.120
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	14.9
Lead	11.6

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-1bb	Client:	PBS Engineering and Environmental
Date Received:	06/12/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/12/20	Lab ID:	006198-02
Date Analyzed:	06/12/20	Data File:	006198-02.134
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	16.5
Lead	13.9

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-7aa	Client:	PBS Engineering and Environmental
Date Received:	06/12/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/12/20	Lab ID:	006198-03
Date Analyzed:	06/12/20	Data File:	006198-03.146
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	14.5
Lead	19.5

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-7bb	Client:	PBS Engineering and Environmental
Date Received:	06/12/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/12/20	Lab ID:	006198-04
Date Analyzed:	06/12/20	Data File:	006198-04.086
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	16.2
Lead	24.5

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-12aa	Client:	PBS Engineering and Environmental
Date Received:	06/12/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/12/20	Lab ID:	006198-05
Date Analyzed:	06/12/20	Data File:	006198-05.087
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	15.2
Lead	7.01

Analysis For Total Metals By EPA Method 6020B

Client ID:	R1-12bb	Client:	PBS Engineering and Environmental
Date Received:	06/12/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/12/20	Lab ID:	006198-06
Date Analyzed:	06/12/20	Data File:	006198-06.088
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	13.3
Lead	7.94

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	PBS Engineering and Environmental
Date Received:	Not Applicable	Project:	Star Lake Soil Remediation
Date Extracted:	06/12/20	Lab ID:	I0-340 mb
Date Analyzed:	06/12/20	Data File:	I0-340 mb.118
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	<1
Lead	<1

Date of Report: 06/17/20
Date Received: 06/12/20
Project: Star Lake Soil Remediation PO 41519.001, F&BI 006198

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES FOR TOTAL METALS USING EPA METHOD 6020B

Laboratory Code: 006198-01 x5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	mg/kg (ppm)	10	11.2	60 b	116 b	75-125	64 b
Lead	mg/kg (ppm)	50	10.3	88	94	75-125	7

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	mg/kg (ppm)	10	88	80-120
Lead	mg/kg (ppm)	50	97	80-120

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.

006198

SAMPLE CHAIN OF CUSTODY

ME 06-12-20

Page # 1 of 1 BI2

Report To James Welles

Company PBS

Address

City, State, ZIP Seattle

Phone (206) 348 6317 Email james.welles@pbsusa.com

SAMPLERS (*signature*)

PROJECT NAME: STAR LAKE SOIL REMEDIATION

PO #: 4/519.001

REMARKS: Project specific RLs? - Yes / No

INVOICE TO

TURNAROUND TIME
- ☐ Standard turnaround
- ☒ RUSH Next Day Noon
- Rush charges authorized by: Mon per J.W

SAMPLE DISPOSAL
- ☐ Archive samples
- ☐ Other
- Default: Dispose after 30 days

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	As Pb (6020)				Notes
R1-1aa	01	6/12/20	0915	SOIL	1								X				
R1-1bb	02		0920		1								X				
R1-7aa	03		0901		1								X				
R1-7bb	04		0906		1								X				
R1-12aa	05		0910		1								X				
R1-12bb	06		0913		1								X				

ANALYSES REQUESTED

Samples received at 10 °C

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	J Welles	PBS	6/12/20	1025
Received by:	Liz Webber-Bruya	F?B	6/12/20	1025
Relinquished by:				
Received by:				

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

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

June 17, 2020

James Welles, Project Manager
PBS Engineering and Environmental, Inc.
214 E. Galer St, Suite 300
Seattle, WA 98102

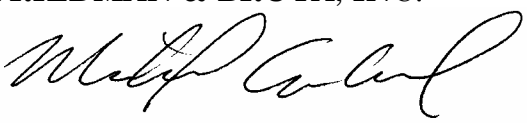
Dear Mr Welles:

Included are the results from the testing of material submitted on June 15, 2020 from the Star Lake Soil Remediation PO 41519.001, F&BI 006224 project. There are 8 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 should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.



Michael Erdahl
Project Manager

Enclosures
PBS0617R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on June 15, 2020 by Friedman & Bruya, Inc. from the PBS Engineering and Environmental Star Lake Soil Remediation PO 41519.001, F&BI 006224 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	PBS Engineering and Environmental
006224 -01	R2-3a
006224 -02	R2-4a
006224 -03	R2-7a
006224 -04	R2-8a

All quality control requirements were acceptable.

Analysis For Total Metals By EPA Method 6020B

Client ID:	R2-3a	Client:	PBS Engineering and Environmental
Date Received:	06/15/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/16/20	Lab ID:	006224-01
Date Analyzed:	06/16/20	Data File:	006224-01.037
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	20.4
Lead	23.6

Analysis For Total Metals By EPA Method 6020B

Client ID:	R2-4a	Client:	PBS Engineering and Environmental
Date Received:	06/15/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/16/20	Lab ID:	006224-02
Date Analyzed:	06/16/20	Data File:	006224-02.042
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	14.8
Lead	28.8

Analysis For Total Metals By EPA Method 6020B

Client ID:	R2-7a	Client:	PBS Engineering and Environmental
Date Received:	06/15/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/16/20	Lab ID:	006224-03
Date Analyzed:	06/16/20	Data File:	006224-03.043
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	24.9
Lead	27.8

Analysis For Total Metals By EPA Method 6020B

Client ID:	R2-8a	Client:	PBS Engineering and Environmental
Date Received:	06/15/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/16/20	Lab ID:	006224-04
Date Analyzed:	06/16/20	Data File:	006224-04.044
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	14.8
Lead	26.7

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	PBS Engineering and Environmental
Date Received:	Not Applicable	Project:	Star Lake Soil Remediation
Date Extracted:	06/16/20	Lab ID:	I0-341 mb2
Date Analyzed:	06/16/20	Data File:	I0-341 mb2.036
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	<1
Lead	<1

Date of Report: 06/17/20
Date Received: 06/15/20
Project: Star Lake Soil Remediation PO 41519.001, F&BI 006224

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES FOR TOTAL METALS USING EPA METHOD 6020B

Laboratory Code: 006187-01 x5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	mg/kg (ppm)	10	<5	83	83	75-125	0
Lead	mg/kg (ppm)	50	13.9	97	100	75-125	3

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	mg/kg (ppm)	10	92	80-120
Lead	mg/kg (ppm)	50	102	80-120

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.

006224

SAMPLE CHAIN OF CUSTODY

ME 06/15/20 BI

Page # 1 of 1

Report To James Welles

Company PBS

Address

City, State, ZIP Seattle

Phone (206) 348 6317 Email james.welles@pbsusa.com

SAMPLERS (*signature*)

PROJECT NAME: STAR LAKE SOIL REMEDIATION

PO #: 41519.001

REMARKS: Project specific RLs? - Yes / No

INVOICE TO

TURNAROUND TIME
- ☐ Standard turnaround
- ☒ RUSH Next Day
- Rush charges authorized by:

SAMPLE DISPOSAL
- ☐ Archive samples
- ☐ Other
- Default: Dispose after 30 days

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	As/Pb (6020)				Notes
R2-3a	01	6/15/20	1236	SOIL	1								X				
R2-4a	02	"	1238	"	1								X				
R2-7a	03	"	1245	"	1								X				
R2-8a	04	"	1247	"	1								X				

ANALYSES REQUESTED

Samples received at 19 °C

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	J Welles	PBS	6/15/20	1401
Received by:	Nhan Phan	FRBT	6/15/20	1401
Relinquished by:				
Received by:				

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

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

June 22, 2020

James Welles, Project Manager
PBS Engineering and Environmental, Inc.
214 E. Galer St, Suite 300
Seattle, WA 98102

Dear Mr Welles:

Included are the results from the testing of material submitted on June 17, 2020 from the Star Lake Soil Remediation PO 41519.001, F&BI 006257 project. There are 6 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 should have any questions.

Sincerely,

FRIEDMAN & BRUYA, INC.

Michael Erdahl
Project Manager

Enclosures
PBS0622R.DOC

CASE NARRATIVE

This case narrative encompasses samples received on June 17, 2020 by Friedman & Bruya, Inc. from the PBS Engineering and Environmental Star Lake Soil Remediation PO 41519.001, F&BI 006257 project. Samples were logged in under the laboratory ID's listed below.

Laboratory ID	PBS Engineering and Environmental
006257 -01	R2-3aa
006257 -02	R2-7aa

All quality control requirements were acceptable.

Analysis For Total Metals By EPA Method 6020B

Client ID:	R2-3aa	Client:	PBS Engineering and Environmental
Date Received:	06/17/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/17/20	Lab ID:	006257-01
Date Analyzed:	06/17/20	Data File:	006257-01.109
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	17.9
Lead	24.3

Analysis For Total Metals By EPA Method 6020B

Client ID:	R2-7aa	Client:	PBS Engineering and Environmental
Date Received:	06/17/20	Project:	Star Lake Soil Remediation
Date Extracted:	06/17/20	Lab ID:	006257-02
Date Analyzed:	06/17/20	Data File:	006257-02.119
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	30.5
Lead	24.8

Analysis For Total Metals By EPA Method 6020B

Client ID:	Method Blank	Client:	PBS Engineering and Environmental
Date Received:	Not Applicable	Project:	Star Lake Soil Remediation
Date Extracted:	06/17/20	Lab ID:	I0-351 mb
Date Analyzed:	06/17/20	Data File:	I0-351 mb.107
Matrix:	Soil	Instrument:	ICPMS2
Units:	mg/kg (ppm) Dry Weight	Operator:	SP

Analyte:	Concentration mg/kg (ppm)
Arsenic	<1
Lead	<1

Date of Report: 06/22/20
Date Received: 06/17/20
Project: Star Lake Soil Remediation PO 41519.001, F&BI 006257

QUALITY ASSURANCE RESULTS FOR THE ANALYSIS OF SOIL SAMPLES FOR TOTAL METALS USING EPA METHOD 6020B

Laboratory Code: 006257-01 x5 (Matrix Spike)

Analyte	Reporting Units	Spike Level	Sample Result (Wet wt)	Percent Recovery MS	Percent Recovery MSD	Acceptance Criteria	RPD (Limit 20)
Arsenic	mg/kg (ppm)	10	14.4	73 b	95 b	75-125	26 b
Lead	mg/kg (ppm)	50	20.7	88	89	75-125	1

Laboratory Code: Laboratory Control Sample

Analyte	Reporting Units	Spike Level	Percent Recovery LCS	Acceptance Criteria
Arsenic	mg/kg (ppm)	10	84	80-120
Lead	mg/kg (ppm)	50	96	80-120

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.

006257

SAMPLE CHAIN OF CUSTODY

ME 6/17/20

BI1

Page # 1 of 1

Report To James Welles

Company PBS

Address

City, State, ZIP Seattle

Phone (206) 348 6317 Email james.welles@pbsusa.com

SAMPLERS (*signature*)

PROJECT NAME: STAR LAKE SOIL REMEDIATION

PO #: 41519.001

REMARKS: Project specific RLs? - Yes / No

INVOICE TO

TURNAROUND TIME
- ☐ Standard turnaround
- ☒ RUSH next day

Rush charges authorized by:

SAMPLE DISPOSAL
- ☐ Archive samples
- ☐ Other

Default: Dispose after 30 days

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	As/Pb (6020)				Notes
R2-3aa	01	6/17/20	0836	SOIL	1								X				
R2-7aa	02	6/17/20	0840	SOIL	1								X				
																	Samples received at 22 °C

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	J. Welles	PBS	6/17/20	1133
Received by:	Khoi Hoang	FBI	6/17/20	1133
Relinquished by:				
Received by:				

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