MAUL FOSTER ALONGI
1329 North State Street, Suite 301 | Bellingham, WA 98225 | 360 594 6262 | www.maulfoster.com

February 3, 2023
Project No. M0615.25.001

Scott Hooton
Project Manager, Environmental Programs
Port of Tacoma
One Sitcum Plaza, Tacoma, WA 98421

Re: 2022 Annual Monitoring Summary Report
Former Dunlap Mound Site
Agreed Order No. DE 13124
Monitoring Dates: June 23, 2022, and December 7, 2022

Dear Scott Hooton:

On June 23 and December 7, 2022, Maul Foster & Alongi, Inc. (MFA), conducted two performance groundwater monitoring events on behalf of the Port of Tacoma (the Port) at the former Dunlap Mound Site, located at 3009 Taylor Way, Tacoma, Washington (the Site) (Figure 1). Groundwater monitoring activities were conducted consistent with the requirements set forth in Agreed Order No. DE 13124 between the Port and the Washington State Department of Ecology (Ecology) and in compliance with the *Draft Cleanup Action Plan* prepared by Dalton, Olmstead & Fuglevand (DOF) (DOF 2015b). The field activities and analytical results of the monitoring events are discussed below.

SITE BACKGROUND

The Site, also known as the former Arkema Mound, is approximately 15 acres and is located at 3009 Taylor Way, Tacoma, Washington. The Site is immediately south of a former Arkema manufacturing site located along a portion of the Hylebos Waterway at 2901 Taylor Way. Prior to the early 1990s, Asarco slag was placed as ballast and the Site operated as a log sort yard. The Port is the current owner of the Site, which is now used for storage and staging semitruck trailers (DOF 2015b).

Between the early 1990s and 2015, several interim remedial actions were completed at the Site under Consent Decree No. 92-2-11351-7 and later Agreed Order No. 6129 with Ecology (DOF 2015b). Following completion of the interim actions, a remedial investigation report was finalized in September 2015 (DOF 2015a). The remedial investigation report concluded that the completed interim actions reduced metal concentrations in Site soils, and that all migration pathways, except for groundwater to surface water, were controlled. In 2016, the Port entered Agreed Order No. DE 13124 with Ecology that required performance/confirmation groundwater monitoring and the preparation of an environmental covenant for the Site. The primary objective of the performance/confirmation groundwater

monitoring is to evaluate dissolved arsenic concentrations in the upper aquifer where groundwater discharges to surface water in two areas of the Site: along the Hylebos shoreline in the northeast area, and along the western/southern Site boundary at the head of the Kaiser Ditch (DOF 2021).

Three monitoring wells (MW-H[R], MW-E[R], and MW-1[R]) were installed at the Site in November 2016 (Figure 2). Performance/confirmation groundwater monitoring began in January 2017, with quarterly groundwater monitoring events completed until December 2020 in general accordance with the performance/confirmation groundwater monitoring plan (DOF 2015b, 2021). Following agreement with Ecology, monitoring was discontinued at MW-1(R) in October 2018 (DOF 2021).

In the 2020 annual monitoring summary report, DOF requested a modification to the sampling frequency of 18 months due to stable or decreasing trends of total and dissolved arsenic concentrations in groundwater (DOF 2021). On March 1, 2022, Ecology approved a modification to the groundwater monitoring program to continue on a six-month frequency (Ecology 2022). Monitoring activities resumed in June 2022, as described in this report.

FIELD PROCEDURES

MFA performed groundwater monitoring events at the Site on June 23 and December 7, 2022. Groundwater samples were collected from MW-H(R) and MW-E(R) at the Site using low-flow sampling procedures. The groundwater level in each well was measured prior to sampling and is presented in Table 1. During purging, MFA recorded flow rates, water levels, and water-quality field parameters (pH, temperature, specific conductance, dissolved oxygen, oxidation-reduction potential, and turbidity) on field sampling data sheets (Attachment A). Ferrous iron was measured using a Hach Model IR-18C field kit during the final readings of field parameters. The final field parameters at each sampling event are presented in Table 2.

During the monitoring events, water-quality field parameters were allowed to stabilize before sample collection at monitoring well MW-H(R). However, at monitoring well MW-E(R), significant drawdown was observed during low-flow purging during both the June and December 2022 events (see Attachment A). During the June monitoring event, MFA measured an initial depth to water in monitoring well MW-E(R) of 6.96 feet below ground surface (ft bgs). After four minutes of purging, the depth to water was measured at 7.60 ft bgs, resulting in a water column of only 2.35 feet. After four hours and 30 minutes, the well had not recharged (depth to water measured at 7.58 ft bgs) and a sample was collected for analysis from the remaining water column. Significant drawdown was also observed at MW-E(R) during the December 2022 event within ten minutes of purging and the well was allowed time to recharge (see Attachment A). After two hours and 30 minutes, the well had recharged, and a sample was collected. Field duplicates were collected from MW-H(R) during both 2022 monitoring events.

During the June 2022 monitoring event, groundwater samples collected for dissolved arsenic analysis were field filtered with a 0.45-micron filter and placed directly into laboratory-provided nitric-acid-preserved container, while samples collected for total metals analysis were placed directly into an unpreserved container. Due to dissolved arsenic concentrations exceeding the value of total arsenic concentrations in June (see Results and Discussion section), the sample collection procedure was modified for the December 2022 monitoring event; groundwater for both total and dissolved analyses was first collected into an unpreserved container and homogenized in the field to reduce the potential for non-homogenous sample collection. Groundwater for dissolved arsenic analysis were withdrawn from the unpreserved container, field filtered with a 0.45-micron filter, and placed into a laboratory-provided nitric-acid-preserved container. Groundwater samples for total metals analysis were transferred directly into a nitric-acid-preserved container from the unpreserved container.

All samples were immediately placed in a cooler on ice and submitted to ALS Environmental in Kelso, Washington, for laboratory analysis under standard chain-of-custody procedures. Groundwater samples were analyzed for total and dissolved arsenic by U.S. Environmental Protection Agency Method 200.8.

RESULTS AND DISCUSSION

The laboratory analytical reports for the June and December 2022 monitoring events are provided in Attachment B, and analytical data for both events is included in Table 3. Dissolved arsenic data were screened relative to the cleanup level of 5 micrograms per liter (ug/L), consistent with the *Draft Cleanup Action Plan* (DOF 2015b). Analytical data and the laboratory's internal quality assurance and quality control data were reviewed to assess whether they met project-specific data quality objectives. A data validation memorandum summarizing data evaluation procedures, data usability, and deviations from specific field and/or laboratory methods is included as Attachment C. The data are considered acceptable for their intended use, with appropriate data qualifiers assigned. A Mann-Kendall trend analysis[1] was completed to evaluate concentration trends since compliance/performance monitoring began in 2017 (see Attachment D). Groundwater data from the 2022 monitoring events will be submitted to Ecology's Environmental Information Management System database within 45 days of completion of data validation.

During both monitoring events, the dissolved arsenic concentration was often higher than the total arsenic concentration analyzed from the same sample. Dissolved arsenic concentrations exceeded total arsenic concentrations during previous groundwater monitoring events in July 2017 and April 2018 (DOF 2021), as well. It is possible that matrix interferences influenced the total or dissolved analyses (potentially due to heterogeneity of

[1] Using a toolkit developed by GSI Environmental, Inc.,

the matrix during sample collection and/or brackish matrix caused by tidal influence on groundwater at the Site). To address these potential influences on the data, the laboratory used a saline solution for all quality control samples and the sample collection procedure was modified during the December 2022 monitoring event, as described in the Field Procedure section. This modification appears to have reduced variability of dissolved and total arsenic concentrations in December's samples to acceptable limits (see Attachment C). Both monitoring event results indicate arsenic is present in groundwater primarily in dissolved form.

Monitoring Well MW-H(R)

During the June and December 2022 monitoring events, dissolved arsenic was detected in groundwater from MW-H(R) at concentrations of 45.6 ug/L and 29.0 ug/L, respectively. In both monitoring events, the dissolved arsenic concentration in groundwater from MW-H(R) exceeded the cleanup level (5 ug/L). Similar results were observed for total arsenic with groundwater concentrations of 42.1 ug/L and 27.0 ug/L, respectively.

Plots depicting dissolved and total arsenic concentrations at MW-H(R) are presented in Figure 3. The Mann-Kendall trend analysis shows a decreasing trend for dissolved and total arsenic concentrations in monitoring well MW-H(R) since monitoring began in 2017 (Attachment D).

Monitoring Well MW-E(R)

During the June and December 2022 monitoring event, dissolved arsenic was detected in groundwater from MW-E(R) at concentrations of 17.0 ug/L and 0.92 ug/L, respectively. Dissolved arsenic concentrations from MW-E(R) exceeded the cleanup level (5 ug/L) during the June 2022 monitoring event but not the December 2022 monitoring event. During the June and December 2022 monitoring events, total arsenic was detected in groundwater from MW-E(R) at concentrations of 6.56 ug/L and 1.06 ug/L, respectively.

Plots depicting dissolved and total arsenic concentrations at MW-E(R) are presented in Figure 4. The Mann-Kendall trend analysis shows a probable decreasing trend for dissolved arsenic concentrations and a decreasing trend for total arsenic concentrations in monitoring well MW-E(R) since monitoring began in 2017 (Attachment D).

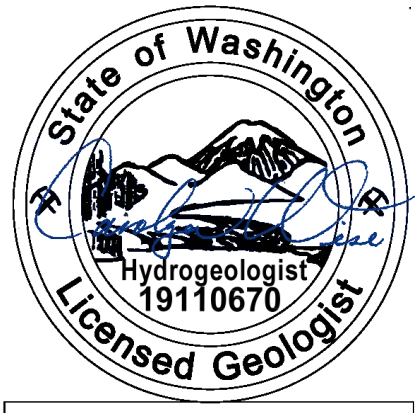
RECOMMENDATIONS

Based on the laboratory results and Mann-Kendall trend analysis following completion of the June and December 2022 groundwater monitoring events, total and dissolved arsenic concentrations are likely decreasing in both monitoring wells at the Site. Therefore, it is recommended that monitoring at the Site be modified to 18-month intervals with the next event scheduled for June 2024.

Please contact Audrey Hackett at (206) 556-2015 if you have any questions related to the groundwater monitoring activities or results presented above.

Sincerely,

Maul Foster & Alongi, Inc.



02/03/2023

Audrey Hackett
Senior Environmental Scientist

Carolyn R. Wise, LHG
Project Hydrogeologist

Attachments: Limitations
References
Tables
Figures
Attachment A—Water Field Sampling Data Sheets
Attachment B—Analytical Laboratory Reports
Attachment C—Data Validation Memorandum
Attachment D—Mann-Kendall Trend Analysis and Plots

cc: Andy Smith, Washington State Department of Ecology

LIMITATIONS

The services undertaken in completing this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty, express or implied, is made. These services were performed consistent with our agreement with our client. This report is solely for the use and information of our client unless otherwise noted. Any reliance on this report by a third party is at such party's sole risk.

Opinions and recommendations contained in this report apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. We are not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. We do not warrant the accuracy of information supplied by others, or the use of segregated portions of this report.

REFERENCES

DOF. 2015a. *Remedial Investigation, Former Arkema Mound Site, 3009 Taylor Way, Tacoma, Washington.* Prepared for Port of Tacoma. Dalton, Olmsted & Fuglevand. September.

DOF. 2015b. *Draft Cleanup Action Plan, Former Arkema Mound Site.* Prepared for Port of Tacoma. Dalton, Olmsted & Fuglevand. November 20.

DOF. 2021. David Cooper, Dalton, Olmsted & Fuglevand. *2020 Annual Monitoring Summary Report, Former Dunlap Mound.* Memorandum to Mohsen Kourehdar, Washington State Department of Ecology. May 5.

Ecology. 2022. Andrew Smith, Washington State Department of Ecology. *Former Dunlap Mound.* Email to Scott Hooton, Port of Tacoma. March 1.

TABLES

Table 1
Summary of Groundwater Water Levels
Former Dunlap Mound Site
Port of Tacoma

Location	Elevation of Top of Casing (ft MLLW)	Well Depth (ft below TOC)	Date	Water Level (ft below TOC)	Water Level Elevation (ft MLLW)
MW-1(R)	15.95	10.2	01/12/2017	2.6	13.35
			04/25/2017	1.81	14.14
			07/28/2017	4.36	11.59
			10/26/2017	2.71	13.24
			01/31/2018	1.55	14.40
			04/30/2018	2.8	13.15
			07/30/2018	4.81	11.14
			10/30/2018	3.02	12.93
MW-E(R)	16.53	10.0	01/12/2017	6.53	10.00
			04/25/2017	6.15	10.38
			07/28/2017	7.37	9.16
			10/26/2017	7	9.53
			01/31/2018	4.75	11.78
			04/30/2018	6.65	9.88
			07/30/2018	7.7	8.83
			10/30/2018	7.35	9.18
			06/28/2019	7.74	8.79
			09/26/2019	7.7	8.83
			12/30/2019	5.28	11.25
			03/31/2020	6.18	10.35
			06/30/2020	7.51	9.02
			09/29/2020	7.6	8.93
			12/23/2020	4.9	11.63
			06/23/2022	6.96	9.57
			12/07/2022	5.44	11.09
MW-H (R)	18.96	13.1	01/12/2017	7.15	11.81
			04/25/2017	7.20	11.76
			07/28/2017	7.36	11.60
			10/26/2017	7.85	11.11
			01/31/2018	7.09	11.87
			04/30/2018	7.62	11.34
			07/30/2018	8.11	10.85
			10/30/2018	7.25	11.71
			06/28/2019	8.09	10.87
			09/26/2019	7.9	11.06
			12/30/2019	7.21	11.75
			03/31/2020	7.22	11.74
			06/30/2020	7.48	11.48

Table 1
Summary of Groundwater Water Levels
Former Dunlap Mound Site
Port of Tacoma

Location	Elevation of Top of Casing (ft MLLW)	Well Depth (ft below TOC)	Date	Water Level (ft below TOC)	Water Level Elevation (ft MLLW)
MW-H(R) (cont.)	18.96	13.1	09/29/2020	7.81	11.15
			12/23/2020	7.21	11.75
			06/23/2022	7.63	11.33
			12/07/2022	7.32	11.64

Notes

2017–2020 water levels are provided by DOF.[(1)]

DOF = Dalton, Olmsted & Fuglevand, Inc.

ft = feet.

MLLW = mean lower low water.

TOC = top of casing.

Reference

[(1)]DOF. 2021. David Cooper, Dalton, Olmsted & Fuglevand, Inc. *2020 Annual Monitoring Summary Report, Former Dunlap Mound* . Table 1. Memorandum to M. Kourehdar, Washington State Department of Ecology. May 5.

Table 2
Summary of Field Parameter Results
Former Dunlap Mound Site
Port of Tacoma

Location	Date	Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	Ferrous Iron (mg/L)	ORP (mV)	pH (SU)	Temperature (°C)	Turbidity (NTU)
MW-1(R)	01/12/2017	828	0.3	4.5	-12.9	6.7	10.6	73.1
	04/25/2017	853	0.1	2.8	-1.3	6.7	11.7	51.2
	07/28/2017	1,010	0.9	4.0	-26.3	6.4	17.2	4.0
	10/26/2017	834	0.7	6.9	-8.9	6.7	15.0	5.6
	01/31/2018	1,176	0.4	2.8	-34.3	6.7	9.3	43.5
	04/30/2018	1,130	0.1	2.8	-42.3	6.5	11.3	31.2
	07/30/2018	1,220	0.1	3.0	-99.5	6.7	15.5	11.0
	10/30/2018	1,033	1.1	4.0	44.8	6.5	15.1	6.8
MW-E(R)	01/12/2017	1,261	0.4	4.5	-57.0	6.4	12.5	60.5
	04/25/2017	646	0.3	5.5	17.2	6.7	10.3	45.6
	07/28/2017	2,216	1.0	6.5	-13.9	6.2	17.8	2.6
	10/26/2017	1,845	0.4	3.7	-30.7	6.4	16.3	6.2
	01/31/2018	612	0.3	2.8	-10.9	6.4	10.0	4.8
	04/30/2018	1,143	1.8	2.2	-86.5	6.4	10.0	12.2
	07/30/2018	2,855	0.4	4.0	-90.2	6.6	17.4	15.7
	10/30/2018	2,404	2.5	2.8	11.2	6.5	16.2	14.9
	06/28/2019	2,837	0.7	4.5	-116.5	6.7	14.3	5.9
	09/26/2019	2,226	0.4	3.2	-92.8	6.2	10.3	18.3
	12/30/2019	595	1.3	2.8	-54.6	6.1	12.0	12.4
	03/31/2020	1,865	3.0	3.6	-88.5	6.2	10.4	3.8
	06/30/2020	2,347	1.4	4.5	-3.4	6.5	13.4	8.3
	09/29/2020	2,445	1.9	6.8	27.3	6.5	17.5	10.3
	12/23/2020	745	1.5	3.5	33.9	6.9	12.8	11.2
	06/23/2022	2,496	2.85	5.5	166	6.34	13.3	29.2
	12/07/2022	596.3	9.4	2.5	-2.6	6.33	12.0	3.08
MW-H (R)	01/12/2017	13,538	0.5	5.0	18.1	6.4	11.5	12.1
	04/25/2017	9,242	0.6	4.3	-0.2	6.5	11.5	14.6
	07/28/2017	11,311	1.4	6.0	-20.1	6.1	18.6	4.3

Table 2
Summary of Field Parameter Results
Former Dunlap Mound Site
Port of Tacoma

Location	Date	Conductivity (uS/cm)	Dissolved Oxygen (mg/L)	Ferrous Iron (mg/L)	ORP (mV)	pH (SU)	Temperature (°C)	Turbidity (NTU)
MW-H (R) (cont.)	10/26/2017	23,373	0.4	5.8	15.8	6.0	16.1	21.8
	01/31/2018	12,883	2.1	2.2	-28.2	6.4	10.1	4.6
	04/30/2018	8,460	1.5	3.5	-56.8	6.4	11.1	34.9
	07/30/2018	17,211	0.8	6.5	-32.2	6.4	17.4	6.5
	10/30/2018	25,604	0.3	4.5	22.7	6.3	16.2	42.9
	06/28/2019	13,618	2.7	6.0	-51.2	6.3	14.9	25.4
	09/26/2019	24,364	0.5	5.6	2.2	6.0	17.4	24.3
	12/30/2019	13,905	0.3	6.0	-22.1	5.9	12.6	32.1
	03/31/2020	16,572	0.4	7.0	-31.6	6.1	10.9	46.2
	06/30/2020	9,933	1.5	3.8	115.7	6.2	13.8	12.3
	09/29/2020	20,611	1.1	7.0	85.2	6.4	17.0	44.4
	12/23/2020	9,875	1.2	6.5	18.4	5.9	12.1	24.7
	06/23/2022	7,332	0.89	4.2	67.4	6.51	17.3	66.0
	12/07/2022	12,605	3.5	6.0	-16.0	6.24	12.7	1.40

Notes

2017–2020 field parameters are provided by DOF[(1)].

°C = degrees Celsius.

DOF = Dalton, Olmsted & Fuglevand, Inc.

mg/L = milligrams per liter.

mV = millivolt.

NTU = nephelometric turbidity unit.

ORP = oxidation reduction potential.

SU = standard units.

uS/cm = microsiemens per centimeter.

Reference

[(1)]DOF. 2021. David Cooper, Dalton, Olmsted & Fuglevand, Inc. *2020 Annual Monitoring Summary Report, Former Dunlap Mound* . Table 1. Memorandum to M. Kourehdar, Washington State Department of Ecology. May 5.

Table 3
Summary of Groundwater Analytical Results
Former Dunlap Mound Site
Port of Tacoma

Location	Collection Date	Sample Type	Dissolved Metals (ug/L)			Total Metals (ug/L)		
			Arsenic	Copper	Zinc	Arsenic	Copper	Zinc
Cleanup Level:[1]			5	3.1	81	NV	NV	NV
MW-1(R)	01/12/2017	N	0.956 D	--	--	0.954	--	--
	04/25/2017	N	0.399 D	--	--	0.404	--	--
	07/28/2017	N	4.03	--	--	1.46	--	--
	10/26/2017	N	0.825	--	--	2.32	--	--
	01/31/2018	N	0.349	--	--	0.682	--	--
	04/30/2018	N	0.247	--	--	0.391	--	--
	07/30/2018	N	1.70	--	--	0.375	--	--
	10/30/2018	N	0.344	--	--	0.328	--	--
MW-E(R)	01/12/2017	N	15.7 D	--	--	22.9	--	--
	04/25/2017	N	7.96 D	--	--	35.5	--	--
	07/28/2017	N	30.3	--	--	14.4	--	--
	10/26/2017	N	25.1	--	--	26.1 D	--	--
	01/31/2018	N	5.36	--	--	2.07	--	--
	04/30/2018	N	40.2 D	--	--	21.7	--	--
	07/30/2018	N	48.6	--	--	13.1	--	--
	10/30/2018	N	50.2	--	--	13.0	--	--
	06/28/2019	N	18.8	--	--	20.7	--	--
	09/26/2019	N	26.6	--	--	28.8	--	--
	12/30/2019	N	4.69	--	--	5.24	--	--
	03/31/2020	N	2.00 D	--	--	2.21	--	--
	06/30/2020	N	11.0 D	--	--	11.3 D	--	--
	09/29/2020	N	19.2 D	--	--	23.8 D	--	--
	12/23/2020	N	3.61 D	--	--	3.67 D	--	--
	06/23/2022	N	17.0 J	--	--	6.56 J	--	--
	12/07/2022	N	0.92	--	--	1.06	--	--
MW-H(R)	01/12/2017	N	67.5 D	2.5 U	20 U	72.2	2.5 U	20 U
	04/25/2017	N	46.7 D	2.5 U	20 U	55.3	2.5 U	20 U
	07/28/2017	N	90.2 D	--	--	81.6 D	--	--
	10/26/2017	N	50.5 D	--	--	60.3 D	--	--
	01/31/2018	N	50.9 D	--	--	55.7 D	--	--
	04/30/2018	N	60.5 D	--	--	45.8 D	--	--
	07/30/2018	N	34.7 D	--	--	50.7 D	--	--
	10/30/2018	N	36.2 D	--	--	54.7 D	--	--
	06/28/2019	N	47.2 D	--	--	57.5 D	--	--
	06/28/2019	FD	45.8	--	--	58.7	--	--
	09/26/2019	N	46.4 D	--	--	48.1 D	--	--
	09/26/2019	FD	46.5	--	--	49.8	--	--
	12/30/2019	N	34.7 D	--	--	41.3 D	--	--

Table 3
Summary of Groundwater Analytical Results
Former Dunlap Mound Site
Port of Tacoma

Location	Collection Date	Sample Type	Dissolved Metals (ug/L)			Total Metals (ug/L)		
			Arsenic	Copper	Zinc	Arsenic	Copper	Zinc
Cleanup Level:[1]			5	3.1	81	NV	NV	NV
MW-H(R) (cont.)	12/30/2019	FD	35.0	--	--	43.1	--	--
	03/31/2020	N	7.51 D	--	--	20.9 D	--	--
	03/31/2020	FD	8.58	--	--	20.4	--	--
	06/30/2020	N	32.9 D	--	--	40.7 D	--	--
	06/30/2020	FD	34.4	--	--	42.2	--	--
	09/29/2020	N	26.5 D	--	--	45.9 D	--	--
	09/29/2020	FD	29.8	--	--	42.0	--	--
	12/23/2020	N	32.8 D	--	--	35.5 D	--	--
	12/23/2020	FD	31.7	--	--	34.8	--	--
	06/23/2022	N	45.6	--	--	42.1	--	--
	06/23/2022	FD	44.5	--	--	41.8	--	--
	12/07/2022	N	26.6	--	--	26.4	--	--
	12/07/2022	FD	29.0	--	--	27.0	--	--

Notes

2017–2020 analytical results are provided by DOF[2].

Gray shading indicates values that exceed project cleanup levels; non-detects (U) were not compared with cleanup levels.

-- = not analyzed.

D = the reported value is from a dilution.

DOF = Dalton, Olmsted & Fuglevand, Inc.

FD = field duplicate sample.

J = result is estimated.

N = normal environmental sample.

NV = no value.

U = result is non-detect at the detection limit.

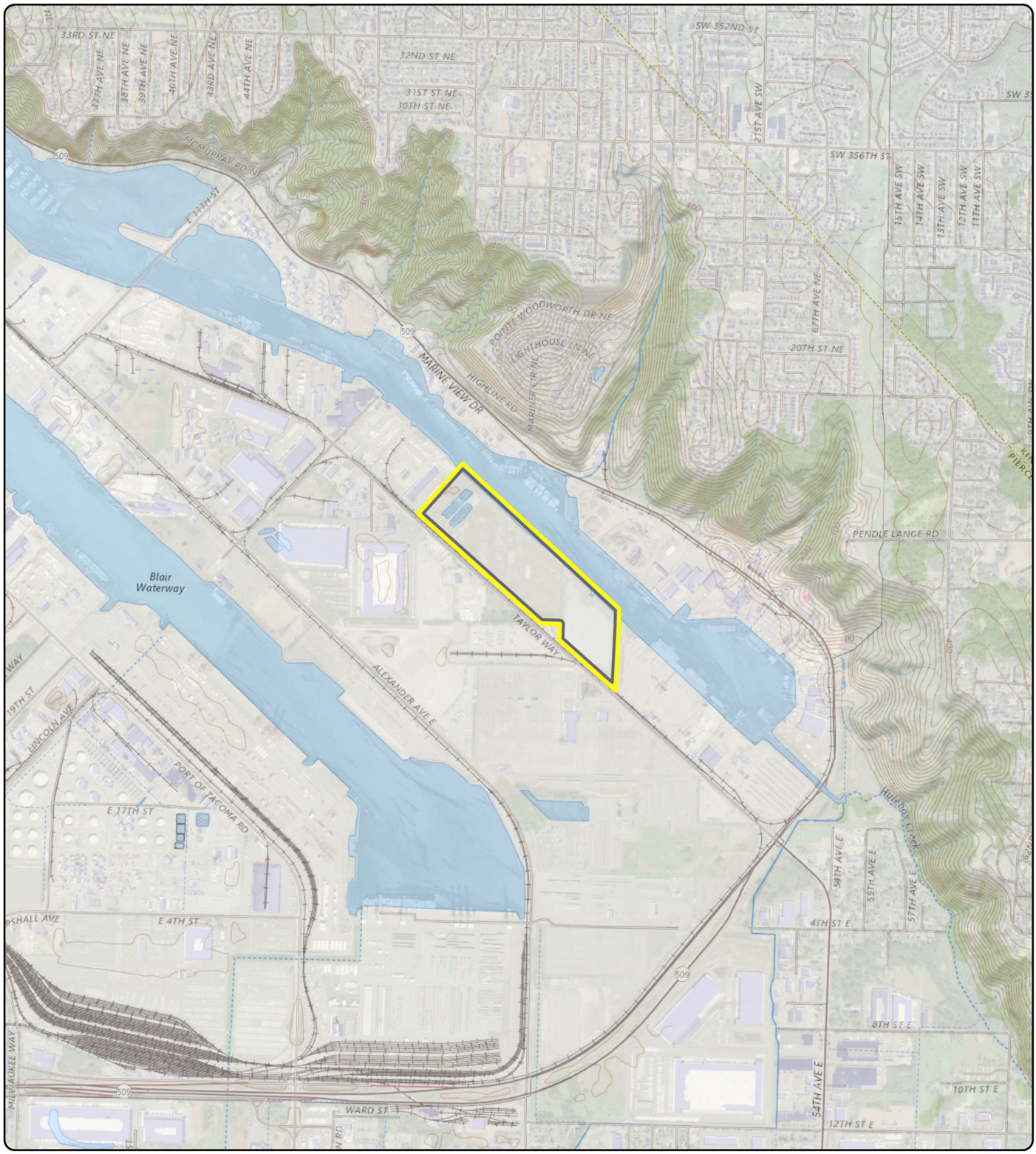
ug/L = micrograms per liter.

Reference

[1]DOF. 2015. *Draft Cleanup Action Plan, Former Arkema Mound Site* . Prepared for Port of Tacoma. Dalton, Olmsted & Fuglevand, Inc. November 20.

[2]DOF. 2021. David Cooper, Dalton, Olmsted & Fuglevand, Inc. *2020 Annual Monitoring Summary Report, Former Dunlap Mound* . Table 1. Memorandum to M. Kourehdar, Washington State Department of Ecology Ref. May 5.

FIGURES



Notes
U.S. Geological Survey 7.5-minute topographic quadrangles: Tacoma North and Poverty Bay. Township 21 north, range 3 east, sections 35, 36.

Data Source
Property boundary obtained from Pierce County.

Legend

Property Boundary

Figure 1
Property Location

Former Dunlap Mound Site
3009 Taylor Way
Tacoma, WA

0 1,000 2,000
Feet

MAUL FOSTER ALONGI
p. 971 544 2139 | www.maulfoster.com

Path: X:\0_MFA_Projects\M0615.25\001\M0615_25_001.aprx
Print Date: 1/11/2023
Reviewed By: jlenahansen
Produced By: jelstratt
Project: M0615.25.001

Figure 2
Property Features

Former Dunlap Mound Site
3009 Taylor Way
Tacoma, WA

Legend

- Monitoring Well
- Property Boundary
- Tax Lot

0 200
Feet

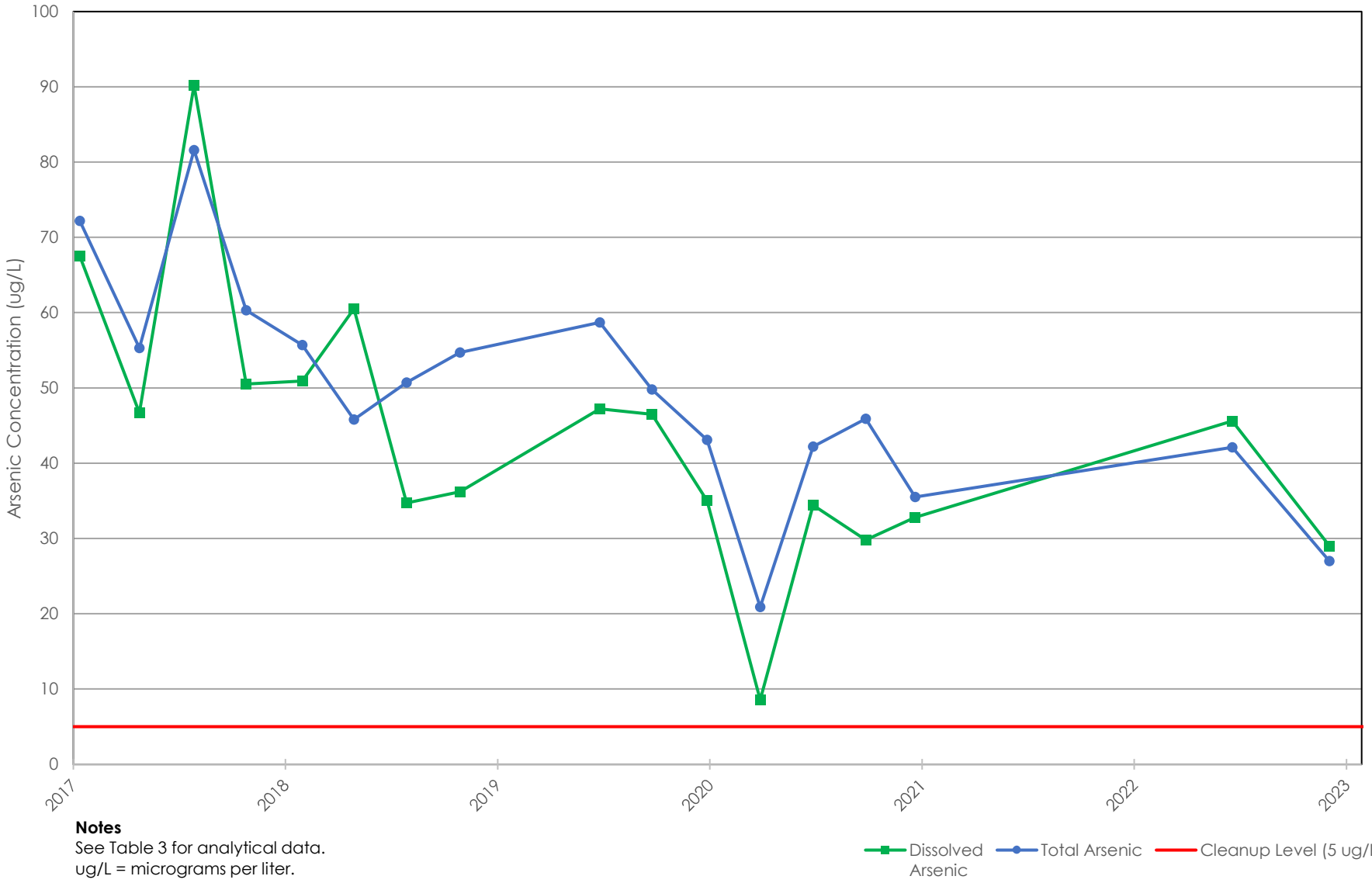
Data Sources
Aerial photograph obtained from Bing; tax lot data obtained from Pierce County.

MAUL FOSTER ALONGI
p. 971 544 2139 | www.maulfoster.com

Project: M0615.25.001 Produced By: jeistott Reviewed By: jlenathansen Print Date: 1/24/2023

MAUL FOSTER ALONGI

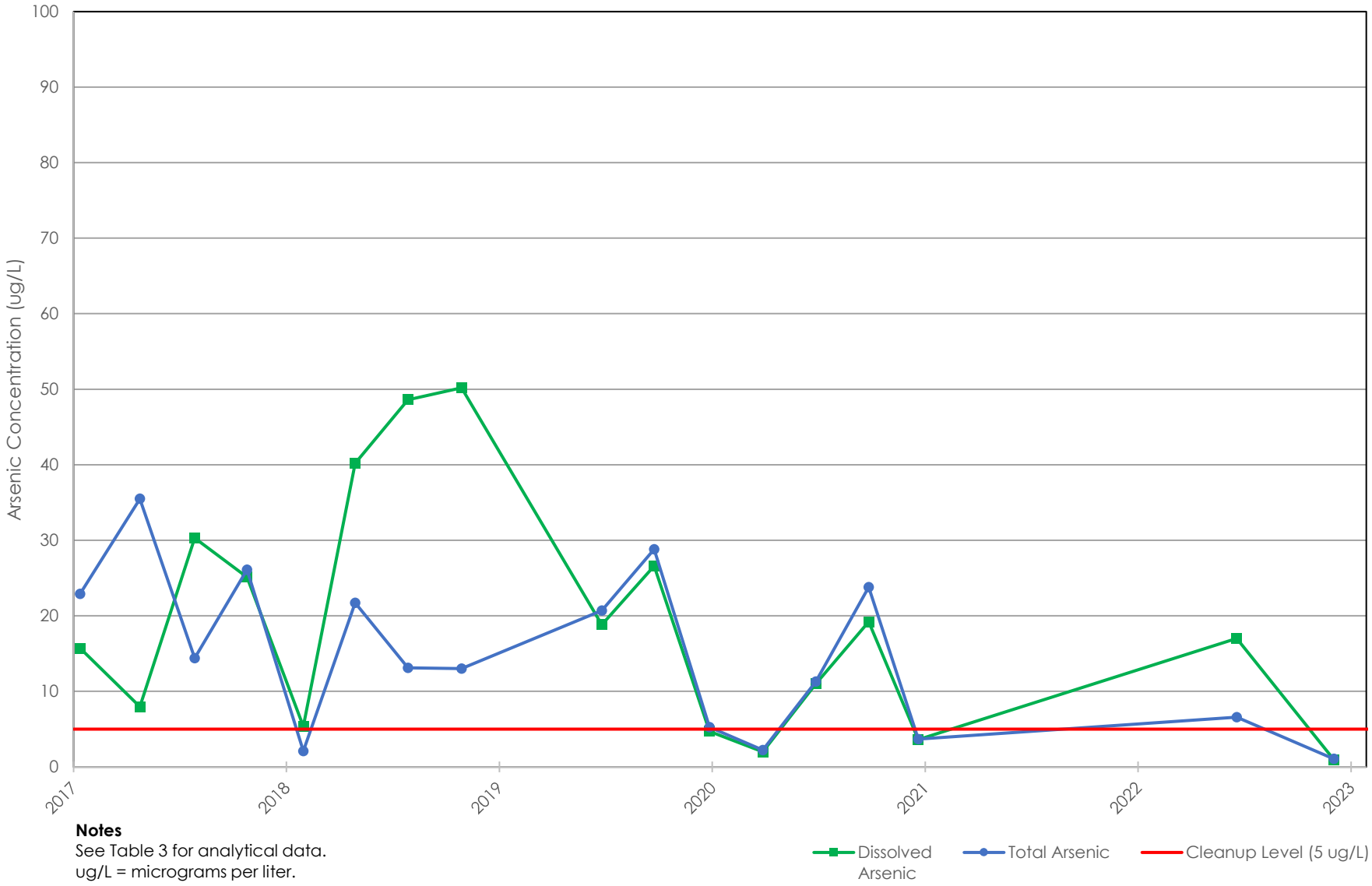
Figure 3
MW-H(R) Trend Plot
Former Dunlap Mound Site
Tacoma, Washington



Notes
See Table 3 for analytical data.
ug/L = micrograms per liter.

MAUL FOSTER ALONGI

Figure 4
MW-E(R) Trend Plot
Former Dunlap Mound Site
Tacoma, Washington



Notes
See Table 3 for analytical data.
ug/L = micrograms per liter.

ATTACHMENT A

WATER FIELD SAMPLING DATA SHEETS

Maul Foster & Alongi, Inc.

109 East 13th Street, Vancouver, WA 98660 (360) 694-2691 Fax. (360) 906-1

Water Field Sampling Data Sheet

Client Name	Port of Tacoma	**Sample Location**	MW-E(R)		
Project #	M0615.25.001	**Sampler**	S. Maloney		
Project Name	Former Dunlap Mound Site	**Sampling Date**	6/23/2022		
Sampling Event	June 2022	**Sample Name**	MW-E(R)		
Sub Area		**Sample Depth**	8.9		
FSDS QA:	J. Lenahansen, 7/21/2022	**Easting**		**Northing**	**TOC**

Hydrology/Level Measurements

					(Product Thickness)	(Water Column)	(Gallons/ft x Water Column)
Date	**Time**	**DT-Bottom**	**DT-Product**	**DT-Water**	**DTP-DTW**	**DTB-DTW**	**Pore Volume**
6/23/2022	8:40	9.95		6.96		2.99	0.49

(0.75" = 0.023 gal/ft) (1" = 0.041 gal/ft) (1.5" = 0.092 gal/ft) (2" = 0.163 gal/ft) (3" = 0.367 gal/ft) (4" = 0.653 gal/ft) (6" = 1.469 gal/ft) (8" = 2.611 gal/ft)

Water Quality Data

Purge Method	**Time**	**Purge Vol (gal)**	**Flowrate l/min**	**pH**	**Temp (C)**	**E Cond (uS/cm)**	**DO (mg/L)**	**ORP**	**Turbidity**
(2) Peristaltic Pump									
Final Field Parameters	9:34:00 AM	0	0.2	6.34	13.3	2496	2.85	166	29.2

Methods: (1) Submersible Pump (2) Peristaltic Pump (3) Disposable Bailer (4) Vacuum Pump (5) Dedicated Bailer (6) Inertia Pump (7) Other (specify)

Water Quality Observations:

Clear; colorless; no odor; no sheen.

Sample Information

Sampling Method	**Sample Type**	**Sampling Time**	**Container Code/Preservative**	**#**	**Filtered**
(2) Peristaltic Pump	Groundwater	2:00:00 PM	VOA-Glass		
			Amber Glass		
			White Poly		
			Yellow Poly		
			Green Poly		
			Red Total Poly	2	No
			Red Dissolved Poly	2	Yes
			Total Bottles	4	

General Sampling Comments

Began purging at 09:30. Water level decresed to 7.60 feet bgs after 4 minutes of purging. Paused following parameter collection to assess recharge. Water level prior to sampling was 7.58 feet bgs.
Ferrous Iron: 5.5 mg/L.
Final DTW: 8.87 feet bgs.

Maul Foster & Alongi, Inc.

109 East 13th Street, Vancouver, WA 98660 (360) 694-2691 Fax. (360) 906-1

Water Field Sampling Data Sheet

Client Name	Port of Tacoma	**Sample Location**	MW-E(R)				
Project #	M0615.25.001	**Sampler**	C. Sifford				
Project Name	Former Dunlap Mound Site	**Sampling Date**	12/7/2022				
Sampling Event	December 2022	**Sample Name**	MW-E(R)				
Sub Area		**Sample Depth**	7.5				
FSDS QA:	J. Lenahansen, 1/11/2023	**Easting**		**Northing**		**TOC**	

Hydrology/Level Measurements

					(Product Thickness)	(Water Column)	(Gallons/ft x Water Column)
Date	**Time**	**DT-Bottom**	**DT-Product**	**DT-Water**	**DTP-DTW**	**DTB-DTW**	**Pore Volume**
12/7/2022	10:16	9.95		5.44		4.51	0.74

(0.75" = 0.023 gal/ft) (1" = 0.041 gal/ft) (1.5" = 0.092 gal/ft) (2" = 0.163 gal/ft) (3" = 0.367 gal/ft) (4" = 0.653 gal/ft) (6" = 1.469 gal/ft) (8" = 2.611 gal/ft)

Water Quality Data

Purge Method	**Time**	**Purge Vol (gal)**	**Flowrate l/min**	**pH**	**Temp (C)**	**E Cond (uS/cm)**	**DO (mg/L)**	**ORP**	**Turbidity**
(2) Peristaltic Pump	10:32:00 AM	0.05	0.04	6.32	11.4	543.4	8.1	-63.3	1.59
	10:35:00 AM	0.1	0.04	6.3	12.8	540.3	5.7	-66.6	2.85
Final Field Parameters	1:10:00 PM	0.15	0.04	6.33	12	596.3	9.4	-2.6	3.08

Methods: (1) Submersible Pump (2) Peristaltic Pump (3) Disposable Bailer (4) Vacuum Pump (5) Dedicated Bailer (6) Inertia Pump (7) Other (specify)

Water Quality Observations:

Clear; colorless; sulfur odor; no sheen.

Sample Information

Sampling Method	**Sample Type**	**Sampling Time**	**Container Code/Preservative**	**#**	**Filtered**
(2) Peristaltic Pump	Groundwater	1:20:00 PM	VOA-Glass		
			Amber Glass		
			White Poly		
			Yellow Poly		
			Green Poly		
			Red Total Poly	1	No
			Red Dissolved Poly	1	Yes
			Total Bottles	2	

General Sampling Comments

Began purge at 10:25.
Ferrous iron = 2.5 mg/L.
Water level dropped 1.11 feet in 10 minutes.
Paused purging to allow 0.59 ft of recharge between 10:36 and 13:07.
DTW at time of sampling = 6.56 ft.
Final DTW = 7.02 ft.

Maul Foster & Alongi, Inc.

109 East 13th Street, Vancouver, WA 98660 (360) 694-2691 Fax. (360) 906-1

Water Field Sampling Data Sheet

Client Name	Port of Tacoma	**Sample Location**	MW-H(R)				
Project #	M0615.25.001	**Sampler**	S. Maloney				
Project Name	Former Dunlap Mound Site	**Sampling Date**	6/23/2022				
Sampling Event	June 2022	**Sample Name**	MW-H(R)				
Sub Area		**Sample Depth**	10.5				
FSDS QA:	J. Lenahansen, 7/21/2022	**Easting**		**Northing**		**TOC**	

Hydrology/Level Measurements

					(Product Thickness)	(Water Column)	(Gallons/ft x Water Column)
Date	**Time**	**DT-Bottom**	**DT-Product**	**DT-Water**	**DTP-DTW**	**DTB-DTW**	**Pore Volume**
6/23/2022	9:00	13.04		7.63		5.41	0.88

(0.75" = 0.023 gal/ft) (1" = 0.041 gal/ft) (1.5" = 0.092 gal/ft) (2" = 0.163 gal/ft) (3" = 0.367 gal/ft) (4" = 0.653 gal/ft) (6" = 1.469 gal/ft) (8" = 2.611 gal/ft)

Water Quality Data

Purge Method	**Time**	**Purge Vol (gal)**	**Flowrate l/min**	**pH**	**Temp (C)**	**E Cond (uS/cm)**	**DO (mg/L)**	**ORP**	**Turbidity**
(2) Peristaltic Pump	10:36:00 AM	0.2	0.1	6.51	16.7	8701	0.78	66.2	68.3
	10:39:00 AM	0.3	0.1	6.52	16.9	8300	0.75	64.2	76.1
	10:42:00 AM	0.4	0.1	6.52	17	8035	0.74	64.3	73.5
	10:45:00 AM	0.5	0.1	6.52	17.1	7740	0.8	63.9	73.9
	10:48:00 AM	0.6	0.1	6.51	17.3	7525	0.85	65.5	71.8
	10:51:00 AM	0.7	0.1	6.51	17.4	7392	0.87	66.6	70.4
Final Field Parameters	10:54:00 AM	0.8	0.1	6.51	17.3	7332	0.89	67.4	66

Methods: (1) Submersible Pump (2) Peristaltic Pump (3) Disposable Bailer (4) Vacuum Pump (5) Dedicated Bailer (6) Inertia Pump (7) Other (specify)

Water Quality Observations:

Clear; colorless; no odor; no sheen.

Sample Information

Sampling Method	**Sample Type**	**Sampling Time**	**Container Code/Preservative**	**#**	**Filtered**
(2) Peristaltic Pump	Groundwater	11:15:00 AM	VOA-Glass		
			Amber Glass		
			White Poly		
			Yellow Poly		
			Green Poly		
			Red Total Poly	2	No
			Red Dissolved Poly	2	Yes
			Total Bottles	4	

General Sampling Comments

Began purging at 10:14. Paused at 10:18 to assess recharge.
Ferrous Iron: 4.2 mg/L.
Final DTW: 8.07 feet bgs.
Dup sample DUPL-1 collected here.

Maul Foster & Alongi, Inc.

109 East 13th Street, Vancouver, WA 98660 (360) 694-2691 Fax. (360) 906-1

Water Field Sampling Data Sheet

Client Name	Port of Tacoma	**Sample Location**	MW-H(R)
Project #	M0615.25.001	**Sampler**	C. Sifford
Project Name	Former Dunlap Mound Site	**Sampling Date**	12/7/2022
Sampling Event	December 2022	**Sample Name**	MW-H(R)
Sub Area		**Sample Depth**	10
FSDS QA:	J. Lenahansen, 1/11/2023	**Easting**	**Northing**	**TOC**

Hydrology/Level Measurements

					(Product Thickness)	(Water Column)	(Gallons/ft x Water Column)
Date	**Time**	**DT-Bottom**	**DT-Product**	**DT-Water**	**DTP-DTW**	**DTB-DTW**	**Pore Volume**
12/7/2022	11:01	13.02		7.32		5.7	0.93

(0.75" = 0.023 gal/ft) (1" = 0.041 gal/ft) (1.5" = 0.092 gal/ft) (2" = 0.163 gal/ft) (3" = 0.367 gal/ft) (4" = 0.653 gal/ft) (6" = 1.469 gal/ft) (8" = 2.611 gal/ft)

Water Quality Data

Purge Method	Time	Purge Vol (gal)	Flowrate l/min	pH	Temp (C)	E Cond (uS/cm)	DO (mg/L)	ORP	Turbidity
(2) Peristaltic Pump	11:45:00 AM	1.1	0.1	6.22	12.7	13525	4.6	-47.5	5.86
	11:49:00 AM	1.2	0.1	6.23	12.7	13384	4	-17.1	5.48
	11:52:00 AM	1.3	0.1	6.23	12.7	13231	3.8	-27.4	3.43
	11:56:00 AM	1.4	0.1	6.23	12.7	13130	3.7	-3.8	2.31
	12:01:00 PM	1.6	0.1	6.24	12.7	12944	3.5	23.8	1.74
	12:06:00 PM	1.8	0.1	6.24	12.7	12653	3.4	-20.5	1.74
Final Field Parameters	12:10:00 PM	1.9	0.1	6.24	12.7	12605	3.5	-16	1.4

Methods: (1) Submersible Pump (2) Peristaltic Pump (3) Disposable Bailer (4) Vacuum Pump (5) Dedicated Bailer (6) Inertia Pump (7) Other (specify)

Water Quality Observations:

Cloudy, then clear; slight orange tint; no odor; no sheen.

Sample Information

Sampling Method	Sample Type	Sampling Time	Container Code/Preservative	#	Filtered
(2) Peristaltic Pump	Groundwater	12:20:00 PM	VOA-Glass		
			Amber Glass		
			White Poly		
			Yellow Poly		
			Green Poly		
			Red Total Poly	1	No
			Red Dissolved Poly	1	Yes
			Total Bottles	2	

General Sampling Comments

Began purge at 11:05.
Ferrous iron = 6.0 mg/L.
Duplicate sample DUPL-1 collected here.
ORP began oscillating between -30 and +20 at 11:47.
Final DTW = 7.98 feet.

ATTACHMENT B

ANALYTICAL LABORATORY REPORTS

ALS Environmental
ALS Group USA, Corp
1317 South 13th Avenue
Kelso, WA 98626
T : +1 360 577 7222
F : +1 360 636 1068
www.alsglobal.com

August 04, 2022

Analytical Report for Service Request No: K2207090
Revised Service Request No: K2207090.01

Audrey Hackett
Maul Foster & Alongi, Incorporated
2815 2nd Avenue, Suite 540
Seattle, WA 98121

RE: Port of Tacoma - Dunlap Mound / M0615.25.0001, Task 3

Dear Audrey,

Enclosed is the revised report of the sample(s) submitted to our laboratory June 24, 2022
For your reference, these analyses have been assigned our service request number **K2207090.**

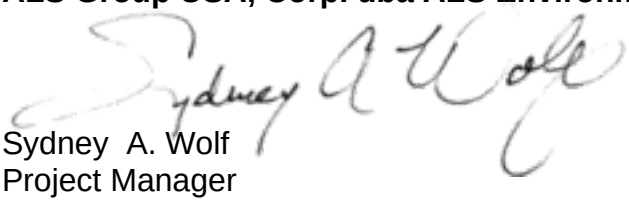
Revised to include Batch QC.

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3377. You may also contact me via email at Sydney.Wolf@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental



Sydney A. Wolf
Project Manager

ALS Environmental
ALS Group USA, Corp
1317 South 13th Avenue
Kelso, WA 98626
T : +1 360 577 7222
F : +1 360 636 1068
www.alsglobal.com

Table of Contents

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/EnvironmentalLabCertification/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.
Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

Case Narrative

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Client: Maul Foster & Alongi, Incorporated
Project: Port of Tacoma - Dunlap Mound
Sample Matrix: Ground Water

Service Request: K2207090
Date Received: 06/24/2022

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier II level requested by the client.

Sample Receipt:

Three ground water samples were received for analysis at ALS Environmental on 06/24/2022. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

Metals:

Method 200.8, 07/06/2022: The concentration of dissolved Arsenic in sample MW-E(R) was found to be higher than the total concentration (17.0 ug/L versus 6.56 ug/L respectively). The sample containers received from the field were analyzed directly (i.e. without digestion) confirming that Arsenic was truly higher in the bottle designated for dissolved analysis. No additional corrective action was appropriate.

Approved by Sydney A Wolfe Date 08/04/2022

Chain of Custody

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

SAMPLE CHAIN OF CUSTODY

KZZ07040

Page # 1 of 1

Report To Audrey Hackett
Company Maul Foster & Alongi, Inc.
Address 2815 2nd Ave Suite 540
City, State, ZIP Seattle, WA 98121
Phone 206 331 1835 Email ahackett@maulfoster.com

SAMPLERS (*signature*)

PROJECT NAME: Port of Tacoma - Dunlap Mound
PO #: M0615.25.001

REMARKS

INVOICE TO: accounting@maulfoster.com

TURNAROUND TIME
☒ Standard Turnaround
☐ RUSH
Rush charges authorized by:

SAMPLE DISPOSAL
☐ Dispose after 30 days
☐ Archive Samples
☐ Other

Sample ID	Lab ID	Date Sampled	Time Sampled	Sample Type	# of Jars	TPH-HCID	TPH-Diesel	TPH-Gasoline	BTEX by 8021B	VOCs by 8260C	SVOCs by 8270D	PAHs 8270D SIM	Total + D Cr and As by EPA 200.8*	Salinity		Notes
MW-H(R)		6/23/22	1115	GW	4								⊗	X		* Screen samples for salinity prior to analysis to inform potential reductive precipitation
MW-E(R)		"	1400	GW	4								⊗	X		
DUPL-1		"	1115	GW	4								⊗	X		
																x = run
																⊗ = hold

SIGNATURE	PRINT NAME	COMPANY	DATE	TIME
Relinquished by:	Sean Maloney	MFA	6/23/22	1415
Received by:		AIS	6/24/22	0950
Relinquished by:				
Received by:				

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

PM SW

Cooler Receipt and Preservation Form

Client Arcadis Foster + Atenoji Service Request K22 07090

Received: 6/24/22 Opened: 6/24/22 By: AP Unloaded: 6/24/22 By: AP

1. Samples were received via? *USPS* *Fed Ex* *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) *Cooler* *Box* *Envelope* *Other*_____ *NA*
3. Were custody seals on coolers? NA Y (N) If yes, how many and where? _____
   If present, were custody seals intact? Y N If present, were they signed and dated? Y N

Temp Blank	Sample Temp	IR Gun	Cooler #/COC ID / NA	Out of temp indicate with "X"	PM Notified If out of temp	Tracking Number NA	Filed
—	2.4	IR02		—	—	274713583614	

4. Was a Temperature Blank present in cooler? NA Y (N) If yes, notate the temperature in the appropriate column above:
   If no, take the temperature of a representative sample bottle contained within the cooler; notate in the column "Sample Temp":
5. Were samples received within the method specified temperature ranges? NA (Y) N
   If no, were they received on ice and same day as collected? If not, notate the cooler # below and notify the PM. (NA) Y N

If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*

6. Packing material: *Inserts* (*Baggies*) *Bubble Wrap* *Gel Packs* (*Wet Ice*) *Dry Ice* *Sleeves* _____
7. Were custody papers properly filled out (ink, signed, etc.)? NA (Y) N
8. Were samples received in good condition (unbroken) NA (Y) N
9. Were all sample labels complete (ie, analysis, preservation, etc.)? NA (Y) N
10. Did all sample labels and tags agree with custody papers? NA (Y) N
11. Were appropriate bottles/containers and volumes received for the tests indicated? NA Y (N)
12. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA (Y) N
13. Were VOA vials received without headspace? *Indicate in the table below.* (NA) Y N
14. Was C12/Res negative? (NA) Y N
15. Were 100ml sterile microbiology bottles filled exactly to the 100ml mark? (NA) Y N Under filled Overfilled

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, Resolutions: All bottles preserved with HNO3, did not receive a Salinity bottle

Metals

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360)577-7222 Fax (360)636-1068
www.alsglobal.com

Analytical Report

Client:	Maul Foster & Alongi, Incorporated	**Service Request:**	K2207090
Project:	Port of Tacoma - Dunlap Mound/M0615.25.0001, Task 3	**Date Collected:**	06/23/22 11:15
Sample Matrix:	Ground Water	**Date Received:**	06/24/22 09:50
Sample Name:	MW-H(R)	**Basis:**	NA
Lab Code:	K2207090-001		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**45.6**	ug/L	0.50	2	07/14/22 09:55	07/12/22	

Analytical Report

Client:	Maul Foster & Alongi, Incorporated	**Service Request:**	K2207090
Project:	Port of Tacoma - Dunlap Mound/M0615.25.0001, Task 3	**Date Collected:**	06/23/22 11:15
Sample Matrix:	Ground Water	**Date Received:**	06/24/22 09:50
Sample Name:	MW-H(R)	**Basis:**	NA
Lab Code:	K2207090-001		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**42.1**	ug/L	0.50	2	07/14/22 09:51	07/12/22	

Analytical Report

Client:	Maul Foster & Alongi, Incorporated	**Service Request:**	K2207090
Project:	Port of Tacoma - Dunlap Mound/M0615.25.0001, Task 3	**Date Collected:**	06/23/22 14:00
Sample Matrix:	Ground Water	**Date Received:**	06/24/22 09:50
Sample Name:	MW-E(R)	**Basis:**	NA
Lab Code:	K2207090-002		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**17.0**	ug/L	0.50	1	07/06/22 13:23	07/05/22	

Analytical Report

Client:	Maul Foster & Alongi, Incorporated	**Service Request:**	K2207090
Project:	Port of Tacoma - Dunlap Mound/M0615.25.0001, Task 3	**Date Collected:**	06/23/22 14:00
Sample Matrix:	Ground Water	**Date Received:**	06/24/22 09:50
Sample Name:	MW-E(R)	**Basis:**	NA
Lab Code:	K2207090-002		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**6.56**	ug/L	0.50	1	07/06/22 13:21	07/05/22	

Analytical Report

Client:	Maul Foster & Alongi, Incorporated	**Service Request:**	K2207090
Project:	Port of Tacoma - Dunlap Mound/M0615.25.0001, Task 3	**Date Collected:**	06/23/22 11:15
Sample Matrix:	Ground Water	**Date Received:**	06/24/22 09:50
Sample Name:	DUPL-1	**Basis:**	NA
Lab Code:	K2207090-003		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**44.5**	ug/L	0.50	2	07/14/22 09:57	07/12/22	

Analytical Report

Client:	Maul Foster & Alongi, Incorporated	**Service Request:**	K2207090
Project:	Port of Tacoma - Dunlap Mound/M0615.25.0001, Task 3	**Date Collected:**	06/23/22 11:15
Sample Matrix:	Ground Water	**Date Received:**	06/24/22 09:50
Sample Name:	DUPL-1	**Basis:**	NA
Lab Code:	K2207090-003		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**41.8**	ug/L	0.50	2	07/14/22 09:54	07/12/22	

Analytical Report

Client:	Maul Foster & Alongi, Incorporated	**Service Request:**	K2207090
Project:	Port of Tacoma - Dunlap Mound/M0615.25.0001, Task 3	**Date Collected:**	NA
Sample Matrix:	Ground Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	KQ2211214-01		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	ND U	ug/L	0.50	2	07/14/22 09:48	07/12/22	

Analytical Report

Client:	Maul Foster & Alongi, Incorporated	**Service Request:**	K2207090
Project:	Port of Tacoma - Dunlap Mound/M0615.25.0001, Task 3	**Date Collected:**	NA
Sample Matrix:	Ground Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	KQ2210900-01		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	ND U	ug/L	0.50	1	07/06/22 13:00	07/05/22	

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	Maul Foster & Alongi, Incorporated	**Service Request:**	K2207090
Project	Port of Tacoma - Dunlap Mound/M0615.25.0001, Task 3	**Date Collected:**	06/23/22
Sample Matrix:	Ground Water	**Date Received:**	06/24/22
		Date Analyzed:	07/14/22

Replicate Sample Summary
Total Metals

Sample Name:	MW-H(R)	**Units:**	ug/L
Lab Code:	K2207090-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample KQ2211214-05 Result	Average	RPD	RPD Limit
Arsenic	200.8	0.50	42.1	43.8	43.0	4	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	Maul Foster & Alongi, Incorporated	**Service Request:**	K2207090
Project	Port of Tacoma - Dunlap Mound/M0615.25.0001, Task 3	**Date Collected:**	NA
Sample Matrix:	Surface Water	**Date Received:**	NA
		Date Analyzed:	07/06/22

Replicate Sample Summary
Total Metals

Sample Name:	Batch QC	**Units:**	ug/L
Lab Code:	K2207367-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample KQ2210900-04 Result	Average	RPD	RPD Limit
Arsenic	200.8	0.50	9.92	9.70	9.81	2	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	Maul Foster & Alongi, Incorporated	**Service Request:**	K2207090
Project	Port of Tacoma - Dunlap Mound/M0615.25.0001, Task 3	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
		Date Analyzed:	07/06/22

Replicate Sample Summary

Total Metals

Sample Name:	Batch QC	**Units:**	ug/L
Lab Code:	K2207388-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample KQ2210900-06 Result	Average	RPD	RPD Limit
Arsenic	200.8	0.50	0.92	0.81	0.87	13	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Printed 8/2/2022 3:04:40 PM Superset Reference:

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Maul Foster & Alongi, Incorporated	**Service Request:**	K2207090
Project:	Port of Tacoma - Dunlap Mound/M0615.25.0001, Task 3	**Date Collected:**	06/23/22
Sample Matrix:	Ground Water	**Date Received:**	06/24/22
		Date Analyzed:	07/14/22
		Date Extracted:	07/12/22

Matrix Spike Summary
Total Metals

Sample Name:	MW-H(R)	**Units:**	ug/L
Lab Code:	K2207090-001	**Basis:**	NA
Analysis Method:	200.8		
Prep Method:	EPA CLP ILM04.0		

Matrix Spike
KQ2211214-06

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Arsenic	42.1	96.4	50.0	109	70-130

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

Client:	Maul Foster & Alongi, Incorporated	**Service Request:**	K2207090
Project:	Port of Tacoma - Dunlap Mound/M0615.25.0001, Task 3	**Date Collected:**	N/A
Sample Matrix:	Surface Water	**Date Received:**	N/A
		Date Analyzed:	07/6/22
		Date Extracted:	07/5/22

Matrix Spike Summary
Total Metals

Sample Name:	Batch QC	**Units:**	ug/L
Lab Code:	K2207367-001	**Basis:**	NA
Analysis Method:	200.8		
Prep Method:	EPA CLP ILM04.0		

Matrix Spike
KQ2210900-03

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Arsenic	9.92	58.8	50.0	98	70-130

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Maul Foster & Alongi, Incorporated	**Service Request:**	K2207090
Project:	Port of Tacoma - Dunlap Mound/M0615.25.0001, Task 3	**Date Collected:**	N/A
Sample Matrix:	Water	**Date Received:**	N/A
		Date Analyzed:	07/6/22
		Date Extracted:	07/5/22

Matrix Spike Summary
Total Metals

Sample Name:	Batch QC	**Units:**	ug/L
Lab Code:	K2207388-001	**Basis:**	NA
Analysis Method:	200.8		
Prep Method:	EPA CLP ILM04.0		

Matrix Spike
KQ2210900-05

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Arsenic	0.92	51.9	50.0	102	70-130

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Maul Foster & Alongi, Incorporated	**Service Request:**	K2207090
Project:	Port of Tacoma - Dunlap Mound/M0615.25.0001, Task 3	**Date Analyzed:**	07/14/22
Sample Matrix:	Ground Water		

Lab Control Sample Summary
Total Metals

Units:ug/L
Basis:NA

Lab Control Sample
KQ2211214-02

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Arsenic	200.8	53.0	50.0	106	85-115

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client:	Maul Foster & Alongi, Incorporated	**Service Request:**	K2207090
Project:	Port of Tacoma - Dunlap Mound/M0615.25.0001, Task 3	**Date Analyzed:**	07/06/22
Sample Matrix:	Ground Water		

Lab Control Sample Summary
Total Metals

Units:ug/L
Basis:NA

Lab Control Sample
KQ2210900-02

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Arsenic	200.8	48.8	50.0	98	85-115

December 16, 2022 Service Request No:K2214620

Audrey Hackett
Maul Foster & Alongi, Incorporated
2815 2nd Avenue, Suite 540
Seattle, WA 98121

Laboratory Results for: Dunlap Mound

Dear Audrey,

Enclosed are the results of the sample(s) submitted to our laboratory December 09, 2022
For your reference, these analyses have been assigned our service request number **K2214620.**

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. The test results meet requirements of the current NELAP standards, where applicable, and except as noted in the laboratory case narrative provided. For a specific list of NELAP-accredited analytes, refer to the certifications section at www.alsglobal.com. All results are intended to be considered in their entirety, and ALS Group USA Corp. dba ALS Environmental (ALS) is not responsible for use of less than the complete report. Results apply only to the items submitted to the laboratory for analysis and individual items (samples) analyzed, as listed in the report.

Please contact me if you have any questions. My extension is 3377. You may also contact me via email at Sydney.Wolf@alsglobal.com.

Respectfully submitted,

ALS Group USA, Corp. dba ALS Environmental

Sydney A. Wolf
Project Manager

ADDRESS 1317 S. 13th Avenue, Kelso, WA 98626
PHONE +1 360 577 7222 | FAX +1 360 636 1068
ALS Group USA, Corp.
dba ALS Environmental

Narrative Documents

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client: Maul Foster & Alongi, Incorporated
Project: Dunlap Mound
Sample Matrix: Water

Service Request: K2214620
Date Received: 12/09/2022

CASE NARRATIVE

All analyses were performed consistent with the quality assurance program of ALS Environmental. This report contains analytical results for samples for the Tier II level requested by the client.

Sample Receipt:

Three water samples were received for analysis at ALS Environmental on 12/09/2022. Any discrepancies upon initial sample inspection are annotated on the sample receipt and preservation form included within this report. The samples were stored at minimum in accordance with the analytical method requirements.

Metals:

No significant anomalies were noted with this analysis.

Approved by _____ Date 12/16/2022

SAMPLE DETECTION SUMMARY

This form includes only detections above the reporting levels. For a full listing of sample results, continue to the Sample Results section of this Report.

CLIENT ID: MW-H(R)	Lab ID: K2214620-001					
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Arsenic	26.4			0.50	ug/L	200.8
Arsenic, Dissolved	26.6			0.50	ug/L	200.8

CLIENT ID: DUPL-1	Lab ID: K2214620-002					
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Arsenic	27.0			0.50	ug/L	200.8
Arsenic, Dissolved	29.0			0.50	ug/L	200.8

CLIENT ID: MW-E(R)	Lab ID: K2214620-003					
Analyte	**Results**	**Flag**	**MDL**	**MRL**	**Units**	**Method**
Arsenic	1.06			0.50	ug/L	200.8
Arsenic, Dissolved	0.92			0.50	ug/L	200.8

Sample Receipt Information

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Client: Maul Foster & Alongi, Incorporated **Service Request:**K2214620
Project: Dunlap Mound/M0615.25.001

SAMPLE CROSS-REFERENCE

SAMPLE #	CLIENT SAMPLE ID	DATE	TIME
K2214620-001	MW-H(R)	12/7/2022	1220
K2214620-002	DUPL-1	12/7/2022	1220
K2214620-003	MW-E(R)	12/7/2022	1320

ALS Environmental

CHAIN OF CUSTODY
127622

002

SR# K2214620

COC Set 1 of 1

COC#

1317 South 13th Ave, Kelso, WA 98626 Phone (360) 577-7222 / 800-695-7222 / FAX (360) 636-1068
www.alsglobal.com

Project Name: Dunlap Mound	Project Number: M0615.25.001
Project Manager: Audrey Hackett	
Company: Maul Foster & Alongi	
Address: 2815 2nd Ave, Suite 540, Seattle, WA, 98121	
Phone #: 206-331-1835	email: ahackett@maulfoster.com
Sampler Signature:	Sampler Printed Name: Christian Sifford

CLIENT SAMPLE ID	LABID	SAMPLING Date	SAMPLING Time	Matrix	NUMBER OF CONTAINERS	180D: 200.8 / As D SeaH2O	180D: 200.8 / As T SeaH2O	180D: 200.8 / Metals D	180D: 200.8 / Metals T	1	2	3	4	5	Remarks
1. MW-H(R)		12/7/22	12:20	water	2	X	X								All Samples Brackish
2. DUPL-1		12/7/22	12:20	water	2	X	X								
3. MW-E(R)		12/7/22	13:20	water	2	X	X								
4.															
5.															
6.															
7.															
8.															
9.															
10.															

Report Requirements

___ I. Routine Report: Method Blank, Surrogate, as required
___ II. Report Dup., MS, MSD as required
___ III. CLP Like Summary (no raw data)
___ IV. Data Validation Report
___ V. EDD

Invoice Information

P.O.# M0615.25.001
Bill To: Audrey Hackett

Turnaround Requirements

___ 24 hr. ___ 48 hr.
___ 5 Day
___ Standard

Requested Report Date

Circle which metals are to be analyzed

Total Metals: Al (As) Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Dissolved Metals: Al (As) Sb Ba Be B Ca Cd Co Cr Cu Fe Pb Mg Mn Mo Ni K Ag Na Se Sr Tl Sn V Zn Hg

Special Instructions/Comments:

*Indicate State Hydrocarbon Procedure: AK CA WI Northwest Other____(Circle One)

Relinquished By:	Received By:	Relinquished By:	Received By:	Relinquished By:	Received By:
Signature	Signature PPM	Signature	Signature	Signature	Signature
Printed Name: Christian Sifford	Printed Name: Diane PM	Printed Name	Printed Name	Printed Name	Printed Name
Firm: MFA	Firm: ALS	Firm	Firm	Firm	Firm
Date/Time: 12/8/22 15:00	Date/Time: 12/9/22 1015	Date/Time	Date/Time	Date/Time	Date/Time

PM SW

Cooler Receipt and Preservation Form

Client Maul Foster & Alongi Service Request K22 14620

Received: 12/9/22 Opened: 12/9/22 By: PDP Unloaded: 12/9/22 By: PDP

1. Samples were received via? *USPS* (*Fed Ex*) *UPS* *DHL* *PDX* *Courier* *Hand Delivered*
2. Samples were received in: (circle) (*Cooler*) *Box* *Envelope* *Other*_____ *NA*
3. Were custody seals on coolers? NA (Y) N If yes, how many and where? 2 Front
   If present, were custody seals intact? (Y) N If present, were they signed and dated? (Y) N

Temp Blank	Sample Temp	IR Gun	Cooler #/COC ID / NA	Out of temp indicate with "X"	PM Notified if out of temp	Tracking Number NA	Filed
2.4		IR01				391884977197	

4. Was a Temperature Blank present in cooler? NA (Y) N If yes, notate the temperature in the appropriate column above:
   If no, take the temperature of a representative sample bottle contained within the cooler; notate in the column "Sample Temp":
5. Were samples received within the method specified temperature ranges? NA (Y) N
   If no, were they received on ice and same day as collected? If not, notate the cooler # below and notify the PM. (NA) Y N

If applicable, tissue samples were received: *Frozen* *Partially Thawed* *Thawed*

6. Packing material: *Inserts* (*Baggies*) *Bubble Wrap* *Gel Packs* (*Wet Ice*) *Dry Ice* *Sleeves* _____
7. Were custody papers properly filled out (ink, signed, etc.)? NA (Y) N
8. Were samples received in good condition (unbroken) NA (Y) N
9. Were all sample labels complete (ie, analysis, preservation, etc.)? NA (Y) N
10. Did all sample labels and tags agree with custody papers? NA (Y) N
11. Were appropriate bottles/containers and volumes received for the tests indicated? NA (Y) N
12. Were the pH-preserved bottles (*see SMO GEN SOP*) received at the appropriate pH? *Indicate in the table below* NA (Y) N
13. Were VOA vials received without headspace? *Indicate in the table below.* (NA) Y N
14. Was C12/Res negative? (NA) Y N
15. Were 100ml sterile microbiology bottles filled exactly to the 100ml mark? NA Y N Under filled Overfilled

Sample ID on Bottle	Sample ID on COC	Identified by:

Sample ID	Bottle Count Bottle Type	Head-space	Broke	pH	Reagent	Volume added	Reagent Lot Number	Initials	Time

Notes, Discrepancies, Resolutions: _____

_____

1/13/22 *Page of*

Miscellaneous Forms

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Inorganic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
E	The result is an estimate amount because the value exceeded the instrument calibration range.
J	The result is an estimated value.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.
H	The holding time for this test is immediately following sample collection. The samples were analyzed as soon as possible after receipt by the laboratory.

Metals Data Qualifiers

#	The control limit criteria is not applicable.
J	The result is an estimated value.
E	The percent difference for the serial dilution was greater than 10%, indicating a possible matrix interference in the sample.
M	The duplicate injection precision was not met.
N	The Matrix Spike sample recovery is not within control limits. See case narrative.
S	The reported value was determined by the Method of Standard Additions (MSA).
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
W	The post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is less than 50% of spike absorbance.
i	The MRL/MDL or LOQ/LOD is elevated due to a matrix interference.
X	See case narrative.
+	The correlation coefficient for the MSA is less than 0.995.
Q	See case narrative. One or more quality control criteria was outside the limits.

Organic Data Qualifiers

*	The result is an outlier. See case narrative.
#	The control limit criteria is not applicable. See case narrative.
A	A tentatively identified compound, a suspected aldol-condensation product.
B	The analyte was found in the associated method blank at a level that is significant relative to the sample result as defined by the DOD or NELAC standards.
C	The analyte was qualitatively confirmed using GC/MS techniques, pattern recognition, or by comparing to historical data.
D	The reported result is from a dilution.
E	The result is an estimated value.
J	The result is an estimated value.
N	The result is presumptive. The analyte was tentatively identified, but a confirmation analysis was not performed.
P	The GC or HPLC confirmation criteria was exceeded. The relative percent difference is greater than 40% between the two analytical results.
U	The analyte was analyzed for, but was not detected ("Non-detect") at or above the MRL/MDL. *DOD-QSM 4.2 definition* : Analyte was not detected and is reported as less than the LOD or as defined by the project. The detection limit is adjusted for dilution.
i	The MRL/MDL or LOQ/LOD is elevated due to a chromatographic interference.
X	See case narrative.
Q	See case narrative. One or more quality control criteria was outside the limits.

Additional Petroleum Hydrocarbon Specific Qualifiers

F	The chromatographic fingerprint of the sample matches the elution pattern of the calibration standard.
L	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of lighter molecular weight constituents than the calibration standard.
H	The chromatographic fingerprint of the sample resembles a petroleum product, but the elution pattern indicates the presence of a greater amount of heavier molecular weight constituents than the calibration standard.
O	The chromatographic fingerprint of the sample resembles an oil, but does not match the calibration standard.
Y	The chromatographic fingerprint of the sample resembles a petroleum product eluting in approximately the correct carbon range, but the elution pattern does not match the calibration standard.
Z	The chromatographic fingerprint does not resemble a petroleum product.

ALS Group USA Corp. dba ALS Environmental (ALS) - Kelso
State Certifications, Accreditations, and Licenses

Agency	Web Site	Number
Alaska DEH	http://dec.alaska.gov/eh/lab/cs/csapproval.htm	UST-040
Arizona DHS	http://www.azdhs.gov/lab/license/env.htm	AZ0339
Arkansas - DEQ	http://www.adeq.state.ar.us/techsvs/labcert.htm	88-0637
California DHS (ELAP)	http://www.cdph.ca.gov/certlic/labs/Pages/ELAP.aspx	2795
DOD ELAP	http://www.denix.osd.mil/edqw/Accreditation/AccreditedLabs.cfm	L16-58-R4
Florida DOH	http://www.doh.state.fl.us/lab/EnvLabCert/WaterCert.htm	E87412
Hawaii DOH	http://health.hawaii.gov/	-
ISO 17025	http://www.pjlabs.com/	L16-57
Louisiana DEQ	http://www.deq.louisiana.gov/page/la-lab-accreditation	03016
Maine DHS	http://www.maine.gov/dhhs/	WA01276
Minnesota DOH	http://www.health.state.mn.us/accreditation	053-999-457
Nevada DEP	http://ndep.nv.gov/bsdw/labservice.htm	WA01276
New Jersey DEP	http://www.nj.gov/dep/enforcement/oqa.html	WA005
New York - DOH	https://www.wadsworth.org/regulatory/elap	12060
North Carolina DEQ	https://deq.nc.gov/about/divisions/water-resources/water-resources-data/water-sciences-home-page/laboratory-certification-branch/non-field-lab-certification	605
Oklahoma DEQ	http://www.deq.state.ok.us/CSDnew/labcert.htm	9801
Oregon – DEQ (NELAP)	http://public.health.oregon.gov/LaboratoryServices/EnvironmentalLaboratoryAccreditation/Pages/index.aspx	WA100010
South Carolina DHEC	http://www.scdhec.gov/environment/EnvironmentalLabCertification/	61002
Texas CEQ	http://www.tceq.texas.gov/field/qa/env_lab_accreditation.html	T104704427
Washington DOE	http://www.ecy.wa.gov/programs/eap/labs/lab-accreditation.html	C544
Wyoming (EPA Region 8)	https://www.epa.gov/region8-waterops/epa-region-8-certified-drinking-water-	-
Kelso Laboratory Website	www.alsglobal.com	NA

Analyses were performed according to our laboratory's NELAP-approved quality assurance program. A complete listing of specific NELAP-certified analytes, can be found in the certification section at www.ALSGlobal.com or at the accreditation bodies web site.
Please refer to the certification and/or accreditation body's web site if samples are submitted for compliance purposes. The states highlighted above, require the analysis be listed on the state certification if used for compliance purposes and if the method/anlayte is offered by that state.

Acronyms

ASTM	American Society for Testing and Materials
A2LA	American Association for Laboratory Accreditation
CARB	California Air Resources Board
CAS Number	Chemical Abstract Service registry Number
CFC	Chlorofluorocarbon
CFU	Colony-Forming Unit
DEC	Department of Environmental Conservation
DEQ	Department of Environmental Quality
DHS	Department of Health Services
DOE	Department of Ecology
DOH	Department of Health
EPA	U. S. Environmental Protection Agency
ELAP	Environmental Laboratory Accreditation Program
GC	Gas Chromatography
GC/MS	Gas Chromatography/Mass Spectrometry
LOD	Limit of Detection
LOQ	Limit of Quantitation
LUFT	Leaking Underground Fuel Tank
M	Modified
MCL	Maximum Contaminant Level is the highest permissible concentration of a substance allowed in drinking water as established by the USEPA.
MDL	Method Detection Limit
MPN	Most Probable Number
MRL	Method Reporting Limit
NA	Not Applicable
NC	Not Calculated
NCASI	National Council of the Paper Industry for Air and Stream Improvement
ND	Not Detected
NIOSH	National Institute for Occupational Safety and Health
PQL	Practical Quantitation Limit
RCRA	Resource Conservation and Recovery Act
SIM	Selected Ion Monitoring
TPH	Total Petroleum Hydrocarbons
tr	Trace level is the concentration of an analyte that is less than the PQL but greater than or equal to the MDL.

Client:	Maul Foster & Alongi, Incorporated	**Service Request:**	K2214620
Project:	Dunlap Mound/M0615.25.001		

Sample Name:	MW-H(R)	**Date Collected:**	12/7/22
Lab Code:	K2214620-001	**Date Received:**	12/9/22
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ACOUCH	JCHAN

Sample Name:	DUPL-1	**Date Collected:**	12/7/22
Lab Code:	K2214620-002	**Date Received:**	12/9/22
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ACOUCH	JCHAN

Sample Name:	MW-E(R)	**Date Collected:**	12/7/22
Lab Code:	K2214620-003	**Date Received:**	12/9/22
Sample Matrix:	Water		

Analysis Method	Extracted/Digested By	Analyzed By
200.8	ACOUCH	JCHAN

Sample Results

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Metals

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Analytical Report

Client:	Maul Foster & Alongi, Incorporated	**Service Request:**	K2214620
Project:	Dunlap Mound/M0615.25.001	**Date Collected:**	12/07/22 12:20
Sample Matrix:	Water	**Date Received:**	12/09/22 10:15
Sample Name:	MW-H(R)	**Basis:**	NA
Lab Code:	K2214620-001		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**26.6**	ug/L	0.50	2	12/16/22 08:48	12/14/22	

Analytical Report

Client:	Maul Foster & Alongi, Incorporated	**Service Request:**	K2214620
Project:	Dunlap Mound/M0615.25.001	**Date Collected:**	12/07/22 12:20
Sample Matrix:	Water	**Date Received:**	12/09/22 10:15
Sample Name:	MW-H(R)	**Basis:**	NA
Lab Code:	K2214620-001		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**26.4**	ug/L	0.50	2	12/16/22 08:42	12/14/22	

Analytical Report

Client:	Maul Foster & Alongi, Incorporated	**Service Request:**	K2214620
Project:	Dunlap Mound/M0615.25.001	**Date Collected:**	12/07/22 12:20
Sample Matrix:	Water	**Date Received:**	12/09/22 10:15
Sample Name:	DUPL-1	**Basis:**	NA
Lab Code:	K2214620-002		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**29.0**	ug/L	0.50	2	12/16/22 08:49	12/14/22	

Analytical Report

Client:	Maul Foster & Alongi, Incorporated	**Service Request:**	K2214620
Project:	Dunlap Mound/M0615.25.001	**Date Collected:**	12/07/22 12:20
Sample Matrix:	Water	**Date Received:**	12/09/22 10:15
Sample Name:	DUPL-1	**Basis:**	NA
Lab Code:	K2214620-002		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**27.0**	ug/L	0.50	2	12/16/22 08:46	12/14/22	

Analytical Report

Client:	Maul Foster & Alongi, Incorporated	**Service Request:**	K2214620
Project:	Dunlap Mound/M0615.25.001	**Date Collected:**	12/07/22 13:20
Sample Matrix:	Water	**Date Received:**	12/09/22 10:15
Sample Name:	MW-E(R)	**Basis:**	NA
Lab Code:	K2214620-003		

Dissolved Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**0.92**	ug/L	0.50	2	12/16/22 08:50	12/14/22	

Analytical Report

Client:	Maul Foster & Alongi, Incorporated	**Service Request:**	K2214620
Project:	Dunlap Mound/M0615.25.001	**Date Collected:**	12/07/22 13:20
Sample Matrix:	Water	**Date Received:**	12/09/22 10:15
Sample Name:	MW-E(R)	**Basis:**	NA
Lab Code:	K2214620-003		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	**1.06**	ug/L	0.50	2	12/16/22 08:47	12/14/22	

QC Summary Forms

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Metals

ALS Environmental—Kelso Laboratory
1317 South 13th Avenue, Kelso, WA 98626
Phone (360) 577-7222 Fax (360) 425-9096
www.alsglobal.com

Analytical Report

Client:	Maul Foster & Alongi, Incorporated	**Service Request:**	K2214620
Project:	Dunlap Mound/M0615.25.001	**Date Collected:**	NA
Sample Matrix:	Water	**Date Received:**	NA
Sample Name:	Method Blank	**Basis:**	NA
Lab Code:	KQ2222027-01		

Total Metals

Analyte Name	Analysis Method	Result	Units	MRL	Dil.	Date Analyzed	Date Extracted	Q
Arsenic	200.8	ND U	ug/L	0.50	2	12/16/22 08:40	12/14/22	

Client:	Maul Foster & Alongi, Incorporated	**Service Request:**	K2214620
Project:	Dunlap Mound/M0615.25.001	**Date Collected:**	12/07/22
Sample Matrix:	Water	**Date Received:**	12/09/22
		Date Analyzed:	12/16/22
		Date Extracted:	12/14/22

Matrix Spike Summary
Total Metals

Sample Name:	MW-H(R)	**Units:**	ug/L
Lab Code:	K2214620-001	**Basis:**	NA
Analysis Method:	200.8		
Prep Method:	EPA CLP ILM04.0		

Matrix Spike
KQ2222027-03

Analyte Name	Sample Result	Result	Spike Amount	% Rec	% Rec Limits
Arsenic	26.4	80.8	50.0	109	70-130

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

Matrix Spike and Matrix Spike Duplicate Data is presented for information purposes only. The matrix may or may not be relevant to samples reported in this report. The laboratory evaluates system performance based on the LCS and LCSD control limits.

ALS Group USA, Corp.

dba ALS Environmental

QA/QC Report

Client:	Maul Foster & Alongi, Incorporated	**Service Request:**	K2214620
Project	Dunlap Mound/M0615.25.001	**Date Collected:**	12/07/22
Sample Matrix:	Water	**Date Received:**	12/09/22
		Date Analyzed:	12/16/22

Replicate Sample Summary
Total Metals

Sample Name:	MW-H(R)	**Units:**	ug/L
Lab Code:	K2214620-001	**Basis:**	NA

Analyte Name	Analysis Method	MRL	Sample Result	Duplicate Sample KQ2222027-04 Result	Average	RPD	RPD Limit
Arsenic	200.8	0.50	26.4	27.2	26.8	3	20

Results flagged with an asterisk (*) indicate values outside control criteria.

Results flagged with a pound (#) indicate the control criteria is not applicable.

Percent recoveries and relative percent differences (RPD) are determined by the software using values in the calculation which have not been rounded.

ALS Group USA, Corp.
dba ALS Environmental

QA/QC Report

Client: Maul Foster & Alongi, Incorporated
Project: Dunlap Mound/M0615.25.001
Sample Matrix: Water

Service Request: K2214620
Date Analyzed: 12/16/22

Lab Control Sample Summary
Total Metals

Units:ug/L
Basis:NA

Lab Control Sample
KQ2222027-02

Analyte Name	Analytical Method	Result	Spike Amount	% Rec	% Rec Limits
Arsenic	200.8	50.6	50.0	101	85-115

ATTACHMENT C

DATA VALIDATION MEMORANDUM

DATA QUALITY ASSURANCE/QUALITY CONTROL REVIEW

PROJECT NO. M0615.25.001 | DECEMBER 20, 2022 | PORT OF TACOMA

Maul Foster & Alongi, Inc. (MFA), conducted an independent stage 2A review of the quality of analytical results for groundwater samples and associated quality control samples collected in June and December 2022 at the Former Dunlap Mound site located at 3009 Taylor Way, Tacoma, Washington.

ALS Group USA Corporation, dba ALS Environmental (ALS), performed the analyses. MFA reviewed ALS report numbers K2207090.01 and K2214620. The analyses performed and samples analyzed are listed below.

Analysis	Reference
Total and dissolved metals	EPA 200.8
Note EPA = U.S. Environmental Protection Agency.	

Collection Date	Samples Analyzed
Report K2207090.01	
06/23/2022	MW-H(R)
06/23/2022	MW-E(R)
06/23/2022	DUPL-1
Report K2214620	
12/07/2022	MW-H(R)
12/07/2022	DUPL-1
12/07/2022	MW-E(R)

DATA QUALIFICATION

Analytical results were evaluated according to applicable sections of U.S. Environmental Protection Agency (EPA) guidelines for data review (EPA 2020) and appropriate laboratory- and method-specific guidelines (ALS 2021, EPA 1986).

Based on the results of the data quality review procedures described below, the data, with the appropriate final data qualifiers assigned, are considered acceptable for their intended use. Final data qualifiers represent qualifiers originating from the laboratory and accepted by the reviewer, and data qualifiers assigned by the reviewer during validation.

Final data qualifier:

- J = result is estimated.

TOTAL AND DISSOLVED COMPOUNDS

Total and dissolved EPA Method 200.8 metals results were compared. Where dissolved metals results were greater than their associated total results, qualification was not required when the relative percent difference (RPD) was less than 20 percent.

According to report K2207090.01, the EPA Method 200.8 dissolved arsenic result for sample MW-E(R) was greater than the associated total arsenic result, with an RPD of 88.6 percent. ALS noted in the case narrative that EPA Method 200.8 analysis of both the total and dissolved fractions of sample MW-E(R) were performed a second time using an undigested sample obtained directly from the original sample containers. The reanalyzed results confirmed the reported results. The reviewer confirmed with the sampler and MFA project manager that it was unlikely that the total and dissolved containers for sample MW-E(R) had been switched or mislabeled in the field. The reviewer confirmed that higher dissolved arsenic results had been periodically reported for samples collected during 2017–2020 from the same monitoring well. The reviewer confirmed with the sampler that the MW-E(R) monitoring well experienced some draw-down during sample collection and concluded that it is possible that groundwater conditions may have changed during sample collection. The reviewer recommended to the sampler and MFA project manager that future field collection events include a sample homogenization step before the total and dissolved sample containers are filled.

The total and dissolved arsenic results for sample MW-E(R) have been qualified by the reviewer with J, as shown in the following table:

Report	Collection Date	Sample	Component	Original Result (ug/L)	RPD (%)	Qualified Result (ug/L)
K2207090.01	06/23/2022	MW-E(R)	Total arsenic	6.56	88.6	6.56 J
			Dissolved arsenic	17.0		17.0 J

Notes
J = result is estimated.
RPD = relative percent difference.
ug/L = micrograms per liter.

All remaining detected total metals results were greater than their associated dissolved metals results or met the RPD acceptance criteria.

SAMPLE CONDITIONS

Sample Custody

Sample custody was appropriately documented on the chain-of-custody forms accompanying the reports.

Holding Times

Analyses were performed within the recommended holding time criteria.

Preservation and Sample Storage

The samples were preserved and stored appropriately.

According to the cooler receipt and preservation form provided with report K2207090.01, ALS did not receive containers for the salinity analysis. The reviewer confirmed with ALS that because salinity was requested as a screening analysis, a separate container was not required, and that salinity was evaluated using the containers provided for the EPA Method 200.8 total and dissolved metals analyses.

Sample Filtration

The reviewer confirmed that field samples for dissolved EPA Method 200.8 analysis were filtered in the field during sample collection with a 0.45-micron filter.

REPORTING LIMITS

The laboratory evaluated results to MRLs. Samples that required dilutions because of high analyte concentrations and/or matrix interferences were reported with raised MRLs.

BLANKS

Method Blanks

Laboratory method blanks are used to assess whether laboratory contamination was introduced during sample preparation and analysis. Laboratory method blank analyses were performed at the required frequencies. For purposes of data qualification, the laboratory method blanks were associated with all samples prepared in the analytical batch.

EPA Method 200.8 dissolved metals method blanks were not reported. The reviewer confirmed with ALS that the laboratory applied the total metals method blank results to both the total and dissolved metals results, because both total and dissolved metals samples were batched, digested, and analyzed together.

All laboratory method blank results were non-detect to method reporting limits (MRLs) for all target analytes.

Equipment Rinsate Blanks

Equipment rinsate blanks are used to evaluate field equipment decontamination. These blanks were not required for this sampling event, as all samples were collected using dedicated, single-use equipment.

Filter Blanks

Field filter blanks are used to assess whether contamination was introduced during field filtering procedures.

Filter blanks were not submitted for analysis. The reviewer could not evaluate whether metals contamination was introduced during field filtering procedures.

LABORATORY CONTROL SAMPLE AND LABORATORY CONTROL SAMPLE DUPLICATE RESULTS

A laboratory control sample (LCS) and a laboratory control sample duplicate (LCSD) are spiked with target analytes to provide information about laboratory precision and accuracy. The LCS samples were extracted and analyzed at the required frequency. LCSD results were not reported; batch precision was evaluated with laboratory duplicate results.

EPA Method 200.8 dissolved metals LCS results were not reported. The reviewer confirmed with ALS that the laboratory applied total metals LCS results to both the total and dissolved metals results, because total and dissolved metals samples were batched, digested, and analyzed together.

All LCS results were within acceptance limits for percent recovery.

LABORATORY DUPLICATE RESULTS

Laboratory duplicate results are used to evaluate laboratory precision. All laboratory duplicate samples were extracted and analyzed at the required frequency.

Laboratory duplicate results greater than five times the MRL were evaluated using laboratory RPD control limits. Laboratory duplicate results less than five times the MRL, including non-detects, were evaluated using a control limit of the MRL of the parent sample; the absolute difference of the laboratory duplicate sample result and the parent sample result, or the MRL for non-detects, was compared to the MRL of the parent sample.

The laboratory duplicate results met the acceptance criteria.

MATRIX SPIKE AND MATRIX SPIKE DUPLICATE RESULTS

MS and MSD results are used to evaluate laboratory precision and accuracy as well as the effect of the sample matrix on sample preparation and analysis. ALS did not report MSD results; batch precision was evaluated with laboratory duplicate sample results.

The MS results were within acceptance limits for percent recovery.

FIELD DUPLICATE RESULTS

Field duplicate samples measure both field and laboratory precision. The following field duplicate and parent sample pair was submitted for analysis:

Report	Parent Sample	Field Duplicate Sample
K2207090.01	MW-H(R)	DUPL-1

Report	Parent Sample	Field Duplicate Sample
K2214620	MW-H(R)	DUPL-1

MFA uses acceptance criteria of 100 percent RPD for results that are less than five times the MRL, or 50 percent RPD for results that are greater than five times the MRL.

All field duplicate results met the RPD acceptance criteria.

DATA PACKAGE

The data package was reviewed for transcription errors, omissions, and anomalies.

The field sampler name was not recorded on the chain of custody for report K2207090.01. The reviewer confirmed that samples were collected by Sean Maloney, who also relinquished samples to the laboratory.

According to the chain of custody form provided with report K2207090.01, salinity analysis was requested for all three samples to determine whether the samples should be processed by reductive precipitation before EPA Method 200.8 total and dissolved metals analysis. The reviewer confirmed that salinity results were not reported, as they were used for screening purposes only.

EPA Method 200.8 results from samples processed by reductive precipitation were not provided in report K2207090.01. The reviewer confirmed with the laboratory that the analysis had been attempted with samples MW-H(R) and DUPL-1 but, due to unacceptably low arsenic recovery in the batch LCS, the samples were reprocessed and reanalyzed by EPA Method 200.8, using saline solution for all quality control samples. Sample MW-E(R) was analyzed by standard EPA Method 200.8.

No additional issues were found.

REFERENCES

ALS. 2021. *Quality Assurance Manual.* Rev. 29.0. ALS Group USA, Corp. dba ALS Environmental: Kelso, WA. July 16.

EPA. 1986. *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.* EPA publication SW-846. 3rd ed. U.S. Environmental Protection Agency. Final updates I (1993), II (1995), IIA (1994), IIB (1995), III (1997), IIIA (1999), IIIB (2005), IV (2008), V (2015), VI phase I (2017), VI phase II (2018), VI phase III (2019), VII phase I (2019), and VII phase II (2020).

EPA. 2020. *National Functional Guidelines for Inorganic Superfund Methods Data Review.* EPA 542-R-20-006. U.S. Environmental Protection Agency, Office of Superfund Remediation and Technology Innovation: Washington, DC. November.

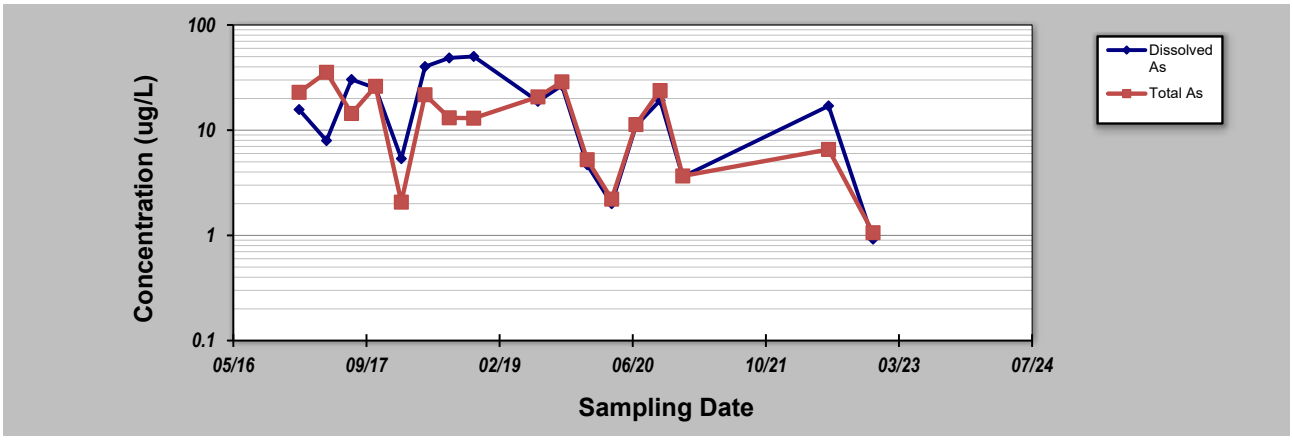
ATTACHMENT D

MANN-KENDALL TREND ANALYSIS AND PLOTS

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	19-Jan-23	Job ID:	M0615.25.001
Facility Name:	MFA	Constituent:	Arsenic - MW-E(R)
Conducted By:	J. Lenahansen	Concentration Units:	ug/L

Sampling Point ID:	Dissolved As	Total As					
Sampling Event	Sampling Date	ARSENIC - MW-E(R) CONCENTRATION (ug/L)						
1	1/12/2017	15.7	22.9					
2	4/25/2017	7.96	35.5					
3	7/28/2017	30.3	14.4					
4	10/26/2017	25.1	26.1					
5	1/31/2018	5.36	2.07					
6	4/30/2018	40.2	21.7					
7	7/30/2018	48.6	13.1					
8	10/30/2018	50.2	13					
9	6/28/2019	18.8	20.7					
10	9/26/2019	26.6	28.8					
11	12/30/2019	4.69	5.24					
12	3/31/2020	2	2.21					
13	6/30/2020	11	11.3					
14	9/29/2020	19.2	23.8					
15	12/23/2020	3.61	3.67					
16	6/23/2022	17	6.56					
17	12/7/2022	0.92	1.06					
18								
19								
20								
Coefficient of Variation:		0.82	0.71					
Mann-Kendall Statistic (S):		-38	-56					
Confidence Factor:		93.6%	98.9%					
Concentration Trend:		Prob. Decreasing	Decreasing					



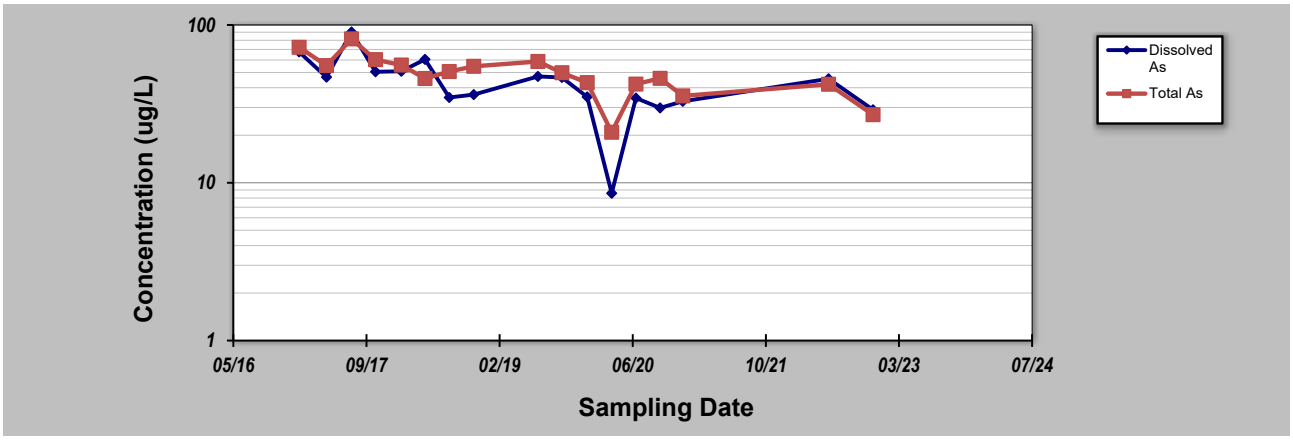
Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	19-Jan-23	Job ID:	M0615.25.001
Facility Name:	MFA	Constituent:	Arsenic - MW-H(R)
Conducted By:	J. Lenahansen	Concentration Units:	ug/L

Sampling Point ID:	Dissolved As	Total As					
Sampling Event	Sampling Date	ARSENIC - MW-H(R) CONCENTRATION (ug/L)						
1	1/12/2017	67.5	72.2					
2	4/25/2017	46.7	55.3					
3	7/28/2017	90.2	81.6					
4	10/26/2017	50.5	60.3					
5	1/31/2018	50.9	55.7					
6	4/30/2018	60.5	45.8					
7	7/30/2018	34.7	50.7					
8	10/30/2018	36.2	54.7					
9	6/28/2019	47.2	58.7					
10	9/26/2019	46.5	49.8					
11	12/30/2019	35	43.1					
12	3/31/2020	8.58	20.9					
13	6/30/2020	34.4	42.2					
14	9/29/2020	29.8	45.9					
15	12/23/2020	32.8	35.5					
16	6/23/2022	45.6	42.1					
17	12/7/2022	29	27					
18								
19								
20								
Coefficient of Variation:		0.41	0.30					
Mann-Kendall Statistic (S):		-82	-92					
Confidence Factor:		>99.9%	>99.9%					
Concentration Trend:		Decreasing	Decreasing					



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.