MAUL FOSTER ALONGI
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June 6, 2022
Project No. M0615.23.001

Sarah Weeks
Environmental Project Manager
Port of Tacoma
One Sitcum Plaza, Tacoma, WA 98421

Re: Groundwater Monitoring Report
Former Wasser & Winters Log Sort Yard
Consent Decree No. 93-2-08684-4
Facility Site ID: 1218
Monitoring Date: February 17, 2022

Dear Sarah Weeks:

On February 17, 2022, Maul Foster & Alongi, Inc. (MFA), conducted a groundwater monitoring event on behalf of the Port of Tacoma (the Port) at the former Wasser & Winters Company log sort yard, located at 1602 Marine View Drive in Tacoma, Washington (the Site) (Figure 1). Groundwater sampling activities were conducted in February 2022 consistent with the requirements set forth in the Consent Decree No. 93-2-08684-4, between the Port and the Washington State Department of Ecology (Ecology). Field activities and results of the groundwater monitoring event are summarized below.

SITE BACKGROUND

The site is approximately 11.4 acres and encompasses the upland portion of a 13.54-acre parcel, which is owned by the Port. From 1972 to 1984, the Wasser & Winters Company operated the Site as a log sort yard (Ecology, 2019). In the 1970s and early 1980s, slag generated by Asarco Incorporated of Tacoma, Washington, was placed on the Site for use as roadbed or ballast.

Ecology conducted a surface water investigation at the Site between November 1983 and June 1984. Elevated concentrations of several metals—including arsenic, copper, lead, and zinc—were detected in surface water samples collected from runoff locations that discharged to the Hylebos Waterway. Ecology concluded that the metals leached from the slag on the Site (Norton and Johnson, 1985).

Between 1987 and 1993, several investigations were conducted at the Site to determine concentrations of metals (including arsenic, copper, lead, and zinc) in soil, groundwater, and surface water (Ecology, 2019).

Ecology issued Consent Decree No. 93-2-08684-4 in 1993 describing remediation action goals and alternatives for the Site (Ecology, 1993) and requiring five-year periodic reviews to assess the progress of the remedial actions. In 1994, monitoring wells CMW-1 through CMW-4 were installed to monitor the effectiveness of the remedial action on the Site (see Figure 2).

Construction of a low-permeability asphalt cap and stormwater drainage system was completed in 1995 in accordance with the Final Engineering and Design Report (Kennedy Jenks, 1993). The cap covers the portion of the Site containing the slag from Asarco Incorporated.

The northern portion of the Site has been leased to WJR Tacoma, LLC, since 1996 and operated as Calbag Metals (Calbag), a scrap metal recycling facility. Calbag vacated the southern 3.4 acres of the Site in 2016, at which time portions of the pavement previously under scrap metal piles and equipment were exposed. This area was repaired by the Port in October 2017. The repairs were observed during a 2019 inspection by Windward Environmental, LLC (Windward, 2019). The most recent cap inspection was completed by MFA in February 2022 and (described in a separate report [MFA, 2022]).

Metals concentrations in groundwater were generally consistent and were below cleanup levels between 1994 and 2009. Wells CMW-1, CMW-2, and CMW-4 were decommissioned in the late 1990s. In 2011, Ecology approved a Port request to discontinue the monitoring of copper, lead, and zinc in groundwater at the Site. In 2019, Ecology requested CMW-1, CMW-2, and CMW-4 be re-installed and sampled and pore-water sampling be performed between CMW-3 and Hylebos Creek in response to elevated arsenic observed in CMW-3. Two sampling events were completed at CMW-1, CMW-2, and CMW-4, in August 2019 and February 2020, dissolved arsenic was below the marine chronic criteria at all three locations. In March 2021, a groundwater sample was collected from CMW-3 and pore water samples were collected from between CMW-3 and Hylebos Creek, (within the Mowitch Restoration Site), located adjacent to the Site and downgradient of CMW-3, to evaluate the potential for off-site impacts. The arsenic concentration in the groundwater sample collected from CMW-3 continued to be above the marine chronic criteria, but at lower concentrations than in previous events. The porewater samples remained well below the marine chronic criteria, indicating that the elevated dissolved arsenic concentrations observed in CMW-3 do not extend off-site to Hylebos Creek and the Mowitch Restoration Site (Anchor, 2021).

GROUNDWATER MONITORING FIELDWORK

On February 17, 2022, two groundwater samples, including one field duplicate, were collected from monitoring well CMW-3. The groundwater level was measured prior to sampling (see Table 1). New disposable tubing was used for purging and sampling at the monitoring well. Water quality field parameters (e.g., temperature, specific conductance, pH, turbidity) were allowed to stabilize before sample collection. During purging, the flow rates, water levels, and water quality parameters were recorded on a field sampling data sheet (see Attachment A). Samples were

collected directly into laboratory-provided bottles and immediately placed in a cooler on ice. Under standard chain-of-custody procedures, groundwater samples were submitted to Analytical Resources, LLC, in Tukwila, Washington, for laboratory analysis. The groundwater samples were filtered at the lab within 24 hours of collection with a 0.45-micron filter and preserved with nitric acid at Analytical Resources, LLC.

Groundwater samples were analyzed for dissolved arsenic by U.S. Environmental Protection Agency Method 200.8.

GROUNDWATER MONITORING RESULTS

The laboratory analytical report is provided as Attachment B, and analytical data are presented in Table 2. 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 the appropriate data qualifiers assigned. Results from the groundwater monitoring are as follows:

- Dissolved arsenic was detected at a concentration of 157 micrograms per liter in CMW-3, exceeding the marine chronic criteria of 36 micrograms per liter.

A plot depicting dissolved arsenic concentrations over time (since monitoring began in 1994) for CMW-3 is presented in Figure 3.

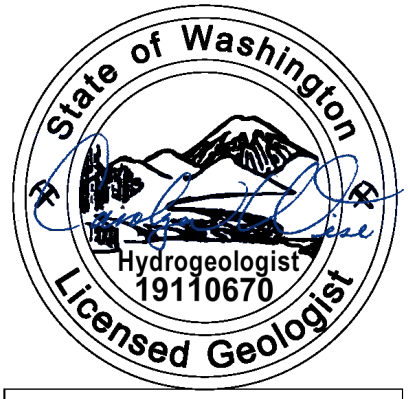
RECOMMENDATIONS

Groundwater quality will continue to be monitored in accordance with the Consent Decree, as amended and the Memorandum of Understanding (MOU). Per the MOU groundwater monitoring is required at the Site every 30 month, however, the Port has completed supplemental monitoring annually since 2017. The next scheduled sampling event is in August 2024, however, the Port plans to conduct groundwater sampling in February 2023 to continue to monitor the effectiveness of the low-permeability asphalt cap repairs that were performed in October 2017. Groundwater monitoring results from future events will be submitted to Ecology within 45 days of completion of data validation.

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.



CAROLYN ROCHELLE WISE 06-06-2022

Audrey Hackett
Senior Environmental Scientist

Carolyn R. Wise, LHG
Project Hydrogeologist

Attachments: Limitations
References
Tables
Figures
Attachment A—Water Field Sampling Data Sheet
Attachment B—Analytical Laboratory Report
Attachment C—Data Validation Memorandum

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

Anchor. 2021. Memorandum (re: supplemental groundwater and porewater sampling report, former Wasser & Winters log sort yard, Consent Decree No. 93-2-08684-4, Washington State Department of Ecology facility site ID #1218, monitoring date: March 8, 2021) to P. Balaraju and A. Smith, Washington State Department of Ecology, from N. Bacher, Anchor QEA, LLC, Tacoma, Washington. June 9.

Ecology. 1993. Consent decree no. 93-2-08684-4, State of Washington Department of Ecology, plaintiff, v. Port of Tacoma, defendant. August 27.

Ecology. 2019. Second periodic review report final, Wasser Winters, Facility Site ID#: 1218, Cleanup Site ID#: 3404, 1602 Marine Drive, Tacoma, Washington. Washington State Department of Ecology, Southwest Regional Office, Toxics Cleanup Program. September.

Kennedy Jenks. 1993. Final engineering and design report, Wasser & Winters log sort yard site. Kennedy Jenks Consultants, Inc. October.

MFA. 2022. Environmental cap and drainage system inspection report, Former Wasser & Winters Log Sort Yard. Maul Foster & Alongi, Inc.

Norton, D., and A. Johnson. 1985. Completion report on WQIS Project 1 for the Commencement Bay nearshore/tideflats remedial investigation: assessment of log sort yards as metal sources to Commencement Bay waterways, November 1983 to June 1984. Washington State Department of Ecology memorandum. February 27.

Windward. 2019. Environmental cap and drainage system inspection report: former Wasser & Winters log sort yard. Windward Environmental LLC. October 30.

TABLES

Table 1
Water Levels
Former Wasser & Winters Company Log Sort Yard, Tacoma, Washington
Port of Tacoma

Location ID:	Date:	Top of Casing Elevation (feet MLLW)	Depth of Water Below Top of Casing (feet)	Water Level Elevation (feet)
CMW-1	8/16/2019	16.72	6.46	10.26
	2/27/2020		5.9	10.82
CMW-2	8/16/2019	19.08	8.82	10.26
	2/27/2020		8.3	10.78
CMW-3	2/7/1994	20.34	9.72	10.62
	5/17/1994		9.83	10.51
	8/17/1994		10.24	10.1
	11/11/1994		10.47	9.87
	5/17/1995		9.48	10.86
	9/29/1995		10.37	9.97
	3/9/1996		8.51	11.83
	10/8/1996		10.24	10.1
	8/14/1997		9.76	10.58
	12/30/1997		8.8	11.54
	6/11/1998		9.68	10.66
	12/22/1998		8.75	11.59
	8/13/1999		10.05	10.29
	1/28/2000		8.76	11.58
	1/8/2001		9.92	10.42
	7/16/2002		9.81	10.53
	2/23/2004		9.45	10.89
	7/26/2005		10.04	10.3
	1/30/2007		9.88	10.46
	2/26/2008		9.24	11.1
	7/23/2009		10.18	10.16
	2/17/2012		10.21	10.13
	5/25/2012		9.85	10.49
	8/22/2014		9.98	10.36
	2/13/2017		8.82	11.52
	8/16/2019		10.05	10.29
	2/27/2020		9.36	10.98
	3/8/2021		9.28	11.06
	2/17/2022		9.55	10.79
CMW-4	8/16/2019	20.12	8.87	11.25
	2/27/2020		8.74	11.38

NOTES:
Top of casing elevation surveyed by Sitts & Hill Engineers, Inc., September 2019.
Depth to water measured from reference point on top of well casing.
MLLW = mean lower low water.

Table 2
Summary of Groundwater Analytical Results
Former Wasser & Winters Company Log Sort Yard, Tacoma, Washington
Port of Tacoma

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Location ID:	Collection Date:	Sample Type:	Dissolved Arsenic	Dissolved Copper	Dissolved Lead	Dissolved Zinc
		Units:	ug/L	ug/L	ug/L	ug/L
		Cleanup Levels:[a][1][2]	36	2.9	8.5	86
CMW-1	2/7/1994	N	2	5	4	45
	5/17/1994	N	2	2 U	4	6
	8/17/1994	N	4	2 U	3	5
	11/11/1994	N	3	2 U	1	8
	5/17/1995	N	6	2 U	1 U	4 U
	5/17/1995	FD	5	2 U	1 U	4 U
	9/29/1995	N	5 U	2 U	1	4 U
	3/9/1996	N	5	2 U	1	4 U
	10/8/1996	N	1 U	2 U	1	4 U
	8/14/1997	N	2	2 U	1 U	4 U
	12/30/1997	N	4	2 U	1 U	133
	6/11/1998	N	1 U	2 U	2 U	4 U
	12/22/1998	N	1 U	2 U	5 U	4 U
	8/16/2019	N	6.12	--	--	--
	2/27/2020	N	12.7	--	--	--
CMW-2	2/7/1994	N	1 U	7	2	5
	2/7/1994	FD	1	12	1	8
	5/17/1994	N	1 U	7	2	16
	8/17/1994	N	2	2 U	4	17
	11/11/1994	N	7	3	4	10
	5/17/1995	N	3	2 U	4	17
	9/29/1995	N	23	2 U	1 U	4 U
	3/9/1996	N	10	2 U	1	4 U
	10/8/1996	N	12	2 U	1 U	4 U
	8/14/1997	N	18	2 U	1 U	4
	12/30/1997	N	10	2 U	1 U	92
	12/30/1997	FD	11	2 U	1 U	16
	6/11/1998	N	8	2 U	1 U	4
	12/22/1998	N	8	2 U	1 U	4 U
	8/16/2019	N	11	--	--	--
	2/27/2020	N	7.84	--	--	--
CMW-3	2/7/1994	N	49	2 U	1 U	8
	5/17/1994	N	72	2 U	1	7
	5/17/1994	FD	74	2 U	2	5
	8/17/1994	N	95	2 U	1 U	5
	8/17/1994	FD	86	2 U	2	8
	11/11/1994	N	82	2 U	2	8

Table 2
Summary of Groundwater Analytical Results
Former Wasser & Winters Company Log Sort Yard, Tacoma, Washington
Port of Tacoma

MAUL FOSTER ALONGI

Location ID:	Collection Date:	Sample Type:	Dissolved Arsenic	Dissolved Copper	Dissolved Lead	Dissolved Zinc
		Units:	ug/L	ug/L	ug/L	ug/L
		Cleanup Levels:[a][1][2]	36	2.9	8.5	86
CMW-3 (continued)	11/11/1994	FD	25	2 U	2	4 U
	5/17/1995	N	74	2 U	1 U	7
	9/29/1995	N	100	2 U	1 U	5
	9/29/1995	FD	102	2 U	1 U	4 U
	3/9/1996	N	82	2 U	1 U	4 U
	10/8/1996	N	83	2 U	1 U	4 U
	10/8/1996	FD	84	2 U	1 U	4 U
	8/14/1997	N	144	2 U	1 U	5
	8/14/1997	FD	135	2 U	1 U	7
	12/30/1997	N	123	2 U	1 U	139
	6/11/1998	N	89	2 U	1 U	4 U
	6/11/1998	FD	86	2 U	1 U	4 U
	12/22/1998	N	190	2 U	1 U	2 U
	12/22/1998	FD	170	2 U	1 U	2 U
	1/28/2000	N	7.2	1 U	0.5 U	99
	7/16/2002	N	117	1.02	0.5 U	3.32
	7/16/2002	FD	111	0.979	0.5 U	4.67
	2/23/2004	N	77.2	1.07	0.2 U	3.98
	2/23/2004	FD	77.5	1.06	0.675	4.79
	7/26/2005	N	13.1	2.63	2.5 U	5 U
	7/26/2005	FD	12.9	2.5 U	2.0 U	5 U
	1/30/2007	N	60	4.6	2.0 U	34
	2/26/2008	N	12	1.2 J	2.0 U	47
	2/26/2008	FD	11	0.8 J	2.0 U	35
	7/23/2009	N	41.3	1.5	2.0 U	2.7
	7/23/2009	FD	41.7	1.4	0.2 U	1.4
	2/17/2012	N	2,750[b]	--	--	--
	2/17/2012	FD	3,100[b]	--	--	--
	5/25/2012	N	471	--	--	--
	5/25/2012	FD	455	--	--	--
	8/22/2014	N	346	--	--	--
	8/22/2014	FD	353	--	--	--
	2/13/2017	N	925	--	--	--
	2/13/2017	FD	899	--	--	--
	2/19/2018	N	168	--	--	--
	2/19/2018	FD	201	--	--	--
	8/16/2019	N	154	--	--	--

Table 2
Summary of Groundwater Analytical Results
Former Wasser & Winters Company Log Sort Yard, Tacoma, Washington
Port of Tacoma

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Location ID:	Collection Date:	Sample Type:	Dissolved Arsenic	Dissolved Copper	Dissolved Lead	Dissolved Zinc
		Units:	ug/L	ug/L	ug/L	ug/L
		Cleanup Levels:[a][1][2]	36	2.9	8.5	86
CMW-3 (continued)	2/27/2020	N	196	--	--	
	3/8/2021	N	224	--	--	--
	3/8/2021	FD	214	--	--	--
	2/17/2022	N	157	--	--	--
	2/17/2022	FD	155	--	--	--
CMW-4	2/7/1994	N	6	3	2	13
	5/17/1994	N	23	2 U	3	8
	8/17/1994	N	33	2 U	2	6
	11/11/1994	N	26	3	14	10
	5/17/1995	N	24	2 U	1 U	4 U
	9/29/1995	N	34	2 U	1 U	6
	3/9/1996	N	18	2 U	1 U	4 U
	3/9/1996	FD	18	2 U	1 U	4 U
	10/8/1996	N	26	2 U	1 U	4 U
	8/14/1997	N	27	2 U	1 U	4 U
	12/30/1997	N	21	2 U	1 U	146
	6/11/1998	N	22	2 U	1 U	4
	12/22/1998	N	28	2 U	1 U	9
	8/16/2019	N	3.22	--	--	--
	8/16/2019	FD	4.38	--	--	--
	2/27/2020	N	7.52	--	--	--
	2/27/2020	FD	7.31	--	--	--
PW-U[c]	3/8/2021	N	2.53	--	--	--
PW-D[c]	3/8/2021	N	2.28	--	--	--

Table 2
Summary of Groundwater Analytical Results
Former Wasser & Winters Company Log Sort Yard, Tacoma, Washington
Port of Tacoma

NOTES:

Shading indicates values that exceed cleanup levels; non-detects (U) were not evaluated against cleanup levels.

Lead, zinc, and copper analyses were discontinued in 2011 with Ecology approval, dated June 28, 2011.

Monitoring wells CMW-1, CMW-2, and CMW-4 were decommissioned in 2000. During an in-person meeting on April 3, 2019, Ecology requested that the three wells be re-installed, and the wells were re-installed on July 10, 2019.

[a]Cleanup levels established by Ecology Consent Decree No. 93-2-08684-4 and EPA aquatic life criteria, marine water, chronic (WAC 173-201A).

[b]Results from the February 2012 sampling event are considered invalid due to improper sampling procedures, resulting in higher-than-normal turbidity.

[c]Pore water sample collected using a passive nylon mesh diffusion sampler and processed as a groundwater sample.

-- = not analyzed

Ecology = Washington State Department of Ecology.

EPA = United States Environmental Protection Agency.

FD = field duplicate sample.

ID = identification.

J = result is estimated.

N = normal environmental sample.

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

ug/L = micrograms per liter.

WAC = Washington Administrative Code.

REFERENCES:

[1]Ecology. 1993. Consent Decree No. 93-2-08684-4. Washington State Department of Ecology. August.

[2]EPA. 2020. WAC 173-201A-240. Toxic substances. Table 240. U.S. Environmental Protection Agency. January.

FIGURES

Source:
U.S. Geological Survey (2021) 7.5-minute topographic quadrangle: Poverty Bay; Township 21 north, range 3 east, section 36; Property boundary obtained from Pierce County GIS.

Legend

Site Boundary

Figure 1
Site Location

Former Wasser & Winters Company
Log Sort Yard
1602 Marine View Drive
Tacoma, Washington

0 1,000 2,000
Feet

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Path: X:\0615.23\001\Pro\0615_23_001_003.aprx
Print Date: 3/24/2022
Reviewed By: chackett
Produced By: jelstrott
Project: M0615.23.001

Figure 2
Site Features

Former Wasser & Winters Company
Log Sort Yard
1602 Marine View Drive
Tacoma, Washington

Legend

- Monitoring Well
- Ecology Block Wall
- Site Boundary
- Tax Lot

NOTE:
Ecology = Washington State Department of Ecology

0 100
Feet

Source:
Aerial photograph obtained from City of Tacoma (2018); tax lot data obtained from Pierce County GIS; monitoring well locations obtained from Anchor QEA Supplemental Groundwater Monitoring and Porewater Sampling Locations figure

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Project: M0615.23.001 Produced By: jelstratt Reviewed By: ahackett Print Date: 3/25/2022

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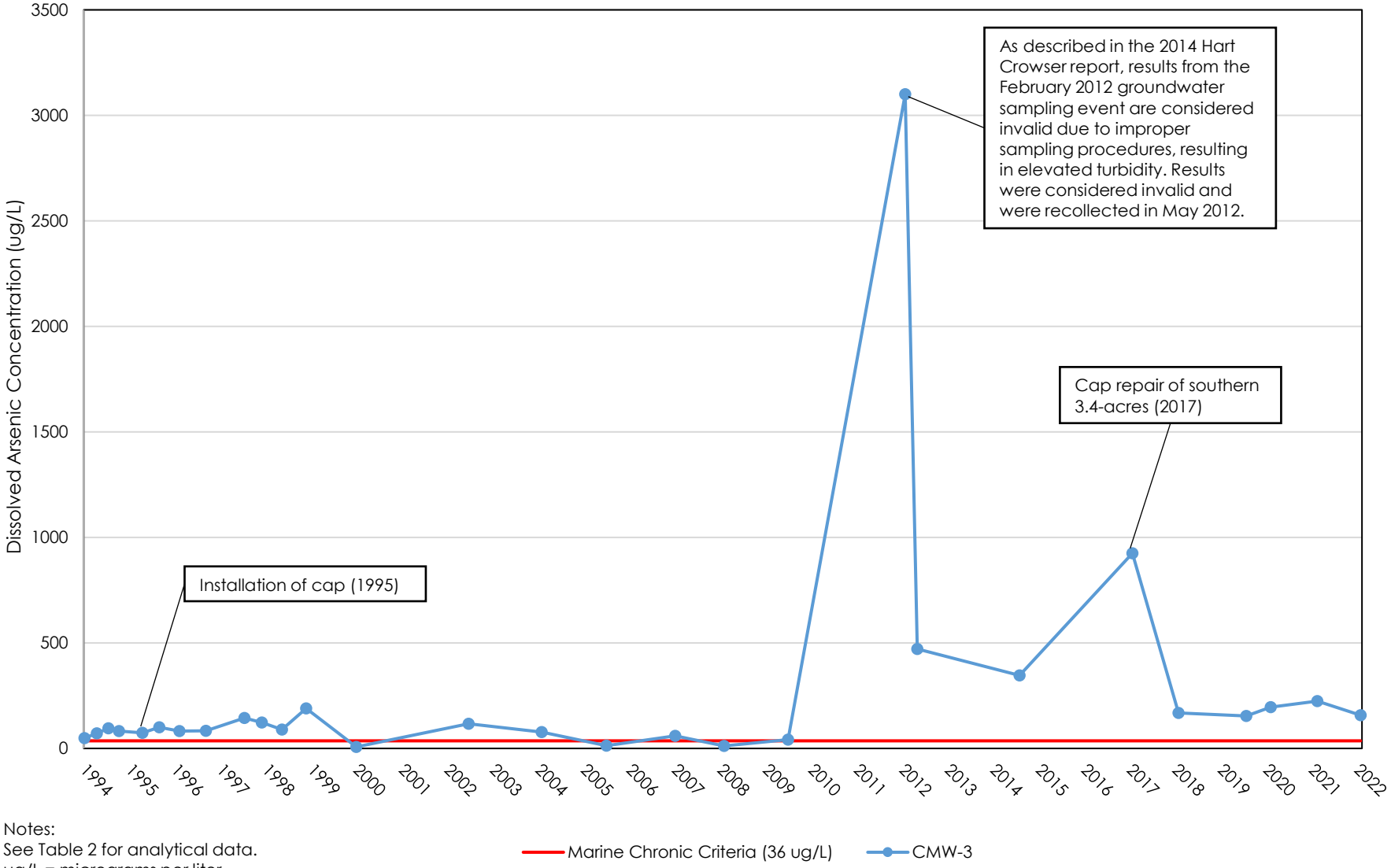
Figure 3
Dissolved Arsenic Trend Plot
Former Wasser Winters Company Log Sort Yard
Tacoma, Washington



Notes:
See Table 2 for analytical data.
ug/L = micrograms per liter.

Reference:
EPA. 2020. Washington Administrative Code 173-201A-240. Toxic substances. Table 240. U.S. Environmental Protection Agency. January.

ATTACHMENT A

WATER FIELD SAMPLING DATA SHEET

Maul Foster & Alongi, Inc.

400 E. Mill Plain Blvd, Suite 400, Vancouver, WA 98660 (360) 694-2691 Fax. (360) 906-1958

Water Field Sampling Data Sheet

Client Name	Port of Tacoma	**Sample Location**	CMW-3		
Project #	M0615.23.001	**Sampler**	S. Maloney		
Project Name	Wasser Winters Site	**Sampling Date**	2/17/2022		
Sampling Event	February 2022	**Sample Name**	CMW-3-021722		
Sub Area		**Sample Depth**	11		
FSDS QA:	R.Paul 2/25/22	**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**
2/17/2022	13:45	12.49		9.55		2.94	0.48

(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	1:57:00 PM	0.75		6.75	10.4	553.5	0.78	16.3	1.82
	2:00:00 PM	1		6.74	10.4	539.4	0.71	13.1	2.22
	2:03:00 PM	1.25		6.74	10.4	530.9	0.66	11	1.37
	2:06:00 PM	1.5		6.72	10.4	512.3	0.61	7	1.95
Final Field Parameters	2:09:00 PM	1.75		6.71	10.3	499	0.56	1.2	1.34

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	2:15:00 PM	VOA-Glass		
			Amber Glass		
			White Poly	1	No
			Yellow Poly		
			Green Poly		
			Red Total Poly		
			Red Dissolved Poly		
			Total Bottles	1	

General Sampling Comments

Began purging at 13:48.

Sampled after 3 well volumes purged.

CMW-DUP-021722 collected here.

Signature _____

ATTACHMENT B

ANALYTICAL LABORATORY REPORT

Analytical Resources, LLC
Analytical Chemists and Consultants

23 February 2022

Audrey Hackett
Maul, Foster & Alongi, Inc.
2001 NW 19th Avenue, Suite 200
Portland, WA 97209

RE: Port of Tacoma Wasser and Winters Site (Port of Tacoma Wasser

Please find enclosed sample receipt documentation and analytical results for samples from the project referenced above.

Sample analyses were performed according to ARI's Quality Assurance Plan and any provided project specific Quality Assurance Plan. Each analytical section of this report has been approved and reviewed by an analytical peer, the appropriate Laboratory Supervisor or qualified substitute, and a technical reviewer.

Should you have any questions or problems, please feel free to contact us at your convenience.

Associated Work Order(s)	Associated SDG ID(s)
22B0268	N/A

I certify that this data package is in compliance with the terms and conditions of the contract, both technically and for completeness, for other than the conditions detailed in the enclose Narrative. ARI, an accredited laboratory, certifies that the report results for which ARI is accredited meets all the requirements of the accrediting body. A list of certified analyses, accreditations, and expiration dates is included in this report.

Release of the data contained in this hardcopy data package has been authorized by the Laboratory Manager or his/her designee, as verified by the following signature.

Analytical Resources, LLC

Kelly Bottem, Client Services Manager

The results in this report apply to the samples analyzed in accordance with the chain of custody document. This analytical report must be reproduced in its entirety.

ACCREDITED IN ACCORDANCE WITH nelac
Cert# 100006-012

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number: 22B0268	Turn-around Requested: standard
ARI Client Company: Maul Foster & Alongi	Phone: 206-556-2015
Client Contact: Audrey Hackett ahackett@maulfoster.com	
Client Project Name: Port of Tacoma - Wasser & Winters Site	
Client Project #: 0615.23.001	Samplers: Sean Maloney

Page: 1 of 1	
Date: 2/17/22	Ice Present?
No. of Coolers:	Cooler Temps: 2.4

Analytical Resources, LLC
Analytical Chemists and Consultants
4611 South 134th Place, Suite 100
Tukwila, WA 98168
206-695-6200 206-695-6201 (fax)

Sample ID	Date	Time	Matrix	No. Containers	Analysis Requested: * Dissolved Arsenic by EPA 200.8	Notes/Comments
CMW-3-021722	2/17/22	1415	GW	1	X	Analyze all samples w/ reductive precipitation.
CMW-DUP-021722	2/17/22	1415	GW	1	X	

Comments/Special Instructions	Relinquished by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
	Printed Name: Sean Maloney	Printed Name: Arden Paist	Printed Name:	Printed Name:
	Company: Maul Foster & Alongi	Company: ARI	Company:	Company:
	Date & Time: 2/17/2022 1545	Date & Time: 2/17/22 1545	Date & Time:	Date & Time:

Limits of Liability: *ARI will perform all requested services in accordance with appropriate methodology following ARI Standard Operating Procedures and the ARI Quality Assurance Program. This program meets standards for the industry. The total liability of ARI, its officers, agents, employees, or successors, arising out of or in connection with the requested services, shall not exceed the Invoiced amount for said services. The acceptance by the client of a proposal for services by ARI release ARI from any liability in excess thereof, not withstanding any provision to the contrary in any contract, purchase order or co-signed agreement between ARI and the Client.*

Sample Retention Policy: All samples submitted to ARI will be appropriately discarded no sooner than 90 days after receipt or 60 days after submission of hardcopy data, whichever is longer, unless alternate retention schedules have been established by work-order or contract.

Maul, Foster & Alongi, Inc.	Project: Port of Tacoma Wasser and Winters Site	
2001 NW 19th Avenue, Suite 200	Project Number: Port of Tacoma Wasser and Winters Site	**Reported:**
Portland WA, 97209	Project Manager: Audrey Hackett	23-Feb-2022 18:34

ANALYTICAL REPORT FOR SAMPLES

Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
CMW-3-021722	22B0268-01	Water	17-Feb-2022 14:15	18-Feb-2022 15:45
CMW-DUP-021722	22B0268-02	Water	17-Feb-2022 14:15	18-Feb-2022 15:45

Maul, Foster & Alongi, Inc.	Project: Port of Tacoma Wasser and Winters Site	
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Portland WA, 97209	Project Manager: Audrey Hackett	23-Feb-2022 18:34

Work Order Case Narrative

Dissolved Metals - EPA Method 200.8

The sample(s) were digested and analyzed within the recommended holding times.

Initial and continuing calibrations were within method requirements.

The method blank(s) were clean at the reporting limits.

The blank spike (BS/LCS) percent recoveries were within control limits.

Analytical Resources, LLC
Analytical Chemists and Consultants

Printed: 2/18/2022 2:06:50PM

WORK ORDER

22B0268

Samples will be discarded 90 days after submission of a final report unless other instructions are received.

Client: Maul, Foster & Alongi, Inc. | **Project Manager: Kelly Bottem**

Project: Port of Tacoma Wasser and Winters Site | **Project Number: Port of Tacoma Wasser and Winters Site**

Report To:
Maul, Foster & Alongi, Inc.
Audrey Hackett
2001 NW 19th Avenue, Suite 200
Portland, WA 97209
Phone: (971) 544-2139
Fax: -

Invoice To:
Maul, Foster & Alongi, Inc.
Audrey Hackett
2001 NW 19th Avenue, Suite 200
Portland, WA 97209
Phone :(971) 544-2139
Fax: -

Date Due: 23-Feb-2022 18:00 (1 day TAT)

Received By: Arden B Paist | Date Received: 18-Feb-2022 15:45

Logged In By: Isabelle Beasley | Date Logged In: 18-Feb-2022 14:01

Samples Received at: **2.4°C**

Intact, properly signed and dated custody seals attached to outside of cooler(s)	No	Custody papers included with the cooler	Yes
Custody papers properly filled out (in, signed, analyses requested, etc)	Yes	Was a temperature blank included in the cooler	No
Was sufficient ice used (if appropriate)	Yes	All bottles sealed in individual plastic bags	No
All bottles arrived in good condition (unbroken)	Yes	All bottle labels complete and legible	Yes
Number of containers listed on COC match number received	Yes	Bottle labels and tags agree with COC	Yes
Correct bottles used for the requested analyses	Yes	All VOC vials free of air bubbles	No
Analyses/bottles require preservation (attach preservation sheet excluding VOC)	No	Sufficient amount of sample sent in each bottle	Yes
Sample split at ARI	No		

22B0268-01 CMW-3-021722 [Water] Sampled 17-Feb-2022 14:15

Filter 0.45 micron	02/23/2022	1	2/19/2022
Met Diss 200.8 - As UCT	02/23/2022	1	8/16/2022

22B0268-02 CMW-DUP-021722 [Water] Sampled 17-Feb-2022 14:15

Filter 0.45 micron	02/23/2022	1	2/19/2022
Met Diss 200.8 - As UCT	02/23/2022	1	8/16/2022

Preservation Confirmation

Container ID	Container Type	pH
22B0268-01 A	HDPE NM, 500 mL	lab 2 preserve
22B0268-02 A	HDPE NM, 500 mL	lab 2 preserve

LB
Preservation Confirmed By

2/18/22
Date

Reviewed By

Date

Analytical Resources, Incorporated
Analytical Chemists and Consultants

Cooler Receipt Form

ARI Client: Maul Foster + Alongi
COC No(s): NA
Assigned ARI Job No: 22B0268

Project Name: Port of Tacoma – Wasser + Winters Site
Delivered by: Fed-Ex UPS Courier Hand Delivered Other: _____
Tracking No: NA

Preliminary Examination Phase:

Were intact, properly signed and dated custody seals attached to the outside of the cooler?	YES	NO
Were custody papers included with the cooler?	YES	NO
Were custody papers properly filled out (ink, signed, etc.)	YES	NO

Temperature of Cooler(s) (°C) (recommended 2.0-6.0 °C for chemistry)

Time 1545 — 2.4 _____ _____ _____ _____ _____

If cooler temperature is out of compliance fill out form 00070F

Temp Gun ID#: ~~DOO~~ 009708

Cooler Accepted by: KP Date: 2/17/22 Time: 1545

Complete custody forms and attach all shipping documents

Log-In Phase:

Was a temperature blank included in the cooler?		YES	NO
What kind of packing material was used? …	Bubble Wrap Wet Ice Gel Packs Baggies Foam Block Paper Other: _____		
Was sufficient ice used (if appropriate)?	NA	YES	NO
How were bottles sealed in plastic bags?	Individually	Grouped	Not
Did all bottles arrive in good condition (unbroken)?		YES	NO
Were all bottle labels complete and legible?		YES	NO
Did the number of containers listed on COC match with the number of containers received?		YES	NO
Did all bottle labels and tags agree with custody papers?		YES	NO
Were all bottles used correct for the requested analyses?		YES	NO
Do any of the analyses (bottles) require preservation? (attach preservation sheet, excluding VOCs) …	NA	YES	NO
Were all VOC vials free of air bubbles?	NA	YES	NO
Was sufficient amount of sample sent in each bottle?		YES	NO
Date VOC Trip Blank was made at ARI	NA	_____	

Were the sample(s) split by ARI? NA YES Date/Time: _____ Equipment: _____ Split by: _____

Samples Logged by: KB Date: 2/18/22 Time: 14:01 Labels checked by: _____

***** Notify Project Manager of discrepancies or concerns *****

Sample ID on Bottle	Sample ID on COC	Sample ID on Bottle	Sample ID on COC

Additional Notes, Discrepancies, & Resolutions:

By: _____ Date: _____

WORK ORDER

22B0268

Samples will be discarded 90 days after submission of a final report unless other instructions are received.

Client: Maul, Foster & Alongi, Inc. **Project Manager:** Kelly Bottem

Project: Port of Tacoma Wasser and Winters Site **Project Number:** Port of Tacoma Wasser and Winters Site

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Portland, WA 97209
Phone :(971) 544-2139
Fax: -

Date Due:	23-Feb-2022 18:00 (1 day TAT)		
Received By:	Arden B Paist	Date Received:	18-Feb-2022 15:45
Logged In By:	Isabelle Beasley	Date Logged In:	18-Feb-2022 14:01

Samples Received at: **2.4°C**

Intact, properly signed and dated custody seals attached to outside of cooler(s)	No	Custody papers included with the cooler	Yes
Custody papers properly filled out (in, signed, analyses requested, etc)	Yes	Was a temperature blank included in the cooler	No
Was sufficient ice used (if appropriate)	Yes	All bottles sealed in individual plastic bags	No
All bottles arrived in good condition (unbroken)	Yes	All bottle labels complete and legible	Yes
Number of containers listed on COC match number received	Yes	Bottle labels and tags agree with COC	Yes
Correct bottles used for the requested analyses	Yes	All VOC vials free of air bubbles	No
Analyses/bottles require preservation (attach preservation sheet excluding VOC)	No	Sufficient amount of sample sent in each bottle	Yes
Sample split at ARI	No		

22B0268-01 CMW-3-021722 [Water] Sampled 17-Feb-2022 14:15

Filter 0.45 micron	02/23/2022	1	2/19/2022
Met Diss 200.8 - As UCT	02/23/2022	1	8/16/2022

22B0268-02 CMW-DUP-021722 [Water] Sampled 17-Feb-2022 14:15

Filter 0.45 micron	02/23/2022	1	2/19/2022
Met Diss 200.8 - As UCT	02/23/2022	1	8/16/2022

Preservation Confirmation

Container ID	Container Type	pH	
22B0268-01 A	HDPE NM, 500 mL	lab 2 preserve	(1)
22B0268-02 A	HDPE NM, 500 mL	lab 2 preserve	(1)

AB
Preservation Confirmed By

2/18/22
Date

(1) Filtered w/ 0.45µ & preserved to pH <2 with 0.75 mL conc. HNO3 (3126351) MM 2/18/22

Reviewed By

Date

Maul, Foster & Alongi, Inc.	Project: Port of Tacoma Wasser and Winters Site	
2001 NW 19th Avenue, Suite 200	Project Number: Port of Tacoma Wasser and Winters Site	**Reported:**
Portland WA, 97209	Project Manager: Audrey Hackett	23-Feb-2022 18:34

CMW-3-021722

22B0268-01 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8 UCT-KED — Sampled: 02/17/2022 14:15

Instrument: ICPMS2 Analyst: MCB — Analyzed: 02/22/2022 17:22

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 22B0268-01 A 02

Preparation Batch: BKB0466 — Sample Size: 25 mL — Filtration Batch: BKB0457

Prepared: 02/21/2022 — Final Volume: 25 mL — Filtration Date: 02/18/2022 16:36

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Arsenic, Dissolved	7440-38-2	5	0.187	1.00	157	ug/L	D

Maul, Foster & Alongi, Inc.	Project: Port of Tacoma Wasser and Winters Site	
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Portland WA, 97209	Project Manager: Audrey Hackett	23-Feb-2022 18:34

CMW-DUP-021722

22B0268-02 (Water)

Metals and Metallic Compounds (dissolved)

Method: EPA 200.8 UCT-KED — Sampled: 02/17/2022 14:15

Instrument: ICPMS2 Analyst: MCB — Analyzed: 02/21/2022 23:09

Analysis by: Analytical Resources, LLC

Sample Preparation: Preparation Method: REN EPA 600/4-79-020 4.1.4 HNO3 matrix — Extract ID: 22B0268-02 A 02

Preparation Batch: BKB0466 — Sample Size: 25 mL — Filtration Batch: BKB0457

Prepared: 02/21/2022 — Final Volume: 25 mL — Filtration Date: 02/18/2022 16:36

Analyte	CAS Number	Dilution	Detection Limit	Reporting Limit	Result	Units	Notes
Arsenic, Dissolved	7440-38-2	1	0.0373	0.200	155	ug/L	

Maul, Foster & Alongi, Inc.	Project: Port of Tacoma Wasser and Winters Site	
2001 NW 19th Avenue, Suite 200	Project Number: Port of Tacoma Wasser and Winters Site	**Reported:**
Portland WA, 97209	Project Manager: Audrey Hackett	23-Feb-2022 18:34

Analysis by: Analytical Resources, LLC

Metals and Metallic Compounds (dissolved) - Quality Control

Batch BKB0466 - REN EPA 600/4-79-020 4.1.4 HNO3 matrix

Instrument: ICPMS2 Analyst: MCB

QC Sample/Analyte	Isotope	Result	Detection Limit	Reporting Limit	Units	Spike Level	Source Result	%REC	%REC Limits	RPD	RPD Limit	Notes
Blank (BKB0466-BLK1)					Prepared: 21-Feb-2022 Analyzed: 21-Feb-2022 22:49							
Arsenic, Dissolved	75a	ND	0.0373	0.200	ug/L							U
LCS (BKB0466-BS1)					Prepared: 21-Feb-2022 Analyzed: 21-Feb-2022 22:54							
Arsenic, Dissolved	75a	24.5	0.0373	0.200	ug/L	25.0		98.0	80-120			

Maul, Foster & Alongi, Inc.	Project: Port of Tacoma Wasser and Winters Site	
2001 NW 19th Avenue, Suite 200	Project Number: Port of Tacoma Wasser and Winters Site	**Reported:**
Portland WA, 97209	Project Manager: Audrey Hackett	23-Feb-2022 18:34

Certified Analyses included in this Report

Analyte	Certifications
EPA 200.8 UCT-KED in Water	
Arsenic-75a	NELAP,WADOE,WA-DW,DoD-ELAP

Code	Description	Number	Expires
ADEC	Alaska Dept of Environmental Conservation	17-015	03/28/2023
DoD-ELAP	DoD-Environmental Laboratory Accreditation Program	66169	02/28/2022
NELAP	ORELAP - Oregon Laboratory Accreditation Program	WA100006-012	05/12/2022
WADOE	WA Dept of Ecology	C558	06/30/2022
WA-DW	Ecology - Drinking Water	C558	06/30/2022

Maul, Foster & Alongi, Inc.	Project: Port of Tacoma Wasser and Winters Site	
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Portland WA, 97209	Project Manager: Audrey Hackett	23-Feb-2022 18:34

Notes and Definitions

D	The reported value is from a dilution
J	Estimated concentration value detected below the reporting limit.
U	This analyte is not detected above the reporting limit (RL) or if noted, not detected above the limit of detection (LOD).
DET	Analyte DETECTED
ND	Analyte NOT DETECTED at or above the reporting limit
NR	Not Reported
dry	Sample results reported on a dry weight basis
RPD	Relative Percent Difference
[2C]	Indicates this result was quantified on the second column on a dual column analysis.

ATTACHMENT C

DATA VALIDATION MEMORANDUM

DATA QUALITY ASSURANCE/QUALITY CONTROL REVIEW

PROJECT NO. M0615.23.001 | FEBRUARY 24, 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 at the former Wasser Winters Log Sort Yard site in Tacoma, Washington, on February 17, 2022.

Analytical Resources, LLC (ARL), performed the analyses. ARL report number 22B0268 was reviewed. The analyses performed and samples analyzed are listed below.

Analysis	Reference
Dissolved arsenic	EPA Method 200.8
NOTES: EPA = U.S. Environmental Protection Agency.	

Samples Analyzed
Report 22B0268
CMW-3-021722
CMW-DUP-021722

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 (ARL, 2021; EPA, 1986).

Based on the results of the data quality review procedures described below, the data are considered acceptable for their intended use.

HOLDING TIMES, PRESERVATION, AND SAMPLE STORAGE

Holding Times

Extractions and analyses were performed within the recommended holding time criteria.

Preservation and Sample Storage

According to the preservation confirmation section of the cooler receipt form accompanying report 22B0268, samples were filtered with a 0.45-micron filter and preserved with nitric acid after receipt at the laboratory. Filtration and preservation were performed within one day of sample collection. No qualification was required.

The samples were preserved and stored appropriately.

BLANKS

Method Blanks

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

The laboratory method blank result was non-detect to the method detection limit.

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.

Trip Blanks

Trip blanks are used to evaluate whether volatile organic compound contamination was introduced during sample storage and shipment between the sampling location and the laboratory. Trip blank samples were not submitted.

LABORATORY CONTROL SAMPLE/LABORATORY CONTROL SAMPLE DUPLICATE RESULTS

A laboratory control sample (LCS) and an LCS duplicate are spiked with target analytes to provide information about laboratory precision and accuracy.

No LCS duplicate results were reported.

The LCS sample was extracted and analyzed at the required frequency, and the result was within acceptance limits for percent recovery.

LABORATORY DUPLICATE RESULTS

Laboratory duplicate results are used to evaluate laboratory precision.

No laboratory duplicate results were reported.

MATRIX SPIKE/MATRIX SPIKE DUPLICATE RESULTS

Matrix spike and matrix spike duplicate results are used to evaluate laboratory precision and accuracy as well as the effect of the sample matrix on sample preparation and analysis.

No matrix spike or matrix spike duplicate results were reported.

FIELD DUPLICATE RESULTS

Field duplicate samples measure both field and laboratory precision. According to report 22B0268, the following field duplicate and parent sample pairs were submitted for analysis (CMW-3-021722/CMW-DUP-021722). MFA uses acceptance criteria of 50 percent relative percent difference for results that are greater than five times the method reporting limit.

The field duplicate result met relative percent difference acceptance criteria.

REPORTING LIMITS

ARL reported results using routine method detection limits, except for samples requiring dilutions because of high analyte concentrations and/or matrix interferences.

DATA PACKAGE

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

The chain of custody form accompanying report 22B0268 lists instructions to analyze samples using reductive precipitation. The reviewer confirmed that ARL is not able to perform this procedure, and that samples were analyzed by EPA Method 200.8 without the reductive precipitation preparation at the approval of the MFA project manager. No further action was required.

No other issues were found.

REFERENCES

ARL. 2021. Quality assurance plan. Revision 19.0. Analytical Resources, LLC. Tukwila, Washington. December 29.

EPA. 1986. Test methods for evaluating solid waste, physical/chemical methods. EPA publication SW-846. 3d 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).

EPA. 2020. EPA contract laboratory program, 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. November.