



May 14, 2024

Project No. M0615.18.004

Scott Hooton

Project Manager, Environmental Program

Port of Tacoma

One Sitcum Plaza, Tacoma, WA 98421

Re: Groundwater Monitoring Report  
Former Murray Pacific No. 2 Sort Yard Site  
Consent Decree No. 94-2-09922-7  
Facility Site ID: 1211  
Monitoring Date: February 17, 2024

Dear Scott Hooton:

On February 17, 2024, Maul Foster & Alongi, Inc. (MFA), conducted a groundwater monitoring event on behalf of the Port of Tacoma (the Port) at the former Murray Pacific Corporation (Murray Pacific) No. 2 Log Sort Yard Site, located at 2407 Port of Tacoma Road in Tacoma, Washington (the Site) (Figure 1). Groundwater monitoring activities were conducted consistent with the requirements set forth in Consent Decree No. 94-2-09922-7 (CD), dated September 1994, between the Port and the Washington State Department of Ecology (Ecology) and the operation and maintenance plan (HLA 1997). The field activities and the analytical results of the monitoring event are discussed below.

## Site Background

The Site is located adjacent to the Blair Waterway at 2407 Port of Tacoma Road in Tacoma, Washington (Figure 1). The Site was leased to Murray Pacific from 1970 to 1994 and operated as a log sort yard. Before 1970, the Site was unleased and undeveloped. Asarco slag was used as ballast to provide a stable surface for operating log handling machinery. The Port is the property owner and leases the Site to Washington United Terminals for use as a marine terminal.

Ecology collected stormwater runoff samples from the Site between November 1983 and June 1984 (Norton 1985). Metals were detected in stormwater leaving the Site at concentrations above the U.S. Environmental Protection Agency (EPA) water-quality standards. Kennedy/Jenks Consultants performed a remedial investigation and feasibility study as an independent action for the Port in compliance with Ecology's Model Toxics Control Act (Kennedy/Jenks 1993). In September 1994, Ecology and the Port entered the CD for the Site (Ecology 1994). In 1997, a low-permeability asphalt cap and stormwater drainage system was constructed. In 1998, monitoring wells were installed for groundwater compliance monitoring. A restrictive covenant (no. 9808240631) was recorded for the Site in 1998, limiting activities that may interfere with or reduce the effectiveness of the cleanup action and requiring that the Site be used for industrial uses only (Port 1998).

In July 2019, Ecology conducted a periodic review of post-cleanup site conditions and site data and concluded that human health and the environment continue to be protected by the remedy. Ecology determined that the requirements of the restrictive covenants and the CD were met (Ecology 2019).

Periodic groundwater monitoring and cap inspections are performed to evaluate the long-term effectiveness and performance of the cleanup action at the Site. Groundwater monitoring has been conducted at monitoring wells MW-X, MW-Y, and MW-Z since 1998 to monitor groundwater quality on the Site (Figure 2). Groundwater monitoring is conducted every 18 months consistent with a 2011 memorandum of understanding (MOU) between Ecology and the Port (Ecology 2011). The contaminant of concern in groundwater is arsenic. The groundwater cleanup level (CUL) was modified from 0.14 micrograms per liter (ug/L) to 5 ug/L in 2009 (Ecology 2009). In 2022, Ecology published *Natural Background Groundwater Arsenic Concentrations in Washington State*, a study that indicates the natural background concentration of arsenic in groundwater in the Puget Sound basin is 8 ug/L (Ecology 2022). The previous arsenic standard of 5 ug/L is based on an outdated survey of ambient contaminant levels throughout Washington (PTI 1989). Therefore, the CUL for arsenic at this site has been adjusted to Ecology's updated natural background concentration of 8 ug/L.

The last groundwater monitoring event was conducted by MFA in August 2022 (MFA 2022b). MFA also completed a cap inspection in February 2022 (MFA 2022a). According to the MOU schedule, the next groundwater monitoring event will occur in August 2025, 18 months following the previous event. According to the 30-month schedule, the next cap inspection event will occur in August 2024, 30 months following the previous event.

## Groundwater Monitoring Field Procedures

On February 17, 2024, groundwater samples were collected from MW-X, MW-Y, and MW-Z using low-flow sampling procedures. The groundwater level in each well was measured prior to sampling (Table 1). During purging, flow rates, water levels, and water quality parameters (pH, temperature, specific conductance, dissolved oxygen, oxidation-reduction potential, and turbidity) were recorded on field sampling data sheets (Attachment A). Water-quality field parameters were stabilized before sample collection. Samples were collected directly into laboratory-provided bottles and were immediately placed in a cooler on ice. A field duplicate sample was collected from MW-X. Groundwater samples were field filtered with a 0.45-micron filter and preserved with nitric acid during sample collection. The samples were submitted to Apex Laboratories in Tigard, Oregon, under standard chain-of-custody procedures for analysis of dissolved arsenic by EPA Method 6020B. This laboratory was selected for its sophisticated instrumentation (a triple quad mass spectrometer) that reduces interference of chloride and other ions that can artificially elevate metals concentrations in brackish samples, as those routinely encountered at the Murray Pacific site.

## Groundwater Monitoring Results and Discussion

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

- In MW-X, dissolved arsenic was not detected in groundwater at or above the reporting limit of 0.360 ug/L. The field duplicate was collected from MW-X and dissolved arsenic concentrations also remained below the method detection limit of 0.360 ug/L in the duplicate sample.
- In MW-Y, dissolved arsenic was detected in groundwater at a concentration of 289 ug/L, above the groundwater CUL of 8 ug/L.
- In MW-Z, dissolved arsenic was detected in groundwater at a concentration of 0.595 ug/L, below the groundwater CUL of 8 ug/L.

Plots depicting dissolved arsenic concentrations over time (since monitoring began in 1994) for MW-X, MW-Y, and MW-Z are presented in Figure 3. Groundwater monitoring results from this event will be submitted to Ecology's Environmental Information Management database within 45 days after completion of data validation. The groundwater cleanup level (CUL) was modified from 0.14 ug/L to 5 ug/L in 2009 (Ecology 2009). In 2024, the CUL for arsenic was updated to 8 ug/L, which is the natural background concentration of arsenic in groundwater for the Puget Sound basin (Ecology 2022). In addition, the EPA Water Quality Marine Chronic for arsenic (36 ug/L) may be an applicable CUL for arsenic at the Site.

The concentration of dissolved arsenic in MW-Y is higher than recent previous monitoring events. The most recent cap inspection report prepared in 2022 identified damage to the cap near MW-Y, which may be contributing to higher concentrations of arsenic in the groundwater (MFA 2022a). In October and November 2022, the main aisle located west of the monitoring well MY-Y was repaved. In October 2023 and May 2024, the Port conducted additional crack sealing and repaving at the Site. The next cap inspection is scheduled for August 2024. Cap conditions and recommendations will be provided in the forthcoming August 2024 cap inspection report.

## Closing

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.



Audrey Hackett  
Senior Environmental Scientist

05-14-2024

Carolyn R. Wise, LHG  
Project Hydrogeologist

## Attachments

Limitations

Figures

Tables

A—Water Field Sampling Data Sheets

B—Analytical Laboratory Reports

C—Data Validation Memorandum

## References

- Anchor QEA. 2019. N. Bacher, Anchor QEA, LLC. *Groundwater Monitoring Report—Former Murray Pacific No. 2 Sort Yard, Consent Decree No. 94-2-09922-7*. Memorandum to P. Balaraju and A. Smith, Washington State Department of Ecology. November 14.
- Ecology. 1994. *Consent Decree 94-2-09922-7*. Washington State Department of Ecology. September 15.
- Ecology. 1998. *Declaration of Restrictive Covenant No. 9808240631*. Environmental covenant granted to the Port of Tacoma. Washington State Department of Ecology. August 24.
- Ecology. 2009. G. Barrett, Washington State Department of Ecology. *Groundwater Monitoring Summary Report for 23 July 2009, Former Murray Pacific No. 2 Log Yard*. Letter to M. Rettman, Port of Tacoma. October 26.
- Ecology. 2019. *Second Periodic Review Final Report, Murray Pacific 2, Facility Site ID#: 1211, Cleanup Site ID#: 3075*. Washington State Department of Ecology, Toxics Cleanup Program. July.
- Ecology. 2022. *Natural Background Groundwater Arsenic Concentrations in Washington State*. Washington State Department of Ecology, Toxics Cleanup Program: Olympia, WA. January.
- HLA. 1997. *Operation & Maintenance Plan*. Murray Pacific No. 2 Log Sort Yard Remediation Project, Port of Tacoma, Tacoma, WA. Harding Lawson Associates. December.
- Kennedy/Jenks. 1993. *Remedial Investigation/Feasibility Study, Murray Pacific Logyard No. 2, Tacoma, Washington*. Kennedy/Jenks Consultants Inc. 1993.
- MFA. 2022a. *Environmental Cap and Drainage System Inspection Report, Former Murray Pacific No. 2 Log Sort Yard*. Prepared for Port of Tacoma. Maul Foster & Alongi, Inc. June 15.
- MFA. 2022b. Audrey Hackett and Carolyn R. Wise, LHG, Maul Foster & Alongi, Inc. *Groundwater Monitoring Report, Former Murray Pacific No. 2 Log Sort Yard Site, Consent Decree No. 94-2-09922-7, Facility Site ID 1211, Monitoring Date August 21 and August 22, 2022*. Letter to Scott Hooton, Port of Tacoma. September 22.
- 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. February 27.

## 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.

# Figures

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**Notes:**  
 US Geological Survey 7.5-minute topographic quadrangle: Tacoma North. Township 21 North, Range 3 East, Section 35. Murray Pacific = Murray Pacific Corporation.

**Legend**

 Site Boundary

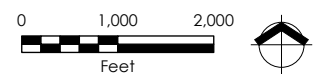
**Figure 1  
 Site Location**

Former Murray Pacific No. 2 Sort Yard Site Tacoma, WA



This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

**Data Source:**  
 Site boundary approximated from environmental covenant, Exhibit A.










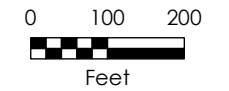
## Figure 2 Site Features

Former Murray Pacific  
No. 2 Sort Yard Site  
Tacoma, WA

### Legend

-  Monitoring Well
-  Site Boundary
-  Tax Lot

**Note:**  
Murray Pacific = Murray Pacific Corporation.

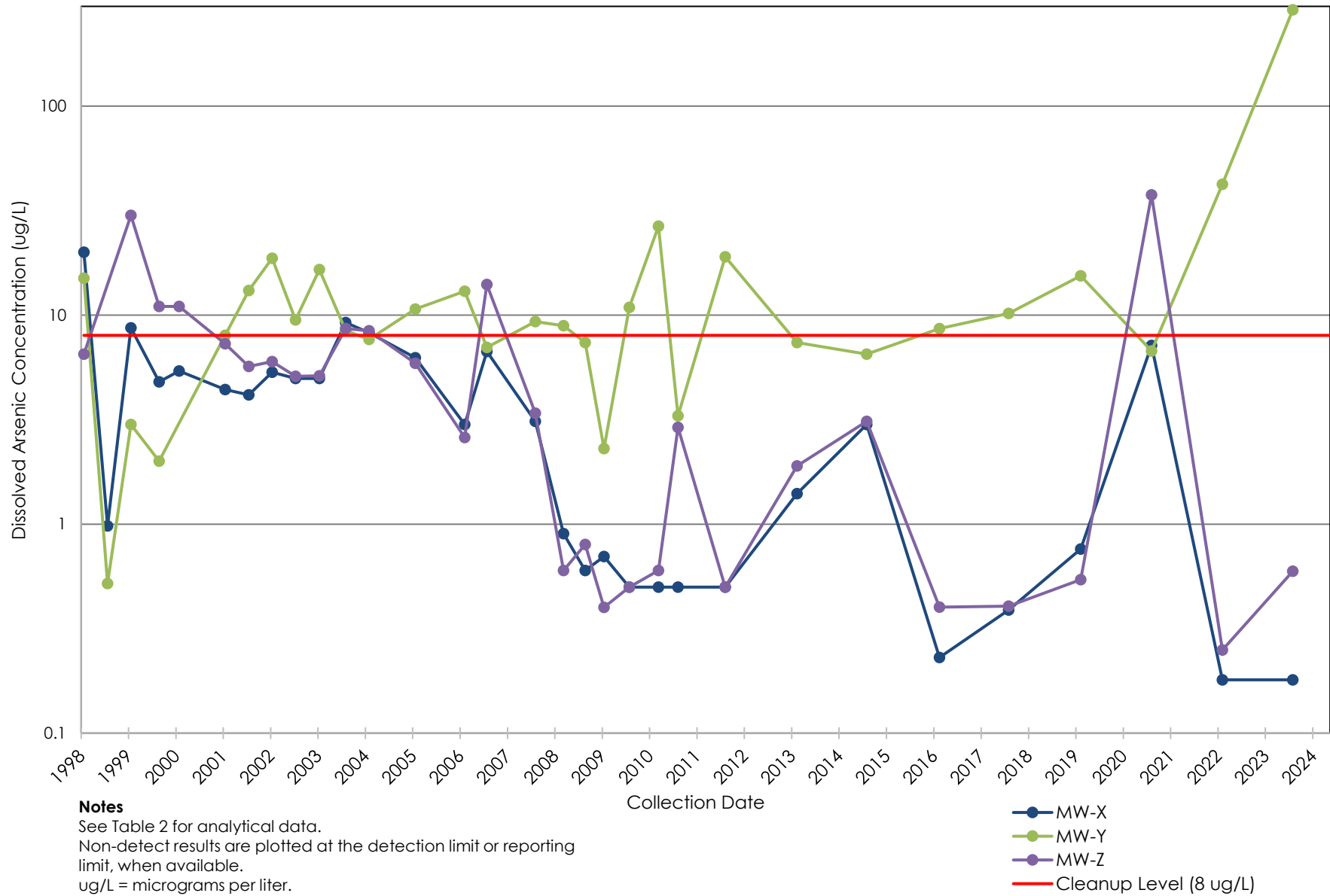


**Data Sources:**  
Aerial photograph obtained from Bing;  
tax lot data obtained from Pierce County.

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**Figure 3**  
**MW-X, MW-Y, and MW-Z Dissolved Arsenic Trend Plot**  
**Former Murray Pacific No. 2 Log Sort Yard**  
**Tacoma, Washington**



# Tables

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**Table 1**  
**Water Level Measurements**  
**Former Murray Pacific No. 2 Log Sort Yard**  
**Tacoma, Washington**



Location	Date	Depth to Water (feet)
MW-X	07/22/1998	10.62
	01/21/1999	10.08
	07/20/1999	10.14
	02/24/2000	10.09
	07/27/2000	10.76
	07/17/2001	11.02
	01/16/2002	10.97
	07/16/2002	10.78
	01/13/2003	10.95
	07/15/2003	10.90
	02/04/2004	10.80
	08/02/2004	11.00
	07/26/2005	10.93
	08/11/2006	10.84
	01/29/2007	10.72
	02/08/2008	10.14
	09/12/2008	11.80
	02/27/2009	11.12
	07/23/2009	11.05
	02/04/2010	10.90
	09/17/2010	10.89
	02/15/2011	10.70
	02/14/2012	11.85
	08/23/2013	10.91
	02/12/2015	10.69
	08/26/2016	10.83
02/12/2018	10.55	
08/23/2019	10.90	
02/19/2021	10.95	
08/22/2022	10.56	
02/17/2024	10.61	
MW-Y	07/22/1998	9.48
	01/21/1999	8.18
	07/20/1999	9.37
	02/24/2000	9.15
	07/27/2000	9.56
	07/17/2001	9.70
	01/16/2002	9.51
	07/16/2002	9.42
	01/13/2003	9.77

**Table 1**  
**Water Level Measurements**  
**Former Murray Pacific No. 2 Log Sort Yard**  
**Tacoma, Washington**



Location	Date	Depth to Water (feet)
MW-Y (continued)	07/15/2003	9.72
	02/04/2004	9.41
	08/02/2004	9.86
	07/26/2005	9.84
	08/11/2006	9.79
	01/29/2007	9.70
	02/08/2008	9.46
	09/12/2008	9.73
	02/27/2009	9.58
	07/23/2009	9.62
	02/04/2010	9.41
	09/17/2010	9.56
	02/15/2011	9.3
	02/14/2012	9.95
	08/23/2013	9.43
	02/12/2015	9.38
	08/26/2016	9.71
	02/12/2018	9.44
	08/23/2019	9.8
	02/19/2021	9.40
08/21/2022	9.41	
02/17/2024	9.38	
MW-Z	07/22/1998	15.35
	01/21/1999	12.01
	07/20/1999	13.07
	02/24/2000	12.27
	07/27/2000	13.29
	07/17/2001	12.48
	01/16/2002	13.28
	07/16/2002	12.71
	01/13/2003 <sup>(a)</sup>	28.10
	07/15/2003	12.92
	02/04/2004	12.15
	08/02/2004	13.17
	07/26/2005	13.38
	08/11/2006	13.26
	01/29/2007	13.17
	02/08/2008	12.54
	09/12/2008	13.13
02/27/2009	13.14	

**Table 1**  
**Water Level Measurements**  
**Former Murray Pacific No. 2 Log Sort Yard**  
**Tacoma, Washington**



Location	Date	Depth to Water (feet)
MW-Z (continued)	07/23/2009	13.36
	02/04/2010	11.5
	09/17/2010	12.51
	02/15/2011	11.62
	02/14/2012	12.95
	08/23/2013	13.23
	02/12/2015	11.64
	08/26/2016	12.65
	02/08/2018	12.33
	08/23/2019	12.9
	02/19/2021	12.21
	08/21/2022	12.46
	02/17/2024	12.05
<b>Notes</b>		
Depth to water measurements collected before February 2021 provided to Maul Foster Alongi, Inc., by Port of Tacoma.		
<sup>(a)</sup> The water level measured in MW-Z on January 13, 2003 is an outlier and may have been incorrectly recorded at the time of data collection and reporting.		

**Table 2**  
**Groundwater Analytical Data**  
**Former Murray Pacific No. 2 Log Sort Yard**  
**Tacoma, Washington**



Location	Sample Type	Collection Date	Dissolved Arsenic	Dissolved Copper <sup>(a)</sup>	Dissolved Lead <sup>(a)</sup>	Dissolved Zinc <sup>(a)</sup>
Units:			ug/L			
Groundwater Cleanup Levels <sup>(b)</sup> :			8	2.9	8.5	86
MW-X	N	07/22/1998	20	3.2	0.52	8.9
	FD	07/22/1998	3.4	3.3	ND	8
	N	01/21/1999	0.98	ND	ND	23
	FD	01/21/1999	0.52	ND	ND	18
	N	07/20/1999	7.7	2.2	ND	79
	FD	07/20/1999	8.7	2	ND	71
	N	02/24/2000	4.5	2.2	ND	86
	FD	02/24/2000	4.8	2.3	ND	100
	N	07/27/2000	4.9	1.4	ND	5.5
	FD	07/27/2000	5.4	1.6	ND	4.4
	N	07/17/2001	4.4	1.2	ND	50
	FD	07/17/2001	4.3	ND	ND	64
	N	01/16/2002	3.88	1.5	--	ND
	FD	01/16/2002	4.15	1.9	--	7.93
	N	07/16/2002	5.06	1.53	--	1.29
	FD	07/16/2002	5.33	1.95	--	2.6
	N	01/13/2003	4.97	ND	--	ND
	FD	01/13/2003	4.73	ND	--	ND
	N	07/15/2003	4.81	ND	--	ND
	FD	07/15/2003	4.97	ND	--	ND
	N	02/04/2004	9.22	1.32	--	5.46
	FD	02/04/2004	8.9	1.17	--	6.23
	N	08/02/2004	8.24	2.61	--	18.6
	FD	08/02/2004	7.45	1.49	--	14.7
	N	07/26/2005	5.37	ND	--	ND
	FD	07/26/2005	6.26	3.57	--	7.44
	N	08/11/2006	3	ND	--	ND
	FD	08/11/2006	ND	ND	--	--
	N	01/29/2007	6.7	ND	ND	ND
	N	02/08/2008	3.1	--	--	--
	FD	02/08/2008	1.9 J	--	--	--
	N	09/12/2008	0.7	--	--	--
FD	09/12/2008	0.9	--	--	--	
N	02/27/2009	0.6	--	--	--	
FD	02/27/2009	0.6	--	--	--	
N	07/23/2009	0.7	--	--	--	
FD	07/23/2009	0.4	--	--	--	
N	02/04/2010	0.5 U	--	--	--	

**Table 2**  
**Groundwater Analytical Data**  
**Former Murray Pacific No. 2 Log Sort Yard**  
**Tacoma, Washington**



Location	Sample Type	Collection Date	Dissolved Arsenic	Dissolved Copper <sup>(a)</sup>	Dissolved Lead <sup>(a)</sup>	Dissolved Zinc <sup>(a)</sup>
Units:			ug/L			
Groundwater Cleanup Levels <sup>(b)</sup> :			8	2.9	8.5	86
MW-X (continued)	FD	02/04/2010	0.5 U	--	--	--
	N	09/17/2010	0.5 U	--	--	--
	FD	09/17/2010	0.5 U	--	--	--
	N	02/15/2011	0.5 U	--	--	--
	FD	02/15/2011	0.5 U	--	--	--
	N	02/14/2012	0.5 U	--	--	--
	FD	02/14/2012	0.5 U	--	--	--
	N	08/23/2013	1.4	--	--	--
	FD	08/23/2013	1.3	--	--	--
	N	02/12/2015	3.0	--	--	--
	FD	02/12/2015	3.0	--	--	--
	N	08/26/2016	0.217	--	--	--
	FD	08/26/2016	0.230	--	--	--
	N	02/12/2018	0.357	--	--	--
	FD	02/12/2018	0.388	--	--	--
	N	08/23/2019	0.76	--	--	--
	N	02/19/2021	6.99	--	--	--
	FD	02/19/2021	7.15	--	--	--
	N	8/22/2022	0.18 U	--	--	--
	FD	08/22/2022	0.18 U	--	--	--
N	02/17/2024	0.360 U	--	--	--	
FD	02/17/2024	0.360 U	--	--	--	
MW-Y	N	07/22/1998	15	2	1.7	8.5
	N	01/21/1999	0.52	ND	ND	24
	N	07/20/1999	3	ND	ND	73
	N	02/24/2000	2	ND	ND	94
	N	07/27/2000	ND	ND	ND	ND
	N	07/17/2001	8	ND	ND	23
	N	01/16/2002	13.1	ND	--	6.92
	N	07/16/2002	18.7	0.584	--	2.77
	N	01/13/2003	9.49	ND	--	ND
	N	07/15/2003	16.5	ND	--	ND
	N	02/04/2004	8.45	2.45	--	9.64
	N	08/02/2004	7.64	ND	--	12.9
	N	07/26/2005	10.7	ND	--	ND
	N	08/11/2006	13	ND	--	ND
	N	01/29/2007	7	ND	--	ND
N	02/08/2008	9.3	--	--	--	



**Table 2**  
**Groundwater Analytical Data**  
**Former Murray Pacific No. 2 Log Sort Yard**  
**Tacoma, Washington**



Location	Sample Type	Collection Date	Dissolved Arsenic	Dissolved Copper <sup>(a)</sup>	Dissolved Lead <sup>(a)</sup>	Dissolved Zinc <sup>(a)</sup>
Units:			ug/L			
Groundwater Cleanup Levels <sup>(b)</sup> :			8	2.9	8.5	86
MW-Y (continued)	N	09/12/2008	8.9	--	--	--
	N	02/27/2009	7.4	--	--	--
	N	07/23/2009	2.3	--	--	--
	N	02/04/2010	10.9	--	--	--
	N	09/17/2010	26.6	--	--	--
	N	02/15/2011	3.3	--	--	--
	N	02/14/2012	19	--	--	--
	N	08/23/2013	7.4	--	--	--
	N	02/12/2015	6.5	--	--	--
	N	08/26/2016	8.62	--	--	--
	N	02/12/2018	10.2	--	--	--
	N	08/23/2019	15.4	--	--	--
	N	02/19/2021	6.74	--	--	--
	N	08/21/2022	42.3	--	--	--
N	02/17/2024	289	--	--	--	
MW-Z	N	07/22/1998	6.5	ND	0.84	3.7
	N	01/22/1999	ND	ND	ND	16
	N	07/20/1999	30	2.3	ND	68
	N	02/24/2000	11	2.3	0.52	44
	N	07/27/2000	11	1.9	ND	ND
	N	07/17/2001	7.3	1.4	ND	16
	N	01/16/2002	5.68	1.84	--	5.69
	N	07/16/2002	5.99	2.25	--	3.3
	N	01/13/2003	5.1	2.92	--	ND
	N	07/15/2003	5.12	ND	--	ND
	N	02/04/2004	8.62	1.62	--	6.62
	N	08/02/2004	8.41	2.07	--	14.3
	N	07/26/2005	5.88	ND	--	ND
	N	08/11/2006	2.6	ND	--	ND
	N	01/29/2007	14	ND	--	ND
	N	02/08/2008	3.4	--	--	--
	N	09/12/2008	0.6	--	--	--
	N	02/27/2009	0.8	--	--	--
	N	07/23/2009	0.4	--	--	--
	N	02/04/2010	0.5 U	--	--	--
	N	09/17/2010	0.6	--	--	--
N	02/15/2011	2.9	--	--	--	
N	02/14/2012	0.5 U	--	--	--	

**Table 2**  
**Groundwater Analytical Data**  
**Former Murray Pacific No. 2 Log Sort Yard**  
**Tacoma, Washington**



Location	Sample Type	Collection Date	Dissolved Arsenic	Dissolved Copper <sup>(a)</sup>	Dissolved Lead <sup>(a)</sup>	Dissolved Zinc <sup>(a)</sup>
Units:			ug/L			
Groundwater Cleanup Levels <sup>(b)</sup> :			8	2.9	8.5	86
MW-Z (continued)	N	08/23/2013	1.9	--	--	--
	N	02/12/2015	3.1	--	--	--
	N	08/26/2016	0.401	--	--	--
	N	02/12/2018	0.405	--	--	--
	N	08/23/2019	0.542	--	--	--
	FD	08/23/2019	0.485	--	--	--
	N	02/19/2021	37.6	--	--	--
	N	08/21/2022	0.25 J	--	--	--
N	02/17/2024	0.595	--	--	--	

**Notes**

Shading indicates results that exceed CULs. Non-detect data (indicated by ND or U) were not compared to CULs. All groundwater analytical results prior to February 2021 provided by Port of Tacoma.

Samples collected between 2019 and 2021 were analyzed by EPA Method 6020B. All other samples analyzed by EPA Method 200.8.

-- = not analyzed.  
 CUL = cleanup level.  
 Ecology = Washington State Department of Ecology.  
 EPA = U.S. Environmental Protection Agency.  
 FD = field duplicate sample.  
 J = result is estimated.  
 N = normal environmental sample.  
 ND = result is non-detect. Reporting limit is not available.  
 U = result is non-detect at the detection limit or reporting limit.  
 ug/L = micrograms per liter.

<sup>(a)</sup>Lead analysis was discontinued on September 28, 2001, and copper and zinc analyses were discontinued on February 20, 2007, with Ecology approval.

<sup>(b)</sup>Groundwater CULs established in Consent Decree 94-2-09922-7. The arsenic CUL was modified from 0.14 ug/L (National Toxics Rule) to 5 ug/L (Model Toxics Control Act Method A) in 2009 (Ecology 2009). In 2024, the arsenic CUL was modified again to 8 ug/L based on the results for the natural background concentration of arsenic in groundwater in the Puget Sound basin (Ecology 2022).

# Attachment A

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## Water Field Sampling Data Sheets



MAUL  
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## Water Field Sampling Data Sheet

<b>Client Name</b>	Port of Tacoma	<b>Sample Location</b>	MW-X		
<b>Project #</b>	M0615.18.004	<b>Sampler</b>	C. Sifford		
<b>Project Name</b>	Murray Pacific GW Monitoring	<b>Sampling Date</b>	2/17/2024		
<b>Sampling Event</b>	February 2024	<b>Sample Name</b>	MW-X-GW-12.0		
<b>Sub Area</b>		<b>Sample Depth (ft)</b>	12		
<b>FSDS QA:</b>	B. Murphy 3/27/2024	<b>Easting</b>		<b>Northing</b>	
		<b>TOC</b>			

### Hydrology/Level Measurements

Date	Time	DT-Bottom	DT-Product	DT-Water	(Product Thickness)	(Water Column)	(Gallons/ft x Water Column)
					DTP-DTW	DTB-DTW	Pore Volume
2/17/2024	13:05	13.47		10.61		2.86	0.47

(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	Water Level
(2) Peristaltic Pump	1:13:00 PM	0.1	0.2						8.52	10.77
	1:18:00 PM	0.4	0.2	6.7	13.2	5148	0.38	-39.2	1.99	10.79
	1:21:00 PM	0.6	0.2	6.69	13.2	5128	0.2	-53.7	0.59	10.79
	1:28:00 PM	1.1	0.2	6.7	13.2	5117	0.14	-62.7	0.91	10.8
	1:31:00 PM	1.2	0.2	6.71	13.2	5119	0.14	-65.4	0.94	10.8
Final Parameters	1:34:00 PM	1.3	0.2	6.72	13.2	5108	0.12	-67.5	0.83	10.8

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	1:40:00 PM	VOA-Glass		
			Amber Glass		
			White Poly		
			Yellow Poly		
			Green Poly		
			Red Total Poly		
			Red Dissolved Poly	1	Yes
			Total Bottles	1	

### General Sampling Comments

Began purging at 13:09.  
MW-DUP-GW-12.0 collected at this location.

Signature \_\_\_\_\_



## Water Field Sampling Data Sheet

<b>Client Name</b>	Port of Tacoma	<b>Sample Location</b>	MW-Y		
<b>Project #</b>	M0615.18.004	<b>Sampler</b>	C. Sifford		
<b>Project Name</b>	Murray Pacific GW Monitoring	<b>Sampling Date</b>	2/17/2024		
<b>Sampling Event</b>	February 2024	<b>Sample Name</b>	MW-Y-GW-12.5		
<b>Sub Area</b>		<b>Sample Depth (ft)</b>	12.5		
<b>FSDS QA:</b>	B. Murphy 3/27/2024	<b>Easting</b>		<b>Northing</b>	
		<b>TOC</b>			

### Hydrology/Level Measurements

Date	Time	DT-Bottom	DT-Product	DT-Water	(Product Thickness)	(Water Column)	(Gallons/ft x Water Column)
					DTP-DTW	DTB-DTW	Pore Volume
2/17/2024	11:59	14.91		9.38		5.53	0.9

(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	Water Level
(2) Peristaltic Pump	12:03:00 PM	0.1	0.18						15.5	9.55
	12:08:00 PM	0.4	0.18	6.53	13.5	3344	0.31	-109	9.92	9.64
	12:16:00 PM	0.8	0.18	6.6	13.4	3354	0.1	-141.2	5.58	9.67
	12:19:00 PM	1	0.18	6.59	13.5	3348	0.1	-144.5	3.19	9.67
	12:22:00 PM	1.1	0.18	6.6	13.5	3340	0.08	-146.8	3.53	9.68
Final Parameters	12:25:00 PM	1.2	0.18	6.59	13.6	3340	0.07	-148.2	3.62	9.67

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; slight sulfur-like odor; no sheen.

### Sample Information

Sampling Method	Sample Type	Sampling Time	Container Code/Preservative	#	Filtered
(2) Peristaltic Pump	Groundwater	12:30:00 PM	VOA-Glass		
			Amber Glass		
			White Poly		
			Yellow Poly		
			Green Poly		
			Red Total Poly		
			Red Dissolved Poly	1	Yes
			Total Bottles	1	

### General Sampling Comments

Began purging at 12:00.

Signature \_\_\_\_\_



## Water Field Sampling Data Sheet

<b>Client Name</b>	Port of Tacoma	<b>Sample Location</b>	MW-Z		
<b>Project #</b>	M0615.18.004	<b>Sampler</b>	C. Sifford		
<b>Project Name</b>	Murray Pacific GW Monitoring	<b>Sampling Date</b>	2/17/2024		
<b>Sampling Event</b>	February 2024	<b>Sample Name</b>	MW-Z-GW-23.0		
<b>Sub Area</b>		<b>Sample Depth (ft)</b>	23		
<b>FSDS QA:</b>	B. Murphy 3/27/2024	<b>Easting</b>		<b>Northing</b>	
		<b>TOC</b>			

### Hydrology/Level Measurements

Date	Time	DT-Bottom	DT-Product	DT-Water	(Product Thickness)	(Water Column)	(Gallons/ft x Water Column)
					DTP-DTW	DTB-DTW	Pore Volume
2/17/2024	14:09	28.23		12.05		16.18	2.64

(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	Water Level
(2) Peristaltic Pump	2:13:00 PM	0.1	0.24						1.34	12.12
	2:29:00 PM	1.1	0.24	6.47	14.2	5948	0.1	-53.9	1.8	12.18
	2:39:00 PM	1.8	0.24	6.5	14.2	5924	0.09	-60.7	1.48	12.21
	2:42:00 PM	2.1	0.24	6.46	14.2	5915	0.09	-62.1	1.34	12.21
	2:45:00 PM	2.3	0.24	6.48	14.2	5905	0.09	-63.3	1.41	12.21
	2:48:00 PM	2.5	0.24	6.47	14.2	5883	0.09	-64.2	0.89	12.21
Final Parameters	2:51:00 PM	2.7	0.24	6.47	14.2	5875	0.1	-64.9	0.91	12.21

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; slight yellow tint; no odor; no sheen.

### Sample Information

Sampling Method	Sample Type	Sampling Time	Container Code/Preservative	#	Filtered
(2) Peristaltic Pump	Groundwater	3:00:00 PM	VOA-Glass		
			Amber Glass		
			White Poly		
			Yellow Poly		
			Green Poly		
			Red Total Poly		
			Red Dissolved Poly	1	Yes
			Total Bottles	1	

### General Sampling Comments

Began purging at 14:11.

Signature \_\_\_\_\_

# Attachment B

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## Analytical Laboratory Reports



MAUL  
FOSTER  
ALONGI



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

Wednesday, March 6, 2024

Audrey Hackett  
Maul Foster & Alongi, INC.  
3140 NE Broadway Street  
Portland, OR 97232

RE: A4B1421 - Murray Pacific - M0615.18.004

Thank you for using Apex Laboratories. We greatly appreciate your business and strive to provide the highest quality services to the environmental industry.

Enclosed are the results of analyses for work order A4B1421, which was received by the laboratory on 2/20/2024 at 10:51:00AM.

If you have any questions concerning this report or the services we offer, please feel free to contact me by email at: [pnerenberg@apex-labs.com](mailto:pnerenberg@apex-labs.com), or by phone at 503-718-2323.

Please note: All samples will be disposed of within 30 days of sample receipt, unless prior arrangements have been made.

Cooler Receipt Information	
<p><u>Acceptable Receipt Temperature is less than, or equal to, 6 degC (not frozen), or received on ice the same day as sampling.</u></p> <p>(See Cooler Receipt Form for details)</p>	
<p>Default Cooler</p>	<p style="text-align: center; border-top: 1px solid black;">2.3 degC</p>

This Final Report is the official version of the data results for this sample submission, unless superseded by a subsequent, labeled amended report.

All other deliverables derived from this data, including Electronic Data Deliverables (EDDs), CLP-like forms, client requested summary sheets, and all other products are considered secondary to this report.



Apex Laboratories

*The results in this report apply to the samples analyzed in accordance with the chain of custody document(s) and updated by any subsequent written communications. This analytical report must be reproduced in its entirety.*

Philip Nerenberg, Lab Director





ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<u>Maul Foster &amp; Alongi, INC.</u> 3140 NE Broadway Street Portland, OR 97232	Project: <u>Murray Pacific</u> Project Number: <b>M0615.18.004</b> Project Manager: <b>Audrey Hackett</b>	<b>Report ID:</b> <b>A4B1421 - 03 06 24 1710</b>
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**ANALYTICAL REPORT FOR SAMPLES**

**SAMPLE INFORMATION**

Client Sample ID	Laboratory ID	Matrix	Date Sampled	Date Received
MW-X-GW-12.0	A4B1421-01	Water	02/17/24 13:40	02/20/24 10:51
MW-Y-GW-12.5	A4B1421-02	Water	02/17/24 12:30	02/20/24 10:51
MW-Z-GW-23.0	A4B1421-03	Water	02/17/24 15:00	02/20/24 10:51
MW-DUP-GW-12.0	A4B1421-04	Water	02/17/24 13:40	02/20/24 10:51

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Philip Nerenberg, Lab Director



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503-718-2323  
ORELAP ID: OR100062

<b>Maul Foster &amp; Alongi, INC.</b> 3140 NE Broadway Street Portland, OR 97232	Project: <b>Murray Pacific</b> Project Number: <b>M0615.18.004</b> Project Manager: <b>Audrey Hackett</b>	<b>Report ID:</b> <b>A4B1421 - 03 06 24 1710</b>
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**ANALYTICAL SAMPLE RESULTS**

**Dissolved Metals by EPA 200.8 (ICPMS)**

Analyte	Sample Result	Detection Limit	Reporting Limit	Units	Dilution	Date Analyzed	Method Ref.	Notes	
<b>MW-X-GW-12.0 (A4B1421-01RE1)</b>				<b>Matrix: Water</b>					
Batch: 24C0058									
Arsenic	ND	---	0.360	ug/L	1	03/04/24 17:07	EPA 200.8 (Diss)	A-01	
<b>MW-Y-GW-12.5 (A4B1421-02RE1)</b>				<b>Matrix: Water</b>					
Batch: 24C0058									
Arsenic	<b>289</b>	---	0.360	ug/L	1	03/04/24 17:10	EPA 200.8 (Diss)	<b>A-01</b>	
<b>MW-Z-GW-23.0 (A4B1421-03RE1)</b>				<b>Matrix: Water</b>					
Batch: 24C0058									
Arsenic	<b>0.595</b>	---	0.360	ug/L	1	03/04/24 17:13	EPA 200.8 (Diss)	<b>A-01</b>	
<b>MW-DUP-GW-12.0 (A4B1421-04RE1)</b>				<b>Matrix: Water</b>					
Batch: 24C0058									
Arsenic	ND	---	0.360	ug/L	1	03/04/24 17:16	EPA 200.8 (Diss)	A-01	

Apex Laboratories

Philip Nerenberg, Lab Director

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503-718-2323  
ORELAP ID: OR100062

<b>Maul Foster &amp; Alongi, INC.</b> 3140 NE Broadway Street Portland, OR 97232	Project: <b>Murray Pacific</b> Project Number: <b>M0615.18.004</b> Project Manager: <b>Audrey Hackett</b>	<b>Report ID:</b> <b>A4B1421 - 03 06 24 1710</b>
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**QUALITY CONTROL (QC) SAMPLE RESULTS**

**Dissolved Metals by EPA 200.8 (ICPMS)**

Analyte	Result	Detection Limit	Reporting Limit	Units	Dilution	Spike Amount	Source Result	% REC	% REC Limits	RPD	RPD Limit	Notes
<b>Batch 24C0058 - Matrix Matched Direct Inject</b>						<b>Water</b>						
<b>Blank (24C0058-BLK3)</b>			Prepared: 03/01/24 18:11 Analyzed: 03/04/24 16:38									
<u>EPA 200.8 (Diss)</u>												
Arsenic	ND	---	0.360	ug/L	1	---	---	---	---	---	---	A-01
<b>LCS (24C0058-BS3)</b>			Prepared: 03/01/24 18:11 Analyzed: 03/04/24 16:41									
<u>EPA 200.8 (Diss)</u>												
Arsenic	4.91	---	0.378	ug/L	1	5.00	---	98	85-115%	---	---	A-01
<b>Duplicate (24C0058-DUP3)</b>			Prepared: 03/01/24 18:11 Analyzed: 03/04/24 16:47									
<u>QC Source Sample: Non-SDG (A4B1319-01RE1)</u>												
Arsenic	42.2	---	0.360	ug/L	1	---	41.7	---	---	1	20%	A-01
<b>Matrix Spike (24C0058-MS3)</b>			Prepared: 03/01/24 18:11 Analyzed: 03/04/24 16:50									
<u>QC Source Sample: Non-SDG (A4B1319-01RE1)</u>												
<u>EPA 200.8 (Diss)</u>												
Arsenic	47.3	---	0.378	ug/L	1	5.00	41.7	111	70-130%	---	---	A-01

Apex Laboratories

Philip Nerenberg, Lab Director

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503-718-2323  
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<b><u>Maul Foster &amp; Alongi, INC.</u></b> 3140 NE Broadway Street Portland, OR 97232	Project: <b><u>Murray Pacific</u></b> Project Number: <b>M0615.18.004</b> Project Manager: <b>Audrey Hackett</b>	<b>Report ID:</b> <b>A4B1421 - 03 06 24 1710</b>
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**SAMPLE PREPARATION INFORMATION**

**Dissolved Metals by EPA 200.8 (ICPMS)**

<u>Prep: Matrix Matched Direct Inject</u>					Sample	Default	RL Prep
Lab Number	Matrix	Method	Sampled	Prepared	Initial/Final	Initial/Final	Factor
<u>Batch: 24C0058</u>							
A4B1421-01RE1	Water	EPA 200.8 (Diss)	02/17/24 13:40	03/01/24 18:11	10mL/20mL	45mL/50mL	1.80
A4B1421-02RE1	Water	EPA 200.8 (Diss)	02/17/24 12:30	03/01/24 18:11	10mL/20mL	45mL/50mL	1.80
A4B1421-03RE1	Water	EPA 200.8 (Diss)	02/17/24 15:00	03/01/24 18:11	10mL/20mL	45mL/50mL	1.80
A4B1421-04RE1	Water	EPA 200.8 (Diss)	02/17/24 13:40	03/01/24 18:11	10mL/20mL	45mL/50mL	1.80

Apex Laboratories

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Philip Nerenberg, Lab Director



**ANALYTICAL REPORT**

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Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b><u>Maul Foster &amp; Alongi, INC.</u></b> 3140 NE Broadway Street Portland, OR 97232	Project: <b><u>Murray Pacific</u></b> Project Number: <b>M0615.18.004</b> Project Manager: <b>Audrey Hackett</b>	<b><u>Report ID:</u></b> <b>A4B1421 - 03 06 24 1710</b>
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**QUALIFIER DEFINITIONS**

**Client Sample and Quality Control (QC) Sample Qualifier Definitions:**

**Apex Laboratories**

A-01 Direct analysis performed by EPA 6020B.

Apex Laboratories

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ANALYTICAL REPORT

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**REPORTING NOTES AND CONVENTIONS:**

**Abbreviations:**

- DET Analyte DETECTED at or above the detection or reporting limit.
- ND Analyte NOT DETECTED at or above the detection or reporting limit.
- NR Result Not Reported
- RPD Relative Percent Difference. RPDs for Matrix Spikes and Matrix Spike Duplicates are based on concentration, not recovery.

**Detection Limits: Limit of Detection (LOD)**

Limits of Detection (LODs) are normally set at a level of one half the validated Limit of Quantitation (LOQ).  
If no value is listed ('-----'), then the data has not been evaluated below the Reporting Limit.

**Reporting Limits: Limit of Quantitation (LOQ)**

Validated Limits of Quantitation (LOQs) are reported as the Reporting Limits for all analyses where the LOQ, MRL, PQL or CRL are requested. The LOQ represents a level at or above the low point of the calibration curve, that has been validated according to Apex Laboratories' comprehensive LOQ policies and procedures.

**Reporting Conventions:**

Basis: Results for soil samples are generally reported on a 100% dry weight basis.  
The Result Basis is listed following the units as " dry", " wet", or " " (blank) designation.

- " dry" Sample results and Reporting Limits are reported on a dry weight basis. (i.e. "ug/kg dry")  
See Percent Solids section for details of dry weight analysis.
- " wet" Sample results and Reporting Limits for this analysis are normally dry weight corrected, but have not been modified in this case.
- " " Results without 'wet' or 'dry' designation are not normally dry weight corrected. These results are considered 'As Received'.

Results for Volatiles analyses on soils and sediments that are reported on a "dry weight" basis include the water miscible solvent (WMS) correction referenced in the EPA 8000 Method guidance documents. Solid and Liquid samples reported on an "As Received" basis do not have the WMS correction applied, as dry weight was not performed.

**QC Source:**

In cases where there is insufficient sample provided for Sample Duplicates and/or Matrix Spikes, a Lab Control Sample Duplicate (LCS Dup) may be analyzed to demonstrate accuracy and precision of the extraction batch.

Non-Client Batch QC Samples (Duplicates and Matrix Spike/Duplicates) may not be included in this report. Please request a Full QC report if this data is required.

**Miscellaneous Notes:**

- " --- " QC results are not applicable. For example, % Recoveries for Blanks and Duplicates, % RPD for Blanks, Blank Spikes and Matrix Spikes, etc.
- " \*\*\* " Used to indicate a possible discrepancy with the Sample and Sample Duplicate results when the %RPD is not available. In this case, either the Sample or the Sample Duplicate has a reportable result for this analyte, while the other is Non Detect (ND).

Apex Laboratories

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Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

**Maul Foster & Alongi, INC.**

3140 NE Broadway Street  
Portland, OR 97232

Project: **Murray Pacific**

Project Number: **M0615.18.004**

Project Manager: **Audrey Hackett**

**Report ID:**

**A4B1421 - 03 06 24 1710**

REPORTING NOTES AND CONVENTIONS (Cont.):

**Blanks:**

- Standard practice is to evaluate the results from Blank QC Samples down to a level equal to 1/2 the Reporting Limit (RL).
- For Blank hits falling between 1/2 the RL and the RL (J flagged hits), the associated sample and QC data will receive a 'B-02' qualifier.
- For Blank hits above the RL, the associated sample and QC data will receive a 'B' qualifier, per Apex Laboratories' Blank Policy.
- For further details, please request a copy of this document.
- Sample results flagged with a 'B' or 'B-02' qualifier are potentially biased high if the sample results are less than ten times the level found in the blank for inorganic analyses, or less than five times the level found in the blank for organic analyses.
- 'B' and 'B-02' qualifications are only applied to sample results detected above the Reporting Level, if results are not reported to the MDL.

**Preparation Notes:**

Mixed Matrix Samples:

Water Samples:

Water samples containing significant amounts of sediment are decanted or separated prior to extraction, and only the water portion analyzed, unless otherwise directed by the client.

Soil and Sediment Samples:

Soil and Sediment samples containing significant amounts of water are decanted prior to extraction, and only the solid portion analyzed, unless otherwise directed by the client.

**Sampling and Preservation Notes:**

Certain regulatory programs, such as National Pollutant Discharge Elimination System (NPDES), require that activities such as sample filtration (for dissolved metals, orthophosphate, hexavalent chromium, etc.) and testing of short hold analytes (pH, Dissolved Oxygen, etc.) be performed in the field (on-site) within a short time window. In addition, sample matrix spikes are required for some analyses, and sufficient volume must be provided, and billable site specific QC requested, if this is required. All regulatory permits should be reviewed to ensure that these requirements are being met.

Data users should be aware of which regulations pertain to the samples they submit for testing. If related sample collection activities are not approved for a particular regulatory program, results should be considered estimates. Apex Laboratories will qualify these analytes according to the most stringent requirements, however results for samples that are for non-regulatory purposes may be acceptable.

Samples that have been filtered and preserved at Apex Laboratories per client request are listed in the preparation section of the report with the date and time of filtration listed.

Apex Laboratories maintains detailed records on sample receipt, including client label verification, cooler temperature, sample preservation, hold time compliance and field filtration. Data is qualified as necessary, and the lack of qualification indicates compliance with required parameters.

Apex Laboratories

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Philip Nerenberg, Lab Director



ANALYTICAL REPORT

Apex Laboratories, LLC

6700 S.W. Sandburg Street
Tigard, OR 97223
503-718-2323
ORELAP ID: OR100062

Table with 3 columns: Client (Maul Foster & Alongi, INC.), Project (Murray Pacific), and Report ID (A4B1421 - 03 06 24 1710).

LABORATORY ACCREDITATION INFORMATION

ORELAP Certification ID: OR100062 (Primary Accreditation) -
EPA ID: OR01039

All methods and analytes reported from work performed at Apex Laboratories are included on Apex Laboratories' ORELAP Scope of Certification, with the exception of any analyte(s) listed below:

Apex Laboratories

Table with 6 columns: Matrix, Analysis, TNI\_ID, Analyte, TNI\_ID, Accreditation. Content: All reported analytes are included in Apex Laboratories' current ORELAP scope.

Secondary Accreditations

Apex Laboratories also maintains reciprocal accreditation with non-TNI states (Washington DOE), as well as other state specific accreditations not listed here.

Subcontract Laboratory Accreditations

Subcontracted data falls outside of Apex Laboratories' Scope of Accreditation. Please see the Subcontract Laboratory report for full details, or contact your Project Manager for more information.

Field Testing Parameters

Results for Field Tested data are provided by the client or sampler, and fall outside of Apex Laboratories' Scope of Accreditation.

Apex Laboratories

Handwritten signature of Philip Nerenberg

The results in this report apply to the samples analyzed in accordance with the chain of custody document(s) and updated by any subsequent written communications. This analytical report must be reproduced in its entirety.

Philip Nerenberg, Lab Director





**ANALYTICAL REPORT**

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

**Maul Foster & Alongi, INC.** Project: **Murray Pacific**  
3140 NE Broadway Street Project Number: **M0615.18.004**  
Portland, OR 97232 Project Manager: **Audrey Hackett** Report ID: **A4B1421 - 03 06 24 1710**

<b>CHAIN OF CUSTODY</b>		Lab # <u>A4B1421</u> coc # of _____	
<b>APEX LABS</b> 6700 SW Sandburg St., Tigard, OR 97223 Ph: 503-718-2323		Project Name: <u>Murray Pacific</u> Project #: <u>M0615.18.004</u>	
Company: <u>Maul Foster &amp; Alongi, Inc.</u> Address: <u>2815 2nd Ave, Ste 540, Seattle, WA</u> Phone: <u>206-331-1855</u> Email: <u>hacketta@maulfooster.com</u>		Project Mgr: <u>Audrey Hackett</u> PO # _____	
Sampled by: <u>Christian Sifford</u> Site Location: _____ State: <u>Washington</u> County: <u>Pierce</u>		<b>ANALYSIS REQUEST</b> 8260 Halo VOCs 8260 RBDM VOCs 8260 BTEX NWTPH-GX NWTPH-DX NWTPH-HCID # OF CONTAINERS _____ MATRIX _____ TIME _____ DATE _____	
SAMPLE ID <u>MW-X-GW-12.0</u> <u>MW-Y-GW-12.5</u> <u>MW-Z-GW-23.0</u> <u>MW-DUP-GW-12.0</u>		Priority Metals (13) AL, Sb, Ba, Be, Cd, Cr, Cu, Fe, Pb, Hg, Mn, Mo, Ni, K, Se, Ag, Na, TL, V, Zn TOTAL (DISS) TCLP Metals (8) 8081 Pesticides 8082 PCBs 8270 Semi-Vols Full List 8270 SIM PAHs 8260 VOCs Full List	
TAT Requested (circle) 1 Day _____ 2 Day _____ 3 Day _____ 5 Day <u>Standard</u> Other: _____		SPECIAL INSTRUCTIONS: <u>All samples bracketish</u> <u>All samples field filtered</u> <u>Diss Metals by EPA 200.8</u>	
RECEIVED BY: Signature: _____ Date: <u>4/1/20</u> Printed Name: <u>Christian Sifford</u> Time: <u>9:15</u> Company: <u>MEFA</u>		RECEIVED BY: Signature: _____ Date: _____ Printed Name: _____ Time: _____ Company: _____	

Apex Laboratories

*Philip Nerenberg*

Philip Nerenberg, Lab Director

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ANALYTICAL REPORT

**Apex Laboratories, LLC**

6700 S.W. Sandburg Street  
Tigard, OR 97223  
503-718-2323  
ORELAP ID: OR100062

<b>Maul Foster &amp; Alongi, INC.</b> 3140 NE Broadway Street Portland, OR 97232	Project: <b>Murray Pacific</b> Project Number: <b>M0615.18.004</b> Project Manager: <b>Audrey Hackett</b>	<b>Report ID:</b> <b>A4B1421 - 03 06 24 1710</b>
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**APEX LABS COOLER RECEIPT FORM**

**Client:** Maul Foster + Alongi Element WO#: A4B1421

**Project/Project #:** Murray Pacific

**Delivery Info:**  
Date/time received: 2/20/24 @ 10:57 By: VRS  
Delivered by: Apex  Client  ESS  FedEx  UPS  Radio  Morgan  SDS  Evergreen  Other

**Cooler Inspection** Date/time inspected: 2/20/24 @ 10:57 By: VRS

Chain of Custody included? Yes  No   
Signed/dated by client? Yes  No

	Cooler #1	Cooler #2	Cooler #3	Cooler #4	Cooler #5	Cooler #6	Cooler #7
Temperature (°C)	<u>2-3</u>						
Custody seals? (Y/N)	<u>N</u>						
Received on ice? (Y/N)	<u>Y</u>						
Temp. blanks? (Y/N)	<u>Y</u>						
Ice type: (Gel/Real/Other)	<u>Real</u>						
Condition (In/Out):	<u>In</u>						

Cooler out of temp? (Y/N) Possible reason why: \_\_\_\_\_  
Green dots applied to out of temperature samples? Yes  No   
Out of temperature samples form initiated? Yes  No

**Sample Inspection:** Date/time inspected: 2/22/24 @ 15:47 By: AW

All samples intact? Yes  No  Comments: \_\_\_\_\_

Bottle labels/COCs agree? Yes  No  Comments: \_\_\_\_\_

COC/container discrepancies form initiated? Yes  No   
Containers/volumes received appropriate for analysis? Yes  No  Comments: \_\_\_\_\_

Do VOA vials have visible headspace? Yes  No  NA   
Comments: \_\_\_\_\_

Water samples: pH checked: Yes  No  NA  pH appropriate? Yes  No  NA  pH ID: A03E172  
Comments: \_\_\_\_\_

**Additional information:** 2711 4054 9488

Labeled by: AW      Witness: [Signature]      Cooler Inspected by: [Signature]

Form Y-003 R-01

Apex Laboratories

*Philip Nerenberg*

Philip Nerenberg, Lab Director

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# Attachment C

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## Data Validation Memorandum



MAUL  
FOSTER  
ALONGI

# Data Quality Assurance/Quality Control Review

Project No. M0615.18.004 | March 12, 2024 | Port of Tacoma

Maul Foster & Alongi, Inc. (MFA), conducted an independent Stage 2A review of the quality of analytical results for groundwater and associated quality control samples collected on February 17, 2024, at the former Murray Pacific No. 2 Log Sort Yard located at 2407 Port of Tacoma Road, Tacoma, Washington.

Apex Laboratories, LLC (Apex), performed the analyses. MFA reviewed Apex report number A4B1421. The analyses performed and the samples analyzed are listed in the following tables.

Analysis	Reference
Dissolved arsenic	EPA 200.8/6020B

**Note**

EPA = U.S. Environmental Protection Agency.

Samples Analyzed
<b>Report A4B1421</b>
MW-X-GW-12.0
MW-Y-GW-12.5
MW-Z-GW-23.0
MW-DUP-GW-12.0

## 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 (Apex 2023, 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:

- U = result is non-detect at the method reporting limit (MRL).

## Sample Conditions

### Sample Custody

Sample custody was appropriately documented on the chain-of-custody (COC) form accompanying the report. The reviewer confirmed that the gap in custody in report A4B1421 is due to shipment via third-party shipping service.

### Holding Times

Extractions and analyses were performed within the recommended holding times.

## Preservation and Sample Storage

The samples were preserved and stored appropriately.

## Sample Filtration

Field samples for dissolved EPA Method 200.8 analysis were field-filtered with a 0.45-micron filter during sample collection.

## Reporting Limits

The laboratory evaluated results to MRLs.

## 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 blanks were associated with all samples prepared in the analytical batch.

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

### 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.

### Field Filter Blanks

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

Field 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. Apex did not report LCSD results; laboratory precision was evaluated using laboratory duplicate results. The LCS was prepared and analyzed at the required frequency.

The LCS result was within acceptance limits for percent recovery.

## Laboratory Duplicate Results

Laboratory duplicate results are used to evaluate laboratory precision. The laboratory duplicate sample was prepared and analyzed at the required frequency.

Laboratory duplicate results greater than five times the MRL were evaluated using laboratory RPD control limits.

The laboratory duplicate result met the acceptance criterion.

## Matrix Spike and Matrix Spike Duplicate Results

Matrix spike (MS) and matrix spike duplicate (MSD) results are used to evaluate laboratory precision, accuracy, and the effect of the sample matrix on sample preparation and analysis. Apex did not report MSD results; laboratory precision was evaluated using laboratory duplicate results. The MS sample was prepared and analyzed at the required frequency.

The MS result was 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
A4B1421	MW-X-GW-12.0	MW-DUP-GW-12.0

Both results in the sample pair were non-detect; RPD was not evaluated.

## Data Package

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

On the COC form accompanying report A4B1421, there is no year listed for the sample collection date. The reviewer confirmed that samples were collected in 2024 and Apex correctly reported the samples as such.

According to report A4B1421, EPA Method 200.8 was analyzed under EPA Method 6020B. The reviewer confirmed with the laboratory that the analytical method was switched to meet analytical quality control limits, and that the reported dissolved arsenic results are acceptable.

No other issues were found.

## References

Apex. 2023. *Quality Systems Manual*. Rev. 11. Apex Laboratories, LLC: Tigard, OR. June 20.

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.