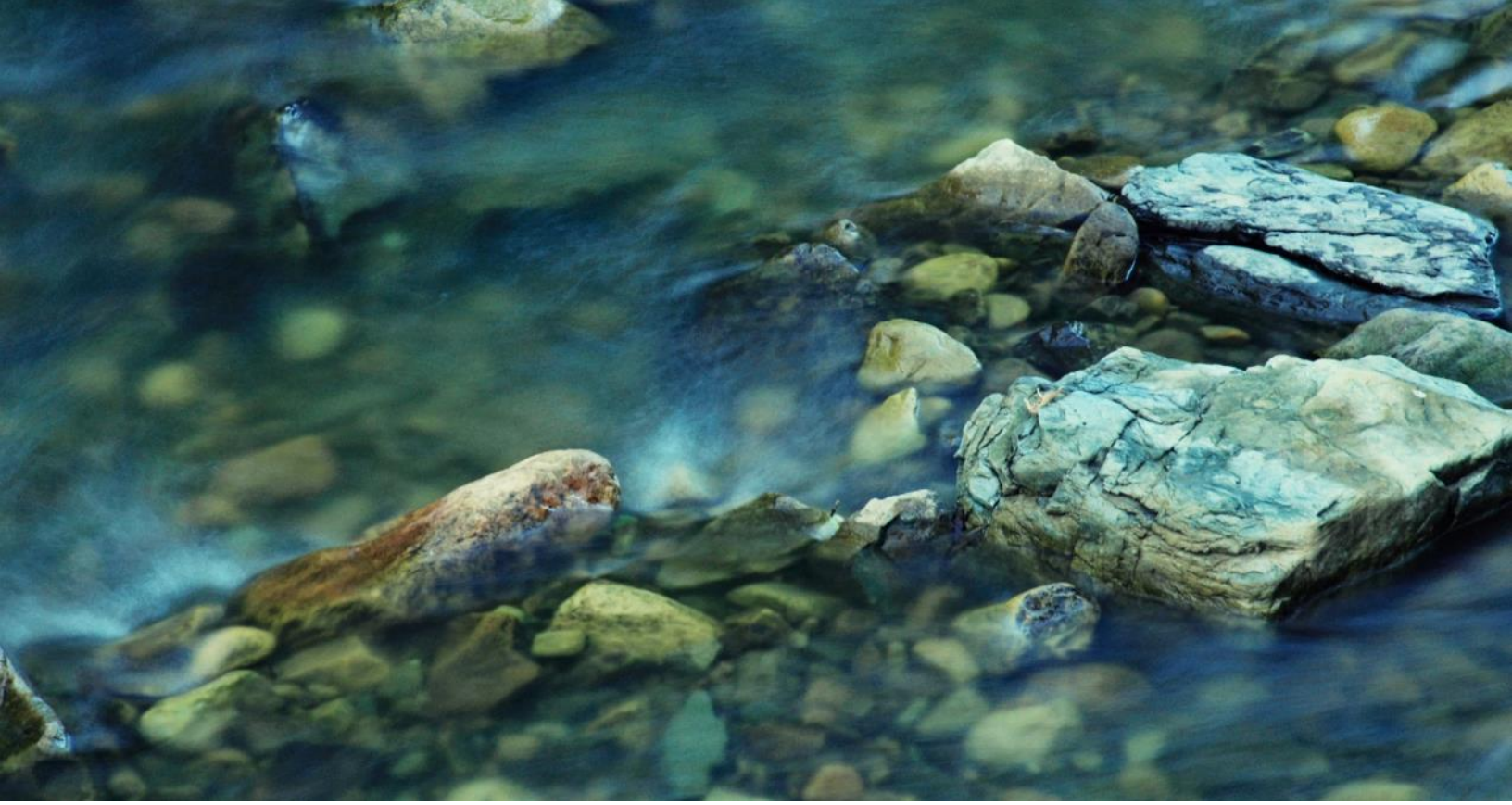

May 2019
Former Kaiser Aluminum Property

ANCHOR QEA

2019 Groundwater Monitoring Report

Prepared for the Port of Tacoma

May 2019
Former Kaiser Aluminum Property

2019 Groundwater Monitoring Report

Prepared for
Port of Tacoma
P.O. Box 1837
Tacoma, Washington 98401

Prepared by
Anchor QEA, LLC
1119 Pacific Avenue, Suite 1600
Tacoma, Washington 98402

Project Number: 170092-02.01
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ABBREVIATIONS

µg/L	micrograms per liter
Ecology	Washington Department of Ecology
Kaiser Aluminum	Kaiser Aluminum & Chemical Corporation
Port	Port of Tacoma
Site	Former Kaiser Aluminum Property located at 3400 Taylor Way in Tacoma, Washington
SPL	Spent Pot Lining

1 Introduction

This report summarizes field activities and presents results of the 2019 annual performance groundwater quality monitoring event conducted by Anchor QEA on behalf of the Port of Tacoma (Port) at the Former Kaiser Aluminum Property located at 3400 Taylor Way in Tacoma, Washington (Site; Figure 1). Groundwater sampling activities were conducted in accordance with the requirements set forth in the public review Consent Decree 16-2-12406-8, dated July 2016, between the Port and the Washington Department of Ecology (Ecology 2016a).

This is the third year of annual performance groundwater quality monitoring and concludes the initial sampling that will be used to establish baseline groundwater conditions to evaluate long-term effectiveness of the remedial action.

2 Site History

The Site encompasses approximately 96 acres of the Blair Hylebos Peninsula in Tacoma, Washington. The Hylebos Waterway is northeast and the Blair Waterway is southwest of the Site (Figure 1). From 1941 to 1947, the Department of Defense built and operated an aluminum smelter at the Site. In 1947, Kaiser Aluminum & Chemical Corporation (Kaiser Aluminum) purchased the Site and operated the aluminum production facility until 2001. In 2002, Kaiser Aluminum closed the plant and, in 2003, the Port purchased the smelter property from Kaiser Aluminum for redevelopment. Between 2003 and 2010, the Port demolished the smelter complex, shipped thousands of tons of waste to approved disposal, treatment, or recycling facilities, and placed a 2- to 6-foot-thick layer of structural fill on approximately 80 of the 96 acres.

The Site is zoned for industrial use and is undergoing redevelopment as an import automotive processing center under a 30-year lease agreement. The facility is expected to be complete by July 2019.

The Remedial Investigation/Feasibility Study (Landau Associates 2012) identified the Spent Pot Lining (SPL) Area, the Rod Mill Area Closed Landfill, and the Former Log Yard Area as requiring further remedial action, which was completed in 2016. Performance groundwater quality monitoring is required in the SPL and Former Log Yard Areas following completion of the remedial action.

3 Groundwater Monitoring

This section summarizes the field observations and laboratory results from the five groundwater monitoring wells sampled on February 28, 2019, in the SPL and Former Log Yard Areas at the Site.

Groundwater sampling activities were conducted in accordance with the *Performance Groundwater Quality Monitoring Plan,* which is included as Appendix A in the *Cleanup Action Plan* (Ecology 2016b).

3.1 Water Level Measurements

Prior to groundwater sampling, water levels were measured to the nearest 0.01 foot in each monitoring well relative to the top of the surveyed casing rim using a water level meter. Table 1 provides the water level measurements converted to elevations referenced to mean lower low water and North American Vertical Datum of 1988. Field records of water level measurements are provided on field forms located in Appendix A.

3.2 Groundwater Sampling

A site map showing well locations is presented in Figure 2. On February 28, 2019, groundwater samples were collected from five monitoring wells, along with two sample duplicates. Three samples were collected from the Former Log Yard, including MW-101(S), MW-102(S), and MW-103(S). Two locations were collected from the SPL Area, including MW-SPL1(S) and MW-SPL2(S).

Groundwater samples were obtained from monitoring wells using a peristaltic pump and dedicated polyethylene tubing. Groundwater was pumped at 0.5 liter per minute or less using a peristaltic pump through tubing placed within the screened interval. A water quality meter with a flow-through cell was used to monitor water quality parameters during purging. Groundwater samples at each location were obtained after ambient groundwater conditions were reached, such that pH, temperature, specific conductance, dissolved oxygen, and turbidity stabilized for three successive readings (i.e., the readings were within ±0.1 pH units for pH, ±3% for conductivity, and ±10% for dissolved oxygen and turbidity). Field records of water quality parameters are provided in Appendix A.

Groundwater samples were collected directly into laboratory-provided bottles once water quality parameters had stabilized and were subsequently placed in a cooler on ice. All groundwater samples were hand delivered to Analytical Resources, Inc., under chain-of-custody procedures. The groundwater sampling field logs are provided in Appendix A.

Laboratory data were subjected to a standard U.S. Environmental Protection Agency Level 2B data validation review prior to use in data reduction and reporting.

4 Results

Table 2 presents the analytical results for groundwater performance monitoring and includes all data from the 2017, 2018, and 2019 for comparison purposes. Lab reports (2019 only) are provided in Appendix B. The data validation report (2019 only) is included in Appendix C.

4.1 Spent Pot Lining Area

Results of testing for the SPL Area demonstrated compliance with applicable cleanup levels contained in the *Cleanup Action Plan* (Ecology 2016b). The following is a summary of the results:

- Detected cyanide concentrations were below the groundwater cleanup levels established in the *Cleanup Action Plan* (Ecology 2016b) by approximately two orders of magnitude. Total cyanide and weak acid dissociable cyanide were detected in both MW-SPL1(S) and MW-SPL2(S).
- Carcinogenic polycyclic aromatic hydrocarbons were detected in MW-SPL1(S) and MW-SPL2(S), but at concentrations less than the groundwater cleanup levels.

4.2 Former Log Yard Area

Results of testing in the Former Log Yard Area documented current concentrations of total arsenic in groundwater. The results are as summarized as follows:

- MW-101(S): 5.63 micrograms per liter (µg/L)
- MW-102(S): 14.9 µg/L
- MW-103(S): 1.4 µg/L

The result from MW-102(S) exceeded the cleanup level of (8 µg/L).

5 References

Ecology (Washington Department of Ecology), 2016a. Public Review Consent Decree between the Port of Tacoma and Washington Department of Ecology. July 1, 2016.

Ecology, 2016b. *Ecology Cleanup Action Plan*. Former Kaiser Aluminum Property, 3400 Taylor Way, Tacoma, Washington. Issued by Washington Department of Ecology. July 1, 2016.

Landau Associates, 2012. *Final Remedial Investigation/Feasibility Study, Former Kaiser Aluminum Property, 3400 Taylor Way, Tacoma, Washington.* Prepared for the Port of Tacoma. August 2012.

Tables

Table 1
Groundwater Level Observations

Groundwater Monitoring Well ID	Date Sampled	Time	Depth to Water (TOC)	Top of Well Elevation (feet MLLW)	Groundwater Elevation (feet MLLW)	Top of Well Elevation (NAVD88)	Groundwater Elevation (NAVD88)
MW-101(S)	2/28/2019	9:30	7.53	18.51	10.98	15.84	8.31
MW-102(S)	2/28/2019	10:21	10.69	20.32	9.63	17.65	6.96
MW-103(S)	2/28/2019	11:19	7.1	18.24	11.14	15.57	8.47
MW-SPL1(S)	2/28/2019	12:57	5.81	19.98	14.17	17.31	11.5
MW-SPL2(S)	2/28/2019	14:19	6.17	20.01	13.84	17.34	11.17

Notes:

MLLW: mean lower low water

NADVD88: North American Vertical Datum of 1988

TOC: top of casing

Table 2
Analytical Results

				Conventional Parameters (mg/L)		Metals (µg/L)	Polycyclic Aromatic Hydrocarbons (µg/L)							
Well ID			Date	Cyanide	Cyanide, Weak Acid Dissociable	Arsenic	Benzo(a) anthracene	Benzo(a) pyrene	Benzo(b,j,k) fluoranthenes	Chrysene	Dibenzo(a,h) anthracene	Indeno (1,2,3-c,d) pyrene	Total cPAH TEQ (7 minimum CAEPA 2005) (U = 0)	Total cPAH TEQ (7 minimum CAEPA 2005) (U = 1/2)
MTCA Method B Cleanup Level				16	0.01	8.0	0.020	0.018	0.018	0.019	0.018	0.018	0.030	0.030
2017	Former Log Yard Area	MW-101(S)	2/13/2017	--	--	**3.43**	--	--	--	--	--	--	--	--
		MW-102(S)	2/13/2017	--	--	**10.1**	--	--	--	--	--	--	--	--
		MW-102(S) (Duplicate)	2/13/2017	--	--	**11.1**	--	--	--	--	--	--	--	--
		MW-103(S)	2/13/2017	--	--	**1.25**	--	--	--	--	--	--	--	--
	SPL Area	MW-SPL1(S)	2/13/2017	**0.103**	0.005 U	--	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
		MW-SPL2(S)	2/13/2017	**0.023**	0.005 U	--	0.01 U	0.01 U	**0.004 J**	**0.006 J**	0.01 U	0.01 U	**0.00046 J**	**0.00696 J**
		MW-SPL2(S) (Duplicate)	2/13/2017	**0.023**	0.005 U	--	0.01 U	0.01 U	**0.005 J**	**0.007 J**	0.01 U	0.01 U	**0.00057 J**	**0.00707 J**
2018	Former Log Yard Area	MW-101(S)	2/19/2018	--	--	**5.37**	--	--	--	--	--	--	--	--
		MW-102(S)	2/19/2018	--	--	**11.9**	--	--	--	--	--	--	--	--
		MW-103(S)	2/19/2018	--	--	**1.03**	--	--	--	--	--	--	--	--
		MW-103(S) (Duplicate)	2/19/2018	--	--	**1.05**	--	--	--	--	--	--	--	--
	SPL Area	MW-SPL1(S)	2/19/2018	**0.054**	0.005 U	--	**0.001 J**	0.01 U	0.01 U	**0.002 J**	0.01 U	0.01 U	**0.00012 J**	**0.00662 J**
		MW-SPL2(S)	2/19/2018	**0.036**	0.005 U	--	**0.003 J**	0.01 U	**0.007 J**	**0.006 J**	0.01 U	**0.002 J**	**0.00126 J**	**0.00676 J**
		MW-SPL2(S) (Duplicate)	2/19/2018	**0.027**	0.005 U	--	**0.002 J**	0.01 U	**0.005 J**	**0.006 J**	0.01 U	**0.002 J**	**0.00096 J**	**0.00646 J**
2019	Former Log Yard Area	MW-101(S)	2/28/2019	--	--	**5.63**	--	--	--	--	--	--	--	--
		MW-102(S)	2/28/2019	--	--	**14.9**	--	--	--	--	--	--	--	--
		MW-103(S)	2/28/2019	--	--	**1.38**	--	--	--	--	--	--	--	--
		MW-103(S) (Duplicate)	2/28/2019	--	--	**1.4**	--	--	--	--	--	--	--	--
	SPL Area	MW-SPL1(S)	2/28/2019	**0.021**	**0.009**	--	0.01 U	0.01 U	0.01 U	**0.002 J**	0.01 U	0.01 U	**0.00002 J**	**0.00702 J**
		MW-SPL101(S) (Duplicate)	2/28/2019	**0.017**	**0.006**	--	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
		MW-SPL2(S)	2/28/2019	**0.141**	**0.009**	--	0.01 U	0.01 U	0.01 U	**0.003 J**	0.01 U	0.01 U	**0.00003 J**	**0.00703 J**

Notes:

Total cPAH TEQ (7 minimum CAEPA 2005) calculation includes benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-c,d)pyrene. Per MTCA cleanup Regulation, Table 708-2 TEQ for Minimum Required cPAHs under Washington Administrative Code 173-340-708(e).

U.S. Environmental Protection Agency Stage 2B data validation was completed by Laboratory Data Consultants.

: Shading indicates result exceeded MTCA Method B Cleanup Level established for the site.

Bold: detected result

--: not analyzed

µg/L: micrograms per liter

CAEPA: California Environmental Protection Agency

cPAH: carcinogenic polycyclic aromatic hydrocarbon

J: laboratory analytical result was detected above the method detection limit but below the quantitation limit

mg/L: milligrams per liter

MTCA: Model Toxics Control Act

SPL: Spent Pot Lining

TEQ: Toxic Equivalents Quotient

U: compound analyzed, but not detected above detection limit

Figures

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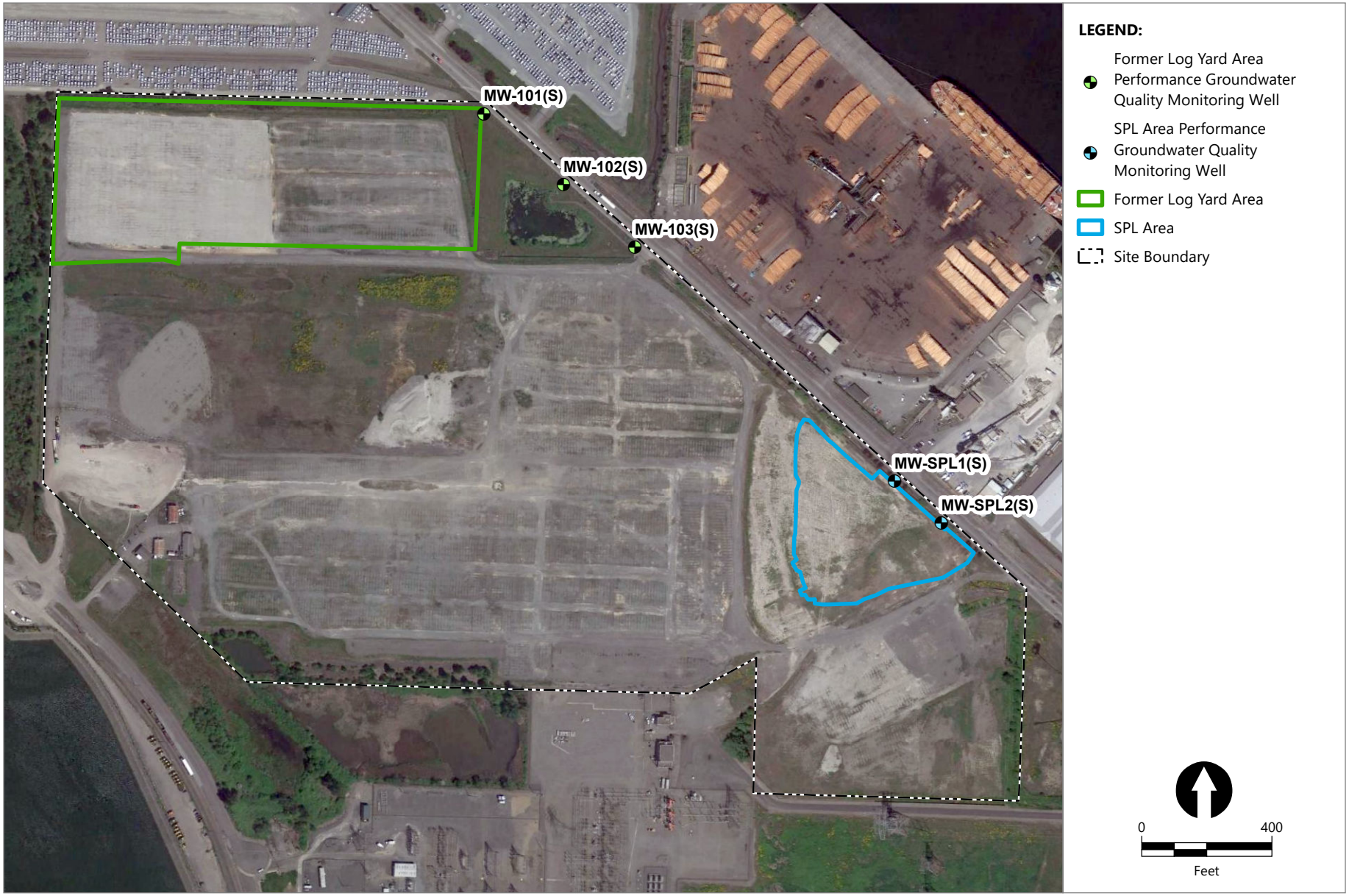
ANCHOR QEA

Figure 1
Site Map
Groundwater Monitoring Report
Former Kaiser Aluminum Property



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ANCHOR QEA

Figure 2
Performance Groundwater Quality Monitoring Well Locations
Groundwater Monitoring Report
Former Kaiser Aluminum Property

Appendix A
Field Forms

FIELD SAMPLING DATA SHEET

ANCHOR QEA
1119 Pacific Ave., Suite 1600
Tacoma, WA 98402
Office: 253-572-0927

PROJECT NAME: Former Kaiser Aluminum **WELL ID:** MW-101(S)
SITE ADDRESS: 3400 Tayor Way, Tacoma, WA **BLIND ID:** MW-101(S)-022819
DUP ID: — Time: —

WIND FROM: N | (NE) | E | SE | S | SW | W | NW | LIGHT | MEDIUM | (CALM) | HEAVY
WEATHER: (SUNNY) | PRTLY CLDY | CLOUDY | RAIN | No Wind **TEMPERATURE:** 34 °F

HYDROLOGY/LEVEL MEASUREMENTS (Nearest 0.01 ft) [Product Thickness] [Water Column] [Water Column x Gal/ft]

Date	Time	DT-Water	DT-Product	DT-Bottom	DTB-DTP	DTB-DTW		Volume (gal)
2/28/19	09:30	7.53	—		—		X 1	
/ /	:	—	—	—	—	—	X 3	

Gal/ft = (dia./2)² x 0.163 | 1" = 0.041 | (2" = 0.163) | 6" = 1.469 | 8" = 2.611

§ METHODS: (A) Dedicated Submersible Pump (B) Peristaltic Pump (C) Disposable Bailer (D) Waterra inertial pump (E) Dedicated Pneumatic Pump (F) Other_____

GROUNDWATER SAMPLING DATA

Bottle Type	Date	Time	Method §	#	Volume	Preservative [circle]	Ice	Filter	pH	[√ if used]
Amber Glass	/—/	—:	—	—	1 L	None	YES	NO	---	
Green Poly	/—/	—:	—	—	500 ml	NaOH	YES	NO	---	
Red Poly	2/28/19	10:00	B	1	(500 ml)	(HNO3)	(YES)	(NO)	---	√
Other Glass	/—/	—:	—	—			YES	NO	---	
Other Poly	/—/	—:	—	—			YES	NO	---	

Total Bottles (include duplicate count): 1 **MS & MSD** (circle if collected)

BOTTLE TYPE	ANALYSIS PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)
Amber - Glass	cPAHs
Green - Poly	Total & WAD Cyanide
Red - Poly	(Arsenic)
Other - Glass	
Other - Poly	

WATER QUALITY DATA Purge Start Time: 0933 **Sampling Method**: (A) 3X volume purge (B) Low-flow (C) Grab (D) Went dry

Meas.	Method §	Time (24hr)	Purged (gal)(L)	DTW (ft TOC)	pH	Spec Cond (µS/cm)	Temp (°C)	DO (mg/l)	ORP (mV)	Turbidity (NTU)	Water Quality
1	B	0937	0.8	7.54	7.17	2644	7.9	0.71	-92.4	15.86	Clear, colorless
2	B	0941	1.6	7.53	7.21	2715	7.9	0.43	-108.5	17.70	" "
3	B	0945	2.4	7.53	7.25	2722	8.0	0.39	-115.8	16.20	" "
4	B	0949	3.2	7.53	7.25	2734	8.0	0.38	-120.2	16.65	" "
5	B	0953	4.0	7.53	7.24	2733	8.0	0.38	-122.8	15.93	" "
6	B	0957	4.8	7.53	7.25	2733	8.0	0.37	-120.1	15.74	" "
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											

[Select A-G] [Cumulative Totals] [Clarity, Color]

Comments: 1 liter = 0.264 gal

SAMPLER: Doug Luffoon (PRINTED NAME) (SIGNATURE)

FIELD SAMPLING DATA SHEET

ANCHOR QEA
1119 Pacific Ave., Suite 1600
Tacoma, WA 98402
Office: 253-572-0927

PROJECT NAME: Former Kaiser Aluminum **WELL ID:** MW-102(S)

SITE ADDRESS: 3400 Tayor Way, Tacoma, WA **BLIND ID:** MW-102(S)-022819

DUP ID: — Time: —

WIND FROM: N | NE | E | SE | S | SW | W | NW | LIGHT | MEDIUM | (CALM) | HEAVY

WEATHER: (SUNNY) | PRTLY CLDY | CLOUDY | RAIN | No Wind **TEMPERATURE:** 39 °F

HYDROLOGY/LEVEL MEASUREMENTS (Nearest 0.01 ft) [Product Thickness] [Water Column] [Water Column x Gal/ft]

Date	Time	DT-Water	DT-Product	DT-Bottom	DTB-DTP	DTB-DTW		Volume (gal)
2/28/19	10:21	10.69	—		—		X 1	
/	:		—	—	—	—	X 3	

Gal/ft = (dia./2)² x 0.163 | 1" = 0.041 | (2" = 0.163) | 6" = 1.469 | 8" = 2.611

§ METHODS: (A) Dedicated Submersible Pump (B) Peristaltic Pump (C) Disposable Bailer (D) Waterra inertial pump (E) Dedicated Pneumatic Pump (F) Other_____

GROUNDWATER SAMPLING DATA

Bottle Type	Date	Time	Method §	#	Volume	Preservative [circle]	Ice	Filter	pH	[√ if used]
Amber Glass	/	:	—	—	1 L	None	YES	NO	—	
Green Poly	/	:	—	—	500 ml	NaOH	YES	NO	—	
Red Poly	2/28/19	11:06	B	1	(500 ml)	(HNO3)	(YES)	(NO)	—	✓
Other Glass	/	:	—	—			YES	NO	—	
Other Poly	/	:	—	—			YES	NO	—	

Total Bottles (include duplicate count): 1 **MS & MSD** (circle if collected)

BOTTLE TYPE	ANALYSIS PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)
Amber - Glass	cPAHs
Green - Poly	Total & WAD Cyanide
Red - Poly	(Arsenic)
Other - Glass	
Other - Poly	

WATER QUALITY DATA Purge Start Time: 1023 **Sampling Method**: (A) 3X volume purge (B) Low-flow (C) Grab (D) Went dry

Meas.	Method §	Time (24hr)	Purged (gal)(L)	DTW (ft TOC)	pH	Spec Cond (µS/cm)	Temp (°C)	DO (mg/l)	ORP (mV)	Turbidity (NTU)	Water Quality
1	B	1027	1.2	10.83	6.71	1272	10.8	0.36	-66.0	72.54	light orange cloudy w/S.S.
2	B	1031	2.4	10.81	6.68	1289	10.9	0.34	-70.6	32.09	Orange tint w/ l.He S.S.
3	B	1035	3.6	10.83	6.65	1653	11.3	0.40	-88.9	11.07	Very light orange tint
4	B	1039	4.8	10.82	6.65	1804	11.3	0.37	-96.2	8.74	clear, colorless
5	B	1043	6.0	10.82	6.66	1894	11.2	0.32	-101.4	5.71	" "
6	B	1047	7.2	10.82	6.66	1957	11.3	0.27	-105.2	4.55	" "
7	B	1051	8.4	10.82	6.65	1978	11.3	0.26	-106.7	4.10	" "
8	B	1055	9.6	10.82	6.65	2028	11.3	0.23	-108.7	2.69	" "
9	B	1059	10.8	10.82	6.65	2059	11.3	0.22	-110.0	2.31	" "
10	B	1103	12.0	10.82	6.65	2095	11.3	0.22	-110.9	2.83	" "
11											
12											
13											
14											
15											
16											

[Select A-G] [Cumulative Totals] [Clarity, Color]

Comments: 1 liter = 0.264 gal

S.S. = Suspended solids

SAMPLER: Doug Lufkin (PRINTED NAME) (SIGNATURE)

FIELD SAMPLING DATA SHEET

ANCHOR QEA

1119 Pacific Ave., Suite 1600
Tacoma, WA 98402
Office: 253-572-0927

PROJECT NAME: Former Kaiser Aluminum
WELL ID: MW-103(S)
SITE ADDRESS: 3400 Tayor Way, Tacoma, WA
BLIND ID: MW-103(S)-022819
DUP ID: MW-203(S)-022819 Time: 1221

WIND FROM: N | NE | E | SE | S | SW | (W) | NW
WEATHER: (SUNNY) | PRTLY CLDY | CLOUDY | RAIN | (LIGHT) | MEDIUM | HEAVY | No Wind
TEMPERATURE: 43 °F

HYDROLOGY/LEVEL MEASUREMENTS (Nearest 0.01 ft) [Product Thickness] [Water Column] [Water Column x Gal/ft]

Date	Time	DT-Water	DT-Product	DT-Bottom	DTB-DTP	DTB-DTW		Volume (gal)
2/28/19	11:19	7.10	—		—		X 1	
/ /	:						X 3	

Gal/ft = (dia./2)² x 0.163 | 1" = 0.041 | (2" = 0.163) | 6" = 1.469 | 8" = 2.611

§ METHODS: (A) Dedicated Submersible Pump (B) Peristaltic Pump (C) Disposable Bailer (D) Waterra inertial pump (E) Dedicated Pneumatic Pump (F) Other_____

GROUNDWATER SAMPLING DATA

Bottle Type	Date	Time	Method §	#	Volume	Preservative [circle]	Ice	Filter	pH	[√ if used]
Amber Glass	/ /	:	—	—	1 L	None	YES	NO	---	
Green Poly	/ /	:	—	—	500 ml	NaOH	YES	NO	---	
Red Poly	2/28/19	12:19	B	1	(500 ml)	(HNO3)	(YES)	(NO)	---	✓
Other Glass	/ /	:	—	—			YES	NO	---	
Other Poly	/ /	:	—	—			YES	NO	---	

Total Bottles (include duplicate count): 1 + 1 (DUP) = 2 **MS & MSD** (circle if collected)

BOTTLE TYPE	ANALYSIS PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)
Amber - Glass	cPAHs
Green - Poly	Total & WAD Cyanide
Red - Poly	(Arsenic)
Other - Glass	
Other - Poly	

WATER QUALITY DATA Purge Start Time: 1121 **Sampling Method**: (A) 3X volume purge (B) Low-flow (C) Grab (D) Went dry

Meas.	Method §	Time (24hr)	Purged (gal)(L)	DTW (ft TOC)	pH	Spec Cond (µS/cm)	Temp (°C)	DO (mg/l)	ORP (mV)	Turbidity (NTU)	Water Quality
1	B	1125	1.2	7.20	6.35	241.2	7.2	2.69	6.8	45.26	Light cloudy gray
2	B	1129	2.4	7.20	6.34	240.6	7.2	1.94	15.5	29.00	Gray tint
3	B	1133	3.6	7.21	6.33	255.3	7.2	1.45	27.1	27.47	" "
4	B	1137	4.8	7.21	6.30	318.2	7.2	1.03	37.2	8.46	Clear, colorless
5	B	1141	6.0	7.20	6.27	386.6	7.3	0.79	44.3	7.11	" "
6	B	1145	7.2	7.20	6.29	430.6	7.3	0.72	48.5	5.47	" "
7	B	1149	8.4	7.20	6.30	491.8	7.4	0.57	55.9	3.64	" "
8	B	1153	9.6	7.20	6.28	521.9	7.4	0.56	59.2	3.62	" "
9	B	1157	10.8	7.20	6.29	537.2	7.3	0.53	61.8	2.17	" "
10	B	1201	12.0	7.20	6.28	565.7	7.3	0.46	65.3	1.66	" "
11	B	1205	13.2	7.20	6.29	580.3	7.4	0.47	68.9	1.86	" "
12	B	1209	14.4	7.20	6.30	590.8	7.4	0.46	70.6	1.68	" "
13	B	1213	15.6	7.20	6.29	593.8	7.3	0.46	72.5	2.41	" "
14	D	1217	16.8	7.20	6.29	597.5	7.4	0.45	74.8	1.91	" "
15											
16											

[Select A-G] [Cumulative Totals] [Clarity, Color]

Comments: 1 liter = 0.264 gal

SAMPLER: Doug Laffoon (PRINTED NAME) (SIGNATURE)

FIELD SAMPLING DATA SHEET

ANCHOR QEA

1119 Pacific Ave., Suite 1600
Tacoma, WA 98402
Office: 253-572-0927

PROJECT NAME: Former Kaiser Aluminum
WELL ID: MW-SPL1(S)
SITE ADDRESS: 3400 Tayor Way, Tacoma, WA
BLIND ID: MW-SPL1(S)-022819
DUP ID: MW-SPL-101(S)-022819 Time: 1355

WIND FROM:	N	NE	E	SE	S	SW	W	NW	LIGHT	MEDIUM	HEAVY
WEATHER:	SUNNY		PRTLY CLDY		CLOUDY		RAIN		No Wind	TEMPERATURE:	46 °F

HYDROLOGY/LEVEL MEASUREMENTS (Nearest 0.01 ft) [Product Thickness] [Water Column] [Water Column x Gal/ft]

Date	Time	DT-Water	DT-Product	DT-Bottom	DTB-DTP	DTB-DTW		Volume (gal)
2/28/19	12:57	5.81	—		—		X 1	
/ /	:						X 3	

Gal/ft = (dia./2)² x 0.163 | 1" = 0.041 | 2" = 0.163 | 6" = 1.469 | 8" = 2.611

§ METHODS: (A) Dedicated Submersible Pump (B) Peristaltic Pump (C) Disposable Bailer (D) Waterra inertial pump (E) Dedicated Pneumatic Pump (F) Other_____

GROUNDWATER SAMPLING DATA

Bottle Type	Date	Time	Method §	#	Volume	Preservative [circle]	Ice	Filter	pH	[√ if used] √
Amber Glass	2/28/19	13:50	B	2	1L	None	YES	NO	---	✓
Green Poly	//	//	//	1	500 ml	NaOH	YES	NO	---	✓
Red Poly	/—	:	—	—	500 ml	HNO3	YES	NO	---	
Other Glass	/—	:	—	—			YES	NO	---	
Other Poly	/—	:	—	—			YES	NO	---	

Total Bottles (include duplicate count): 3 +3(DUP) = 6 **MS & MSD** (circle if collected)

BOTTLE TYPE	ANALYSIS PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)
Amber - Glass	cPAHs
Green - Poly	Total & WAD Cyanide
Red - Poly	Arsenic
Other - Glass	
Other - Poly	

WATER QUALITY DATA Purge Start Time: 1301 **Sampling Method**: (A) 3X volume purge (B) Low-flow (C) Grab (D) Went dry

Meas.	Method §	Time (24hr)	Purged (gal)(L)	DTW (ft TOC)	pH	Spec Cond (µS/cm)	Temp (°C)	DO (mg/l)	ORP (mV)	Turbidity (NTU)	Water Quality
1	B	1305	1.2	6.07	7.06	5061	8.6	0.54	9.4	145.1	Light orange cloudy
2	B	1309	2.4	6.07	6.98	5116	8.6	0.36	-10.7	74.52	orange tint
3	B	1313	3.6	6.07	6.99	5181	8.8	0.26	-28.8	64.16	" "
4	B	1317	4.8	6.07	7.00	5240	8.7	0.26	-41.3	19.13	~~clear, colorless~~ orange tint
5	B	1321	6.0	6.07	7.08	5320	8.7	0.24	-53.2	14.52	" "
6	B	1325	7.2	6.07	7.07	5353	8.6	0.23	-57.3	12.87	" "
7	B	1329	8.4	6.07	7.09	5364	8.7	0.24	-62.1	7.92	" "
8	B	1333	9.6	6.08	7.11	5402	8.4	0.23	-65.9	8.58	" "
9	B	1337	10.8	6.08	7.12	5412	8.3	0.19	-70.5	7.28	" "
10	B	1341	12.0	6.08	7.11	5417	8.3	0.20	-73.4	6.74	" "
11	B	1345	13.2	6.08	7.13	5423	8.4	0.20	-76.3	6.53	" "
12											
13											
14											
15											
16											

[Select A-G] [Cumulative Totals] [Clarity, Color]

Comments: 1 liter = 0.264 gal

Slight sulfide aroma from sample water.
Triple rinse the NAOH from total/WAD Cyanide bottle.

SAMPLER: Dory Luffoon (PRINTED NAME) (SIGNATURE)

FIELD SAMPLING DATA SHEET

ANCHOR QEA

1119 Pacific Ave., Suite 1600
Tacoma, WA 98402
Office: 253-572-0927

PROJECT NAME: Former Kaiser Aluminum
WELL ID: MW-SPL2(S) ~~-022819~~
SITE ADDRESS: 3400 Tayor Way, Tacoma, WA
BLIND ID: MW-SPL2(S) -022819
DUP ID: — Time: —

WIND FROM: N | NE | E | SE | S | SW | (W) | NW
WEATHER: (SUNNY) | PRTLY CLDY | CLOUDY | RAIN | No Wind
(LIGHT) | MEDIUM | HEAVY
TEMPERATURE: 48 °F

HYDROLOGY/LEVEL MEASUREMENTS (Nearest 0.01 ft)

Date	Time	DT-Water	DT-Product	DT-Bottom	[Product Thickness] DTB-DTP	[Water Column] DTB-DTW	[Water Column x Gal/ft] Volume (gal)
2/28/19	14:19	6.17	—		—		X 1
/ /	:						X 3

Gal/ft = (dia./2)^2 x 0.163 | 1" = 0.041 | (2" = 0.163) | 6" = 1.469 | 8" = 2.611

§ METHODS: (A) Dedicated Submersible Pump (B) Peristaltic Pump (C) Disposable Bailer (D) Waterra inertial pump (E) Dedicated Pneumatic Pump (F) Other_____

GROUNDWATER SAMPLING DATA

Bottle Type	Date	Time	Method §	#	Volume	Preservative [circle]	Ice	Filter	pH	[√ if used]
Amber Glass	2/28/19	15:00	B	2	(1 L)	(None)	(YES)	(NO)	—	√
Green Poly	/√/	15:00	B	1	(500 ml)	(NaOH)	(YES)	(NO)	—	√
Red Poly	/ /	:	—	—	500 ml	HNO3	YES	NO	—	
Other Glass	/ /	:	—	—			YES	NO	—	
Other Poly	/ /	:	—	—			YES	NO	—	

Total Bottles (include duplicate count): 3 — **MS & MSD** (circle if collected)

BOTTLE TYPE	ANALYSIS PER BOTTLE TYPE (Circle applicable or write non-standard analysis below)
Amber - Glass	(cPAHs)
Green - Poly	(Total & WAD Cyanide)
Red - Poly	Arsenic
Other - Glass	
Other - Poly	

WATER QUALITY DATA — Purge Start Time: 1420 — **Sampling Method**: (A) 3X volume purge (B) Low-flow (C) Grab (D) Went dry

Meas.	Method §	Time (24hr)	Purged (gal)(L)	DTW (ft TOC)	pH	Spec Cond (µS/cm)	Temp (°C)	DO (mg/l)	ORP (mV)	Turbidity (NTU)	Water Quality [Clarity, Color]
1	B	1424	1.2	6.20	7.92	4203	9.4	0.32	-17.4	8.33	Orange / gold tint
2	B	1428	2.4	6.21	7.92	4211	9.0	0.24	-47.1	6.09	" " "
3	B	1432	3.6	6.21	7.91	3975	8.8	0.20	-69.7	3.57	" " "
4	B	1436	4.8	6.21	7.91	3979	8.8	0.18	-87.0	3.81	" " "
5	B	1440	6.0	6.21	7.91	4186	9.2	0.15	-96.1	3.14	" " "
6	B	1441	7.2	6.21	7.92	3911	9.1	0.13	-104.4	3.54	" " "
7	B	1448	8.4	6.21	7.93	4159	9.3	0.12	-108.6	3.10	" " "
8	B	1452	9.6	6.21	7.93	4173	9.3	0.12	-113.2	2.69	" " "
9	B	1456	10.8	6.21	7.93	4162	9.2	0.12	-116.4	3.65	" " "
10											
11											
12											
13											
14											
15											
16											

[Select A-G] [Cumulative Totals]

Comments: 1 liter = 0.264 gal

SAMPLER: Dory Laffoon (PRINTED NAME) (SIGNATURE)

Chain of Custody Record & Laboratory Analysis Request

ARI Assigned Number:	Turn-around Requested: STANDARD
ARI Client Company: Anchor QEA	Phone:
Client Contact: Nik Bacher	
Client Project Name: Port of Tacoma - Kaiser GWM 1Q2019	
Client Project #: 170092-02.01	Samplers: D. LAFFOON, N. BACHER

Page: 1	of 1
Date: 2/27/19	Ice Present?
No. of Coolers: 1	Cooler Temps: 1.8

Analytical Resources, Incorporated
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: Total Arsenic	Total Cyanide	WAD Cyanide	PAHs					Notes/Comments
MW-101(S)-022819	2/28/19	1000	WG	1	X								
MW-102(S)-022819		1106		1	X								
MW-103(S)-022819		1219		1	X								
MW-203(S)-022819		1221		1	X								
MW-SPL1(S)-022819		1350		3		X	X	X					Cyanide not preserved
MW-SPL101(S)-022819		1355		3		X	X	X					Cyanide not preserved
MW-SPL2(S)-022819		1500		3		X	X	X					Cyanide not preserved

Comments/Special Instructions	Relinquished by: (Signature)	Received by: (Signature)	Relinquished by: (Signature)	Received by: (Signature)
MW-SPL Cyanide samples not preserved as they may contain sulfide. Containers triple rinsed.	Printed Name: Nik Bacher	Printed Name: Stephanie Fisher	Printed Name:	Printed Name:
	Company: AQ	Company: ARI	Company:	Company:
	Date & Time: 3/1/2019 0916	Date & Time: 3-1-19 0916	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.

Appendix B
Laboratory Data

Appendix C
Data Validation Report

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

Anchor QEA, LLC
1201 Third Ave. Suite 2600
Seattle, WA 98101
ATTN: Ms. Delaney Peterson
dpeterson@anchorqea.com

April 5, 2019

SUBJECT: Port of Tacoma, Kaiser, Data Validation

Dear Ms. Peterson,

Enclosed are the final validation reports for the fractions listed below. This SDG was received on March 22, 2019. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #44606:

SDG #	Fraction
19C0006	Polynuclear Aromatic Hydrocarbons, Arsenic, Wet Chemistry

The data validation was performed under Stage 2B guidelines. The analyses were validated using the following documents, as applicable to each method:

- Ecology Cleanup Action Plan, Former Kaiser Aluminum Property, 3400 Taylor Way, Tacoma, Washington, July 2016
- USEPA, National Functional Guidelines Organic Superfund Methods Data Review, January 2017
- USEPA, National Functional Guidelines Inorganic Superfund Methods Data Review, January 2017
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Christina Rink

Christina Rink
crink@lab-data.com
Project Manager/Senior Chemist

EDD Stage 2B

LDC #44606 (Anchor Environmental-Seattle WA / Port of Tacoma, Kaiser)

LDC	SDG#	DATE REC'D	(3) DATE DUE	PAHs (8270D-SIM)		As (200.8)		CN- (4500 CN E)		WAD CN- (4500)																											
Matrix:	Water/Sediment			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	19C0006	03/22/19	04/12/19	3	0	4	0	3	0	3	0																										
Total	J/CR			3	0	4	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13

Shaded cells indicate Stage 4 validation (all other cells are Stage 2B validation). These sample counts do not include MS, MSD, or DUP's.

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Port of Tacoma, Kaiser

LDC Report Date: April 3, 2019

Parameters: Polynuclear Aromatic Hydrocarbons

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): 19C0006

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
MW-SPL1(S)-022819	19C0006-05	Water	02/28/19
MW-SPL101(S)-022819	19C0006-06	Water	02/28/19
MW-SPL2(S)-022819	19C0006-07	Water	02/28/19

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Ecology Cleanup Action Plan, Former Kaiser Aluminum Property, 3400 Taylor Way, Tacoma, Washington (July 2016) and a modified outline of the USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (January 2017). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Polynuclear Aromatic Hydrocarbons (PAHs) by Environmental Protection Agency (EPA) SW 846 Method 8270D in Selected Ion Monitoring (SIM) mode

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. GC/MS Instrument Performance Check

A decafluorotriphenylphosphine (DFTPP) tune was performed at 12 hour intervals.

All ion abundance requirements were met.

III. Initial Calibration and Initial Calibration Verification

An initial calibration was performed as required by the method.

The percent relative standard deviations (%RSD) were less than or equal to 20.0% for all compounds.

Average relative response factors (RRF) for all compounds were within validation criteria.

The percent differences (%D) of the initial calibration verification (ICV) standard were less than or equal to 30.0% for all compounds.

IV. Continuing Calibration

Continuing calibration was performed at the required frequencies.

The percent differences (%D) were less than or equal to 20.0% for all compounds.

All of the continuing calibration relative response factors (RRF) were within validation criteria.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Surrogates

Surrogates were added to all samples as required by the method. Surrogate recoveries (%R) were not within QC limits for samples MW-SPL1(S)-022819 and MW-SPL101(S)-022819. Using professional judgment, no data were qualified when one surrogate %R was outside the QC limits and the %R was greater than or equal to 10%.

VIII. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

IX. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

X. Field Duplicates

Samples MW-SPL1(S)-022819 and MW-SPL101(S)-022819 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/L)		RPD
	MW-SPL1(S)-022819	MW-SPL101(S)-022819	
Chrysene	0.002	0.010U	Not calculable

XI. Internal Standards

All internal standard areas and retention times were within QC limits.

XII. Compound Quantitation

Raw data were not reviewed for Stage 2B validation.

XIII. Target Compound Identifications

Raw data were not reviewed for Stage 2B validation.

XIV. System Performance

Raw data were not reviewed for Stage 2B validation.

XV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Port of Tacoma, Kaiser
Polynuclear Aromatic Hydrocarbons - Data Qualification Summary - SDG 19C0006

No Sample Data Qualified in this SDG

Port of Tacoma, Kaiser
Polynuclear Aromatic Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG 19C0006

No Sample Data Qualified in this SDG

LDC #: 44606A2b **VALIDATION COMPLETENESS WORKSHEET** Date: 4/3/19
SDG #: 19C0006 Stage 2B Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: FM
2nd Reviewer:

METHOD: GC/MS Polynuclear Aromatic Hydrocarbons (EPA SW 846 Method 8270D-SIM)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A/A	
II.	GC/MS Instrument performance check	A	
III.	Initial calibration/ICV	A/A	%RSD ≤ 20 ICV ≤ 30
IV.	Continuing calibration	A	CCV ≤ 20
V.	Laboratory Blanks	A	
VI.	Field blanks	N	
VII.	Surrogate spikes	SW	
VIII.	Matrix spike/Matrix spike duplicates	N	CS
IX.	Laboratory control samples	A	LCS
X.	Field duplicates	SW	D = 1, 2
XI.	Internal standards	A	
XII.	Compound quantitation RL/LOQ/LODs	N	
XIII.	Target compound identification	N	
XIV.	System performance	N	
XV.	Overall assessment of data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank; SB=Source blank; OTHER:

	Client ID		Lab ID	Matrix	Date
1	MW-SPL1(S)-022819	D	19C0006-05	Water	02/28/19
2	MW-SPL101(S)-022819	D	19C0006-06	Water	02/28/19
3	MW-SPL2(S)-022819		19C0006-07	Water	02/28/19
4					
5					
6					
7					
8					

Notes:

	BHC0141-BLK1						

VALIDATION FINDINGS WORKSHEET

METHOD: GC/MS SVOA

A. Phenol	CC. Dimethylphthalate	EEE. Bis(2-ethylhexyl)phthalate	GGGG. C30-Hopane	I1. Methyl methanesulfonate
B. Bis (2-chloroethyl) ether	DD. Acenaphthylene	FFF. Di-n-octylphthalate	HHHH. 1-Methylphenanthrene	J1. Ethyl methanesulfonate
C. 2-Chlorophenol	EE. 2,6-Dinitrotoluene	GGG. Benzo(b)fluoranthene	IIII. 1,4-Dioxane	K1. o,o',o''-Triethylphosphorothioate
D. 1,3-Dichlorobenzene	FF. 3-Nitroaniline	HHH. Benzo(k)fluoranthene	JJJJ. Acetophenone	L1. n-Phenylene diamine
E. 1,4-Dichlorobenzene	GG. Acenaphthene	III. Benzo(a)pyrene	KKKK. Atrazine	M1. 1,4-Naphthoquinone
F. 1,2-Dichlorobenzene	HH. 2,4-Dinitrophenol	JJJ. Indeno(1,2,3-cd)pyrene	LLLL. Benzaldehyde	N1. N-Nitro-o-toluidine
G. 2-Methylphenol	II. 4-Nitrophenol	KKK. Dibenz(a,h)anthracene	MMMM. Caprolactam	O1. 1,3,5-Trinitrobenzene
H. 2,2'-Oxybis(1-chloropropane)	JJ. Dibenzofuran	LLL. Benzo(g,h,i)perylene	NNNN. 2,6-Dichlorophenol	P1. Pentachlorobenzene
I. 4-Methylphenol	KK. 2,4-Dinitrotoluene	MMM. Bis(2-Chloroisopropyl)ether	OOOO. 1,2-Diphenylhydrazine	Q1. 4-Aminobiphenyl
J. N-Nitroso-di-n-propylamine	LL. Diethylphthalate	NNN. Aniline	PPPP. 3-Methylphenol	R1. 2-Naphthylamine
K. Hexachloroethane	MM. 4-Chlorophenyl-phenyl ether	OOO. N-Nitrosodimethylamine	QQQQ. 3&4-Methylphenol	S1. Triphenylene
L. Nitrobenzene	NN. Fluorene	PPP. Benzoic Acid	RRRR. 4-Dimethyldibenzothiophene (4MDT)	T1. Octachlorostyrene
M. Isophorone	OO. 4-Nitroaniline	QQQ. Benzyl alcohol	SSSS. 2/3-Dimethyldibenzothiophene (4MDT)	U1. Famphur
N. 2-Nitrophenol	PP. 4,6-Dinitro-2-methylphenol	RRR. Pyridine	TTTT. 1-Methyldibenzothiophene (1MDT)	V1. 1,4-phenylenediamine
O. 2,4-Dimethylphenol	QQ. N-Nitrosodiphenylamine	SSS. Benzidine	UUUU.. 2,3,4,6-Tetrachlorophenol	W1. Methapyrilene
P. Bis(2-chloroethoxy)methane	RR. 4-Bromophenyl-phenylether	TTT. 1-Methylnaphthalene	VVVV. 1,2,4,5-Tetrachlorobenzene	X1. Pentachloroethane
Q. 2,4-Dichlorophenol	SS. Hexachlorobenzene	UUU.Benzo(b)thiophene	WWWW.. 2-Picoline	Y1. 3,3'-Dimethylbenzidine
R. 1,2,4-Trichlorobenzene	TT. Pentachlorophenol	VVV.Benzonaphthothiophene	XXXX. 3-Methylcholanthrene	Z1. o-Toluidine
S. Naphthalene	UU. Phenanthrene	WWW.Benzo(e)pyrene	YYYY. a,a-Dimethylphenethylamine	A2. 1-Naphthylamine
T. 4-Chloroaniline	VV. Anthracene	XXX. 2,6-Dimethylnaphthalene	ZZZZ. Hexachloropropene	B2. 4-Aminobiphenyl
U. Hexachlorobutadiene	WW. Carbazole	YYY. 2,3,5-Trimethylnaphthalene	A1. N-Nitrosodiethylamine	C2. 4-Nitroquinoline-1-oxide
V. 4-Chloro-3-methylphenol	XX. Di-n-butylphthalate	ZZZ. Perylene	B1. N-Nitrosodi-n-butylamine	D2. Hexachloropene
W. 2-Methylnaphthalene	YY. Fluoranthene	AAAA. Dibenzothiophene	C1. N-Nitrosomethylethylamine	E2. Bis (2-chloro-1-methylethyl) ether
X. Hexachlorocyclopentadiene	ZZ. Pyrene	BBBB. Benzo(a)fluoranthene	D1. N-Nitrosomorpholine	F2. Bifenthrin
Y. 2,4,6-Trichlorophenol	AAA. Butylbenzylphthalate	CCCC. Benzo(b)fluorene	E1. N-Nitrosopyrrolidine	G2. Cyfluthrin
Z. 2,4,5-Trichlorophenol	BBB. 3,3'-Dichlorobenzidine	DDDD. cis/trans-Decalin	F1. Phenacetin	H2. Cypermethrin
AA. 2-Chloronaphthalene	CCC. Benzo(a)anthracene	EEEE. Biphenyl	G1. 2-Acetylaminofluorene	I2. Permethrin (cis/trans)
BB. 2-Nitroaniline	DDD. Chrysene	FFFF. Retene	H1. Pronamide	J2. 5-Nitro-o-toluidine

LDC #: 44606A26

VALIDATION FINDINGS WORKSHEET
Surrogate Recovery

Reviewer: FT
2nd Reviewer:

METHOD: GC/MS BNA (EPA SW 846 Method 8270D)

Please see qualification below for all questions answered "N". Not applicable questions are identified as "N/A".

Y (N) N/A Were percent recoveries (%R) for surrogates within QC limits?
Y N N/A If 2 or more base neutral or acid surrogates were outside QC limits, was a reanalysis performed to confirm %R?
Y N N/A If any %R was less than 10 percent, was a reanalysis performed to confirm %R?

#	Sample ID	Surrogate	%R (Limits)	Qualifications
	1	YY-d10	53.4 (57-120)	no qual
			( )	
			( )	
	2	↓	51.2 (↓)	↓
			( )	
			( )	
			( )	
			( )	
			( )	
			( )	
			( )	
			( )	
			( )	
			( )	
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			( )	
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			( )	
			( )	
			( )	
			( )	
			( )	
			( )	
			( )	
			( )	

(NBZ) = Nitrobenzene - d5
(FBP) = 2-Fluorobiphenyl
(TPH) = Terphenyl - d14
(2FP) = 2-Fluorophenol
(TBP) = 2,4,6 -Tribromophenol
(2CP) = 2-Chlorophenol - d4

LDC #: 44606A2D

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Page: 1 of 1
Reviewer: EJ
2nd reviewer:

METHOD: GC/MS BNA (EPA SW 846 Method 8270D)

Y N N/A Were field duplicate pairs identified in this SDG?
Y N N/A Were target compounds identified in the field duplicate pairs?

Compound	Concentration (ug/L) 1	2	RPD (≤ %)	QUAL
DDD	0.002	0.0104	NC	—

Compound	Concentration ( )		RPD (≤ %)	QUAL

Compound	Concentration ( )		RPD (≤ %)	QUAL

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Port of Tacoma, Kaiser

LDC Report Date: March 27, 2019

Parameters: Arsenic

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): 19C0006

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
MW-101(S)-022819	19C0006-01	Water	02/28/19
MW-102(S)-022819	19C0006-02	Water	02/28/19
MW-103(S)-022819	19C0006-03	Water	02/28/19
MW-203(S)-022819	19C0006-04	Water	02/28/19

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Ecology Cleanup Action Plan, Former Kaiser Aluminum Property, 3400 Taylor Way, Tacoma, Washington (July 2016) and a modified outline of the USEPA National Functional Guidelines (NFG) for Inorganic Superfund Methods Data Review (January 2017). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Arsenic by Environmental Protection Agency (EPA) Method 200.8

All sample results were subjected to Level III data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. ICPMS Tune

The mass calibration was within 0.1 AMU and the percent relative standard deviation (%RSD) was less than or equal to 5%.

III. Instrument Calibration

Initial and continuing calibrations were performed as required by the method.

The initial calibration verification (ICV) and continuing calibration verification (CCV) standards were within QC limits.

IV. ICP Interference Check Sample Analysis

The frequency of interference check sample (ICS) analysis was met. All criteria were within QC limits.

V. Laboratory Blanks

Laboratory blanks were analyzed as required by the methods. No contaminants were found in the laboratory blanks.

VI. Field Blanks

No field blanks were identified in this SDG.

VII. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

VIII. Duplicate Sample Analysis

The laboratory has indicated that there were no duplicate (DUP) analyses specified for the samples in this SDG, and therefore duplicate analyses were not performed for this SDG.

IX. Serial Dilution

Serial dilution was not performed for this SDG.

X. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the method. Percent recoveries (%R) were within QC limits.

XI. Field Duplicates

Samples MW-103(S)-022819 and MW-203(S)-022819 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Analyze	Concentration (ug/L)		RPD
	MW-103(S)-022819	MW-203(S)-022819	
Arsenic	1.38	1.4	1

XII. Internal Standards (ICP-MS)

Internal standards were not reviewed for Stage 2B validation.

XIII. Sample Result Verification

Raw data were not reviewed for Stage 2B validation.

XIV. Overall Assessment of Data

The analysis was conducted within all specifications of the method. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Port of Tacoma, Kaiser
Arsenic - Data Qualification Summary - SDG 19C0006

No Sample Data Qualified in this SDG

Port of Tacoma, Kaiser
Arsenic - Laboratory Blank Data Qualification Summary - SDG 19C0006

No Sample Data Qualified in this SDG

LDC #: 44606A4a **VALIDATION COMPLETENESS WORKSHEET** Date: 3/26/19
SDG #: 19C0006 Stage 2B Page: 1 of 1
Laboratory: Analytical Resources, Inc. Reviewer: KK
2nd Reviewer:

METHOD: Arsenic (EPA ~~SW 846~~ Method 200.8)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II.	ICP/MS Tune	A	
III.	Instrument Calibration	A	
IV.	ICP Interference Check Sample (ICS) Analysis	A	
V.	Laboratory Blanks	A	
VI.	Field Blanks	N	
VII.	Matrix Spike/Matrix Spike Duplicates	N	CS
VIII.	Duplicate sample analysis	N	
IX.	Serial Dilution	N	
X.	Laboratory control samples	A	LCS
XI.	Field Duplicates	SW	(3+4)
XII.	Internal Standard (ICP-MS)	N	not reviewed for Stage 2B
XIII.	Sample Result Verification	N	
XIV.	Overall Assessment of Data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	MW-101(S)-022819	19C0006-01	Water	02/28/19
2	MW-102(S)-022819	19C0006-02	Water	02/28/19
3	MW-103(S)-022819	19C0006-03	Water	02/28/19
4	MW-203(S)-022819	19C0006-04	Water	02/28/19
5				
6				
7				
8				
9				
10				
11				
12				

Notes:

LDC#: 44606A4a

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: KK
2nd Reviewer:

METHOD: Metals (EPA Method 200.8)

Analyte	Concentration (ug/L)		RPD	Difference	Limits	Qualifiers
	3	4				
Arsenic	1.38	1.4	1			

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Port of Tacoma, Kaiser

LDC Report Date: March 27, 2019

Parameters: Wet Chemistry

Validation Level: Stage 2B

Laboratory: Analytical Resources, Inc.

Sample Delivery Group (SDG): 19C0006

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
MW-SPL1(S)-022819	19C0006-05	Water	02/28/19
MW-SPL101(S)-022819	19C0006-06	Water	02/28/19
MW-SPL2(S)-022819	19C0006-07	Water	02/28/19
MW-SPL1(S)-022819MS	19C0006-05MS	Water	02/28/19
MW-SPL1(S)-022819DUP	19C0006-05DUP	Water	02/28/19

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Ecology Cleanup Action Plan, Former Kaiser Aluminum Property, 3400 Taylor Way, Tacoma, Washington (July 2016) and a modified outline of the USEPA National Functional Guidelines (NFG) for Inorganic Superfund Methods Data Review (January 2017). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following methods:

Total Cyanide by Standard Method 4500-CN E
Weak Acid Dissociable Cyanide by Standard Method 4500-CN I

All sample results were subjected to Stage 2B data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered non-detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition.

All technical holding time requirements were met.

II. Initial Calibration

All criteria for the initial calibration of each method were met.

III. Continuing Calibration

Continuing calibration frequency and analysis criteria were met for each method when applicable.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the methods. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Matrix Spike/Matrix Spike Duplicates

Matrix spike (MS) sample analysis was performed on an associated project sample. Percent recoveries (%R) were within QC limits.

VII. Duplicate Sample Analysis

Duplicate (DUP) sample analysis was performed on an associated project sample. Results were within QC limits.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) were analyzed as required by the methods. Percent recoveries (%R) were within QC limits.

IX. Field Duplicates

Samples MW-SPL1(S)-022819 and MW-SPL101(S)-022819 were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Compound	Concentration (mg/L)		RPD
	MW-SPL1(S)-022819	MW-SPL101(S)-022819	
Cyanide	0.0210	0.0170	21
Weak acid dissociable cyanide	0.009	0.006	40

X. Sample Result Verification

Raw data were not reviewed for Stage 2B validation.

XI. Overall Assessment of Data

The analysis was conducted within all specifications of the methods. No results were rejected in this SDG.

The quality control criteria reviewed were met and are considered acceptable. Based upon the data validation all results are considered valid and usable for all purposes.

Port of Tacoma, Kaiser
Wet Chemistry - Data Qualification Summary - SDG 19C0006

No Sample Data Qualified in this SDG

Port of Tacoma, Kaiser
Wet Chemistry - Laboratory Blank Data Qualification Summary - SDG 19C0006

No Sample Data Qualified in this SDG

LDC #: 44606A6 **VALIDATION COMPLETENESS WORKSHEET** Date: 3/26/19

SDG #: 19C0006 Stage 2B Page: 1 of 1

Laboratory: Analytical Resources, Inc. Reviewer: MC

(SM4500-CN-E) (SM4500-CN-I) 2nd Reviewer:

METHOD: (Analyte) Cyanide & WAD Cyanide ~~(Method SM 4500)~~

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II	Initial calibration	A	
III.	Calibration verification	A	
IV	Laboratory Blanks	A	
V	Field blanks	N	
VI.	Matrix Spike/Matrix Spike Duplicates	A	MS
VII.	Duplicate sample analysis	A	DUP
VIII.	Laboratory control samples	A	LCS
IX.	Field duplicates	SW	(1+2)
X.	Sample result verification	N	
XI	Overall assessment of data	A	

Note: A = Acceptable ND = No compounds detected D = Duplicate SB=Source blank
N = Not provided/applicable R = Rinsate TB = Trip blank OTHER:
SW = See worksheet FB = Field blank EB = Equipment blank

Samples appended with "F" were analyzed as dissolved

	Client ID	Lab ID	Matrix	Date
1	MW-SPL1(S)-022819	19C0006-05	Water	02/28/19
2	MW-SPL101(S)-022819	19C0006-06	Water	02/28/19
3	MW-SPL2(S)-022819	19C0006-07	Water	02/28/19
4	MW-SPL1(S)-022819MS	19C0006-05MS	Water	02/28/19
5	MW-SPL1(S)-022819DUP	19C0006-05DUP	Water	02/28/19
6				
7				
8				
9				
10				
11				
12				
13				
14				

Notes:

LDC #: 44606A6

VALIDATION FINDINGS WORKSHEET
Sample Specific Analysis Reference

Reviewer: KK
2nd reviewer: C

All circled methods are applicable to each sample.

Sample ID	Parameter
1-3	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk (CN) NH_3 TKN TOC Cr6+ ClO_4 (CN- Weak Acid Dissociable)
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
QC:	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
4-5	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4 (WAD-CN)
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4
	pH TDS Cl F NO_3 NO_2 SO_4 O-PO_4 Alk CN NH_3 TKN TOC Cr6+ ClO_4

Comments:

LDC#: 44606A6

VALIDATION FINDINGS WORKSHEET
Field Duplicates

Reviewer: KK
2nd Reviewer: [signature]

METHOD: Inorganics (See cover)

Analyte	Concentration (mg/L)		RPD	Difference	Limits	Qualifiers
	1	2				
Cyanide	0.0210	0.0170	21			
WAD Cyanide	0.009	0.006	40			

LDC #: 44606

EDD POPULATION COMPLETENESS WORKSHEET

Anchor

Date: 4/4
Page: 1 of 1
2nd Reviewer:

The LDC job number listed above was entered by FM
Entered from Body or Summary

	EDD Process	Y/N	Initial	Comments/Action
I.	EDD Completeness	-	FM	
Ia.	- All methods present?	Y		
Ib.	- All samples present/match report?	Y		
Ic.	- All reported analytes present?	Y		
Id.	- 10% or 100% verification of EDD?	Y		
II.	EDD Preparation/Entry	-	FM	
IIa.	- QC Level applied? (EPAStage2B or EPAStage4)	Y		
IIb.	- Laboratory EMPC qualified results qualified (J with reason code 23)?	—		
III.	Reasonableness Checks	-	FM	
IIIa.	- Do all qualified ND results have ND qualifier (e.g. UJ)?	—		
IIIb.	- Do all qualified detect results have detect qualifier (e.g. J)?	—		
IIIc.	- If reason codes are used, do all qualified results have reason code field populated, and vice versa?	—		
IIId.	- Do blank concentrations in report match EDD, where data was qualified due to blank?	—		
IIIe.	- Is the detect flag set to "N" for all "U" qualified blank results?	—		
IIIf.	- Were there multiple results due to dilutions/reanalysis? If so, were results qualified appropriately?	—/—		
IIIg.	-Are all results marked reportable "Yes" unless rejected for overall assessment in the data validation report?	Y		
IIIh.	-Are there any lab "R" qualified data? / Are the entry columns blank for these results?	—/—		
IIIi.	-Are there any discrepancies between the data packet and the EDD?	N		

Notes: *see discrepancy sheet