Intended for

Mr. Andy Smith

Washington State Department of Ecology

Prepared by

Ramboll US Corporation

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2018 ANNUAL REPORT

CASCADE TIMBER #1 SITE 2502 MARINE VIEW DRIVE TACOMA, WA

Ramboll
400 E. Evergreen Blvd.
Suite 302
Vancouver, WA 98660
USA

T +1 360 597 7066
www.ramboll.com

RAMBOLL

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ACRONYMS AND ABBREVIATIONS

amsl	above mean sea level
DOT	Department of Transportation
Ecology	Washington State Department of Ecology
MCHI	McFarland Holdings Incorporated
mg/L	milligrams per liter
MTCA	Model Toxics Control Act
O&M	Operations and Maintenance
TAI	Test America Incorporated
USEPA	United States Environmental Protection Agency

EXECUTIVE SUMMARY

This 2018 Annual Report describes the July 2018 groundwater monitoring event and site inspection at the Cascade Timber #1 site in Tacoma, Washington (the "Site"). The Site is currently an inactive facility, consisting of a containment cell for impacted soil, slag, and woody debris.

The Site forms the western portion (approximately 0.5 acres) of a larger property (approximately 8-acres) that was formerly owned by Cascade Pole Company and leased by the Cascade Timber Company (CTC) from 1977 to 1981. Cascade Timber Company operated the property as a log sort yard. The Site is located along the Hylebos Waterway, and is within the Commencement Bay Nearshore/Tideflats Superfund Site (CBNTSS), which was added to the National Priorities List in 1982. The CBNTSS includes the head of Hylebos Waterway and those upland sites that are believed to contribute contamination to the waterway.

From at least 1977 to 1981, slag from the ore smelting process produced at the ASARCO smelting facility in Tacoma, Washington was placed throughout the CTC property as ballast to keep heavy equipment from sinking into the soft soil. As demonstrated in prior investigations of the log yard property, soil and groundwater impacts attributed to the placement of slag were identified.

In 1986, the property owner (Cascade Pole Company) sold the property to McFarland Holdings, Incorporated (MCHI). Consent Decree No. 932100995 was issued by the State of Washington Department of Ecology (Ecology) in October 1993, identifying the responsible parties as MCHI, Cascade Pole Company, and ASARCO Incorporated. Under the Consent Decree, materials (e.g., wood waste, soil, crushed slag) containing levels of contaminants exceeding the cleanup standards were excavated and consolidated for containment with a double barrier cap system, which was constructed on the Site. Four groundwater monitoring wells were installed, and maintenance of the containment system and monitoring of stormwater runoff from the Site was performed.

ASARCO had been responsible for the Site until December 9, 2009. On that date, the United States Bankruptcy Court for the Southern District of Texas entered an order associated with ASARCO's bankruptcy, Case No. 05-21207, that approved a Settlement Agreement establishing the ASARCO Multi-State Custodial Trust for certain ASARCO owned sites, including the "McFarland Designated Property" (i.e., the Site), approval of the appointment of a Custodial Trust, approval of a Custodial Trust Agreement, and for the conveyance of the Site to the ASARCO Multi-State Custodial Trust.

Ramboll has conducted the required groundwater monitoring and containment cell maintenance activities since 2011 on behalf of the ASARCO Multi-State Custodial Trust (Trust). In July 2018, the four monitoring wells at the Site were purged and sampled using low-flow methods, and the containment cell improvements (e.g., fences, piping, vegetative cover) were inspected to identify necessary maintenance actions. Analytical results for the July 2018 sampling event are similar to the results from Ramboll's previous sampling events conducted from 2011 through 2017. All reported concentrations of primary constituents of concern (i.e., arsenic, copper, lead and zinc) were below Ecology's surface water quality standards (i.e., marine chronic criteria) identified as the cleanup criteria in the 1993 Consent Decree. Based on the 2018 Site inspection, no immediate repair actions were identified.

As noted in the Second Periodic Review Report published by the Washington State Department of Ecology (Ecology) in June 2016, groundwater cannot be used for drinking water purposes due to salinity. Groundwater monitoring conducted by Ramboll since 2011 has not identified any exceedances of

applicable surface water quality standards, and temporal trends do not suggest that concentrations are likely to approach or exceed relevant regulatory criteria specified in the Consent Decree.

The Trust and Ecology have a meeting scheduled for December 12, 2018, to discuss the comprehensive data set collected to date and the regulatory and administrative path forward in consideration of remaining funds in the Trust account.

1. SITE BACKGROUND AND SETTING

1.1 Site Background

The Site consists of a single parcel (0321268000), located adjacent to the Hylebos Waterway, in Tacoma, Pierce County, Washington. The Site is a portion of a larger property (8.1 acres in total) that was formerly operated by the Cascade Timber Company from 1977 to 1981 for use as a log sorting yard. During this time period, slag from the ore smelting process at the ASARCO smelting facility in Tacoma, Washington was placed as base rock/ballast to keep heavy equipment from sinking into soft soil. Over the years, the slag was pulverized from heavy equipment traffic and was mixed with woody debris associated with the log sorting operations, ultimately resulting in soil and groundwater impacts by arsenic, copper, lead, and zinc. The selected remedy consisted of removal of impacted debris from areas across the larger approximately 8-acre site and placement in an on-Site containment cell constructed in 1994-1995.

In 1986, the property owner (Cascade Pole Company) sold the property to McFarland Holdings, Incorporated (MCHI). Consent Decree No. 932100995 was issued by the State of Washington Department of Ecology (Ecology) in October 1993, identifying the responsible parties as MCHI, Cascade Pole Company, and ASARCO Incorporated. Under the Consent Decree, materials (e.g., wood waste, soil, crushed slag) containing levels of contaminants exceeding the cleanup standards were excavated and consolidated for containment with a double barrier cap system, which was constructed on the Site. Four groundwater monitoring wells were installed, and maintenance of the containment system and monitoring of stormwater runoff from the Site was performed.

ASARCO had been responsible for the Site until December 9, 2009. On that date, the United States Bankruptcy Court for the Southern District of Texas entered an order associated with ASARCO's bankruptcy, Case No. 05-21207, that approved a Settlement Agreement establishing the ASARCO Multi-State Custodial Trust for certain ASARCO owned sites, including the "McFarland Designated Property" (i.e., the Site), approval of the appointment of a Custodial Trust, approval of a Custodial Trust Agreement, and for the conveyance of the Site to the ASARCO Multi-State Custodial Trust.

1.2 Description of the Site

The Site covers approximately 0.51 acres in an industrial land use area. The Site is secured with a chain-link fence and is accessed from its northern boundary along Marine View Drive. The Site includes a containment cell (aboveground and partially below-ground), and four shallow perimeter groundwater monitoring wells (MCW-1 through MCW-4). The Hylebos Waterway is located approximately 450 feet south of the Site boundary. The Site is not actively used for any purpose other than the containment cell.

2. GROUND WATER MONITORING ACTIVITIES

2.1 Sampling Procedures

On July 25, 2018, Ramboll conducted groundwater sampling activities. Upon arrival at the Site, Ramboll field personnel removed the well caps to allow the monitoring wells to equilibrate with atmospheric pressure for approximately 30 minutes. Water levels were then measured to the nearest 0.01 feet (relative to the top-of-casing) using an electric water level indicator. Groundwater level measurements and well construction information are summarized in Table 1.

After measuring the water level at each well, groundwater purging and sampling was conducted using a peristaltic pump and new ¼-inch tubing employing "low-flow" techniques. Groundwater was purged at a rate ranging from approximately 0.05 to 0.1 liter per minute (L/min). During purging, the groundwater level was monitored, adjusting the purge rate as necessary to limit the drawdown to less than approximately 0.33 feet. After purging at least one tubing volume, groundwater parameters including temperature, pH, conductivity, turbidity, dissolved oxygen (DO), and oxidation-reduction potential (ORP) were monitored using an in-line flow-through cell. Parameter readings were recorded every 3 to 5 minutes on field purge logs, until parameter measurements indicated that groundwater conditions had stabilized. Generally, the criterion for achieving stabilization is three consecutive readings of each parameter described above within 10% of each other. Purge logs are included in Attachment A.

Upon achieving stabilization, groundwater samples were collected into laboratory prepared bottles. After collection, the groundwater samples were labelled, recorded on a chain-of-custody, and stored in a cooler with ice pending delivery to Test America Incorporated (TAI), a Washington-certified analytical laboratory in Fife, Washington. Purged water was contained in Department of Transportation (DOT)-approved 55-gallon steel drums and stored at the Site pending disposal. Based on the analytical results from Ramboll's prior groundwater monitoring events, the purged water stored at the Site can be managed as non-regulated waste.

2.2 Laboratory Analysis

Groundwater samples obtained from wells MCW-1 through MCW-4 were analyzed for the primary constituents of concern, as required by the Consent Decree:

- Total and dissolved metals (i.e., arsenic, copper, lead, and zinc) by United States Environmental Protection Agency (USEPA) Method 200 series.

In addition, the following parameters were analyzed to evaluate potential changes in groundwater geochemistry and for consistency with previous sampling events at the Site:

- Total hardness by USEPA Method SM2340B;
- Total alkalinity, bicarbonate, and carbonate by USEPA Method SM2320B;
- Total chloride and sulfate by USEPA Method 300;
- Total calcium, magnesium, sodium, and potassium by USEPA Method 200 series.

2.3 Quality Assurance/Quality control

One blind duplicate sample (all analyses) was included in the analytical program for this monitoring event (collected from MCW-1). Because the groundwater sampling method did not include the use of any reusable equipment (i.e., only new, disposable sampling equipment was used), equipment rinsate blank samples were not collected as part of the groundwater sampling program.

3. GROUNDWATER MONITORING RESULTS

3.1 Groundwater Elevations

In the July 2018 monitoring event, groundwater depths ranged from approximately 9.12 feet (MCW-2) to 13.62 feet (MCW-4) below the respective top-of-casing (TOC). Based on these measurements and the TOC elevations (surveyed in December 2012), groundwater elevations beneath the Site ranged from approximately 11.53 feet (MCW-4) to 14.12 feet (MCW-3) above mean sea level (amsl; Table 1). The groundwater elevations suggest that shallow groundwater flow beneath the Site is to the southeast (towards the Hylebos Waterway), with a northeasterly component of flow in the vicinity of MCW-1 and is consistent with several monitoring events conducted by Ramboll from 2011 through 2017.

3.2 Groundwater Analytical Results

The results of laboratory analyses are summarized in Table 2, and laboratory analytical reports are included in Attachment B. None of the primary constituents of concern (arsenic, copper, lead and zinc) were reported at concentrations above the Site cleanup levels.

3.3 Statistical Trend Analysis

To evaluate temporal changes in concentrations of primary constituents of concern (i.e., arsenic, copper, lead, and zinc; see Figures 2a through 2d), Ramboll conducted a statistical analysis of the groundwater monitoring results for the past 10 sampling events dating back to 2011 using the temporal trend evaluation module in the Three-Tiered Monitoring Optimization Tool (3TMO) developed by Parsons and Ramboll for the Air Force Center for Engineering and the Environment (now the Air Force Civil Engineer Center). The 3TMO program is designed to facilitate long-term monitoring optimization evaluations at the site level. Specifically, the temporal trend evaluation module within 3TMO applies the Mann-Kendall nonparametric test to calculate the temporal trends in analyte concentrations over time.

The results of the Mann-Kendall test are summarized in Table 3, and indicate that the majority of constituents exhibit a stable trend, or no statistically significant trend at all; exceptions are noted below:

- For MCW-2, total zinc concentrations exhibit a "probably increasing" trend according to the Mann-Kendall analysis. However, inspection of Table 2 demonstrates that total zinc concentrations in MCW-2 have only reported above the laboratory reporting limit during one sampling event (December 2012), and the laboratory reported concentrations and historical reporting limits have been less than the cleanup criteria for zinc specified in the Consent Decree (0.086 mg/L).
- For MCW-3, the Mann-Kendall test indicates a statistically significant increasing trend for dissolved arsenic; however, all detections of dissolved arsenic have been below the cleanup criteria specified in the Consent Decree (0.036 mg/L) and the identified trend is similar to historical fluctuations over time.
- For MCW-4, total and dissolved arsenic concentrations have varied historically and are identified as "probably increasing" by the Mann-Kendall analysis; however, maximum concentrations for

both forms of arsenic (0.0071 mg/L) remain well below the cleanup criteria specified in the Consent Decree (0.036 mg/L).

- Although Copper was detected in MCW-1 above the cleanup criteria during one sampling event (i.e., in 2016) it has since returned to below criteria and has been identified as "stable" by the Mann-Kendall analysis.

Collectively, the results suggest that groundwater concentrations are predominantly stable or do not exhibit a statistically significant increasing trend likely to approach or exceed the relevant regulatory criteria specified in the Consent Decree.

4. OPERATIONS AND MAINTENANCE (O&M) INSPECTION

In July 2018, Ramboll personnel visually inspected the containment cell and general Site improvements (monitoring wells, vent pipes, drainage channels, fences, etc.) to evaluate their condition and to identify items requiring repair (e.g., damaged wells, clogged drains, damaged gates or fences). Routine grounds-keeping tasks (e.g., litter pickup, vegetation control, maintaining signage) were also performed as necessary. The O&M inspection was documented by Ramboll personnel on field logs and photographs, as appropriate. Site inspection field notes are included in Attachment C, and select photographs are included in Attachment D.

Vegetation was cleared from the Site (including the top of the cell and ground surface) in December 2017. Ramboll personnel visually inspected the surface of the containment cell in July 2018. Vegetation was observed on the surface, consisting of a variety of grasses and young blackberry plants. During the inspection, Ramboll noted growth of a Scotch broom shrub along the base of the southeastern side of the containment cell that appears to have grown into the side of the containment cell at the ground surface. Ramboll also noted an increase in vegetation growth on top of the containment cell and at the base surrounding the containment cell, particularly along the eastern side. Access to MCW-4 is partially obstructed by the vegetation growth from the southeastern corner, such that MW-4 is more easily accessible from the northeastern corner. This vegetation does not pose an immediate concern, but Ramboll will continue to monitor changes and provide recommendations for vegetation control in the future, as necessary.

During the July 2018 inspection, the monitoring wells were inspected and found to be in good condition. Three wells are completed with aboveground monuments (MCW-1, MCW-3, and MCW-4) and one well (MCW-2) is completed with a flush-mount vault. Each of the wells were locked, contained well caps, and the concrete surrounding the well casings was observed to be in good condition and free of significant cracks. The rubber seal beneath the well cover on MCW-2 was replaced as part of the 2017 O&M activities and was noted to be in good condition during Ramboll's inspection. The locks on the three wells completed with aboveground monuments (MCW-1, MCW-3, and MCW-4) were observed to be significantly rusted. The lock on MCW-3 became stuck and broke when Ramboll personnel attempted to open it. Ramboll subsequently replaced the locks on all three aboveground wells, due to the significant amount of rust on the locks.

The perimeter fence was inspected in July 2018 and was noted to be in good condition. Appropriate signage was observed in place.

The two "gas vent boots" protruding from the center of the containment cell appeared to be unobstructed, and in good condition. The "cleanout boots" located in the northeastern and northwestern corners of the containment cell were visually inspected and were found to be unobstructed and in good condition. The "cell drain boot" located in the southeast corner of the containment cell was also visually inspected and noted to be in good condition, although the paint coating appeared to be chipping off in some areas.

Based on the above observations, no maintenance actions were identified based on the 2018 inspection.

5. CONCLUSIONS

Based on the results of ten consecutive sampling events conducted by Ramboll from 2011 to 2018, concentrations of the primary constituents of concern in groundwater (i.e., arsenic, copper, lead and zinc) have been below the cleanup criteria specified in the Consent Decree, with one exception (i.e., copper in one sample from MCW-2 during the 2016 event). As noted in the Second Periodic Review Report published by Ecology in June 2016, groundwater cannot be used for drinking water purposes due to salinity. Given the general compliance with the established Site cleanup criteria – and considering that the Site and adjacent properties are currently used for industrial purposes with no current or likely future use of groundwater for drinking water purposes – additional groundwater evaluation is not recommended at this time.

The Trust and Ecology have a meeting scheduled for December 12, 2018, to discuss the comprehensive data set collected to date and the regulatory and administrative path forward in consideration of remaining funds in the Trust account.

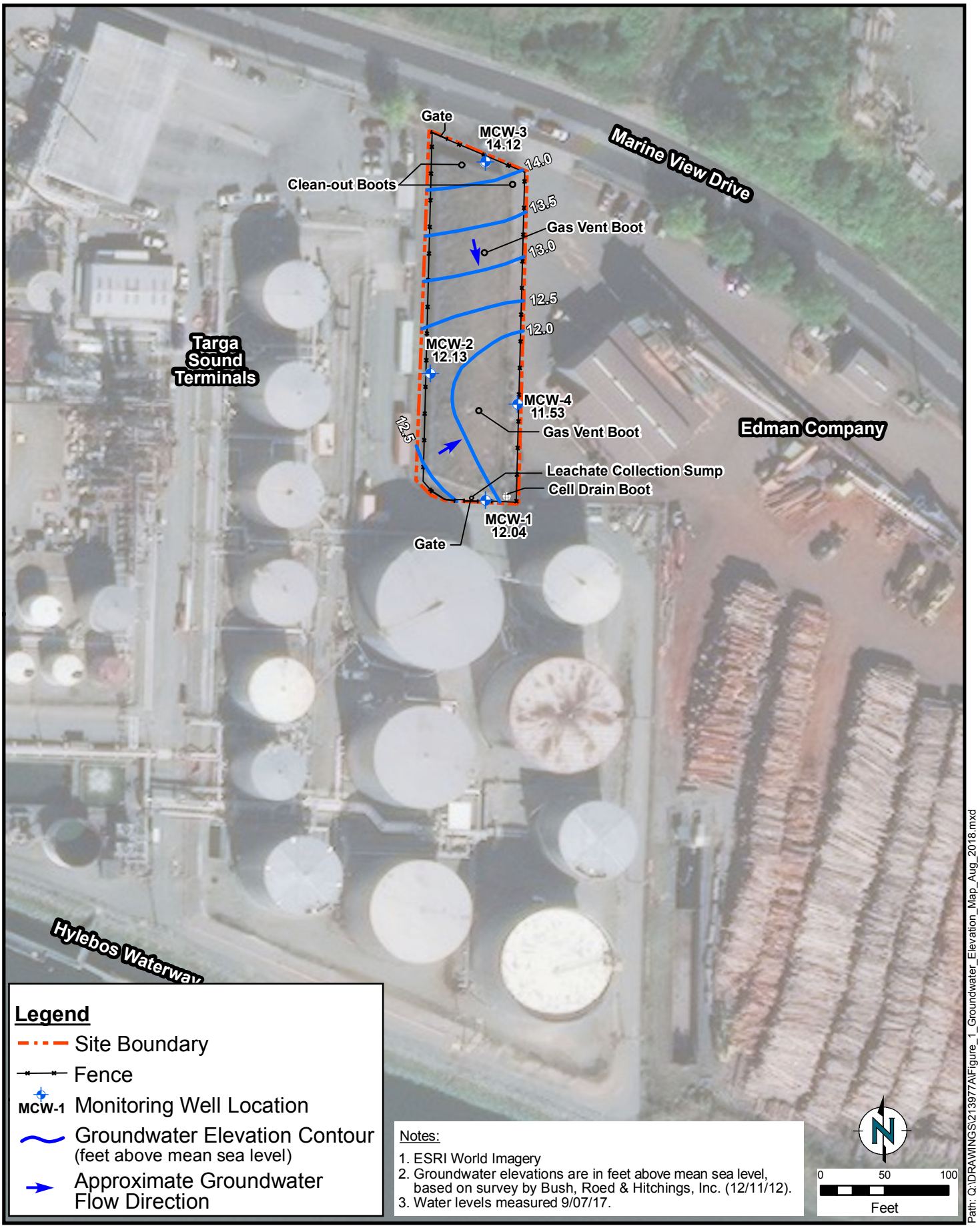
6. REFERENCES

Ecology. 2016. Second Periodic Review Report. Edman Company Side 1 (aka Cascade Timber #1), Facility Site ID#:1204, Cleanup Site ID#: 2662, 2502 Marine View Drive, Tacoma, Washington. June.

Hydrometrics, Inc. 1993. "Operations and Maintenance Plan, Cascade Timber No. 1 Remediation, Tacoma, Washington." November 1.

State of Washington Department of Ecology (Ecology). 1993. Ecology v. McFarland Cascade Holdings, Inc.; Cascade Pole Company; and Asarco Incorporated, Consent Decree No. 932100995. October.

FIGURES



RAMBOLL

DRAFTED BY: RSO | Date: 8/13/2018

Groundwater Elevation Map - July 2018
Cascade Timber No. 1 Site

Cascade Timber No. 1 ("McFarland, WA") Site
2502 Marine View Drive
Tacoma, WA 98422

Figure
1

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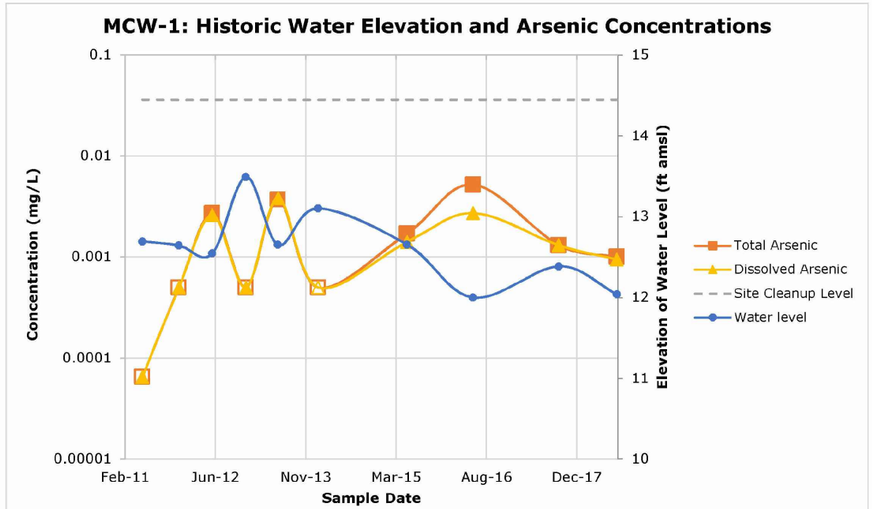
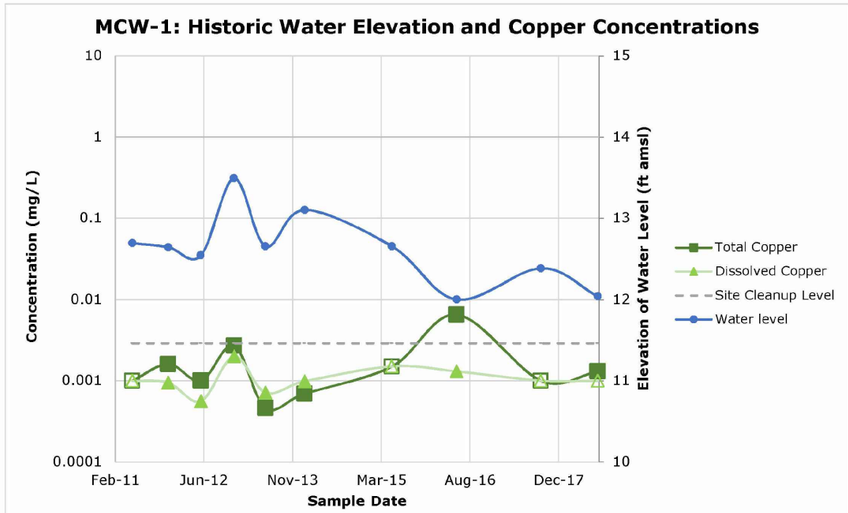
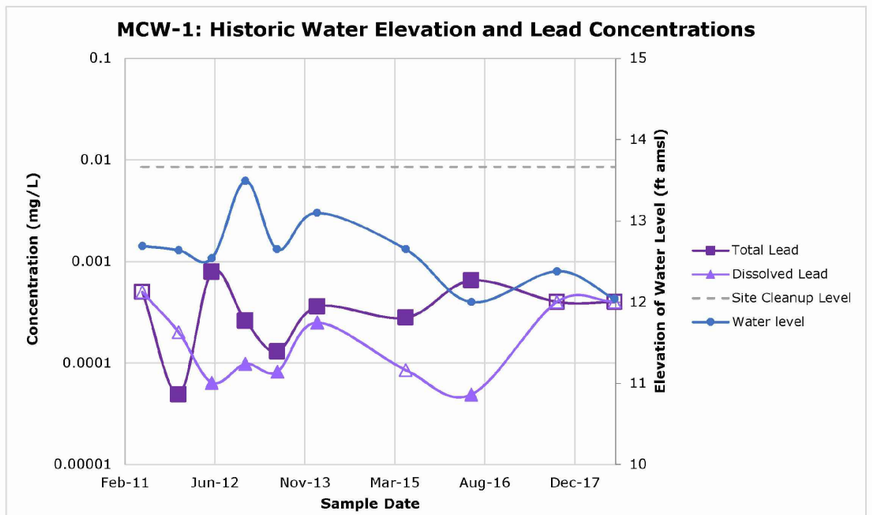
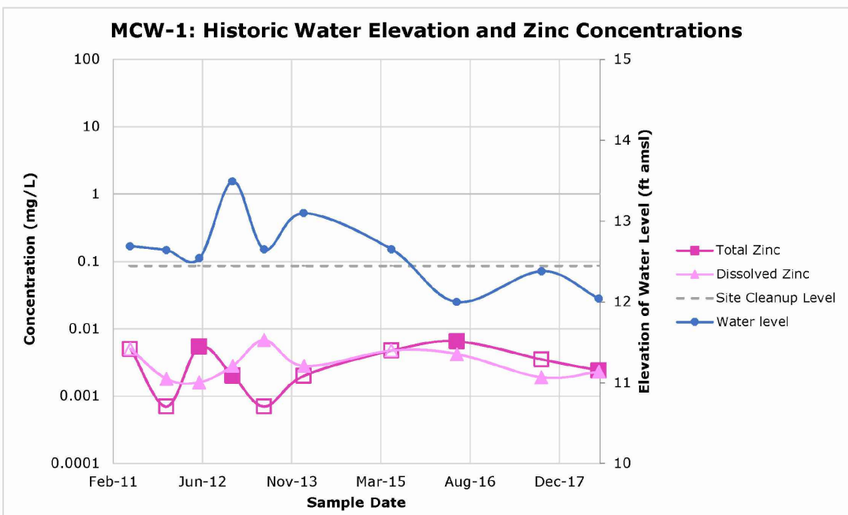








Mann-Kendall Results Summary				Arsenic		Copper		Lead		Zinc	
Well ID	Start Date	End Date	Samples	**Total**	**Dissolved**	**Total**	**Dissolved**	**Total**	**Dissolved**	**Total**	**Dissolved**
MCW-1	5/18/2011	7/25/2018	10	--	--	--	Stable	--	ND	--	Stable
MCW-2	5/18/2011	7/25/2018	10	Stable	Stable	--	--	--	ND	Probably Increasing	--
MCW-3	5/18/2011	7/25/2018	10	Stable	Increasing	ND	ND	--	ND	--	--
MCW-4	5/18/2011	7/25/2018	10	Probably Increasing	Probably Increasing	--	--	--	ND	--	Stable

Notes:
*Open symbols indicate samples with no detections, the value shown on the graph is half of the reporting limit
mg/L = milligrams per liter
ft amsl = feet above mean sea level

Mann-Kendall Results:
-- = No statistically significant temporal trend (<90% confidence) in concentrations; low variability of results (coefficient of variation [COV]<1)
ND = all sample results are less than the laboratory practical quantitation limit (have a qualifier of "J"), or the results are a mixture of non- detects and results having a "J" qualifier
Stable = no statistically significant temporal trend (<90% confidence) in concentrations; low variability of results (COV < 1)
Probably Increasing = statistically significant (90-95% confidence) increasing trend in concentrations
Increasing = statistically significant (>95% confidence) increasing trend in concentrations
Decreasing = statistically significant (>95% confidence) decreasing trend in concentrations

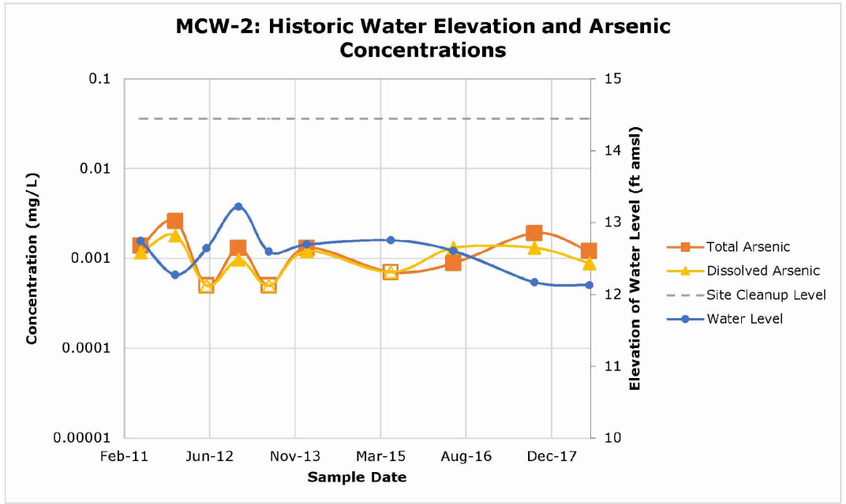
GROUNDWATER ELEVATION AND METAL CONCENTRATIONS - MCW-1

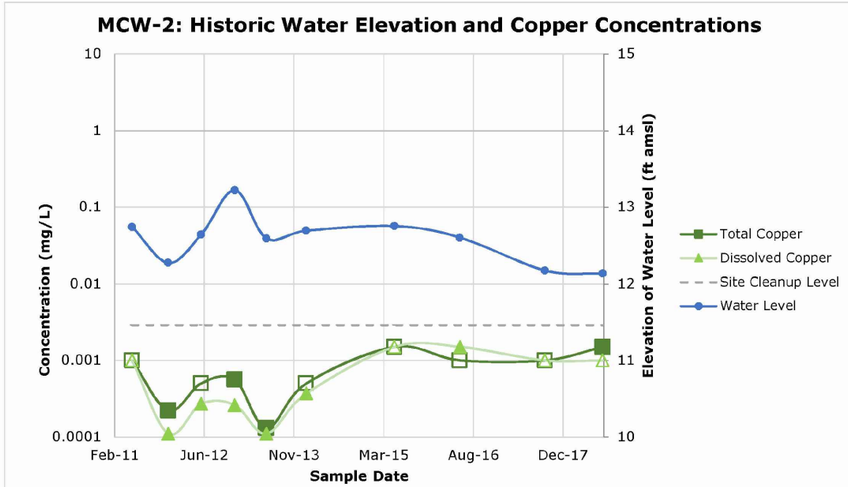
CASCADE TIMBER NO. 1 ("McFarland, WA") SITE
2502 MARINE VIEW DRIVE
TACOMA, WA 98422

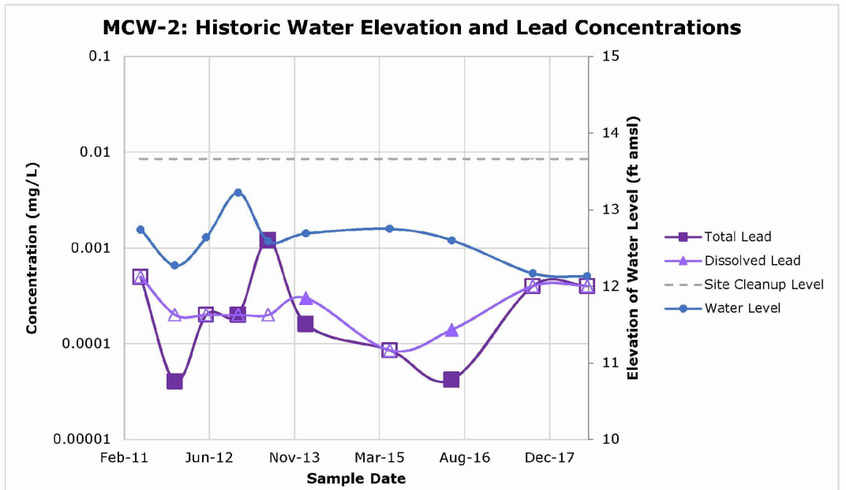
RAMBOLL

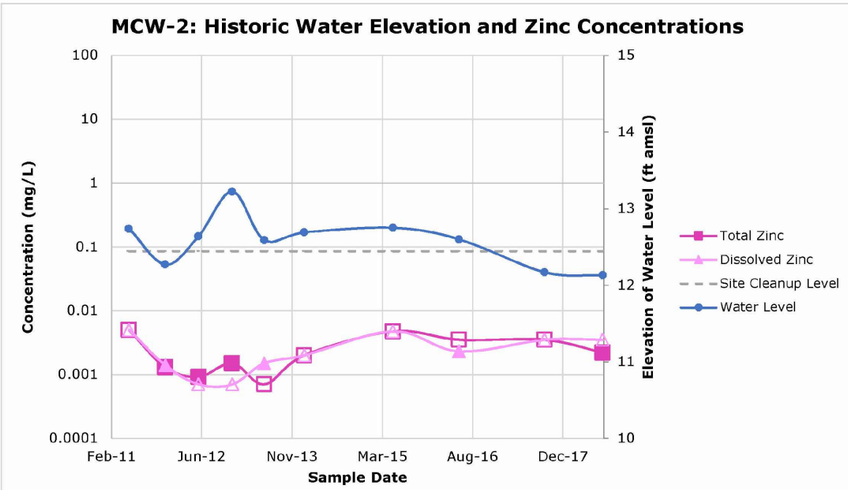
FIGURE
2a

DRAFTED BY: DLB | DATE: 11/29/2018 | PROJECT: 1690006896









Mann-Kendall Results Summary				Arsenic		Copper		Lead		Zinc	
Well ID	Start Date	End Date	Samples	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
MCW-1	5/18/2011	7/25/2018	10	--	--	--	Stable	--	ND	--	Stable
MCW-2	5/18/2011	7/25/2018	10	Stable	Stable	--	--	--	ND	Probably Increasing	--
MCW-3	5/18/2011	7/25/2018	10	Stable	Increasing	ND	ND	--	ND	--	--
MCW-4	5/18/2011	7/25/2018	10	Probably Increasing	Probably Increasing	--	--	--	ND	--	Stable

Notes:
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GROUNDWATER ELEVATION AND METAL CONCENTRATIONS - MCW-2

CASCADE TIMBER NO. 1 ("McFarland, WA") SITE
2502 MARINE VIEW DRIVE
TACOMA, WA 98422

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FIGURE **2b**

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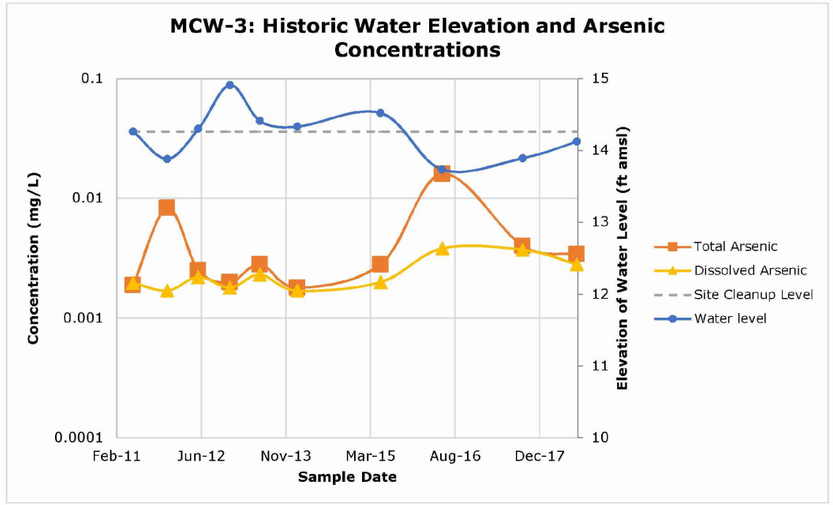

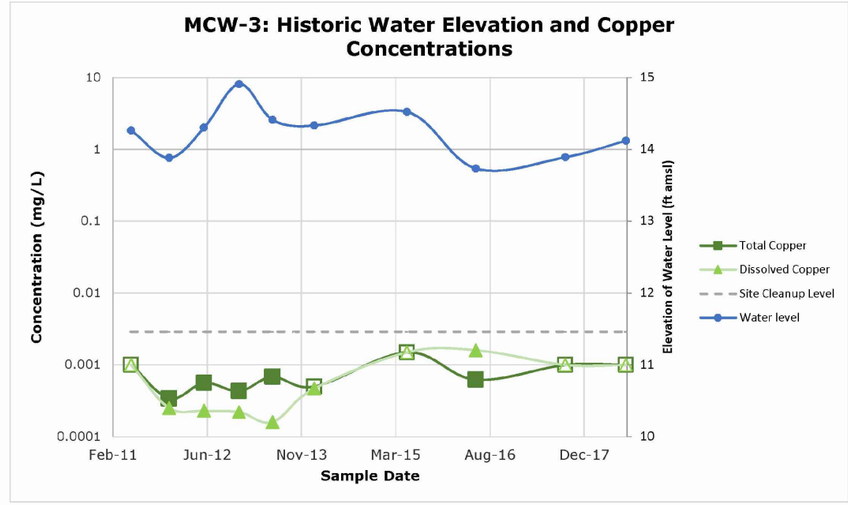

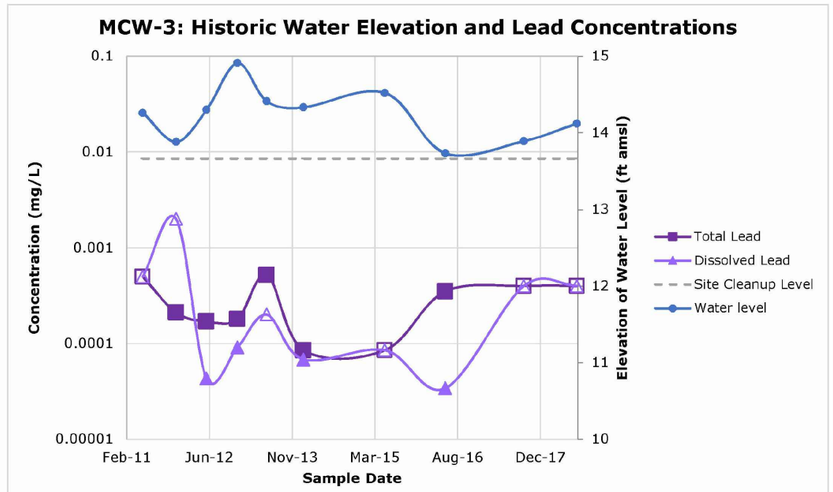

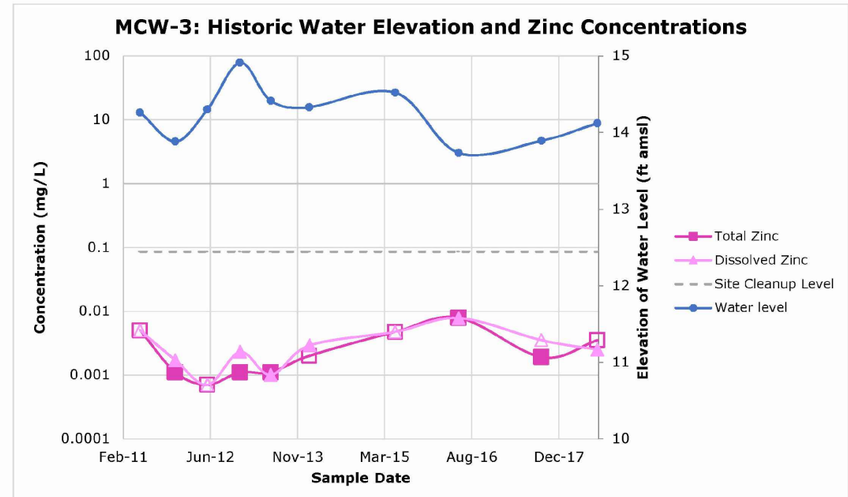

Mann-Kendall Results Summary				Arsenic		Copper		Lead		Zinc	
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MCW-2	5/18/2011	7/25/2018	10	Stable	Stable	--	--	--	ND	Probably Increasing	--
MCW-3	5/18/2011	7/25/2018	10	Stable	Increasing	ND	ND	--	ND	--	--
MCW-4	5/18/2011	7/25/2018	10	Probably Increasing	Probably Increasing	--	--	--	ND	--	Stable

Notes:
*Open symbols indicate samples with no detections, the value shown on the graph is half of the reporting limit
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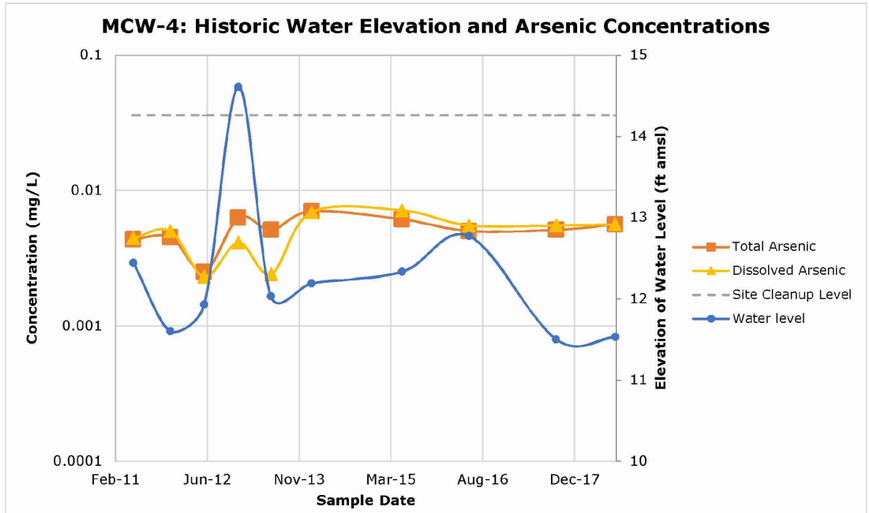
GROUNDWATER ELEVATION AND METAL CONCENTRATIONS - MCW-3

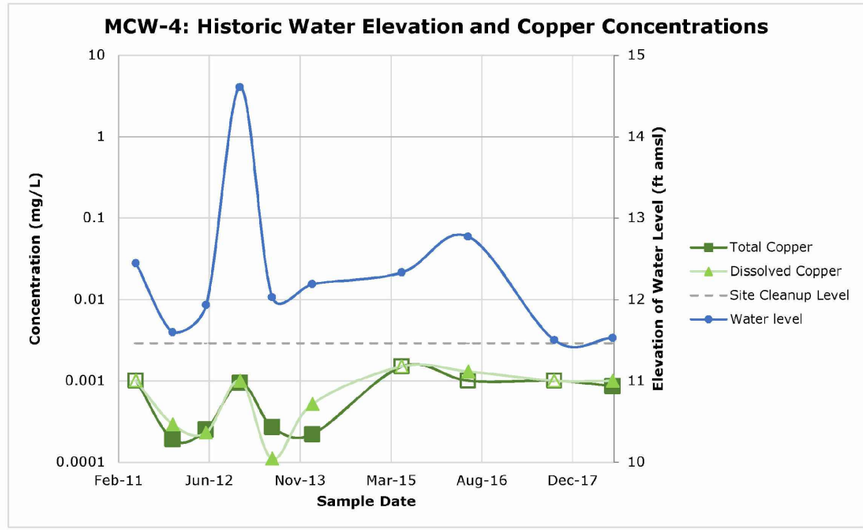
CASCADE TIMBER NO. 1 ("McFarland, WA") SITE
2502 MARINE VIEW DRIVE
TACOMA, WA 98422

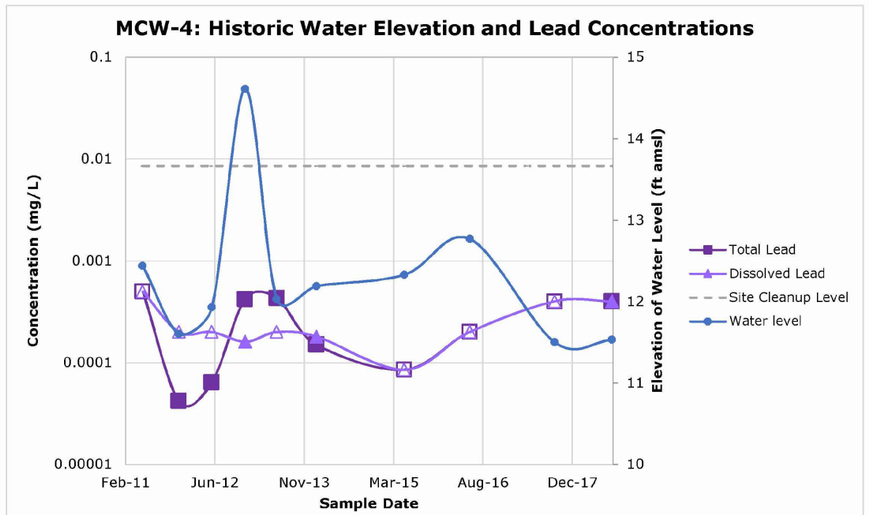
RAMBOLL

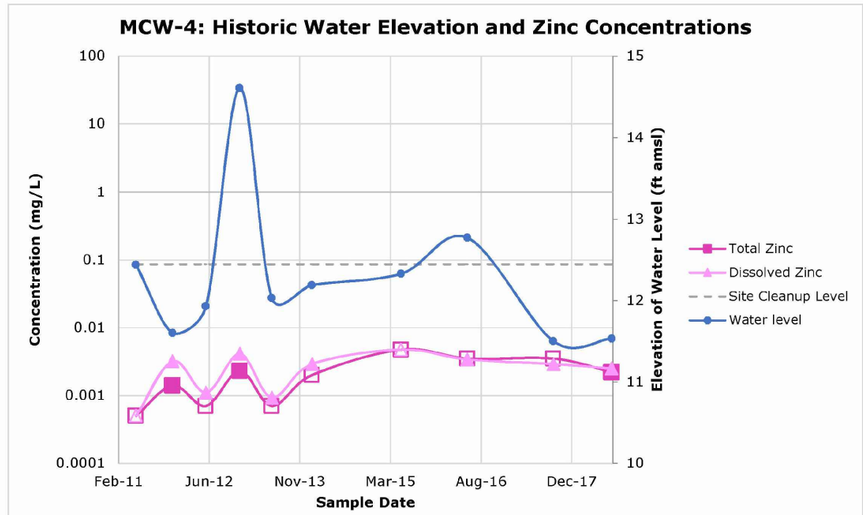
FIGURE
2c

DRAFTED BY: DLB | DATE: 11/29/2018 | PROJECT: 1690006896









Mann-Kendall Results Summary				Arsenic		Copper		Lead		Zinc	
Well ID	Start Date	End Date	Samples	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
MCW-1	5/18/2011	7/25/2018	10	--	--	--	Stable	--	ND	--	Stable
MCW-2	5/18/2011	7/25/2018	10	Stable	Stable	--	--	--	ND	Probably Increasing	--
MCW-3	5/18/2011	7/25/2018	10	Stable	Increasing	ND	ND	--	ND	--	--
MCW-4	5/18/2011	7/25/2018	10	Probably Increasing	Probably Increasing	--	--	--	ND	--	Stable

Notes:
*Open symbols indicate samples with no detections, the value shown on the graph is half of the reporting limit
mg/L = milligrams per liter
ft amsl = feet above mean sea level

Mann-Kendall Results:
-- = No statistically significant temporal trend (<90% confidence) in concentrations; low variability of results (coefficient of variation [COV]<1)
ND = all sample results are less than the laboratory practical quantitation limit (have a qualifier of "U"), or the results are a mixture of detects and results having a "J" qualifier
Stable = no statistically significant temporal trend (<90% confidence) in concentrations; low variability of results (COV < 1)
Probably Increasing = statistically significant (90-95% confidence) increasing trend in concentrations
Increasing = statistically significant (>95% confidence) increasing trend in concentrations
Decreasing = statistically significant (>95% confidence) decreasing trend in concentrations

GROUNDWATER ELEVATION AND METAL CONCENTRATIONS - MCW-4

CASCADE TIMBER NO. 1 ("McFarland, WA") SITE
2502 MARINE VIEW DRIVE
TACOMA, WA 98422

RAMBOLL

FIGURE
2d

DRAFTED BY: DLB | DATE: 11/29/2018 | PROJECT: 1690006896

TABLES

Table 1: Groundwater Elevation Measurements (2011 - 2018)
Cascade Timber No.1 ("McFarland, WA") Site
2502 Marine View Drive, Tacoma, Washington

Well Number[1]	Casing Diameter (inches)	Total Depth (feet)	Screen Interval (feet below ground surface)	Top of Casing Elevation[2]	Measurement Date	Depth to Water (feet below top of casing)	Elevation (ft)
MCW-1	2	19	10-15	24.83	5/18/11	12.14	12.69
					12/6/11	12.19	12.64
					6/7/12	12.29	12.54
					12/11/12	11.34	13.49
					6/6/13	12.18	12.65
					1/14/14	11.73	13.10
					5/21/15	12.18	12.65
					5/20/16	12.83	12.00
					9/7/17	12.45	12.38
					7/25/18	12.79	12.04
MCW-2	2	16	10-15	21.25	5/18/11	8.51	12.74
					12/6/11	8.98	12.27
					6/7/12	8.61	12.64
					12/11/12	8.03	13.22
					6/6/13	8.66	12.59
					1/14/14	8.56	12.69
					5/21/15	8.50	12.75
					5/20/16	8.65	12.60
					9/7/17	9.08	12.17
					7/25/18	9.12	12.13
MCW-3	2	14	9-14	24.95	5/18/11	10.69	14.26
					12/6/11	11.07	13.88
					6/7/12	10.65	14.30
					12/11/12	10.04	14.91
					6/6/13	10.54	14.41
					1/14/14	10.62	14.33
					5/21/15	10.43	14.52
					5/20/16	11.22	13.73
					9/7/17	11.06	13.89
					7/25/18	10.83	14.12
MCW-4	2	18	12-17	25.15	5/18/11	12.71	12.44
					12/6/11	13.55	11.60
					6/7/12	13.22	11.93
					12/11/12	12.57	12.58
					6/6/13	13.12	12.03
					1/14/14	12.96	12.19
					5/21/15	12.82	12.33
					5/20/16	12.38	12.77
					9/7/17	13.65	11.50
					7/25/18	13.62	11.53

Notes

[1.] MCW-1, MCW-2, MCW-3, MCW-4 constructed on August 31, 1994.
[2.] Elevations obtained from Bush, Roed and Hitchings (resurveyed on 12/11/12).

RAMBOLL

Table 2: Summary of Groundwater Analytical Results
Cascade Timber No.1 ("McFarland, WA") Site
2502 Marine View Drive, Tacoma, Washington

			Arsenic		Copper		Lead		Zinc		Calcium	Magnesium	Potassium	Sodium	Hardness	Hydroxide Alkalinity	Carbonate Alkalinity	Bicarbonate Alkalinity	Chloride	Sulfate	TPH-Gx	TPH-Dx	TPH-Oil
			Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Total	Total	Total	Total	Total	Total	Total	Total	Total	--	--	--
Site Cleanup Standard[1]		**Units**	0.036		0.0029		0.0085		0.086		--	--	--	--	--	--	--	--	--	--	1	0.5	0.5
MCW-1	**05/18/2011**	**mg/l**	< 0.001	< 0.001	< 0.002	< 0.002	< 0.001	< 0.001	< 0.01	< 0.01	11.4	3.19	2.28	15.2	41.5	< 5.0	< 5.0	60.2	1.8	6.67	NA	NA	NA
	12/06/2011		<0.001	<0.001	0.00094 J	0.0016	0.00005 J	<0.0004	<0.0014	0.0018	18	5.3	2.9 J	18 B	71	<5.0	<5.0	66	1.8	11	< 0.094	< 0.24	< 0.47
	06/07/ 2012		0.0027	0.0026	0.001	0.00056 J	0.00079	0.000064 J	0.0054	0.0016	14	4.6	1.9 J	14	52	<5.0	<5.0	70	3.6	6.5	NA	NA	NA
	12/11/2012		<0.001	<0.001	0.0027	0.0020	0.00026 J	0.000098 J	0.0020	0.0028	14 B	4.1	2.4 J	14	49	<5.0	<5.0	61	2.01	11.3	NA	NA	NA
	6/6/2013		0.0037	0.0038	0.00046	0.00071 J	0.00013 J	0.000082 J	<0.0014	0.0068	15 B	5.0	2.0 J	14	69	<5.0	<5.0	89	1.5 B	5.3	NA	NA	NA
	1/14/2014		<0.001	<0.001	0.00069 J	0.00098 J	0.00036 J	0.00025 J	< 0.004	0.0028 J	17	5.1 J	2.5 J	15	68	<5.0	<5.0	81	1.7	8.8	NA	NA	NA
	5/21/2015		0.0017 J	0.0014 J	< 0.0030	< 0.0030	0.00028 J	< 0.00017	< 0.0095	< 0.0095	12	< 15	1.9 J	14	39	< 5.0	< 5.0	69	0.78 J	3.9	NA	NA	NA
	5/20/2016		0.0052	0.0027	**0.0065**	0.0013 J B	0.00065	0.000049 J	0.0065 J	0.0042 J	8.6	3.1 J	1.7 J	13	70	<4.0	<4.0	65	1.3	3.4	NA	NA	NA
	9/7/2017		0.0013	0.0013	<0.0020	<0.0020	<0.00080	<0.00080	<0.0070	0.0019J	13	4.4	2.3 J	15	62	<5.0	<5.0	94	0.48J	1.1J	NA	NA	NA
	7/25/2018		0.0010	0.00094 J	0.0013 J	<0.0020	<0.00080	<0.00080	0.0024 J	0.0023 J	14	4.8	2.4 J	15	60	<5.0	<5.0	83	0.87 J	2.2 B	NA	NA	NA
	7/25/2018 (dup)		0.00093 J	0.00092 J	<0.0020	0.0013 J	<0.00080	<0.00080	<0.0070	0.0031 J	14	4.8	2.3 J	14	55	<5.0	<5.0	77	0.76 J	2.1 B	NA	NA	NA
MCW-2	**05/18/2011**	**mg/l**	0.00138	0.00116	< 0.002	< 0.002	< 0.001	< 0.001	< 0.01	<0.01	24.4	10.1	4.43	10.5	103	< 5.0	< 5.0	128	5.52	< 1.0	NA	NA	NA
	05/18/2011 (dup)		<0.001	<0.001	< 0.002	< 0.002	< 0.001	< 0.001	< 0.01	0.0101	25.6	10.6	4.84	11	107	<5.0	<5.0	127	5.49	<1.0	NA	NA	NA
	12/06/2011		0.0026	0.0018	0.00022 J	0.00011 J	0.00004 J	<0.0004	0.0013 J	0.0014	26	13	4	12 B	140	<5.0	<5.0	140	9.6	<1.2	< 0.094	< 0.24	< 0.47
	12/6/2011 (dup)		0.0019	0.0017	0.0021 J	0.0032 J	0.00004 J	<0.0004	0.0013 J	0.0015	26	13	4.2	12 B	150	<5.0	<5.0	140	8.7	<1.2	< 0.094	< 0.24	< 0.47
	6/7/2012		<0.001	<0.001	<0.001	0.00027 J	<0.0004	<0.0004	0.00092 J	<0.0014	26	10	4.8	11	130	<5.0	<5.0	130	6	<1.2	NA	NA	NA
	6/7/2012 (dup)		<0.001	<0.001	0.0003 J	0.00018 J	0.000052 J	<0.0004	<0.0014	0.00091 J	26	10	4.8	11	130	<5.0	<5.0	130	6.1	<1.2	NA	NA	NA
	12/11/2012		0.0013	0.00096 J	0.00056 J	0.00026 J	0.00020 J	<0.00040	0.0015	<0.0014	30 B	12	6.2	12	150	<5.0	<5.0	140	9.06	0.77	NA	NA	NA
	12/11/2012 (dup)		0.0014	<0.0010	0.00052 J	0.00070 J	0.00016 J	0.000073 J	0.0019	0.0030	28 B	12	5.7	11	150	<5.0	<5.0	140	8.77	<0.5	NA	NA	NA
	6/6/2013		<0.001	<0.001	0.00013 J	0.00011 J	0.0012	<0.0004	<0.0014	0.0015	26 B	10	5.4	12	110 B	<5.0	<5.0	140	7.0 B	<1.0	NA	NA	NA
	6/6/2013 (dup)		<0.001	<0.001	<0.001	<0.001	0.000057 J	<0.0004	<0.0014	<0.0014	25 B	10	5.2	11	110 B	<5.0	<5.0	140	8.1 B	<1.0	NA	NA	NA
	1/14/2014		0.0013	0.0012	<0.001	0.00037 J	0.00016 J	0.00030 J	<0.004	<0.004	27	12	4.9	11	120	<5.0	<5.0	140	6.4	<1.2	NA	NA	NA
	5/21/2015		< 0.0014	< 0.0014	< 0.0030	< 0.0030	< 0.00017	< 0.00017	< 0.0095	< 0.0095	29	< 15	5.1	12	120	< 5.0	< 5.0	140	6.0	< 0.40	NA	NA	NA
	5/20/2016		0.00088 J	0.0013	<0.0020	0.0021 B	0.000058 J	0.00011 J	0.0019 J	0.0033 J	24	11	5.0	11	120	<4.0	<4.0	130	5.9	<0.50	NA	NA	NA
	5/20/2016 (dup)		0.00084 J	0.0015	<0.0020	0.0015 J B	0.000042 J	0.00014 J	<0.0070	0.0023 J	25	10	5.1	11	150	<4.0	<4.0	130	5.8	<0.50	NA	NA	NA
	9/7/2017		0.0019	0.0013	<0.0020	<0.0020	<0.00080	<0.00080	<0.0070	<0.0070	22	10	4.1	10	120	<5.0	<5.0	130	7.3	<1.2	NA	NA	NA
	9/7/2017 (dup)		0.0020	0.0018	<0.0020	<0.0020	0.00023J	<0.00080	0.0022J	<0.0070	23	10	4.9	10	110	<5.0	<5.0	130	6.7	<1.2	NA	NA	NA
	7/25/2018		0.0012	0.00088 J	0.0015 J	<0.0020	<0.00080	<0.00080	0.0022 J	<0.0070	27	12	5.3	11	120	<5.0	<5.0	130	8.2	0.66 JB	NA	NA	NA
MCW-3	**5/18/2011**	**mg/l**	0.00189	0.00197	< 0.002	< 0.002	< 0.001	< 0.001	< 0.01	< 0.01	24.1	15.8	2.08	11.0	125	< 5.0	< 5.0	135	14.6	< 1.0	NA	NA	NA
	12/6/2011		0.0083	0.0017	0.00034 J	0.00025 J	0.00021 J	<0.004	0.0011 J	0.0017	24	16	2.4 J	12 B	140	<5.0	<5.0	140	7.5	<1.2	< 0.094	< 0.24	< 0.47
	6/7/2012		0.0025	0.0022	0.00056 J	0.00023 J	0.00017 J	0.000043 J	<0.0014	<0.0014	20	12	1.9 J	9.7	120	<5.0	<5.0	120	9.2	<1.2	NA	NA	NA
	12/11/2012		0.0020	0.0018	0.00043 J	0.00022 J	0.00018 J	0.000091 J	0.0011 J	0.0023	22 B	14	2.3 J	11	120	<5.0	<5.0	130	7.9	<0.5	NA	NA	NA
	6/6/2013		0.0028	0.0023	0.00068 J	0.00016 J	0.00052	<0.0004	0.0011 J	0.0010 J	17 B	11	2.1 J	8.9	89 B	<5.0	<5.0	110	8.1 B	<1.0	NA	NA	NA
	1/14/2014		0.0018	0.0017	<0.001	0.00047 J	0.000068 J	0.00008 J	<0.004	0.0029J	20	13	1.9 J	9.4	110	<5.0	<5.0	120	7.4	<1.2	NA	NA	NA
	1/14/2014 (dup)		0.0017	0.0017	<0.001	<0.001	0.000085 J	0.000065 J	<0.004	<0.004	21	13	1.9 J	9.5	130	<5.0	<5.0	120	7.4	<1.2	NA	NA	NA
	5/21/2015		0.0028 J	0.0020 J	< 0.0030	< 0.0030	< 0.00017	< 0.00017	< 0.0095	< 0.0095	22	< 15	2.0 J	9.3	110	<5.0	<5.0	120	6.5	< 0.40	NA	NA	NA
	5/20/2016		0.016	0.0038	0.00062 J	0.0016 JB	0.00035 J	0.000034 J	0.0079	0.0078	23	13	2.1 J	8.7	200	<4.0	<4.0	130	7.2	<0.50	NA	NA	NA
	9/7/2017		0.0040	0.0037	<0.0020	<0.0020	<0.00080	<0.00080	0.0019J	<0.0070	20	12	2.3 J	9.8	120	<5.0	<5.0	130	6.2	<1.2	NA	NA	NA
	7/25/2018		0.0034	0.0028	<0.0020	<0.0020	<0.00080	<0.00080	<0.0070	0.0025 J	22	14	2.3 J	9.9	110	<5.0	<5.0	130	5.5	0.66 J B	NA	NA	NA
MCW-4	**5/18/2011**	**mg/l**	0.00435	0.00444	< 0.002	< 0.002	< 0.001	< 0.001	< 0.01	< 0.01	31.5	15.1	3.57	13.5	141	< 5.0	< 5.0	176	7.82	0	NA	NA	NA
	12/6/2011		0.0045	0.0050	0.00019 J	0.00029 J	0.00004 J	<0.0004	0.0014	0.0032	35	14	4.8	14 B	180	<5.0	<5.0	170	10	<1.2	< 0.094	< 0.24	< 0.47
	6/7/2012		0.0025	0.0023	0.00025 J	0.00023 J	0.000064 J	<0.0004	<0.0014	0.0011 J	28	12	4.4	14	150	<5.0	<5.0	150	8.6	<1.2	NA	NA	NA
	12/11/2012		0.0063	0.0041	0.00094 J	0.001	0.00042	0.00016 J	0.0023	0.0041	36 B	14	4.4	14	160	<5.0	<5.0	140	11.2	<0.5	NA	NA	NA
	6/6/2013		0.0051	0.0024	0.00027 J	0.0011	0.00043	<0.0004	<0.0014	0.00093 J	28 B	11	3.9	11	120 B	<5.0	<5.0	140	9.6 B	0.25 J	NA	NA	NA
	1/14/2014		0.007	0.0069	0.00022 J	0.00052 J	0.00015 J	0.00018 J	<0.004	0.0029 J	30	14	3.6	14	320	<5.0	<5.0	150	7.7	<1.2	NA	NA	NA
	5/21/2015		0.0071	0.0064	< 0.0030	< 0.0030	< 0.00017	< 0.00017	< 0.0095	< 0.0095	29	< 15	3.5	11	130	<5.0	<5.0	140	6.9	< 0.40	NA	NA	NA
	5/21/2015 (dup)		0.0061	0.0071	< 0.0030	< 0.0030	< 0.00017	< 0.00017	< 0.0095	< 0.0095	29	< 15	3.7	11	130	<5.0	<5.0	140	6.8	< 0.40	NA	NA	NA
	5/20/2016		0.0050	0.0055	<0.0020	0.0013 J B	<0.00040	<0.00040	<0.0070	0.0034 J	27	12	3.6	11	120	<4.0	<4.0	150	7.2	<0.50	NA	NA	NA
	9/7/2017		0.0051	0.0055	<0.0020	<0.0020	<0.00080	<0.00080	<0.0070	0.0029J	27	11	3.8	12	130	<5.0	<5.0	140	6.9	<1.2	NA	NA	NA
	7/25/2018		0.0056	0.0056	0.00086 J	<0.0020	<0.00080	<0.00080	0.0022 J	0.0025 J	27	12	3.3	10	130	<5.0	<5.0	140	6.4	0.66 J B	NA	NA	NA

Notes

[1] Marine Chronic Surface Water Standard
mg/l milligrams per liter
dup duplicate
-- criteria not established
TPH-Gx gasoline range petroleum hydrocarbons
TPH-Dx diesel range petroleum hydrocarbons (>C12-C24)
TPH-Oil motor oil range petroleum hydrocarbons
Bold values and cells shaded grey represent an exceedance of the MTCA Method A/B criteria.
NA not analyzed
J Result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value.
B Compound was found in the blank and sample
< Concentration was below reporting limit

RAMBOLL

Table 3: Summary of Mann-Kendall Test Results
Cascade Timber No.1 ("McFarland, WA") Site
2502 Marine View Drive, Tacoma, Washington

Mann-Kendall Results Summary				**Arsenic**		**Copper**		**Lead**		**Zinc**	
Well ID	Start Date	End Date	Samples	**Total**	**Dissolved**	**Total**	**Dissolved**	**Total**	**Dissolved**	**Total**	**Dissolved**
MCW-1	5/18/2011	7/25/2018	10	--	--	--	Stable	--	ND	--	Stable
MCW-2	5/18/2011	7/25/2018	10	Stable	Stable	--	--	--	ND	Probably Increasing	--
MCW-3	5/18/2011	7/25/2018	10	Stable	Increasing	ND	ND	--	ND	--	--
MCW-4	5/18/2011	7/25/2018	10	Probably Increasing	Probably Increasing	--	--	--	ND	--	Stable

Notes:

-- = No statistically significant temporal trend (<90% confidence) in concentrations; low variability of results (coefficient of variation [COV]<1)

ND = all sample results are less than the laboratory practical quantitation limit (have a qualifier of "J"), or the results are a mixture of non- detects and results having a "J" qualifier

Stable = no statistically significant temporal trend (<90% confidence) in concentrations; low variability of results (COV < 1)

Probably Increasing = statistically significant (90-95% confidence) increasing trend in concentrations

Increasing = statistically significant (>95% confidence) increasing trend in concentrations

Decreasing **=** statistically significant (>95% confidence) decreasing trend in concentrations

ATTACHMENT A

PURGE LOGS

RAMBOLL
400 E Evergreen Blvd., Suite 304
Vancouver, Washington 98660
(360) 597-7070

WATER PURGING AND SAMPLING LOG

PROJECT NAME: McFarland
PROJECT NUMBER: 160000e896
PROJECT LOCATION: Tacoma, WA
FIELD PERSON: S. Leick
PROJECT MANAGER: D. Rowe
DATE: 7-25-18

PURGING/SAMPLING METHOD: Low-flow	WELL NUMBER: MCW-1
EQUIPMENT CLEANING METHOD: N/A - disposable equipment	CASING RADIUS: (in.)
PURGE WATER DISPOSAL: on-site 55-gallon drums	TOTAL DEPTH (TD): 18.5 (ft.)
GALLONS PURGED: ~2 / CASING VOLUMES: ~2	DEPTH TO WATER (DTW): 12.79 (ft.)
	CASING VOLUME: 0.93 (gal.)
	(TD-DTW) (CR)²(.163)=
	WELL VOLUMES: (gal.)

PURGE START TIME: 10:12 PURGE RATE (GPM):

TIME/GALLONS PURGED	pH	CONDUCTIVITY (µmnos/cm)	TURBIDITY (NTU)	D.O. (mg/L)	TEMP (°C)	ORP (mv)	COMMENTS
10:15	6.20	0.145		3.62	18.33	-35.9	Black + yellow sediment in tubing during start of purge → rotten egg smell
10:18	6.07	0.147	DTW: 13.46	0.42	17.05	-64.1	
10:21	6.07	0.144		0.25	18.03	-68.2	
10:24	6.07	0.144		0.24	18.13	-69.8	
10:27	6.06	0.143		0.24	18.49	-71.2	
10:30	6.06	0.144		0.24	18.69	-72.3	
10:35	6.07	0.146		0.26	17.57	-75.1	
10:40	6.08	0.146		0.22	17.53	-76.0	

PURGE STOP TIME: 1055
FINAL DTW: ~~13.10~~ 13.9 @ 80% =
LAB NAME:
SAMPLE ID: MCW-1-20180725@10:45

OBSERVATIONS/COMMENTS: Duplicate sample MCW-99-20180725@10:50

PUMP SET AT = ~15 FEET

RAMBOLL
400 E Evergreen Blvd., Suite 304
Vancouver, Washington 98660
(360) 597-7070

WATER PURGING AND SAMPLING LOG

PROJECT NAME: McFarland
PROJECT NUMBER: 1690006896
PROJECT LOCATION: Tacoma, WA
FIELD PERSON: S. Leick
PROJECT MANAGER: D. Rowe
DATE: 7-25-18

PURGING/SAMPLING METHOD: Low-flow	WELL NUMBER: MCW-2
EQUIPMENT CLEANING METHOD: N/A - disposable equipment	CASING RADIUS: 2 (in.)
PURGE WATER DISPOSAL: on-site 55-gallon drums	TOTAL DEPTH (TD): 15.1' (ft.)
GALLONS PURGED: ~2 / CASING VOLUMES: ~2	DEPTH TO WATER (DTW): 9.12 (ft.)
	CASING VOLUME: 0.98 (gal.)
	(TD-DTW) $(CR)^2(.163)$=
	WELL VOLUMES: (gal.)

PURGE START TIME: 9:02 PURGE RATE (GPM):

TIME/GALLONS PURGED	pH	CONDUCTIVITY (µmnos/cm)	TURBIDITY (NTU)	D.O. (mg/L)	TEMP (°C)	ORP (mv)	COMMENTS
9:04	6.27	~~0.29~~ 0.291	N/A	4.16	15.38	-81.2	N
9:07	6.26	0.278		0.81	15.17	-86.0	
9:10	6.28	0.273		0.50	14.90	-86.8	
9:13	6.30	0.271		0.46	14.58	-86.7	
9:16	6.31	0.269		0.43	14.53	-85.9	DTW=9.35
9:21	6.33	0.269		0.40	14.48	-85.4	
9:26	6.34	0.269		0.35	14.43	-85.1	
9:31	6.35	0.269		0.30	14.37	-84.6	
9:36	6.31	0.270	V	0.26	14.30	-83.6	DTW=9.35

ESL

PURGE STOP TIME: 9:52
FINAL DTW: 9.35 @ 80% =
LAB NAME: Test America
SAMPLE ID: MCW-2-20180725 @9:40

OBSERVATIONS/COMMENTS:

PUMP SET AT = 13' FEET

RAMBOLL
400 E Evergreen Blvd., Suite 304
Vancouver, Washington 98660
(360) 597-7070

WATER PURGING AND SAMPLING LOG

PROJECT NAME: McFarland
PROJECT NUMBER: 160000e8gb
PROJECT LOCATION: Tacoma, WA
FIELD PERSON: S. Leick
PROJECT MANAGER: D. Rowe
DATE: 7-25-18

PURGING/SAMPLING METHOD: Low-flow
EQUIPMENT CLEANING METHOD: N/A - disposable equipment
PURGE WATER DISPOSAL: On-site 55-gallon drums
GALLONS PURGED: ~2
CASING VOLUMES: ~2

WELL NUMBER: MCW-3
CASING RADIUS: (in.)
TOTAL DEPTH (TD): 16.98 (ft.)
DEPTH TO WATER (DTW): 10.83 (ft.)
CASING VOLUME: (gal.)
(TD-DTW) $(CR)^2(.163)$=
WELL VOLUMES: (gal.)

PURGE START TIME: 12:36 pm
PURGE RATE (GPM):

TIME/GALLONS PURGED	pH	CONDUCTIVITY (µmnos/cm)	TURBIDITY (NTU)	D.O. (mg/L)	TEMP (°C)	ORP (mv)	COMMENTS
12:39	6.34	0.237	N/A	0.55	18.86	55.9	
12:42	6.28	0.235		0.44	18.54	54.7	
12:45	6.42	0.236		0.32	18.21	68.4	
12:48	6.48	0.235		0.28	18.18	74.5	
12:51	6.48	0.235		0.30	17.89	77.6	
12:54	6.48	0.235		0.27	17.72	79.2	
12:59	6.50	0.235		0.26	17.68	82.1	
13:04	6.52	0.236		0.22	17.76	82.3	

PURGE STOP TIME:
FINAL DTW: 11.10 @ 80% =
LAB NAME:
SAMPLE ID: MCW-3-20180725 @ 13:10

OBSERVATIONS/COMMENTS:

PUMP SET AT = ~12 FEET

RAMBOLL
400 E Evergreen Blvd., Suite 304
Vancouver, Washington 98660
(360) 597-7070

WATER PURGING AND SAMPLING LOG

PROJECT NAME: McFarland
PROJECT NUMBER: 1690000896
PROJECT LOCATION: Tacoma, WA
FIELD PERSON: S. Leick
PROJECT MANAGER: D. Rowe
DATE: 7-25-18

PURGING/SAMPLING METHOD: Low Flow
EQUIPMENT CLEANING METHOD: N/A - disposable equip.
PURGE WATER DISPOSAL: On-Site 55-gallon drums
GALLONS PURGED: ~2
CASING VOLUMES: ~2

WELL NUMBER: MCW-4
CASING RADIUS: (in.)
TOTAL DEPTH (TD): 19.98' (ft.)
DEPTH TO WATER (DTW): 13.62' (ft.)
CASING VOLUME: (gal.)
(TD-DTW) (CR)²(.163)=
WELL VOLUMES: (gal.)

PURGE START TIME: ~~11:30~~ 11:45
PURGE RATE (GPM):

TIME/GALLONS PURGED	pH	CONDUCTIVITY (µmnos/cm)	TURBIDITY (NTU)	D.O. (mg/L)	TEMP (°C)	ORP (mv)	COMMENTS
11:48	5.85	0.278		0.50	16.61	-19.6	
11:51	5.61	0.278		0.29	16.27	-51.2	
11:54	6.12	0.276		0.22	15.92	-71.8	
11:57	6.22	0.276		0.21	15.96	-78.3	
12:00	6.23	0.276		0.24	15.87	-80.0	
12:05	6.24	0.276		0.30	15.82	-81.3	
12:10	6.28	0.275		0.27	15.79	-83.3	
							e SL

PURGE STOP TIME: 1220
FINAL DTW: 13.70 @ 80% =
LAB NAME:
SAMPLE ID: MCW-4-20180725@1215

OBSERVATIONS/COMMENTS:

PUMP SET AT = ~15' FEET

ATTACHMENT B

LABORATORY RESULTS

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Seattle
5755 8th Street East
Tacoma, WA 98424
Tel: (253)922-2310

TestAmerica Job ID: 580-79100-1
Client Project/Site: Tacoma, WA

For:
Ramboll US Corporation
8440 SE Sunnybrook Blvd
Suite 204
Clackamas, Oregon 97015

Attn: Devon Rowe

Authorized for release by:
7/31/2018 3:38:10 PM

Sheri Cruz, Project Manager I
(253)922-2310
sheri.cruz@testamericainc.com

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Case Narrative

Client: Ramboll US Corporation
Project/Site: Tacoma, WA

TestAmerica Job ID: 580-79100-1

Job ID: 580-79100-1

Laboratory: TestAmerica Seattle

Narrative

Job Narrative
580-79100-1

Comments
No additional comments.

Receipt
The samples were received on 7/25/2018 2:29 PM; the samples arrived in good condition. The temperature of the cooler at receipt was 11.4º C.

Metals
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

General Chemistry
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Definitions/Glossary

Client: Ramboll US Corporation
Project/Site: Tacoma, WA

TestAmerica Job ID: 580-79100-1

Qualifiers

Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

General Chemistry

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Client Sample ID: MCW-2-20180725

Date Collected: 07/25/18 09:40
Date Received: 07/25/18 14:29

Lab Sample ID: 580-79100-1

Matrix: Water

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	**27**		1.1	0.16	mg/L		07/26/18 10:36	07/27/18 17:55	1
Potassium	**5.3**		3.3	0.41	mg/L		07/26/18 10:36	07/27/18 17:55	1
Sodium	**11**		2.0	0.33	mg/L		07/26/18 10:36	07/27/18 17:55	1
Magnesium	**12**		1.1	0.13	mg/L		07/26/18 10:36	07/27/18 17:55	1

Method: 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**0.0012**		0.0010	0.00020	mg/L		07/26/18 10:36	07/27/18 17:19	1
Copper	**0.0015**	**J**	0.0020	0.00060	mg/L		07/26/18 10:36	07/27/18 17:19	1
Lead	ND		0.00080	0.00020	mg/L		07/26/18 10:36	07/27/18 17:19	1
Zinc	**0.0022**	**J**	0.0070	0.0019	mg/L		07/26/18 10:36	07/27/18 17:19	1

Method: 200.8 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**0.00088**	**J**	0.0010	0.00020	mg/L		07/27/18 09:55	07/27/18 23:04	1
Lead	ND		0.00080	0.00020	mg/L		07/27/18 09:55	07/27/18 23:04	1
Copper	ND		0.0020	0.00060	mg/L		07/27/18 09:55	07/27/18 23:04	1
Zinc	ND		0.0070	0.0019	mg/L		07/27/18 09:55	07/27/18 23:04	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**8.2**		0.90	0.14	mg/L			07/29/18 00:00	1
Sulfate	**0.66**	**J B**	1.2	0.26	mg/L			07/29/18 00:00	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity	**130**		5.0	5.0	mg/L			07/30/18 12:32	1
Bicarbonate Alkalinity as CaCO3	**130**		5.0	5.0	mg/L			07/30/18 12:32	1
Carbonate Alkalinity as CaCO3	ND		5.0	5.0	mg/L			07/30/18 12:32	1
Hydroxide Alkalinity as CaCO3	ND		5.0	5.0	mg/L			07/30/18 12:32	1
Hardness as calcium carbonate	**120**		10	10	mg/L			07/28/18 09:31	1

Client Sample ID: MCW-1-20180725

Date Collected: 07/25/18 10:45
Date Received: 07/25/18 14:29

Lab Sample ID: 580-79100-2

Matrix: Water

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	**14**		1.1	0.16	mg/L		07/26/18 10:36	07/27/18 17:59	1
Potassium	**2.4**	**J**	3.3	0.41	mg/L		07/26/18 10:36	07/27/18 17:59	1
Sodium	**15**		2.0	0.33	mg/L		07/26/18 10:36	07/27/18 17:59	1
Magnesium	**4.8**		1.1	0.13	mg/L		07/26/18 10:36	07/27/18 17:59	1

Method: 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**0.0010**		0.0010	0.00020	mg/L		07/26/18 10:36	07/27/18 17:22	1
Copper	**0.0013**	**J**	0.0020	0.00060	mg/L		07/26/18 10:36	07/27/18 17:22	1
Lead	ND		0.00080	0.00020	mg/L		07/26/18 10:36	07/27/18 17:22	1
Zinc	**0.0024**	**J**	0.0070	0.0019	mg/L		07/26/18 10:36	07/27/18 17:22	1

Method: 200.8 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**0.00094**	**J**	0.0010	0.00020	mg/L		07/27/18 09:55	07/27/18 23:42	1
Lead	ND		0.00080	0.00020	mg/L		07/27/18 09:55	07/27/18 23:42	1
Copper	ND		0.0020	0.00060	mg/L		07/27/18 09:55	07/27/18 23:42	1
Zinc	**0.0023**	**J**	0.0070	0.0019	mg/L		07/27/18 09:55	07/27/18 23:42	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**0.87**	**J**	0.90	0.14	mg/L			07/29/18 00:12	1
Sulfate	**2.2**	**B**	1.2	0.26	mg/L			07/29/18 00:12	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity	**83**		5.0	5.0	mg/L			07/30/18 12:32	1
Bicarbonate Alkalinity as CaCO3	**83**		5.0	5.0	mg/L			07/30/18 12:32	1
Carbonate Alkalinity as CaCO3	ND		5.0	5.0	mg/L			07/30/18 12:32	1
Hydroxide Alkalinity as CaCO3	ND		5.0	5.0	mg/L			07/30/18 12:32	1
Hardness as calcium carbonate	**60**		4.0	4.0	mg/L			07/28/18 09:31	1

Client: Ramboll US Corporation
Project/Site: Tacoma, WA

TestAmerica Job ID: 580-79100-1

Client Sample ID: MCW-99-20180725
Date Collected: 07/25/18 10:50
Date Received: 07/25/18 14:29

Lab Sample ID: 580-79100-3
Matrix: Water

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	14		1.1	0.16	mg/L		07/26/18 10:36	07/27/18 18:02	1
Potassium	2.3	J	3.3	0.41	mg/L		07/26/18 10:36	07/27/18 18:02	1
Sodium	14		2.0	0.33	mg/L		07/26/18 10:36	07/27/18 18:02	1
Magnesium	4.8		1.1	0.13	mg/L		07/26/18 10:36	07/27/18 18:02	1

Method: 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.00093	J	0.0010	0.00020	mg/L		07/26/18 10:36	07/27/18 17:26	1
Copper	ND		0.0020	0.00060	mg/L		07/26/18 10:36	07/27/18 17:26	1
Lead	ND		0.00080	0.00020	mg/L		07/26/18 10:36	07/27/18 17:26	1
Zinc	ND		0.0070	0.0019	mg/L		07/26/18 10:36	07/27/18 17:26	1

Method: 200.8 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.00092	J	0.0010	0.00020	mg/L		07/27/18 09:55	07/27/18 23:46	1
Lead	ND		0.00080	0.00020	mg/L		07/27/18 09:55	07/27/18 23:46	1
Copper	0.0013	J	0.0020	0.00060	mg/L		07/27/18 09:55	07/27/18 23:46	1
Zinc	0.0031	J	0.0070	0.0019	mg/L		07/27/18 09:55	07/27/18 23:46	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	0.76	J	0.90	0.14	mg/L			07/29/18 00:24	1
Sulfate	2.1	B	1.2	0.26	mg/L			07/29/18 00:24	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity	77		5.0	5.0	mg/L			07/30/18 12:32	1
Bicarbonate Alkalinity as CaCO3	77		5.0	5.0	mg/L			07/30/18 12:32	1
Carbonate Alkalinity as CaCO3	ND		5.0	5.0	mg/L			07/30/18 12:32	1
Hydroxide Alkalinity as CaCO3	ND		5.0	5.0	mg/L			07/30/18 12:32	1
Hardness as calcium carbonate	55		10	10	mg/L			07/28/18 09:31	1

Client: Ramboll US Corporation
Project/Site: Tacoma, WA

TestAmerica Job ID: 580-79100-1

Client Sample ID: MCW-4-20180725
Date Collected: 07/25/18 12:15
Date Received: 07/25/18 14:29

Lab Sample ID: 580-79100-4
Matrix: Water

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	27		1.1	0.16	mg/L		07/26/18 10:36	07/27/18 18:05	1
Potassium	3.3		3.3	0.41	mg/L		07/26/18 10:36	07/27/18 18:05	1
Sodium	10		2.0	0.33	mg/L		07/26/18 10:36	07/27/18 18:05	1
Magnesium	12		1.1	0.13	mg/L		07/26/18 10:36	07/27/18 18:05	1

Method: 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0056		0.0010	0.00020	mg/L		07/26/18 10:36	07/27/18 17:29	1
Copper	0.00086	J	0.0020	0.00060	mg/L		07/26/18 10:36	07/27/18 17:29	1
Lead	ND		0.00080	0.00020	mg/L		07/26/18 10:36	07/27/18 17:29	1
Zinc	0.0022	J	0.0070	0.0019	mg/L		07/26/18 10:36	07/27/18 17:29	1

Method: 200.8 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	0.0056		0.0010	0.00020	mg/L		07/27/18 09:55	07/27/18 23:49	1
Lead	ND		0.00080	0.00020	mg/L		07/27/18 09:55	07/27/18 23:49	1
Copper	ND		0.0020	0.00060	mg/L		07/27/18 09:55	07/27/18 23:49	1
Zinc	0.0025	J	0.0070	0.0019	mg/L		07/27/18 09:55	07/27/18 23:49	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	6.4		0.90	0.14	mg/L			07/29/18 00:36	1
Sulfate	0.66	J B	1.2	0.26	mg/L			07/29/18 00:36	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity	140		5.0	5.0	mg/L			07/30/18 12:32	1
Bicarbonate Alkalinity as CaCO3	140		5.0	5.0	mg/L			07/30/18 12:32	1
Carbonate Alkalinity as CaCO3	ND		5.0	5.0	mg/L			07/30/18 12:32	1
Hydroxide Alkalinity as CaCO3	ND		5.0	5.0	mg/L			07/30/18 12:32	1
Hardness as calcium carbonate	130		4.0	4.0	mg/L			07/28/18 09:31	1

Client Sample ID: MCW-3-20180725
Date Collected: 07/25/18 13:10
Date Received: 07/25/18 14:29

Lab Sample ID: 580-79100-5
Matrix: Water

Method: 200.7 Rev 4.4 - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	**22**		1.1	0.16	mg/L		07/26/18 10:36	07/27/18 18:09	1
Potassium	**2.3**	**J**	3.3	0.41	mg/L		07/26/18 10:36	07/27/18 18:09	1
Sodium	**9.9**		2.0	0.33	mg/L		07/26/18 10:36	07/27/18 18:09	1
Magnesium	**14**		1.1	0.13	mg/L		07/26/18 10:36	07/27/18 18:09	1

Method: 200.8 - Metals (ICP/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**0.0034**		0.0010	0.00020	mg/L		07/26/18 10:36	07/27/18 17:33	1
Copper	ND		0.0020	0.00060	mg/L		07/26/18 10:36	07/27/18 17:33	1
Lead	ND		0.00080	0.00020	mg/L		07/26/18 10:36	07/27/18 17:33	1
Zinc	ND		0.0070	0.0019	mg/L		07/26/18 10:36	07/27/18 17:33	1

Method: 200.8 - Metals (ICP/MS) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	**0.0028**		0.0010	0.00020	mg/L		07/27/18 09:55	07/27/18 23:53	1
Lead	ND		0.00080	0.00020	mg/L		07/27/18 09:55	07/27/18 23:53	1
Copper	ND		0.0020	0.00060	mg/L		07/27/18 09:55	07/27/18 23:53	1
Zinc	**0.0025**	**J**	0.0070	0.0019	mg/L		07/27/18 09:55	07/27/18 23:53	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**5.5**		0.90	0.14	mg/L			07/29/18 00:47	1
Sulfate	**0.66**	**J B**	1.2	0.26	mg/L			07/29/18 00:47	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity	**130**		5.0	5.0	mg/L			07/30/18 12:32	1
Bicarbonate Alkalinity as CaCO3	**130**		5.0	5.0	mg/L			07/30/18 12:32	1
Carbonate Alkalinity as CaCO3	ND		5.0	5.0	mg/L			07/30/18 12:32	1
Hydroxide Alkalinity as CaCO3	ND		5.0	5.0	mg/L			07/30/18 12:32	1
Hardness as calcium carbonate	**110**		4.0	4.0	mg/L			07/28/18 09:31	1

Method: 200.7 Rev 4.4 - Metals (ICP)

Lab Sample ID: MB 580-280098/10-A
Matrix: Water
Analysis Batch: 280350

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 280098

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Calcium	ND		1.1	0.16	mg/L		07/26/18 10:36	07/27/18 17:20	1
Potassium	ND		3.3	0.41	mg/L		07/26/18 10:36	07/27/18 17:20	1
Sodium	ND		2.0	0.33	mg/L		07/26/18 10:36	07/27/18 17:20	1
Magnesium	ND		1.1	0.13	mg/L		07/26/18 10:36	07/27/18 17:20	1

Lab Sample ID: LCS 580-280098/11-A
Matrix: Water
Analysis Batch: 280350

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 280098

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Calcium	10.0	10.8		mg/L		108	85 - 115
Potassium	10.0	10.6		mg/L		106	85 - 115
Sodium	10.0	10.4		mg/L		104	85 - 115
Magnesium	10.0	10.7		mg/L		107	85 - 115

Lab Sample ID: LCSD 580-280098/12-A
Matrix: Water
Analysis Batch: 280350

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 280098

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Calcium	10.0	10.8		mg/L		108	85 - 115	0	20
Potassium	10.0	10.7		mg/L		107	85 - 115	1	20
Sodium	10.0	10.6		mg/L		106	85 - 115	1	20
Magnesium	10.0	10.8		mg/L		108	85 - 115	1	20

Method: 200.8 - Metals (ICP/MS)

Lab Sample ID: MB 580-280098/10-A
Matrix: Water
Analysis Batch: 280413

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 280098

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.0010	0.00020	mg/L		07/26/18 10:36	07/30/18 11:35	1
Copper	ND		0.0020	0.00060	mg/L		07/26/18 10:36	07/30/18 11:35	1
Lead	ND		0.00080	0.00020	mg/L		07/26/18 10:36	07/30/18 11:35	1
Zinc	ND		0.0070	0.0019	mg/L		07/26/18 10:36	07/30/18 11:35	1

Lab Sample ID: LCS 580-280098/11-A
Matrix: Water
Analysis Batch: 280413

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 280098

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.100	0.101		mg/L		101	85 - 115
Copper	0.100	0.0979		mg/L		98	85 - 115
Lead	0.100	0.0977		mg/L		98	85 - 115
Zinc	0.100	0.0974		mg/L		97	85 - 115

Method: 200.8 - Metals (ICP/MS) (Continued)

Lab Sample ID: LCSD 580-280098/12-A
Matrix: Water
Analysis Batch: 280413

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 280098

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	0.100	0.0997		mg/L		100	85 - 115	1	20
Copper	0.100	0.0974		mg/L		97	85 - 115	1	20
Lead	0.100	0.0977		mg/L		98	85 - 115	0	20
Zinc	0.100	0.0966		mg/L		97	85 - 115	1	20

Lab Sample ID: LCS 580-280209/15-A
Matrix: Water
Analysis Batch: 280358

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 280209

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.100	0.103		mg/L		103	85 - 115
Copper	0.100	0.0978		mg/L		98	85 - 115
Lead	0.100	0.104		mg/L		104	85 - 115
Zinc	0.100	0.0995		mg/L		99	85 - 115

Lab Sample ID: LCSD 580-280209/16-A
Matrix: Water
Analysis Batch: 280358

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA
Prep Batch: 280209

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	0.100	0.102		mg/L		102	85 - 115	0	20
Copper	0.100	0.0979		mg/L		98	85 - 115	0	20
Lead	0.100	0.104		mg/L		104	85 - 115	0	20
Zinc	0.100	0.0994		mg/L		99	85 - 115	0	20

Lab Sample ID: MB 580-280043/6-B
Matrix: Water
Analysis Batch: 280358

Client Sample ID: Method Blank
Prep Type: Dissolved
Prep Batch: 280209

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Arsenic	ND		0.0010	0.00020	mg/L		07/27/18 09:55	07/27/18 23:00	1
Copper	ND		0.0020	0.00060	mg/L		07/27/18 09:55	07/27/18 23:00	1
Lead	ND		0.00080	0.00020	mg/L		07/27/18 09:55	07/27/18 23:00	1
Zinc	ND		0.0070	0.0019	mg/L		07/27/18 09:55	07/27/18 23:00	1

Lab Sample ID: 580-79100-1 MS
Matrix: Water
Analysis Batch: 280358

Client Sample ID: MCW-2-20180725
Prep Type: Dissolved
Prep Batch: 280209

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Arsenic	0.00088	J	0.100	0.0967		mg/L		96	70 - 130
Copper	ND		0.100	0.0895		mg/L		90	70 - 130
Lead	ND		0.100	0.0985		mg/L		99	70 - 130
Zinc	ND		0.100	0.0933		mg/L		93	70 - 130

Method: 200.8 - Metals (ICP/MS) (Continued)

Lab Sample ID: 580-79100-1 MSD — **Client Sample ID: MCW-2-20180725**
Matrix: Water — **Prep Type: Dissolved**
Analysis Batch: 280358 — **Prep Batch: 280209**

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Arsenic	0.00088	J	0.100	0.102		mg/L		101	70 - 130	6	20
Copper	ND		0.100	0.0941		mg/L		94	70 - 130	5	20
Lead	ND		0.100	0.101		mg/L		101	70 - 130	2	20
Zinc	ND		0.100	0.0971		mg/L		97	70 - 130	4	20

Lab Sample ID: 580-79100-1 DU — **Client Sample ID: MCW-2-20180725**
Matrix: Water — **Prep Type: Dissolved**
Analysis Batch: 280358 — **Prep Batch: 280209**

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Arsenic	0.00088	J	0.000884	J	mg/L		0.1	20
Copper	ND		ND		mg/L		NC	20
Lead	ND		ND		mg/L		NC	20
Zinc	ND		ND		mg/L		NC	20

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 580-280366/3 — **Client Sample ID: Method Blank**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 280366

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		0.90	0.14	mg/L			07/28/18 21:05	1
Sulfate	0.383	J	1.2	0.26	mg/L			07/28/18 21:05	1

Lab Sample ID: LCS 580-280366/4 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 280366

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	50.0	50.8		mg/L		102	90 - 110
Sulfate	50.0	50.3		mg/L		101	90 - 110

Lab Sample ID: LCSD 580-280366/5 — **Client Sample ID: Lab Control Sample Dup**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 280366

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	50.0	51.6		mg/L		103	90 - 110	2	15
Sulfate	50.0	51.0		mg/L		102	90 - 110	1	15

Method: SM 2320B - Alkalinity

Lab Sample ID: LCS 580-280397/2 — **Client Sample ID: Lab Control Sample**
Matrix: Water — **Prep Type: Total/NA**
Analysis Batch: 280397

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity	100	102		mg/L		102	85 - 115

Method: SM 2340C - Hardness, Total (mg/l as CaC03)

Lab Sample ID: MB 580-280284/1
Matrix: Water
Analysis Batch: 280284

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Hardness as calcium carbonate	ND		2.0	2.0	mg/L			07/28/18 09:31	1

Lab Sample ID: LCS 580-280284/2
Matrix: Water
Analysis Batch: 280284

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Hardness as calcium carbonate			1000	1050		mg/L		105	90 - 110		

Lab Sample ID: 580-79100-1 DU
Matrix: Water
Analysis Batch: 280284

Client Sample ID: MCW-2-20180725
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Hardness as calcium carbonate	120			125		mg/L				8	20

Lab Chronicle

Client: Ramboll US Corporation
Project/Site: Tacoma, WA

TestAmerica Job ID: 580-79100-1

Client Sample ID: MCW-2-20180725
Date Collected: 07/25/18 09:40
Date Received: 07/25/18 14:29

Lab Sample ID: 580-79100-1
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.8			280098	07/26/18 10:36	CJB	TAL SEA
Total/NA	Analysis	200.7 Rev 4.4		1	280350	07/27/18 17:55	SPP	TAL SEA
Dissolved	Filtration	FILTRATION			280043	07/25/18 15:22	CJB	TAL SEA
Dissolved	Prep	200.8			280209	07/27/18 09:55	CJB	TAL SEA
Dissolved	Analysis	200.8		1	280358	07/27/18 23:04	FCW	TAL SEA
Total/NA	Prep	200.8			280098	07/26/18 10:36	CJB	TAL SEA
Total/NA	Analysis	200.8		1	280358	07/27/18 17:19	FCW	TAL SEA
Total/NA	Analysis	300.0		1	280366	07/29/18 00:00	EMM	TAL SEA
Total/NA	Analysis	SM 2320B		1	280397	07/30/18 12:32	EMM	TAL SEA
Total/NA	Analysis	SM 2340C		1	280284	07/28/18 09:31	R1K	TAL SEA

Client Sample ID: MCW-1-20180725
Date Collected: 07/25/18 10:45
Date Received: 07/25/18 14:29

Lab Sample ID: 580-79100-2
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.8			280098	07/26/18 10:36	CJB	TAL SEA
Total/NA	Analysis	200.7 Rev 4.4		1	280350	07/27/18 17:59	SPP	TAL SEA
Dissolved	Filtration	FILTRATION			280043	07/25/18 15:22	CJB	TAL SEA
Dissolved	Prep	200.8			280209	07/27/18 09:55	CJB	TAL SEA
Dissolved	Analysis	200.8		1	280358	07/27/18 23:42	FCW	TAL SEA
Total/NA	Prep	200.8			280098	07/26/18 10:36	CJB	TAL SEA
Total/NA	Analysis	200.8		1	280358	07/27/18 17:22	FCW	TAL SEA
Total/NA	Analysis	300.0		1	280366	07/29/18 00:12	EMM	TAL SEA
Total/NA	Analysis	SM 2320B		1	280397	07/30/18 12:32	EMM	TAL SEA
Total/NA	Analysis	SM 2340C		1	280284	07/28/18 09:31	R1K	TAL SEA

Client Sample ID: MCW-99-20180725
Date Collected: 07/25/18 10:50
Date Received: 07/25/18 14:29

Lab Sample ID: 580-79100-3
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.8			280098	07/26/18 10:36	CJB	TAL SEA
Total/NA	Analysis	200.7 Rev 4.4		1	280350	07/27/18 18:02	SPP	TAL SEA
Dissolved	Filtration	FILTRATION			280043	07/25/18 15:22	CJB	TAL SEA
Dissolved	Prep	200.8			280209	07/27/18 09:55	CJB	TAL SEA
Dissolved	Analysis	200.8		1	280358	07/27/18 23:46	FCW	TAL SEA
Total/NA	Prep	200.8			280098	07/26/18 10:36	CJB	TAL SEA
Total/NA	Analysis	200.8		1	280358	07/27/18 17:26	FCW	TAL SEA
Total/NA	Analysis	300.0		1	280366	07/29/18 00:24	EMM	TAL SEA
Total/NA	Analysis	SM 2320B		1	280397	07/30/18 12:32	EMM	TAL SEA
Total/NA	Analysis	SM 2340C		1	280284	07/28/18 09:31	R1K	TAL SEA

Lab Chronicle

Client: Ramboll US Corporation
Project/Site: Tacoma, WA

TestAmerica Job ID: 580-79100-1

Client Sample ID: MCW-4-20180725

Lab Sample ID: 580-79100-4

Date Collected: 07/25/18 12:15
Matrix: Water
Date Received: 07/25/18 14:29

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.8			280098	07/26/18 10:36	CJB	TAL SEA
Total/NA	Analysis	200.7 Rev 4.4		1	280350	07/27/18 18:05	SPP	TAL SEA
Dissolved	Filtration	FILTRATION			280043	07/25/18 15:22	CJB	TAL SEA
Dissolved	Prep	200.8			280209	07/27/18 09:55	CJB	TAL SEA
Dissolved	Analysis	200.8		1	280358	07/27/18 23:49	FCW	TAL SEA
Total/NA	Prep	200.8			280098	07/26/18 10:36	CJB	TAL SEA
Total/NA	Analysis	200.8		1	280358	07/27/18 17:29	FCW	TAL SEA
Total/NA	Analysis	300.0		1	280366	07/29/18 00:36	EMM	TAL SEA
Total/NA	Analysis	SM 2320B		1	280397	07/30/18 12:32	EMM	TAL SEA
Total/NA	Analysis	SM 2340C		1	280284	07/28/18 09:31	R1K	TAL SEA

Client Sample ID: MCW-3-20180725

Lab Sample ID: 580-79100-5

Date Collected: 07/25/18 13:10
Matrix: Water
Date Received: 07/25/18 14:29

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	200.8			280098	07/26/18 10:36	CJB	TAL SEA
Total/NA	Analysis	200.7 Rev 4.4		1	280350	07/27/18 18:09	SPP	TAL SEA
Dissolved	Filtration	FILTRATION			280043	07/25/18 15:22	CJB	TAL SEA
Dissolved	Prep	200.8			280209	07/27/18 09:55	CJB	TAL SEA
Dissolved	Analysis	200.8		1	280358	07/27/18 23:53	FCW	TAL SEA
Total/NA	Prep	200.8			280098	07/26/18 10:36	CJB	TAL SEA
Total/NA	Analysis	200.8		1	280358	07/27/18 17:33	FCW	TAL SEA
Total/NA	Analysis	300.0		1	280366	07/29/18 00:47	EMM	TAL SEA
Total/NA	Analysis	SM 2320B		1	280397	07/30/18 12:32	EMM	TAL SEA
Total/NA	Analysis	SM 2340C		1	280284	07/28/18 09:31	R1K	TAL SEA

Laboratory References:

TAL SEA = TestAmerica Seattle, 5755 8th Street East, Tacoma, WA 98424, TEL (253)922-2310

Accreditation/Certification Summary

Client: Ramboll US Corporation
Project/Site: Tacoma, WA

TestAmerica Job ID: 580-79100-1

Laboratory: TestAmerica Seattle

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	EPA Region	Identification Number	Expiration Date
Washington	State Program	10	C553	02-17-19

The following analytes are included in this report, but accreditation/certification is not offered by the governing authority:

Analysis Method	Prep Method	Matrix	Analyte
SM 2320B		Water	Hydroxide Alkalinity as CaCO3

Sample Summary

Client: Ramboll US Corporation
Project/Site: Tacoma, WA

TestAmerica Job ID: 580-79100-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
580-79100-1	MCW-2-20180725	Water	07/25/18 09:40	07/25/18 14:29
580-79100-2	MCW-1-20180725	Water	07/25/18 10:45	07/25/18 14:29
580-79100-3	MCW-99-20180725	Water	07/25/18 10:50	07/25/18 14:29
580-79100-4	MCW-4-20180725	Water	07/25/18 12:15	07/25/18 14:29
580-79100-5	MCW-3-20180725	Water	07/25/18 13:10	07/25/18 14:29

TestAmerica
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TestAmerica Seattle
5755 8th Street E.
Tacoma, WA 98424
Tel. 253-922-2310
Fax 253-922-5047
www.testamericainc.com

☐ Rush
☐ Short Hold

Chain of Custody Record

Client	Client Contact	Date	Chain of Custody Number
Rambol	Devon Rowe / Sam Leick DRowe@Rambll SLeick@Rambll	7-25-18	37470
Address	**Telephone Number (Area Code)/Fax Number**	**Lab Number**	**Page 1 of 1**
400 E. Evergreen Blvd. St. 302	360-597-7070		
City / **State** / **Zip Code**	**Sampler**	**Lab Contact**	
Vancouver / WA / 986600	S. Leick	Sheri Cruz	
Project Name and Location (State)	**Billing Contact**		
Tacoma, WA			
Contract/Purchase Order/Quote No.			

Analysis (Attach list if more space is needed): Alkalinity; Chloride+Sulfate; Hardness; Total metals; Ca Carbonate; Dissolved metals

Loc: 580 79100 pt

Sample I.D. and Location/Description (Containers for each sample may be combined on one line)	Date	Time	Matrix: Air	Aqueous	Sed.	Soil	Containers & Preservatives: Unpres.	H2SO4	HNO3	HCl	NaOH	ZnAc/NaOH	
MCW-2-20180725	7-25-18	9:40		X			2		2				Did not have field filters - no samples have been filtered. Dissolved metals collected in unpreserved container
MCW-1-20180725	7-25-18	10:45		X			↓		↓				
MCW-99-20180725	7-25-18	10:50		X									
MCW-4-20180725	7-25-18	12:15		X									
MCW-3-20180725	7-25-18	13:10		X									

580-79100 Chain of Custody

Therm. ID: TR5 Cor: 1.4 ° Unc: 1.3 °
Cooler Dsc: Ly Red
Packing:
Cust. Seal: Yes ___ No ___
Wet/Packs/Dry Ice/None
FedEx:
UPS:
Lab Cour:
Other: CD

Cooler: ☐ Yes ☐ No Cooler Temp: ___

Possible Hazard Identification: ☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal: ☐ Return To Client ☐ Disposal By Lab ☐ Archive For ___ Months (A fee may be assessed if samples are retained longer than 1 month)

Turn Around Time Required (business days): ☐ 24 Hours ☐ 48 Hours ☐ 5 Days ☒ 10 Days ☐ 15 Days ☐ Other ___

QC Requirements (Specify)

	Relinquished By Sign/Print	Date	Time	Received By Sign/Print	Date	Time
1.	Sam Leick / Samantha Leick	7-25-18	14:29	Ken Hobbs	7.25.18	1429
2.						
3.						

Comments

DISTRIBUTION: WHITE – Stays with the Samples; CANARY – Returned to Client with Report; PINK – Field Copy

Cruz, Sheri

From: Samantha Leick <SLeick@ramboll.com>
Sent: Tuesday, July 17, 2018 2:00 PM
To: Cruz, Sheri
Cc: Devon M Rowe
Subject: Bottle order

Follow Up Flag: Follow up
Flag Status: Flagged

-External Email-

Hi Sheri,

I'm hoping to order some sample bottles for a project coming up in Tacoma. Our site is super close to your Tacoma location so I'm hoping to pick the bottles and a cooler up the morning of July 25th. We're going to be collecting 5 groundwater samples for the following analytes:

- Total hardness – USEPA SM2340C
- Total and dissolved metals – USEPA 200.8- arsenic, copper, lead, and zinc
- Total alkalinity, bicarbonate, and carbonate – USEPA SM2320B
- Total Chloride and sulfate – USEPA 300
- Total Calcium, magnesium, sodium, and potassium – USEPA 200

We'd like to report to the MDL. The PO number for this will be 1690006896-001 and you can include Devon and I on the project communication. Please let me know if you have any questions. I can be reached via cell: 262-358-0557.

Thanks!
Sam

Samantha Leick

Consultant 2
1692735 - Seattle

D +1 (360) 5977070
M +1 (262) 3580557
sleick@ramboll.com

Login Sample Receipt Checklist

Client: Ramboll US Corporation

Job Number: 580-79100-1

Login Number: 79100
List Number: 1
Creator: Hobbs, Kenneth F

List Source: TestAmerica Seattle

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	N/A	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

ATTACHMENT C

FIELD INSPECTION NOTES

Site Inspection Field Notes – 7/25/18

System Component	Notes/Actions Taken or Needed
1.0 - Signs	Signs are present + readable on perimeter fence.
1.1 - Fence	Perimeter fence is functional w/ locked gates. Gate in SW corner has been repaired + is functional.
1.2 - Gate	Gate + lock are functional.
1.3 - Manhole	Manhole is in place + functional.
2.0 - Open Ditches	There are no open ditches on site.
* 3.0 - Pipes and Culverts	No damage observed to pipes or vents, and they appear functional.*
* 3.1 - Pipes and Culverts	Vegetation is not obstructing flow to pipes.
* 3.2 - Pipes and Culverts	Protective coating is present on pipes. Coating wear noted in 2015, 2016, + 2017 visits: still present in similar condition
* 3.3 - Pipes and Culverts	No visible damage to vent pipes. No culverts present.
* 3.4 - Pipes and Culverts	All pipes + vents appear functional from perimeter vantage point.
* 3.5 - Pipes and Culverts	No misalignment of pipes or vents observed.
* 3.6 - Pipes and Culverts	No erosion or blockage of pipes + vents.
* 4.0 - Vegetative Cover	No lack of vegetation, as viewed from cell perimeter. Vegetation had been cleared since 2017 visit, but new growth has started.
* 4.1 - Vegetative Cover	No disturbance of earth (erosions, cracks, mounds) observed from cell perimeter.
* 4.2 - Vegetative Cover	Vegetation had been cleared since 2017. New vegetation growth since vegetation was cleared in December 2017 - dry at time of 2018 visit.
* 5.1 - Cover liner	Liner is not visible from cell perimeter due to rock covering + grass + vegetation on top of cell.
* 5.2 - Cover liner	No bulging observed from perimeter.

(*) Due to safety constraints, Ramboll was not able to walk on top of the cell. Observations were made from a ladder along the perimeter of the cell.

ATTACHMENT D

SITE PHOTOGRAPHS

Photo 1: Top of containment cell looking east from northwest corner, northwest cleanout boot is visible in the foreground.

Photo 2: Top of containment cell looking south from the northwest corner, northern gas boot is visible.

RAMBOLL	**Site Photographs** Cascade Timber #1 (“McFarland, WA”) 2502 Marine View Drive, Tacoma, Washington July 2018

Photo 3: Top of containment cell, view to the north from southwest corner, southern gas boot visible.

Photo 4: Top of containment cell, view to the north, southern and northern gas boots visible.

Photo 5: View to the east along the southern side of the containment cell. MCW-1 (standpipe in background) is visible.

Photo 6: Leachate collection sump (manhole).

RAMBOLL	**Site Photographs** Cascade Timber #1 (“McFarland, WA”) 2502 Marine View Drive, Tacoma, Washington July 2018

Photo 7: View to the north of the cell drain boot showing some aging on the paint coating.

Photo 8: View to north from southeast corner, vegetation partially blocking access..

Photo 9: Fence and gate along southwestern boundary.

Photo 10: View to the east from northwestern corner, MCW-3 visible in background (standpipe). Purge water containment drums on right side of photograph.

Photo 11: View to the north from eastern side of containment cell.

Photo 12: View to the south from northwest corner.