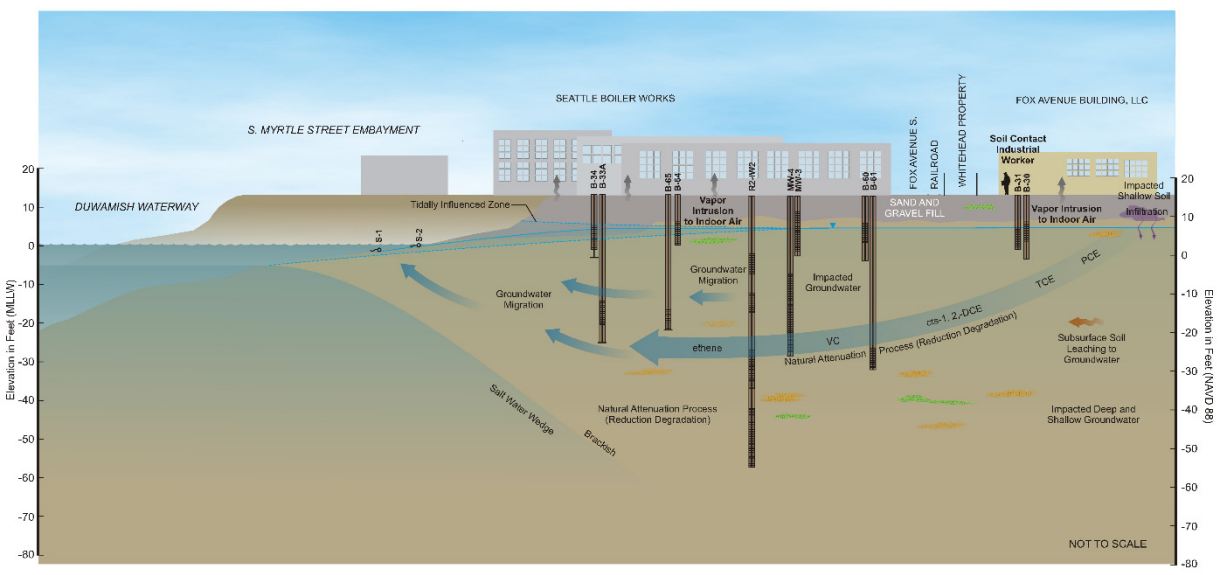
Fox Avenue Site
Seattle, Washington

2018 Annual Report



Prepared for

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LIMITATIONS

This report has been prepared for the exclusive use of the Fox Ave Trust*,* their authorized agents, and regulatory agencies. It has been prepared following the described methods and information available at the time of the work. No other party should use this report for any purpose other than that originally intended, unless Floyd|Snider agrees in advance to such reliance in writing. The information contained herein should not be utilized for any purpose or project except the one originally intended. Under no circumstances shall this document be altered, updated, or revised without written authorization of Floyd|Snider.

The interpretations and conclusions contained in this report are based in part on site characterization data collected by others. Floyd|Snider cannot assure the accuracy of this information.

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List of Acronyms and Abbreviations

Acronym/ Abbreviation	Definition
CALIBRE	CALIBRE Systems, Inc.
CAP	Cleanup Action Plan
CUL	Cleanup level
CVOC	Chlorinated volatile organic compound
DCE	Dichloroethene
Ecology	Washington State Department of Ecology
Loading Dock	Loading Dock Source Area
µg/L	Micrograms per liter
mg/kg	Milligrams per kilogram
NW Corner	Northwest Corner Area
PCE	Tetrachloroethene
RL	Remediation Level
Site	Fox Avenue Site
TCE	Trichloroethene
TOC	Total organic carbon
TPH	Total petroleum hydrocarbons
VOC	Volatile organic compound
WBZ	Water Bearing Zone

1.0 Introduction

1.1 PURPOSE OF REPORT

The purpose of this report, jointly prepared by Floyd|Snider and CALIBRE Systems, Inc. (CALIBRE) is to document the cleanup activities and monitoring implemented in 2018 at the Fox Avenue Site (the Site; Figure 1.1). The work described in this report was performed in accordance with Agreed Order No. 8985 between Fox Ave LLC and the Washington State Department of Ecology (Ecology; Ecology 2012). Per the Cleanup Action Plan (CAP) for the Site, bio-polishing is to be performed following thermal treatment of the chlorinated volatile organic compounds (CVOCs) until the groundwater remediation level (RL) is met. The Main Source Area was thermally treated, as well as the Loading Dock Source Area (Loading Dock). One source area, the Northwest Corner Area (NW Corner), was not thermally treated; instead, this area underwent soil vapor extraction. Thermal treatment occurred from January to May of 2013 and achieved its goal of reducing source area soil contaminant concentrations to the RL of an average of 10 milligrams per kilogram (mg/kg) or less of the sum of tetrachloroethene (PCE) and trichloroethene (TCE) concentrations. Following thermal treatment, aquifer temperatures in the Main Source Area were too high to implement bio-polishing until mid-2014, as summarized in the 2014 Annual Report (Floyd|Snider 2015).

1.2 GROUNDWATER PERFORMANCE CRITERIA FROM CLEANUP ACTION PLAN

At the Site, three environmental media were historically impacted from releases of solvents: soil, groundwater, and indoor air. RLs were established in the CAP for soil and groundwater that were technology-based.

The groundwater RL was set at a total CVOC concentration of 250 micrograms per liter (µg/L) as measured in wells located downgradient of Fox Avenue S., the conditional point of compliance for groundwater. Per the requirements of the CAP, the groundwater RL must be met within 10 years following the thermal remediation. Therefore, 2018 represents the fifth year toward this goal.

In addition to the RL for groundwater, cleanup levels (CULs) were established for the individual constituents found in groundwater. These CULs must be met at the seeps along the Myrtle Street Embayment within 15 years following thermal treatment (i.e., end of 2028). CULs must also be met throughout the plume upgradient of the seeps to the conditional point of compliance along Fox Avenue S. within 50 years (end of 2063). The site-wide CULs for groundwater, as documented in the CAP, are presented in Table 1.1.

The RLs for site soil were achieved in 2013 as documented in the *Construction Completion Report* (Floyd|Snider 2013). Documentation of the achievement of indoor air CULs, both on- and offsite, is contained in the *Construction Completion Report* as well.

Table 1.1
Site-Wide Cleanup Levels for Groundwater

Chemical of Concern	Seep or Groundwater Cleanup Level (µg/L)
Benzene	51
1,1-DCE	3.2
Pentachlorophenol	3.0
PCE	3.3
TCE	30
TPH (Mineral Spirits- to Heavy Oil-Range)	500
Vinyl Chloride	2.4

Abbreviations:
DCE Dichloroethene
TPH Total petroleum hydrocarbons

2.0 Remedial Actions Undertaken

Bio-polishing actions implemented in 2018 included injection of soluble substrate in selected wells and performance monitoring of CVOC concentrations in groundwater. The following sections summarize the work completed in 2018. All work was completed in accordance with previously submitted and approved project work plans.

2.1 PERFORMANCE MONITORING

Performance monitoring included the collection of site-wide groundwater samples in May 2018.

2.2 SUBSTRATE INJECTION

Substrate was injected in August 2018 and January 2019. Table 2.1 provides a summary of the substrate injections. The August 2018 substrate injection covered site-wide treatment including the source area, the former Whitehead property, the NW Corner, the Loading Dock, Seattle Boiler Works, and S. Myrtle Street. The January 2019 substrate injection focused on downgradient areas in Seattle Boiler Works and S. Myrtle Street.

Table 2.1
Substrate Injection Summary

Well ID	Area	Gallons Injected	Pounds of Substrate Injected
August 2018 Substrate Injections			
MW-07	Source Area and Whitehead	1,000	747
MW-09	Source Area and Whitehead	1,000	747
B-49	Source Area and Whitehead	1,000	747
R0-IW4S	Source Area and Whitehead	1,000	747
R0-IW8S	Source Area and Whitehead	1,000	747
R1-IW8	NW Corner	550	443
R1-IW10	NW Corner	550	443
R1-IW13	NW Corner	550	443
R1-IW14	NW Corner	550	443
R1-IW15	NW Corner	550	443
R1-IW16	Loading Dock	500	390
R2-IW1	Seattle Boiler Works	2,000	1,610
R2-IW2	Seattle Boiler Works	2,000	1,610
R2-IW3	S. Myrtle Street Cul-de-Sac	2,000	2,336
R2-IW4	S. Myrtle Street Cul-de-Sac	2,000	2,336

Well ID	Area	Gallons Injected	Pounds of Substrate Injected
R2-IW5	S. Myrtle Street Cul-de-Sac	2,000	2,336
R2-IW10	Seattle Boiler Works	2,000	1,610
R2-IW11	Seattle Boiler Works	2,000	1,610
January 2019 Substrate Injections			
R1-IW8	NW Corner	500	390
R1-IW10	NW Corner	500	390
R1-IW13	NW Corner	528	412
R1-IW14	NW Corner	505	394
R1-IW15	NW Corner	500	390
R2-IW1	Seattle Boiler Works	2,083	1,528
R2-IW2	Seattle Boiler Works	2,073	1,521
R2-IW10	Seattle Boiler Works	1,701	1,255
R2-IW11	Seattle Boiler Works	2,043	1,499
R2-IW3	S. Myrtle Street Cul-de-Sac	2,000	1,498
R2-IW4	S. Myrtle Street Cul-de-Sac	2,000	1,498
R2-IW5	S. Myrtle Street Cul-de-Sac	2,000	1,498
	Total	**38,683**	**32,061**

3.0 Groundwater Monitoring Data

3.1 SAMPLING PROCEDURES

Samples from selected wells were collected using low-flow sampling procedures in accordance with the project work plans. In addition, three seeps in the Myrtle Street Embayment were sampled for volatile organic compounds (VOCs) during a minus low tide on May 17, 2018. All samples were analyzed for the selected list of Site VOCs. Additional monitoring parameters were analyzed for in selected wells. These additional parameters included redox indicators such as total and dissolved iron, sulfate, sulfide, acetylene, methane, ethene, and ethane, as well as total organic carbon (TOC) as an indicator of substrate availability.

Samples were delivered under chain-of-custody to Fremont Analytical for analysis. All investigation-derived waste from sampling was containerized and managed in accordance with the project work plans.

3.2 SUMMARY OF DATA FROM GROUNDWATER SAMPLING

The 2018 VOC data are presented in Table 3.1 and other monitoring parameters are presented in Table 3.2.

3.3 QUALITY ASSURANCE REVIEW AND ENVIRONMENTAL INFORMATION MANAGEMENT LOADING

A basic quality assurance review was performed by Floyd|Snider on all of the analytical laboratory reports received. The reviews concluded that all of the laboratory data were deemed acceptable for use. All data were subsequently uploaded to Ecology's Environmental Information Management (EIM) database.

4.0 Groundwater Monitoring Data Discussion

Performance data collected in 2018 are discussed in this section by treatment area. The 2018 data includes 36 wells sampled from both Water Bearing Zones (WBZs) along with three seeps at the Myrtle Street Embayment. Overall the remediation is progressing as designed; the data indicate that only four wells contain total CVOC concentrations above the RL of 250 µg/L. Additionally, 18 wells and 1 seep have contaminant concentrations that are less than the CULs.

Figures 4.1 and 4.2 show the sum of the four key CVOCs (PCE, TCE, *cis*-1,2-DCE, and vinyl chloride) in the 1st and 2nd WBZ wells site-wide based on the most current data collected. The sum of the CVOCs is the specific performance criterion for comparison with the RL of 250 µg/L.

4.1 MAIN SOURCE AREA AND DOWNGRADIENT TO FOX AVENUE S.

Aquifer conditions for both the 1st and 2nd WBZs were evaluated by comparing groundwater data collected from injection and monitoring wells to post-thermal baseline data. Baseline data were collected prior to the July 2014 injection of substrate into the 2nd WBZ and the January 2015 injection into the 1st WBZ.

Data through May 2018 indicate effective bioremediation in the Main Source Area and Fox Avenue S. Total CVOC concentrations in Fox Avenue S. wells (i.e., B-18, B-19, B-20A, B-58, B-59, B-60, B-61, and B-63) are all less than the RL of 250 µg/L CVOCs. One 1st WBZ well in the Main Source Area (MW-18S) and one on the Whitehead property (MW-09) had total CVOC concentrations greater than the Site RL whereas all 2nd WBZ wells were at concentrations less than the RL.

Treatment was completed in the area of wells MW-18S and MW-09 by injection of substrate in wells R0-IW4S, R0-IW8S, B-49, MW-07, and MW-09 in the 1st WBZ in August 2018. The last prior substrate injection in this area was completed in March 2017.

4.2 NW CORNER

In the NW Corner, CVOCs are only found in 1st WBZ groundwater. Wells sampled in the 1st WBZ in 2018 showed CVOC concentrations close to and slightly greater than the RL. Monitoring wells NW1-1 and B-22, showed total CVOC concentrations of 387 µg/L and 194 µg/L, respectively. Parent products PCE and TCE remain at non-detect levels at NW1-1 indicating continued degradation is occurring. The total CVOC results from monitoring well B-22 have increased over the past year with appreciable parent residual concentration of PCE and TCE. Treatment by injection of additional substrate was completed around the area of NW1-1 and B-22 in August 2018 and January 2019.

4.3 DOWNGRADIENT OF FOX AVENUE

Wells downgradient of Fox Avenue are located either on the Seattle Boiler Works property or in S. Myrtle Street. Results from all six monitoring wells sampled in these areas show compliance

with the RL, as does one of the two injection wells that were sampled. However, results for injection well R2-IW1, located on Seattle Boiler Works, show total CVOC concentrations slightly greater than the RL. Similar to the NW Corner, focused additional substrate injection was completed in this area in August 2018 and January 2019 using wells R2-IW1, R2-IW2, R2-IW3, R2-IW4, R2-IW5, R2-IW10, and R2-IW11.

4.4 SEEPS

Vinyl chloride is the primary CVOC at each of the three embayments. That contaminant showed reductions in two of three seeps over the past year, with total CVOC concentrations ranging from non-detect to approximately 40 µg/L. The vinyl chloride concentrations in the seeps continue to show an overall decline over time (as shown in Table 4.1), with the exception of seep 3-3b, which increased from 2017 concentrations but is still on an overall downward trend. 2018 represents the first year that one of the three seeps, S-2, had no reported detections of any CVOCs. Two additional substrate injection events have been completed of this area since the last monitoring of the seeps (treatment in the areas of Seattle Boiler Works and S. Myrtle Street).

Table 4.1
Post-Thermal Vinyl Chloride Concentrations in the Seeps

Seep	2014 (µg/L)	2015 (µg/L)	2016 (µg/L)	2017 (µg/L)	2018 (µg/L)
S-2	ND	30.9	7.4	4.4	ND
S-3	372	7.5	27.1	13.3	11.7
S-3b	136	72.8	46.4	10.9	39.8
S-4	ND	ND	ND	NS	NS

Abbreviations:
ND Non-detect
NS Not sampled

5.0 Recommendations

Recommendations for 2019 are as follows:

1. Perform the annual site-wide groundwater monitoring event in Spring 2019.
2. Reduce the wells sampled in the 2nd WBZ of the Main Source Area due to the low and stable concentrations observed in this area since 2014. Refer to Table 5.1 for a list of recommend wells to be sampling in 2019.
3. Reduce monitoring at other areas of the Site that are below or near the CULs (refer to Table 5.1).
4. Target any additional treatment needed in Summer 2019 after review of the Spring data.

6.0 References

Floyd|Snider. 2013. *Construction Completion Report*. Fox Avenue Site, Seattle, Washington. Prepared for Fox Avenue Building LLC, Seattle, Washington. 3 October.

_____. 2015. *2014 Annual Report, Fox Avenue Site, Seattle, Washington*. Prepared for Fox Avenue Building LLC, Seattle, Washington.

Washington State Department of Ecology (Ecology). 2012. *Agreed Order No. DE 8985 in the Matter of Remedial Action by Fox Avenue Building, LLC*. 18 June.

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Tables

Table 3.1
Summary of Volatile Organic Compound Data in Groundwater

				Non-Chlorinated Volatile Organic Compounds								
			Analyte	Acetone	Benzene	EB	MEK	Naphthalene	Toluene	1,2,4-TMBZ	Xylene	Xylene (ortho)
			Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Location	Sample ID	WBZ	Sample Date									
Monitoring Wells												
Main Source Area												
MW-15D	MW-15D-052418	2nd	05/24/2018	72.1	1 U	1.33	63.5	1 U	2.04	9	1.71	1 U
MW-16D	MW-16D-052418	2nd	05/24/2018	5 U	1 U	1 U	5 U	1 U	1 U	19.6	1 U	1 U
MW-17D	MW-17D-052418	2nd	05/24/2018	5 U	5.87	2.01	5 U	1 U	6.4	1 U	1.71	1 U
MW-18S	MW-18S-052318	1st	05/23/2018	5 U	1 U	1 U	5 U	1 U	1.36	1.54	4.54	4.41
Whitehead												
B-45	B-45-052318	2nd	05/23/2018	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U
B-49	B-49-052318	1st	05/23/2018	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U
MW-07	MW-7-052318	1st	05/23/2018	5 U	1 U	1 U	57.7	1 U	1 U	1 U	1 U	1 U
MW-08	MW-8-052318	2nd	05/23/2018	5 U	1 U	1 U	5 U	1 U	1.38	1 U	1 U	1 U
MW-09	MW-9-052318	1st	05/23/2018	5 U	1 U	1 U	46.7	1 U	1 U	1 U	1 U	1 U
MW-10	MW-10-052318	2nd	05/23/2018	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U
	Dup-1-052318	2nd	05/23/2018	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U
Fox Avenue												
B-18	B-18-051718	1st	05/17/2018	5 U	1.39	1 U	5 U	1 U	1 U	1 U	1 U	1 U
B-19	B-19-051718	2nd	05/17/2018	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U
B-20A	B-20a-051818	1st	05/18/2018	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U
B-58	B-58-051718	1st	05/17/2018	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U
B-59	B-59-051718	2nd	05/17/2018	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U
B-60	B-60-051718	1st	05/17/2018	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U
B-61	B-61-051718	2nd	05/17/2018	5 U	1.59	1 U	5 U	1 U	1 U	1 U	1 U	1 U
B-63	B-63-051718	2nd	05/17/2018	5 U	3.73	1 U	5 U	1 U	1 U	1 U	1 U	1 U
NW Corner												
B-22	B-22-051818	1st	05/18/2018	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U
	DUP02-051818	1st	05/18/2018	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U
NW 1-1	NW1-1-051718	1st	05/17/2018	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U
Myrtle Street												
B-33A	B-33a-051718	2nd	05/17/2018	5 U	9.77	1 U	5 U	1 U	1 U	1 U	1 U	1 U
B-35	B-35-051818	2nd	05/18/2018	5 U	2.51	1.55	5 U	1 U	1 U	1 U	1 U	1 U
B-64	B-64-051718	1st	05/17/2018	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U
B-65	B-65-051718	2nd	05/17/2018	5 U	2.2	1 U	5 U	1 U	1 U	1 U	1 U	1.14
Seattle Boiler Works												
MW-05	MW-5-051718	1st	05/17/2018	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U
MW-06	MW-6-051718	2nd	05/17/2018	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U
Injection Wells												
Fox Avenue												
R1-IW4A	R1-IW4a-11-051818	1st	05/18/2018	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U
R1-IW4B	R1-IW4b-50-051818	2nd	05/18/2018	5 U	1 U	1.98	5 U	1 U	1 U	1 U	1 U	1 U
R1-IW7	R1-IW7-41-051818	2nd	05/18/2018	5 U	1 U	1.63	5 U	1 U	1 U	1 U	1 U	1 U
R1-IW17	R1-IW17-12-051818	1st	05/18/2018	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U
	R1-IW17-55-051818	2nd	05/18/2018	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U
Main Source Area												
R0-IW2D	R0-IW02D-052418	2nd	05/24/2018	175	1 U	1 U	284	1 U	1 U	1 U	1 U	1 U
R0-IW6D	R0-IW06D-052418	2nd	05/24/2018	687	1 U	1 U	200	1 U	1 U	1 U	1 U	1 U
R0-IW9S	R0-IW09S-052418	1st	05/24/2018	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U
NW Corner												
R1-IW15	R1-IW15-55-051818	2nd	05/18/2018	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U

Table 3.1
Summary of Volatile Organic Compound Data in Groundwater

				Non-Chlorinated Volatile Organic Compounds								
			Analyte	Acetone	Benzene	EB	MEK	Naphthalene	Toluene	1,2,4-TMBZ	Xylene	Xylene (ortho)
			Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Location	**Sample ID**	**WBZ**	**Sample Date**									
Seattle Boiler Works												
R2-IW1	R2-IW1-17-051718	1st	05/17/2018	5 U	1.29	1 U	591	1 U	184	1 U	1 U	1 U
	R2-IW1-45-051718	2nd	05/17/2018	5 U	1.43	1 U	599	1 U	190	1 U	1 U	1 U
	DUP01-051718	2nd	05/17/2018	5 U	1.49	1 U	638	1 U	197	1 U	1 U	1 U
R2-IW8	R2-IW8-63-051718	2nd	05/17/2018	5 U	1.17	4.47	5 U	1 U	1 U	1 U	1 U	1 U
Seep Data												
S-2	SP-02-051718		05/17/2018	5 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U
S-13 (Calibre S-3)	SP-03-051718		05/17/2018	5 U	7.34	3.66	5 U	4.88	1 U	1 U	1 U	1 U
S-3b	SP-03B-051718		05/17/2018	5 U	1.27	1 U	5 U	1 U	1 U	1 U	1 U	1 U

Note:

Blank cells indicate analyte was not analyzed for the sample.

Abbreviations:

CVOC Chlorinated volatile organic compound
DCA Dichloroethane
DCE Dichloroethene
EB Ethylbenzene
MEK Methyl ethyl ketone
µg/L Micrograms per liter
PCE Tetrachloroethene
TCE Trichloroethene
TMBZ Trimethylbenzene
VC Vinyl chloride
WBZ Water bearing zone

Qualifiers:

U Analyte is not detected at the associated reporting limit.

Table 3.1
Summary of Volatile Organic Compound Data in Groundwater

				Chlorinated Volatile Organic Compounds							
			Analyte	1,1-DCA	1,1-DCE	cis-1,2-DCE	PCE	trans-1,2-DCE	TCE	VC	Total CVOCs
			Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Location	**Sample ID**	**WBZ**	**Sample Date**								
Monitoring Wells											
Main Source Area											
MW-15D	MW-15D-052418	2nd	05/24/2018	1 U	1 U	1 U	1 U	1 U	0.5 U	0.2 U	1 U
MW-16D	MW-16D-052418	2nd	05/24/2018	1 U	1 U	6.7	3.76	1 U	0.796	11.2	22.5
MW-17D	MW-17D-052418	2nd	05/24/2018	1 U	1 U	1 U	1 U	1 U	0.5 U	0.2 U	1 U
MW-18S	MW-18S-052318	1st	05/23/2018	5.74	1 U	347	37.4	3.3	16.9	373	783
Whitehead											
B-45	B-45-052318	2nd	05/23/2018	1 U	1 U	1 U	1 U	1 U	0.5 U	0.2 U	1 U
B-49	B-49-052318	1st	05/23/2018	1 U	1 U	32.3	1.36	1 U	1.83	48.9	84.4
MW-07	MW-7-052318	1st	05/23/2018	1 U	1 U	55.5	1 U	1 U	5.05	0.2 U	60.6
MW-08	MW-8-052318	2nd	05/23/2018	1 U	1 U	15.6	1 U	1.32	0.5 U	0.2 U	16.9
MW-09	MW-9-052318	1st	05/23/2018	1 U	1 U	436	1 U	4.18	0.5 U	180	620
MW-10	MW-10-052318	2nd	05/23/2018	1 U	1 U	1.6	1 U	1 U	0.5 U	0.2 U	1.6
	Dup-1-052318	2nd	05/23/2018	1 U	1 U	1.6	1 U	1 U	0.5 U	0.2 U	1.6
Fox Avenue											
B-18	B-18-051718	1st	05/17/2018	1 U	1 U	1 U	1 U	1 U	0.5 U	4.27	4.27
B-19	B-19-051718	2nd	05/17/2018	1 U	1 U	18.9	1 U	1 U	0.5 U	10.3	29.2
B-20A	B-20a-051818	1st	05/18/2018	1 U	1 U	13.4	1 U	1 U	0.5 U	14.1	27.5
B-58	B-58-051718	1st	05/17/2018	1 U	1 U	30.6	1 U	1 U	0.5 U	57.8	88.4
B-59	B-59-051718	2nd	05/17/2018	1 U	1 U	1 U	1 U	1 U	0.5 U	9.04	9.04
B-60	B-60-051718	1st	05/17/2018	1 U	1 U	1 U	1 U	1 U	0.5 U	9.46	9.46
B-61	B-61-051718	2nd	05/17/2018	1 U	1 U	1 U	1 U	1 U	0.5 U	0.2 U	1 U
B-63	B-63-051718	2nd	05/17/2018	1.97	1 U	1 U	1 U	1 U	0.5 U	1.54	3.51
NW Corner											
B-22	B-22-051818	1st	05/18/2018	1 U	1 U	60.2	99.7	1.16	29.5	3.66	194
	DUP02-051818	1st	05/18/2018	1 U	1 U	88.9	56.6	1.11	28.6	3.52	179
NW 1-1	NW1-1-051718	1st	05/17/2018	1 U	1 U	324	1 U	1 U	0.5 U	63.1	387
Myrtle Street											
B-33A	B-33a-051718	2nd	05/17/2018	4.24	1 U	1 U	1 U	1 U	0.5 U	5.13	9.37
B-35	B-35-051818	2nd	05/18/2018	1 U	1 U	1 U	1 U	1 U	0.5 U	2.6	2.6
B-64	B-64-051718	1st	05/17/2018	1 U	1 U	6.5	1 U	1 U	0.5 U	4.82	11.3
B-65	B-65-051718	2nd	05/17/2018	3.68	1 U	1 U	1 U	1 U	0.5 U	0.2 U	3.68
Seattle Boiler Works											
MW-05	MW-5-051718	1st	05/17/2018	1 U	1 U	1 U	3.3	1 U	0.583	0.2 U	3.88
MW-06	MW-6-051718	2nd	05/17/2018	1 U	1 U	36.9	25.9	1 U	15.8	0.2 U	78.6
Injection Wells											
Fox Avenue											
R1-IW4A	R1-IW4a-11-051818	1st	05/18/2018	1 U	1 U	2.03	1 U	1 U	1.73	8.45	12.2
R1-IW4B	R1-IW4b-50-051818	2nd	05/18/2018	1 U	1 U	1 U	1 U	1 U	0.5 U	0.2 U	1 U
R1-IW7	R1-IW7-41-051818	2nd	05/18/2018	1 U	1 U	1 U	1 U	1 U	0.5 U	0.2 U	1 U
R1-IW17	R1-IW17-12-051818	1st	05/18/2018	1 U	1 U	1 U	1 U	1 U	0.5 U	0.2 U	1 U
	R1-IW17-55-051818	2nd	05/18/2018	1 U	1 U	1 U	1 U	1 U	0.5 U	0.2 U	1 U
Main Source Area											
R0-IW2D	R0-IW02D-052418	2nd	05/24/2018	1 U	1 U	47.9	1 U	1 U	2.18	0.2 U	50.1
R0-IW6D	R0-IW06D-052418	2nd	05/24/2018	1 U	1 U	27.7	1 U	1 U	2.81	0.2 U	30.5
R0-IW9S	R0-IW09S-052418	1st	05/24/2018	1 U	1 U	1 U	1 U	1 U	0.5 U	0.2 U	1 U
NW Corner											
R1-IW15	R1-IW15-55-051818	2nd	05/18/2018	1 U	1 U	1.12	1 U	1 U	0.5 U	0.2 U	1.12

Table 3.1
Summary of Volatile Organic Compound Data in Groundwater

				Chlorinated Volatile Organic Compounds							
			Analyte	1,1-DCA	1,1-DCE	cis-1,2-DCE	PCE	trans-1,2-DCE	TCE	VC	Total CVOCs
			Unit	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L	µg/L
Location	**Sample ID**	**WBZ**	**Sample Date**								
Seattle Boiler Works											
R2-IW1	R2-IW1-17-051718	1st	05/17/2018	1 U	1 U	87.6	1 U	1 U	0.5 U	149	237
	R2-IW1-45-051718	2nd	05/17/2018	1 U	1 U	102	1 U	1 U	0.5 U	233	335
	DUP01-051718	2nd	05/17/2018	1 U	1 U	105	1 U	1 U	0.5 U	244	349
R2-IW8	R2-IW8-63-051718	2nd	05/17/2018	1 U	1 U	1 U	1 U	1 U	0.5 U	0.2 U	1 U
Seep Data											
S-2	SP-02-051718		05/17/2018	1 U	1 U	1 U	1 U	1 U	0.5 U	0.2 U	1 U
S-13 (Calibre S-3)	SP-03-051718		05/17/2018	2.14	1 U	9.62	1 U	1 U	0.717	11.7	24.2
S-3b	SP-03B-051718		05/17/2018	1 U	1 U	69.5	1 U	1.46	1.1	39.8	112

Note:

Blank cells indicate analyte was not analyzed for the sample.

Abbreviations:

CVOC Chlorinated volatile organic compound
DCA Dichloroethane
DCE Dichloroethene
EB Ethylbenzene
MEK Methyl ethyl ketone
µg/L Micrograms per liter
PCE Tetrachloroethene
TCE Trichloroethene
TMBZ Trimethylbenzene
VC Vinyl chloride
WBZ Water bearing zone

Qualifiers:

U Analyte is not detected at the associated reporting limit.

Table 3.2
Summary of Performance Parameters in Groundwater

				Conventionals			Dissolved Gases		
			Analyte	Total Organic Carbon	Sulfate	Sulfide	Ethane	Ethene	Methane
			Unit	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L
Location	Sample ID	WBZ	Sample Date						
Monitoring Wells									
Main Source Area									
MW-15D	MW-15D-052418	2nd	05/24/2018	69.7	54	4.8	1.62 U	1.51 U	3.08
MW-16D	MW-16D-052418	2nd	05/24/2018	92.9	1.29	0.6	1.62 U	0.0151 UJ	6.01
MW-17D	MW-17D-052418	2nd	05/24/2018	256	0.684	0.5 U	1.62 U	0.0151 UJ	5.04 J
MW-18S	MW-18S-052318	1st	05/23/2018	242	135	1.4	1.62 U	1.51 U	1.71
Whitehead									
B-45	B-45-052318	2nd	05/23/2018	148	4.21	0.5 U	0.44 JQ	1.51 U	4.43
B-49	B-49-052318	1st	05/23/2018	48.4	13.2	0.5 U	0.0809 U	0.0757 U	1.35
MW-07	MW-7-052318	1st	05/23/2018	101	88.4	2.2	0.809 U	0.757 U	2.62
MW-08	MW-8-052318	2nd	05/23/2018	51.9	42	2.4	0.0809 U	0.0757 U	0.606
MW-09	MW-9-052318	1st	05/23/2018	93	43.6	0.5 U	0.324 U	0.303 U	1.13
MW-10	MW-10-052318	2nd	05/23/2018	41.9	65	0.6	0.809 U	0.757 U	2.34
	Dup-1-052318	2nd	05/23/2018	50.1	63.8	0.8	1.62 U	1.51 U	4.48
Fox Avenue									
B-58	B-58-051718	1st	05/17/2018		114				
B-59	B-59-051718	1st	05/17/2018		12.4				
Injection Wells									
Main Source Area									
R0-IW2D	R0-IW02D-052418	2nd	05/24/2018	1110	2.9	1.6	0.809 U	0.757 U	1.77
R0-IW6D	R0-IW06D-052418	2nd	05/24/2018	1420	267	2.4	0.809 U		2.26
R0-IW9S	R0-IW09S-052418	1st	05/24/2018	234	2.79	1.6	0.809 U	0.0151 UJ	1.02
Fox Ave Compliance									
R1-IW4A	R1-IW4a-11-051818	1st	05/18/2018	7.25					
R1-IW4B	R1-IW4b-50-051818	2nd	05/18/2018	7.88					
NW Corner									
R1-IW15	R1-IW15-55-051818	2nd	05/18/2018	5.22					
Seattle Boiler Works									
R2-IW1	R2-IW1-17-051718	1st	05/17/2018	117					
	R2-IW1-45-051718	2nd	05/17/2018	155					

Note:

Blank cells indicate analyte was not analyzed for the sample.

Abbreviations:

µg/L Micrograms per liter
mg/L Milligrams per liter
WBZ Water bearing zone

Qualifiers:

J Analyte is detected, concentration is estimated.
JQ Analyte is detected between the method detection limit and method reporting limit, the concentration is estimated.
U Analyte is not detected at the associated reporting limit.
UJ Analyte is not detected at the associated reporting limit, which is estimated.

Table 5.1
Spring 2019 Proposed Sampling List

Location	WBZ	Total CVOCs in 2018 (µg/L)	Sample 2019 (Y/N)	Proposed Analytes	
				VOCs	TOC
Monitoring Wells					
Main Source Area					
MW-15D	2nd	1 U	*No*		
MW-16D	2nd	22.5	*No*		
MW-17D	2nd	1 U	*No*		
MW-18S	1st	783	**Yes**	X	
Whitehead					
B-45	2nd	1 U	*No*		
B-49	1st	84.4	**Yes**	X	
MW-07	1st	60.6	**Yes**	X	
MW-08	2nd	16.9	*No*		
MW-09	1st	620	**Yes**	X	X
MW-10	2nd	1.6	*No*		
	2nd	1.6			
Fox Avenue					
B-18	1st	4.27	*No*		
B-19	2nd	29.2	**Yes**	X	
B-20A	1st	27.5	**Yes**	X	
B-58	1st	88.4	**Yes**	X	
B-59	2nd	9.04	*No*		
B-60	1st	9.46	*No*		
B-61	2nd	1 U	*No*		
B-63	2nd	3.51	*No*		
NW Corner					
B-22	1st	194	**Yes**	X	
	1st	179			
NW 1-1	1st	387	**Yes**	X	
Myrtle Street					
B-33A	2nd	9.37	**Yes**	X	
B-35	2nd	2.6	**Yes**	X	
B-64	1st	11.3	**Yes**	X	
B-65	2nd	3.68	*No*		
Seattle Boiler Works					
MW-05	1st	3.88	*No*		
MW-06	2nd	78.6	**Yes**	X	
Injection Wells					
Fox Avenue					
R1-IW4A	1st	12.2	**Yes**	X	X
R1-IW4B	2nd	1 U	*No*		
R1-IW7	2nd	1 U	*No*		
R1-IW17	1st	1 U	*No*		
	2nd	1 U	*No*		
Main Source Area					
R0-IW2D	2nd	50.1	**Yes**	X	X
R0-IW6D	2nd	30.5	*No*		
R0-IW9S	1st	1 U	*No*		
NW Corner					
R1-IW15	2nd	1.12	*No*		
Seattle Boiler Works					
R2-IW1	1st	237	**Yes**	X	X
	2nd	335	**Yes**	X	X
	2nd	349			
R2-IW8	2nd	1 U	*No*		
Seep Data					
S-2		1 U	*No*		
S-13 (Calibre S-3)		24.2	**Yes**	X	
S-3b		112	**Yes**	X	

Note:

Blank cells indicate analyte was not analyzed for the sample.

Abbreviations:

CVOC Chlorinated volatile organic compound
TOC Total organic carbon
VOC Volatile organic compound
WBZ Water bearing zone

Qualifier:

U Analyte is not detected at the associated reporting limit.

Fox Avenue Site
Seattle, Washington

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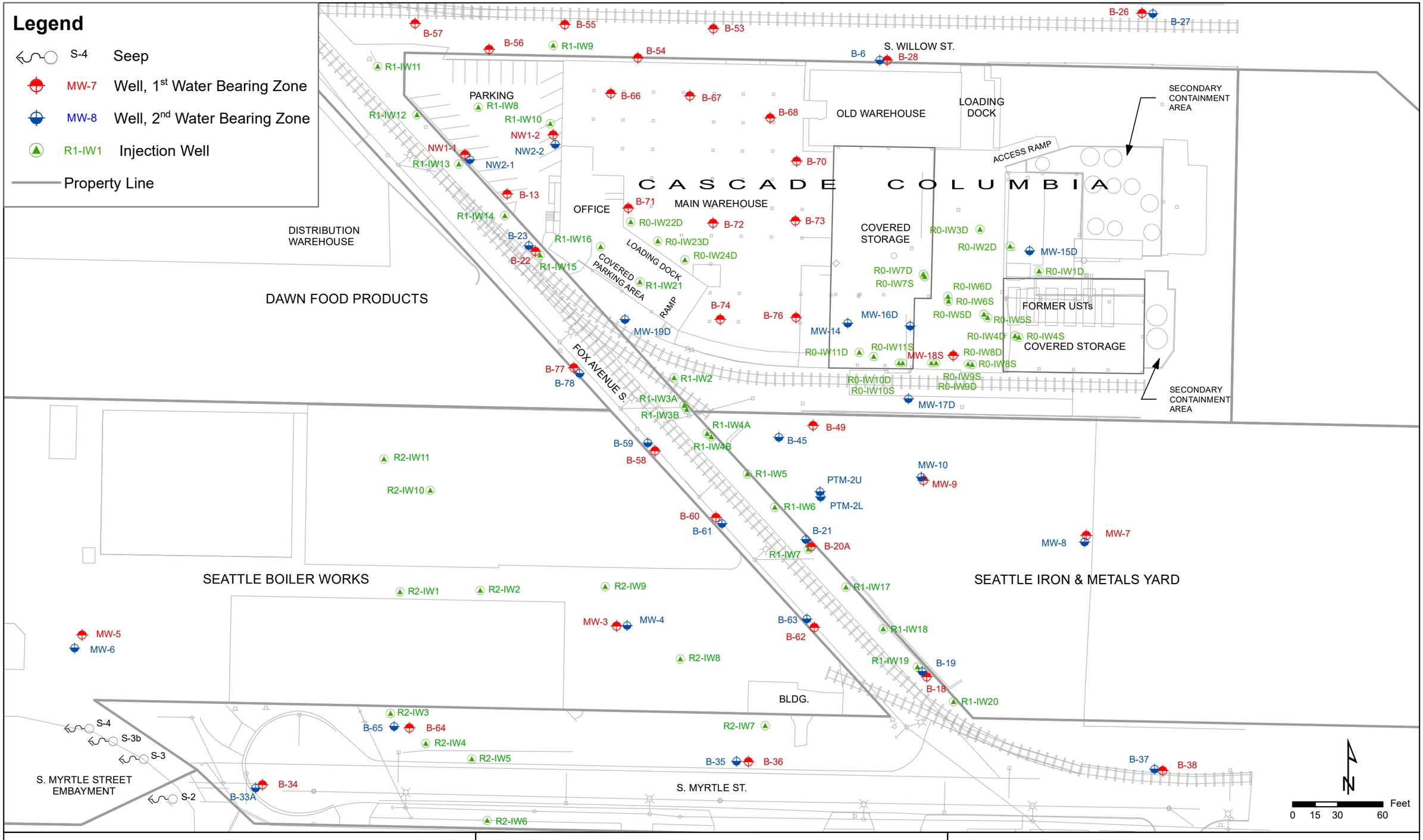
Figures



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Fox Avenue Site
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Figure 1.1
Site Plan

I:\GIS\Projects\FOXAVE-RA\MXD\2018 Annual Report\Figure 1.1 Site Plan.mxd
2/15/2019

Legend
Total CVOCs (µg/L)

- 0–1
- 1–10
- 10–100
- 100–1,000

Notes:
- Thermal treatment period from January–May 2013.
- Total CVOCs include tetrachlorethene (PCE), trichloroethene (TCE), vinyl chloride (VC), and cis-1,2-dichloroethene (cis-DCE).
- Data shown are from the May 2018 sampling event.

Abbreviations:
- CVOC = Chlorinated volatile organic compound
- µg/L = Micrograms per liter
- UST = Underground Storage Tank

Qualifier:
- U = The analyte was not detected greater than or equal to the concentration reported.

N

0 50 100

Scale in Feet

S. WILLOW ST.

PARKING

NW 1-1
387

OLD WAREHOUSE

LOADING DOCK

SECONDARY CONTAINMENT AREA

ACCESS RAMP

C A S C A D E C O L U M B I A

OFFICE

MAIN WAREHOUSE

DISTRIBUTION WAREHOUSE

B-22
193

COVERED STORAGE

LOADING DOCK

COVERED PARKING AREA

RAMP

DAWN FOOD PRODUCTS

FORMER USTs

COVERED STORAGE

R0-IW9S
1.00 U

MW-18S
774

FOX AVENUE S.

SECONDARY CONTAINMENT AREA

B-49
84.4

R1-IW4A
12.2

B-58
88.4

MW-09
616

B-60
9.46

B-20A
27.5

MW-07
60.6

R1-IW17
1.00 U

SEATTLE BOILER WORKS

R2-IW1
237

SEATTLE IRON & METALS YARD

MW-05
3.88

B-18
4.27

BLDG.

B-64
11.3

S. MYRTLE STREET EMBAYMENT

S. MYRTLE ST.

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Figure 4.1
Total CVOCs Concentrations in Groundwater
1st Water Bearing Zone
May 2018

File: I:\GIS\Projects\FOXAVE-RA\MXD\2018 Annual Report\Figure 4.1 Total CVOCs WBZ1.mxd
Date: 2/26/2019

Legend
Total CVOCs (µg/L)

- 0–1
- 1–10
- 10–100
- 100–1,000

Notes:
- Thermal treatment period from January–May 2013.
- Total CVOCs include tetrachlorethene (PCE), trichloroethene (TCE), vinyl chloride (VC), and cis-1,2-dichloroethene (cis-DCE).
- Data shown are from the May 2018 sampling event.

Abbreviations:
- CVOC = Chlorinated volatile organic compound
- µg/L = Micrograms per liter
- UST = Underground Storage Tank

Qualifier:
- U = The analyte was not detected greater than or equal to the concentration reported.

N

0 50 100

Scale in Feet

S. WILLOW ST.

PARKING

OLD WAREHOUSE

LOADING DOCK

SECONDARY CONTAINMENT AREA

ACCESS RAMP

C A S C A D E C O L U M B I A

OFFICE

MAIN WAREHOUSE

DISTRIBUTION WAREHOUSE

COVERED STORAGE

R0-IW2D *50.1*

MW-15D *1.00 U*

R1-IW15 *1.12*

LOADING DOCK

COVERED PARKING AREA

RAMP

R0-IW6D *30.5*

DAWN FOOD PRODUCTS

MW-16D *22.5*

FORMER USTs

COVERED STORAGE

FOX AVENUE S.

MW-17D *1.00 U*

SECONDARY CONTAINMENT AREA

B-59 *9.04*

R1-IW4B *1.00 U*

B-45 *1.00 U*

MW-10 *1.60*

B-61 *1.00 U*

R1-IW7 *1.00 U*

MW-08 *15.6*

R1-IW17 *1.00 U*

SEATTLE BOILER WORKS

R2-IW1 *335*

SEATTLE IRON & METALS YARD

B-63 *1.54*

MW-06 *78.6*

R2-IW8 *1.00 U*

B-19 *29.2*

BLDG.

B-65 *1.00 U*

B-35 *2.60*

S. MYRTLE STREET EMBAYMENT

B-33A *5.13*

S. MYRTLE ST.

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Figure 4.2
Total CVOCs Concentrations in Groundwater
2nd Water Bearing Zone
May 2018

File: I:\GIS\Projects\FOXAVE-RA\MXD\2018 Annual Report\Figure 4.2 Total CVOCs WBZ2.mxd
Date: 2/26/2019