SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

ALASKA
CALIFORNIA
COLORADO
FLORIDA
MISSOURI
OREGON
WASHINGTON
WISCONSIN

TRANSMITTAL

TO	Mr. Ned Dunn	DATE	4/19/17
COMPANY	Seattle Center Redevelopment	PHONE	206-684-7212
ADDRESS	305 Harrison Street, Suite 109 Seattle, WA 98103	FAX	206-386-9019
		JOB NO.	21-1-12176-046
PROJECT	**SEATTLE CENTER LOT NO. 2 FINAL QUARTER TWENTY-FIVE MONITORING REPORT**		

THE FOLLOWING ITEMS ARE TRANSMITTED:

DATE	NO. COPIES	DESCRIPTION
APRIL 2017	1	Final Quarter Twenty-Five Groundwater and Remediation System Monitoring Report for the Seattle Center Lot No. 2.

☐ Per your request ☐ For your approval ☐ For your information ☒ For your files
☐ For your review ☐ For your action ☐ Return with comments ☐ Other

Comments:

Hello Ned,

Enclosed with this transmittal letter is the final Twenty-Five Quarter Groundwater and Remediation System Monitoring Report for Seattle Center Lot No. 2 for your review. Your comments, as discussed in our phone conversation that occurred April 18, 2017 have been incorporated.

If you have any questions or require anything further, please don't hesitate to contact me at 206-695-6704.

Regards,

-Ed

By: Edwin V. Ptak c: Scott Gaulke, PE

Title: Environmental Scientist Vice President

November 2016 to February 2017 Q25
Phase II Groundwater Monitoring
Seattle Center Lot Number 2
Seattle, Washington

April 18, 2017

SHANNON & WILSON, INC.

GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Excellence. Innovation. Service. Value.

Since 1954.

Submitted To:
Seattle Center Redevelopment
Attn: Mr. Ned Dunn
305 Harrison Street, Suite 109
Seattle, Washington 98103

By:
Shannon & Wilson, Inc.
400 N 34th Street, Suite 100
Seattle, Washington 98103

21-1-12176-046

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

April 19, 2017

Seattle Center Redevelopment
305 Harrison Street, Suite 109
Seattle, WA 98109

Attn: Mr. Ned Dunn

RE: NOVEMBER 2016 TO FEBRUARY 2017 (25TH QUARTER) PHASE II GROUNDWATER AND REMEDIATION SYSTEM MONITORING, SEATTLE CENTER LOT NUMBER 2, SEATTLE, WASHINGTON

This letter report summarizes the status of Phase II groundwater monitoring activities at the Seattle Center Lot Number 2 property (Site). Remediation of gasoline-contaminated groundwater at the site through the use of an active in situ treatment system was conducted by the City of Seattle in conjunction with redevelopment of the property by IRIS Holdings, LLC, a wholly owned entity of the Bill & Melinda Gates Foundation. The goal of the remediation was to remove gasoline-range total petroleum hydrocarbons (TPH-G) in groundwater and meet cleanup levels in groundwater at a conditional point of compliance. Monitoring activities consisted of quarterly groundwater sampling. The groundwater remediation system was turned off in March 2016 in accordance with our discussion during our March 14, 2016, meeting. The system was turned off to determine if remediation of the source areas was completed or if rebound would occur and to evaluate if monitored natural attenuation (MNA) of the remaining contamination was sufficient to be the final groundwater treatment method. This letter report presents groundwater monitoring results from February 2017, the 25th quarter of Phase II operation and the fourth monitoring event to be conducted during the rebound test and MNA evaluation.

BACKGROUND

Previous environmental studies have identified gasoline- and benzene-impacted groundwater that originates primarily from two hot spot areas: a former fueling area in the north-central portion of the property and a former gasoline underground storage tank location in the central portion of the Site. Baseline sampling data was used to estimate lateral extent of groundwater impacted with benzene (February 2008), as shown in Figure 1. In general, groundwater flow direction is to the south-southwest (Figure 3).

400 NORTH 34TH STREET, SUITE 100
P.O. BOX 300303
SEATTLE, WASHINGTON 98103-8636
206-632-8020 FAX: 206-695-6777
www.shannonwilson.com

To facilitate cleanup of gasoline- and benzene-contaminated groundwater at the Site, a two-phase remediation plan was developed.[1] Each phase consisted of a system of soil vapor extraction (SVE) and air sparging (AS) wells. Phase I was installed in 2006 to 2007 and operated from June 2007 to June 2008. Phase I was discontinued when redevelopment activities required removal of the equipment. Phase I operated for approximately 8,870 hours.

Phase II of the remediation included reinstalling the AS/SVE system after the current property was completed. The reinstalled system commenced operation in November 2010. Phase II was completed in March 2016 following an analysis of groundwater data that indicated decreasing trends in concentrations of contaminants in source area wells and an absence of contaminants in point of compliance wells. Based on an evaluation of the groundwater data, the remediation system was shut off on March 15, 2016, to conduct a rebound test. Additional analyses were added to the monitoring program to assist with the evaluation of the feasibility of MNA as a final treatment method. Results of the groundwater monitoring for the rebound test and the evaluation of the feasibility of MNA as a final treatment method are discussed below.

GROUNDWATER MONITORING

In accordance with our discussion during our March 14, 2016, meeting, the SVE/AS system was shut off to initiate a rebound test. Groundwater monitoring for the 25th round of quarterly sampling was conducted to analyze for the contaminants of concern, evaluate the effects (if any) of the rebound test, and evaluate the feasibility of MNA as a final groundwater treatment method.

Groundwater sampling was conducted on February 22, 23, and 24, 2017. Sampled wells included compliance wells SW-26 and SW-27, and wells SVE-13, SVE-16, SVE-17, SVE-19, SVE-20, SVE-23, SVE-24, SVE-25, and SVE-26. Compliance well SW-25 was not sampled in February 2017 due to a change in site conditions. Safe access to the well was not possible due to the installation of a fence at the top of a retaining wall. The Bill & Melinda Gates Foundation will install a gate allowing for safe access in advance of the May 2017 sampling event. Prior to sampling, approximately 1 to 2.5 gallons of groundwater were purged from each well until water quality parameters stabilized. Each monitoring well was sampled using low-flow techniques,

[1] Shannon & Wilson, Inc., 2009, Groundwater remediation plan, Phase II remediation design, Seattle Center lot no. 2, Seattle, Washington: Report prepared by Shannon & Wilson, Inc., Seattle, Wash., and Aspect Consulting LLC, Seattle, Wash., 21-1-12176-018, for Seattle Center Redevelopment, Seattle, Wash., June 11.

except SVE-13. Groundwater sampling from well SVE-13 was conducted using a disposable high-density polyethylene bailer due to a malfunction of the dedicated submersible pump. Consequently, water quality parameters could not be collected for this location. Groundwater samples were collected from the well once three well volumes had been removed.

The collected samples were transported under chain-of-custody protocols to OnSite Environmental, Inc. in Redmond, Washington, to analyze for Northwest TPH-G and benzene, toluene, ethylbenzene, and xylenes by U.S. Environmental Protection Agency (EPA) Method 8021. Additional parameters were added to the monitoring program as recommended in the Guidance for Petroleum Contaminated Ground Water by Natural Attenuation.[2] MNA indicator parameters include: nitrate and sulfate by EPA Method 300.0, manganese by EPA Method 200.8, ferrous iron by SM3500-Fe B, and alkalinity by SM 4500 NH3 E. Depth to groundwater measurements were recorded for the wells sampled during each monitoring event using an electronic water level indicator. The calculated groundwater elevations based on field measurements are presented in Table 3.

Investigation-derived Waste Disposal

Groundwater purged from wells during sampling was contained onsite in the 500-gallon treatment system water collection tank. The treatment system water collection tank will continue to be used to store purge water from future sampling events.

Groundwater Results

In the southern plume, TPH-G was detected above the Model Toxics Control Act (MTCA) cleanup criteria at SVE-23 and below the cleanup criteria at SVE-24 (Table 1). Benzene was detected above the cleanup criteria at SVE-25. TPH-G was detected above cleanup criteria in SVE-23 during the 25th quarter (Table 2). SVE-23 has historically exceeded the cleanup criteria for TPH-G since the implementation of the Phase II remediation with the exception of the 9th, 10th, and 20th quarters (Table 2). With the exception of the last three quarters, benzene and TPH-G were not detected for five consecutive quarters at SVE-24. The benzene detection at SVE-25 is the first exceedance of the cleanup criteria for benzene or TPH-G since August 2015.

[2] Washington State Department of Ecology, 2005, Guidance on remediation of petroleum-contaminated ground water by natural attenuation (v. 1.0): Olympia, Wash., Washington State Dept. of Ecology, publication no. 05-09-091, 139 p.

In the middle plume during the 25th quarter, TPH-G and benzene were not detected above laboratory reporting limits. TPH-G and benzene were detected during the previous event at SVE-16; however, neither have exceeded cleanup criteria since November 2015. TPH-G and benzene have not been detected at SVE-17 and SVE-19 since November 2015 and May 2016, respectively.

TPH-G and benzene were not detected during the 25th quarter in the northern plume. They were also not detected during the previous event in November of 2016. TPH-G was detected at SVE-13 during the 22nd and 23rd quarters at levels below cleanup criteria. Benzene has not been detected at SVE-13 since the 6th quarter sampling event completed in May 2012.

Figures 3 and 4 are time series plots that show historical concentrations of TPH-G and benzene, respectively, for each SVE well. A summary of the analytical groundwater results is presented in Figure 2 and Table 1. The analytical laboratory report from this quarter's groundwater sampling is contained in Appendix A.

Natural Attenuation Evaluation

Based on soil source removal activities conducted during the construction of the existing building, the decreasing trend in concentrations of TPH-G and benzene in source area wells, and the absence of these contaminants in the downgradient point of compliance wells, MNA is being evaluated as a final groundwater treatment method. MNA, under favorable conditions, reduces the mass and concentrations of contaminants in the environment through physical, chemical, and biological processes. To evaluate the feasibility of MNA, an analysis of the status of the plumes and a review of the geochemical parameters were conducted. Plume status evaluation was completed using Mann-Kendall statistical analysis for benzene and TPH-G concentrations. The results are presented in Appendix B. The north, middle, and south TPH-G and benzene plumes are either stable or decreasing. Two wells, SVE-13 and SVE-24, yielded no trend, which is likely an artifact of the Mann-Kendall statistical analysis that requires the use of half the laboratory detection limits in place of zero values for non-detects; this masks any trends in these wells. In general, according to the guidance provided by the Washington State Department of Ecology,[2] the analysis of the primary and secondary geochemical parameters show that conditions for MNA through biodegradation continue to be favorable (Table 1).

Additional groundwater monitoring is required to further evaluate the feasibility of MNA. The next groundwater sampling event is scheduled for May 2017. Results of the next quarterly

groundwater monitoring event will be used to evaluate any rebound of contaminants and further evaluate MNA as a final groundwater treatment method.

CONCLUSIONS

In general, THP-G and benzene are consistent with historical declining trends in concentrations (see Figures 4 and 5). A rebound of elevated concentrations of TPH-G and benzene in source area wells and detections of contaminants in the downgradient point of compliance wells were not observed during the May 2016, August 2016, November 2016, and February 2017 sampling events, which indicates that the current groundwater conditions are likely representative of natural conditions uninfluenced by the AS/SVE treatment system. Results of the last four quarterly groundwater monitoring events indicate that conditions for monitored natural attenuation are favorable. The AS/SVE system will remain off and post-treatment groundwater conditions will continue to be evaluated. A Mann-Kendall statistical analysis of the status of the plumes reveals that the north, middle, and south plumes are either stable or decreasing, which indicates that the conditions for natural attenuation are favorable. Monitoring well SVE-13 shows no trend, likely due to the Mann-Kendall statistical analysis requirement to use half of the laboratory detection limits in place of zero values for non-detects. Monitoring well SVE-24 also shows no trend, likely due to the concentrations of benzene and TPH-G observed during the last three quarters of monitoring. These results have been consistent throughout the shut-off period and likely do not suggest any conflict with the overall results of the Mann-Kendall analyses that the plumes are either shrinking or stable. Groundwater monitoring data will be used to further evaluate the effects, if any, of the rebound test and status of the plumes. Groundwater monitoring data will also be used to continue to evaluate conditions for natural attenuation.

Benzene was detected during the 23rd and 24th monitoring events (August and November 2016) at SVE-24 in excess of the MTCA Method A cleanup criteria. Prior to the 23rd event, benzene was not detected at SVE-24 for six consecutive events. During the 25th event, benzene returned to a concentration below the cleanup criteria. A similar trend was observed at SVE-24 during the 8th, 9th, and 10th quarter events, which were completed in August 2012, November 2012, and February 2013. Both occurrences of this trend can be seen in Figure 5 and are characterized by peak benzene concentrations measured during the November sampling event and may be associated with high seasonal groundwater elevations. Further monitoring data is required to evaluate whether similar concentrations of benzene will continue to be present at SVE-24.

Source area sampling point SVE-25 has historically exceeded the cleanup criteria since the implementation of the Phase II remediation. Beginning in November 2015, TPH-G and benzene concentrations have been below the cleanup criteria. Based on the review of the results of other source area wells and the evaluation of the plume status, it is likely that the recent absence of TPH-G and benzene and previous detections below the cleanup criteria at SVE-25 are a reflection of the occurrence of biodegradation through natural attenuation. The benzene detection above cleanup criteria in February of 2017 is inconsistent with recent trends. Further monitoring data will be required to evaluate whether benzene will continue to be present at SVE-25.

LIMITATIONS

The data presented in this letter report are based on sampling at the Site and should be considered representative of our observations at the time. We also note that the facts and conditions referenced in this letter report may change over time, and that those set forth here are applicable to the facts and conditions as described only at the time this letter report was written. We believe that the conclusions stated here are factual, but no guarantee is made or implied.

This letter report was prepared for the exclusive use of Seattle Center Redevelopment and its representatives and in no way guarantees that any agency or its staff will reach the same conclusions as Shannon & Wilson, Inc. Shannon & Wilson, Inc. has prepared the enclosed Appendix C, “Important Information About Your Geotechnical/Environmental Report,” to help you and others in understanding our reports.

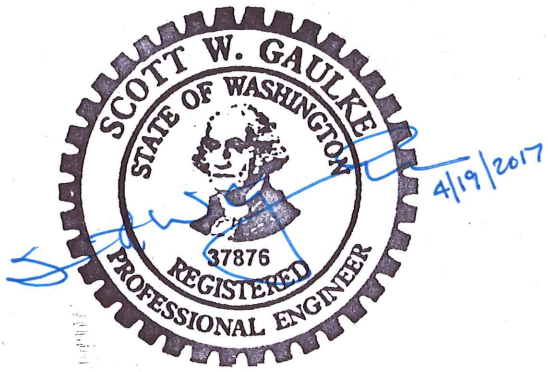
SHANNON & WILSON, INC.

If you have any questions regarding the findings presented herein, please call me at (206) 632-8020.

Sincerely,

SHANNON & WILSON, INC.

Edwin V. Ptak
Environmental Scientist



Scott W. Gaulke, PE, LHG
Vice President

EVP:SKH:SWG/evp

Enc: Table 1 – Groundwater Analytical Results for February 2017
Table 2 – Historical Groundwater Analytical Results (5 pages)
Table 3 – Groundwater Elevations (6 pages)
Figure 1 – Site Plan
Figure 2 – TPH-G and Benzene Concentrations in Groundwater
Figure 3 – Groundwater Contour Map
Figure 4 – Historical TPH-G Concentrations in SVE Wells
Figure 5 – Historical Benzene Concentrations in SVE Wells
Appendix A – Groundwater Analytical Laboratory Report
Appendix B – Plume Status Evaluation
Appendix C – Important Information About Your Geotechnical/Environmental Report

TABLE 1
GROUNDWATER ANALYTICAL RESULTS FOR
FEBRUARY 2017

Well Number	Sample ID	Quarter	Date Collected	BTEX (µg/L)				TPH - Gasoline (µg/L)	Secondary Geochemical Indicators					Primary Geochemical Indicators				
				Benzene	Toluene	Ethylbenzene	Xylenes		Manganese (µg/L)	Alkalinity (mg/L)	Nitrate (mg/L)	Sulfate (mg/L)	Ferrous Iron (mg/L)	ORP	DO (mg/L)	pH	Specific Conductivity (mmhos/cm)	Temperature (°C)
Soil Vapor Extraction Wells																		
SVE-13	SVE-13	Q25	2/24/2017	< 4.0	< 4.0	< 4.0	**6.3**	< 400	**4,800**	**950**	< 0.050	**55**	**12.1**	*	*	*	*	*
SVE-16	SVE-16	Q25	2/24/2017	< 4.0	< 4.0	< 4.0	< 4.0	< 400	**1,200**	**320**	**0.45**	**79**	**5.44**	-20.5	0.13	6.72	0.65	14.5
SVE-17	SVE-17	Q25	2/24/2017	< 4.0	< 4.0	< 4.0	< 4.0	< 400	**1,700**	**350**	< 0.050	**24**	**22.9**	-110.3	0.09	6.51	0.67	15.4
SVE-19	SVE-19	Q25	2/24/2017	< 4.0	< 4.0	< 4.0	< 4.0	< 400	**9,400**	**300**	< 0.050	**860**	**71.1**	-121.4	0.10	6.93	1.82	15.2
SVE-20	SVE-20	Q25	2/23/2017	< 4.0	< 4.0	**6.1**	< 4.0	< 400	**3,200**	**820**	< 0.050	**240**	**34.5**	-136.1	0.11	6.97	1.52	15.1
SVE-23	SVE-23	Q25	2/23/2017	< 4.0	**10**	**86**	**177**	**2,700**	**1,300**	**260**	< 0.050	**5.7**	**20.4**	-99.7	0.08	6.82	0.49	15.0
SVE-24	SVE-24	Q25	2/22/2017	**2.9**	< 1.0	**2.3**	< 1.0	**160**	**13,000**	**300**	**0.19**	**1,800**	**23.4**	18.9	0.20	6.52	3.04	14.9
SVE-25	SVE-25	Q25	2/23/2017	**10**	< 4.0	**7.8**	**8.1**	< 400	**2,000**	**140**	**0.056**	**220**	**11.8**	-48.4	0.14	6.46	0.67	14.5
SVE-26	SVE-26	Q25	2/23/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 100	**940**	**94**	**0.17**	**240**	**37.7**	171.4	0.29	6.28	0.60	14.4
Compliance Wells																		
SW-25	**	Q25	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**
SW-26	SW-26	Q25	2/22/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 100	**250**	**180**	**0.36**	**43**	**0.209**	55.2	0.15	7.24	0.41	15.0
SW-27	SW-27	Q25	2/22/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 100	**470**	**120**	**0.054**	**80**	**18.3**	-5.7	0.30	6.47	0.37	15.3
NA	Trip Blank	Q25	NA	< 1.0	< 1.0	< 1.0	< 1.0	< 100	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
MTCA Method A Cleanup Levels				5	1,000	700	1,000	800/1,000[1]	--	--	--	--	--	NA	NA	NA	NA	NA

Notes:

[1] Cleanup level for gasoline is 800 micrograms per liter (µg/L) if benzene is present; 1,000 µg/L if no detectable benzene in groundwater.

* = parameters could not be collected due to pump modification; three well volumes were purged and a bailer was used to collect samples

** = well not monitored/sampled due to change in site conditions preventing safe access to the well. Access will be provided for next event.

-- = Model Toxics Control Act (MTCA) Method A cleanup criteria not established for this parameter.

< = less than reporting limit indicated

Bolded text indicates analyte detected.

Shaded text indicates concentration exceeds state cleanup criterion.

°C = degrees Celsius

BTEX = benzene, toluene, ethylbenzene, and xylenes

DO = dissolved oxygen in milligrams per liter (mg/L)

ID = identification

mmhos/cm = millimhos per centimeter

NA = not applicable

ORP = oxygen reduction potential in millivolts

SVE = soil vapor extraction

TPH = total petroleum hydrocarbons

TABLE 2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS

Well Number	Sample ID	Quarter	Date Collected	BTEX				TPH - Gasoline	Units	Field Measurements	
				Benzene	Toluene	Ethylbenzene	Xylenes			ORP	DO
SVE-13	SVE-13	Q25	2/24/2017	< 4.0	< 4.0	< 4.0	**6.3**	< 400	µg/L	*	*
	SVE-13	Q24	11/18/2016	< 4.0	< 4.0	< 4.0	**4.0**	< 400	µg/L	*	*
	SVE-13	Q23	8/29/2016	< 4.0	< 4.0	< 4.0	**19.0**	**520**	µg/L	*	*
	SVE-13	Q22	5/26/2016	< 1.0	< 1.0	< 1.0	**9.2**	**780**	µg/L	*	*
	SVE-13	Q21	2/26/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 100	µg/L	*	*
	SVE-13	Q20	11/20/2015	< 1.0	< 1.0	< 1.0	< 1.0	< 100	µg/L	*	*
	SVE-13	Q19	8/28/2015	< 1.0	< 1.0	**2.9**	**32**	**1,000**	µg/L	*	*
	SVE-13	Q18	5/29/2015	< 4.0	< 4.0	< 4.0	**18**	**680**	µg/L	*	*
	SVE-13	Q17	2/27/2015	< 1.0	< 1.0	**2.1**	**15**	**720**	µg/L	*	*
	SVE-13	Q16	11/21/2014	< 1.0	< 1.0	**3.6**	**13**	**640**	µg/L	*	*
	SVE-13	Q15	8/29/2014	< 1.0	**1.9**	**8.4**	**40**	**1,800**	µg/L	*	*
	SVE-13	Q14	5/28/2014	< 1.0	< 1.0	**1.1**	**2.6**	**220**	µg/L	44.8	1.08
	SVE-13	Q13	2/25/2014	< 1.0	**1.3**	**4.0**	**15**	**720**	µg/L	*	*
	SVE-13	Q12	11/26/2013	< 1.0	**4.4**	**10**	**66**	**1,400**	µg/L	-74.5	0.44
	SVE-13	Q11	8/30/2013	--	--	--	--	--	--	--	--
	SVE-13	Q10	5/30/2013	< 1.0	< 1.0	**1.2**	**5.3**	**270**	µg/L	45.3	0.27
	SVE-13	Q9	2/27/2013	< 1.0	< 1.0	< 1.0	**1.1**	**270**	µg/L	-1.1	0.23
	SVE-13	Q8	11/26/2012	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	33.9	0.11
	SVE-13-083012	Q7	8/30/2012	< 1.0	**1.6**	**3.8**	**33**	**900**	µg/L	-21.8	0.04
	SVE-13-053012	Q6	5/30/2012	**1.8**	< 1.0	**24**	**21**	**1,100**	µg/L	-219.5	0.30
	SVE-13-022912	Q5	2/29/2012	< 1.0	**1.5**	**3.3**	**16**	**1,500**	µg/L		
	SVE-13-112911	Q4	11/29/2011	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-10.5	0.40
	SVE-13-083011	Q3	8/30/2011	< 4.0	**5.0**	**5.7**	**20**	**4,900**	µg/L	-96.9	0.99
	SVE-13	Q2	5/27/2011	< 4.0	< 4.0	< 4.0	**8.2**	**2,400**	µg/L	-56.9	0.09
	SVE-13-022411	Q1	2/24/2011	< 1.0	< 5.0	**4.2**	**25**	**5,100**	µg/L	-73	0.35
	SVE-13-052010	Interim	5/20/2010	**8.1**	< 4.0	**33**	**69**	**13,000**	µg/L	-344.7	0.53
SVE-16	SVE-16	Q25	2/24/2017	< 4.0	< 4.0	**< 4.0**	< 4.0	< 400	µg/L	-20.5	0.13
	SVE-16	Q24	11/18/2016	**2.0**	< 1.0	**3.0**	< 1.0	**260**	µg/L	-101.7	0.43
	SVE-16	Q23	8/29/2016	< 4.0	< 4.0	< 4.0	< 4.0	< 400	µg/L	210.4	0.31
	SVE-16	Q22	5/25/2016	**1.4**	**3.4**	**6.2**	**7.2**	**420**	µg/L	-42.9	0.17
	SVE-16	Q21	2/26/2016	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	39.2	0.21
	SVE-16	Q20	11/19/2015	**5.7**	**1.9**	**14**	**4.0**	**950**	µg/L	48.9	0.77
	SVE-16	Q19	8/28/2015	**4.8**	**1.3**	**15**	**2.0**	**950**	µg/L	-63.3	0.67
	SVE-16	Q18	5/28/2015	**5.0**	< 1.0	**19**	< 2.0	**830**	µg/L	-30.4	0.35
	SVE-16	Q17	2/27/2015	**1.4**	< 1.0	**4.5**	**3.3**	**570**	µg/L	-41.4	3.19
	SVE-16	Q16	11/21/2014	**2.6**	< 1.0	< 1.0	< 2.0	**400**	µg/L	79.1	0.12
	SVE-16	Q15	8/29/2014	**3.3**	< 1.0	**17**	< 2.0	**970**	µg/L	-54.3	0.08
	SVE-16	Q14	5/28/2014	**5.1**	< 1.0	**24**	**2.2**	**900**	µg/L	-39.5	0.17
	SVE-16	Q13	2/25/2014	**3.6**	< 1.0	**17**	**1.5**	**580**	µg/L	-0.7	0.23
	SVE-16	Q12	11/25/2013	**6.5**	< 1.0	**36**	**2.2**	**790**	µg/L	-99.2	0.22
	SVE-16	Q11	8/30/2013	**5.2**	**1.4**	**29**	**15**	**850**	µg/L	-58.7	0.14
	SVE-16	Q10	5/30/2013	< 4.0	< 4.0	**7.2**	< 8.0	< 400	µg/L	-17.1	0.31
	SVE-16	Q9	2/27/2013	< 1.0	< 1.0	**2.9**	**< 2.0**	**220**	µg/L	-34.4	0.17
	SVE-16	Q8	11/27/2012	**7.9**	**2.7**	**46**	**51**	**1,900**	µg/L	-89.5	0.14
	SVE-16-083012	Q7	8/30/2012	**9.0**	**1.3**	**48**	**21**	**1,200**	µg/L	-36.4	0.06
	SVE-16-053112	Q6	5/31/2012	**2.5**	< 1.0	**11**	**2.1**	**370**	µg/L	-300.4	0.43
	SVE-16-022912	Q5	2/29/2012	**3.1**	< 1.0	**10**	**1.8**	**440**	µg/L	-25	0.94
	SVE-16-112911	Q4	11/29/2011	**10**	< 1.0	**37**	**12**	**1,100**	µg/L	-62.2	0.89
	SVE-16-083011	Q3	8/30/2011	**9.7**	< 1.0	**30**	**11**	**1,100**	µg/L	-59.4	6.02
	SVE-16	Q2	5/27/2011	**8.5**	< 1.0	**5.6**	**1.7**	**480**	µg/L	-13	0.48
	SVE-16-022411	Q1	2/24/2011	**16**	< 1.0	**13**	**20**	**1,300**	µg/L	-15.8	1.27
	SVE-16-052010	Interim	5/20/2010	**17**	< 1.0	**33**	**3.5**	**820**	µg/L	89.9	0.51
SVE-17	SVE-17	Q25	2/24/2017	< 4.0	< 4.0	< 4.0	< 4.0	< 400	µg/L	-110.3	0.09
	SVE-17	Q24	11/18/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 100	µg/L	-46.4	0.19
	SVE-17	Q23	8/26/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 100	µg/L	315.8	0.19
	SVE-17	Q22	5/25/2016	< 1.0	**3.2**	< 1.0	< 2.0	< 100	µg/L	-4.0	0.15
	SVE-17	Q21	2/26/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 100	µg/L	-47.2	0.31
	SVE-17	Q20	11/19/2015	**4.0**	**1.2**	**8.4**	**2.7**	**630**	µg/L	-32.4	4.80
	SVE-17	Q19	8/26/2015	< 1.0	< 1.0	< 1.0	< 1.0	< 100	µg/L	5.5	2.76
	SVE-17	Q18	5/28/2015	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	10.4	0.41
	SVE-17	Q17	2/27/2015	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	47.8	3.41
	SVE-17	Q16	11/21/2014	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	66.3	0.23
	SVE-17	Q15	8/28/2014	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-5.0	0.21
	SVE-17	Q14	5/28/2014	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-9.9	2.04
	SVE-17	Q13	2/25/2014	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-5.4	1.68
	SVE-17	Q12	11/25/2013	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	9.1	3.44
	SVE-17	Q11	8/30/2013	< 1.0	< 1.0	< 1.0	< 2.0	**120**	µg/L	-26.0	0.15
	SVE-17	Q10	5/30/2013	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	35.7	0.21
	SVE-17	Q9	2/27/2013	< 1.0	< 1.0	< 1.0	**1.9**	**400**	µg/L	7.1	0.27
	SVE-17	Q8	11/26/2012	< 1.0	< 1.0	< 1.0	**1.4**	**180**	µg/L	-17.7	0.17
	SVE-17-083012	Q7	8/30/2012	< 1.0	< 1.0	< 1.0	< 2.0	**170**	µg/L	28.5	0.09
	SVE-17-053112	Q6	5/31/2012	< 1.0	< 1.0	< 1.0	**2**	**300**	µg/L	-245.0	0.59
	SVE-17-022912	Q5	2/29/2012	< 1.0	< 1.0	< 1.0	**12**	**720**	µg/L	65.5	0.78
	SVE-17-112911	Q4	11/29/2011	**1.2**	< 1.0	< 1.0	**12**	**620**	µg/L	-19.0	0.40
	SVE-17-083011	Q3	8/30/2011	**1.2**	< 1.0	**2.3**	**22**	**880**	µg/L	58.5	4.97
	SVE-17	Q2	5/27/2011	**3.2**	< 1.0	**4.1**	**34**	**1,200**	µg/L	32.4	0.37
	SVE-17-022411	Q1	2/24/2011	**2.6**	**1.1**	**6.4**	**49**	**1,900**	µg/L	85.3	1.29
	SVE-17-052010	Interim	5/20/2010	**2.9**	< 1.0	**8.1**	**6.0**	**590**	µg/L	28.5	0.38

TABLE 2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS

Well Number	Sample ID	Quarter	Date Collected	BTEX				TPH - Gasoline	Units	Field Measurements	
				Benzene	Toluene	Ethylbenzene	Xylenes			ORP	DO
SVE-19	SVE-19	Q25	2/24/2017	< 4.0	< 4.0	< 4.0	< 4.0	< 400	µg/L	-121.4	0.10
	SVE-19	Q24	11/17/2016	< 4.0	< 4.0	< 4.0	< 4.0	< 400	µg/L	-67.1	0.10
	SVE-19	Q23	8/26/2016	< 4.0	< 4.0	< 4.0	< 4.0	< 400	µg/L	276.4	0.15
	SVE-19	Q22	5/25/2016	< 1.0	< 1.0	< 1.0	< 2.0	**160**	µg/L	-18.2	0.16
	SVE-19	Q21	2/25/2016	< 1.0	< 1.0	< 1.0	< 2.0	**240**	µg/L	-59.4	0.08
	SVE-19	Q20	11/19/2015	< 1.0	< 1.0	**4**	**2.4**	**400**	µg/L	33	1.53
	SVE-19	Q19	8/26/2015	< 1.0	< 1.0	< 1.0	< 1.0	**200**	µg/L	39.7	0.30
	SVE-19	Q18	5/28/2015	< 1.0	< 1.0	< 1.0	< 2.0	**180**	µg/L	52.1	0.39
	SVE-19	Q17	2/26/2015	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	20.1	0.16
	SVE-19	Q16	11/19/2014	< 1.0	< 1.0	**1.3**	< 2.0	**210**	µg/L	14.6	0.11
	SVE-19	Q15	8/28/2014	< 1.0	< 1.0	< 1.0	< 2.0	**170**	µg/L	-14.1	0.18
	SVE-19	Q14	5/27/2014	< 1.0	< 1.0	**4.7**	< 2.0	**510**	µg/L	-39.2	1.11
	SVE-19	Q13	2/25/2014	< 1.0	< 1.0	**4.8**	< 2.0	**560**	µg/L	-51.3	0.27
	SVE-19	Q12	11/25/2013	< 1.0	< 1.0	**3.6**	< 2.0	**400**	µg/L	-28.9	0.19
	SVE-19	Q11	8/30/2013	< 1.0	< 1.0	**5.8**	< 2.0	**780**	µg/L	-23.1	0.19
	SVE-19	Q10	5/30/2013	< 4.0	< 4.0	**44**	< 8.0	**960**	µg/L	-2.1	0.31
	SVE-19	Q9	2/26/2013	< 1.0	< 1.0	**12**	< 2.0	**670**	µg/L	-17.5	0.26
	SVE-19	Q8	11/26/2012	**1.1**	< 1.0	**22**	**4.5**	**1,300**	µg/L	-34.7	0.13
	SVE-19-083012	Q7	8/30/2012	< 1.0	< 1.0	**2.9**	**3.2**	**360**	µg/L	36.3	0.12
	SVE-19-053112	Q6	5/31/2012	**2.0**	< 1.0	**52**	**4.9**	**1,500**	µg/L	-290	0.42
	SVE-19-022912	Q5	2/29/2012	**1.5**	< 1.0	**34**	**8.8**	**1,300**	µg/L	73.4	0.84
	SVE-19-112911	Q4	11/29/2011	**3.2**	< 1.0	**46**	**15**	**1,900**	µg/L	43.3	0.36
	SVE-19-083011	Q3	8/30/2011	**3.4**	< 1.0	**62**	**35**	**2,000**	µg/L	83	5.24
	SVE-19	Q2	5/27/2011	**2.6**	**1.8**	**36**	**70**	**1,400**	µg/L	89.2	0.26
	SVE-19-022411	Q1	2/24/2011	**4.5**	**6.1**	**52**	**168**	**2,400**	µg/L	120.1	0.45
	SVE-19-052010	Interim	5/20/2010	**14**	**3.4**	**94**	**122**	**3,100**	µg/L	-14.3	0.31
SVE-20	SVE-20	Q25	2/23/2017	< 4.0	< 4.0	**6.1**	< 4.0	< 400	µg/L	-136.1	0.11
	SVE-20	Q24	11/17/2016	< 4.0	< 4.0	**4.9**	< 4.0	< 400	µg/L	-110.8	0.12
	SVE-20	Q23	8/26/2016	< 4.0	< 4.0	**6.3**	< 4.0	< 400	µg/L	85.3	0.18
	SVE-20	Q22	5/25/2016	**1.0**	**3.0**	**5.4**	**3.6**	**340**	µg/L	-104.3	0.17
	SVE-20	Q21	2/25/2016	< 1.0	< 1.0	< 1.0	< 2.0	<400	µg/L	-151.3	0.09
	SVE-20	Q20	11/19/2015	< 1.0	< 1.0	**4.8**	**4**	**500**	µg/L	107.5	14.58
	SVE-20	Q19	8/26/2015	< 1.0	< 1.0	**1.9**	< 2.0	**260**	µg/L	-88.4	0.39
	SVE-20	Q18	5/28/2015	< 1.0	< 1.0	**2.1**	< 2.0	**330**	µg/L	-17.4	0.37
	SVE-20	Q17	2/26/2015	< 1.0	< 1.0	**5.0**	< 2.0	**390**	µg/L	-81.2	3.31
	SVE-20	Q16	11/19/2014	**1.2**	< 1.0	**5.1**	**11**	**770**	µg/L	-83.4	0.10
	SVE-20	Q15	8/28/2014	**1.1**	< 1.0	**4.1**	**6.1**	**810**	µg/L	-111.3	0.11
	SVE-20	Q14	5/27/2014	**1.5**	**1.4**	**11**	**15**	**870**	µg/L	-94.2	1.08
	SVE-20	Q13	2/24/2014	**2.0**	**1.7**	**11**	**17**	**840**	µg/L	-89.4	0.45
	SVE-20	Q12	11/25/2013	**1.9**	**1.7**	**13**	**17**	**790**	µg/L	-109.2	0.46
	SVE-20	Q11	8/30/2013	**2.8**	**4.0**	**66**	**63**	**3,000**	µg/L	-95.4	0.38
	SVE-20	Q10	5/29/2013	< 4.0	< 4.0	**22**	**22**	**790**	µg/L	-40.2	0.21
	SVE-20	Q9	2/26/2013	**1.4**	**1.3**	**28**	**23**	**1,100**	µg/L	-63.8	0.28
	SVE-20	Q8	11/26/2012	**2.2**	**2.5**	**50**	**42**	**2,300**	µg/L	-91.2	0.09
	SVE-20-083012	Q7	8/30/2012	< 1.0	< 1.0	**20**	**4**	**690**	µg/L	-26.4	0.11
	SVE-20-053012	Q6	5/30/2012	< 1.0	**1.1**	**2.7**	**12**	**1,300**	µg/L	-232.3	0.44
	SVE-20-022912	Q5	2/29/2012	**3.3**	**1.9**	**51**	**54**	**1,800**	µg/L	-19.1	0.4
	SVE-20-112911	Q4	11/29/2011	**4.1**	**1.1**	**25**	**26**	**1,300**	µg/L	-33.2	0.34
	SVE-20-083011	Q3	8/30/2011	**5.1**	< 4.0	**61**	**40**	**2,200**	µg/L	-67	5.15
	SVE-20	Q2	5/27/2011	**4.7**	< 4.0	**58**	**43**	**3,100**	µg/L	-46.1	0.36
	SVE-20-022411	Q1	2/24/2011	**8.8**	**1.7**	**47**	**50**	**3,000**	µg/L	-73.9	0.53
	SVE-20-052010	Interim	5/20/2010	**13**	< 4.0	**81**	**146**	**4,600**	µg/L	-96.8	0.10
SVE-23	SVE-23	Q25	2/23/2017	< 4.0	**10**	**86**	**177**	**2,700**	µg/L	-99.7	0.08
	SVE-23	Q24	11/17/2016	< 4.0	**11.0**	**89**	**218**	**3,100**	µg/L	-110.8	0.12
	SVE-23	Q23	8/26/2016	< 4.0	**12.0**	**86**	**218**	**3,100**	µg/L	248.3	0.21
	SVE-23	Q22	5/25/2016	**3.2**	**11.0**	**78**	**185**	**3,700**	µg/L	-74.3	0.02
	SVE-23	Q21	2/25/2016	< 1.0	**8.8**	**69**	**175**	**2,800**	µg/L	-113.7	0.08
	SVE-23	Q20	11/19/2015	< 1.0	< 1.0	< 1.0	< 1.0	< 100	µg/L	-44.6	0.54
	SVE-23	Q19	8/26/2015	**2.1**	**7.2**	**49**	**87**	**2,200**	µg/L	-47.5	0.67
	SVE-23	Q18	5/28/2015	**1.8**	< 1.0	**45**	**3.8**	**2,200**	µg/L	-12.4	0.68
	SVE-23	Q17	2/26/2015	**2.7**	**8.2**	**62.0**	**143**	**2,800**	µg/L	-75.9	4.93
	SVE-23	Q16	11/19/2014	< 4.0	**8.8**	**85.0**	**210**	**3,500**	µg/L	-31.4	0.16
	SVE-23	Q15	8/28/2014	< 4.0	**6.8**	**81**	**185**	**3,500**	µg/L	-64.2	0.14
	SVE-23	Q14	5/27/2014	**2.9**	**9.8**	**74**	**125**	**2,800**	µg/L	-56.1	1.03
	SVE-23	Q13	2/24/2014	**2.0**	**4.2**	**44**	**43**	**1,400**	µg/L	-40.3	0.46
	SVE-23	Q12	11/25/2013	**4.4**	**11**	**67**	**125**	**2,500**	µg/L	-92.3	0.37
	SVE-23	Q11	8/29/2013	**5.3**	**12**	**67**	**135**	**3,100**	µg/L	-51.3	0.14
	SVE-23	Q10	5/29/2013	**1.1**	**1.5**	**9.8**	**15.1**	**460**	µg/L	43.1	0.26
	SVE-23	Q9	2/26/2013	< 1.0	< 1.0	**3.3**	**5.6**	**230**	µg/L	82.4	0.30
	SVE-23	Q8	11/26/2012	**5.0**	**8.0**	**56**	**89**	**2,400**	µg/L	-55.5	0.05
	SVE-23-083012	Q7	8/30/2012	**8.2**	**11**	**75**	**126**	**3,300**	µg/L	-27.4	0.23
	SVE-23-053112	Q6	5/31/2012	**3.9**	**3.1**	**27**	**30**	**1,200**	µg/L	-232.1	0.54
	SVE-23-022912	Q5	2/29/2012	**3.3**	**2.5**	**27**	**24**	**880**	µg/L	57.4	0.58
	SVE-23-112911	Q4	11/29/2011	**6.9**	**6.5**	**53**	**47**	**1,600**	µg/L	-42.5	0.47
	SVE-23-083011	Q3	8/30/2011	**13**	**8**	**78**	**73**	**2,600**	µg/L	-39.5	5.11
	SVE-23	Q2	5/27/2011	**21**	**10**	**100**	**176**	**4,200**	µg/L	-48.7	0.42
	SVE-23-022411	Q1	2/24/2011	**27**	**7.4**	**130**	**197**	**6,000**	µg/L	-68.9	0.85
	SVE-23-052010	Interim	5/20/2010	**47**	**19**	**250**	**820**	**7,700**	µg/L	-44.1	0.25

TABLE 2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS

Well Number	Sample ID	Quarter	Date Collected	BTEX				TPH - Gasoline	Units	Field Measurements	
				Benzene	Toluene	Ethylbenzene	Xylenes			ORP	DO
SVE-24	SVE-24	Q25	2/22/2017	**2.9**	< 1.0	**2.3**	< 1.0	**160**	µg/L	18.9	0.20
	SVE-24	Q24	11/17/2016	**38**	4.5	**18**	20.5	**680**	µg/L	-80.4	0.20
	SVE-24	Q23	8/25/2016	**13**	< 4.0	**6.3**	< 4.0	**440**	µg/L	48.3	0.16
	SVE-24	Q22	5/24/2016	< 1.0	**1.0**	< 1.0	< 1.0	< 100	µg/L	-35.4	0.18
	SVE-24	Q21	2/25/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 100	µg/L	-4.9	0.24
	SVE-24	Q20	11/19/2015	< 1.0	< 1.0	< 1.0	< 1.0	< 100	µg/L	150.0	16.80
	SVE-24	Q19	8/26/2015	< 1.0	< 1.0	< 1.0	< 1.0	< 100	µg/L	-1.6	0.38
	SVE-24	Q18	5/28/2015	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-28.1	0.34
	SVE-24	Q17	2/26/2015	< 1.0	< 1.0	< 1.0	< 2.0	**150**	µg/L	-96.8	1.41
	SVE-24	Q16	11/19/2014	**2.0**	< 1.0	**3.7**	< 2.0	**330**	µg/L	-21.4	0.13
	SVE-24	Q15	8/28/2014	< 1.0	< 1.0	< 1.0	< 2.0	**190**	µg/L	-70.1	0.12
	SVE-24	Q14	5/27/2014	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-33.2	1.01
	SVE-24	Q13	2/24/2014	< 1.0	< 1.0	< 1.0	< 2.0	**110**	µg/L	-39.8	0.77
	SVE-24	Q12	11/25/2013	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-34.0	0.35
	SVE-24	Q11	8/29/2013	< 1.0	< 1.0	**2.5**	< 2.0	**210**	µg/L	-34.2	0.21
	SVE-24	Q10	5/29/2013	< 1.0	< 1.0	**2.4**	< 2.0	**180**	µg/L	-48.1	0.28
	SVE-24	Q9	2/26/2013	**14**	< 1.0	**6.8**	< 2.0	**310**	µg/L	-38.8	0.33
	SVE-24	Q8	11/26/2012	**31**	**1.4**	**9.5**	**3.4**	**500**	µg/L	-71.1	0.15
	SVE-24-082912	Q7	8/29/2012	**3.1**	< 1.0	**2.8**	< 2.0	**260**	µg/L	-15.7	0.27
	SVE-24-053012	Q6	5/30/2012	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-250.0	0.30
	SVE-24-022912	Q5	2/29/2012	**1.1**	< 1.0	< 1.0	**1.8**	**140**	µg/L	-33.3	3.65
	SVE-24-112911	Q4	11/29/2011	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-71.0	0.70
	SVE-24-083011	Q3	8/30/2011	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-11.9	0.15
	SVE-24	Q2	5/31/2011	< 4.0	< 4.0	< 4.0	< 4.0	< 400	µg/L	-11.4	0.19
	SVE-24-022411	Q1	2/24/2011	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-42.6	0.68
	SVE-24-052010	Interim	5/20/2010	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-273.6	0.63
SVE-25	SVE-25	Q25	2/23/2017	**10**	< 4.0	**7.8**	**8.1**	< 400	µg/L	-48.4	0.14
	SVE-25	Q24	11/17/2016	< 1.0	< 1.0	**1.4**	< 1.0	< 100	µg/L	38.4	0.18
	SVE-25	Q23	8/25/2016	< 1.0	< 1.0	**1.9**	< 1.0	< 100	µg/L	343.9	0.18
	SVE-25	Q22	5/24/2016	**4**	**1.2**	**14**	**1.6**	**270**	µg/L	-11.9	0.14
	SVE-25	Q21	2/25/2016	< 1.0	< 1.0	**9.5**	< 2.0	< 100	µg/L	-62.4	0.14
	SVE-25	Q20	11/20/2015	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-39.5	0.59
	SVE-25	Q19	8/26/2015	**43**	**8.5**	**130**	**47**	**2,000**	µg/L	-56.0	0.23
	SVE-25	Q18	5/28/2015	**68**	< 4.0	**160**	**12**	**3,000**	µg/L	-4.1	0.29
	SVE-25	Q17	2/26/2015	**120**	**13**	**190**	**106**	**2,900**	µg/L	-137.1	4.39
	SVE-25	Q16	11/19/2014	**250**	**40**	**300**	**140**	**3,800**	µg/L	-57.5	0.07
	SVE-25	Q15	8/28/2014	**170**	**85**	**220**	**281**	**4,400**	µg/L	-98.4	0.16
	SVE-25	Q14	5/27/2014	**91**	**19**	**200**	**158**	**3,500**	µg/L	-68.8	1.04
	SVE-25	Q13	2/24/2014	**120**	**52**	**260**	**257**	**4,800**	µg/L	-53.1	0.77
	SVE-25	Q12	11/25/2013	**100**	**28**	**200**	**113**	**3,200**	µg/L	-90.3	0.26
	SVE-25	Q11	8/29/2013	**93**	**7.5**	**130**	**71**	**2,200**	µg/L	-53.2	0.21
	SVE-25	Q10	5/29/2013	**68**	**4.6**	**82**	**40**	**1,300**	µg/L	-56.9	0.28
	SVE-25	Q9	2/27/2013	**190**	**29**	**150**	**180**	**3,200**	µg/L	-68.1	0.20
	SVE-25	Q8	11/26/2012	**380**	**160**	**270**	**580**	**7,200**	µg/L	-107.6	0.01
	SVE-25-082912	Q7	8/29/2012	**200**	**160**	**180**	**377**	**5,300**	µg/L	-21.3	0.39
	SVE-25-053012	Q6	5/30/2012	**79**	**20**	**63**	**160**	**1,600**	µg/L	-218.5	0.25
	SVE-25-022912	Q5	2/29/2012	**400**	**230**	**330**	**498**	**6,600**	µg/L	-83.2	1.11
	SVE-25-112911	Q4	11/29/2011	**290**	**230**	**240**	**480**	**5,800**	µg/L	-114	0.60
	SVE-25-083011	Q3	8/30/2011	**430**	**220**	**250**	**591**	**6,700**	µg/L	-74.5	0.08
	SVE-25	Q2	5/31/2011	**390**	**330**	**200**	**490**	**6,100**	µg/L	-46.8	0.17
	SVE-25-022411	Q1	2/24/2011	**400**	**370**	**200**	**440**	**6,900**	µg/L	-82.5	0.34
	SVE-25-052010	Interim	5/20/2010	**360**	**130**	**150**	**109**	**2,800**	µg/L	-177.9	0.91
SVE-26	SVE-26	Q25	2/23/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 100	µg/L	171.4	0.29
	SVE-26	Q24	11/16/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 100	µg/L	-52.4	0.21
	SVE-26	Q23	8/25/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 100	µg/L	101.4	0.20
	SVE-26	Q22	5/24/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 100	µg/L	36.2	4.41
	SVE-26	Q21	2/25/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 100	µg/L	59.6	5.79
	SVE-26	Q20	11/19/2015	< 1.0	< 1.0	< 1.0	< 1.0	< 100	µg/L	-44.1	17.93
	SVE-26	Q19	8/26/2015	< 1.0	< 1.0	< 1.0	< 1.0	< 100	µg/L	-42.5	0.19
	SVE-26	Q18	5/28/2015	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-9.4	1.1
	SVE-26	Q17	2/26/2015	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-51.9	6.01
	SVE-26	Q16	11/19/2014	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-15.1	0.11
	SVE-26	Q15	8/28/2014	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-48	0.21
	SVE-26	Q14	5/27/2014	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-111	1.02
	SVE-26	Q13	2/24/2014	< 1.0	< 1.0	< 1.0	< 2.0	**130**	µg/L	-66.4	0.59
	SVE-26	Q12	11/25/2013	**1.4**	< 1.0	< 1.0	< 2.0	**170**	µg/L	-104.3	0.35
	SVE-26	Q11	8/29/2013	**2.7**	< 1.0	< 1.0	< 1.0	**180**	µg/L	0.6	0.29
	SVE-26	Q10	5/29/2013	**1.4**	< 1.0	< 1.0	< 2.0	**130**	µg/L	-31.2	0.26
	SVE-26	Q9	2/27/2013	< 1.0	< 1.0	**1.6**	< 2.0	**170**	µg/L	-30	0.87
	SVE-26	Q8	11/26/2012	< 1.0	< 1.0	**4.8**	**4.8**	**270**	µg/L	-64.5	0.03
	SVE-26-082912	Q7	8/29/2012	**7.6**	< 1.0	**20**	**26**	**520**	µg/L	-24.4	0.32
	SVE-26-053012	Q6	5/30/2012	**250**	**54**	**260**	**161**	**3,700**	µg/L	-225.6	0.28
	SVE-26-022912	Q5	2/29/2012	**99**	**21**	**84**	**91**	**1,400**	µg/L	-60.4	1.17
	SVE-26-112911	Q4	11/29/2011	**180**	**86**	**91**	**200**	**2,600**	µg/L	-116	0.70
	SVE-26-083011	Q3	8/30/2011	**170**	**100**	**81**	**180**	**2,200**	µg/L	-54	0.21
	SVE-26	Q2	5/31/2011	**150**	**96**	**28**	**61**	**990**	µg/L	-25.7	0.49
	SVE-26-022411	Q1	2/24/2011	**11**	**2.3**	**1.1**	**11**	**270**	µg/L	-84	0.21
	SVE-26-052010	Interim	5/20/2010	< 4.0	< 4.0	< 4.0	< 4.0	< 400	µg/L	-149.9	1.90

TABLE 2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS

Well Number	Sample ID	Quarter	Date Collected	BTEX				TPH - Gasoline	Units	Field Measurements	
				Benzene	Toluene	Ethylbenzene	Xylenes			ORP	DO
	**	Q25	**	**	**	**	**	**	**	**	**
	SW-25	Q24	11/18/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 100	µg/L	*	*
	SW-25	Q23	8/29/2016	< 4.0	< 4.0	< 4.0	< 4.0	< 400	µg/L	*	*
	SW-25	Q22	5/26/2016	< 1.0	**2.9**	< 1.0	< 1.0	< 100	µg/L	*	*
	SW-25	Q21	2/26/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 100	µg/L	*	*
	SW-25	Q20	11/19/2015	< 1.0	< 1.0	< 1.0	< 1.0	< 100	µg/L	*	*
	SW-25	Q19	8/28/2015	< 1.0	< 1.0	< 1.0	< 1.0	< 100	µg/L	*	*
	SW-25	Q18	5/29/2015	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	104.8	3.41
	SW-25	Q17	3/3/2015	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	108.4	9.41
	SW-25	Q16	11/21/2014	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	102.1	1.39
	SW-25	Q15	8/29/2014	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	61.2	2.11
	SW-25	Q14	5/28/2014	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	71.8	1.02
	SW-25	Q13	2/25/2014	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	86.4	0.88
SW-25	SW-25	Q12	11/26/2013	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	118.2	2.01
	SW-25	Q11	8/30/2013	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	37.2	1.1
	SW-25	Q10	5/30/2013	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	110.6	5.61
	SW-25	Q9	2/27/2013	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	60.5	2.04
	SW-25	Q8	11/26/2012	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	78.9	4.03
	SW-25-083012	Q7	8/30/2012	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	10.7	2.76
	SW-25-053112	Q6	5/31/2012	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-138.6	3.07
	SW-25-022912	Q5	2/29/2012	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	66.2	8.51
	SW-25-120911	Q4	12/9/2011	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	81.7	3.14
	SW-25-083011	Q3	8/30/2011	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	0.8	3.41
	SW-25	Q2	5/31/2011	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	31.7	4.84
	SW-25-022411	Q1	2/24/2011	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-10.9	5.46
	SW-25-110510	Interim	11/5/2010	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-14	3.58
	SW-25-043010	Interim	4/30/2010	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-85.3	2.17
	SW-26	Q25	2/22/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 100	µg/L	55.2	0.15
	SW-26	Q24	11/16/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 100	µg/L	-38.7	0.38
	SW-26	Q23	8/25/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 100	µg/L	479.4	0.68
	SW-26	Q22	5/24/2016	< 1.0	**2.9**	< 1.0	< 1.0	< 100	µg/L	-3.4	0.24
	SW-26	Q21	2/25/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 100	µg/L	-21.7	0.19
	SW-26	Q20	11/19/2015	< 1.0	< 1.0	< 1.0	< 1.0	< 100	µg/L	-31.0	3.35
	SW-26	Q19	8/26/2015	< 1.0	< 1.0	< 1.0	< 1.0	< 100	µg/L	-30.0	0.66
	SW-26	Q18	5/28/2015	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	26.4	0.68
	SW-26	Q17	2/26/2015	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-51.9	6.01
	SW-26	Q16	11/19/2014	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-4.8	0.20
	SW-26	Q15	8/28/2014	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-57.8	0.17
	SW-26	Q14	5/27/2014	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-50.1	1.03
	SW-26	Q13	2/25/2014	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-50.2	0.75
SW-26	SW-26	Q12	11/25/2013	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-52.0	5.71
	SW-26	Q11	8/29/2013	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-18.1	5.51
	SW-26	Q10	5/29/2013	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-48.2	5.63
	SW-26	Q9	2/27/2013	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-70.2	1.32
	SW-26	Q8	11/26/2012	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-37.6	5.18
	SW-26-082912	Q7	8/29/2012	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	21.0	5.15
	SW-26-053012	Q6	5/30/2012	**3.1**	< 1.0	**2.2**	**1.1**	**230**	µg/L	-206.7	2.86
	SW-26-022912	Q5	2/29/2012	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-69.6	1.15
	SW-26-112911	Q4	11/29/2011	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-93.0	0.70
	SW-26-083011	Q3	8/30/2011	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-11.5	4.08
	SW-26	Q2	5/31/2011	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	20.8	0.8
	SW-26-022411	Q1	2/24/2011	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-66.3	2.22
	SW-26-110510	Interim	11/5/2010	**5.5**	< 1.0	**1.0**	< 2.0	< 100	µg/L	-103	1.09
	SW-26-043010	Interim	4/30/2010	**5.5**	< 4.0	< 4.0	< 8.0	< 400	µg/L	-152	0.85
	SW-27	Q25	2/22/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 100	µg/L	-5.7	0.30
	SW-27	Q24	11/17/2016	< 4.0	< 4.0	< 4.0	< 4.0	< 400	µg/L	8.3	2.14
	SW-27	Q23	8/25/2016	< 4.0	< 4.0	< 4.0	< 4.0	< 400	µg/L	*	*
	SW-27	Q22	5/24/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 100	µg/L	*	*
	SW-27	Q21	2/25/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 100	µg/L	*	*
	SW-27	Q20	11/19/2015	< 1.0	< 1.0	< 1.0	< 1.0	< 100	µg/L	*	*
	SW-27	Q19	8/26/2015	< 1.0	< 1.0	< 1.0	< 1.0	< 100	µg/L	*	*
	SW-27	Q18	5/28/2015	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	*	*
	SW-27	Q17	2/26/2015	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	*	*
SW-27	SW-27	Q16	11/19/2014	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	*	*
	SW-27	Q15	8/28/2014	< 4.0	< 4.0	< 4.0	< 8.0	< 400	µg/L	*	*
	SW-27	Q14	5/27/2014	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	*	*
	SW-27	Q13	2/24/2014	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	*	*
	SW-27	Q12	11/25/2013	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	*	*
	SW-27	Q11	8/29/2013	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	*	*
	SW-27	Q10	5/29/2013	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	79.1	8.72
	SW-27	Q9	2/27/2013	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	22.4	4.56
	SW-27	Q8	11/27/2012	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	15.4	0.41
	SW-27-082912	Q7	8/29/2012	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	19.3	3.38
	SW-27-053112	Q6	5/31/2012	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-165.8	2.3

TABLE 2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS

Well Number	Sample ID	Quarter	Date Collected	BTEX				TPH - Gasoline	Units	Field Measurements	
				Benzene	Toluene	Ethylbenzene	Xylenes			ORP	DO
SW-27	SW-27-022912	Q5	2/29/2012	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	24.2	1.93
	SW-27-112911	Q4	11/29/2011	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	-1.0	6.2
	SW-27-083011	Q3	8/30/2011	< 1.0	< 1.0	< 1.0	< 2.0	< 100	µg/L	39.9	4.41
	SW-27	Q2	5/31/2011	**1.5**	< 1.0	< 1.0	< 2.0	< 100	µg/L	32.7	0.6
	SW-27-022411	Q1	2/24/2011	**2.1**	< 1.0	< 1.0	< 2.0	< 100	µg/L	-26.4	0.33
	SW-27-110510	Interim	11/5/2010	**8.0**	< 1.0	< 1.0	< 2.0	< 100	µg/L	-157	0
	SW-27-043010	Interim	4/30/2010	**4.5**	< 1.0	< 1.0	< 2.0	< 100	µg/L	-99.2	0.67
MTCA Method A Cleanup Levels				5	1,000	700	1,000	800/1,000 [1]	µg/L	NA	NA

Notes:

[1] Cleanup level for gasoline is 800 micrograms per liter (µg/L) if benzene is present; 1,000 µg/L if no detectable benzene in groundwater.

* = parameters could not be collected due to pump modification; bailer used to collect samples

< = less than reporting limit indicated

Bolded text indicates analyte detected.

Shaded text indicates concentration exceeds state cleanup criterion.

BTEX = benzene, toluene, ethylbenzene, and xylenes

DO = dissolved oxygen in milligrams per liter

ID = identification

MTCA = Model Toxics Control Act

NA = not applicable

ORP = oxygen reduction potential in millivolts

SVE = soil vapor extraction

TPH = total petroleum hydrocarbons

TABLE 3
GROUNDWATER ELEVATIONS

Well Number	Date	TOC Elevation	DTW	Groundwater Elevation
SVE-13	2/24/2017	79.67	26.83	52.84
	11/18/2016	79.67	27.32	52.35
	8/29/2016	79.67	29.62	50.05
	5/26/2016	79.67	29.28	50.39
	2/26/2016	79.67	27.42	52.25
	11/20/2015	79.67	28.20	51.47
	8/28/2015	79.67	29.19	50.48
	5/29/2015	79.67	28.78	50.89
	2/27/2015	79.67	27.95	51.72
	11/21/2014	79.67	28.55	51.12
	8/29/2014	79.67	29.98	49.69
	5/28/2014	79.67	28.73	50.94
	2/25/2014	79.67	27.25	52.42
	11/26/2013	79.67	28.30	51.37
	8/30/2013	79.67	*	*
	5/30/2013	79.67	25.43	54.24
	2/27/2013	79.67	26.21	53.46
	11/26/2012	79.67	26.66	53.01
	8/30/2012	79.67	28.22	51.45
	5/30/2012	79.67	26.90	52.77
	2/29/2012	79.67	26.28	53.39
	11/29/2011	79.67	26.66	53.01
	8/30/2011	79.67	26.89	52.78
	5/27/2011	79.67	25.40	54.27
	2/24/2011	79.67	24.79	54.88
	5/20/2010	79.67	28.17	51.50
SVE-16	2/24/2017	51.67	5.62	46.05
	11/18/2016	51.67	6.03	45.64
	8/29/2016	51.67	7.52	44.15
	5/25/2016	51.67	8.00	43.67
	2/26/2016	51.67	6.21	45.46
	11/19/2015	51.67	8.63	43.04
	8/28/2015	51.67	8.63	43.04
	5/28/2015	51.67	8.63	43.04
	2/27/2015	51.67	8.52	43.15
	11/21/2014	51.67	7.60	44.07
	8/29/2014	51.67	8.55	43.12
	5/28/2014	51.67	8.31	43.36
	2/25/2014	51.67	8.13	43.54
	11/25/2013	51.67	9.25	42.42
	8/30/2013	51.67	8.80	42.87
	5/30/2013	51.67	8.00	43.67
	2/27/2013	51.67	7.44	44.23
	11/27/2012	51.67	6.94	44.73
	8/30/2012	51.67	8.64	43.03
	5/31/2012	51.67	7.91	43.76
	2/29/2012	51.67	7.53	44.14
	11/29/2011	51.67	7.88	43.79
	8/30/2011	51.67	7.55	44.12
	5/27/2011	51.67	6.03	45.64
	2/24/2011	51.67	6.73	44.94
	5/20/2010	51.67	7.02	44.65

TABLE 3
GROUNDWATER ELEVATIONS

Well Number	Date	TOC Elevation	DTW	Groundwater Elevation
SVE-17	2/24/2017	51.67	7.81	43.86
	11/18/2016	51.67	8.62	43.05
	8/26/2016	51.67	9.91	41.76
	5/25/2016	51.67	10.22	41.45
	2/26/2016	51.67	8.67	43.00
	11/19/2015	51.67	9.30	42.37
	8/26/2015	51.67	10.20	41.47
	5/28/2015	51.67	10.78	40.89
	2/27/2015	51.67	10.98	40.69
	11/21/2014	51.67	10.25	41.42
	8/28/2014	51.67	11.48	40.19
	5/28/2014	51.67	**	**
	2/25/2014	51.67	11.25	40.42
	11/25/2013	51.67	11.68	39.99
	8/30/2013	51.67	11.05	40.62
	5/30/2013	51.67	10.03	41.64
	2/27/2013	51.67	9.68	41.99
	11/26/2012	51.67	10.22	41.45
	8/30/2012	51.67	10.98	40.69
	5/31/2012	51.67	10.73	40.94
	2/29/2012	51.67	10.53	41.14
	11/29/2011	51.67	10.94	40.73
	8/30/2011	51.67	10.27	41.40
	5/27/2011	51.67	9.40	42.27
	2/24/2011	51.67	9.41	42.26
	5/20/2010	51.67	9.54	42.13
SVE-19	2/24/2017	51.67	11.15	40.52
	11/17/2016	51.67	12.17	39.50
	8/26/2016	51.67	12.98	38.69
	5/25/2016	51.67	13.00	38.67
	2/25/2016	51.67	11.68	39.99
	11/19/2015	51.67	12.13	39.54
	8/26/2015	51.67	14.13	37.54
	5/28/2015	51.67	14.20	37.47
	2/26/2015	51.67	15.12	36.55
	11/19/2014	51.67	14.02	37.65
	8/28/2014	51.67	15.05	36.62
	5/27/2014	51.67	14.40	37.27
	2/25/2014	51.67	14.63	37.04
	11/25/2013	51.67	14.76	36.91
	8/30/2013	51.67	13.93	37.74
	5/30/2013	51.67	13.02	38.65
	2/26/2013	51.67	12.48	39.19
	11/26/2012	51.67	13.01	38.66
	8/30/2012	51.67	13.58	38.09
	5/31/2012	51.67	13.24	38.43
	2/29/2012	51.67	13.42	38.25
	11/29/2011	51.67	13.70	37.97
	8/30/2011	51.67	13.04	38.63
	5/27/2011	51.67	12.38	39.29
	2/24/2011	51.67	12.41	39.26
	5/20/2010	51.67	12.94	38.73

TABLE 3
GROUNDWATER ELEVATIONS

Well Number	Date	TOC Elevation	DTW	Groundwater Elevation
SVE-20	2/23/2017	51.67	12.65	39.02
	11/17/2016	51.67	13.27	38.40
	8/26/2016	51.67	13.61	38.06
	5/25/2016	51.67	14.12	37.55
	2/25/2016	51.67	12.71	38.96
	11/19/2015	51.67	14.30	37.37
	8/26/2015	51.67	15.92	35.75
	5/28/2015	51.67	15.95	35.72
	2/26/2015	51.67	17.05	34.62
	11/19/2014	51.67	15.28	36.39
	8/28/2014	51.67	15.99	35.68
	5/27/2014	51.67	15.65	36.02
	2/24/2014	51.67	16.31	35.36
	11/25/2013	51.67	16.28	35.39
	8/30/2013	51.67	15.10	36.57
	5/29/2013	51.67	14.50	37.17
	2/26/2013	51.67	14.05	37.62
	11/26/2012	51.67	14.17	37.50
	8/30/2012	51.67	14.72	36.95
	5/30/2012	51.67	14.93	36.74
	2/29/2012	51.67	14.85	36.82
	11/29/2011	51.67	15.33	36.34
	8/30/2011	51.67	14.61	37.06
	5/27/2011	51.67	14.01	37.66
	2/24/2011	51.67	12.14	39.53
	5/20/2010	51.67	14.58	37.09
SVE-23	2/23/2017	51.67	13.66	38.01
	11/17/2016	51.67	14.50	37.17
	8/26/2016	51.67	14.68	36.99
	5/25/2016	51.67	15.51	36.16
	2/25/2016	51.67	13.97	37.70
	11/19/2015	51.67	14.70	36.97
	8/26/2015	51.67	15.99	35.68
	5/28/2015	51.67	16.97	34.70
	2/26/2015	51.67	16.25	35.42
	11/19/2014	51.67	16.30	35.37
	8/28/2014	51.67	16.98	34.69
	5/27/2014	51.67	17.12	34.55
	2/24/2014	51.67	17.58	34.09
	11/25/2013	51.67	17.50	34.17
	8/29/2013	51.67	16.51	35.16
	5/29/2013	51.67	15.77	35.90
	2/26/2013	51.67	15.74	35.93
	11/26/2012	51.67	15.68	35.99
	8/30/2012	51.67	16.00	35.67
	5/31/2012	51.67	15.71	35.96
	2/29/2012	51.67	15.90	35.77
	11/29/2011	51.67	16.05	35.62
	8/30/2011	51.67	15.22	36.45
	5/27/2011	51.67	15.05	36.62
	2/24/2011	51.67	14.82	36.85
	5/20/2010	51.67	15.41	36.26

TABLE 3
GROUNDWATER ELEVATIONS

Well Number	Date	TOC Elevation	DTW	Groundwater Elevation
SVE-24	2/22/2017	51.67	14.23	37.44
	11/17/2016	51.67	15.24	36.43
	8/25/2016	51.67	15.34	36.33
	5/24/2016	51.67	15.77	35.90
	2/25/2016	51.67	13.80	37.87
	11/19/2015	51.67	15.01	36.66
	8/26/2015	51.67	16.01	35.66
	5/28/2015	51.67	17.13	34.54
	2/26/2015	51.67	15.92	35.75
	11/19/2014	51.67	16.94	34.73
	8/28/2014	51.67	17.90	33.77
	5/27/2014	51.67	18.20	33.47
	2/24/2014	51.67	18.60	33.07
	11/25/2013	51.67	18.44	33.23
	8/29/2013	51.67	17.17	34.50
	5/29/2013	51.67	16.00	35.67
	2/26/2013	51.67	15.57	36.10
	11/26/2012	51.67	16.43	35.24
	8/29/2012	51.67	17.52	34.15
	5/30/2012	51.67	16.58	35.09
	2/29/2012	51.67	16.51	35.16
	11/29/2011	51.67	17.23	34.44
	8/30/2011	51.67	16.29	35.38
	5/31/2011	51.67	16.31	35.36
	2/24/2011	51.67	16.16	35.51
	5/20/2010	51.67	17.59	34.08
SVE-25	2/23/2017	51.67	13.51	38.16
	11/17/2016	51.67	14.35	37.32
	8/25/2016	51.67	13.98	37.69
	5/24/2016	51.67	15.10	36.57
	2/25/2016	51.67	12.82	38.85
	11/19/2015	51.67	13.40	38.27
	8/26/2015	51.67	16.62	35.05
	5/28/2015	51.67	16.62	35.05
	2/26/2015	51.67	15.02	36.65
	11/19/2014	51.67	15.85	35.82
	8/28/2014	51.67	16.20	35.47
	5/27/2014	51.67	17.23	34.44
	2/24/2014	51.67	17.34	34.33
	11/25/2013	51.67	17.65	34.02
	8/29/2013	51.67	16.17	35.50
	5/29/2013	51.67	13.00	38.67
	2/27/2013	51.67	14.44	37.23
	11/26/2012	51.67	14.56	37.11
	8/29/2012	51.67	16.08	35.59
	5/30/2012	51.67	15.16	36.51
	2/29/2012	51.67	14.93	36.74
	11/29/2011	51.67	15.61	36.06
	8/30/2011	51.67	14.53	37.14
	5/31/2011	51.67	14.95	36.72
	2/24/2011	51.67	14.78	36.89
	5/20/2010	51.67	16.00	35.67

TABLE 3
GROUNDWATER ELEVATIONS

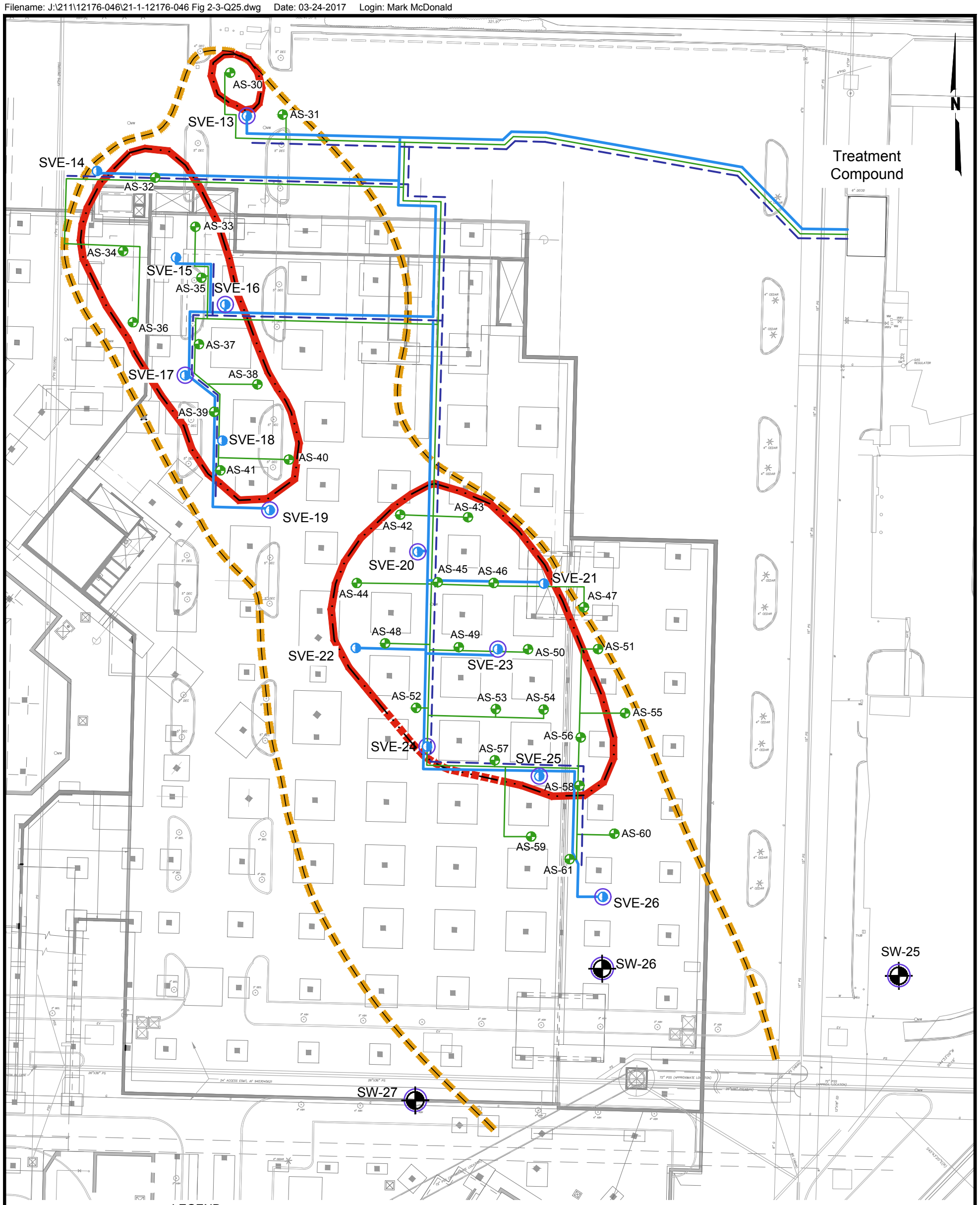
Well Number	Date	TOC Elevation	DTW	Groundwater Elevation
SVE-26	2/23/2017	46.67	8.41	38.26
	11/16/2016	46.67	6.20	40.47
	8/25/2016	46.67	8.56	38.11
	5/24/2016	46.67	10.25	36.42
	2/25/2016	46.67	7.21	39.46
	11/19/2015	46.67	9.30	37.37
	8/26/2015	46.67	10.33	36.34
	5/28/2015	46.67	13.53	33.14
	2/26/2015	46.67	11.10	35.57
	11/19/2014	46.67	11.40	35.27
	8/28/2014	46.67	9.65	37.02
	5/27/2014	46.67	13.80	32.87
	2/24/2014	46.67	12.32	34.35
	11/25/2013	46.67	13.73	32.94
	8/29/2013	46.67	14.18	32.49
	5/29/2013	46.67	10.91	35.76
	2/27/2013	46.67	10.92	35.75
	11/26/2012	46.67	8.77	37.90
	8/29/2012	46.67	11.41	35.26
	5/30/2012	46.67	10.20	36.47
	2/29/2012	46.67	10.32	36.35
	11/29/2011	46.67	10.40	36.27
	8/30/2011	46.67	9.58	37.09
	5/31/2011	46.67	10.66	36.01
	2/24/2011	46.67	10.99	35.68
	5/20/2010	46.67	12.83	33.84
SW-25	2/24/2017	*	*	*
	11/18/2016	80.25	63.05	17.20
	8/29/2016	80.25	64.70	15.55
	5/26/2016	80.25	66.50	13.75
	2/26/2016	80.25	67.21	13.04
	11/20/2015	80.25	63.37	16.88
	8/28/2015	80.25	65.37	14.88
	5/29/2015	80.25	65.45	14.80
	3/3/2015	80.25	63.08	17.17
	11/21/2014	80.25	64.95	15.30
	8/29/2014	80.25	67.35	12.90
	5/28/2014	80.25	70.80	9.45
	2/25/2014	80.25	69.90	10.35
	11/26/2013	80.25	63.40	16.85
	8/30/2013	80.25	63.10	17.15
	5/30/2013	80.25	63.45	16.80
	2/27/2013	80.25	61.34	18.91
	11/26/2012	80.25	61.60	18.65
	8/30/2012	80.25	61.67	18.58
	5/31/2012	80.25	60.81	19.44
	2/29/2012	80.25	59.92	20.33
	12/9/2011	80.25	56.89	23.36
	8/30/2011	80.25	61.97	18.28
	5/31/2011	80.25	59.20	21.05
	2/24/2011	80.25	58.23	22.02
	11/2/2010	80.25	58.04	22.21
	4/30/2010	80.25	56.04	24.21

TABLE 3
GROUNDWATER ELEVATIONS

Well Number	Date	TOC Elevation	DTW	Groundwater Elevation
SW-26	2/22/2017	46.60	14.41	32.19
	11/16/2016	46.60	14.58	32.02
	8/25/2016	46.60	14.60	32.00
	5/24/2016	46.60	16.12	30.48
	2/25/2016	46.60	14.90	31.70
	11/19/2015	46.60	14.50	32.10
	8/26/2015	46.60	16.51	30.09
	5/28/2015	46.60	20.38	26.22
	2/26/2015	46.60	17.75	28.85
	11/19/2014	46.60	18.10	28.50
	8/28/2014	46.60	16.05	30.55
	5/27/2014	46.60	20.61	25.99
	2/25/2014	46.60	18.57	28.03
	11/25/2013	46.60	19.41	27.19
	8/29/2013	46.60	19.31	27.29
	5/29/2013	46.60	17.65	28.95
	2/27/2013	46.60	17.83	28.77
	11/26/2012	46.60	13.84	32.76
	8/29/2012	46.60	18.02	28.58
	5/30/2012	46.60	19.25	27.35
	2/29/2012	46.60	19.23	27.37
	11/29/2011	46.60	19.29	27.31
	8/30/2011	46.60	20.09	26.51
	5/31/2011	46.60	20.52	26.08
	2/24/2011	46.60	20.02	26.58
	11/2/2010	46.60	13.67	32.93
	4/30/2010	46.60	22.07	24.53
SW-27	2/22/2017	51.65	23.57	28.08
	11/17/2016	51.65	24.61	27.04
	8/25/2016	51.65	23.50	28.15
	5/24/2016	51.65	25.91	25.74
	2/25/2016	51.65	25.80	25.85
	11/19/2015	51.65	23.20	28.45
	8/26/2015	51.65	24.60	27.05
	5/28/2015	51.65	28.10	23.55
	2/26/2015	51.65	25.23	26.42
	11/19/2014	51.65	27.16	24.49
	8/28/2014	51.65	25.95	25.70
	5/27/2014	51.65	25.05	26.60
	2/24/2014	51.65	25.57	26.08
	11/25/2013	51.65	26.30	25.35
	8/29/2013	51.65	28.20	23.45
	5/29/2013	51.65	22.50	29.15
	2/27/2013	51.65	22.82	28.83
	11/26/2012	51.65	22.25	29.40
	8/29/2012	51.65	23.85	27.80
	5/31/2012	51.65	24.20	27.45
	2/29/2012	51.65	23.68	27.97
	11/29/2011	51.65	23.21	28.44
	8/30/2011	51.65	22.36	29.29
	5/31/2011	51.65	23.12	28.53
	2/24/2011	51.65	23.57	28.08
	11/2/2010	51.65	23.64	28.01
	4/30/2010	51.65	23.39	28.26

Notes:
* = Not sampled due to Mercer Street construction activities.
** = Data missing due to malfunction.
Elevations are in feet (North America Vertical Datum [NAVD] 88)
DTW = depth to water
SVE = soil vapor extraction
TOC = top of well casing

Filename: J:\211\12176-046\21-1-12176-046 Fig 2-3-Q25.dwg Date: 03-24-2017 Login: Mark McDonald



LEGEND

- SVE (Soil Vapor Extraction) Well
- AS (Air Sparging) Well
- Well Selected for Groundwater Monitoring
- Compliance Monitoring Well
- Estimated Baseline Extent of Benzene in Groundwater >5 µg/L (February 2008)
- Estimated Baseline Extent of Benzene in Soil >0.3 mg/kg (January-March 2008)
- SVE Piping (Multiple Pipes)
- AS Piping (Multiple Pipes)
- Fugitive Vapor Collection Piping

0 40 80

Scale in Feet

NOTES

1. Well locations and piping are adapted from as-built drawing provided by Sellen Construction, received 5-18-2011.
2. Figure adapted from electronic files provided by Aspect Consulting and KPFF, dated March 2008 and March 2011.
3. Well AS-30 was decommissioned in May 2013.

Phase 2 Remediation Monitoring - 25th Quarter
Seattle Center Lot No. 2
Seattle, Washington

SITE PLAN

April 2017 21-1-12176-046

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 1

FIG. 1

Filename: J:\211\12176-046\21-1-12176-046 Fig 2-3-Q25.dwg Date: 03-24-2017 Login: Mark McDonald

SVE-13	11-18-16	02-24-17
TPH-G	ND	ND
B	ND	ND

SVE-16	11-18-16	02-24-17
TPH-G	260	ND
B	2.0	ND

SVE-17	11-18-16	02-24-17
TPH-G	ND	ND
B	ND	ND

SVE-19	11-17-16	02-24-17
TPH-G	ND	ND
B	ND	ND

SVE-20	11-17-16	02-23-17
TPH-G	ND	ND
B	ND	ND

SVE-23	11-17-16	02-23-17
TPH-G	3100	2700
B	ND	ND

SVE-24	11-17-16	02-22-17
TPH-G	680	160
B	38	2.9

SVE-25	11-17-16	02-23-17
TPH-G	ND	ND
B	ND	10

SVE-26	11-16-16	02-23-17
TPH-G	ND	ND
B	ND	ND

SW-26	11-16-16	02-22-17
TPH-G	ND	ND
B	ND	ND

SW-25	11-18-16	*
TPH-G	ND	*
B	ND	*

SW-27	11-16-16	02-22-17
TPH-G	ND	ND
B	ND	ND

Treatment Compound

N

LEGEND

- SVE (Soil Vapor Extraction) Well
- AS (Air Sparging) Well
- Well Selected for Groundwater Monitoring
- Compliance Monitoring Well
- Estimated Baseline Extent of Benzene in Groundwater >5 µg/L (February 2008)
- Estimated Baseline Extent of Benzene in Soil >0.3 mg/kg (January-March 2008)
- SVE Piping (Multiple Pipes)
- AS Piping (Multiple Pipes)
- Fugitive Vapor Collection Piping

CONCENTRATIONS LEGEND

TPH-G	Gasoline-Range Hydrocarbons
B	Benzene
µg/L	Micrograms per Liter
ND	Not Detected
*	Not Sampled in February 2017

0 40 80

Scale in Feet

NOTES

1. Well locations and piping are adapted from as-built drawing provided by Sellen Construction, received 5-18-2011.
2. Figure adapted from electronic files provided by Aspect Consulting and KPFF, dated March 2008 and March 2011.
3. Well AS-30 was decommissioned in May 2013.

Phase 2 Remediation Monitoring - 25th Quarter
Seattle Center Lot No. 2
Seattle, Washington

TPH-G AND BENZENE CONCENTRATIONS IN GROUNDWATER

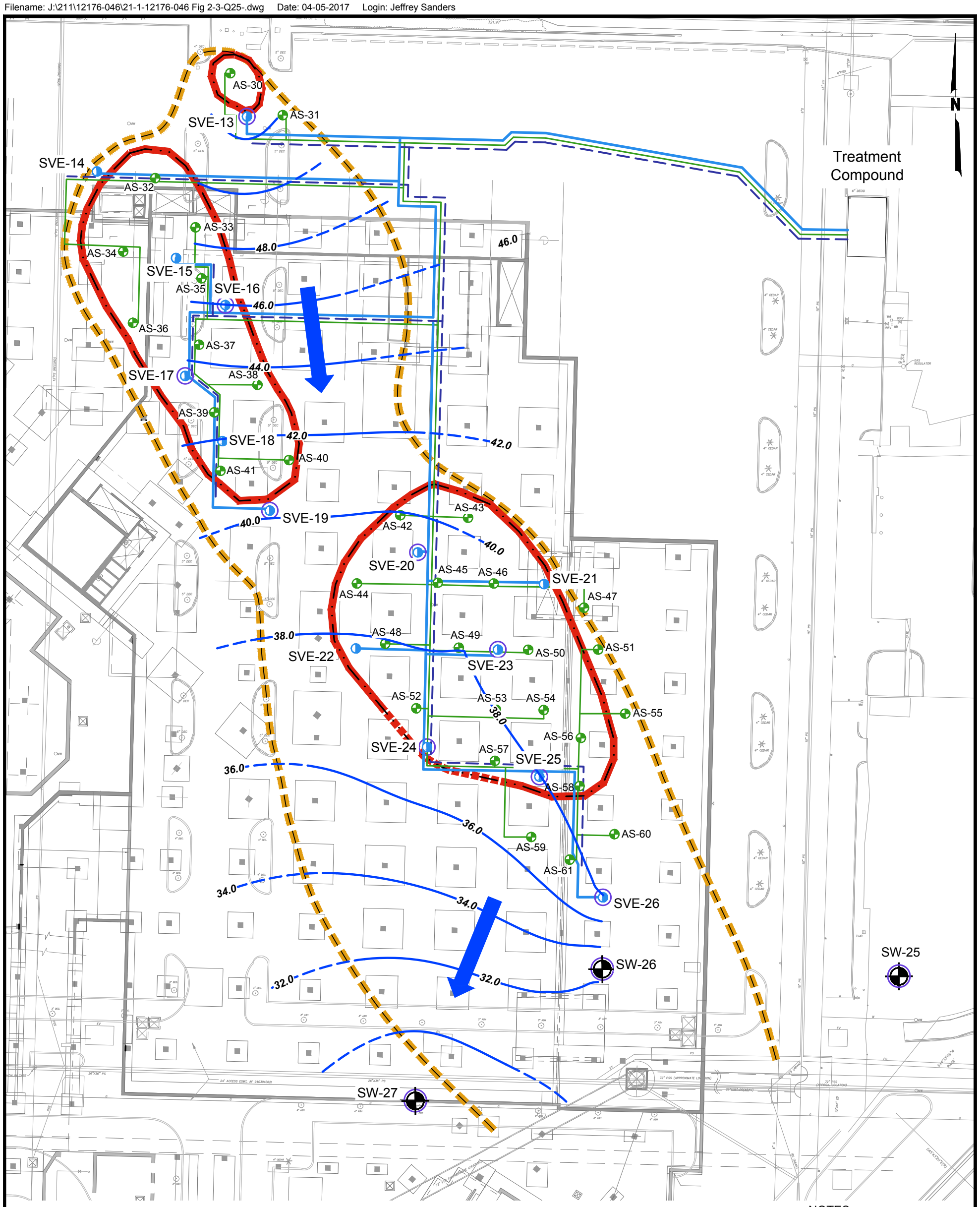
April 2017 21-1-12176-046

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 2

FIG. 2

Filename: J:\211\12176-046\21-1-12176-046 Fig 2-3-Q25-.dwg Date: 04-05-2017 Login: Jeffrey Sanders



LEGEND

- SVE (Soil Vapor Extraction) Well
- AS (Air Sparging) Well
- Well Selected for Groundwater Monitoring
- Compliance Monitoring Well
- 48.0 — Approximate Groundwater Elevation (in feet) (Dashed where inferred)
- Approximate Groundwater Flow Direction
- Estimated Baseline Extent of Benzene in Groundwater >5 µg/L (February 2008)
- Estimated Baseline Extent of Benzene in Soil >0.3 mg/kg (January-March 2008)

0 40 80

Scale in Feet

NOTES

1. Well locations and piping are adapted from as-built drawing provided by Sellen Construction, received 5-18-2011.
2. Figure adapted from electronic files provided by Aspect Consulting and KPFF, dated March 2008 and March 2011.
3. Well AS-30 was decommissioned in May 2013.

Phase 2 Remediation Monitoring - 25th Quarter
Seattle Center Lot No. 2
Seattle, Washington

GROUNDWATER CONTOUR MAP

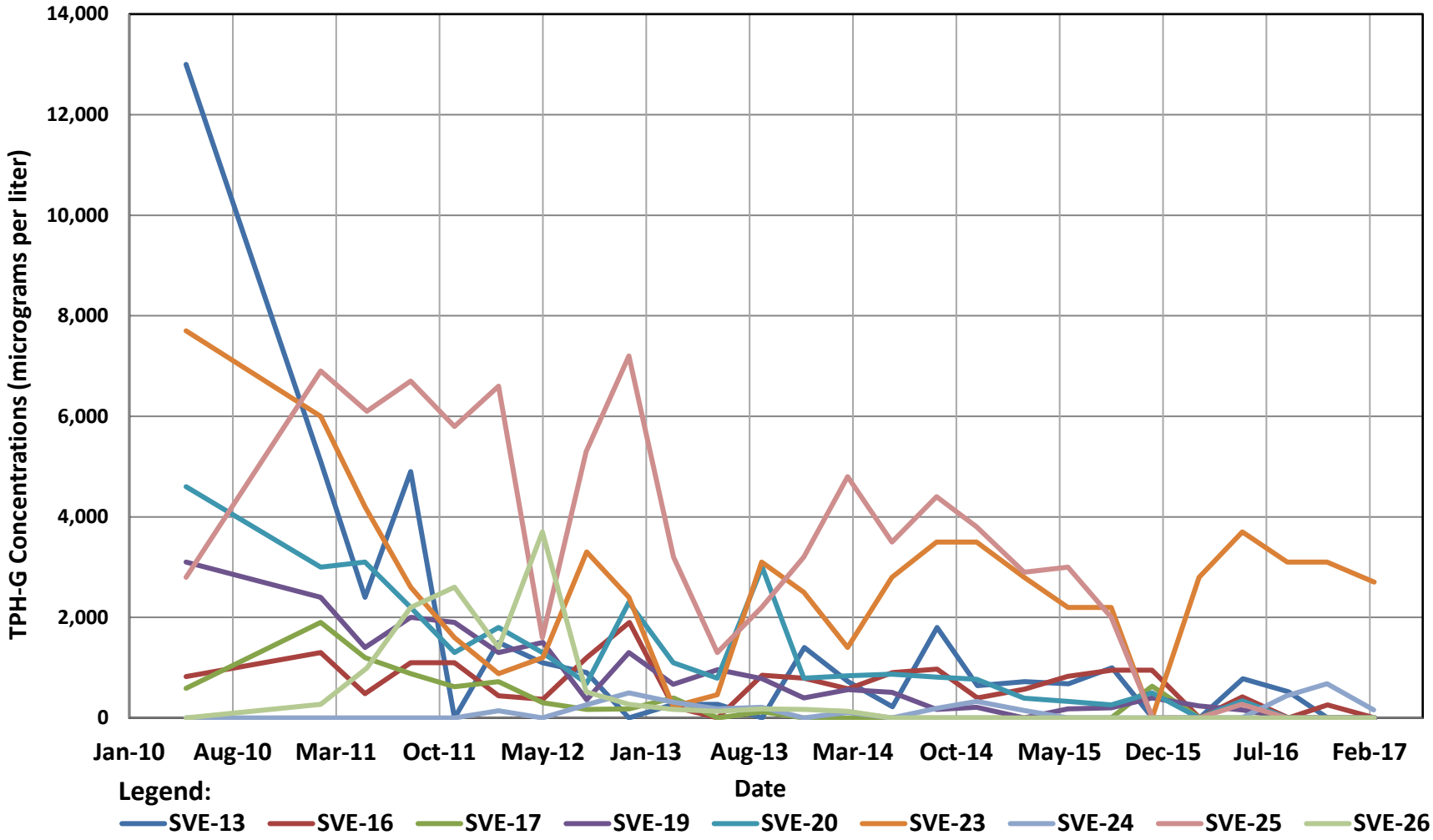
April 2017 21-1-12176-046

SHANNON & WILSON, INC. GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 3

FIG. 1

I:\WIP\21-1\12176 bus barn\Phase II\Phase II Monitoring Reports\2017\Q25 GW monitoring\Draft\21-1-12176-046-Q25-R1-T1-T3.xlsx



Non-Detects plotted as zero.

Cleanup Level = 800 micrograms per liter

Phase 2 Remediation Monitoring - 25th Quarter
Seattle Center Lot No. 2 Seattle, Washington

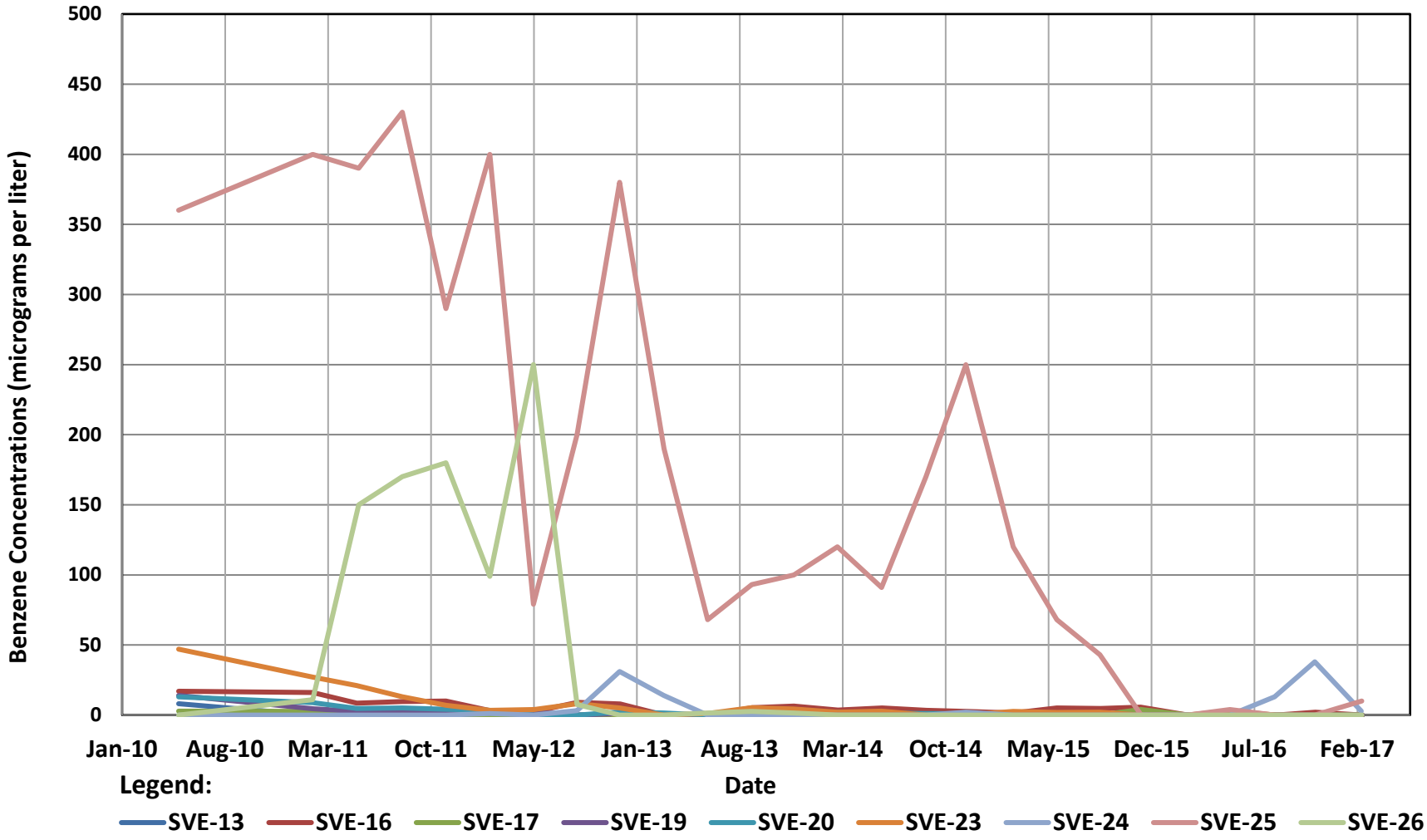
HISTORICAL TPH-G CONCENTRATIONS IN SVE WELLS

April 2017 21-1-12176-046

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. 4

FIG. 4



Non-Detects plotted as zero.

Cleanup Level = 5 micrograms per liter

Phase 2 Remediation Monitoring - 25th Quarter
Seattle Center Lot No. 2 Seattle, Washington

HISTORICAL BENZENE CONCENTRATIONS IN SVE WELLS

April 2017 21-1-12176-046

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. 5

FIG. 5

APPENDIX A

GROUNDWATER ANALYTICAL LABORATORY REPORT

OnSite Environmental Inc.
14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

March 2, 2017

Edwin Ptak
Shannon & Wilson, Inc.
400 N 34th Street, Suite 100
Seattle, WA 98103

Re: Analytical Data for Project 21-1-12176-044
Laboratory Reference No. 1702-206

Dear Edwin:

Enclosed are the analytical results and associated quality control data for samples submitted on February 22, 2017.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

This report pertains to the samples analyzed in accordance with the chain of custody, and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 2, 2017
Samples Submitted: February 22, 2017
Laboratory Reference: 1702-206
Project: 21-1-12176-044

Case Narrative

Samples were collected on February 22, 2017 and received by the laboratory on February 22, 2017. They were maintained at the laboratory at a temperature of 2°C to 6°C.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

This report pertains to the samples analyzed in accordance with the chain of custody, and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 2, 2017
Samples Submitted: February 22, 2017
Laboratory Reference: 1702-206
Project: 21-1-12176-044

NWTPH-Gx/BTEX

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SW-27**					
Laboratory ID:	02-206-01					
Benzene	**ND**	1.0	EPA 8021B	2-23-17	2-23-17	
Toluene	**ND**	1.0	EPA 8021B	2-23-17	2-23-17	
Ethyl Benzene	**ND**	1.0	EPA 8021B	2-23-17	2-23-17	
m,p-Xylene	**ND**	1.0	EPA 8021B	2-23-17	2-23-17	
o-Xylene	**ND**	1.0	EPA 8021B	2-23-17	2-23-17	
Gasoline	**ND**	100	NWTPH-Gx	2-23-17	2-23-17	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*102*	*61-118*				
Client ID:	**SW-26**					
Laboratory ID:	02-206-02					
Benzene	**ND**	1.0	EPA 8021B	2-23-17	2-23-17	
Toluene	**ND**	1.0	EPA 8021B	2-23-17	2-23-17	
Ethyl Benzene	**ND**	1.0	EPA 8021B	2-23-17	2-23-17	
m,p-Xylene	**ND**	1.0	EPA 8021B	2-23-17	2-23-17	
o-Xylene	**ND**	1.0	EPA 8021B	2-23-17	2-23-17	
Gasoline	**ND**	100	NWTPH-Gx	2-23-17	2-23-17	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*99*	*61-118*				
Client ID:	**SVE-24**					
Laboratory ID:	02-206-03					
Benzene	**2.9**	1.0	EPA 8021B	2-23-17	2-23-17	
Toluene	**ND**	1.0	EPA 8021B	2-23-17	2-23-17	
Ethyl Benzene	**2.3**	1.0	EPA 8021B	2-23-17	2-23-17	
m,p-Xylene	**ND**	1.0	EPA 8021B	2-23-17	2-23-17	
o-Xylene	**ND**	1.0	EPA 8021B	2-23-17	2-23-17	
Gasoline	**160**	100	NWTPH-Gx	2-23-17	2-23-17	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*99*	*61-118*				

This report pertains to the samples analyzed in accordance with the chain of custody, and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 2, 2017
Samples Submitted: February 22, 2017
Laboratory Reference: 1702-206
Project: 21-1-12176-044

NWTPH-Gx/BTEX
QUALITY CONTROL

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0223W1					
Benzene	**ND**	1.0	EPA 8021B	2-23-17	2-23-17	
Toluene	**ND**	1.0	EPA 8021B	2-23-17	2-23-17	
Ethyl Benzene	**ND**	1.0	EPA 8021B	2-23-17	2-23-17	
m,p-Xylene	**ND**	1.0	EPA 8021B	2-23-17	2-23-17	
o-Xylene	**ND**	1.0	EPA 8021B	2-23-17	2-23-17	
Gasoline	**ND**	100	NWTPH-Gx	2-23-17	2-23-17	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*101*	*61-118*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	02-161-01										
	ORIG	DUP									
Benzene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Toluene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Ethyl Benzene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
m,p-Xylene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
o-Xylene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Gasoline	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Surrogate:											
Fluorobenzene						*93*	*95*	*61-118*			
MATRIX SPIKES											
Laboratory ID:	02-161-01										
	MS	MSD	MS	MSD		MS	MSD				
Benzene	**48.6**	**53.7**	50.0	50.0	ND	**97**	**107**	80-120	10	13	
Toluene	**49.1**	**55.5**	50.0	50.0	ND	**98**	**111**	81-115	12	14	
Ethyl Benzene	**49.8**	**55.7**	50.0	50.0	ND	**100**	**111**	81-114	11	12	
m,p-Xylene	**49.8**	**55.7**	50.0	50.0	ND	**100**	**111**	81-114	11	13	
o-Xylene	**50.0**	**55.1**	50.0	50.0	ND	**100**	**110**	81-113	10	11	
Surrogate:											
Fluorobenzene						*104*	*110*	*61-118*			

This report pertains to the samples analyzed in accordance with the chain of custody, and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 2, 2017
Samples Submitted: February 22, 2017
Laboratory Reference: 1702-206
Project: 21-1-12176-044

TOTAL MANGANESE
EPA 6010C

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	02-206-01					
Client ID:	**SW-27**					
Manganese	**460**	10	6010C	3-1-17	3-1-17	
Lab ID:	02-206-02					
Client ID:	**SW-26**					
Manganese	**240**	10	6010C	3-1-17	3-1-17	
Lab ID:	02-206-03					
Client ID:	**SVE-24**					
Manganese	**13000**	200	6010C	3-1-17	3-1-17	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 2, 2017
Samples Submitted: February 22, 2017
Laboratory Reference: 1702-206
Project: 21-1-12176-044

TOTAL MANGANESE
EPA 6010C
METHOD BLANK QUALITY CONTROL

Date Extracted:	3-1-17
Date Analyzed:	3-1-17
Matrix:	Water
Units:	ug/L (ppb)
Lab ID:	MB0301WH2

Analyte	Method	Result	PQL
Manganese	6010C	**ND**	10

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 2, 2017
Samples Submitted: February 22, 2017
Laboratory Reference: 1702-206
Project: 21-1-12176-044

TOTAL MANGANESE
EPA 6010C
DUPLICATE QUALITY CONTROL

Date Extracted: 3-1-17
Date Analyzed: 3-1-17

Matrix: Water
Units: ug/L (ppb)

Lab ID: 02-165-01

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Manganese	**113**	**113**	0	10	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 2, 2017
Samples Submitted: February 22, 2017
Laboratory Reference: 1702-206
Project: 21-1-12176-044

TOTAL MANGANESE
EPA 6010C
MS/MSD QUALITY CONTROL

Date Extracted: 3-1-17
Date Analyzed: 3-1-17

Matrix: Water
Units: ug/L (ppb)

Lab ID: 02-165-01

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Manganese	500	**610**	99	**621**	102	2	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 2, 2017
Samples Submitted: February 22, 2017
Laboratory Reference: 1702-206
Project: 21-1-12176-044

DISSOLVED MANGANESE
EPA 6010C

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	02-206-01					
Client ID:	**SW-27**					
Manganese	**470**	11	6010C	2-22-17	2-24-17	
Lab ID:	02-206-02					
Client ID:	**SW-26**					
Manganese	**250**	11	6010C	2-22-17	2-24-17	
Lab ID:	02-206-03					
Client ID:	**SVE-24**					
Manganese	**13000**	200	6010C	2-22-17	2-24-17	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 2, 2017
Samples Submitted: February 22, 2017
Laboratory Reference: 1702-206
Project: 21-1-12176-044

DISSOLVED MANGANESE
EPA 6010C
METHOD BLANK QUALITY CONTROL

Date Filtered:	2-22-17
Date Analyzed:	2-24-17
Matrix:	Water
Units:	ug/L (ppb)
Lab ID:	MB0222F1

Analyte	Method	Result	PQL
Manganese	6010C	**ND**	11

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 2, 2017
Samples Submitted: February 22, 2017
Laboratory Reference: 1702-206
Project: 21-1-12176-044

DISSOLVED MANGANESE
EPA 6010C
DUPLICATE QUALITY CONTROL

Date Filtered: 2-22-17
Date Analyzed: 2-24-17

Matrix: Water
Units: ug/L (ppb)

Lab ID: 02-206-02

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Manganese	**250**	**252**	1	11	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 2, 2017
Samples Submitted: February 22, 2017
Laboratory Reference: 1702-206
Project: 21-1-12176-044

DISSOLVED MANGANESE
EPA 6010C
MS/MSD QUALITY CONTROL

Date Filtered: 2-22-17
Date Analyzed: 2-24-17

Matrix: Water
Units: ug/L (ppb)

Lab ID: 02-206-02

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Manganese	555	**864**	111	**828**	104	4	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 2, 2017
Samples Submitted: February 22, 2017
Laboratory Reference: 1702-206
Project: 21-1-12176-044

TOTAL ALKALINITY
SM 2320B

Matrix: Water
Units: mg CaCO3/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SW-27**					
Laboratory ID:	02-206-01					
Total Alkalinity	**120**	2.0	SM 2320B	2-23-17	2-23-17	
Client ID:	**SW-26**					
Laboratory ID:	02-206-02					
Total Alkalinity	**180**	2.0	SM 2320B	2-23-17	2-23-17	
Client ID:	**SVE-24**					
Laboratory ID:	02-206-03					
Total Alkalinity	**300**	2.0	SM 2320B	2-23-17	2-23-17	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 2, 2017
Samples Submitted: February 22, 2017
Laboratory Reference: 1702-206
Project: 21-1-12176-044

TOTAL ALKALINITY
SM 2320B
QUALITY CONTROL

Matrix: Water
Units: mg CaCO3/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0223W1					
Total Alkalinity	**ND**	2.0	SM 2320B	2-23-17	2-23-17	

Analyte	Result		Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE									
Laboratory ID:	02-206-01								
	ORIG	DUP							
Total Alkalinity	**124**	**120**	NA	NA	NA	NA	3	10	
SPIKE BLANK									
Laboratory ID:	SB0223W1								
	SB		SB		SB				
Total Alkalinity	**96.0**		100	NA	96	86-117	NA	NA	

This report pertains to the samples analyzed in accordance with the chain of custody, and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 2, 2017
Samples Submitted: February 22, 2017
Laboratory Reference: 1702-206
Project: 21-1-12176-044

SULFATE
ASTM D516-07

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SW-27**					
Laboratory ID:	02-206-01					
Sulfate	**80**	50	ASTM D516-07	2-27-17	2-27-17	
Client ID:	**SW-26**					
Laboratory ID:	02-206-02					
Sulfate	**43**	10	ASTM D516-07	2-27-17	2-27-17	
Client ID:	**SVE-24**					
Laboratory ID:	02-206-03					
Sulfate	**1800**	500	ASTM D516-07	2-27-17	2-27-17	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 2, 2017
Samples Submitted: February 22, 2017
Laboratory Reference: 1702-206
Project: 21-1-12176-044

SULFATE
ASTM D516-07
QUALITY CONTROL

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0227F1					
Sulfate	**ND**	5.0	ASTM D516-07	2-27-17	2-27-17	

Analyte	Result		Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE									
Laboratory ID:	02-206-01								
	ORIG	DUP							
Sulfate	**79.7**	**83.2**	NA	NA	NA	NA	4	10	
MATRIX SPIKE									
Laboratory ID:	02-206-01								
	MS		MS		MS				
Sulfate	**185**		100	79.7	105	77-129	NA	NA	
SPIKE BLANK									
Laboratory ID:	SB0227F1								
	SB		SB		SB				
Sulfate	**9.72**		10.0	NA	97	91-113	NA	NA	

This report pertains to the samples analyzed in accordance with the chain of custody, and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 2, 2017
Samples Submitted: February 22, 2017
Laboratory Reference: 1702-206
Project: 21-1-12176-044

NITRATE (as Nitrogen)
EPA 353.2

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SW-27**					
Laboratory ID:	02-206-01					
Nitrate	**0.054**	0.050	EPA 353.2	2-24-17	2-24-17	
Client ID:	**SW-26**					
Laboratory ID:	02-206-02					
Nitrate	**0.36**	0.050	EPA 353.2	2-24-17	2-24-17	
Client ID:	**SVE-24**					
Laboratory ID:	02-206-03					
Nitrate	**0.19**	0.050	EPA 353.2	2-24-17	2-24-17	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 2, 2017
Samples Submitted: February 22, 2017
Laboratory Reference: 1702-206
Project: 21-1-12176-044

NITRATE (as Nitrogen)
EPA 353.2
QUALITY CONTROL

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0224W1					
Nitrate	**ND**	0.050	EPA 353.2	2-24-17	2-24-17	

Analyte	Result		Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE									
Laboratory ID:	02-206-01								
	ORIG	DUP							
Nitrate	**0.0538**	**ND**	NA	NA	NA	NA	NA	9	
MATRIX SPIKE									
Laboratory ID:	02-206-01								
	MS		MS		MS				
Nitrate	**2.25**		2.00	0.0538	110	93-126	NA	NA	
SPIKE BLANK									
Laboratory ID:	SB0224W1								
	SB		SB		SB				
Nitrate	**2.21**		2.00	NA	111	96-122	NA	NA	

This report pertains to the samples analyzed in accordance with the chain of custody, and is intended only for the use of the individual or company to whom it is addressed.

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-napthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical _____.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1- Sample extract treated with a Sulfuric acid/Silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in method 8260C, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

This report pertains to the samples analyzed in accordance with the chain of custody, and is intended only for the use of the individual or company to whom it is addressed.

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

Shannon & Wilson
Ed Ptak
400 N. 34th Street, Suite 100
Seattle, WA 98103

RE: Seattle Center
Work Order Number: 1702245

February 24, 2017

Attention Ed Ptak:

Fremont Analytical, Inc. received 3 sample(s) on 2/22/2017 for the analyses presented in the following report.

Ferrous Iron by SM3500-Fe B

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Mike Ridgeway
Laboratory Director

CC:
David Baumeister

Date: *02/24/2017*

CLIENT: Shannon & Wilson
Project: Seattle Center
Work Order: 1702245

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1702245-001	SW-27	02/22/2017 12:00 PM	02/22/2017 2:28 PM
1702245-002	SW-26	02/22/2017 1:00 PM	02/22/2017 2:28 PM
1702245-003	SVE-24	02/22/2017 2:00 PM	02/22/2017 2:28 PM

Case Narrative

WO#: **1702245**
Date: **2/24/2017**

CLIENT: Shannon & Wilson
Project: Seattle Center

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

* - Flagged value is not within established control limits
B - Analyte detected in the associated Method Blank
D - Dilution was required
E - Value above quantitation range
H - Holding times for preparation or analysis exceeded
I - Analyte with an internal standard that does not meet established acceptance criteria
J - Analyte detected below Reporting Limit
N - Tentatively Identified Compound (TIC)
Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
S - Spike recovery outside accepted recovery limits
ND - Not detected at the Reporting Limit
R - High relative percent difference observed

Acronyms:

%Rec - Percent Recovery
CCB - Continued Calibration Blank
CCV - Continued Calibration Verification
DF - Dilution Factor
HEM - Hexane Extractable Material
ICV - Initial Calibration Verification
LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
MB or MBLANK - Method Blank
MDL - Method Detection Limit
MS/MSD - Matrix Spike / Matrix Spike Duplicate
PDS - Post Digestion Spike
Ref Val - Reference Value
RL - Reporting Limit
RPD - Relative Percent Difference
SD - Serial Dilution
SGT - Silica Gel Treatment
SPK - Spike
Surr - Surrogate

CLIENT: Shannon & Wilson
Project: Seattle Center

Lab ID: 1702245-001 **Collection Date:** 2/22/2017 12:00:00 PM
Client Sample ID: **SW-27** **Matrix:** Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ferrous Iron by SM3500-Fe B				Batch ID: R34641		Analyst: KT
Ferrous Iron	18.3	0.500	D	mg/L	10	2/23/2017 11:46:00 AM

Lab ID: 1702245-002 **Collection Date:** 2/22/2017 1:00:00 PM
Client Sample ID: **SW-26** **Matrix:** Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ferrous Iron by SM3500-Fe B				Batch ID: R34641		Analyst: KT
Ferrous Iron	0.209	0.0500		mg/L	1	2/23/2017 11:44:00 AM

Lab ID: 1702245-003 **Collection Date:** 2/22/2017 2:00:00 PM
Client Sample ID: **SVE-24** **Matrix:** Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ferrous Iron by SM3500-Fe B				Batch ID: R34641		Analyst: KT
Ferrous Iron	23.4	1.00	D	mg/L	20	2/23/2017 11:47:00 AM

Fremont Analytical

Date: *2/24/2017*

Work Order: 1702245
CLIENT: Shannon & Wilson
Project: Seattle Center

QC SUMMARY REPORT

Ferrous Iron by SM3500-Fe B

Sample ID	**MB-R34641**	SampType: **MBLK**			Units: **mg/L**		Prep Date: **2/23/2017**		RunNo: **34641**	
Client ID:	**MBLKW**	Batch ID: **R34641**					Analysis Date: **2/23/2017**		SeqNo: **661257**	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Ferrous Iron	ND	0.0500									

Sample ID	**LCS-R34641**	SampType: **LCS**			Units: **mg/L**		Prep Date: **2/23/2017**		RunNo: **34641**	
Client ID:	**LCSW**	Batch ID: **R34641**					Analysis Date: **2/23/2017**		SeqNo: **661258**	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Ferrous Iron	0.903	0.0500	1.000	0	90.3	90	110				

Sample ID	**1702245-002ADUP**	SampType: **DUP**			Units: **mg/L**		Prep Date: **2/23/2017**		RunNo: **34641**	
Client ID:	**SW-26**	Batch ID: **R34641**					Analysis Date: **2/23/2017**		SeqNo: **661264**	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Ferrous Iron	0.218	0.0500						0.2086	4.40	20	

Sample ID	**1702245-002AMS**	SampType: **MS**			Units: **mg/L**		Prep Date: **2/23/2017**		RunNo: **34641**	
Client ID:	**SW-26**	Batch ID: **R34641**					Analysis Date: **2/23/2017**		SeqNo: **661265**	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Ferrous Iron	1.15	0.0500	1.000	0.2086	94.1	85	115				

Sample ID	**1702245-002AMSD**	SampType: **MSD**			Units: **mg/L**		Prep Date: **2/23/2017**		RunNo: **34641**	
Client ID:	**SW-26**	Batch ID: **R34641**					Analysis Date: **2/23/2017**		SeqNo: **661266**	
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Ferrous Iron	1.16	0.0500	1.000	0.2086	95.3	85	115	1.150	1.02	20	

Sample Log-In Check List

Client Name:	**SW**	Work Order Number:	**1702245**
Logged by:	**Clare Griggs**	Date Received:	**2/22/2017 2:28:00 PM**

Chain of Custody

1.	Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
2.	How was the sample delivered?	Client		

Log In

3.	Coolers are present?	Yes ☑	No ☐	NA ☐
4.	Shipping container/cooler in good condition?	Yes ☑	No ☐	
5.	Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact)	Yes ☐	No ☐	Not Required ☑
6.	Was an attempt made to cool the samples?	Yes ☑	No ☐	NA ☐
7.	Were all items received at a temperature of >0°C to 10.0°C*	Yes ☐	No ☑	NA ☐
	Samples received straight from field.			
8.	Sample(s) in proper container(s)?	Yes ☑	No ☐	
9.	Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
10.	Are samples properly preserved?	Yes ☑	No ☐	
11.	Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
12.	Is there headspace in the VOA vials?	Yes ☐	No ☐	NA ☑
13.	Did all samples containers arrive in good condition(unbroken)?	Yes ☑	No ☐	
14.	Does paperwork match bottle labels?	Yes ☑	No ☐	
15.	Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
16.	Is it clear what analyses were requested?	Yes ☑	No ☐	
17.	Were all holding times able to be met?	Yes ☑	No ☐	

Special Handling (if applicable)

18.	Was client notified of all discrepancies with this order?	Yes ☐	No ☐	NA ☑

Person Notified: _____ Date _____

By Whom: _____ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding: _____

Client Instructions: _____

19. Additional remarks:

Item Information

Item #	Temp ºC
Cooler	9.1
Sample	12.9

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

Chain of Custody Record and Laboratory Services Agreement

Fremont Analytical

3600 Fremont Ave N.
Seattle, WA 98103
Tel: 206-352-3790
Fax: 206-352-7178

Date: 2/22/17

Laboratory Project No (internal): 1702245

Page: 1 of: 1

Client: Shannon & Wilson Inc.
Address: 400 N 34th St. Suite 100
City, State, Zip: Seattle, WA 98103
Telephone: 206-632-8020 Fax: 206-695-6777

Project Name: Seattle Center
Project No: 21-1-12176-044 Collected by: EVP
Location: Seattle Center
Report To (PM): EVP
PM Email: evp@shanwil.com

*Matrix Codes: A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD = Sediment, SL = Solid, W = Water, DW = Drinking Water, GW = Ground Water, SW = Storm Water, WW = Waste Water

	Sample Name	Sample Date	Sample Time	Sample Type (Matrix)*	VOCs (EPA 8260 / 624)	GX/BTEX	BTEX	Gasoline Range Organics (GX)	Hydrocarbon Identification (HCID)	Diesel/Heavy Oil Range Organics (DX)	SVOCs (EPA 8270 / 625)	PAHs (EPA 8270 - SIM / 625)	PCBs (EPA 8082 / 608)	Metals** (EPA 6020 / 200.8)	Total (T) | Dissolved (D)	Anions (IC)***	EDB (8011)	Ferrous Fe				Comments
1	SW-27	2/22/17	1200	GW														X				
2	SW-26	"	1300	"														X				
3	SVE-24	"	1400	"														X				
4																						
5																						
6																						
7																						
8																						
9																						
10																						

**Metals Analysis (Circle): MTCA-5 RCRA-8 Priority Pollutants TAL *Individual:* Ag Al As B Ba Be Ca Cd Co Cr Cu Fe Hg K Mg Mn Mo Na Ni Pb Sb Se Sr Sn Ti Tl U V Zn

***Anions (Circle): Nitrate Nitrite Chloride Sulfate Bromide O-Phosphate Fluoride Nitrate+Nitrite

Sample Disposal: ☐ Return to Client ☒ Disposal by Lab (Samples will be held for 30 days unless otherwise noted. A fee may be assessed if samples are retained after 30 days.)

Turn-around times for samples received after 4:00pm will begin on the following business day.

Special Remarks:
bill to Onsite
David Baumister

I represent that I am authorized to enter into this Agreement with Fremont Analytical on behalf of the Client named above, that I have verified Client's agreement to each of the terms on the front and backside of this Agreement.

Relinquished	Date/Time	Received	Date/Time
x	2/22/17 1430	x	2/22/17 2:28pm
Relinquished	Date/Time	Received	Date/Time
x		x	

TAT → SameDay^ NextDay^ 2 Day 3 Day (STD)

^Please coordinate with the lab in advance

Chain of Custody

Page 1 of 1

OnSite Environmental Inc.
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Laboratory Number: 02-206

Company: Shannon & Wilson Inc.
Project Number: 21-1-12176-044
Project Name: Seattle Center
Project Manager: EVP
Sampled by: EVP

Turnaround Request (in working days)
(Check One)
☐ Same Day ☐ 1 Day
☐ 2 Days ☐ 3 Days
☒ Standard (7 Days) (TPH analysis 5 Days)
☐ _____ (other)

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx (☐ Acid / SG Clean-up)	Volatiles 8260C	Halogenated Volatiles 8260C	EDB EPA 8011 (Waters Only)	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664A	total ** diss. manganese	alkalinity	sulfate	nitrate	% moisture * Ferrous Iron
1	SW-27	2/22/17	1200	GW	6		X																X	X	X	X	X
2	SW-26	"	1300	"	6		X																X	X	X	X	X
3	SVE-24	"	1400	"	6		X																X	X	X	X	X
4	TRIP BLANK	"	-	GW	1																						

	Signature	Company	Date	Time
Relinquished	[signature]	S&W	2/22/17	1410
Received	[signature]	Spdy	2/22/17	1410
Relinquished	[signature]	Spdy	2/22/17	1520
Received	[signature]	OSE	2/22/17	1520
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions
* Samples sent directly to Fremont Analytical
** Need lab filtering

Data Package: Standard ☐ Level III ☐ Level IV ☐
Chromatograms with final report ☐ Electronic Data Deliverables (EDDs) ☒

OnSite Environmental Inc.
14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

March 2, 2017

Edwin Ptak
Shannon & Wilson, Inc.
400 N 34th Street, Suite 100
Seattle, WA 98103

Re: Analytical Data for Project 21-1-12176-044
Laboratory Reference No. 1702-220

Dear Edwin:

Enclosed are the analytical results and associated quality control data for samples submitted on February 23, 2017.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,

David Baumeister
Project Manager

Enclosures

This report pertains to the samples analyzed in accordance with the chain of custody, and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 2, 2017
Samples Submitted: February 23, 2017
Laboratory Reference: 1702-220
Project: 21-1-12176-044

Case Narrative

Samples were collected on February 23, 2017 and received by the laboratory on February 23, 2017. They were maintained at the laboratory at a temperature of 2°C to 6°C.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

This report pertains to the samples analyzed in accordance with the chain of custody, and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 2, 2017
Samples Submitted: February 23, 2017
Laboratory Reference: 1702-220
Project: 21-1-12176-044

NWTPH-Gx/BTEX

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SVE-26**					
Laboratory ID:	02-220-01					
Benzene	**ND**	1.0	EPA 8021B	2-27-17	2-27-17	
Toluene	**ND**	1.0	EPA 8021B	2-27-17	2-27-17	
Ethyl Benzene	**ND**	1.0	EPA 8021B	2-27-17	2-27-17	
m,p-Xylene	**ND**	1.0	EPA 8021B	2-27-17	2-27-17	
o-Xylene	**ND**	1.0	EPA 8021B	2-27-17	2-27-17	
Gasoline	**ND**	100	NWTPH-Gx	2-27-17	2-27-17	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*97*	*61-118*				
Client ID:	**SVE-25**					
Laboratory ID:	02-220-02					
Benzene	**10**	4.0	EPA 8021B	2-27-17	2-27-17	
Toluene	**ND**	4.0	EPA 8021B	2-27-17	2-27-17	
Ethyl Benzene	**7.8**	4.0	EPA 8021B	2-27-17	2-27-17	
m,p-Xylene	**8.1**	4.0	EPA 8021B	2-27-17	2-27-17	
o-Xylene	**ND**	4.0	EPA 8021B	2-27-17	2-27-17	
Gasoline	**ND**	400	NWTPH-Gx	2-27-17	2-27-17	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*90*	*61-118*				
Client ID:	**SVE-23**					
Laboratory ID:	02-220-03					
Benzene	**ND**	4.0	EPA 8021B	2-27-17	2-27-17	
Toluene	**10**	4.0	EPA 8021B	2-27-17	2-27-17	
Ethyl Benzene	**86**	4.0	EPA 8021B	2-27-17	2-27-17	
m,p-Xylene	**170**	4.0	EPA 8021B	2-27-17	2-27-17	
o-Xylene	**6.6**	4.0	EPA 8021B	2-27-17	2-27-17	
Gasoline	**2700**	400	NWTPH-Gx	2-27-17	2-27-17	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*91*	*61-118*				

This report pertains to the samples analyzed in accordance with the chain of custody, and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 2, 2017
Samples Submitted: February 23, 2017
Laboratory Reference: 1702-220
Project: 21-1-12176-044

NWTPH-Gx/BTEX

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SVE-20**					
Laboratory ID:	02-220-04					
Benzene	**ND**	4.0	EPA 8021B	2-27-17	2-27-17	
Toluene	**ND**	4.0	EPA 8021B	2-27-17	2-27-17	
Ethyl Benzene	**6.1**	4.0	EPA 8021B	2-27-17	2-27-17	
m,p-Xylene	**ND**	4.0	EPA 8021B	2-27-17	2-27-17	
o-Xylene	**ND**	4.0	EPA 8021B	2-27-17	2-27-17	
Gasoline	**ND**	400	NWTPH-Gx	2-27-17	2-27-17	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*90*	*61-118*				
Client ID:	**Trip Blank**					
Laboratory ID:	02-220-05					
Benzene	**ND**	1.0	EPA 8021B	2-27-17	2-27-17	
Toluene	**ND**	1.0	EPA 8021B	2-27-17	2-27-17	
Ethyl Benzene	**ND**	1.0	EPA 8021B	2-27-17	2-27-17	
m,p-Xylene	**ND**	1.0	EPA 8021B	2-27-17	2-27-17	
o-Xylene	**ND**	1.0	EPA 8021B	2-27-17	2-27-17	
Gasoline	**ND**	100	NWTPH-Gx	2-27-17	2-27-17	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*96*	*61-118*				

This report pertains to the samples analyzed in accordance with the chain of custody, and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 2, 2017
Samples Submitted: February 23, 2017
Laboratory Reference: 1702-220
Project: 21-1-12176-044

NWTPH-Gx/BTEX
QUALITY CONTROL

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0227W1					
Benzene	**ND**	1.0	EPA 8021B	2-27-17	2-27-17	
Toluene	**ND**	1.0	EPA 8021B	2-27-17	2-27-17	
Ethyl Benzene	**ND**	1.0	EPA 8021B	2-27-17	2-27-17	
m,p-Xylene	**ND**	1.0	EPA 8021B	2-27-17	2-27-17	
o-Xylene	**ND**	1.0	EPA 8021B	2-27-17	2-27-17	
Gasoline	**ND**	100	NWTPH-Gx	2-27-17	2-27-17	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*92*	*61-118*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	02-220-01										
	ORIG	DUP									
Benzene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Toluene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Ethyl Benzene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
m,p-Xylene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
o-Xylene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Gasoline	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Surrogate:											
Fluorobenzene						*97*	*96*	*61-118*			
MATRIX SPIKES											
Laboratory ID:	02-220-01										
	MS	MSD	MS	MSD		MS	MSD				
Benzene	**48.9**	**49.0**	50.0	50.0	ND	**98**	**98**	80-120	0	13	
Toluene	**49.5**	**49.6**	50.0	50.0	ND	**99**	**99**	81-115	0	14	
Ethyl Benzene	**50.3**	**50.4**	50.0	50.0	ND	**101**	**101**	81-114	0	12	
m,p-Xylene	**49.7**	**49.8**	50.0	50.0	ND	**99**	**100**	81-114	0	13	
o-Xylene	**49.9**	**50.0**	50.0	50.0	ND	**100**	**100**	81-113	0	11	
Surrogate:											
Fluorobenzene						*97*	*94*	*61-118*			

This report pertains to the samples analyzed in accordance with the chain of custody, and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 2, 2017
Samples Submitted: February 23, 2017
Laboratory Reference: 1702-220
Project: 21-1-12176-044

TOTAL MANGANESE
EPA 6010C

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	02-220-01					
Client ID:	**SVE-26**					
Manganese	**980**	10	6010C	3-1-17	3-1-17	
Lab ID:	02-220-02					
Client ID:	**SVE-25**					
Manganese	**2100**	50	6010C	3-1-17	3-1-17	
Lab ID:	02-220-03					
Client ID:	**SVE-23**					
Manganese	**1300**	50	6010C	3-1-17	3-1-17	
Lab ID:	02-220-04					
Client ID:	**SVE-20**					
Manganese	**3500**	50	6010C	3-1-17	3-1-17	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 2, 2017
Samples Submitted: February 23, 2017
Laboratory Reference: 1702-220
Project: 21-1-12176-044

TOTAL MANGANESE
EPA 6010C
METHOD BLANK QUALITY CONTROL

Date Extracted:	3-1-17
Date Analyzed:	3-1-17
Matrix:	Water
Units:	ug/L (ppb)
Lab ID:	MB0301WH2

Analyte	Method	Result	PQL
Manganese	6010C	**ND**	10

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 2, 2017
Samples Submitted: February 23, 2017
Laboratory Reference: 1702-220
Project: 21-1-12176-044

TOTAL MANGANESE
EPA 6010C
DUPLICATE QUALITY CONTROL

Date Extracted: 3-1-17
Date Analyzed: 3-1-17

Matrix: Water
Units: ug/L (ppb)

Lab ID: 02-165-01

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Manganese	**113**	**113**	0	10	

This report pertains to the samples analyzed in accordance with the chain of custody, and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 2, 2017
Samples Submitted: February 23, 2017
Laboratory Reference: 1702-220
Project: 21-1-12176-044

TOTAL MANGANESE
EPA 6010C
MS/MSD QUALITY CONTROL

Date Extracted: 3-1-17
Date Analyzed: 3-1-17

Matrix: Water
Units: ug/L (ppb)

Lab ID: 02-165-01

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Manganese	500	**610**	99	**621**	102	2	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 2, 2017
Samples Submitted: February 23, 2017
Laboratory Reference: 1702-220
Project: 21-1-12176-044

DISSOLVED MANGANESE
EPA 6010C

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	02-220-01					
Client ID:	**SVE-26**					
Manganese	**940**	11	6010C	2-23-17	2-24-17	
Lab ID:	02-220-02					
Client ID:	**SVE-25**					
Manganese	**2000**	50	6010C	2-23-17	2-24-17	
Lab ID:	02-220-03					
Client ID:	**SVE-23**					
Manganese	**1300**	50	6010C	2-23-17	2-24-17	
Lab ID:	02-220-04					
Client ID:	**SVE-20**					
Manganese	**3200**	50	6010C	2-23-17	2-24-17	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 2, 2017
Samples Submitted: February 23, 2017
Laboratory Reference: 1702-220
Project: 21-1-12176-044

DISSOLVED MANGANESE
EPA 6010C
METHOD BLANK QUALITY CONTROL

Date Filtered:	2-23-17
Date Analyzed:	2-24-17
Matrix:	Water
Units:	ug/L (ppb)
Lab ID:	MB0223F1

Analyte	Method	Result	PQL
Manganese	6010C	**ND**	11

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 2, 2017
Samples Submitted: February 23, 2017
Laboratory Reference: 1702-220
Project: 21-1-12176-044

DISSOLVED MANGANESE
EPA 6010C
DUPLICATE QUALITY CONTROL

Date Filtered: 2-22-17
Date Analyzed: 2-24-17

Matrix: Water
Units: ug/L (ppb)

Lab ID: 02-206-02

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Manganese	**250**	**252**	1	11	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 2, 2017
Samples Submitted: February 23, 2017
Laboratory Reference: 1702-220
Project: 21-1-12176-044

DISSOLVED MANGANESE
EPA 6010C
MS/MSD QUALITY CONTROL

Date Filtered: 2-22-17
Date Analyzed: 2-24-17

Matrix: Water
Units: ug/L (ppb)

Lab ID: 02-206-02

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Manganese	555	**864**	111	**828**	104	4	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 2, 2017
Samples Submitted: February 23, 2017
Laboratory Reference: 1702-220
Project: 21-1-12176-044

TOTAL ALKALINITY
SM 2320B

Matrix: Water
Units: mg CaCO3/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SVE-26**					
Laboratory ID:	02-220-01					
Total Alkalinity	**94**	2.0	SM 2320B	2-28-17	2-28-17	
Client ID:	**SVE-25**					
Laboratory ID:	02-220-02					
Total Alkalinity	**140**	2.0	SM 2320B	2-28-17	2-28-17	
Client ID:	**SVE-23**					
Laboratory ID:	02-220-03					
Total Alkalinity	**260**	2.0	SM 2320B	2-28-17	2-28-17	
Client ID:	**SVE-20**					
Laboratory ID:	02-220-04					
Total Alkalinity	**820**	2.0	SM 2320B	2-28-17	2-28-17	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 2, 2017
Samples Submitted: February 23, 2017
Laboratory Reference: 1702-220
Project: 21-1-12176-044

TOTAL ALKALINITY
SM 2320B
QUALITY CONTROL

Matrix: Water
Units: mg CaCO3/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0228W1					
Total Alkalinity	**ND**	2.0	SM 2320B	2-28-17	2-28-17	

Analyte	Result		Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE									
Laboratory ID:	02-220-01								
	ORIG	DUP							
Total Alkalinity	**94.0**	**94.0**	NA	NA	NA	NA	0	10	
SPIKE BLANK									
Laboratory ID:	SB0228W1								
	SB		SB		SB				
Total Alkalinity	**100**		100	NA	100	86-117	NA	NA	

This report pertains to the samples analyzed in accordance with the chain of custody, and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 2, 2017
Samples Submitted: February 23, 2017
Laboratory Reference: 1702-220
Project: 21-1-12176-044

SULFATE
ASTM D516-07

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SVE-26**					
Laboratory ID:	02-220-01					
Sulfate	**240**	100	ASTM D516-07	2-27-17	2-27-17	
Client ID:	**SVE-25**					
Laboratory ID:	02-220-02					
Sulfate	**220**	100	ASTM D516-07	2-27-17	2-27-17	
Client ID:	**SVE-23**					
Laboratory ID:	02-220-03					
Sulfate	**5.7**	5.0	ASTM D516-07	2-27-17	2-27-17	
Client ID:	**SVE-20**					
Laboratory ID:	02-220-04					
Sulfate	**240**	130	ASTM D516-07	2-27-17	2-27-17	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 2, 2017
Samples Submitted: February 23, 2017
Laboratory Reference: 1702-220
Project: 21-1-12176-044

SULFATE
ASTM D516-07
QUALITY CONTROL

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0227F1					
Sulfate	**ND**	5.0	ASTM D516-07	2-27-17	2-27-17	

Analyte	Result		Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE									
Laboratory ID:	02-206-01								
	ORIG	DUP							
Sulfate	**79.7**	**83.2**	NA	NA	NA	NA	4	10	
MATRIX SPIKE									
Laboratory ID:	02-206-01								
	MS		MS		MS				
Sulfate	**185**		100	79.7	105	77-129	NA	NA	
SPIKE BLANK									
Laboratory ID:	SB0227F1								
	SB		SB		SB				
Sulfate	**9.72**		10.0	NA	97	91-113	NA	NA	

This report pertains to the samples analyzed in accordance with the chain of custody, and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 2, 2017
Samples Submitted: February 23, 2017
Laboratory Reference: 1702-220
Project: 21-1-12176-044

NITRATE (as Nitrogen)
EPA 353.2

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SVE-26**					
Laboratory ID:	02-220-01					
Nitrate	**0.17**	0.050	EPA 353.2	2-24-17	2-24-17	
Client ID:	**SVE-25**					
Laboratory ID:	02-220-02					
Nitrate	**0.056**	0.050	EPA 353.2	2-24-17	2-24-17	
Client ID:	**SVE-23**					
Laboratory ID:	02-220-03					
Nitrate	**ND**	0.050	EPA 353.2	2-24-17	2-24-17	
Client ID:	**SVE-20**					
Laboratory ID:	02-220-04					
Nitrate	**ND**	0.050	EPA 353.2	2-24-17	2-24-17	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 2, 2017
Samples Submitted: February 23, 2017
Laboratory Reference: 1702-220
Project: 21-1-12176-044

NITRATE (as Nitrogen)
EPA 353.2
QUALITY CONTROL

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0224W1					
Nitrate	**ND**	0.050	EPA 353.2	2-24-17	2-24-17	

Analyte	Result		Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE									
Laboratory ID:	02-206-01								
	ORIG	DUP							
Nitrate	**0.0538**	**ND**	NA	NA	NA	NA	NA	9	
MATRIX SPIKE									
Laboratory ID:	02-206-01								
	MS		MS		MS				
Nitrate	**2.25**		2.00	0.0538	110	93-126	NA	NA	
SPIKE BLANK									
Laboratory ID:	SB0224W1								
	SB		SB		SB				
Nitrate	**2.21**		2.00	NA	111	96-122	NA	NA	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-napthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical _____.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1- Sample extract treated with a Sulfuric acid/Silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in method 8260C, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

This report pertains to the samples analyzed in accordance with the chain of custody, and is intended only for the use of the individual or company to whom it is addressed.

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

OnSite Environmental Inc
David Baumeister
14648 NE 95th Street
Redmond, WA 98052

RE: Seattle Center
Work Order Number: 1702259

February 27, 2017

Attention David Baumeister:

Fremont Analytical, Inc. received 4 sample(s) on 2/23/2017 for the analyses presented in the following report.

Ferrous Iron by SM3500-Fe B

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Mike Ridgeway
Laboratory Director

CC:
Ed Ptak

Date: *02/27/2017*

CLIENT: OnSite Environmental Inc
Project: Seattle Center
Work Order: 1702259

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1702259-001	SVE-23	02/23/2017 1:25 PM	02/23/2017 3:40 PM
1702259-002	SVE-25	02/23/2017 12:15 PM	02/23/2017 3:40 PM
1702259-003	SVE-20	02/23/2017 2:30 PM	02/23/2017 3:40 PM
1702259-004	SVE-26	02/23/2017 11:00 AM	02/23/2017 3:40 PM

Note: If no "Time Collected" is supplied, a default of 12:00AM is assigned

Case Narrative

WO#: **1702259**
Date: **2/27/2017**

CLIENT: OnSite Environmental Inc
Project: Seattle Center

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

* - Flagged value is not within established control limits
B - Analyte detected in the associated Method Blank
D - Dilution was required
E - Value above quantitation range
H - Holding times for preparation or analysis exceeded
I - Analyte with an internal standard that does not meet established acceptance criteria
J - Analyte detected below Reporting Limit
N - Tentatively Identified Compound (TIC)
Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
S - Spike recovery outside accepted recovery limits
ND - Not detected at the Reporting Limit
R - High relative percent difference observed

Acronyms:

%Rec - Percent Recovery
CCB - Continued Calibration Blank
CCV - Continued Calibration Verification
DF - Dilution Factor
HEM - Hexane Extractable Material
ICV - Initial Calibration Verification
LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
MB or MBLANK - Method Blank
MDL - Method Detection Limit
MS/MSD - Matrix Spike / Matrix Spike Duplicate
PDS - Post Digestion Spike
Ref Val - Reference Value
RL - Reporting Limit
RPD - Relative Percent Difference
SD - Serial Dilution
SGT - Silica Gel Treatment
SPK - Spike
Surr - Surrogate

CLIENT: OnSite Environmental Inc
Project: Seattle Center

Lab ID: 1702259-001 **Collection Date:** 2/23/2017 1:25:00 PM
Client Sample ID: **SVE-23** **Matrix:** Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ferrous Iron by SM3500-Fe B				Batch ID: R34652		Analyst: KT
Ferrous Iron	20.4	2.50	D	mg/L	50	2/24/2017 12:06:00 PM

Lab ID: 1702259-002 **Collection Date:** 2/23/2017 12:15:00 PM
Client Sample ID: **SVE-25** **Matrix:** Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ferrous Iron by SM3500-Fe B				Batch ID: R34652		Analyst: KT
Ferrous Iron	11.8	1.00	D	mg/L	20	2/24/2017 12:08:00 PM

Lab ID: 1702259-003 **Collection Date:** 2/23/2017 2:30:00 PM
Client Sample ID: **SVE-20** **Matrix:** Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ferrous Iron by SM3500-Fe B				Batch ID: R34652		Analyst: KT
Ferrous Iron	34.5	2.50	D	mg/L	50	2/24/2017 12:10:00 PM

Analytical Report

Work Order: **1702259**
Date Reported: **2/27/2017**

CLIENT: OnSite Environmental Inc
Project: Seattle Center

Lab ID: 1702259-004 **Collection Date:** 2/23/2017 11:00:00 AM
Client Sample ID: **SVE-26** **Matrix:** Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ferrous Iron by SM3500-Fe B				Batch ID: R34652		Analyst: KT
Ferrous Iron	37.7	1.00	D	mg/L	20	2/24/2017 12:12:00 PM

Work Order: 1702259
CLIENT: OnSite Environmental Inc
Project: Seattle Center

QC SUMMARY REPORT

Ferrous Iron by SM3500-Fe B

Sample ID	**MB-R34652**	SampType: **MBLK**			Units: **mg/L**		Prep Date: **2/24/2017**		RunNo: **34652**		
Client ID:	**MBLKW**	Batch ID: **R34652**					Analysis Date: **2/24/2017**		SeqNo: **661574**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Ferrous Iron	ND	0.0500									

Sample ID	**LCS-R34652**	SampType: **LCS**			Units: **mg/L**		Prep Date: **2/24/2017**		RunNo: **34652**		
Client ID:	**LCSW**	Batch ID: **R34652**					Analysis Date: **2/24/2017**		SeqNo: **661575**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Ferrous Iron	0.950	0.0500	1.000	0	95.0	90	110				

Sample ID	**1702259-004ADUP**	SampType: **DUP**			Units: **mg/L**		Prep Date: **2/24/2017**		RunNo: **34652**		
Client ID:	**SVE-26**	Batch ID: **R34652**					Analysis Date: **2/24/2017**		SeqNo: **661580**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Ferrous Iron	38.0	1.00						37.73	0.620	20	D

Sample ID	**1702276-003AMS**	SampType: **MS**			Units: **mg/L**		Prep Date: **2/24/2017**		RunNo: **34652**		
Client ID:	**BATCH**	Batch ID: **R34652**					Analysis Date: **2/24/2017**		SeqNo: **661586**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Ferrous Iron	26.3	1.00	20.00	5.439	104	85	115				D

Sample ID	**1702276-003AMSD**	SampType: **MSD**			Units: **mg/L**		Prep Date: **2/24/2017**		RunNo: **34652**		
Client ID:	**BATCH**	Batch ID: **R34652**					Analysis Date: **2/24/2017**		SeqNo: **661587**		
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Ferrous Iron	26.8	1.00	20.00	5.439	107	85	115	26.33	1.94	20	D

Sample Log-In Check List

Client Name:	**ONSITE**	Work Order Number:	**1702259**
Logged by:	**Clare Griggs**	Date Received:	**2/23/2017 3:40:00 PM**

Chain of Custody

1.	Is Chain of Custody complete?	Yes ☑	No ☐	Not Present ☐
2.	How was the sample delivered?	Client		

Log In

3.	Coolers are present?	Yes ☑	No ☐	NA ☐
4.	Shipping container/cooler in good condition?	Yes ☑	No ☐	
5.	Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact)	Yes ☐	No ☐	Not Required ☑
6.	Was an attempt made to cool the samples?	Yes ☑	No ☐	NA ☐
7.	Were all items received at a temperature of >0°C to 10.0°C*	Yes ☑	No ☐	NA ☐
8.	Sample(s) in proper container(s)?	Yes ☑	No ☐	
9.	Sufficient sample volume for indicated test(s)?	Yes ☑	No ☐	
10.	Are samples properly preserved?	Yes ☑	No ☐	
11.	Was preservative added to bottles?	Yes ☐	No ☑	NA ☐
12.	Is there headspace in the VOA vials?	Yes ☐	No ☐	NA ☑
13.	Did all samples containers arrive in good condition(unbroken)?	Yes ☑	No ☐	
14.	Does paperwork match bottle labels?	Yes ☑	No ☐	
15.	Are matrices correctly identified on Chain of Custody?	Yes ☑	No ☐	
16.	Is it clear what analyses were requested?	Yes ☑	No ☐	
17.	Were all holding times able to be met?	Yes ☑	No ☐	

Special Handling (if applicable)

18.	Was client notified of all discrepancies with this order?	Yes ☐	No ☐	NA ☑

Person Notified: _____ Date _____

By Whom: _____ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding: _____

Client Instructions: _____

19. Additional remarks:

Item Information

Item #	Temp ºC
Cooler	8.7
Sample	8.4

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

Chain of Custody Record and Laboratory Services Agreement

Fremont Analytical

3600 Fremont Ave N.
Seattle, WA 98103

Tel: 206-352-3790
Fax: 206-352-7178

Date: 2/23/17

Laboratory Project No (internal): 1702259

Page: 1 of: 1

Client: Onsite Environmental
Address: # 1464 NE 95th St.
City, State, Zip: Redmond, WA 98052
Telephone: 425-883-3881 Fax:

Project Name: Seattle Center
Project No: 21-1-12176-044 Collected by: EVP
Location: Seattle Center
Report To (PM): David Baumeister
PM Email: dbaumeister@onsite-env.com

*Matrix Codes: A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD = Sediment, SL = Solid, W = Water, DW = Drinking Water, GW = Ground Water, SW = Storm Water, WW = Waste Water

	Sample Name	Sample Date	Sample Time	Sample Type (Matrix)*	VOCs (EPA 8260 / 624)	GX/BTEX	BTEX	Gasoline Range Organics (GX)	Hydrocarbon Identification (HCID)	Diesel/Heavy Oil Range Organics (DX)	SVOCs (EPA 8270 / 625)	PAHs (EPA 8270 - SIM / 625)	PCBs (EPA 8082 / 608)	Metals** (EPA 6020 / 200.8)	Total (T)	Dissolved (D)	Anions (IC)***	EDB (8011)	Ferrous Fe			Comments
1	SVE-23	2/23/17	1325	GW														X				
2	SVE-25	"	1215	"														X				
3	SVE-20	"	1430	"														X				
4	SVE-26	"	1100	"														X				
5																						
6																						
7																						
8																						
9																						
10																						

**Metals Analysis (Circle): MTCA-5 RCRA-8 Priority Pollutants TAL *Individual:* Ag Al As B Ba Be Ca Cd Co Cr Cu Fe Hg K Mg Mn Mo Na Ni Pb Sb Se Sr Sn Ti Tl U V Zn

***Anions (Circle): Nitrate Nitrite Chloride Sulfate Bromide O-Phosphate Fluoride Nitrate+Nitrite

Sample Disposal: ☐ Return to Client ☒ Disposal by Lab (Samples will be held for 30 days unless otherwise noted. A fee may be assessed if samples are retained after 30 days.)

Turn-around times for samples received after 4:00pm will begin on the following business day.

Special Remarks: cc Ed Ptak (STW) report

I represent that I am authorized to enter into this Agreement with Fremont Analytical on behalf of the Client named above, that I have verified Client's agreement to each of the terms on the front and backside of this Agreement.

Relinquished	Date/Time	Received	Date/Time
x	2/23/17 1540	x	2/23/17 1540
Relinquished	Date/Time	Received	Date/Time
x		x	

TAT → SameDay^ NextDay^ 2 Day 3 Day (STD)

^Please coordinate with the lab in advance

Chain of Custody

OnSite Environmental Inc.
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Company: Shannon & Wilson, Inc.
Project Number: 21-1-12176-044
Project Name: Seattle Center
Project Manager: EVP
Sampled by: EVP

Turnaround Request (in working days)
(Check One)
☐ Same Day ☐ 1 Day
☐ 2 Days ☐ 3 Days
☒ Standard (7 Days) (TPH analysis 5 Days)
☐ _____ (other)

Laboratory Number: 02-220

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx (☐ Acid / SG Clean-up)	Volatiles 8260C	Halogenated Volatiles 8260C	EDB EPA 8011 (Waters Only)	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664A	total & diss. manganese**	alkalinity	sulfate	nitrate	%~~Moisture~~ Ferrous Iron*
1	SVE-26	2/23/17	1100	GW	6		X																X	X	X	X	
2	SVE-25		1215		6		X																X	X	X	X	
3	SVE-23		1325		6		X																X	X	X	X	
4	SVE-20		1430		6		X																X	X	X	X	
5	Trip Blank		–	GW	1		X																				

	Signature	Company	Date	Time
Relinquished		SDW	2/23/17	1515
Received		ALPHA	2/23/17	15:15
Relinquished		ALPHA	2/23/17	16:07
Received		ALPHA	2/23/17	1607
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions
** → metals not field filtered
* Sent directly to Fremont Analytical

Data Package: Standard ☐ Level III ☐ Level IV ☐
Chromatograms with final report ☐ Electronic Data Deliverables (EDDs) ☒

OnSite Environmental Inc.
14648 NE 95th Street, Redmond, WA 98052 • (425) 883-3881

March 6, 2017

Edwin Ptak
Shannon & Wilson, Inc.
400 N 34th Street, Suite 100
Seattle, WA 98103

Re: Analytical Data for Project 21-1-12176-044
Laboratory Reference No. 1702-234

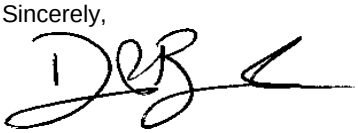
Dear Edwin:

Enclosed are the analytical results and associated quality control data for samples submitted on February 24, 2017.

The standard policy of OnSite Environmental, Inc. is to store your samples for 30 days from the date of receipt. If you require longer storage, please contact the laboratory.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning the data, or need additional information, please feel free to call me.

Sincerely,



David Baumeister
Project Manager

Enclosures

This report pertains to the samples analyzed in accordance with the chain of custody, and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 6, 2017
Samples Submitted: February 24, 2017
Laboratory Reference: 1702-234
Project: 21-1-12176-044

Case Narrative

Samples were collected on February 24, 2017 and received by the laboratory on February 24, 2017. They were maintained at the laboratory at a temperature of 2°C to 6°C.

Please note that any and all soil sample results are reported on a dry-weight basis, unless otherwise noted below.

General QA/QC issues associated with the analytical data enclosed in this laboratory report will be indicated with a reference to a comment or explanation on the Data Qualifier page. More complex and involved QA/QC issues will be discussed in detail below.

Nitrate EPA 353.2 Analysis

The reported Nitrate results are a calculated value based on the subtraction of Nitrite from the Nitrate plus Nitrite result. The Nitrite analysis, which has a 48-hour holding time, was performed within the holding time. Immediately after this analysis, an aliquot of the samples was preserved with concentrated sulfuric acid and stored at 4 degrees C. The preserved samples were then analyzed within the maximum 28-day holding time for the Nitrate plus Nitrite analysis

Any other QA/QC issues associated with this extraction and analysis will be indicated with a footnote reference and discussed in detail on the Data Qualifier page.

This report pertains to the samples analyzed in accordance with the chain of custody, and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 6, 2017
Samples Submitted: February 24, 2017
Laboratory Reference: 1702-234
Project: 21-1-12176-044

NWTPH-Gx/BTEX

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SVE-19**					
Laboratory ID:	02-234-01					
Benzene	**ND**	4.0	EPA 8021B	2-28-17	2-28-17	
Toluene	**ND**	4.0	EPA 8021B	2-28-17	2-28-17	
Ethyl Benzene	**ND**	4.0	EPA 8021B	2-28-17	2-28-17	
m,p-Xylene	**ND**	4.0	EPA 8021B	2-28-17	2-28-17	
o-Xylene	**ND**	4.0	EPA 8021B	2-28-17	2-28-17	
Gasoline	**ND**	400	NWTPH-Gx	2-28-17	2-28-17	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*94*	*61-118*				
Client ID:	**SVE-17**					
Laboratory ID:	02-234-02					
Benzene	**ND**	4.0	EPA 8021B	2-28-17	2-28-17	
Toluene	**ND**	4.0	EPA 8021B	2-28-17	2-28-17	
Ethyl Benzene	**ND**	4.0	EPA 8021B	2-28-17	2-28-17	
m,p-Xylene	**ND**	4.0	EPA 8021B	2-28-17	2-28-17	
o-Xylene	**ND**	4.0	EPA 8021B	2-28-17	2-28-17	
Gasoline	**ND**	400	NWTPH-Gx	2-28-17	2-28-17	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*94*	*61-118*				
Client ID:	**SVE-16**					
Laboratory ID:	02-234-03					
Benzene	**ND**	4.0	EPA 8021B	2-28-17	2-28-17	
Toluene	**ND**	4.0	EPA 8021B	2-28-17	2-28-17	
Ethyl Benzene	**ND**	4.0	EPA 8021B	2-28-17	2-28-17	
m,p-Xylene	**ND**	4.0	EPA 8021B	2-28-17	2-28-17	
o-Xylene	**ND**	4.0	EPA 8021B	2-28-17	2-28-17	
Gasoline	**ND**	400	NWTPH-Gx	2-28-17	2-28-17	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*92*	*61-118*				

This report pertains to the samples analyzed in accordance with the chain of custody, and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 6, 2017
Samples Submitted: February 24, 2017
Laboratory Reference: 1702-234
Project: 21-1-12176-044

NWTPH-Gx/BTEX

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SVE-13**					
Laboratory ID:	02-234-04					
Benzene	**ND**	4.0	EPA 8021B	2-28-17	2-28-17	
Toluene	**ND**	4.0	EPA 8021B	2-28-17	2-28-17	
Ethyl Benzene	**ND**	4.0	EPA 8021B	2-28-17	2-28-17	
m,p-Xylene	**6.3**	4.0	EPA 8021B	2-28-17	2-28-17	
o-Xylene	**ND**	4.0	EPA 8021B	2-28-17	2-28-17	
Gasoline	**ND**	400	NWTPH-Gx	2-28-17	2-28-17	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*92*	*61-118*				

This report pertains to the samples analyzed in accordance with the chain of custody, and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 6, 2017
Samples Submitted: February 24, 2017
Laboratory Reference: 1702-234
Project: 21-1-12176-044

NWTPH-Gx/BTEX
QUALITY CONTROL

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0228W1					
Benzene	**ND**	1.0	EPA 8021B	2-28-17	2-28-17	
Toluene	**ND**	1.0	EPA 8021B	2-28-17	2-28-17	
Ethyl Benzene	**ND**	1.0	EPA 8021B	2-28-17	2-28-17	
m,p-Xylene	**ND**	1.0	EPA 8021B	2-28-17	2-28-17	
o-Xylene	**ND**	1.0	EPA 8021B	2-28-17	2-28-17	
Gasoline	**ND**	100	NWTPH-Gx	2-28-17	2-28-17	
Surrogate:	*Percent Recovery*	*Control Limits*				
Fluorobenzene	*92*	*61-118*				

Analyte	Result		Spike Level		Source Result	Percent Recovery		Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE											
Laboratory ID:	02-229-01										
	ORIG	DUP									
Benzene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Toluene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Ethyl Benzene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
m,p-Xylene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
o-Xylene	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Gasoline	**ND**	**ND**	NA	NA		NA		NA	NA	30	
Surrogate:											
Fluorobenzene						*94*	*99*	*61-118*			
MATRIX SPIKES											
Laboratory ID:	02-229-01										
	MS	MSD	MS	MSD		MS	MSD				
Benzene	**45.2**	**49.4**	50.0	50.0	ND	**90**	**99**	80-120	9	13	
Toluene	**46.1**	**50.3**	50.0	50.0	ND	**92**	**101**	81-115	9	14	
Ethyl Benzene	**46.9**	**51.0**	50.0	50.0	ND	**94**	**102**	81-114	8	12	
m,p-Xylene	**46.0**	**50.3**	50.0	50.0	ND	**92**	**101**	81-114	9	13	
o-Xylene	**46.3**	**50.5**	50.0	50.0	ND	**93**	**101**	81-113	9	11	
Surrogate:											
Fluorobenzene						*96*	*95*	*61-118*			

This report pertains to the samples analyzed in accordance with the chain of custody, and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 6, 2017
Samples Submitted: February 24, 2017
Laboratory Reference: 1702-234
Project: 21-1-12176-044

TOTAL MANGANESE
EPA 6010C

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	02-234-01					
Client ID:	**SVE-19**					
Manganese	**10000**	200	6010C	3-1-17	3-1-17	
Lab ID:	02-234-02					
Client ID:	**SVE-17**					
Manganese	**1900**	50	6010C	3-1-17	3-1-17	
Lab ID:	02-234-03					
Client ID:	**SVE-16**					
Manganese	**1300**	50	6010C	3-1-17	3-1-17	
Lab ID:	02-234-04					
Client ID:	**SVE-13**					
Manganese	**5600**	100	6010C	3-1-17	3-1-17	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 6, 2017
Samples Submitted: February 24, 2017
Laboratory Reference: 1702-234
Project: 21-1-12176-044

TOTAL MANGANESE
EPA 6010C
METHOD BLANK QUALITY CONTROL

Date Extracted:	3-1-17
Date Analyzed:	3-1-17
Matrix:	Water
Units:	ug/L (ppb)
Lab ID:	MB0301WH2

Analyte	Method	Result	PQL
Manganese	6010C	**ND**	10

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 6, 2017
Samples Submitted: February 24, 2017
Laboratory Reference: 1702-234
Project: 21-1-12176-044

TOTAL MANGANESE
EPA 6010C
DUPLICATE QUALITY CONTROL

Date Extracted: 3-1-17
Date Analyzed: 3-1-17

Matrix: Water
Units: ug/L (ppb)

Lab ID: 02-165-01

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Manganese	**113**	**113**	0	10	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 6, 2017
Samples Submitted: February 24, 2017
Laboratory Reference: 1702-234
Project: 21-1-12176-044

TOTAL MANGANESE
EPA 6010C
MS/MSD QUALITY CONTROL

Date Extracted: 3-1-17
Date Analyzed: 3-1-17

Matrix: Water
Units: ug/L (ppb)

Lab ID: 02-165-01

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Manganese	500	**610**	99	**621**	102	2	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 6, 2017
Samples Submitted: February 24, 2017
Laboratory Reference: 1702-234
Project: 21-1-12176-044

DISSOLVED MANGANESE
EPA 6010C

Matrix: Water
Units: ug/L (ppb)

Analyte	Result	PQL	EPA Method	Date Prepared	Date Analyzed	Flags
Lab ID:	02-234-01					
Client ID:	**SVE-19**					
Manganese	**9400**	200	6010C	2-24-17	2-27-17	
Lab ID:	02-234-02					
Client ID:	**SVE-17**					
Manganese	**1700**	50	6010C	2-24-17	2-27-17	
Lab ID:	02-234-03					
Client ID:	**SVE-16**					
Manganese	**1200**	50	6010C	2-24-17	2-27-17	
Lab ID:	02-234-04					
Client ID:	**SVE-13**					
Manganese	**4800**	50	6010C	2-24-17	2-27-17	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 6, 2017
Samples Submitted: February 24, 2017
Laboratory Reference: 1702-234
Project: 21-1-12176-044

DISSOLVED MANGANESE
EPA 6010C
METHOD BLANK QUALITY CONTROL

Date Filtered:	2-24-17
Date Analyzed:	2-27-17
Matrix:	Water
Units:	ug/L (ppb)
Lab ID:	MB0224F1

Analyte	Method	Result	PQL
Manganese	6010C	**ND**	11

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 6, 2017
Samples Submitted: February 24, 2017
Laboratory Reference: 1702-234
Project: 21-1-12176-044

DISSOLVED MANGANESE
EPA 6010C
DUPLICATE QUALITY CONTROL

Date Filtered: 2-24-17
Date Analyzed: 2-27-17

Matrix: Water
Units: ug/L (ppb)

Lab ID: 02-234-01

Analyte	Sample Result	Duplicate Result	RPD	PQL	Flags
Manganese	**9420**	**8800**	7	200	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 6, 2017
Samples Submitted: February 24, 2017
Laboratory Reference: 1702-234
Project: 21-1-12176-044

DISSOLVED MANGANESE
EPA 6010C
MS/MSD QUALITY CONTROL

Date Filtered: 2-24-17
Date Analyzed: 2-27-17

Matrix: Water
Units: ug/L (ppb)

Lab ID: 02-234-01

Analyte	Spike Level	MS	Percent Recovery	MSD	Percent Recovery	RPD	Flags
Manganese	10000	**17500**	81	**19400**	100	10	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 6, 2017
Samples Submitted: February 24, 2017
Laboratory Reference: 1702-234
Project: 21-1-12176-044

TOTAL ALKALINITY
SM 2320B

Matrix: Water
Units: mg CaCO3/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SVE-19**					
Laboratory ID:	02-234-01					
Total Alkalinity	**300**	2.0	SM 2320B	2-28-17	2-28-17	
Client ID:	**SVE-17**					
Laboratory ID:	02-234-02					
Total Alkalinity	**350**	2.0	SM 2320B	2-28-17	2-28-17	
Client ID:	**SVE-16**					
Laboratory ID:	02-234-03					
Total Alkalinity	**320**	2.0	SM 2320B	2-28-17	2-28-17	
Client ID:	**SVE-13**					
Laboratory ID:	02-234-04					
Total Alkalinity	**950**	2.0	SM 2320B	2-28-17	2-28-17	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 6, 2017
Samples Submitted: February 24, 2017
Laboratory Reference: 1702-234
Project: 21-1-12176-044

TOTAL ALKALINITY
SM 2320B
QUALITY CONTROL

Matrix: Water
Units: mg CaCO3/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0228W1					
Total Alkalinity	**ND**	2.0	SM 2320B	2-28-17	2-28-17	

Analyte	Result		Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE									
Laboratory ID:	02-220-01								
	ORIG	DUP							
Total Alkalinity	**94.0**	**94.0**	NA	NA	NA	NA	0	10	
SPIKE BLANK									
Laboratory ID:	SB0228W1								
	SB		SB		SB				
Total Alkalinity	**100**		100	NA	100	86-117	NA	NA	

This report pertains to the samples analyzed in accordance with the chain of custody, and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 6, 2017
Samples Submitted: February 24, 2017
Laboratory Reference: 1702-234
Project: 21-1-12176-044

SULFATE
ASTM D516-07

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SVE-19**					
Laboratory ID:	02-234-01					
Sulfate	**860**	250	ASTM D516-07	2-27-17	2-27-17	
Client ID:	**SVE-17**					
Laboratory ID:	02-234-02					
Sulfate	**24**	10	ASTM D516-07	2-27-17	2-27-17	
Client ID:	**SVE-16**					
Laboratory ID:	02-234-03					
Sulfate	**79**	25	ASTM D516-07	2-27-17	2-27-17	
Client ID:	**SVE-13**					
Laboratory ID:	02-234-04					
Sulfate	**55**	25	ASTM D516-07	2-27-17	2-27-17	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 6, 2017
Samples Submitted: February 24, 2017
Laboratory Reference: 1702-234
Project: 21-1-12176-044

SULFATE
ASTM D516-07
QUALITY CONTROL

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0227F1					
Sulfate	**ND**	5.0	ASTM D516-07	2-27-17	2-27-17	

Analyte	Result		Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE									
Laboratory ID:	02-206-01								
	ORIG	DUP							
Sulfate	**79.7**	**83.2**	NA	NA	NA	NA	4	10	
MATRIX SPIKE									
Laboratory ID:	02-206-01								
	MS		MS		MS				
Sulfate	**185**		100	79.7	105	77-129	NA	NA	
SPIKE BLANK									
Laboratory ID:	SB0227F1								
	SB		SB		SB				
Sulfate	**9.72**		10.0	NA	97	91-113	NA	NA	

This report pertains to the samples analyzed in accordance with the chain of custody, and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 6, 2017
Samples Submitted: February 24, 2017
Laboratory Reference: 1702-234
Project: 21-1-12176-044

NITRATE (as Nitrogen)
EPA 353.2

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
Client ID:	**SVE-19**					
Laboratory ID:	02-234-01					
Nitrate	**ND**	0.050	EPA 353.2	2-28-17	2-28-17	
Client ID:	**SVE-17**					
Laboratory ID:	02-234-02					
Nitrate	**ND**	0.050	EPA 353.2	2-28-17	2-28-17	
Client ID:	**SVE-16**					
Laboratory ID:	02-234-03					
Nitrate	**0.45**	0.050	EPA 353.2	2-28-17	2-28-17	
Client ID:	**SVE-13**					
Laboratory ID:	02-234-04					
Nitrate	**ND**	0.050	EPA 353.2	2-28-17	2-28-17	

This report pertains to the samples analyzed in accordance with the chain of custody,
and is intended only for the use of the individual or company to whom it is addressed.

Date of Report: March 6, 2017
Samples Submitted: February 24, 2017
Laboratory Reference: 1702-234
Project: 21-1-12176-044

NITRATE (as Nitrogen)
EPA 353.2
QUALITY CONTROL

Matrix: Water
Units: mg/L

Analyte	Result	PQL	Method	Date Prepared	Date Analyzed	Flags
METHOD BLANK						
Laboratory ID:	MB0228W1					
Nitrate	**ND**	0.050	EPA 353.2	2-28-17	2-28-17	

Analyte	Result		Spike Level	Source Result	Percent Recovery	Recovery Limits	RPD	RPD Limit	Flags
DUPLICATE									
Laboratory ID:	02-234-01								
	ORIG	DUP							
Nitrate	**ND**	**ND**	NA	NA	NA	NA	NA	9	
MATRIX SPIKE									
Laboratory ID:	02-234-01								
	MS		MS		MS				
Nitrate	**2.23**		2.00	ND	112	93-126	NA	NA	
SPIKE BLANK									
Laboratory ID:	Sb0228W1								
	SB		SB		SB				
Nitrate	**2.21**		2.00	NA	111	96-122	NA	NA	

This report pertains to the samples analyzed in accordance with the chain of custody, and is intended only for the use of the individual or company to whom it is addressed.

OnSite Environmental Inc.

Data Qualifiers and Abbreviations

A - Due to a high sample concentration, the amount spiked is insufficient for meaningful MS/MSD recovery data.

B - The analyte indicated was also found in the blank sample.

C - The duplicate RPD is outside control limits due to high result variability when analyte concentrations are within five times the quantitation limit.

E - The value reported exceeds the quantitation range and is an estimate.

F - Surrogate recovery data is not available due to the high concentration of coeluting target compounds.

H - The analyte indicated is a common laboratory solvent and may have been introduced during sample preparation, and be impacting the sample result.

I - Compound recovery is outside of the control limits.

J - The value reported was below the practical quantitation limit. The value is an estimate.

K - Sample duplicate RPD is outside control limits due to sample inhomogeneity. The sample was re-extracted and re-analyzed with similar results.

L - The RPD is outside of the control limits.

M - Hydrocarbons in the gasoline range are impacting the diesel range result.

M1 - Hydrocarbons in the gasoline range (toluene-napthalene) are present in the sample.

N - Hydrocarbons in the lube oil range are impacting the diesel range result.

N1 - Hydrocarbons in diesel range are impacting lube oil range results.

O - Hydrocarbons indicative of heavier fuels are present in the sample and are impacting the gasoline result.

P - The RPD of the detected concentrations between the two columns is greater than 40.

Q - Surrogate recovery is outside of the control limits.

S - Surrogate recovery data is not available due to the necessary dilution of the sample.

T - The sample chromatogram is not similar to a typical _____.

U - The analyte was analyzed for, but was not detected above the reported sample quantitation limit.

U1 - The practical quantitation limit is elevated due to interferences present in the sample.

V - Matrix Spike/Matrix Spike Duplicate recoveries are outside control limits due to matrix effects.

W - Matrix Spike/Matrix Spike Duplicate RPD are outside control limits due to matrix effects.

X - Sample extract treated with a mercury cleanup procedure.

X1- Sample extract treated with a Sulfuric acid/Silica gel cleanup procedure.

Y - The calibration verification for this analyte exceeded the 20% drift specified in method 8260C, and therefore the reported result should be considered an estimate. The overall performance of the calibration verification standard met the acceptance criteria of the method.

Z -

ND - Not Detected at PQL
PQL - Practical Quantitation Limit
RPD - Relative Percent Difference

This report pertains to the samples analyzed in accordance with the chain of custody, and is intended only for the use of the individual or company to whom it is addressed.

3600 Fremont Ave. N.
Seattle, WA 98103
T: (206) 352-3790
F: (206) 352-7178
info@fremontanalytical.com

OnSite Environmental Inc
David Baumeister
14648 NE 95th Street
Redmond, WA 98052

RE: Seattle Center
Work Order Number: 1702276

February 27, 2017

Attention David Baumeister:

Fremont Analytical, Inc. received 4 sample(s) on 2/24/2017 for the analyses presented in the following report.

Ferrous Iron by SM3500-Fe B

This report consists of the following:

- Case Narrative
- Analytical Results
- Applicable Quality Control Summary Reports
- Chain of Custody

All analyses were performed consistent with the Quality Assurance program of Fremont Analytical, Inc. Please contact the laboratory if you should have any questions about the results.

Thank you for using Fremont Analytical.

Sincerely,

Chelsea Ward
Project Manager

Date: *02/27/2017*

CLIENT: OnSite Environmental Inc
Project: Seattle Center
Work Order: 1702276

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1702276-001	SVE-19	02/24/2017 11:30 AM	02/24/2017 2:50 PM
1702276-002	SVE-17	02/24/2017 12:25 PM	02/24/2017 2:50 PM
1702276-003	SVE-16	02/24/2017 1:15 PM	02/24/2017 2:50 PM
1702276-004	SVE-13	02/24/2017 2:10 PM	02/24/2017 2:50 PM

Case Narrative

WO#: **1702276**
Date: **2/27/2017**

CLIENT: OnSite Environmental Inc
Project: Seattle Center

I. SAMPLE RECEIPT:
Samples receipt information is recorded on the attached Sample Receipt Checklist.

II. GENERAL REPORTING COMMENTS:
Results are reported on a wet weight basis unless dry-weight correction is denoted in the units field on the analytical report ("mg/kg-dry" or "ug/kg-dry").

Matrix Spike (MS) and MS Duplicate (MSD) samples are tested from an analytical batch of "like" matrix to check for possible matrix effect. The MS and MSD will provide site specific matrix data only for those samples which are spiked by the laboratory. The sample chosen for spike purposes may or may not have been a sample submitted in this sample delivery group. The validity of the analytical procedures for which data is reported in this analytical report is determined by the Laboratory Control Sample (LCS) and the Method Blank (MB). The LCS and the MB are processed with the samples and the MS/MSD to ensure method criteria are achieved throughout the entire analytical process.

III. ANALYSES AND EXCEPTIONS:
Exceptions associated with this report will be footnoted in the analytical results page(s) or the quality control summary page(s) and/or noted below.

Qualifiers:

* - Flagged value is not within established control limits
B - Analyte detected in the associated Method Blank
D - Dilution was required
E - Value above quantitation range
H - Holding times for preparation or analysis exceeded
I - Analyte with an internal standard that does not meet established acceptance criteria
J - Analyte detected below Reporting Limit
N - Tentatively Identified Compound (TIC)
Q - Analyte with an initial or continuing calibration that does not meet established acceptance criteria (<20%RSD, <20% Drift or minimum RRF)
S - Spike recovery outside accepted recovery limits
ND - Not detected at the Reporting Limit
R - High relative percent difference observed

Acronyms:

%Rec - Percent Recovery
CCB - Continued Calibration Blank
CCV - Continued Calibration Verification
DF - Dilution Factor
HEM - Hexane Extractable Material
ICV - Initial Calibration Verification
LCS/LCSD - Laboratory Control Sample / Laboratory Control Sample Duplicate
MB or MBLANK - Method Blank
MDL - Method Detection Limit
MS/MSD - Matrix Spike / Matrix Spike Duplicate
PDS - Post Digestion Spike
Ref Val - Reference Value
RL - Reporting Limit
RPD - Relative Percent Difference
SD - Serial Dilution
SGT - Silica Gel Treatment
SPK - Spike
Surr - Surrogate

CLIENT: OnSite Environmental Inc
Project: Seattle Center

Lab ID: 1702276-001 **Collection Date:** 2/24/2017 11:30:00 AM
Client Sample ID: **SVE-19** **Matrix:** Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ferrous Iron by SM3500-Fe B					Batch ID: R34652	Analyst: KT
Ferrous Iron	71.1	2.50	D	mg/L	50	2/24/2017 4:00:00 PM

Lab ID: 1702276-002 **Collection Date:** 2/24/2017 12:25:00 PM
Client Sample ID: **SVE-17** **Matrix:** Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ferrous Iron by SM3500-Fe B					Batch ID: R34652	Analyst: KT
Ferrous Iron	22.9	1.00	D	mg/L	20	2/24/2017 4:02:00 PM

Lab ID: 1702276-003 **Collection Date:** 2/24/2017 1:15:00 PM
Client Sample ID: **SVE-16** **Matrix:** Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ferrous Iron by SM3500-Fe B					Batch ID: R34652	Analyst: KT
Ferrous Iron	5.44	1.00	D	mg/L	20	2/24/2017 4:04:00 PM

Analytical Report

Work Order: **1702276**
Date Reported: **2/27/2017**

CLIENT: OnSite Environmental Inc
Project: Seattle Center

Lab ID: 1702276-004 **Collection Date:** 2/24/2017 2:10:00 PM
Client Sample ID: **SVE-13** **Matrix:** Groundwater

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Ferrous Iron by SM3500-Fe B				Batch ID: R34652		Analyst: KT
Ferrous Iron	12.1	1.00	D	mg/L	20	2/24/2017 4:06:00 PM

Fremont Analytical

Date: *2/27/2017*

Work Order: 1702276
CLIENT: OnSite Environmental Inc
Project: Seattle Center

QC SUMMARY REPORT

Ferrous Iron by SM3500-Fe B

Sample ID	MB-R34652	SampType:	MBLK			Units:	mg/L	Prep Date:	2/24/2017		RunNo:	34652	
Client ID:	MBLKW	Batch ID:	R34652					Analysis Date:	2/24/2017		SeqNo:	661574	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
Ferrous Iron		ND	0.0500										

Sample ID	LCS-R34652	SampType:	LCS			Units:	mg/L	Prep Date:	2/24/2017		RunNo:	34652	
Client ID:	LCSW	Batch ID:	R34652					Analysis Date:	2/24/2017		SeqNo:	661575	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
Ferrous Iron		0.950	0.0500	1.000	0	95.0	90	110					

Sample ID	1702259-004ADUP	SampType:	DUP			Units:	mg/L	Prep Date:	2/24/2017		RunNo:	34652	
Client ID:	BATCH	Batch ID:	R34652					Analysis Date:	2/24/2017		SeqNo:	661580	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
Ferrous Iron		38.0	1.00						37.73	0.620	20	D	

Sample ID	1702276-003AMS	SampType:	MS			Units:	mg/L	Prep Date:	2/24/2017		RunNo:	34652	
Client ID:	SVE-16	Batch ID:	R34652					Analysis Date:	2/24/2017		SeqNo:	661586	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
Ferrous Iron		26.3	1.00	20.00	5.439	104	85	115				D	

Sample ID	1702276-003AMSD	SampType:	MSD			Units:	mg/L	Prep Date:	2/24/2017		RunNo:	34652	
Client ID:	SVE-16	Batch ID:	R34652					Analysis Date:	2/24/2017		SeqNo:	661587	
Analyte		Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
Ferrous Iron		26.8	1.00	20.00	5.439	107	85	115	26.33	1.94	20	D	

Sample Log-In Check List

Client Name:	**ONSITE**	Work Order Number:	**1702276**
Logged by:	**Erica Silva**	Date Received:	**2/24/2017 2:50:00 PM**

Chain of Custody

1.	Is Chain of Custody complete?	Yes	☑	No ☐	Not Present	☐
2.	How was the sample delivered?	Client				

Log In

3.	Coolers are present?	Yes	☑	No ☐	NA	☐
4.	Shipping container/cooler in good condition?	Yes	☑	No ☐		
5.	Custody Seals present on shipping container/cooler? (Refer to comments for Custody Seals not intact)	Yes	☐	No ☐	Not Required	☑
6.	Was an attempt made to cool the samples?	Yes	☑	No ☐	NA	☐
7.	Were all items received at a temperature of >0°C to 10.0°C*	Yes	☑	No ☐	NA	☐
8.	Sample(s) in proper container(s)?	Yes	☑	No ☐		
9.	Sufficient sample volume for indicated test(s)?	Yes	☑	No ☐		
10.	Are samples properly preserved?	Yes	☑	No ☐		
11.	Was preservative added to bottles?	Yes	☐	No ☑	NA	☐
12.	Is there headspace in the VOA vials?	Yes	☐	No ☐	NA	☑
13.	Did all samples containers arrive in good condition(unbroken)?	Yes	☑	No ☐		
14.	Does paperwork match bottle labels?	Yes	☑	No ☐		
15.	Are matrices correctly identified on Chain of Custody?	Yes	☑	No ☐		
16.	Is it clear what analyses were requested?	Yes	☑	No ☐		
17.	Were all holding times able to be met?	Yes	☑	No ☐		

Special Handling (if applicable)

18.	Was client notified of all discrepancies with this order?	Yes	☐	No ☐	NA	☑

Person Notified: _____ Date _____

By Whom: _____ Via: ☐ eMail ☐ Phone ☐ Fax ☐ In Person

Regarding: _____

Client Instructions: _____

19. Additional remarks:

Item Information

Item #	Temp ºC
Cooler	5.4
Sample	6.3
Temp Blank	0.8

* Note: DoD/ELAP and TNI require items to be received at 4°C +/- 2°C

Chain of Custody Record and Laboratory Services Agreement

Fremont Analytical
3600 Fremont Ave N. Tel: 206-352-3790
Seattle, WA 98103 Fax: 206-352-7178

Date: 2/24/17 Laboratory Project No (internal): 1702276

Page: 1 of: 1

Client: Onsite Environmental
Address: 1468 NE 95th St.
City, State, Zip: Redmond WA 98052
Telephone: 425-883-3881 Fax:

Project Name: Seattle Center
Project No: 21-12176-044 Collected by: EVP
Location: Seattle Center
Report To (PM): David Baumeister
PM Email: dbaumeister@onsite-env.com

*Matrix Codes: A = Air, AQ = Aqueous, B = Bulk, O = Other, P = Product, S = Soil, SD = Sediment, SL = Solid, W = Water, DW = Drinking Water, GW = Ground Water, SW = Storm Water, WW = Waste Water

	Sample Name	Sample Date	Sample Time	Sample Type (Matrix)*	VOCs (EPA 8260 / 624)	GX/BTEX	BTEX	Gasoline Range Organics (GX)	Hydrocarbon Identification (HCID)	Diesel/Heavy Oil Range Organics (DX)	SVOCs (EPA 8270 / 625)	PAHs (EPA 8270 - SIM / 625)	PCBs (EPA 8082 / 608)	Metals** (EPA 6020 / 200.8)	Total (T) | Dissolved (D)	Anions (IC)***	EDB (8011)	Previous PR				Comments
1	SVE-19	2/24/17	1130	GW													X					
2	SVE-17	"	1225	"													X					
3	SVE-16	"	1315	"													X					
4	SVE-13	"	1410	"													X					
5																						
6																						
7																						
8																						
9																						
10																						

**Metals Analysis (Circle): MTCA-5 RCRA-8 Priority Pollutants TAL *Individual:* Ag Al As B Ba Be Ca Cd Co Cr Cu Fe Hg K Mg Mn Mo Na Ni Pb Sb Se Sr Sn Ti Tl U V Zn

***Anions (Circle): Nitrate Nitrite Chloride Sulfate Bromide O-Phosphate Fluoride Nitrate+Nitrite

Sample Disposal: ☐ Return to Client ☒ Disposal by Lab (Samples will be held for 30 days unless otherwise noted. A fee may be assessed if samples are retained after 30 days.)

Turn-around times for samples received after 4:00pm will begin on the following business day.

Special Remarks:

I represent that I am authorized to enter into this Agreement with Fremont Analytical on behalf of the Client named above, that I have verified Client's agreement to each of the terms on the front and backside of this Agreement.

Relinquished	Date/Time	Received	Date/Time
x	2/24/17 1450	x	2/24/17 1450
x		x	

TAT → SameDay^ NextDay^ 2 Day 3 Day STD

^Please coordinate with the lab in advance

Chain of Custody

Page 1 of 1

OnSite Environmental Inc.
Analytical Laboratory Testing Services
14648 NE 95th Street • Redmond, WA 98052
Phone: (425) 883-3881 • www.onsite-env.com

Company: Shannon & Wilson Inc.
Project Number: 21-1-12176-044
Project Name: Seattle Center
Project Manager: EVP
Sampled by: EVP

Turnaround Request (in working days)
(Check One)
☐ Same Day ☐ 1 Day
☐ 2 Days ☐ 3 Days
☒ Standard (7 Days) (TPH analysis 5 Days)
☐ _____ (other)

Laboratory Number: 02-234

Lab ID	Sample Identification	Date Sampled	Time Sampled	Matrix	Number of Containers	NWTPH-HCID	NWTPH-Gx/BTEX	NWTPH-Gx	NWTPH-Dx (☐ Acid / SG Clean-up)	Volatiles 8260C	Halogenated Volatiles 8260C	EDB EPA 8011 (Waters Only)	Semivolatiles 8270D/SIM (with low-level PAHs)	PAHs 8270D/SIM (low-level)	PCBs 8082A	Organochlorine Pesticides 8081B	Organophosphorus Pesticides 8270D/SIM	Chlorinated Acid Herbicides 8151A	Total RCRA Metals	Total MTCA Metals	TCLP Metals	HEM (oil and grease) 1664A	total & dissolved manganese**	alkalinity	sulfate	nitrate	%~~Moisture~~ Ferrous Iron*
1	SVE-19	2/24/17	1130	GW	6		X																X	X	X	X	X
2	SVE-17		1225		6		X																X	X	X	X	X
3	SVE-16		~~1140~~ 1315		6		X																X	X	X	X	X
4	SVE-13		1410		6		X																X	X	X	X	X

	Signature	Company	Date	Time
Relinquished		S&W	2/24/17	1430
Received		ALPHA	2/24/17	1430
Relinquished		ALPHA	2/24/17	16:05
Received		ONE	2/24/17	1605
Relinquished				
Received				
Reviewed/Date		Reviewed/Date		

Comments/Special Instructions
* Sent directly to Fremont Analytical
** Need lab filtering

Data Package: Standard ☐ Level III ☐ Level IV ☐
Chromatograms with final report ☐ Electronic Data Deliverables (EDDs) ☒

APPENDIX B

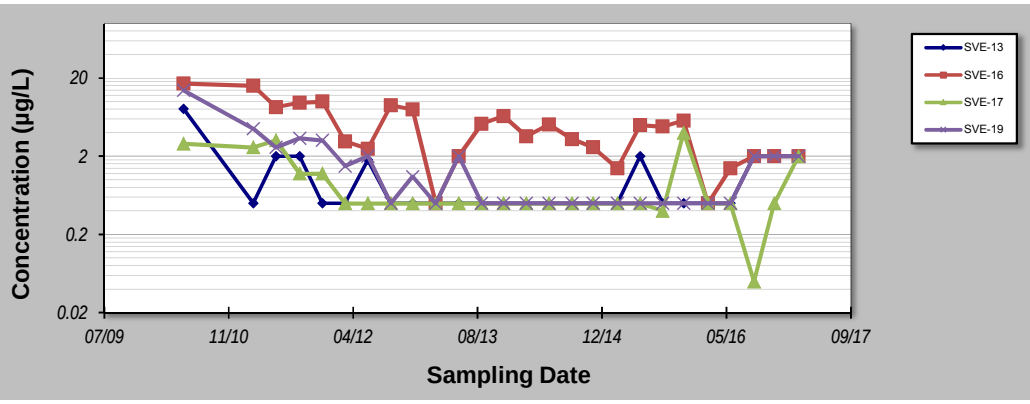
PLUME STATUS EVALUATION

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 22-Mar-17
Facility Name: Seattle Center
Conducted By: SKH

Job ID: 21-1-12176-046
Constituent: benzene
Concentration Units: µg/L

Sampling Point ID:	SVE-13	SVE-16	SVE-17	SVE-19			
Sampling Event	Sampling Date	BENZENE CONCENTRATION (µg/L)						
1	5/20/2010	8.1	17	2.9	14			
2	2/24/2011	0.5	16	2.6	4.5			
3	5/27/2011	2	8.5	3.2	2.6			
4	8/30/2011	2	9.7	1.2	3.4			
5	11/29/2011	0.5	10	1.2	3.2			
6	2/29/2012	0.5	3.1	0.5	1.5			
7	5/30/2012	1.8	2.5	0.5	2			
8	8/30/2012	0.5	9	0.5	0.5			
9	11/26/2012	0.5	7.9	0.5	1.1			
10	2/27/2013	0.5	0.5	0.5	0.5			
11	5/30/2013	0.5	2	0.5	2			
12	8/30/2013		5.2	0.5	0.5			
13	11/26/2013	0.5	6.5	0.5	0.5			
14	2/25/2014	0.5	3.6	0.5	0.5			
15	5/28/2014	0.5	5.1	0.5	0.5			
16	8/29/2014	0.5	3.3	0.5	0.5			
17	11/21/2014	0.5	2.6	0.5	0.5			
18	2/27/2015	0.5	1.4	0.5	0.5			
19	5/29/2015	2	5	0.5	0.5			
20	8/28/2015	0.5	4.8	0.4	0.5			
21	11/20/2015	0.5	5.7	4	0.5			
22	2/26/2016	0.5	0.5	0.5	0.5			
23	5/26/2016	0.5	1.4	0.5	0.5			
24	8/29/2016	2	2	0.05	2			
25	11/18/2016	2	2	0.5	2			
26	2/24/2017	2	2	2	2			
27								
28								
29								
30								
Coefficient of Variation:		1.30	0.82	1.03	1.50			
Mann-Kendall Statistic (S):		-3	-163	-94	-112			
Confidence Factor:		51.9%	>99.9%	98.0%	99.4%			
Concentration Trend:		No Trend	Decreasing	Decreasing	Decreasing			



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

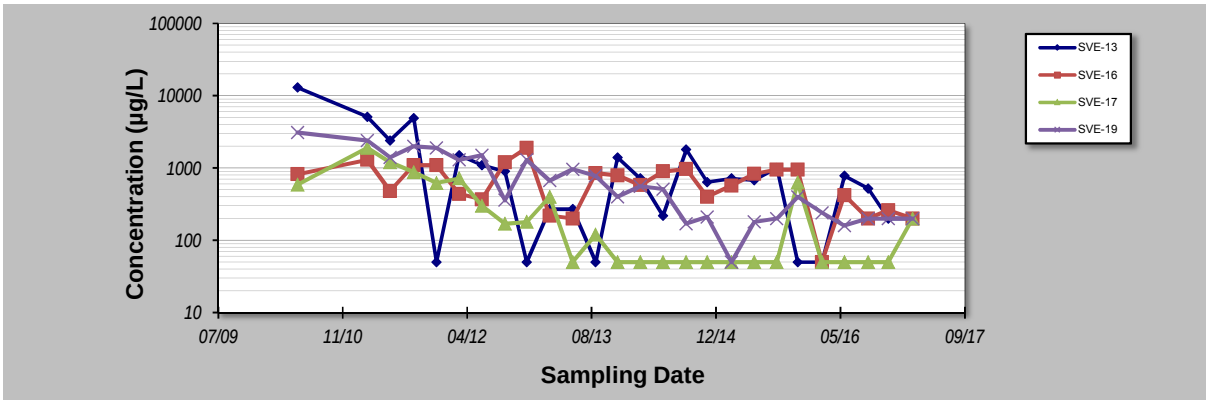
DISCLAIMER: The GSI Mann-Kendall Toolkit is available "as is". Considerable care has been exercised in preparing this software product; however, no party, including without limitation GSI Environmental Inc., makes any representation or warranty regarding the accuracy, correctness, or completeness of the information contained herein, and no such party shall be liable for any direct, indirect, consequential, incidental or other damages resulting from the use of this product or the information contained herein. Information in this publication is subject to change without notice. GSI Environmental Inc., disclaims any responsibility or obligation to update the information contained herein.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 22-Mar-17
Facility Name: Seattle Center
Conducted By: SKH

Job ID: 21-1-12176-046
Constituent: TPH-gas
Concentration Units: µg/L

Sampling Point ID:	SVE-13	SVE-16	SVE-17	SVE-19			
Sampling Event	Sampling Date	TPH-GAS CONCENTRATION (µg/L)						
1	5/20/2010	13000	820	590	3100			
2	2/24/2011	5100	1300	1900	2400			
3	5/27/2011	2400	480	1200	1400			
4	8/30/2011	4900	1100	880	2000			
5	11/29/2011	50	1100	620	1900			
6	2/29/2012	1500	440	720	1300			
7	5/30/2012	1100	370	300	1500			
8	8/30/2012	900	1200	170	360			
9	11/26/2012	50	1900	180	1300			
10	2/27/2013	270	220	400	670			
11	5/30/2013	270	200	50	960			
12	8/30/2013	50	850	120	780			
13	11/26/2013	1400	790	50	400			
14	2/25/2014	720	580	50	560			
15	5/28/2014	220	900	50	510			
16	8/29/2014	1800	970	50	170			
17	11/21/2014	640	400	50	210			
18	2/27/2015	720	570	50	50			
19	5/29/2015	680	830	50	180			
20	8/28/2015	1000	950	50	200			
21	11/20/2015	50	950	630	400			
22	2/26/2016	50	50	50	240			
23	5/26/2016	780	420	50	160			
24	8/29/2016	520	200	50	200			
25	11/18/2016	200	260	50	200			
26	2/24/2017	200	200	200	200			
27								
28								
29								
30								
Coefficient of Variation:		1.81	0.62	1.37	0.99			
Mann-Kendall Statistic (S):		-122	-100	-161	-227			
Confidence Factor:		99.7%	98.6%	>99.9%	>99.9%			
Concentration Trend:		Decreasing	Decreasing	Decreasing	Decreasing			



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

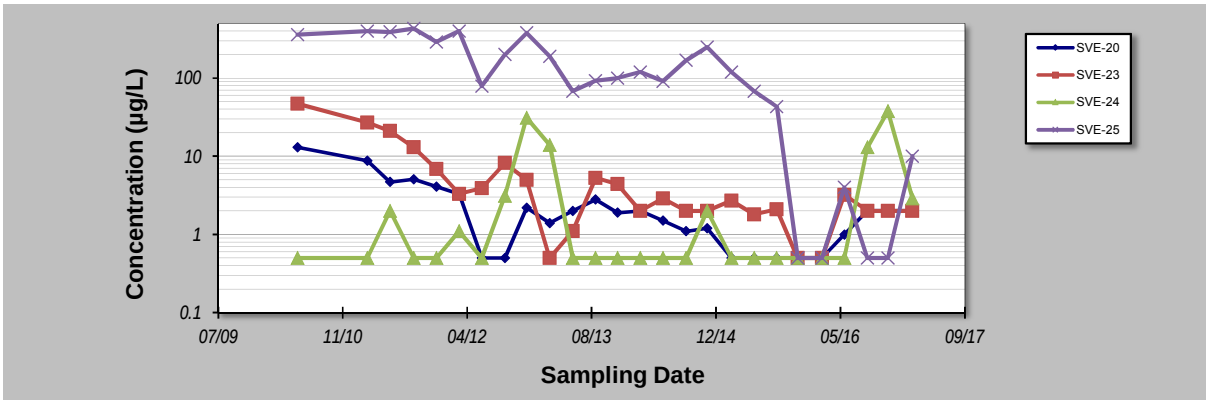
DISCLAIMER: The GSI Mann-Kendall Toolkit is available "as is". Considerable care has been exercised in preparing this software product; however, no party, including without limitation GSI Environmental Inc., makes any representation or warranty regarding the accuracy, correctness, or completeness of the information contained herein, and no such party shall be liable for any direct, indirect, consequential, incidental or other damages resulting from the use of this product or the information contained herein. Information in this publication is subject to change without notice. GSI Environmental Inc., disclaims any responsibility or obligation to update the information contained herein.

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 22-Mar-17
Facility Name: Seattle Center
Conducted By: SKH

Job ID: 21-1-12176-046
Constituent: benzene
Concentration Units: µg/L

Sampling Point ID:	SVE-20	SVE-23	SVE-24	SVE-25			
Sampling Event	Sampling Date	BENZENE CONCENTRATION (µg/L)						
1	5/20/2010	13	47	0.5	360			
2	2/24/2011	8.8	27	0.5	400			
3	5/27/2011	4.7	21	2	390			
4	8/30/2011	5.1	13	0.5	430			
5	11/29/2011	4.1	6.9	0.5	290			
6	2/29/2012	3.3	3.3	1.1	400			
7	5/30/2012	0.5	3.9	0.5	79			
8	8/30/2012	0.5	8.2	3.1	200			
9	11/26/2012	2.2	5	31	380			
10	2/27/2013	1.4	0.5	14	190			
11	5/30/2013	2	1.1	0.5	68			
12	8/30/2013	2.8	5.3	0.5	93			
13	11/26/2013	1.9	4.4	0.5	100			
14	2/25/2014	2	2	0.5	120			
15	5/28/2014	1.5	2.9	0.5	91			
16	8/29/2014	1.1	2	0.5	170			
17	11/21/2014	1.2	2	2	250			
18	2/27/2015	0.5	2.7	0.5	120			
19	5/29/2015	0.5	1.8	0.5	68			
20	8/28/2015	0.5	2.1	0.5	43			
21	11/20/2015	0.5	0.5	0.5	0.5			
22	2/26/2016	0.5	0.5	0.5	0.5			
23	5/26/2016	1	3.2	0.5	4			
24	8/26/2016	2	2	13	0.5			
25	11/17/2016	2	2	38	0.5			
26	2/23/2017	2	2	2.9	10			
27								
28								
29								
30								
Coefficient of Variation:		1.13	1.56	2.15	0.91			
Mann-Kendall Statistic (S):		-146	-179	24	-212			
Confidence Factor:		100.0%	>99.9%	69.2%	>99.9%			
Concentration Trend:		Decreasing	Decreasing	No Trend	Decreasing			



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

DISCLAIMER: The GSI Mann-Kendall Toolkit is available "as is". Considerable care has been exercised in preparing this software product; however, no party, including without limitation GSI Environmental Inc., makes any representation or warranty regarding the accuracy, correctness, or completeness of the information contained herein, and no such party shall be liable for any direct, indirect, consequential, incidental or other damages resulting from the use of this product or the information contained herein. Information in this publication is subject to change without notice. GSI Environmental Inc., disclaims any responsibility or obligation to update the information contained herein.

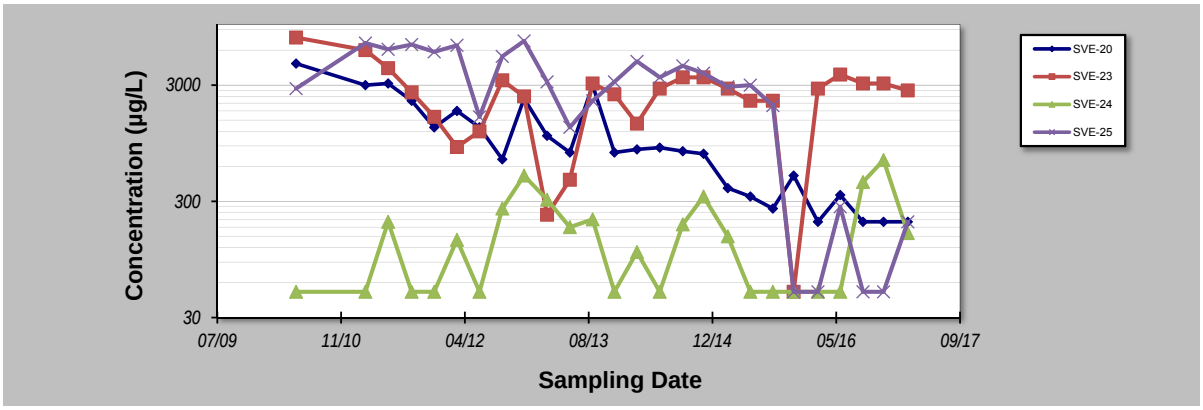
GSI Environmental Inc., www.gsi-net.com

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date: 22-Mar-17
Facility Name: Seattle Center
Conducted By: SKH

Job ID: 21-1-12176-046
Constituent: TPH-gas
Concentration Units: µg/L

Sampling Point ID:	SVE-20	SVE-23	SVE-24	SVE-25			
Sampling Event	Sampling Date	TPH-GAS CONCENTRATION (µg/L)						
1	5/20/2010	4600	7700	50	2800			
2	2/24/2011	3000	6000	50	6900			
3	5/27/2011	3100	4200	200	6100			
4	8/30/2011	2200	2600	50	6700			
5	11/29/2011	1300	1600	50	5800			
6	2/29/2012	1800	880	140	6600			
7	5/30/2012	1300	1200	50	1600			
8	8/30/2012	690	3300	260	5300			
9	11/26/2012	2300	2400	500	7200			
10	2/27/2013	1100	230	310	3200			
11	5/30/2013	790	460	180	1300			
12	8/30/2013	3000	3100	210	2200			
13	11/26/2013	790	2500	50	3200			
14	2/25/2014	840	1400	110	4800			
15	5/28/2014	870	2800	50	3500			
16	8/29/2014	810	3500	190	4400			
17	11/21/2014	770	3500	330	3800			
18	2/27/2015	390	2800	150	2900			
19	5/29/2015	330	2200	50	3000			
20	8/28/2015	260	2200	50	2000			
21	11/20/2015	500	50	50	50			
22	2/26/2016	200	2800	50	50			
23	5/26/2016	340	3700	50	270			
24	8/26/2016	200	3100	440	50			
25	11/17/2016	200	3100	680	50			
26	2/23/2017	200	2700	160	200			
27								
28								
29								
30								
Coefficient of Variation:		0.94	0.61	0.96	0.74			
Mann-Kendall Statistic (S):		-246	-11	29	-180			
Confidence Factor:		>99.9%	58.6%	73.0%	>99.9%			
Concentration Trend:		Decreasing	Stable	No Trend	Decreasing			



Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water* , 41(3):355-367, 2003.

DISCLAIMER: The GSI Mann-Kendall Toolkit is available "as is". Considerable care has been exercised in preparing this software product; however, no party, including without limitation GSI Environmental Inc., makes any representation or warranty regarding the accuracy, correctness, or completeness of the information contained herein, and no such party shall be liable for any direct, indirect, consequential, incidental or other damages resulting from the use of this product or the information contained herein. Information in this publication is subject to change without notice. GSI Environmental Inc., disclaims any responsibility or obligation to update the information contained herein.

APPENDIX C

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL/ENVIRONMENTAL REPORT

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Attachment to and part of Report 21-1-12176-046

Date: April 19, 2017
To: Seattle Center Redevelopment
Attn: Mr. Ned Dunn

IMPORTANT INFORMATION ABOUT YOUR GEOTECHNICAL/ENVIRONMENTAL REPORT

CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include: the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used: (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors which were considered in the development of the report have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events, and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports, and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the
ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland