SHANNON & WILSON
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

November 13, 2019

Mr. Ned Dunn
Seattle Center Redevelopment
305 Harrison Street, Suite 109
Seattle, WA 98109

RE: AUGUST 2019 (3RD BI-ANNUAL) GROUNDWATER AND COMPLIANCE MONITORING, FORMER SEATTLE CENTER LOT NUMBER 2, SEATTLE, WASHINGTON

Dear Mr. Dunn:

This letter report summarizes the status of groundwater monitoring activities at the former Seattle Center Lot Number 2 property, Iris Holdings LLC, 500 5th Ave North in Seattle, Washington (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 have consisted of quarterly and bi-annual groundwater sampling. The groundwater remediation system was turned off in March 2016 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 August 2019, the 3rd bi-annual event of the Rebound Monitoring Component 2 in accordance with the Post-Construction Groundwater Monitoring Plan.[1]

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

[1] Shannon & Wilson Inc., 2017, Post-construction groundwater monitoring plan Seattle Center lot number 2 (IRIS Holding LLC 500 5th Ave North) Seattle, Washington: Report prepared by Shannon & Wilson, Inc., Seattle, Wash., 21-1-12176-046, for Seattle Center Redevelopment, Seattle, Wash, June 9.

location in the central portion of the Site. In general, groundwater flow direction is to the south-southwest (Figure 3).

To facilitate cleanup of gasoline- and benzene-contaminated groundwater at the Site, a two-phase remediation plan was developed.[2] Each phase consisted of a system of soil vapor extraction (SVE) and air sparging (AS) wells (Figure 1). 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 II of the remediation included reinstalling the AS/SVE system after the current property was completed. The reinstalled system commenced operation in November 2010. The first part of Phase II was completed in March 2016, and the system was shut down to conduct a rebound test 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. Additional analyses were added to the monitoring program to assist with the evaluation of the feasibility of MNA as a final treatment method. Groundwater monitoring procedures and methods are discussed in the Post-Construction Groundwater Monitoring Plan, and 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 along with current monitoring results.

The Washington State Department of Ecology (Ecology) issued a No Further Action for the Site on October 17, 2017.[3] The site is currently operating within the post-cleanup controls and monitoring guidelines/restrictions established by Ecology.

GROUNDWATER MONITORING

Groundwater monitoring for the 3rd round of bi-annual 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.

[2] 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.

[3] Washington State Department of Ecology, 2017, No further action at the following site: Letter prepared by the Washington State Department of Ecology, Olympia, Wash., for IRIS Holdings LLC, Seattle, Wash., October 17.

Groundwater sampling was conducted on August 13, 2019. Sampled wells included compliance wells SW-26 and SW-27 and wells SVE-23, SVE-24, and SVE-25, in accordance with the Post Construction Groundwater Monitoring Plan approved by Ecology.

Prior to sampling, approximately 1.0 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.

The groundwater samples were transported under chain-of-custody protocols to OnSite Environmental, Inc. in Redmond, Washington, to analyze for Northwest TPH-G, benzene, toluene, ethylbenzene, and xylenes by U.S. Environmental Protection Agency Method 8021. Depth to groundwater measurements were recorded for the wells using an electronic water level indicator.

Investigation-Derived Waste Disposal

Groundwater purged from wells during sampling was contained on Site in a 200-gallon water collection tank. The tank is located near the wells in east end of the parking garage.

Groundwater Results

TPH-G was detected above the Model Toxics Control Act (MTCA) cleanup criteria of 1,000 micrograms per liter at SVE-23 and SVE-25. Benzene was detected above the MTCA cleanup criteria of 5 micrograms per liter at SVE-25 (Table 1). 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). TPH-G and benzene concentrations have decreased in SVE-25 after two increasing detections seen in the first two bi-annual monitoring events.

Compliance wells (SW-26 and SW-27) have not been detected for contaminants since May 2012.

A summary of the analytical groundwater results is presented in Figure 2 and Table 1. The analytical laboratory report from this groundwater sampling event is contained in Appendix A.

Natural Attenuation Evaluation

In general, according to the guidance provided by Ecology,[4] the analysis of the primary and secondary geochemical parameters (Table 1) show that groundwater conditions support the use of MNA through biodegradation as a final treatment method. In accordance with the Post-Construction Groundwater Monitoring Plan, future monitoring events will include analysis of TPH-G and benzene to continue to evaluate plume status.

CONCLUSIONS

The detection of TPH-G in SVE-23 is consistent with historical trends. TPH-G and benzene concentrations have decreased in SVE-25 after two increasing detections seen in the first two bi-annual monitoring events. Seasonal variations of contamination may be detected within SVE-23 and SVE-25 going forward, but there is not sufficient evidence to determine the status of the plume. Continued monitoring and data collection, in accordance with the Post Construction Monitoring Plan, will provide a better understanding of the conditions at the Site. Analytical results for the two compliance wells remain non-detect for the contaminants of concern.

The Site is within compliance of the No Further Action post-cleanup controls and monitoring plan set by the Ecology in October 2017. Continued bi-annual monitoring will include an evaluation of TPH-G and benzene in three of the southern plume source wells and two downgradient compliance wells.

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 has prepared the enclosed,

[4] Ibid.

SHANNON & WILSON

"Important Information About Your Geotechnical/Environmental Report," to help you and others in understanding our reports.

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

Sincerely,

SHANNON & WILSON

Christian T. Canfield
Environmental Staff

11/13/2019

Scott W. Gaulke, PE, LHG
Vice President

CTC:SWG/ctc

Enc. Table 1 – Groundwater Analytical Results for August 2019
Table 2 – Historical Groundwater Analytical Results (3 pages)
Figure 1 – Site Plan
Figure 2 – TPH-G and Benzene Concentrations in Groundwater
Figure 3 – Groundwater Contour Map
Appendix A – Groundwater Analytical Laboratory Reports
Important Information About Your Geotechnical/Environmental Report

TABLE 1
GROUNDWATER ANALYTICAL RESULTS FOR AUGUST 2019

Well Number	Bi-Annual Event	Date Collected	BTEX (µg/L)				TPH - Gasoline (µg/L)	Primary Geochemical Indicators				
			Benzene	Toluene	Ethylbenzene	Xylenes		ORP (mV)	DO (mg/L)	pH	Specific Conductivity (µS/cm)	Temperature (°C)
Soil Vapor Extraction Wells												
SVE-23	BA3	8/13/2019	**2.57**	**11.3**	**88.9**	**263**	**3,580**	-72.9	0.37	6.81	467	15.5
SVE-24	BA3	8/13/2019	< 1	< 1	< 1	< 1	< 50	-9.8	0.59	6.47	2009	15.6
SVE-25	BA3	8/13/2019	**20.3**	**4.23**	**13.4**	**21.7**	**860**	-67.7	0.41	6.74	956	14.9
Compliance Wells												
SW-26	BA3	8/13/2019	< 1	< 1	< 1	< 1	< 50	17.0	0.50	6.12	2987	15.2
SW-27	BA3	8/13/2019	< 1	< 1	< 1	< 1	< 50	-6.7	0.85	6.48	433	16.2
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.

Bolded text indicates analyte detected.

Shaded text indicates concentration exceeds cleanup levels.

< = less than reporting limit indicated

°C = degrees Celsius

BTEX = benzene, toluene, ethylbenzene, and xylenes

DO = dissolved oxygen

mg/L = milligrams per liter

mV = millivolt

NA = not applicable

ORP = oxygen reduction potential in millivolts

SVE = soil vapor extraction

TPH = total petroleum hydrocarbons

µS/cm = microSiemens per centimeter

µg/L = micrograms per liter

TABLE 2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS

Well Number	Quarter or Bi-Annual Event	Date Collected	BTEX				TPH - Gasoline (µg/L)	Field Measurements	
			Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)		ORP (mV)	DO (mg/L)
SVE-23	BA3	8/13/2019	**2.57**	**11.3**	**88.9**	**263**	**3,580**	-72.9	0.37
	BA2	2/20/2019	**2.65**	**15**	**123**	**212**	**3,430**	160.2	0.17
	BA1	8/28/2018	< 4.0	**9**	**68**	**164**	**3,100**	99.9	0.39
	Q29	2/23/2018	**2.6**	**18**	**100**	**238**	**4,400**	-40	0.15
	Q28	11/28/2017	**3.5**	**20**	**110**	**300**	**5,400**	-164	0.14
	Q27	8/29/2017	< 4.0	**9.6**	**93**	**195**	**3,800**	169	0.41
	Q26	5/25/2017	< 4.0	**12**	**110**	**216**	**4,100**	-92.4	0.10
	Q25	2/23/2017	< 4.0	**10**	**86**	**177**	**2,700**	-99.7	0.08
	Q24	11/17/2016	< 4.0	**11.0**	**89**	**218**	**3,100**	-110.8	0.12
	Q23	8/26/2016	< 4.0	**12.0**	**86**	**218**	**3,100**	248.3	0.21
	Q22	5/25/2016	**3.2**	**11.0**	**78**	**185**	**3,700**	-74.3	0.02
	Q21	2/25/2016	< 1.0	**8.8**	**69**	**175**	**2,800**	-113.7	0.08
	Q20	11/19/2015	< 1.0	< 1.0	< 1.0	< 1.0	< 100	-44.6	0.54
	Q19	8/26/2015	**2.1**	**7.2**	**49**	**87**	**2,200**	-47.5	0.67
	Q18	5/28/2015	**1.8**	< 1.0	**45**	**3.8**	**2,200**	-12.4	0.68
	Q17	2/26/2015	**2.7**	**8.2**	**62.0**	**143**	**2,800**	-75.9	4.93
	Q16	11/19/2014	< 4.0	**8.8**	**85.0**	**210**	**3,500**	-31.4	0.16
	Q15	8/28/2014	< 4.0	**6.8**	**81**	**185**	**3,500**	-64.2	0.14
	Q14	5/27/2014	**2.9**	**9.8**	**74**	**125**	**2,800**	-56.1	1.03
	Q13	2/24/2014	**2.0**	**4.2**	**44**	**43**	**1,400**	-40.3	0.46
	Q12	11/25/2013	**4.4**	**11**	**67**	**125**	**2,500**	-92.3	0.37
	Q11	8/29/2013	**5.3**	**12**	**67**	**135**	**3,100**	-51.3	0.14
	Q10	5/29/2013	**1.1**	**1.5**	**9.8**	**15.1**	**460**	43.1	0.26
	Q9	2/26/2013	< 1.0	< 1.0	**3.3**	**5.6**	**230**	82.4	0.30
	Q8	11/26/2012	**5.0**	**8.0**	**56**	**89**	**2,400**	-55.5	0.05
	Q7	8/30/2012	**8.2**	**11**	**75**	**126**	**3,300**	-27.4	0.23
	Q6	5/31/2012	**3.9**	**3.1**	**27**	**30**	**1,200**	-232.1	0.54
	Q5	2/29/2012	**3.3**	**2.5**	**27**	**24**	**880**	57.4	0.58
	Q4	11/29/2011	**6.9**	**6.5**	**53**	**47**	**1,600**	-42.5	0.47
	Q3	8/30/2011	**13**	**8**	**78**	**73**	**2,600**	-39.5	5.11
	Q2	5/27/2011	**21**	**10**	**100**	**176**	**4,200**	-48.7	0.42
	Q1	2/24/2011	**27**	**7.4**	**130**	**197**	**6,000**	-68.9	0.85
	Interim	5/20/2010	**47**	**19**	**250**	**820**	**7,700**	-44.1	0.25
SVE-24	BA3	8/13/2019	< 1	< 1	< 1	< 1	< 50	-9.8	0.59
	BA2	2/20/2019	< 1	< 1	< 1	< 1	< 50	600.1	0.28
	BA1	8/28/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 100	518.4	0.30
	Q29	2/22/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 100	41	0.31
	Q28	11/28/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 100	-89	0.21
	Q27	8/29/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 100	113	0.21
	Q26	5/24/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 100	223.6	0.18
	Q25	2/22/2017	**2.9**	< 1.0	**2.3**	< 1.0	**160**	18.9	0.20
	Q24	11/17/2016	**38**	4.5	**18**	20.5	**680**	-80.4	0.20
	Q23	8/25/2016	**13**	< 4.0	**6.3**	< 4.0	**440**	48.3	0.16
	Q22	5/24/2016	< 1.0	**1.0**	< 1.0	< 1.0	< 100	-35.4	0.18
	Q21	2/25/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 100	-4.9	0.24
	Q20	11/19/2015	< 1.0	< 1.0	< 1.0	< 1.0	< 100	150.0	16.80
	Q19	8/26/2015	< 1.0	< 1.0	< 1.0	< 1.0	< 100	-1.6	0.38
	Q18	5/28/2015	< 1.0	< 1.0	< 1.0	< 2.0	< 100	-28.1	0.34
	Q17	2/26/2015	< 1.0	< 1.0	< 1.0	< 2.0	**150**	-96.8	1.41
	Q16	11/19/2014	**2.0**	< 1.0	**3.7**	< 2.0	**330**	-21.4	0.13
	Q15	8/28/2014	< 1.0	< 1.0	< 1.0	< 2.0	**190**	-70.1	0.12
	Q14	5/27/2014	< 1.0	< 1.0	< 1.0	< 2.0	< 100	-33.2	1.01
	Q13	2/24/2014	< 1.0	< 1.0	< 1.0	< 2.0	**110**	-39.8	0.77
	Q12	11/25/2013	< 1.0	< 1.0	< 1.0	< 2.0	< 100	-34.0	0.35
	Q11	8/29/2013	< 1.0	< 1.0	**2.5**	< 2.0	**210**	-34.2	0.21
	Q10	5/29/2013	< 1.0	< 1.0	**2.4**	< 2.0	**180**	-48.1	0.28
	Q9	2/26/2013	**14**	< 1.0	**6.8**	< 2.0	**310**	-38.8	0.33
	Q8	11/26/2012	**31**	**1.4**	**9.5**	**3.4**	**500**	-71.1	0.15
	Q7	8/29/2012	**3.1**	< 1.0	**2.8**	< 2.0	**260**	-15.7	0.27
	Q6	5/30/2012	< 1.0	< 1.0	< 1.0	< 2.0	< 100	-250.0	0.30
	Q5	2/29/2012	**1.1**	< 1.0	< 1.0	**1.8**	**140**	-33.3	3.65
	Q4	11/29/2011	< 1.0	< 1.0	< 1.0	< 2.0	< 100	-71.0	0.70
	Q3	8/30/2011	< 1.0	< 1.0	< 1.0	< 2.0	< 100	-11.9	0.15
	Q2	5/31/2011	< 4.0	< 4.0	< 4.0	< 4.0	< 400	-11.4	0.19
	Q1	2/24/2011	< 1.0	< 1.0	< 1.0	< 2.0	< 100	-42.6	0.68
	Interim	5/20/2010	< 1.0	< 1.0	< 1.0	< 2.0	< 100	-273.6	0.63

TABLE 2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS

Well Number	Quarter or Bi-Annual Event	Date Collected	BTEX				TPH - Gasoline (µg/L)	Field Measurements	
			Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)		ORP (mV)	DO (mg/L)
SVE-25	BA3	8/13/2019	**20.3**	**4.23**	**13.4**	**21.7**	**860**	-67.7	0.41
	BA2	2/20/2019	**29.3**	**33.6**	**144**	**338**	**3,230**	218.5	0.14
	BA1	8/28/2018	**20**	**14**	**45**	**97**	**1,200**	276.2	0.19
	Q29	2/22/2018	< 1.0	< 1.0	< 1.0	**2.7**	< 100	119.0	0.21
	Q28	11/28/2017	**2.5**	< 1.0	**3.5**	**2.7**	**100**	-7.0	0.19
	Q27	8/30/2017	< 4.0	< 4.0	< 4.0	< 1.0	< 400	229.0	0.38
	Q26	5/25/2017	< 4.0	< 4.0	< 4.0	< 1.0	< 400	43.8	0.28
	Q25	2/23/2017	**10**	< 4.0	**7.8**	**8.1**	< 400	-48.4	0.14
	Q24	11/17/2016	< 1.0	< 1.0	**1.4**	< 1.0	< 100	38.4	0.18
	Q23	8/25/2016	< 1.0	< 1.0	**1.9**	< 1.0	< 100	343.9	0.18
	Q22	5/24/2016	**4**	**1.2**	**14**	**1.6**	**270**	-11.9	0.14
	Q21	2/25/2016	< 1.0	< 1.0	**9.5**	< 2.0	< 100	-62.4	0.14
	Q20	11/20/2015	< 1.0	< 1.0	< 1.0	< 2.0	< 100	-39.5	0.59
	Q19	8/26/2015	**43**	**8.5**	**130**	**47**	**2,000**	-56.0	0.23
	Q18	5/28/2015	**68**	< 4.0	**160**	**12**	**3,000**	-4.1	0.29
	Q17	2/26/2015	**120**	**13**	**190**	**106**	**2,900**	-137.1	4.39
	Q16	11/19/2014	**250**	**40**	**300**	**140**	**3,800**	-57.5	0.07
	Q15	8/28/2014	**170**	**85**	**220**	**281**	**4,400**	-98.4	0.16
	Q14	5/27/2014	**91**	**19**	**200**	**158**	**3,500**	-68.8	1.04
	Q13	2/24/2014	**120**	**52**	**260**	**257**	**4,800**	-53.1	0.77
	Q12	11/25/2013	**100**	**28**	**200**	**113**	**3,200**	-90.3	0.26
	Q11	8/29/2013	**93**	**7.5**	**130**	**71**	**2,200**	-53.2	0.21
	Q10	5/29/2013	**68**	**4.6**	**82**	**40**	**1,300**	-56.9	0.28
	Q9	2/27/2013	**190**	**29**	**150**	**180**	**3,200**	-68.1	0.20
	Q8	11/26/2012	**380**	**160**	**270**	**580**	**7,200**	-107.6	0.01
	Q7	8/29/2012	**200**	**160**	**180**	**377**	**5,300**	-21.3	0.39
	Q6	5/30/2012	**79**	**20**	**63**	**160**	**1,600**	-218.5	0.25
	Q5	2/29/2012	**400**	**230**	**330**	**498**	**6,600**	-83.2	1.11
	Q4	11/29/2011	**290**	**230**	**240**	**480**	**5,800**	-114	0.60
	Q3	8/30/2011	**430**	**220**	**250**	**591**	**6,700**	-74.5	0.08
	Q2	5/31/2011	**390**	**330**	**200**	**490**	**6,100**	-46.8	0.17
	Q1	2/24/2011	**400**	**370**	**200**	**440**	**6,900**	-82.5	0.34
	Interim	5/20/2010	**360**	**130**	**150**	**109**	**2,800**	-177.9	0.91
SW-26	BA3	8/13/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 100	17.0	0.50
	BA2	2/20/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 100	356.7	0.22
	BA1	8/23/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 100	500.4	0.24
	Q29	2/22/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 100	133.0	0.57
	Q28	11/27/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 100	53.0	0.34
	Q27	8/29/2017	< 1.0	< 1.0	< 1.0	<1.0	< 100	171.0	0.43
	Q26	5/24/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 100	231.4	0.42
	Q25	2/22/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 100	55.2	0.15
	Q24	11/16/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 100	-38.7	0.38
	Q23	8/25/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 100	479.4	0.68
	Q22	5/24/2016	< 1.0	**2.9**	< 1.0	< 1.0	< 100	-3.4	0.24
	Q21	2/25/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 100	-21.7	0.19
	Q20	11/19/2015	< 1.0	< 1.0	< 1.0	< 1.0	< 100	-31.0	3.35
	Q19	8/26/2015	< 1.0	< 1.0	< 1.0	< 1.0	< 100	-30.0	0.66
	Q18	5/28/2015	< 1.0	< 1.0	< 1.0	< 2.0	< 100	26.4	0.68
	Q17	2/26/2015	< 1.0	< 1.0	< 1.0	< 2.0	< 100	-51.9	6.01
	Q16	11/19/2014	< 1.0	< 1.0	< 1.0	< 2.0	< 100	-4.8	0.20
	Q15	8/28/2014	< 1.0	< 1.0	< 1.0	< 2.0	< 100	-57.8	0.17
	Q14	5/27/2014	< 1.0	< 1.0	< 1.0	< 2.0	< 100	-50.1	1.03
	Q13	2/25/2014	< 1.0	< 1.0	< 1.0	< 2.0	< 100	-50.2	0.75
	Q12	11/25/2013	< 1.0	< 1.0	< 1.0	< 2.0	< 100	-52.0	5.71
	Q11	8/29/2013	< 1.0	< 1.0	< 1.0	< 2.0	< 100	-18.1	5.51
	Q10	5/29/2013	< 1.0	< 1.0	< 1.0	< 2.0	< 100	-48.2	5.63
	Q9	2/27/2013	< 1.0	< 1.0	< 1.0	< 2.0	< 100	-70.2	1.32
	Q8	11/26/2012	< 1.0	< 1.0	< 1.0	< 2.0	< 100	-37.6	5.18
	Q7	8/29/2012	< 1.0	< 1.0	< 1.0	< 2.0	< 100	21.0	5.15
	Q6	5/30/2012	**3.1**	< 1.0	**2.2**	**1.1**	**230**	-206.7	2.86
	Q5	2/29/2012	< 1.0	< 1.0	< 1.0	< 2.0	< 100	-69.6	1.15
	Q4	11/29/2011	< 1.0	< 1.0	< 1.0	< 2.0	< 100	-93.0	0.70
	Q3	8/30/2011	< 1.0	< 1.0	< 1.0	< 2.0	< 100	-11.5	4.08
	Q2	5/31/2011	< 1.0	< 1.0	< 1.0	< 2.0	< 100	20.8	0.8
	Q1	2/24/2011	< 1.0	< 1.0	< 1.0	< 2.0	< 100	-66.3	2.22
	Interim	11/5/2010	**5.5**	< 1.0	**1.0**	< 2.0	< 100	-103	1.09
	Interim	4/30/2010	**5.5**	< 4.0	< 4.0	< 8.0	< 400	-152	0.85

TABLE 2
HISTORICAL GROUNDWATER ANALYTICAL RESULTS

Well Number	Quarter or Bi-Annual Event	Date Collected	BTEX				TPH - Gasoline (µg/L)	Field Measurements	
			Benzene (µg/L)	Toluene (µg/L)	Ethylbenzene (µg/L)	Xylenes (µg/L)		ORP (mV)	DO (mg/L)
SW-27	BA3	8/13/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 100	-6.7	0.85
	BA2	2/20/2019	< 1.0	< 1.0	< 1.0	< 1.0	< 100	240.5	0.68
	BA1	8/23/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 100	278.0	1.17
	Q29	2/22/2018	< 1.0	< 1.0	< 1.0	< 1.0	< 100	74	0.71
	Q28	11/28/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 100	-58	0.27
	Q27	8/30/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 100	250	1.84
	Q26	5/24/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 100	309.4	0.31
	Q25	2/22/2017	< 1.0	< 1.0	< 1.0	< 1.0	< 100	-5.7	0.30
	Q24	11/17/2016	< 4.0	< 4.0	< 4.0	< 4.0	< 400	8.3	2.14
	Q23	8/25/2016	< 4.0	< 4.0	< 4.0	< 4.0	< 400	*	*
	Q22	5/24/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 100	*	*
	Q21	2/25/2016	< 1.0	< 1.0	< 1.0	< 1.0	< 100	*	*
	Q20	11/19/2015	< 1.0	< 1.0	< 1.0	< 1.0	< 100	*	*
	Q19	8/26/2015	< 1.0	< 1.0	< 1.0	< 1.0	< 100	*	*
	Q18	5/28/2015	< 1.0	< 1.0	< 1.0	< 2.0	< 100	*	*
	Q17	2/26/2015	< 1.0	< 1.0	< 1.0	< 2.0	< 100	*	*
	Q16	11/19/2014	< 1.0	< 1.0	< 1.0	< 2.0	< 100	*	*
	Q15	8/28/2014	< 4.0	< 4.0	< 4.0	< 8.0	< 400	*	*
	Q14	5/27/2014	< 1.0	< 1.0	< 1.0	< 2.0	< 100	*	*
	Q13	2/24/2014	< 1.0	< 1.0	< 1.0	< 2.0	< 100	*	*
	Q12	11/25/2013	< 1.0	< 1.0	< 1.0	< 2.0	< 100	*	*
	Q11	8/29/2013	< 1.0	< 1.0	< 1.0	< 2.0	< 100	*	*
	Q10	5/29/2013	< 1.0	< 1.0	< 1.0	< 2.0	< 100	79.1	8.72
	Q9	2/27/2013	< 1.0	< 1.0	< 1.0	< 2.0	< 100	22.4	4.56
	Q8	11/27/2012	< 1.0	< 1.0	< 1.0	< 2.0	< 100	15.4	0.41
	Q7	8/29/2012	< 1.0	< 1.0	< 1.0	< 2.0	< 100	19.3	3.38
	Q6	5/31/2012	< 1.0	< 1.0	< 1.0	< 2.0	< 100	-165.8	2.3
	Q5	2/29/2012	< 1.0	< 1.0	< 1.0	< 2.0	< 100	24.2	1.93
	Q4	11/29/2011	< 1.0	< 1.0	< 1.0	< 2.0	< 100	-1.0	6.2
	Q3	8/30/2011	< 1.0	< 1.0	< 1.0	< 2.0	< 100	39.9	4.41
	Q2	5/31/2011	**1.5**	< 1.0	< 1.0	< 2.0	< 100	32.7	0.6
	Q1	2/24/2011	**2.1**	< 1.0	< 1.0	< 2.0	< 100	-26.4	0.33
	Interim	11/5/2010	**8.0**	< 1.0	< 1.0	< 2.0	< 100	-157	0
	Interim	4/30/2010	**4.5**	< 1.0	< 1.0	< 2.0	< 100	-99.2	0.67
MTCA Method A Cleanup Levels			5	1,000	700	1,000	800/1,000 [1]	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.

Bolded text indicates analyte detected.

Shaded text indicates concentration exceeds state cleanup criterion.

< = less than reporting limit indicated

BTEX = benzene, toluene, ethylbenzene, and xylenes

DO = dissolved oxygen in milligrams per liter

MTCA = Model Toxics Control Act

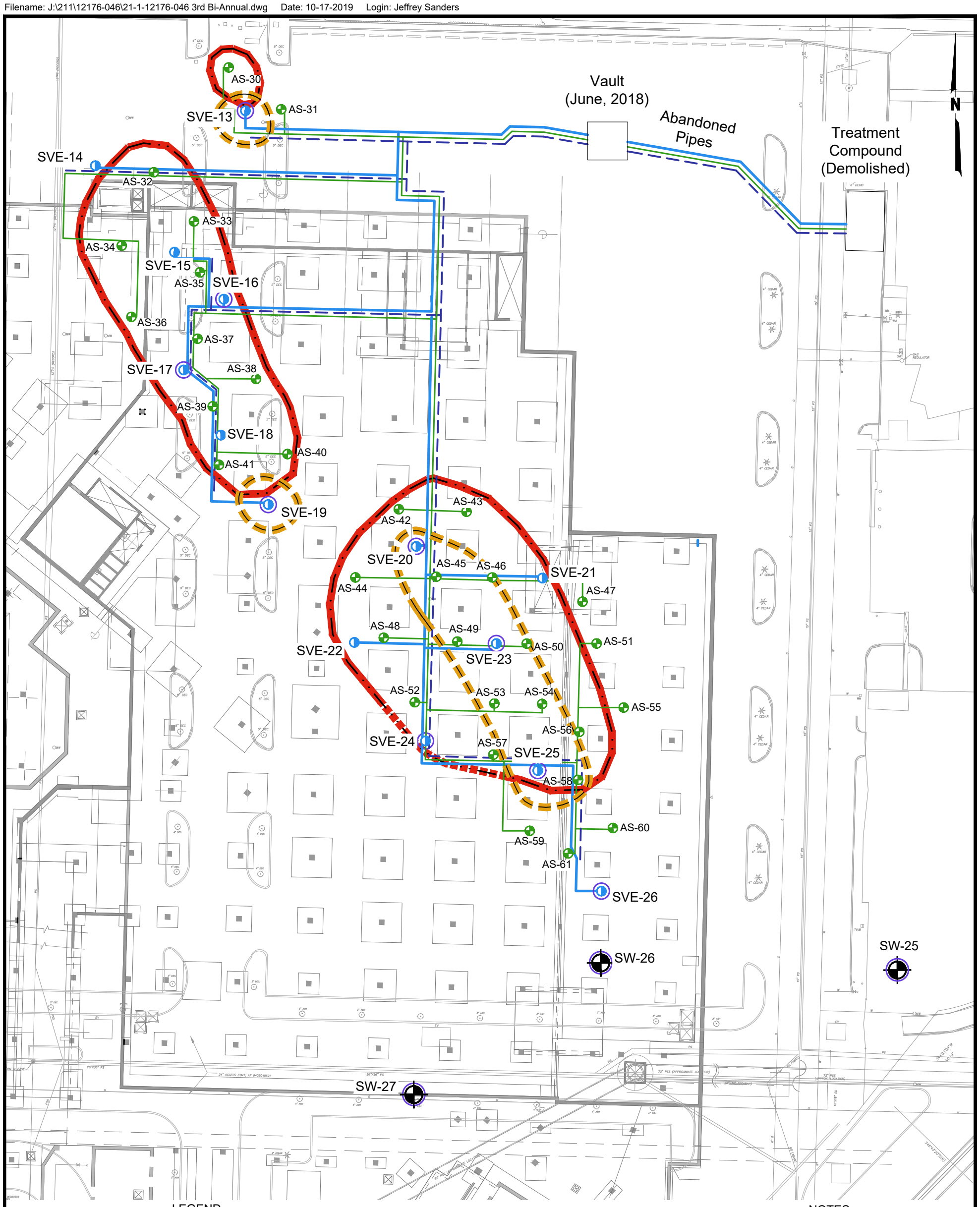
NA = not applicable

ORP = oxygen reduction potential in millivolts

SVE = soil vapor extraction

TPH = total petroleum hydrocarbons

Filename: J:\211\12176-046\21-1-12176-046 3rd Bi-Annual.dwg Date: 10-17-2019 Login: Jeffrey Sanders



LEGEND

- SVE (Soil Vapor Extraction) Well
- AS (Air Sparging) Well
- Well Selected for Groundwater Monitoring
- Compliance Monitoring Well
- Estimated Baseline Extent of Benzene in Soil >0.3 mg/kg (January-March 2008)
- Estimated Extent of TPH-G and Benzene Contamination (February 2019)
- 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 - 3rd Bi-Annual
Seattle Center Lot No. 2
Seattle, Washington

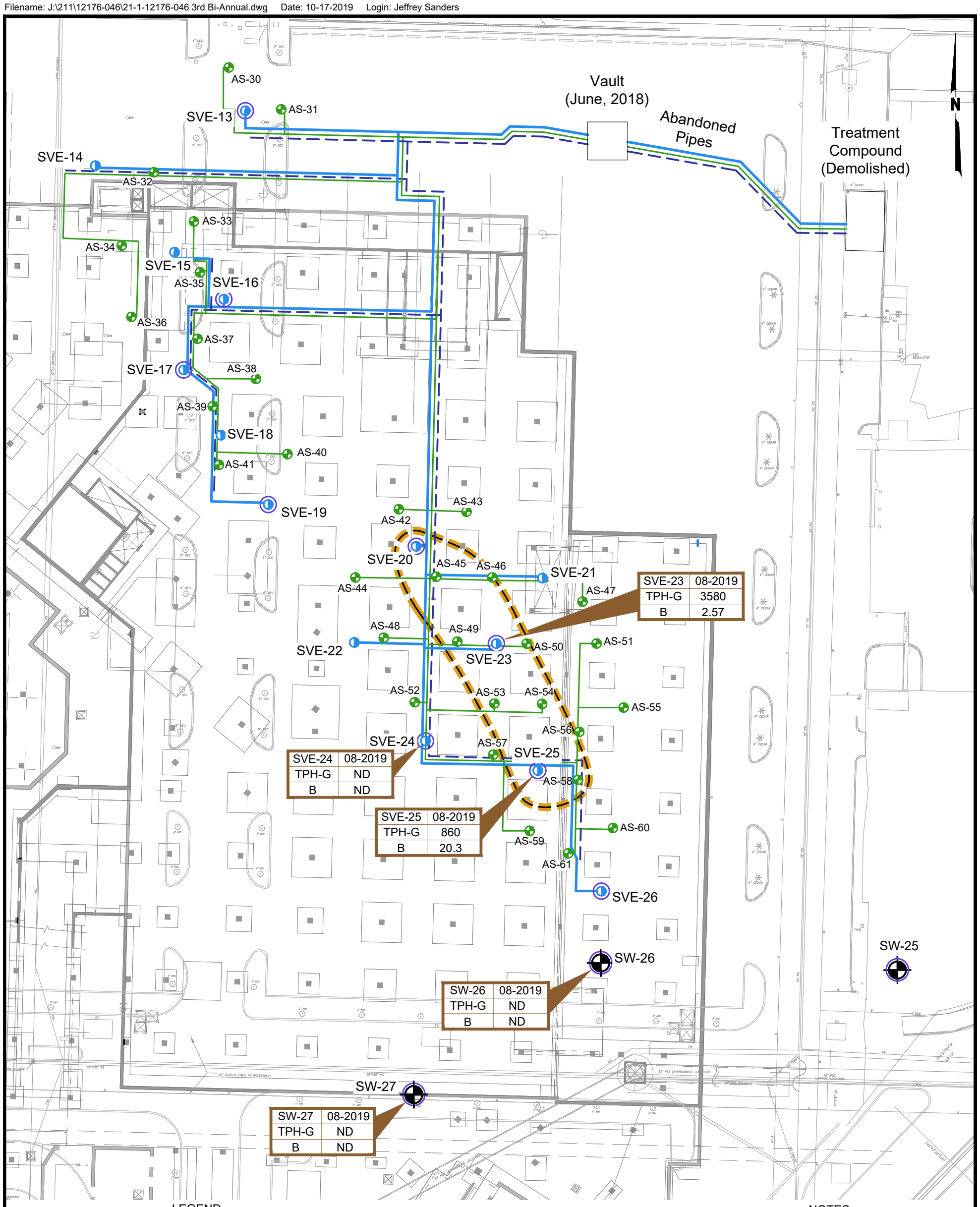
SITE PLAN

November 2019 21-1-12176-046

SHANNON & WILSON, INC. GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 1

Filename: J:\211\12176-046\21-1-12176-046 3rd Bi-Annual.dwg Date: 10-17-2019 Login: Jeffrey Sanders



LEGEND

- SVE (Soil Vapor Extraction) Well
- AS (Air Sparging) Well
- Well Selected for Groundwater Monitoring
- Compliance Monitoring Well
- Estimated Extent of TPH-G and Benzene Contamination (February 2019)
- 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 - 3rd Bi-Annual
Seattle Center Lot No. 2
Seattle, Washington

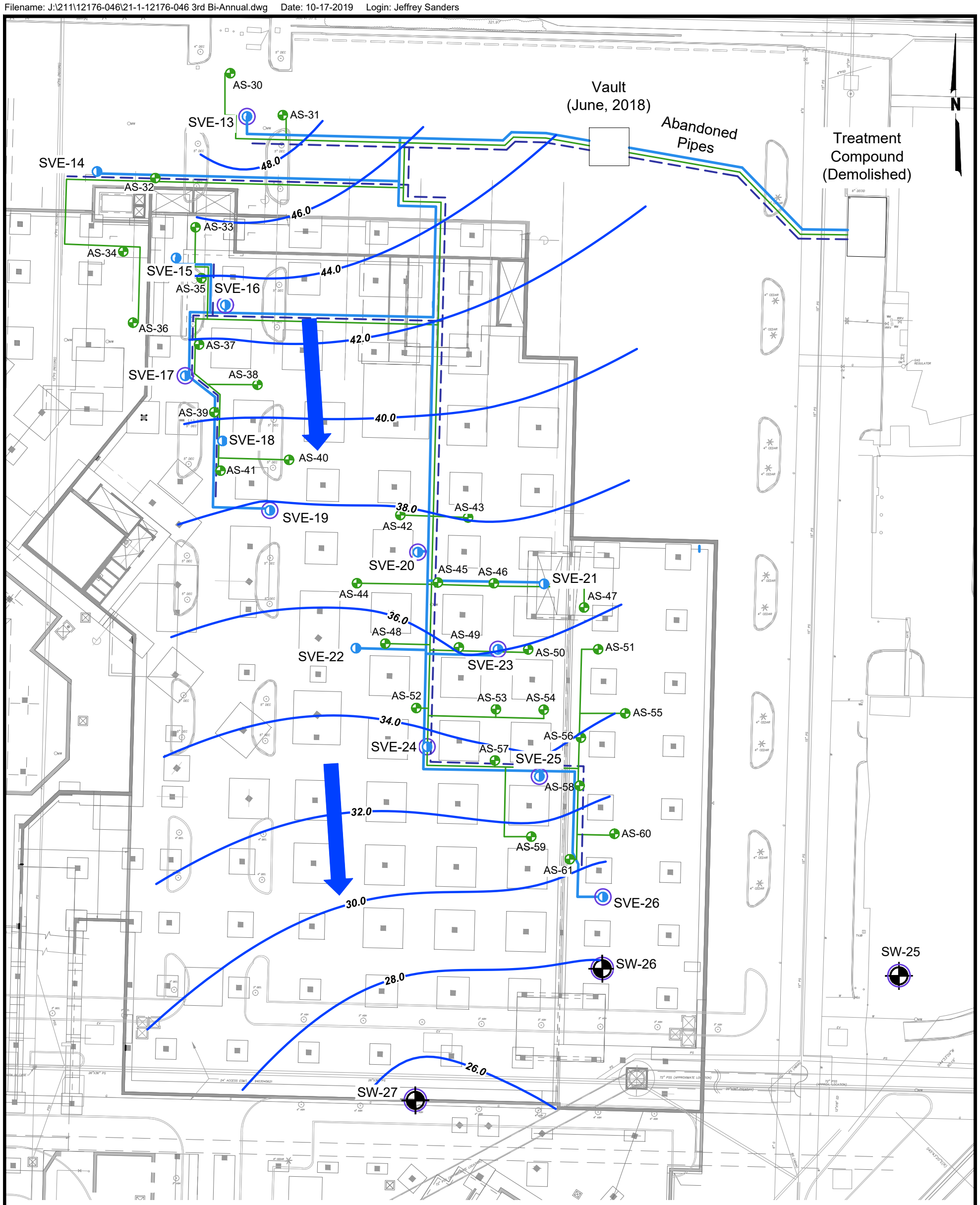
TPH-G AND BENZENE CONCENTRATIONS IN GROUNDWATER

November 2019 21-1-12176-046

SHANNON & WILSON, INC. GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 2

Filename: J:\211\12176-046\21-1-12176-046 3rd Bi-Annual.dwg Date: 10-17-2019 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

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 - 3rd Bi-Annual
Seattle Center Lot No. 2
Seattle, Washington

GROUNDWATER CONTOUR MAP

November 2019 21-1-12176-046

SHANNON & WILSON, INC. GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

FIG. 3

FIG. 3

Appendix A

Groundwater Analytical Laboratory Reports

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

Shannon & Wilson
Christian Canfield
400 N. 34th Street, Suite 100
Seattle, WA 98103

RE: Seattle Center Lot #2
Work Order Number: 1908208

August 21, 2019

Attention Christian Canfield:

Fremont Analytical, Inc. received 6 sample(s) on 8/13/2019 for the analyses presented in the following report.

Gasoline by NWTPH-Gx
Volatile Organic Compounds by EPA Method 8260D

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,

Brianna Barnes
Project Manager

Date: *08/21/2019*

CLIENT: Shannon & Wilson
Project: Seattle Center Lot #2
Work Order: 1908208

Work Order Sample Summary

Lab Sample ID	Client Sample ID	Date/Time Collected	Date/Time Received
1908208-001	SVE-23	08/13/2019 9:35 AM	08/13/2019 5:16 PM
1908208-002	SVE-25	08/13/2019 10:55 AM	08/13/2019 5:16 PM
1908208-003	SVE-24	08/13/2019 12:10 PM	08/13/2019 5:16 PM
1908208-004	SW-26	08/13/2019 2:30 PM	08/13/2019 5:16 PM
1908208-005	SW-27	08/13/2019 4:00 PM	08/13/2019 5:16 PM
1908208-006	Trip Blank	08/05/2019 12:43 PM	08/13/2019 5:16 PM

Case Narrative

WO#: **1908208**

Date: **8/21/2019**

CLIENT: Shannon & Wilson

Project: Seattle Center Lot #2

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

Analytical Report

Work Order: **1908208**
Date Reported: **8/21/2019**

Client: Shannon & Wilson
Collection Date: 8/13/2019 9:35:00 AM
Project: Seattle Center Lot #2
Lab ID: 1908208-001
Matrix: Groundwater
Client Sample ID: **SVE-23**

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Gasoline by NWTPH-Gx				Batch ID: 25528		Analyst: KT
Gasoline	3,580	500	D	µg/L	10	8/17/2019 12:30:21 PM
Surr: Toluene-d8	90.5	65 - 135	D	%Rec	10	8/17/2019 12:30:21 PM
Surr: 4-Bromofluorobenzene	84.7	65 - 135	D	%Rec	10	8/17/2019 12:30:21 PM
Volatile Organic Compounds by EPA Method 8260D				Batch ID: 25528		Analyst: KT
Benzene	2.57	1.00		µg/L	1	8/17/2019 2:33:23 PM
Toluene	11.3	1.00		µg/L	1	8/17/2019 2:33:23 PM
Ethylbenzene	88.9	10.0	D	µg/L	10	8/17/2019 12:30:21 PM
m,p-Xylene	256	10.0	D	µg/L	10	8/17/2019 12:30:21 PM
o-Xylene	7.15	1.00		µg/L	1	8/17/2019 2:33:23 PM
Surr: Dibromofluoromethane	101	45.4 - 152		%Rec	1	8/17/2019 2:33:23 PM
Surr: Toluene-d8	96.4	40.1 - 139		%Rec	1	8/17/2019 2:33:23 PM
Surr: 1-Bromo-4-fluorobenzene	104	64.2 - 128		%Rec	1	8/17/2019 2:33:23 PM

Analytical Report

Work Order: **1908208**
Date Reported: **8/21/2019**

Client: Shannon & Wilson
Collection Date: 8/13/2019 10:55:00 AM
Project: Seattle Center Lot #2
Lab ID: 1908208-002
Matrix: Groundwater
Client Sample ID: **SVE-25**

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Gasoline by NWTPH-Gx				Batch ID: 25528		Analyst: KT
Gasoline	860	500	D	µg/L	10	8/17/2019 1:01:03 PM
Surr: Toluene-d8	94.4	65 - 135	D	%Rec	10	8/17/2019 1:01:03 PM
Surr: 4-Bromofluorobenzene	79.2	65 - 135	D	%Rec	10	8/17/2019 1:01:03 PM
Volatile Organic Compounds by EPA Method 8260D				Batch ID: 25528		Analyst: KT
Benzene	20.3	1.00		µg/L	1	8/17/2019 3:04:15 PM
Toluene	4.23	1.00		µg/L	1	8/17/2019 3:04:15 PM
Ethylbenzene	13.4	10.0	D	µg/L	10	8/17/2019 1:01:03 PM
m,p-Xylene	19.8	10.0	D	µg/L	10	8/17/2019 1:01:03 PM
o-Xylene	1.91	1.00		µg/L	1	8/17/2019 3:04:15 PM
Surr: Dibromofluoromethane	101	45.4 - 152		%Rec	1	8/17/2019 3:04:15 PM
Surr: Toluene-d8	98.5	40.1 - 139		%Rec	1	8/17/2019 3:04:15 PM
Surr: 1-Bromo-4-fluorobenzene	99.1	64.2 - 128		%Rec	1	8/17/2019 3:04:15 PM

Analytical Report

Work Order: **1908208**
Date Reported: **8/21/2019**

Client: Shannon & Wilson
Collection Date: 8/13/2019 12:10:00 PM
Project: Seattle Center Lot #2
Lab ID: 1908208-003
Matrix: Groundwater
Client Sample ID: **SVE-24**

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Gasoline by NWTPH-Gx				Batch ID: 25528		Analyst: KT
Gasoline	ND	50.0		µg/L	1	8/17/2019 9:27:11 AM
Surr: Toluene-d8	93.8	65 - 135		%Rec	1	8/17/2019 9:27:11 AM
Surr: 4-Bromofluorobenzene	79.2	65 - 135		%Rec	1	8/17/2019 9:27:11 AM
Volatile Organic Compounds by EPA Method 8260D				Batch ID: 25528		Analyst: KT
Benzene	ND	1.00		µg/L	1	8/17/2019 9:27:11 AM
Toluene	ND	1.00		µg/L	1	8/17/2019 9:27:11 AM
Ethylbenzene	ND	1.00		µg/L	1	8/17/2019 9:27:11 AM
m,p-Xylene	ND	1.00		µg/L	1	8/17/2019 9:27:11 AM
o-Xylene	ND	1.00		µg/L	1	8/17/2019 9:27:11 AM
Surr: Dibromofluoromethane	102	45.4 - 152		%Rec	1	8/17/2019 9:27:11 AM
Surr: Toluene-d8	101	40.1 - 139		%Rec	1	8/17/2019 9:27:11 AM
Surr: 1-Bromo-4-fluorobenzene	93.8	64.2 - 128		%Rec	1	8/17/2019 9:27:11 AM

Analytical Report

Work Order: **1908208**
Date Reported: **8/21/2019**

Client: Shannon & Wilson
Collection Date: 8/13/2019 2:30:00 PM
Project: Seattle Center Lot #2
Lab ID: 1908208-004
Matrix: Groundwater
Client Sample ID: **SW-26**

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Gasoline by NWTPH-Gx				Batch ID: 25528		Analyst: KT
Gasoline	ND	50.0		µg/L	1	8/17/2019 9:57:32 AM
Surr: Toluene-d8	91.3	65 - 135		%Rec	1	8/17/2019 9:57:32 AM
Surr: 4-Bromofluorobenzene	80.1	65 - 135		%Rec	1	8/17/2019 9:57:32 AM
Volatile Organic Compounds by EPA Method 8260D				Batch ID: 25528		Analyst: KT
Benzene	ND	1.00		µg/L	1	8/17/2019 9:57:32 AM
Toluene	ND	1.00		µg/L	1	8/17/2019 9:57:32 AM
Ethylbenzene	ND	1.00		µg/L	1	8/17/2019 9:57:32 AM
m,p-Xylene	ND	1.00		µg/L	1	8/17/2019 9:57:32 AM
o-Xylene	ND	1.00		µg/L	1	8/17/2019 9:57:32 AM
Surr: Dibromofluoromethane	103	45.4 - 152		%Rec	1	8/17/2019 9:57:32 AM
Surr: Toluene-d8	99.1	40.1 - 139		%Rec	1	8/17/2019 9:57:32 AM
Surr: 1-Bromo-4-fluorobenzene	94.9	64.2 - 128		%Rec	1	8/17/2019 9:57:32 AM

Analytical Report

Work Order: **1908208**
Date Reported: **8/21/2019**

Client: Shannon & Wilson
Collection Date: 8/13/2019 4:00:00 PM
Project: Seattle Center Lot #2
Lab ID: 1908208-005
Matrix: Groundwater
Client Sample ID: **SW-27**

Analyses	Result	RL	Qual	Units	DF	Date Analyzed
Gasoline by NWTPH-Gx				Batch ID: 25528		Analyst: KT
Gasoline	ND	50.0		µg/L	1	8/17/2019 10:28:05 AM
Surr: Toluene-d8	91.0	65 - 135		%Rec	1	8/17/2019 10:28:05 AM
Surr: 4-Bromofluorobenzene	79.8	65 - 135		%Rec	1	8/17/2019 10:28:05 AM
Volatile Organic Compounds by EPA Method 8260D				Batch ID: 25528		Analyst: KT
Benzene	ND	1.00		µg/L	1	8/17/2019 10:28:05 AM
Toluene	ND	1.00		µg/L	1	8/17/2019 10:28:05 AM
Ethylbenzene	ND	1.00		µg/L	1	8/17/2019 10:28:05 AM
m,p-Xylene	ND	1.00		µg/L	1	8/17/2019 10:28:05 AM
o-Xylene	ND	1.00		µg/L	1	8/17/2019 10:28:05 AM
Surr: Dibromofluoromethane	104	45.4 - 152		%Rec	1	8/17/2019 10:28:05 AM
Surr: Toluene-d8	99.0	40.1 - 139		%Rec	1	8/17/2019 10:28:05 AM
Surr: 1-Bromo-4-fluorobenzene	94.6	64.2 - 128		%Rec	1	8/17/2019 10:28:05 AM

Work Order: 1908208
CLIENT: Shannon & Wilson
Project: Seattle Center Lot #2

QC SUMMARY REPORT

Gasoline by NWTPH-Gx

Sample ID	**LCS-25528**	SampType: **LCS**		Units: **µg/L**		Prep Date: **8/16/2019**		RunNo: **53341**			
Client ID:	**LCSW**	Batch ID: **25528**				Analysis Date: **8/16/2019**		SeqNo: **1055082**			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Gasoline	465	50.0	500.0	0	92.9	65	135				
Surr: Toluene-d8	24.3		25.00		97.3	65	135				
Surr: 4-Bromofluorobenzene	20.3		25.00		81.1	65	135				

Sample ID	**MB-25528**	SampType: **MBLK**		Units: **µg/L**		Prep Date: **8/16/2019**		RunNo: **53341**			
Client ID:	**MBLKW**	Batch ID: **25528**				Analysis Date: **8/16/2019**		SeqNo: **1055084**			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Gasoline	ND	50.0									
Surr: Toluene-d8	24.9		25.00		99.5	65	135				
Surr: 4-Bromofluorobenzene	20.2		25.00		80.6	65	135				

Sample ID	**1908192-001ADUP**	SampType: **DUP**		Units: **µg/L**		Prep Date: **8/16/2019**		RunNo: **53341**			
Client ID:	**BATCH**	Batch ID: **25528**				Analysis Date: **8/17/2019**		SeqNo: **1055055**			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Gasoline	ND	50.0						0		30	
Surr: Toluene-d8	25.5		25.00		102	65	135		0		
Surr: 4-Bromofluorobenzene	20.2		25.00		80.6	65	135		0		

Sample ID	**1908218-001ADUP**	SampType: **DUP**		Units: **µg/L**		Prep Date: **8/16/2019**		RunNo: **53341**			
Client ID:	**BATCH**	Batch ID: **25528**				Analysis Date: **8/17/2019**		SeqNo: **1055065**			
Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Gasoline	ND	50.0						0		30	
Surr: Toluene-d8	24.7		25.00		98.6	65	135		0		
Surr: 4-Bromofluorobenzene	19.7		25.00		78.7	65	135		0		

Work Order: 1908208
CLIENT: Shannon & Wilson
Project: Seattle Center Lot #2

QC SUMMARY REPORT

Gasoline by NWTPH-Gx

Sample ID	**1908220-003AMS**	SampType:	**MS**	Units:	**µg/L**	Prep Date:	**8/16/2019**	RunNo:	**53341**
Client ID:	**BATCH**	Batch ID:	**25528**			Analysis Date:	**8/17/2019**	SeqNo:	**1055073**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Gasoline	385	50.0	500.0	0	77.1	65	135				
Surr: Toluene-d8	23.5		25.00		94.1	65	135				
Surr: 4-Bromofluorobenzene	20.1		25.00		80.6	65	135				

Sample ID	**1908220-003AMSD**	SampType:	**MSD**	Units:	**µg/L**	Prep Date:	**8/16/2019**	RunNo:	**53341**
Client ID:	**BATCH**	Batch ID:	**25528**			Analysis Date:	**8/17/2019**	SeqNo:	**1055075**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Gasoline	383	50.0	500.0	0	76.6	65	135	385.5	0.628	30	
Surr: Toluene-d8	23.7		25.00		94.9	65	135		0		
Surr: 4-Bromofluorobenzene	19.9		25.00		79.5	65	135		0		

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Project: Seattle Center Lot #2

QC SUMMARY REPORT

Volatile Organic Compounds by EPA Method 8260D

Sample ID **LCS-25528** SampType: **LCS** Units: **µg/L** Prep Date: **8/16/2019** RunNo: **53339**
Client ID: **LCSW** Batch ID: **25528** Analysis Date: **8/16/2019** SeqNo: **1055020**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	22.7	1.00	20.00	0	113	69.3	132				
Toluene	22.9	1.00	20.00	0	115	61.3	145				
Ethylbenzene	22.3	1.00	20.00	0	112	72	130				
m,p-Xylene	44.5	1.00	40.00	0	111	70.3	134				
o-Xylene	21.8	1.00	20.00	0	109	62	125				
Surr: Dibromofluoromethane	26.2		25.00		105	45.4	152				
Surr: Toluene-d8	25.0		25.00		99.8	40.1	139				
Surr: 1-Bromo-4-fluorobenzene	25.4		25.00		101	64.2	128				

Sample ID **MB-25528** SampType: **MBLK** Units: **µg/L** Prep Date: **8/16/2019** RunNo: **53339**
Client ID: **MBLKW** Batch ID: **25528** Analysis Date: **8/16/2019** SeqNo: **1055021**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	ND	1.00									
Toluene	ND	1.00									
Ethylbenzene	ND	1.00									
m,p-Xylene	ND	1.00									
o-Xylene	ND	1.00									
Surr: Dibromofluoromethane	25.1		25.00		100	45.4	152				
Surr: Toluene-d8	24.7		25.00		98.9	40.1	139				
Surr: 1-Bromo-4-fluorobenzene	23.9		25.00		95.5	64.2	128				

Sample ID **1908192-001ADUP** SampType: **DUP** Units: **µg/L** Prep Date: **8/16/2019** RunNo: **53339**
Client ID: **BATCH** Batch ID: **25528** Analysis Date: **8/17/2019** SeqNo: **1054998**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	ND	1.00						0		30	
Toluene	ND	1.00						0		30	
Ethylbenzene	ND	1.00						0		30	
m,p-Xylene	ND	1.00						0		30	

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QC SUMMARY REPORT

Volatile Organic Compounds by EPA Method 8260D

Sample ID **1908192-001ADUP** SampType: **DUP** Units: **µg/L** Prep Date: **8/16/2019** RunNo: **53339**
Client ID: **BATCH** Batch ID: **25528** Analysis Date: **8/17/2019** SeqNo: **1054998**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
o-Xylene	ND	1.00						0		30	
Surr: Dibromofluoromethane	25.4		25.00		102	45.4	152		0		
Surr: Toluene-d8	24.7		25.00		98.8	40.1	139		0		
Surr: 1-Bromo-4-fluorobenzene	23.9		25.00		95.5	64.2	128		0		

Sample ID **1908218-001ADUP** SampType: **DUP** Units: **µg/L** Prep Date: **8/16/2019** RunNo: **53339**
Client ID: **BATCH** Batch ID: **25528** Analysis Date: **8/17/2019** SeqNo: **1055012**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	ND	1.00						0		30	
Toluene	ND	1.00						0		30	
Ethylbenzene	ND	1.00						0		30	
m,p-Xylene	ND	1.00						0		30	
o-Xylene	ND	1.00						0		30	
Surr: Dibromofluoromethane	25.3		25.00		101	45.4	152		0		
Surr: Toluene-d8	25.1		25.00		100	40.1	139		0		
Surr: 1-Bromo-4-fluorobenzene	23.3		25.00		93.2	64.2	128		0		

Sample ID **1908194-001AMS** SampType: **MS** Units: **µg/L** Prep Date: **8/16/2019** RunNo: **53339**
Client ID: **BATCH** Batch ID: **25528** Analysis Date: **8/17/2019** SeqNo: **1055001**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	22.7	1.00	20.00	0	114	65.4	138				
Toluene	23.2	1.00	20.00	0	116	52	147				
Ethylbenzene	22.3	1.00	20.00	0	112	64.5	136				
m,p-Xylene	45.0	1.00	40.00	0	112	63.3	135				
o-Xylene	22.2	1.00	20.00	0	111	64.8	150				
Surr: Dibromofluoromethane	26.1		25.00		104	45.4	152				
Surr: Toluene-d8	25.4		25.00		101	40.1	139				
Surr: 1-Bromo-4-fluorobenzene	24.8		25.00		99.2	64.2	128				

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QC SUMMARY REPORT

Volatile Organic Compounds by EPA Method 8260D

Sample ID **1908194-001AMS** SampType: **MS** Units: **µg/L** Prep Date: **8/16/2019** RunNo: **53339**
Client ID: **BATCH** Batch ID: **25528** Analysis Date: **8/17/2019** SeqNo: **1055001**

Sample ID **1908194-001AMSD** SampType: **MSD** Units: **µg/L** Prep Date: **8/16/2019** RunNo: **53339**
Client ID: **BATCH** Batch ID: **25528** Analysis Date: **8/17/2019** SeqNo: **1055002**

Analyte	Result	RL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzene	20.0	1.00	20.00	0	99.8	65.4	138	22.71	12.8	30	
Toluene	20.5	1.00	20.00	0	103	52	147	23.21	12.3	30	
Ethylbenzene	19.6	1.00	20.00	0	97.8	64.5	136	22.34	13.3	30	
m,p-Xylene	40.1	1.00	40.00	0	100	63.3	135	44.98	11.4	30	
o-Xylene	19.9	1.00	20.00	0	99.5	64.8	150	22.16	10.7	30	
Surr: Dibromofluoromethane	26.3		25.00		105	45.4	152		0		
Surr: Toluene-d8	25.4		25.00		102	40.1	139		0		
Surr: 1-Bromo-4-fluorobenzene	24.9		25.00		99.7	64.2	128		0		

Sample Log-In Check List

Client Name:	**SW**	Work Order Number:	**1908208**
Logged by:	**Clare Griggs**	Date Received:	**8/13/2019 5:16:00 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	6.3
Sample	9.4

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

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

Chain of Custody Record & Laboratory Services Agreement

Date: 8/13/2019 Page: 1 of: 1

Laboratory Project No (internal): 1908208

Project Name: Seattle Center Lot #2

Special Remarks:

Project No: 21-1-12176-046

Client: Shannon & Wilson, Inc.

Collected by: CTC

Address: 400 N 34th St., Suite 100

Location: Gates Foundation

City, State, Zip: Seattle, WA 98103

Report To (PM): CTC

Sample Disposal: ☐ Return to client ☒ Disposal by lab (after 30 days)

Telephone: 206-695-6716

Fax: 206-695-6777

PM Email: ctc@shanwil.com

	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)	PCBs (EPA 8082 / 608)	Metals** (EPA 6020 / 200.8)	Total (T) | Dissolved (D)	Anions (IC)***	EDB (8011)	Comments
1	SVE-23	8/13/19	0935	GW		X												
2	SVE-25	8/13/19	1055	GW		X												
3	SVE-24	8/13/19	1210	GW		X												
4	SW-26	8/13/19	1430	GW		X												
5	SW-27	8/13/19	1600	GW		X												
6	Trip Blank																	
7																		
8																		
9																		
10																		

*Matrix: 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

**Metals (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

I represent that I am authorized to enter into this Agreement with Fremont Analytical on behalf of the Client named above and 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 [signature]	8/13/2019 1716	x [signature]	8/13/19 1716
Relinquished	Date/Time	Received	Date/Time
x		x	

Turn-around Time:

- ☒ Standard
- ☐ 3 Day
- ☐ 2 Day
- ☐ Next Day
- Same Day ____ (specify)

Important Information About Your Geotechnical/Environmental Report

SHANNON & WILSON
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Attachment to and part of Report: 21-1-12176-046
Date: November 13, 2019
To: Mr. Ned Dunn
Seattle Center Redevelopment

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 that 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