2019 Groundwater Monitoring Report
South Woodwaste Landfill
Arlington, Washington

Submitted to

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Date: 11 May 2020

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Date: 11 May 2020

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1. Introduction

This report presents quarterly groundwater data collected from March to December 2019 by Jeff Lervick PLE LLC for J.H. Baxter & Co's (Baxter) closed South Woodwaste Landfill (South Landfill, Site), located at 6520 188th Street NE in Arlington, Snohomish County, Washington (Figure 1, Source: GSI Water Solutions, Inc.). Baxter closed the South Landfill in 1991; it is covered with a vegetated soil cap.

Four monitoring wells were installed in 1988. Monitoring wells BXS-1, BXS-2, and BXS-3 are located hydraulically downgradient of the South Landfill. Monitoring well BXS-4 is located hydraulically upgradient of the South Landfill (Figures 2 and 3, Source: GSI Water Solutions, Inc.). Monitoring well BXS-4 represents background groundwater quality providing the benchmark to compare with the water quality data from downgradient wells. Boring logs, groundwater monitoring procedures, and a summary of site conditions encountered during the installation of the monitoring wells are included in the hydrogeologic report prepared by Sweet-Edwards/EMCON, Inc. (EMCON, 1989).

Sampling in 2019 was conducted in March, June, October, and December in accordance with the Washington State Department of Ecology (Ecology)-approved sampling and analysis plan (SAP) dated March 2017 (GSI 2017). Groundwater samples were collected on a quarterly basis from monitoring well BXS-3 and on a semi-annual basis from the remaining wells.

2. Hydrogeology

Bi-quarterly groundwater monitoring events included collecting groundwater level measurements at the four monitoring wells to understand the flow direction and gradient of the shallow groundwater.

2.1 Groundwater Elevations

Groundwater levels were measured at the four monitoring wells before purging the wells for groundwater sampling. Groundwater elevation data for 2019 are summarized in Table 1.

During the March and October 2019 monitoring events, groundwater elevations were highest in monitoring well BXS-4 and lowest in BXS-1. The groundwater level in BXS-4 and BXS-1 varied the greatest (26.05 feet) during the third quarter.

Groundwater elevation contour maps for February 2016 (Figure 2, Source: GSI Water Solutions, Inc.) and September 2016 (Figure 3, Source: GSI Water Solutions, Inc.) are provided for reference. Groundwater flow direction in 2019 was toward the northwest and is consistent with the regional groundwater flow in the aquifer (Figure 4, Source: GSI Water Solutions, Inc.).

2.2 Groundwater Velocities

Groundwater velocities (v_x) were estimated using Darcy's law:

$v_x = - Ki / n_e$

Hydraulic conductivity (K) in the fine sand beneath the Site was estimated at 3×10^{-2} to 6×10^{-2} centimeters per second based on slug tests performed in monitoring wells BXS-2 and BXS-4 (EMCON, 1989). Porosity (n_e) was assumed to be 0.300 (i.e., 30 percent).

The gradient (i) between wells BXS-2 and BXS-4, which are 1,080 feet apart, was greatest during the third quarter (0.022) (Table 2). This slope results in velocity estimates of 6.3 to 12.6 feet per day. Table 2 shows the calculated hydraulic gradients and groundwater velocities during the third quarter 2019. The gradient and groundwater velocity are similar to previous years.

3. Groundwater Quality

Groundwater monitoring events were conducted on March 16, 2019, for the first quarter; June 6, 2019, for the second quarter; October 12, 2019, for the third quarter; and December 22, 2019, for the fourth quarter. Groundwater sampling was performed using a submersible bladder pump and tubing dedicated to each well. Sampling procedures are described in the latest SAP (GSI 2017).

Field measurements using a flow-thru cell were taken for pH, conductivity, temperature, oxidation-reduction potential (ORP), and dissolved oxygen before groundwater sampling. Groundwater samples for conventional parameters and dissolved metals were collected quarterly. In accordance with the latest SAP, groundwater samples were analyzed by AmTest Laboratories of Kirkland, WA, for the following:

- **Conventional Parameters:** ammonia as nitrogen, chemical oxygen demand (COD), chloride, sulfate, tannin and lignin, total dissolved solids (TDS), and total organic carbon (TOC)
- **Dissolved Metals:** Arsenic, barium, iron, manganese, and nickel

3.1 Groundwater Sampling

Field measurements collected from February 2007 through December 2019 are summarized in Table 3A. Field sampling records are included in Appendix A. The analytical data from 2007 through 2019 are summarized in Tables 3B and 3C. Laboratory analytical reports and chain-of-custody (COC) forms for the 2019 groundwater monitoring events are included in Appendix B.

4. Data Review

This section describes the data review process to evaluate the adequacy and quality of the analytical data from the 2019 groundwater monitoring events. The objective of the data review is to identify estimated, unreliable, or invalid measurements. Information about the reliability of the data is critical to the interpretation of the results. The review was performed according to guidelines prepared by the U.S. Environmental Protection Agency (EPA; EPA, 2010).

4.1 Field Quality Assurance (QA) /QC

During the quarterly groundwater monitoring events, field duplicates were prepared and collected by field personnel in accordance with standard practice. Field duplicate samples for the June and October monitoring events were collected from monitoring well BXS-3 and labeled as BXS-103.

Field duplicate results aid in the assessment of sampling and analytical precision. Analytical results for the original and duplicate samples collected from each sampling event were evaluated using the relative percent difference (RPD). RPD is the difference between the two results divided by the mean and expressed as a percent. The RPD was calculated for an analyte when both the primary sample and duplicate sample had a detected concentration. For analytes with concentrations greater than or equal to five times the associated method reporting limit (MRL) and when the RPD is greater than 35 percent, the reported values are considered estimated concentrations. For analytes with concentrations less than five times the associated MRL, the reported values are considered estimated if the absolute difference between primary and duplicate is greater than the value of the MRL. The following analytes for samples at monitoring well BXS-3 were qualified as estimated concentrations and flagged with a "J" in Tables 3B and 3C:

- **BXS-3 June 2019:** Tannin & Lignin, TOC

4.2 Laboratory QA/QC

Sample coolers for each quarterly monitoring event arrived at the laboratories in good condition and with no broken bottles. The laboratory reports are complete and contain results for all samples and corresponding analyses requested on the COC forms.

All analyses were performed within the required holding time for the parameters of interest. The EPA method for pH analysis of water samples, Method 150.1 (EPA, 1999a), specifies that pH analyses be performed "as soon as possible preferably in the field at the time of sampling." For that reason, field-analyzed pH results are used for trend analysis and statistical evaluation.

Only chloride from the third quarter analyses was detected in the method blanks above the MRL. Blank concentrations, however, amounted to less than 7 percent of the lowest detected chloride levels in correlated well samples.

Laboratory duplicate RPDs (0-32%) were below laboratory limits or, for sample concentrations less than five times the MRL, the difference between parent and duplicate sample concentrations was less than the MRL, and as such, data were not modified. Analytical values derived from measurements close to the MDL are not subject to the same accuracy and precision criteria as results derived from measurements higher on the calibration range for the method.

Matrix spike (MS) recoveries were generally within laboratory limits, or the sample value was significantly higher or lower than the added spike concentration, preventing accurate evaluation of spike recovery.

4.3 Statistical Analysis of Data

Groundwater sample analysis results were statistically evaluated to assess if there was a significant difference between the downgradient wells (BXS-1, BXS-2, and BXS-3) and the upgradient well (BXS-4). The following approach was used for performing the statistical analysis:

- **Non-Detects:** Non-detect results were replaced with a value of half the laboratory MRL.
- **Data Distribution:** The data are assumed to be normally distributed to meet key assumptions of the Student's t-test.
- **Parametric Hypothesis Testing:** Parametric hypothesis testing was performed using the Student's t-test for all parameters in both the upgradient and downgradient wells. For each comparison, the null hypothesis was that there was no difference between the downgradient and upgradient concentrations. The null hypothesis was tested using a two-tailed test at a significance level of 0.05. The t-test statistic (t_{stat}) was calculated from the average and variance of quarterly sampling results in a downgradient well and the upgradient well. Each quarterly sample was compared to the previous three quarterly samples to provide a four-sample running average. The average concentration in the downgradient well was significantly higher than the upgradient well if t_{stat} was greater than the critical test statistic (t_c). Similarly, the average concentration in the downgradient well was significantly lower than the upgradient well if t_{stat} was less than the negative value of the critical test statistic (t_c). The critical test statistic was computed using the percent point function (ppf). The ppf is the inverse of the cumulative distribution function.

Statistically significant detections above background well (BXS-4) concentrations are shown in **bold** in the tables included in Appendix C. Statistically significant detections below background concentrations are shown in gray in the tables included in Appendix C. Historical statistically higher values above background well concentrations since 1989 are shown in Table 4.

5. Discussion of Results

5.1 Statistical Results

Appendix C presents the results of the statistical analyses for each individual parameter tested in the groundwater samples from monitoring wells BXS-1 through BXS-4. Results show average concentration, variance, standard deviation, and the Student's t-test statistic. The parameters detected at a statistically higher concentration in specific downgradient wells compared to the upgradient well are:

- COD, dissolved arsenic and iron in BXS-3
- Dissolved barium in BXS-2
- Chloride and sulfate in BXS-1

- TOC, TDS, and dissolved manganese in BXS-1, BXS-2, and BXS-3
- Tannin & Lignin and dissolved nickel in BXS-2 and BXS-3

5.2 Concentration Trends over Time

Figures 5 through 17 show the concentration trends from 2007 through 2018 for each of the following parameters:

- **Ammonia as Nitrogen** (Figure 5)**:** Similar to 2018, ammonia concentrations in BXS-4 (upgradient well) were higher than downgradient wells in 2019. This is the third time over period of record that background ammonia has exceeded levels in downgradient wells. In BXS-1 and BXS-2, concentrations have been well below background concentrations with the exception of first quarter 2017.
- **Arsenic** (Figure 6)**:** Arsenic concentrations are highest in BXS-3 and have been consistently above levels in BXN-4 (upgradient well). Concentrations in BXS-3 in 2019 and 2018, however, were at their lowest levels since 2009. Arsenic in BXS-4, BXS-2 and BXS-1 have been regularly at or slightly greater than the MDL.
- **Barium** (Figure 7)**:** Barium concentrations in BXS-3 and BXS-2 continue to be higher than those in BXS-4 (upgradient well). Barium levels in all wells appear to be declining.
- **COD** (Figure 8)**:** Similar to 2018, COD levels in all wells fluctuated in 2019. The highest levels are in BXS-3.
- **Chloride** (Figure 9)**:** Chloride concentrations in 2019 were highest in BXS-1, which is fairly typical over the period of record. Exceptions occurred in 2017 and 2018, when values peaked at BXS-2 and BXS-3, respectively.
- **Iron** (Figure 10)**:** Although fluctuating, iron concentrations have been highest in BXS-3 over the monitoring period. Background concentrations and levels in other downgradient wells have been relatively consistent.
- **Manganese** (Figure 11)**:** Manganese concentrations in BXS-3 and BXS-2 have routinely been greater than those in BXS-4 (upgradient well). Levels fluctuate the most and are highest in BXS-3 but concentrations show a decreasing trend. With the exception of increases in the third quarters of 2009 and 2017, manganese levels in other wells have been relatively consistent.
- **Nickel** (Figure 12)**:** Since the second quarter of 2013, nickel levels in all downgradient wells have been higher than those in BXS-4 (upgradient well). Concentrations have typically been higher in BXS-2 and BXS-3. With the exception of an increase in the third quarter of 2009, nickel levels in all wells have been fairly consistent.
- **Field pH** (Figure 13)**:** Field pH has been consistently lower in wells BXS-1, BXS-2, and BXS-3 relative to BXS-4 (upgradient well). Field pH in all wells spiked in October 2019. Even with the recent peak, pH is decreasing in all wells, but less substantially in the downgradient wells.

- **Sulfate** (Figure 14)**:** Except for peaks in BXS-2 in 2017 and 2018, sulfate concentrations in BXS-1 have been routinely greater than those in other wells. Concentrations in BXS-2 and BXS-3 have been consistent and lower or similar to background with the exception of spikes in BXS-2 in 2017, 2018, and 2019.
- **Tannin and Lignin** (Figure 15)**:** Tannin and lignin concentrations in BXS-3 and BXS-2 have regularly exceeded levels in BXS-4 (upgradient well). Concentrations are highest in BXS-3 and appear to be increasing. With the exception of BXS-3, the trend in concentrations in downgradient wells has been stable.
- **TDS** (Figure 16)**:** TDS in BXS-3, BXS-2, and BXS-1 has been consistently higher relative to BXS-4 (upgradient well). TDS is highest in BXS-2. TDS concentrations in BXS-4 have been consistent. Levels are more variable in downgradient wells but are showing a decreasing trend.
- **TOC** (Figure 17)**:** TOC levels in BXS-3, BXS-2, and BXS-1 were consistently above those in BXS-4 (upgradient well). TOC fluctuates the greatest and is highest in BXS-3. Concentrations in BXS-4 have been stable throughout the monitoring period. Values in BX-1 and BXS-2 were more stable in 2019 compared to recent years.

5.3 Comparison to Standards

In Washington, water quality standards for groundwater are provided in the Washington Administrative Code (WAC) 173-200-040 (Washington, 2003). Washington water quality standards for groundwater are listed in Tables 3A, 3B, and 3C.

5.3.1 Comparison to Washington State Standards

There were no detections in 2018 that exceeded Washington water quality standards for groundwater, with the following exceptions:

- **Arsenic:** In BXS-3, arsenic concentrations exceeded Washington's water quality standard for groundwater of 0.05 µg/L in all quarterly monitoring events. Concentrations in BXS-3 ranged from 23 to 102 µg/L.
- **Iron:** In BXS-3, iron concentrations exceeded the state standard in all quarters. Levels ranged from 76,500 to 99,600 µg/L.
- **Manganese:** In all monitoring wells, concentrations exceeded the standard of 50 µg/L in each quarterly monitoring event. Concentrations were highest in BXS-3, ranging from 3,555 to 5,550 µg/L.
- **Field pH:** Most pH measurements in downgradient wells were below the groundwater standard of 6.5 to 8.5. The exceptions were in the third quarter when pH levels in downgradient wells complied with the standard. pH in BXS-4 exceeded the standard in the third quarter. pH levels ranged from 5.73-9.58.

Per the Snohomish Health District's request in a letter dated August 28, 2015, a dissolved arsenic plume delineation was performed in 2019. Arsenic is a naturally occurring element that can become mobilized by reduced geochemical conditions, such as those present at the Site. Once mixed with oxic downgradient waters, arsenic would immobilize through precipitation, sorption, or other complexing forces favorable for arsenic in more aerobic environments. However, to provide a conservative estimate of downgradient transport, arsenic was modeled as non-reactive solute using the Domenico equation for advection and dispersion. Calculations were performed with the Quick Domenico worksheet used by California and Pennsylvania to screen potential landfill impacts and the plume extent plotted in Figure 18. A description of the model inputs and results is provided in Appendix D.

The Domenico model was run for the upper range of site hydraulic conductivity (Table 2). The model was set to a 10-year run period (3650 days), at which point the modeled concentration has reached the furthest downgradient extent given a constant source, the concentration being peak arsenic measured in 2019 (Table D-2). The largest areal extent with arsenic concentrations meeting or exceeding the Washington groundwater standard of 5 µg/L is plotted in Figure 18. Arsenic concentrations exceeding the groundwater standard were not found to persist greater than 310 feet downgradient of BXS-3.

6. Summary

Quarterly groundwater monitoring samples were collected from one upgradient well (BXS-4) and three downgradient wells (BXS-1 through BXS-3) during 2019 at the South Woodwaste Landfill. The samples were analyzed for 7 groundwater quality parameters and 5 dissolved metals.

Some groundwater samples collected during the monitoring events in 2019 exceeded particular Washington water quality standards for groundwater. At times, arsenic, iron, and manganese concentrations did not comply with state standards. Manganese levels in all wells were higher than the standard in each quarter. Arsenic and iron in BXS-3 exceeded state criteria in each quarter. Furthermore, most field pH measurements in downgradient wells were lower than 6.5.

7. References

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Tables

Table 1. Groundwater Elevation Summary for 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Well ID	Inner Casing Diameter (inches)	Total Depth (ft bgs)	Screen Length (ft)	Screened Interval (ft bgs)	TOC Elevation[1] (ft msl)	Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft msl)
BXS-1	2	47.90	10	37.90 - 47.90	142.65	3/16/2019	34.28	108.37
						6/1/2019	NM	NA
						10/12/2019	38.83	103.82
						12/22/2019	NM	NA
BXS-2	2	45.40	10	35.40 - 45.40	142.89	3/16/2019	32.55	110.34
						6/1/2019	NM	NA
						10/12/2019	37.04	105.85
						12/22/2019	NM	NA
BXS-3	2	44.15	10	34.15 - 44.15	142.07	3/16/2019	29.10	112.97
						6/1/2019	29.71	112.36
						10/12/2019	34.15	107.92
						12/22/2019	35.32	106.75
BXS-4	2	47.40	10	37.40 - 47.40	143.42	3/16/2019	10.72	131.35
						6/1/2019	NM	NA
						10/12/2019	13.55	129.87
						12/22/2019	NM	NA

Notes

bgs = below ground surface.

ft = feet.

msl = mean sea level.

TOC = top of casing.

NM - not monitored; ND - no data.

[1] Wells resurveyed in October 2002.

Table 2. Hydraulic Gradient and Groundwater Velocity for 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Gradient (i)	Hydraulic Conductivity (K) (cm/sec)	Porosity (n_e)	Velocity (v_x) (cm/sec)	Velocity (v_x) (ft/day)
3/16/2019	0.019	0.0300 to 0.0600	0.300	0.002 to 0.004	5.5 to 11.0
10/12/2019	0.022			0.002 to 0.004	6.3 to 12.6

Notes

Gradient = BXS-4 groundwater elevation - BXS-2 groundwater elevation/1,800 ft.

cm = centimeter.

ft = feet.

NC = not calculated.

sec = second.

Table 3A. Summary of Groundwater Sampling Field Parameters: 2007 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	pH (standard unit)				Conductivity (µS/cm)				Temperature (°C)				ORP (mV)				Dissolved Oxygen (mg/L)			
SMCL	6.5 - 8.5				--				--				--				--			
WA WQ Std	6.5 - 8.5				--				--				--				--			
Well ID	BXS-4	BXS-3	BXS-2	BXS-1	BXS-4	BXS-3	BXS-2	BXS-1	BXS-4	BXS-3	BXS-2	BXS-1	BXS-4	BXS-3	BXS-2	BXS-1	BXS-4	BXS-3	BXS-2	BXS-1
2/5/2007	8.60	7.12	6.81	6.75	166	730	672	299	9.5	13.2	12.1	11.4	-40	-103	1	241	9.80	2.40	3.00	2.30
4/18/2007	8.09	6.62	6.47	6.31	176	808	796	379	9.5	13.1	12.3	11.7	-136	-113	45	187	1.20	1.80	1.20	0.80
7/18/2007	8.25	6.64	6.52	6.38	222	867	922	415	9.8	13.1	12.5	12.0	-145	-113	62	219	0.00	0.00	0.00	0.00
10/9/2007	7.83	6.30	6.19	6.02	199	810	804	495	9.8	12.8	12.5	12.0	-148	-97	40	226	0.00	0.00	0.00	0.00
1/9/2008	7.81	6.25	6.18	5.91	196	788	772	369	9.3	12.1	12.1	11.4	-147	-67	54	251	0.00	0.00	0.00	0.00
4/30/2008	7.66	6.23	6.10	5.98	201	846	794	485	9.1	12.9	12.2	11.8	-157	-126	32	138	0.00	0.00	0.08	0.15
7/29/2008	7.98	6.42	6.37	6.14	180	726	732	510	9.4	12.9	12.4	12.0	-150	-90	31	185	0.33	0.37	1.77	5.80
10/22/2008	8.32	6.55	6.48	6.28	177	722	733	496	9.6	12.7	12.4	12.0	-173	-93	20	157	0.07	0.12	0.14	1.10
2/1/2009	8.09	6.77	6.56	6.42	176	734	749	401	9.2	12.7	12.0	11.6	-154	-118	59	299	2.33	2.04	1.87	2.66
5/1/2009	8.25	6.44	6.35	6.33	185	736	812	335	9.4	13.2	12.6	12.0	-192	-99	86	121	1.21	0.08	0.10	0.53
8/1/2009	7.89	6.52	6.64	6.41	185	695	797	309	9.4	12.6	12.3	11.9	-172	-128	36	245	8.60	6.28	6.03	6.04
11/1/2009	7.96	6.50	6.46	6.37	192	755	815	315	9.3	12.2	12.0	11.5	-167	-98	52	257	6.73	2.86	1.98	1.18
2/10/2010	8.05	6.59	6.55	6.58	180	726	799	274	9.3	12.9	12.1	12.0	-183	-73	-3	74	0.11	0.17	0.31	1.23
5/26/2010	7.46	6.04	5.96	5.90	189	719	853	288	9.3	12.8	17.0	12.0	-247	-142	59	129	0.00	0.00	0.00	0.00
8/18/2010	7.63	5.98	5.87	5.94	230	690	833	309	9.7	12.5	12.3	12.3	-285	-51	141	258	0.00	0.18	0.38	0.93
11/18/2010	7.99	6.37	6.52	6.34	184	694	813	344	9.7	12.8	12.1	11.9	-287	-193	-42	-30	0.43	0.12	1.98	0.24
2/9/2011	8.02	6.22	6.16	6.24	187	710	844	334	9.5	12.8	11.9	12.0	-164	-128	36	-167	0.10	0.11	0.26	0.28
5/17/2011	7.99	6.24	6.20	6.25	183	732	929	315	9.9	12.8	12.2	12.6	-205	-120	32.0	158	0.36	0.38	0.43	0.45
8/24/2011	7.77	5.79	5.73	5.75	190	741	833	337	10.2	13.0	12.4	12.4	-172	-115	45	164	0.09	0.09	0.19	0.18
11/3/2011	8.36	6.43	6.37	6.46	192	673	852	346	9.8	12.5	12.0	12.0	-274	-140	39	150	1.12	1.04	1.19	1.29
2/14/2012	7.72	6.92	6.74	6.67	192	696	865	359	10.4	13.1	12.5	12.6	-142	-118	74	302	3.10	4.17	4.21	5.76
5/2/2012	6.97	5.70	5.65	5.06	193	693	914	319	10.4	13.1	12.7	12.6	-98	-49	141	396	1.37	1.86	2.23	3.94
8/21/2012	6.62	5.33	5.34	4.90	192	707	895	308	10.7	13.1	12.8	12.8	-84	-47	182	330	1.53	1.97	2.39	2.28
11/13/2012	7.68	6.29	6.26	6.10	147	520	641	239	12.5	12.5	12.9	10.5	-125	-82	216	439	2.39	4.73	7.79	6.45
2/12/2013	7.07	5.66	5.72	5.57	184	529	869	278	9.7	12.4	11.8	12.0	-118	-92	76	337	2.16	3.68	0.82	0.91
6/4/2013	7.32	5.92	5.84	5.69	190	635	892	271	10.1	12.2	12.0	12.2	-141	-99	90	313	0.83	2.62	1.52	0.44
8/25/2013	7.62	6.30	6.22	6.03	193	709	871	299	10.2	12.2	12.0	12.5	-119	-104	118	315	0.36	0.80	2.96	2.22
12/2/2013	7.39	5.88	5.66	5.63	198	699	882	313	9.8	11.9	11.6	12.1	-124	-112	135	328	1.02	5.46	5.74	2.36
3/17/2014	5.92	6.28	6.16	6.06	189	730	817	299	10.0	12.2	11.6	12.7	-112	-94	128	268	1.85	8.84	12.60	2.07
6/2/2014	7.47	5.72	5.79	5.64	213	793	952	318	10.1	12.3	12.2	13.3	-92	-86	84	213	0.15	0.00	0.00	0.00
9/29/2014	7.69	6.25	6.15	5.99	212	733	918	306	10.5	12.3	12.0	12.5	-126	-94	106	273	0.00	0.00	0.00	0.00

Table 3A. Summary of Groundwater Sampling Field Parameters: 2007 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	pH (standard unit)				Conductivity (µS/cm)				Temperature (°C)				ORP (mV)				Dissolved Oxygen (mg/L)			
SMCL	6.5 - 8.5				--				--				--				--			
WA WQ Std	6.5 - 8.5				--				--				--				--			
Well ID	BXS-4	BXS-3	BXS-2	BXS-1	BXS-4	BXS-3	BXS-2	BXS-1	BXS-4	BXS-3	BXS-2	BXS-1	BXS-4	BXS-3	BXS-2	BXS-1	BXS-4	BXS-3	BXS-2	BXS-1
11/17/2014	7.48	5.99	5.88	5.69	192	675	822	285	10.2	11.9	11.6	12.2	-117	-77	111	285	0.00	10.75	0.71	0.00
2/23/2015	7.28	5.84	5.78	5.86	194	682	798	269	10.2	12.4	11.8	12.8	-102	-71	125	299	1.02	1.28	1.25	1.58
9/14/2015	7.50	6.26	6.24	6.02	196	674	778	268	10.8	12.2	11.9	13.3	-136	-107	142	114	1.09	1.33	1.32	1.23
12/7/2015	7.06	6.04	5.94	5.28	187	676	732	286	10.3	12.0	11.7	12.4	-143	-112	159	286	1.25	1.04	1.07	1.18
2/29/2016	6.98	6.00	5.95	5.86	196	644	795	280	10.5	12.4	11.8	12.4	-74	-102	153	365	1.37	0.92	0.98	1.15
6/16/2016	7.69	6.49	6.57	6.03	197	663	754	356	11.1	12.4	12.4	12.9	-162	-120	13.2	339	0.79	0.72	2.54	0.74
9/26/2016	6.84	6.19	6.10	5.81	189	627	637	344	11.8	12.5	12.5	12.8	-128	-153	148	315	0.75	0.75	2.97	0.90
3/8/2017	7.28	6.12	6.08	5.87	188	694	680	373	12.7	13.1	12.8	13.1	57	109	57	161	3.37	1.37	0.76	2.43
6/10/2017	NT	NT	6.36	NT	NT	NT	354	NT	NT	NT	12.4	NT	NT	NT	106	NT	NT	NT	2.90	NT
9/16/2017	6.97	6.18	6.12		156	507	567		12.9	12.8	12.3		-146.4	-126.3	-120.9		0.88	1.62	2.56	
12/14/2017	NT	NT	6.26	NT	NT	NT	587	NT	NT	NT	12.4	NT	NT	NT	78.9	NT	NT	NT	0.42	NT
3/17/2018		6.28		6.18		335		186		10.4		14.1		18.9		-50.1		5.77		1.62
6/16/2018			6.15				375				12.7				68.4				0.35	
9/29/2018	7.92	6.13	6.01	5.71	243	447	505	247	15.3	12.7	12.1	12.5	-67	-61	136	265	0.08	0.03	0.00	0.00
11/17/2018																				
3/16/2019	7.29	6.15	6.16	6.03	208	449	482	231	7.6	11.7	12.4	11.6	-92.5	-117.1	30.5	10.9	0.16	0.20	0.25	0.27
6/1/2019	NT	NT	EM	NT	NT	NT	1502	NT	NT	NT	14.4	NT	NT	NT	-376.3	NT	NT	NT	0.10	NT
10/12/2019	9.58	8.02	7.97	8.09	263	753	773	366	12.5	13.2	13.6	13.3	-83	-82	16	103	0.00	3.21	0.00	0.82
12/22/2019	NT	NT	5.73	NT	NT	NT	449	NT	NT	NT	10.5	NT	NT	NT	-90.2	NT	NT	NT	0.00	NT

Notes

µS/cm = microSiemen per centimete °C = degree Celsius. mg/L = milligram per liter. mV = millivolt. NT = not tested. EM = equipment malfunction

ORP = oxidation-reduction potential.

SMCL = Federal secondary maximum contaminant levels for drinking water.

WA WQ Std = State of Washington's water quality standards for groundwater (WAC 173-200).

Table 3B. Summary of Groundwater Conventional Parameters: 2007 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	pH (standard unit)									Conductivity (µS/cm)								
MCL/SMCL	6.5 - 8.5									--								
WA WQ Std	6.5 - 8.5									--								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
2/1/2007	7.81	7.90	6.38		6.36		6.36		5.79	193	192	517		743		338		4
4/18/2007	7.61	7.45	6.05		6.10		5.94		5.66	195	199	565		779		377		2
7/18/2007	7.69		6.34		6.96		6.28	6.23	6.04	201		518		798		410	401	2
10/9/2007	7.82	7.85	6.36		6.35		6.18		5.72	200	201	638		814		482		3
1/9/2008	7.75		6.41		6.46		6.23	6.25	5.10	215		681		747		375	360	5
4/30/2008	7.76		6.36		6.44		6.38	6.38	6.21	188		658		797		475	472	2,630
7/29/2008	7.83		6.32		6.45	6.40	6.27		5.30	206		659		853	865	592		4
10/22/2008	7.83		6.33		6.41	6.40	6.49			210		700		892	877	592		
2/1/2009	7.94		6.30		6.50		6.67	6.42	5.89	209		604		889		489	479	6
5/1/2009	7.92		6.29		6.29		6.38	6.30	5.64	171		496		768		357	328	2
8/1/2009	6.32		6.45	6.42	6.40		6.31		5.44	176		412	413	757		299		3
11/1/2009	7.66		6.41		6.41		6.42	6.42	6.40	194		598		823		299	314	3
2/10/2010	8.04		6.38		6.56	6.56	6.70		6.43	187		634		848	854	298		2 J
5/26/2010	7.87		6.26		6.33		6.41	6.48	4.93	192		461		881		297	300	4
8/18/2010	7.83		6.15		6.30		6.42	6.46	7.91	209		423		805		311	316	137
11/18/2010	7.72		5.99		6.27		6.35	6.34	6.00	172		543		901		377	364	3
2/9/2011	7.88		6.23		6.38		6.49	6.51		155		371		729		296	296	5
5/17/2011	7.79		6.28		6.42		6.32	6.50	6.06	219		377		801		321	310	3
8/24/2011	8.14		6.45		6.47		6.46	6.74	6.03	202		603		941		359	359	2 J
11/3/2011	7.78		6.35		6.49		6.75	6.57	7.33	195		505		884		360	361	2
2/14/2012	7.94		6.42		6.54		6.64	6.59	6.04	194		425		873		363	361	2
5/2/2012	7.91		6.35		6.68		6.70	6.59	6.86	168		435		925		329	288	3
8/21/2012	7.66		6.32		6.62		6.43	6.69	6.39	192		451		898		311	315	3
11/13/2012	8.09		6.62		6.63		6.81	6.77	7.42	193		463		867		316	326	2,490
2/12/2013	8.28		6.60		7.03		7.07	6.93	7.27	194		377		939		303	299	2 J
6/4/2013	8.21		6.60		6.75		6.94	6.78	7.32	202		516		945		290	299	2 J
8/27/2013	8.04		6.54		6.62		6.69	6.63	6.43	188		428		876		293	292	2 J
12/2/2013	8.13		6.58		6.88		6.93	6.79	6.20	193		513		866		312	310	2 J
3/17/2014	8.30		6.57		6.76		6.80	6.75	6.38	170		408		774		314	260	7
6/2/2014	8.00		6.44		6.42		6.52	6.48	5.97	192		4,790		861		290	292	2 J
9/29/2014	8.04		6.59		7.26		7.11	7.34	6.35	192		396		840		281	284	3
11/17/2014	7.61		6.23		6.69		7.04	6.75	7.77	190		406		819		281	294	3
2/23/2015	7.90 H		6.33 H		6.59 H		6.78 H	6.55 H	6.22 H	209		430		876		292	279	2 J
9/14/2015	7.92 H		6.31 H		6.61 H		6.71 H	6.51 H	7.00 H	204		348		807		283	280	2 J
12/7/2015	7.82 H		6.19 H		6.52 H		6.49 H	6.54 H		204		396		784		312	303	
2/29/2016	7.83		6.27		6.67		6.45	6.56	6.44	220		413		866		317	315	2.9
6/16/2016	8.06		6.24		6.55		6.57	6.63	5.80	216		450		817		397	396	1.5 J
9/26/2016	8.00		6.29		6.54		6.39	6.48	5.81	207		548		747		380	385	10.8
3/8/2017	7.7		6.42		6.42		6.80	6.40		198		425		704		396	398	
6/10/2017					6.96									445				
9/16/2017										195								
12/14/2017																		
3/17/2018	8.3									207								
6/16/2018																		
9/29/2018																		
11/17/2018																		

Table 3B. Summary of Groundwater Conventional Parameters: 2007 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	pH (standard unit)									Conductivity (µS/cm)								
MCL/SMCL	6.5 - 8.5									--								
WA WQ Std	6.5 - 8.5									--								
Well ID	**BXS-4**	**BXS-4 Dup**	**BXS-3**	**BXS-3 Dup**	**BXS-2**	**BXS-2 Dup**	**BXS-1**	**BXS-1 Dup**	**Field Blank**	**BXS-4**	**BXS-4 Dup**	**BXS-3**	**BXS-3 Dup**	**BXS-2**	**BXS-2 Dup**	**BXS-1**	**BXS-1 Dup**	**Field Blank**
3/16/2019																		
6/1/2019																		
10/12/2019																		
12/22/2019																		

Table 3B. Summary of Groundwater Conventional Parameters: 2007 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Chloride (mg/L)									Nitrate + Nitrite as N (mg/L)								
MCL/SMCL	250									10								
WA WQ Std	250									10								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
2/1/2007	1.6	1.6	3.1		4.9		6.4		0.2 U	0.28	0.58	0.96		0.94		0.75		0.03 J
4/18/2007	1.9	1.9	2.3		4.5		5.4		0.2 U	0.23	1.21	0.20		0.63		0.85		0.01 J
7/18/2007	1.7		2.8		4.1		5.1	5.0	0.2 U	0.05 U		0.19		0.08		0.70	0.68	0.01 J
10/9/2007	1.7	1.7	2.7		4.3		5.2		0.1 J	0.05 U	0.05 U	0.17		0.05 U		0.47		0.05 U
1/9/2008	2.0		3.1		4.5		5.8	5.8	0.2 U	0.05 U		0.07		0.05 U		0.58	0.54	0.05 U
4/30/2008	1.8		2.4		4.4		5.0	5.1	0.0 J	0.05 U		0.05 U		0.05 U		0.74	0.73	0.05 U
7/29/2008	1.8		2.8		4.2	4.4	4.5		0.2 U	0.10		0.15		0.05 U	0.05 U	1.48		0.05 U
10/22/2008	1.9		3.6		4.9	4.9	5.1			0.05 U		0.10		0.03 J	0.01 J	0.51		
2/1/2009	1.7		2.6		4.2		7.6	7.6	0.0 J	0.05 U		0.17		0.01 J		0.99	1.02	0.05
5/1/2009	2.2		4.5		6.1		7.3	7.3	0.2 U	0.01 J		0.21		0.03 J		0.12	0.13	0.02 J
8/1/2009	1.8		3.8	3.7	4.3		5.9		0.2 U	0.05 U		0.17	0.17	0.02 J		0.11		0.05 U
11/1/2009	1.9		3.3		4.4		6.5	6.6	0.2 U	0.05 U		0.06		0.05 U		0.05 U	0.05 U	0.05 U
2/10/2010	1.81		2.90		4.20	4.20	5.30		0.06 J	0.05 U		0.13		0.05 U	0.05 U	0.04 J		0.05 U
5/26/2010	1.88		3.40		4.10		5.90	6.00	0.04 J	0.03 J		0.22		0.04 J		0.11	0.11	0.04 J
8/18/2010	1.91		3.04		3.32		5.67	5.70	1.57	0.04 J		0.18		0.04 J		0.14	0.14	0.17
11/18/2010	1.57		2.74		3.21		5.38	5.29	0.40 U	0.05 U		0.12		0.05 U		0.09	0.09	0.05 U
2/9/2011	2.10		2.37		3.43		6.99	7.09	0.40 U	0.05 U		190		0.05 U		0.05 U	0.05 U	0.05 U
5/17/2011	1.65		2.07		3.05		6.17	5.94	0.40 U	0.01 J		0.14		0.02 J		0.15	0.14	0.01 J
8/24/2011	1.69		1.85		2.88		5.71	5.71	0.40 U	0.01 J		0.10		0.01 J		0.06	0.06	0.01 J
11/3/2011	1.93		2.49		3.38		6.01	5.74	0.40 U	0.05 U		0.14		0.01 J		0.10	0.09	0.05 U
2/14/2012	1.67		2.11		2.91		5.33	5.37	0.40 U	0.03 J		0.13		0.02 J		0.08	0.08	0.03 J
5/2/2012	1.66		1.50		2.97		5.70	5.65	0.40 U	0.05 U		0.10		0.01 J		0.05 J	0.03 J	0.05 U
8/21/2012	1.62		1.58		2.96		4.75	4.72	0.40 U	0.05 U		0.10		0.05 U		0.05	0.07	0.05 U
11/13/2012	1.63		1.69		3.00		4.80	4.80	0.40 U	0.01 J		0.05 U		0.01 J		0.04 J	0.03 J	0.05 U
2/12/2013	1.61		2.08		3.07		5.70	5.70	0.40 U	0.02 J		0.13		0.05 U		0.09	0.09	0.05 U
6/4/2013	1.62		1.98		3.00		3.60	3.60	0.40 U	0.05 U		0.05		0.05 U		0.09	0.07	0.05 U
8/27/2013	1.90		1.88		3.39		4.00	3.90	0.40 U	0.02 J		0.03 J		0.02 J		0.13	0.14	0.04 J
12/2/2013	1.54		1.57		2.65		3.56	3.56	0.40 U	0.05 U		0.20		0.01 J		0.03 J	0.03 J	0.01 J
3/17/2014	1.81		2.20 J		2.90		5.97	5.89	0.40 U	0.05 U		0.18 U		0.05 U		0.13 U	0.13 U	0.03 J
6/2/2014	1.64		1.73		2.74		5.23	5.18	0.40 U	0.05 U		0.05 U		0.05 U		0.14	0.14	0.05 U
9/29/2014	1.62		1.71		2.57		4.44	4.45	0.40 U	0.05 U		0.05 U		0.05 U		0.05 U	0.05 U	0.06
11/17/2014	2.02		1.76		3.16		5.04 J	0.52 J	0.40 U	0.05 U		0.05 U		0.05 U		0.05 U	0.05 U	0.03 J
2/23/2015	1.58		1.38		2.32		4.56	4.58	0.40 U	0.05 U		0.05 U		0.05 U		0.07	0.07	0.05 U
9/14/2015	1.93		1.97		2.54		5.41	5.51	0.20 U	0.05 U		0.03 J		0.05 U		0.16 J	0.09 J	0.05 U
12/7/2015	1.66		1.54		2.06		4.58	4.69		0.05 U		0.05 U		0.05 U		0.37	0.36	
2/29/2016	1.83		1.62		2.37		4.90	4.73	0.20 U	0.05 J		0.05 U		0.05 U		0.39	0.38	0.05 U
6/16/2016	1.97		1.57		2.52		3.44	3.45	0.20 U	0.05 U		0.05 U		0.05 U		0.22	0.14	0.05 U
9/26/2016	1.91		2.13		2.53		3.41	3.53	0.20 U	0.05 U		0.16		0.05		0.22	0.16	0.05 U
3/8/2017	1.97		1.77		2.16		3.01	3.04		0.359		0.04 J		0.05 U		0.26 J	0.57 J	
6/10/2017					5.71									0.165				
9/16/2017	2.00									0.055								
12/14/2017					4.78									0.005 U				
3/17/2018	1.96		2.20		2.20	2.20	4.1			0.05 U								
6/16/2018					2.20													
9/29/2018			0.11 J	2.3	2.30		5.70					0.01	0.01	0.01		0.20		
11/17/2018			8.50															

Table 3B. Summary of Groundwater Conventional Parameters: 2007 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Chloride (mg/L)									Nitrate + Nitrite as N (mg/L)								
MCL/SMCL	250									10								
WA WQ Std	250									10								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
3/16/2019	2.76		2.16		2.49		5.55			NT		NT		NT		NT		
6/1/2019			1.45	1.38						NT		NT		NT		NT		
10/12/2019	2.58		1.74	1.58	2.10		5.36			NT		NT		NT		NT		
12/22/2019			1.73						0.5 U	NT		NT		NT		NT		

Table 3B. Summary of Groundwater Conventional Parameters: 2007 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Solids, total dissolved (TDS) (mg/L)									Sulfate (mg/L)								
MCL/SMCL	500									250								
WA WQ Std	500									250								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
2/1/2007	142	146	522		420		231		5 U	1.4	1.4	0.1 J		0.2 J		14.8		0.2 U
4/18/2007	151	140	493		490		229		5 U	1.3	1.3	0.2 U		0.2 U		13.9		0.2 U
7/18/2007	154		414		495		262	248	5 U	1.4		0.2 U		0.2 U		11.3	11.4	0.2 U
10/9/2007	159	151	476		478		294		5 U	1.3	1.3	0.1 J		0.1 J		9.4		0.2 U
1/9/2008	148		578		508		239	233	5 U	0.8		0.2 U		0.2 U		14.0	14.9	0.2 U
4/30/2008	118		496		430		265	256	5 U	1.3		0.1 J		0.2 J		9.6	9.7	0.2 U
7/29/2008	161		415		506	505	363		5 U	1.3		0.1 J		0.1 J	0.2	6.2		0.2 U
10/22/2008	139		465		478	491	323			1.1		0.1 J		0.2 J	0.4	6.7		
2/1/2009	136		461		498		261	263	5 U	1.4		0.1 J		0.1 J		6.4	6.4	0.0 J
5/1/2009	130		460		513		223	220	7	1.7		0.4		0.2 U		6.7	6.6	0.2 U
8/1/2009	119		378	425	491		178		5 U	1.1		0.1 J	0.1 J	0.1 J		13.9		0.2 U
11/1/2009	121		452		496		198	201	5 U	3.3		0.2 U		0.2 U		15.0	14.9	0.2 U
2/10/2010	152		422		518	501	186		5	1.6		0.1 J		0.1 J	0.1 J	19.6		0.0 J
5/26/2010	129		340		508		166	178	5 U	1.5		0.8		0.2 J		15.3	13.4	0.4
8/18/2010	202		381		564		250	241	134	1.6		0.8		1.1		14.1	14.0	1.1
11/18/2010	98		330		462		153	161	5 U	1.1		0.4 U		0.4 U		12.3	11.7	0.4 U
2/9/2011	165		377		512		211	216	5 U	1.5		1.0		1.3		15.2	15.4	0.4 U
5/17/2011	129		374		559		209	194	5 U	0.9		0.2 J		0.3 J		15.9	15.1	0.4 U
8/24/2011	128		399		550		188	199	5 U	1.0		0.4 J		0.6		16.2	16.7	0.4 U
11/3/2011	115		350		532		217	220	5 U	1.1		0.6		0.8		15.8	15.0	0.4 U
2/14/2012	131		344		518		214	269	5 U	0.9		0.3 J		0.4 J		15.7	15.6	0.4 U
5/2/2012	129		336		547		230	222	5.5	0.8		0.3 J		0.3 J		16.4	16.3	0.4 U
8/21/2012	119		376		569		189	210	5 U	0.8		0.4		0.5		14.7	14.6	0.2 U
11/13/2012	131		331		537		188	188	5 U	0.9		0.4		0.5		14.5	14.5	0.2 U
2/12/2013	107		288		539		160	174	5.5	0.8		0.2		0.3		14.3	14.6	0.2 U
6/4/2013	141		340		553		179	168	5 U	0.8		0.4		0.6		13.5	13.3	0.2 U
8/27/2013	141		349		574		201	189	5 U	0.8		0.1 J		0.2 J		12.7	12.6	0.2 U
12/2/2013	132		356		530		223	197	5.5	0.8		0.1 J		0.2 J		12.3	11.9	0.2 U
3/17/2014	137		332		504		176	184	5 U	1.0		2.0 Ui		0.3		12.7	12.7	0.2 U
6/2/2014	NT		NT		NT		NT	NT	NT	0.9		0.2 U		0.1 J		10.1	9.9	0.2 U
9/29/2014	131		312		513		169	162	5 U	0.8		0.1 J		0.2		7.2	7.0	0.2 U
11/17/2014	NT		NT		NT		NT	NT	NT	1.6		0.2 J*		0.3		8.4 J*	0.8 J*	0.2 U
2/23/2015	122		325		479		156	157	5 U	0.8		0.2		0.3		7.7	7.7	0.2 U
9/14/2015	111		267		430		140	147	5 U	1.2		0.4		0.5		9.7	9.9	0.2 U
12/7/2015	112		285		424		146	155		1.1		0.2 J		0.3		10.7	10.6	
2/29/2016	101		290		447		145	125	5 U	0.2 U		0.2 U		0.2 U		9.0	9.1	0.15 J
6/16/2016	118		301		443		190	197	5 U	1.1		0.4		0.5		6.9	7.5	0.2 U
9/26/2016	143		311		419		213	194	5.0 U	1.5		0.2 U		0.2		6.0	5.3	0.2 U
3/8/2017	128						226	221		2.1		0.1 J		0.2 J		4.3	4.6	
6/10/2017					252									7.36				
9/16/2017	139		216		406		193	188	2	1.9		0.2 U		0.2 U		5.6	5.7	ND U
12/14/2017					460									51.6				
3/17/2018	133		440		450	460	240			1.7		0.2		0.3	0.4	9.1		
6/16/2018					430									0.5				
9/29/2018	159		210	260	420		200			0.6		0.1	0.15	0.3		10.9		
11/17/2018			330									2.0						

Table 3B. Summary of Groundwater Conventional Parameters: 2007 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Solids, total dissolved (TDS) (mg/L)									Sulfate (mg/L)								
MCL/SMCL	500									250								
WA WQ Std	500									250								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
3/16/2019	150		360		420		200			3.0		2.3		7.7		14.8		
6/1/2019			220	230								0.22	0.18					
10/12/2019	110		250	260	330		160			0.2		0.30	0.30	0.5		15.0		
12/22/2019			340						1			0.3						0.1 U

Table 3B. Summary of Groundwater Conventional Parameters: 2007 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Ammonia as N (mg/L)									Chemical Oxygen Demand (COD) (mg/L)								
MCL/SMCL	--									--								
WA WQ Std	--									--								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
2/1/2007	0.50	0.52	0.93		0.05 U		0.05 U		0.03 J	5.0 U	5.0 U	75		36		6.0		50 U
4/18/2007	0.50	0.50	0.71		0.05 U		0.05 U		0.05 U	6.0	6.0	80		39		14.0		4.0 J
7/18/2007	0.50		0.74		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		67		31		5.0 U	6.0	5.0 U
10/9/2007	0.48	0.49	0.98		0.05 U		0.05 U		0.05 U	5.0 U	5.0 U	71		33		17.0		5.0 U
1/9/2008	0.55		0.41		0.05 U		0.05 U	0.05 U	0.02 J	5.0 U		61		35		12.0	13.0	5.0 U
4/30/2008	0.46		0.39		0.05 U		0.05 U	0.05 U	0.05 U	3.0 J		76		42		13.0	14.0	5.0 U
7/29/2008	0.48		0.75		0.05 U	0.05 U	0.05 U		0.08	6.0		75		37	35	24		9.0
10/22/2008	0.53		0.54		0.05 U	0.05 U	0.05 U			6.0		65		39	41	16.0		
2/1/2009	0.51		1.44		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		69		42		16.0	16.0	5.0 U
5/1/2009	0.61		1.08		0.05 U		0.05 U	0.05 U	0.05 U	22		70		38		13.0	11.0	5.0 U
8/1/2009	0.49		1.24	1.14	0.05 U		0.05 U		0.01 J	3.0 J		106	83	43		12.0		3.0 J
11/1/2009	0.54		0.56		0.03 J		0.05 J	0.18	0.02 J	5.0 U		66		42		13.7	13.7	5.0 U
2/10/2010	0.53		1.23		0.05 U	0.05 U	0.05 U		0.05 U	5.0 U		68		35	35	5.0 U		5.0 U
5/26/2010	0.56		0.97		0.03 J		0.03 J	0.02 J	0.05 U	3.3 J		74		41		11.0	10.5	5.0 U
8/18/2010	0.53		1.22		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		74		41		10.9	11.8	5.0 U
11/18/2010	0.50		1.02		0.05 U		0.05 U	0.05 U	0.05 U	5.6		68		42		14.7	12.2	7.6
2/9/2011	0.51		1.21		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		75		44		9.1	5.0 U	5.0 U
5/17/2011	0.54		0.70		0.05 U		0.05 U	0.05 U	0.05 U	3.4 J		71		45		8.2	9.7	5.0 U
8/24/2011	0.55		0.66		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		84		42		9.8	8.8	5.0 U
11/3/2011	0.57		0.05 U		0.04 J		0.05 U	0.05 U	0.05 U	5.0 U		69		38		4.7 J	7.6	5.0 U
2/14/2012	0.54		0.81		0.05 U		0.02 J	0.05 U	0.05 U	6.1		74		43		19.7	60	3.5 J
5/2/2012	0.54		0.56		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		63		42		8.4	5.0 U	5.0 U
8/21/2012	0.54		0.58		0.05 U		0.05 U	0.05 U	0.05 U	3.6 J		69		44		6.6	6.1	5.0 U
11/13/2012	0.51		0.93		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		65		38		5.9	10.3	5.0 U
2/12/2013	0.52		0.74		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		57		41		6.3	7.3	5.0 U
6/4/2013	0.53		1.01		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		63		41		5.9	7.4	5.0 U
8/27/2013	0.54		0.71		0.05 U		0.05 U	0.05 U	0.05 U	3.0 J		68		42		7.5	10.1	5.0 U
12/2/2013	0.55		0.82		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		65		37		6.7	5.2	5.0 U
3/17/2014	0.55		1.21		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		73		39		6.7	5.7	5.0 U
6/2/2014	0.58		0.91		0.05 U		0.05 U	0.05 J	0.05 U	5.0 U		71		40		7.1	7.6	5.0 U
9/29/2014	0.52		1.24		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		68		39		6.3	5.8	5.0 U
11/17/2014	0.55		1.08		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		65		34		5.6	6.6	5.0 U
2/23/2015	0.54		1.05		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		69		37		6.8	8.5	5.0 U
9/14/2015	0.54		1.00		0.05 U		0.05 U	0.05 U	0.03 J	5.0 U		82		40		8.2	6.6	5.0 U
12/7/2015	0.51		1.00		0.05 U		0.05 U	0.04 J		5.0 U		73		38		7.3	7.7	
2/29/2016	0.45		1.16		0.05 U		0.05 U	0.05 U	0.025 J	5.0 U		66		44		8.6	7.0	5.0 U
6/16/2016	0.53		1.13		0.05 U		0.05 U	0.10 U	0.028 J	4.8 J		76		45		12.1	10.6	5.0 U
9/26/2016	0.52		0.94		0.05 U		0.46	0.05 U	0.05 U	5.7		85		41		9.9	9.9	5.0 U
3/8/2017	0.05 U		0.88		0.05 U		0.05 U	0.31		9.7		71.1		34.9		9.7	ND U	
6/10/2017					0.05 U									4.8 J				
9/16/2017	0.536		0.993		0.05 U		0.05 U	0.05 U	0.259	3.6 J		70		35		8.2	9.3	ND U
12/14/2017					0.00 U									14				
3/17/2018	0.515		0.847		0.012	0.015	0.006			11.4		40		19	19	5 U		
6/16/2018					0.01									27				
9/29/2018	2.18		0.844	0.842	0.005		0.005			41.6		49	62	38		27.0		
11/17/2018			0.824									54						

Table 3B. Summary of Groundwater Conventional Parameters: 2007 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Ammonia as N (mg/L)									Chemical Oxygen Demand (COD) (mg/L)								
MCL/SMCL	--									--								
WA WQ Std	--									--								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
3/16/2019	1.16		1.04		0.02 U		0.02 U			10 U		37		12		10 U		
6/1/2019			0.02 U	0.02 U								50	40					
10/12/2019	1.26		0.823	0.85	0.03		0.029			12		57	60	38		15.0		
12/22/2019			0.807						0.2 U			40						10 U

Table 3B. Summary of Groundwater Conventional Parameters: 2007 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Tannin and Lignin (mg/L)									Total Organic Carbon (TOC) (mg/L)								
MCL/SMCL	--									--								
WA WQ Std	--									--								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
2/1/2007	0.30	0.40	4.10		1.10		0.16 J		0.09 J	1.10	1.00	28		15.60		3.60		0.08 J
4/18/2007	0.30	0.30	11.90		1.30		0.20 U		0.20 U	1.00	1.00	28		16.70		4.80		0.25 J
7/18/2007	0.30		13.40		1.30		0.12 J	0.13 J	0.20 U	0.90		29		15.60		5.20	5.20	0.07 J
10/9/2007	0.30	0.30	4.70		1.10		0.30		0.20 U	1.00	0.90	26		15.50		7.10		0.08 J
1/9/2008	0.30		8.00		1.20		0.30	0.30	0.06 J	0.80		24		15.80		6.00	6.10	0.14 J
4/30/2008	0.30		23		1.20		0.20	0.20	0.20 U	0.90		28		17.50		5.90	5.90	0.50 U
7/29/2008	0.20		11.50		1.20	1.20	0.20		0.20 U	0.90		28		15.90	16.20	8.30		0.50 U
10/22/2008	0.30		2.50		1.10	1.10	0.20			0.90		24		15.50	16.30	6.60		
2/1/2009	0.20		3.40		1.40		0.17 J	0.20	0.20 U	0.90		22		16.60		5.20	5.20	0.50 U
5/1/2009	0.30		3.50		0.90		0.30	0.30	0.20 U	1.00		22		15.80		4.70	4.90	0.50 U
8/1/2009	0.30		10.70	31	0.90		0.09 J		0.20 U	1.10		29	28	16.90		5.10		0.17 J
11/1/2009	0.39		20.10		1.32		0.19 J	0.18 J	0.04 J	0.72		24		16.70		5.27	5.15	0.50 U
2/10/2010	0.28		10.00		1.30	1.04	0.07 J		0.20 U	0.77		24		17.10	16.50	3.91		0.50 U
5/26/2010	0.32		31		1.10		0.11 J	0.11 J	0.20 U	0.93		25		17.30		4.17	4.14	0.10 J
8/18/2010	0.34		5.22		1.68		0.18 J	0.14 J	0.04 J	0.81		22		15.30		3.70	3.46	0.50 U
11/18/2010	0.36		13.10		1.43		0.15 J	0.16 J	0.04 J	2.61		25		18.20		7.41	7.18	0.08 J
2/9/2011	0.42		15.70		1.58		0.21	0.25	0.09 J	1.15		22		17.20		4.37	4.16	0.50 U
5/17/2011	0.30		15.00		0.46		0.10 J	0.14 J	0.20 U	0.94		18.80		16.40		2.94	3.01	0.07 J
8/24/2011	0.26		21		1.15		0.09 J	0.12 J	0.20 U	0.67		26		14.20		2.98	3.06	0.50 U
11/3/2011	0.36		7.70		1.51		0.24	0.24	0.07 J	1.00		4.41		14.60		3.13	3.35	0.50 U
2/14/2012	0.50		22		2.36		0.22	0.20	0.10 J	1.19		22		15.40		3.09	3.28	0.08 J
5/2/2012	0.41		50		1.46		0.13 J	0.18 J	0.20 U	0.68		17.30		15.50		2.64	4.04	0.50 U
8/21/2012	0.20 J		21		1.42		0.20 U	0.20 U	0.20 U	0.84		19.30		14.80		2.51	2.56	0.50 U
11/13/2012	0.33		12.70		1.63		0.17	0.27	0.20 U	0.90		19.80		14.30		2.74	2.81	0.08 J
2/12/2013	0.31		13.20		1.06		0.09 J	0.09 J	0.20 U	0.73		15.40		15.50		2.54	2.46	0.50 U
6/4/2013	0.25		13.10		1.73		0.06 J	0.07 J	0.20 U	0.82		18.40		15.40		2.39	2.44	0.50 U
8/27/2013	0.28		8.60		1.18		0.13 J	0.15 J	0.20 U	0.88		18.90		14.60		2.54	2.49	0.50 U
12/2/2013	0.18 J		5.75		1.38		0.10 J	0.20 U	0.20 U	0.90		18.40		14.30		2.48	2.54	0.08 J
3/17/2014	0.23		29		1.52		0.03 J	0.06 J	0.20 U	0.84		20.40		13.30		2.29	2.23	0.50 U
6/2/2014	0.28		20.80		1.27		0.20 U	1.15 J	0.12 J	1.00 U		19.80		14.60		2.34	2.48	0.26 J
9/29/2014	0.30		23		0.92		0.10 J	0.08 J	0.20 U	0.78		19.50		14.00		2.25	2.15	0.50 U
11/17/2014	0.29		20.50		1.37		0.11 J	0.10 J	0.20 U	0.78		18.00		13.80		2.45	2.32	0.12 J
2/23/2015	0.31		23		1.33		0.20 U	0.20 U	0.060 J	0.81 U		19.00		14.50		2.47	2.44	0.25 J
9/14/2015	0.22		4.49		1.34		0.09 J	0.08 J	0.20 U	1.00 U		22		12.80		2.45 U	2.56 U	0.80 J
12/7/2015	0.34		1.13		1.23		0.14 J	0.11 J		0.94		17.10		12.80		3.00	2.78	
2/29/2016	0.20		5.30		1.32		0.05 J	0.09 J	0.20 U	0.79		16.60		15.00		2.76	2.65	0.13 J
6/16/2016	0.21		7.80		1.19		0.09 J	0.09 J	0.20 U	0.85		19.60		13.60		3.06	3.07	0.27 J
9/26/2016	0.12 J		3.75		1.04		0.11 J	0.12 J	0.20 U	0.86		22		13.30		3.28	3.31	0.50 U
3/8/2017	0.15 J		49.50		1.18		0.13 J	0.13 J		2.96		19.0		14.10		3.82	0.37 J	
6/10/2017					1.00									3.75				
9/16/2017	0.2 J		18.5		1.26		0.12 J	0.08 J	ND U	1.06		21.3		14.7		3.47	3.29	ND U
12/14/2017					2.8									11.0				
3/17/2018	0.21		2.2		1.9	1.8	0.2			1.53		54.0		59.0 J	16.0	14		
6/16/2018					1.5									30.0				
9/29/2018	0.51		62.0	57.0	1.5		0.20			1.66		19.0	19.0	11.0		2.6		
11/17/2018			50.0									22.0						

Table 3B. Summary of Groundwater Conventional Parameters: 2007 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Tannin and Lignin (mg/L)									Total Organic Carbon (TOC) (mg/L)								
MCL/SMCL	--									--								
WA WQ Std	--									--								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
3/16/2019	0.49		47		2.5		0.22			1.5		18.0		12.0		2.4		
6/1/2019			320 J	53.0 J								45.0 J	20.0 J					
10/12/2019	0.95		100.0	99.0	2.8		0.39			2.3		20.0	20.0	13.0		3.2		
12/22/2019			89.0						0.1 U			19.0						0.5 U

Table 3B. Summary of Groundwater Conventional Parameters: 2007 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Total Coliforms									Pentachlorophenol								
MCL/SMCL	MPN/100 mL									µg/L								
WA WQ Std	1/100 mL									1 µg/L/None								
	1/100 mL									--								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
2/1/2007	1.0 U	1.0 U	1.0 U		1.0 U		1.0 U		1.0 U									
4/18/2007	1.0 U	1.0 U	1.0 U		1.0 U		1.0 U		1.0 U									
7/18/2007	1.0		6.0		2,420 >		1.0 U	1.0	1.0 U									
10/9/2007	1.0 U	1.0 U	1.0 U		5.1		1.0 U		1.0 U									
1/9/2008	1.0 U		1.0 U		1.0 U		1.0 U	1.0 U	3.1									
4/30/2008	1.0 U		1.0 U		2.0		1.0 U	1.0 U	1.0 U									
7/29/2008	1.0 U		1.0 U		249	71	1.0 U		18.7									
10/22/2008	1.0 U		1.0 U		1.0 U	1.0 U	1.0 U		25									
2/1/2009	1.0 U		1.0 U		17.5		1.0	1.0 U	1.0 U									
5/1/2009	1.0 U		1.0		1.0		1.0 U	1.0 U	4.2									
8/1/2009	1.0 U		1.0 U	1.0 U	1.0 U		1.0 U		1.0									
11/1/2009	1.0 U		1.0 U		1.0 U		1.0 U	1.0 U	3.1									
2/10/2010	1.0 U		1.0 U		1.0	1.0	1.0 U		1.0									
5/26/2010	1.0 U		1.0 U		2.0		165	165	48									
8/18/2010	1.0 U		1.0 U		1.0		9.7	3.0	18.9									
11/18/2010	1.0		5.2		2.0		1.0	1.0 U	1.0									
2/9/2011	1.0 U		1.0 U		1.0 U		1.0 U	1.0 U	1.0 U									
5/17/2011	2.0		1.0 U		1.0 U		1.0 U	1.0	1.0 U									
8/24/2011	1.0 U		1.0 U		18.1		1.0 U	1.0 U	1.0 U									
11/3/2011	1.0 U		P		P		P		1.0 U									
2/14/2012	2.0		1.0 U		5.2		1.0 U	1.0 U	1.0 U									
5/2/2012																		
8/21/2012	1.0 U		1.0 U		1.0 U		2.0	1.0 U	1.0 U									
11/13/2012	1.0 U		1.0 U		1.0		1.0 U		1.0 U									
2/12/2013	1.0 U		10.0 U		1.0 U		1.0 U	1.0 U	1.0 U									
6/4/2013																		
8/27/2013	1.0 U		1.0 U		1.0 U		1.0 U	1.0 U	1.0 U									
12/2/2013	1.0 U		1.0 U		1.0 U		41 J	24 J	1.0 U									
3/17/2014	1.0 U		1.0 U		1.0 U		1.0 U	1.0 U	1.0 U									
6/2/2014	1.0 U		1.0 U		1.0 U		1.0 U	1.0 U	1.0 U									
9/29/2014	1.0 U		1.0 U		1.0 U		1.0 U	1.0 U	1.0 U									
11/17/2014	1.0 U		1.0 U		1.0 U		4.1	1.0 U	1.0 U									
2/23/2015	1.0 U		1.0 U		1.0 U		1.0 U	1.0 U	1.0 U									
9/14/2015	1.0 U		1.0 U		1.0 U		3.1	3.1	1.0 U									
12/7/2015	1.0 U		1.0 U		1.0 U		2.0	3.1	1.0 U									
2/29/2016	1.0 U		1.0 U		1.0 U		1.0 U	1.0 U	1.0 U									
6/16/2016	1.0 U		1.0 U		1.0 U		1.0 U	1.0 U	1.0 U									
9/26/2016	1.0 U		1.0 U		1.0 U		1.0 U	1.0 U	1.0 U									
3/8/2017										0.8		ND U		ND U		49 D	41	ND U
6/10/2017																		
9/16/2017												ND U		ND U_i		32	11	
12/14/2017																		
3/17/2018																		
6/16/2018																		
9/29/2018																		
11/17/2018																		

Table 3B. Summary of Groundwater Conventional Parameters: 2007 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Total Coliforms									Pentachlorophenol								
	MPN/100 mL									µg/L								
MCL/SMCL	1/100 mL									1 µg/L/None								
WA WQ Std	1/100 mL									--								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
3/16/2019	NT		NT		NT		NT			NT		NT		NT		NT		
6/1/2019	NT		NT		NT		NT			NT		NT		NT		NT		
10/12/2019	NT		NT		NT		NT			NT		NT		NT		NT		
12/22/2019	NT		NT		NT		NT			NT		NT		NT		NT		

Table 3B. Summary of Groundwater Conventional Parameters: 2007 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Polynuclear Aromatic Hydrocarbons								
	µg/L								
MCL/SMCL	0.2 µg/L/None								
WA WQ Std	0.01 µg/L								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
2/1/2007									
4/18/2007									
7/18/2007									
10/9/2007									
1/9/2008									
4/30/2008									
7/29/2008									
10/22/2008									
2/1/2009									
5/1/2009									
8/1/2009									
11/1/2009									
2/10/2010									
5/26/2010									
8/18/2010									
11/18/2010									
2/9/2011									
5/17/2011									
8/24/2011									
11/3/2011									
2/14/2012									
5/2/2012									
8/21/2012									
11/13/2012									
2/12/2013									
6/4/2013									
8/27/2013									
12/2/2013									
3/17/2014									
6/2/2014									
9/29/2014									
11/17/2014									
2/23/2015									
9/14/2015									
12/7/2015									
2/29/2016									
6/16/2016									
9/26/2016									
3/8/2017									0.1 J
6/10/2017									
9/16/2017			0.013		0.007		0.030	0.013	
12/14/2017									
3/17/2018									
6/16/2018									
9/29/2018									
11/17/2018									

Table 3B. Summary of Groundwater Conventional Parameters: 2007 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Polynuclear Aromatic Hydrocarbons								
	µg/L								
MCL/SMCL	0.2 µg/L/None								
WA WQ Std	0.01 µg/L								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
3/16/2019	NT		NT		NT		NT		
6/1/2019	NT		NT		NT		NT		
10/12/2019	NT		NT		NT		NT		
12/22/2019	NT		NT		NT		NT		

Notes

µS/cm = microSiemen per centi mg/L = milligram per liter. MPN = most probable number. NT = not tested.

J = result is an estimated concentration that is less than the method reporting limit, but greater than or equal to the method detection limit.

J* = result is an estimated concentration because of lab imprecisi U = analyte was not detected above the reported sample quantification limit.

MCL = Federal maximum contaminant levels for drinking water.

SMCL = Federal secondary maximum contaminant levels for drinking water.

WA WQ Std = State of Washington's water quality standards for groundwater (WAC 173-200).

Table 3C. Summary of Groundwater Metals: 2007 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Arsenic, dissolved (µg/L)								
MCL/SMCL	10								
WA WQ Std	0.05								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
2/1/2007	6.8	5.8	145		1.1 B		5.0 U		5.0 U
4/18/2007	6.0	6.0	113		0.7 B		5.0 U		1.5 B
7/18/2007	5.4		113		5.0 U		5.0 U	5.0 U	5.0 U
10/9/2007	5.4	4.8 B	67		5.0 U		5.0 U		5.0 U
1/9/2008	6.7		43		5.0 U		5.0 U	5.0 U	0.7 U
4/30/2008	4.4 J		117		5.0 U		5.0 U	5.0 U	0.7 U
7/30/2008	5.4		111		0.8 J	5.0 U	5.0 U		0.6 U
10/22/2008	7.2		47		5.0 U	5.0 U	1.1 J		
2/1/2009	14.4		114		5.0 U		5.0 U	5.0 U	5.0 U
5/1/2009	6.2		120		1.6 J		0.6 J	0.7 J	5.0 U
8/1/2009	0.8 J		5.0 U	2.5 J	1.5 J		0.8 J		5.0 U
11/1/2009	6.0		64		5.0 U		5.0 U	5.0 U	5.0 U
2/10/2010	7.1		133		3.0 J	2.5 J	1.6 J		5.0 U
5/26/2010	5.5		149		0.9 J		5.0 U	5.0 U	5.0 U
8/18/2010	5.3		139		0.9 J		5.0 U	5.0 U	3.0 J
11/18/2010	5.6		186		5.0 U		5.0 U	5.0 U	5.0 U
2/9/2011	5.5		119		5.0 U		5.0 U	5.0 U	5.0 U
5/17/2011	6.2		139		1.1 J		5.0 U	5.0 U	5.0 U
8/24/2011	6.4		155		5.0 U		5.0 U	5.0 U	5.0 U
11/3/2011	6.2		156		1.0 J		5.0 U	0.6 J	5.0 U
2/14/2012	5.2		158		0.6 J		5.0 U	5.0 U	5.0 U
5/2/2012	5.8		133		0.9 J		5.0 U	5.0 U	5.0 U
8/21/2012	4.9 J		135		5.0 U		5.0 U	5.0 U	5.0 U
11/13/2012	6.2		170		5.0 U		5.0 U	5.0 U	5.0 U
2/12/2013	6.1		119		5.0 U		5.0 U	5.0 U	5.0 U
6/4/2013	6.8		138		1.5 J		5.0 U	1.1 J	1.1 J
8/27/2013	6.3		140		1.0 J		5.0 U	5.0 U	5.0 U
12/2/2013	6.4		164		1.3 J		5.0 U	5.0 U	5.0 U
3/17/2014	6.00		175		0.78		0.50 U	0.50 U	0.50 U
6/2/2014	6.00		157		0.70		0.20 J	0.30 J	0.50 U
9/29/2014	5.86		191		0.69		0.25 J	0.24 J	0.50 U
11/17/2014	5.7		174		0.7		0.3 J	0.3 J	0.5 U
2/23/2015	5.9		163		0.7		0.2 J	0.3 J	0.5 U
9/14/2015	5.9		185		0.6		0.5 U	0.2 J	0.5 U
12/7/2015	6.32		174		0.76		0.26 J	0.26 J	
2/29/2016	6.30		147		0.69		0.29 J	0.23 J	0.50 U
6/16/2016	6.1		138		0.7		0.3 J	0.3 J	0.50 U
9/26/2016	6.56		191		0.47 J		0.25 J	0.26 J	0.50 U
3/8/2017	ND U		161		ND U		ND U	ND U	
6/10/2017					ND U				
9/16/2017	8 J		181		ND U		ND U	ND U	ND U
12/14/2017					5.0				

Table 3C. Summary of Groundwater Metals: 2007 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Arsenic, dissolved (µg/L)								
MCL/SMCL	10								
WA WQ Std	0.05								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
3/17/2018			96		5.0	5.0	5.0		
6/16/2018					5.0				
9/29/2018	ND U		54	51	6.0			5.0 U	
11/17/2018			82						
3/16/2019	5.0 U		66		5.0 U		5.0 U		
6/1/2019			41	48					
10/12/2019	5.0 U		23	24.0	5.0		5.0 U		
12/22/2019			102						5.0 U

Table 3C. Summary of Groundwater Metals: 2007 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Barium, dissolved (µg/L)								
MCL/SMCL	2,000								
WA WQ Std	1,000								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
2/1/2007	29	29	101		47		19.1		5.0 U
4/18/2007	26	26	74		40		25		3.0 B
7/18/2007	33		81		50		25	23	5.0 U
10/9/2007	29	29	83		48		27		5.0 U
1/9/2008	27		65		42		18.3	19.0	0.6 U
4/30/2008	28		111		42		22	23	0.6 U
7/30/2008	30		122		50	51	32		0.5 U
10/22/2008	27		72		42	43	25		
2/1/2009	30		125		50		23	23	5.0 U
5/1/2009	27		111		45		16.7	16.8	5.0 U
8/1/2009	229		15.6	23	40		230		5.0 U
11/1/2009	27		115		46		13.9	13.1	5.0 U
2/10/2010	28		132		50	52	14.3		5.0 U
5/26/2010	28		134		54		14.5	14.6	5.0 U
8/18/2010	26		119		48		14.9	14.3	1.5 J
11/18/2010	25		132		45		15.7	15.7	5.0 U
2/9/2011	29		142		54		16.9	16.6	5.0 U
5/17/2011	25		123		53		15.3	15.5	5.0 U
8/24/2011	24		120		47		15.8	15.3	5.0 U
11/3/2011	25		121		45		15.0	15.2	5.0 U
2/14/2012	27		136		48		16.7	16.3	0.6 J
5/2/2012	29		116		54		16.4	15.9	5.0 U
8/21/2012	28		114		53		15.3	15.5	5.0 U
11/13/2012	28		137		51		15.7	15.8	5.0 U
2/12/2013	26		90		55		13.9	14.2	5.0 U
6/4/2013	26		86		53		13.3	13.3	4.0 U
8/27/2013	28		115		54		16.1	15.2	4.0 U
12/2/2013	26		124		47		15.1	15.6	4.0 U
3/17/2014	27		140		50		15.4	15.5	4.0 U
6/2/2014	28		127		53		15.2	15	4.0 U
9/29/2014	28		135		50		14.9	15	4.0 U
11/17/2014	28		130		50		15.3	14.7	0.6 J
2/23/2015	28		127		47		13.1	13.3	0.1 J
9/14/2015	30		152		47		14.4	15.2	4.0 U
12/7/2015	28		162		44		13.2	13.4	
2/29/2016	29		115		48		14.5	14.6	4.0 U
6/16/2016	31		109		44		18.8	19.1	0.9 J
9/26/2016	31		128		32		17.7	18	4.0 U
3/8/2017	28.9		128		40.1		23	21.7	
6/10/2017					20.3				
9/16/2017	30		129		40.5		18.9 J	29.4 J	ND U
12/14/2017							35.2		

Table 3C. Summary of Groundwater Metals: 2007 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Barium, dissolved (µg/L)								
MCL/SMCL	2,000								
WA WQ Std	1,000								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
3/17/2018	36		49.7		38	37.6	16.4		
6/16/2018					35.7				
9/29/2018	32		29.5	30.4	34.6		16.1		
11/17/2018			26						
3/16/2019	26		34		40		16		
6/1/2019			29.0	28.8					
10/12/2019	28		57.7	57.3	41.1		14.3		
12/22/2019			41.5						0.5 U

Table 3C. Summary of Groundwater Metals: 2007 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Iron, dissolved (µg/L)								
MCL/SMCL	300								
WA WQ Std	300								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
2/1/2007	39	37	110,000		846		20 U		20 U
4/18/2007	43	36	90,500		771		10.1 B		4.7 B
7/18/2007	38		88,100		699		20 U	20 U	20 U
10/9/2007	36	36	62,700		656		20 U		20 U
1/9/2008	41		35,500		608		7.8 J	8.2 J	3 U
4/30/2008	42		102,000		624		8.8 J	8.3 J	3 U
7/30/2008	35		96,800		593	591	20 U		4 U
10/22/2008	75		53,800		560	571	8.8 J		
2/1/2009	55		109,000		542		4.6 J	20 U	4.5 J
5/1/2009	52		102,000		473		6.1 J	4.9 J	20 U
8/1/2009	91		11.6 J	2,280	1,340		91		0.8 J
11/1/2009	44		59,700		480		4.7 J	4.2 J	20 U
2/10/2010	34		94,700		465	493	20 U		20 U
5/26/2010	44		104,000		451		3.5 J	8.9 J	20 U
8/18/2010	39		104,000		482		3.7 J	1.6 J	20 U
11/18/2010	20 U		116,000		420		8.7 J	6 J	20 U
2/9/2011	47		109,000		466		20 U	20 U	20 U
5/17/2011	56		110,000		470		11.7 J	13 J	6.8 J
8/24/2011	35		107,000		412		20 U	1 J	20 U
11/3/2011	42		100,000		388		7.7 J	7.6 J	20 U
2/14/2012	43		97,800		375		20 U	20 U	20 U
5/2/2012	55		97,900		430		20 UJ	20 UJ	20 U
8/21/2012	43		99,200		417		20 U	20 U	20 U
11/13/2012	78		98,100		395		20 U	20 U	20 U
2/12/2013	60		91,600		450		4.4 J	4.6 J	20 U
6/4/2013	58		93,500		416		3.7 J	5.9 J	4.1 J
8/27/2013	65		109,000		416		20 U	5.8 J	20 U
12/2/2013	56		107,000		400		20 U	3 J	20 U
3/17/2014	69		127,000		424		20 U	8.5 J	20 U
6/2/2014	52		118,000		421		20 U	20 U	20 U
9/29/2014	73		111,000		409		20 U	20 U	8.3 J
11/17/2014	70		120,000		421		20 U	20 U	40 U
2/23/2015	73		114,000		375		0.1 U	10.2 J	28 U
9/14/2015	54		122,000		358		6.4 J	3.9 J	20 U
12/7/2015	56		126,000		361		9 J	20 U	
2/29/2016	95		106,000		398		20 U	20 U	4.0 J
6/16/2016	55		108,000		359		3 J	3.8 J	20.0 U
9/26/2016	68		107,000		268		20 J	20 U	3.0 J
3/8/2017	498		112,000		279		71 J	37.0 J	
6/10/2017					8 J				
9/16/2017	839		108,000		328		11 J	65.0 J	ND U
12/14/2017							198		

Table 3C. Summary of Groundwater Metals: 2007 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Iron, dissolved (µg/L)								
MCL/SMCL	300								
WA WQ Std	300								
Well ID	**BXS-4**	**BXS-4 Dup**	**BXS-3**	**BXS-3 Dup**	**BXS-2**	**BXS-2 Dup**	**BXS-1**	**BXS-1 Dup**	**Field Blank**
3/17/2018	825		95,400		139	184	10		
6/16/2018					206				
9/29/2018	886		71,100	69,600	105		10 U		
11/17/2018			81,800						
3/16/2019	131		98,000		117		10 U		
6/1/2019			76,500	79,600					
10/12/2019	45		83,800	85,400	62		10 U		
12/22/2019			99,600						16.0

Table 3C. Summary of Groundwater Metals: 2007 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Manganese, dissolved (µg/L)								
MCL/SMCL	50								
WA WQ Std	50								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
2/1/2007	112	114	13,500		1,350		90		5 U
4/18/2007	107	106	13,500		1,330		123		1.6 B
7/18/2007	118		14,000		1,330		268	268	5 U
10/9/2007	121	120	14,700		1,280		353		2.7 B
1/9/2008	125		17,900		1,270		422	428	1.6 B
4/30/2008	110		12,600		1,150		240	234	0.3 B
7/30/2008	111		13,100		1,190	1,210	309		0.2 U
10/22/2008	111		15,400		1,290	1,300	297		
2/1/2009	120		11,800		1,250		175	174	0.2 J
5/1/2009	108		11,300		1,230		114	116	0.4 J
8/1/2009	4,220		7,870	2,540	2,500		4,180		0.2 J
11/1/2009	110		13,400		1,300		204	204	0.7 J
2/10/2010	116		11,200		1,260	1,330	36		5 U
5/26/2010	115		9,380		1,340		78	78	5 U
8/18/2010	108		9,670		1,310		48	47	5 U
11/18/2010	112		7,880		1,340		93	95	5 U
2/9/2011	125		9,610		1,400		159	160	0.2 J
5/17/2011	100		13,600		1,460		122	116	5 U
8/24/2011	97		14,000		1,340		144	136	5 U
11/3/2011	105				1,300		149	150	0.5 J
2/14/2012	114		8,650		1,510		252	242	0.3 J
5/2/2012	116		12,900		1,570		254	252	5 U
8/21/2012	113		14,000		1,510		201	200	5 U
11/13/2012	119		9,650		1,550		242	244	5 U
2/12/2013	110		10,700		1,610		220	220	5 U
6/4/2013	118		14,800		1,680		212	209	6.2
8/27/2013	119		14,200		1,700		224	219	0.5 J
12/2/2013	111				1,580		217	221	0.1 J
3/17/2014	119		10,400		1,640		287	282	0.3 J
6/2/2014	116		12,300		1,680		253	250	1 U
9/29/2014	118		7,310		1,650		240	241	0.6 J
11/17/2014	115		8,620		1,680		265	267	0.2 J
2/23/2015	120		10,100		1,580		311	301	0.958 J
9/14/2015	114		5,290		1,570		238	268	1 U
12/7/2015	110		5,990		1,500		321	330	
2/29/2016	105		11,800		1,600		150	151	0.8 J
6/16/2016	118		13,900		1,580		249	272	1.0 U
9/26/2016	124		7,620		1,200		290	282	0.3 J
3/8/2017	74.3		8,730		1,540		667	501	
6/10/2017					324				
9/16/2017	845		6,460		1,490		301 J	130 J	0.09 J
12/14/2017							1,417		

Table 3C. Summary of Groundwater Metals: 2007 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Manganese, dissolved (µg/L)								
MCL/SMCL	50								
WA WQ Std	50								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
3/17/2018	115		8,179		1,575	1,578	198		
6/16/2018					1,475				
9/29/2018	143		5,654	5,711	1,416		250		
11/17/2018			4,890						
3/16/2019	137		4,136		1,664		262		
6/1/2019			3,555	3,573					
10/12/2019	145		5,290	5,310	1,670		193		
12/22/2019			5,550						5.0 U

Table 3C. Summary of Groundwater Metals: 2007 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Cadmium, dissolved (µg/L)								
MCL/SMCL	5								
WA WQ Std	10								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
2/1/2007	5.0 U	5.0 U	5.0 U		5.0 U		5.0 U		5.0 U
4/18/2007	5.0 U	5.0 U	2.9 B		0.7 B		1.9 B		5.0 U
7/18/2007	5.0 U		5.0 U		5.0 U		5.0 U	5.0 U	
10/9/2007	5.0 U	5.0 U	5.0 U		5.0 U		5.0 U		
1/9/2008	5.0 U		1.8 J		1.4 J		5.0 U	1.3 J	
4/30/2008	5.0 U		5.0 U		1.1 J		5.0 U	0.7 J	
7/30/2008	5.0 U		4.3 J		5.0 U	5.0 U	0.2 J		
10/22/2008	5.0 U		5.0 U		5.0 U	5.0 U	5.0 U		
2/1/2009	5.0 U		1.2 J		5.0 U		0.2 J	0.3 J	0.2 J
5/1/2009	5.0 U		2.1 J		5.0 U		5.0 U	5.0 U	5.0 U
8/1/2009	5.0 U		5.0 U	5.0 U	5.0 U		5.0 U		5.0 U
11/1/2009	5.0 U		5.0 U		5.0 U		5.0 U	5.0 U	5.0 U
2/10/2010	5.0 U		5.0 U		5.0 U	5.0 U	5.0 U		5.0 U
5/26/2010	5.0 U		5.0 U		5.0 U		5.0 U	5.0 U	5.0 U
8/18/2010	5.0 U		3.0 J		5.0 U		5.0 U	5.0 U	5.0 U
11/18/2010	5.0 U		4.5 J		5.0 U		5.0 U	5.0 U	5.0 U
2/9/2011									5.0 U
5/17/2011									5.0 U
8/24/2011									5.0 U
11/3/2011	5.0 U		2.9 J		2.6 J		5.0 U		5.0 U
2/14/2012	5.0 U		5.0 U		5.0 U		5.0 U	5.0 U	5.0 U
5/2/2012	5.0 U		5.0 U		0.6 J		5.0 U	5.0 U	5.0 U
8/21/2012	NT		NT		NT		NT		NT
11/13/2012	NT		NT		NT		NT		NT
2/12/2013	NT		NT		NT		NT		NT
6/4/2013	NT		NT		NT		NT		NT
8/27/2013	NT		NT		NT		NT		NT
12/2/2013	NT		NT		NT		NT		NT
3/17/2014	NT		NT		NT		NT		NT
6/2/2014	NT		NT		NT		NT		NT
9/29/2014	NT		NT		NT		NT		NT
11/17/2014	NT		NT		NT		NT		NT
2/23/2015	NT		NT		NT		NT		NT
9/14/2015	NT		NT		NT		NT		NT
12/7/2015	NT		NT		NT		NT		NT
2/29/2016	NT		NT		NT		NT		NT
6/16/2016	NT		NT		NT		NT		NT
9/26/2016	NT		NT		NT		NT		NT
3/8/2017	NT		NT		NT		NT		NT
6/10/2017	NT		NT		NT		NT		NT
9/16/2017	NT		NT		NT		NT		NT
12/14/2017	NT		NT		NT		NT		NT

Table 3C. Summary of Groundwater Metals: 2007 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Cadmium, dissolved (µg/L)								
MCL/SMCL	5								
WA WQ Std	10								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
3/17/2018	NT		NT		NT		NT		NT
6/16/2018	NT		NT		NT		NT		NT
9/29/2018	NT		NT		NT		NT		NT
11/17/2018	NT		NT		NT		NT		NT
3/16/2019	NT		NT		NT		NT		NT
6/1/2019	NT		NT		NT		NT		NT
10/12/2019	NT		NT		NT		NT		NT
12/22/2019	NT		NT		NT		NT		NT

Table 3C. Summary of Groundwater Metals: 2007 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Copper, dissolved (µg/L)								
MCL/SMCL	1,300								
WA WQ Std	1,000								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
2/1/2007	10.0 U	10.0 U	10.0 U		10.0 U		3.0 B		10.0 U
4/18/2007	10.0 U	10.0 U	10.0 U		10.0 U		10.0 U		10.0 U
7/18/2007	10.0 U		4.4 B		5.4 B		4.2 B	6.0 B	10.0 U
10/9/2007	10.0 U	10.0 U	10.0 U		10.0 U		10.0 U		10.0 U
1/9/2008	10.0 U		10.0 U		10.0 U		10.0 U	10.0 U	7.0 U
4/30/2008	10.0 U		10.0 U		10.0 U		10.0 U	10.0 U	7.0 U
7/30/2008	10.0 U		10.0 U		1.4 J	1.4 J	3.3 J		1.4 B
10/22/2008	10.0 U		10.0 U		10.0 U	10.0 U	10.0 U		
2/1/2009	10.0 U		10.0 U		2.1 J		1.6 J	2.6 J	10.0 U
5/1/2009	10.0 U		10.0 U		10.0 U		10.0 U	10.0 U	5.8 J
8/1/2009	22		10.0 U	10.0 U	10.0 U		21		10.0 U
11/1/2009	10.0 U		10.0 U		10.0 U		10.0 U	10.0 U	10.0 U
2/10/2010	1.3 J		2.0 J		3.8 J	4.1 J	3.9 J		10.0 U
5/26/2010	10.0 U		10.0 U		1.6 J		2.0 J	2.3 J	10.0 U
8/18/2010	4.2 J		6.9 J		4.4 J		4.0 J	6.8 J	10.0 U
11/18/2010	10.0 U		10.0 U		10.0 U		10.0 U	10.0 U	5.8 J
2/9/2011	10.0 U		3.3 J		10.0 U		2.0 J	2.0 J	10.0 U
5/17/2011	10.0 U		10.0 U		2.8 J		10.0 U	10.0 U	2.2 J
8/24/2011	10.0 U		10.0 U		10.0 U		10.0 U	10.0 U	10.0 U
11/3/2011	10.0 U		10.0 U		10.0 U		10.0 U	2.3 J	10.0 U
2/14/2012	10.0 U		5.2 J		1.7 J		1.7 J	2.9	10.0 U
5/2/2012	0.6 J		10.0 U		1.7 J		2.1 J	2.2	10.0 U
8/21/2012	10.0 U		10.0 U		1.5 J		2.1 J	1.9	10.0 U
11/13/2012	10.0 U		10.0 U		3.4 J		10.0 U	10.0 U	10.0 U
2/12/2013	10.0 U		10.0 U		1.5 J		1.4 J	1.7 J	10.0 U
6/4/2013	4.0 U		4.0 U		2.8 J		2.1 J	2.0 J	4.0 U
8/27/2013	4.0 U		4.0 U		2.3 J		2.0 J	1.6 J	4.0 U
12/2/2013	4.0 U		4.0 U		3.6 J		2.6 J	2.9 J	4.0 U
3/17/2014	4.0 U		4.0 U		4.0 U		4.0 U	4.0 U	4.0 U
6/2/2014	4.0 U		4.0 U		2.6 J		2.0 J	2.1 J	4.0 U
9/29/2014	4.0 U		4.0 U		4.0 U		4.0 U	4.0 U	1.2 J
11/17/2014	4.0 U		4.0 U		4.0 U		4.0 U	4.0 U	1.0 J
2/23/2015	0.1 U		0.3		2.3		1.8	1.8	0.0 J
9/14/2015	4.0 U		4.0 U		2.1 J		13.6	10.1	4.0 U
12/7/2015	4.0 U		1.3 J		3.4 J		3.4 J	2.2 J	
2/29/2016	4.0 U		4.0 U		2.4 J		2.2 J	4.4	4.0 U
6/16/2016	4.0 U		4.0 U		4.0 U		8.3 U	4.0 U	2.2 J
9/26/2016	4.0 U		4.0 U		4.0 U		4.0 U	4.0 U	0.9 J
3/8/2017	NT		NT		NT		NT	NT	NT
6/10/2017					1.8 J				
9/16/2017	ND U		ND U		ND U		ND U	ND U	ND U
12/14/2017	NT		NT		NT		NT		

Table 3C. Summary of Groundwater Metals: 2007 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Copper, dissolved (µg/L)								
MCL/SMCL	1,300								
WA WQ Std	1,000								
Well ID	**BXS-4**	**BXS-4 Dup**	**BXS-3**	**BXS-3 Dup**	**BXS-2**	**BXS-2 Dup**	**BXS-1**	**BXS-1 Dup**	**Field Blank**
3/17/2018	1.4 J		NT		NT		NT		
6/16/2018	NT		NT		NT		NT		
9/29/2018	NT		NT		NT		NT		
11/17/2018	NT		NT		NT		NT		
3/16/2019	NT		NT		NT		NT		
6/1/2019	NT		NT		NT		NT		
10/12/2019	NT		NT		NT		NT		
12/22/2019	NT		NT		NT		NT		

Table 3C. Summary of Groundwater Metals: 2007 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Nickel, dissolved (µg/L)								
MCL/SMCL	100								
WA WQ Std	--								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
2/1/2007	20.0 U	20.0 U	20.0 U		38		20.0 U		20.0 U
4/18/2007	20.0 U	20.0 U	18.2 B		34		10.4 B		20.0 U
7/18/2007	20.0 U		20.4		30		20.0 U	20.0 U	20.0 U
10/9/2007	20.0 U	20.0 U	20.0 U		31		20.0 U		20.0 U
1/9/2008	20.0 U		17.0 J		31		16.0 J	15.5 J	2.0 U
4/30/2008	20.0 U		20.2		32		11.1 J	11.8 J	2.0 U
7/30/2008	20.0 U		4.5 J		25	25	10.2 J		0.5 U
10/22/2008	20.0 U		23		32	32	15.5 J		
2/1/2009	20.0 U		20.6		32		10.7 J	10.5 J	20.0 U
5/1/2009	20.0 U		17.7 J		31		7.0 J	7.9 J	20.0 U
8/1/2009	104		49	27	134		109		20.0 U
11/1/2009	20.0 U		13.2 J		31		11.1 J	10.1 J	20.0 U
2/10/2010	20.0 U		23		32	34	5.9 J		20.0 U
5/26/2010	20.0 U		19.5 J		33		6.5 J	6.7 J	20.0 U
8/18/2010	20.0 U		12.5 J		30		6.8 J	5.5 J	20.0 U
11/18/2010	20.0 U		17.5 J		33		5.8 J	5.2 J	20.0 U
2/9/2011	20.0 U		20.8		34		10.0 J	9.6 J	20.0 U
5/17/2011	20.0 U		15.3 J		39		8.7 J	7.0 J	20.0 U
8/24/2011	20.0 U		16.2 J		32		8.5 J	9.2 J	20.0 U
11/3/2011	20.0 U		11.2 J		31		10.6 J	10.1 J	20.0 U
2/14/2012	20.0 U		23		30		9.4 J	9.3 J	20.0 U
5/2/2012	20.0 U		13.0 J		34		9.2 J	8.9 J	20.0 U
8/21/2012	0.7 J		15.8 J		34		8.9 J	9.1 J	20.0 U
11/13/2012	20.0 U		13.6 J		32		8.8 J	9.7 J	20.0 U
2/12/2013	20.0 U		18.2 J		36		9.2 J	9.4 J	20.0 U
6/4/2013	0.4 J		18.4		37		8.5	8.4	4.0 U
8/27/2013	2.2 J		22		38		11.2	10.8	4.0 U
12/2/2013	5.4		25		38		12.8	13.5	4.0 U
3/17/2014	4.0 U		11.2		31		7.4	7.6	4.0 U
6/2/2014	2.2 J		21		39		10.9	10.4	4.0 U
9/29/2014	4.0 U		16.1		34		8.8	9.0	0.4 J
11/17/2014	1.1 J		19.7		36		10.0	10.1	4.0 U
2/23/2015	0.4 U		18.9		34		9.3	9.3	0.1 J
9/14/2015	4.0 U		18.0		31		7.7	8.3	0.4 J
12/7/2015	4.0 U		20.6		29		6.6	6.9	
2/29/2016	4.0 U		18.4		33		6.6	6.7	4.0 U
6/16/2016	0.4 U		20.8		32		9.2	9.8	4.0 U
9/26/2016	4.0 U		14.8		22		8.4	8.4	4.0 U
3/8/2017	3.5 J		15.3		30.2		17.4	14.0	
6/10/2017					10.2				
9/16/2017	2.7 J		21.0		31		12.0	8.6	ND U
12/14/2017									

Table 3C. Summary of Groundwater Metals: 2007 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Nickel, dissolved (µg/L)								
MCL/SMCL	100								
WA WQ Std	--								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
3/17/2018	1.9 J		5.0		18.0	18.0	5.0		
6/16/2018					5.0				
9/29/2018	ND U		26.0	26.0	32		12.0		
11/17/2018			43.0						
3/16/2019	5		27.0		38.0		12.0		
6/1/2019			28.0	29.0					
10/12/2019	8		35.0	36.0	39.0		12.0		
12/22/2019			28.0						10 U

Table 3C. Summary of Groundwater Metals: 2007 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Zinc, dissolved (µg/L)								
MCL/SMCL	5,000								
WA WQ Std	5,000								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
2/1/2007	2.4 B	10.0 U	12.9		5.8 B		4.0 B		10.0 U
4/18/2007	10.0 U	10.0 U	8.5 B		30		10.0 U		10.0 U
7/18/2007	10.0 U		12.4		11.1		8.0 B	6.5 B	10.0 U
10/9/2007	10.0 U	12.9	15.9		22		7.9 B		10.0 U
1/9/2008	8.3 J		10.0 U		14.8		10.0 U	8.0 J	7.0 U
4/30/2008	10.0 U		10.0 U		10.0 U		10.0 U	10.0 U	7.0 U
7/30/2008	1.0 J		4.8 J		4.4 J	4.2 J	9.1 J		1.5 B
10/22/2008	10.0 U		3.9 J		6.2 J	7.1 J	12.1		
2/1/2009	1.5 J		2.1 J		6.5 J		3.6 J	3.5 J	1.6 J
5/1/2009	10.0 U		3.9 J		3.7 J		1.5 J	2.2 J	5.0 J
8/1/2009	3.8 J		2.6 J	2.4 J	10.0 U		3.4 J		2.4 J
11/1/2009	10.0 U		1.5 J		2.8 J		1.5 J	10.0 U	10.0 U
2/10/2010	10.0 U		1.6 J		5.3 J	5.8 J	1.7 J		10.0 U
5/26/2010	10.0 U		10.0 U		3.5 J		2.1 J	2.5 J	10.0 U
8/18/2010	10.0 U		10.0 U		1.7 J		10.0 U	10.0 U	1.9 J
11/18/2010	10.0 U		2.3 J		4.8 J		10.0 U	1.9 J	10.0 U
2/9/2011	0.4 J		20.0 U		4.9 J		3.1 J	2.5 J	0.3 J
5/17/2011									
8/24/2011	10.0 U		4.2 J		4.7 J		1.7 J	3.1 J	10.0 U
11/3/2011	10.0 U		3.0 J		4.0 J		1.0 J	1.3 J	10.0 U
2/14/2012	0.7 J		6.8 J		5.5 J		3.0 J	3.2 J	0.7 J
5/2/2012	0.4 J		10.0 U		4.3 J		2.5 J	2.3 J	10.0 U
8/21/2012	10.0 U		0.8 J		2.3 J		2.6 J	2.5 J	10.0 U
11/13/2012	10.0 U		0.8 J		3.8 J		2.7 J	2.3 J	10.0 U
2/12/2013	10.0 U		0.9 J		3.2 J		2.4 J	2.1 J	10.0 U
6/4/2013	4.0 U		2.7 J		3.8 J		2.4 J	2.5	4.0 U
8/27/2013	4.0 U		2.9 J		3.6 J		2.7 J	2.5 J	4.0 U
12/2/2013	4.0 U		1.9 J		3.7 J		3.1 J	3.1 J	4.0 U
3/17/2014	4.0 U		0.8 J		4.4		2.8 J	2.8 J	4.0 U
6/2/2014	4.0 U		1.3 J		3.4 J		2.2 J	2.2 J	4.0 U
9/29/2014	0.5 J		1.7 J		5.6		3.2 J	2.4 J	4.0 U
11/17/2014	5.0 U		2.3 J		4.4 J		2.1 J	2.6 J	5.0 U
2/23/2015	0.4 J		2.1		6.5		2.9	2.9	0.5 U
9/14/2015	4.0 U		2.0 J		3.1 J		362	268	4.0 U
12/7/2015	3.2 J		0.5 J		4.4		13.7 J	6.7 J	
2/29/2016	2.1 J		4.1		7.9		8.5	32	4.0 U
6/16/2016	4.3 U		4.0 U		4.0 U		13.0	6.6	1.0 J
9/26/2016	4.0 U		2.1 J		2.1 J		1.2 J	1.1 J	4.0 U
3/8/2017	NT		NT		NT		NT	NT	
6/10/2017					1.9 J				
9/16/2017	0.8 J		1.5 J		1.8 J		1.8 J	5.1 J	2.2 J
12/14/2017	NT		NT		NT		NT		

Table 3C. Summary of Groundwater Metals: 2007 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Zinc, dissolved (µg/L)								
MCL/SMCL	5,000								
WA WQ Std	5,000								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
3/17/2018	4.2		NT				NT		
6/16/2018	NT		NT		NT		NT		
9/29/2018	NT		NT		NT		NT		
11/17/2018	NT		NT		NT		NT		
3/16/2019	NT		NT		NT		NT		
6/1/2019	NT		NT		NT		NT		
10/12/2019	NT		NT		NT		NT		
12/22/2019	NT		NT		NT		NT		

Notes

µg/L = microgram per liter. NT = not tested.

J = estimated concentration that is less than the method reporting limit but greater than or = to the method detection limit.

J* = estimated concentration because of lab imprecision.

MCL = Federal maximum contaminant levels for drinking water.

SMCL = Federal secondary maximum contaminant levels for drinking water.

WA WQ Std = State of Washington's water quality standards for groundwater (WAC 173-200).

U = analyte was not detected above the reported sample quantification limit. B = detected in laboratory blank. R = rejected value.

Table 4. Parameters Statistically Higher than Background: 1989 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Analyte Group	Parameter[1]	Monitoring Period	Unit	Mean Value Downgradient[2,3]			Mean Value Upgradient[2]
				BXS-1	BXS-2	BXS-3	BXS-4
Conventionals	Ammonia as Nitrogen	2001	mg/L			0.10	0.50
Conventionals	Ammonia as Nitrogen	2007	mg/L			0.84	0.50
Conventionals	Ammonia as Nitrogen	2009	mg/L			1.08	0.54
Conventionals	Ammonia as Nitrogen	2010	mg/L			1.11	0.53
Conventionals	Ammonia as Nitrogen	2013	mg/L			0.82	0.53
Conventionals	Ammonia as Nitrogen	2014	mg/L			1.11	0.55
Conventionals	Ammonia as Nitrogen	2015	mg/L			1.03	0.53
Conventionals	Ammonia as Nitrogen	2016	mg/L			1.05	0.51
Conventionals	Carbon, Total Organic	1992	mg/L	3.6	5.0	18.7	1.5
Conventionals	Carbon, Total Organic	1993	mg/L		7.3	20.0	2.0
Conventionals	Carbon, Total Organic	1994	mg/L		8.6	22	2.3
Conventionals	Carbon, Total Organic	1995	mg/L		10.7	31	3.4
Conventionals	Carbon, Total Organic	1996	mg/L	4.9	12.7	39	2.3
Conventionals	Carbon, Total Organic	1997	mg/L		15.0		3.8
Conventionals	Carbon, Total Organic	1998	mg/L			32	10.8
Conventionals	Carbon, Total Organic	1999	mg/L		15.8	32	6.6
Conventionals	Carbon, Total Organic	2000	mg/L	8.1	15.2		1.0
Conventionals	Carbon, Total Organic	2001	mg/L	7.5	14.6	25	3.1
Conventionals	Carbon, Total Organic	2002	mg/L	6.4	13.8	22	2.0
Conventionals	Carbon, Total Organic	2003	mg/L		14.0	22	0.7
Conventionals	Carbon, Total Organic	2004	mg/L	5.1	14.7	23	0.9
Conventionals	Carbon, Total Organic	2005	mg/L	5.7	15.8	25	1.1
Conventionals	Carbon, Total Organic	2006	mg/L	5.1	14.5	28	1.0
Conventionals	Carbon, Total Organic	2007	mg/L	5.2	15.8	28	1.0
Conventionals	Carbon, Total Organic	2008	mg/L	6.7	16.2	26	0.9
Conventionals	Carbon, Total Organic	2009	mg/L	5.1	16.5	24	0.9
Conventionals	Carbon, Total Organic	2010	mg/L	4.8	17.0	24	1.3
Conventionals	Carbon, Total Organic	2011	mg/L	3.4	15.6	17.6	0.9
Conventionals	Carbon, Total Organic	2012	mg/L	2.8	15.0	19.7	0.9
Conventionals	Carbon, Total Organic	2013	mg/L	2.5	15	18	0.83
Conventionals	Carbon, Total Organic	2014	mg/L	2.3	13.9	19.4	0.9
Conventionals	Carbon, Total Organic	2015	mg/L	2.6	13.5	18.9	0.9
Conventionals	Carbon, Total Organic	2016	mg/L	3.0	13	19	0.88
Conventionals	Carbon, Total Organic	2017	mg/L		10.9	20.2	2.01
Conventionals	Carbon, Total Organic	2018	mg/L		26		1.60
Conventionals	Carbon, Total Organic	2019	mg/L	2.8	12.5	26	1.90
Conventionals	Chemical Oxygen Demand	1990	mg/L	28	41	98	2.2
Conventionals	Chemical Oxygen Demand	1993	mg/L			106	31
Conventionals	Chemical Oxygen Demand	1994	mg/L		30	83	22
Conventionals	Chemical Oxygen Demand	1995	mg/L			90	32
Conventionals	Chemical Oxygen Demand	1996	mg/L		41	98	16.0
Conventionals	Chemical Oxygen Demand	1997	mg/L		43	87	19.0
Conventionals	Chemical Oxygen Demand	1998	mg/L		51	98	20.1
Conventionals	Chemical Oxygen Demand	1999	mg/L			92	41
Conventionals	Chemical Oxygen Demand	2000	mg/L		44	71	13.6

Table 4. Parameters Statistically Higher than Background: 1989 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Analyte Group	Parameter[1]	Monitoring Period	Unit	Mean Value Downgradient[2,3]			Mean Value Upgradient[2]
				BXS-1	BXS-2	BXS-3	BXS-4
Conventionals	Chemical Oxygen Demand	2001	mg/L	22	43	70	17.3
Conventionals	Chemical Oxygen Demand	2002	mg/L	19.0	38	60	18.0
Conventionals	Chemical Oxygen Demand	2003	mg/L		37	56	2.9
Conventionals	Chemical Oxygen Demand	2004	mg/L		38	59	2.9
Conventionals	Chemical Oxygen Demand	2005	mg/L		43	70	8.4
Conventionals	Chemical Oxygen Demand	2006	mg/L	12.5	36	72	2.9
Conventionals	Chemical Oxygen Demand	2007	mg/L	9.9	35	73	3.4
Conventionals	Chemical Oxygen Demand	2008	mg/L	16.3	38	69	4.4
Conventionals	Chemical Oxygen Demand	2009	mg/L	13.7	41	78	7.5
Conventionals	Chemical Oxygen Demand	2010	mg/L	9.8	40	71	3.5
Conventionals	Chemical Oxygen Demand	2011	mg/L	8.0	42	75	4.6
Conventionals	Chemical Oxygen Demand	2012	mg/L		42	68	3.7
Conventionals	Chemical Oxygen Demand	2013	mg/L	6.6	40	63	4.5
Conventionals	Chemical Oxygen Demand	2014	mg/L	6.4	38	69	ND
Conventionals	Chemical Oxygen Demand	2015	mg/L	7.0	37	72	ND
Conventionals	Chemical Oxygen Demand	2016	mg/L	9.5	40	74	3.8
Conventionals	Chemical Oxygen Demand	2017	mg/L	8.3	29	71	6.7
Conventionals	Chemical Oxygen Demand	2019	mg/L			47	11.0
Conventionals	Chloride	1989	mg/L	45	61	17.0	6.6
Conventionals	Chloride	1990	mg/L	23	14.5	6.8	2.2
Conventionals	Chloride	1992	mg/L	16.7	6.7	7.7	2.2
Conventionals	Chloride	1993	mg/L	12.1	6.6	12.8	2.3
Conventionals	Chloride	1994	mg/L	13.0	7.4	7.4	2.1
Conventionals	Chloride	1995	mg/L	14.0	10.0	9.6	1.9
Conventionals	Chloride	1996	mg/L	14.6	17.3	9.1	2.0
Conventionals	Chloride	1997	mg/L	12.6	14.8	35	2.0
Conventionals	Chloride	1998	mg/L	11.6	11.0	6.3	2.1
Conventionals	Chloride	1999	mg/L	10.0		6.1	2.2
Conventionals	Chloride	2000	mg/L	7.8	8.3	5.0	2.1
Conventionals	Chloride	2001	mg/L	5.9	7.4	4.7	2.1
Conventionals	Chloride	2002	mg/L	5.3	6.5	3.8	2.0
Conventionals	Chloride	2003	mg/L	4.6	5.5		2.0
Conventionals	Chloride	2004	mg/L		4.3	2.3	1.8
Conventionals	Chloride	2005	mg/L	4.5	4.4	3.7	1.8
Conventionals	Chloride	2006	mg/L	4.0	3.5	2.8	1.7
Conventionals	Chloride	2007	mg/L	5.5	4.4	2.7	1.7
Conventionals	Chloride	2008	mg/L	5.1	4.5	3.0	1.9
Conventionals	Chloride	2009	mg/L	6.8	4.8	3.6	1.9
Conventionals	Chloride	2010	mg/L	5.6	3.7	3.0	1.8
Conventionals	Chloride	2011	mg/L	6.2	3.2		1.8
Conventionals	Chloride	2012	mg/L		3.0		1.7
Conventionals	Chloride	2013	mg/L	4.2	3.0	1.9	1.7
Conventionals	Chloride	2014	mg/L	5.2	2.8	1.9	1.8
Conventionals	Chloride	2015	mg/L	4.9	2.5		1.8
Conventionals	Chloride	2016	mg/L	4.1	2.5		1.8

Table 4. Parameters Statistically Higher than Background: 1989 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Analyte Group	Parameter[1]	Monitoring Period	Unit	Mean Value Downgradient[2,3]			Mean Value Upgradient[2]
				BXS-1	BXS-2	BXS-3	BXS-4
Conventionals	Chloride	2017	mg/L	3.2			2.0
Conventionals	Chloride	2019	mg/L	5.5			2.7
Conventionals	Coliform, total	2010	mg/L		2.0		0.6
Conventionals	Coliform, total	2015	mg/L	2.4			ND
Conventionals	Conductivity	1989	µS/cm	351	607	514	180
Conventionals	Conductivity	1990	µS/cm	366	624	500	214
Conventionals	Conductivity	1992	µS/cm	292	586	533	189
Conventionals	Conductivity	1993	µS/cm		487	526	173
Conventionals	Conductivity	1994	µS/cm	214	479	602	169
Conventionals	Conductivity	1995	µS/cm	333	623		149
Conventionals	Conductivity	1996	µS/cm	290	602	787	161
Conventionals	Conductivity	1997	µS/cm	326		765	169
Conventionals	Conductivity	1998	µS/cm	393	678	738	177
Conventionals	Conductivity	1999	µS/cm	406	786	748	177
Conventionals	Conductivity	2000	µS/cm	417	762	651	166
Conventionals	Conductivity	2001	µS/cm	493	878	886	193
Conventionals	Conductivity	2002	µS/cm	470	849	825	187
Conventionals	Conductivity	2004	µS/cm		821	853	198
Conventionals	Conductivity	2005	µS/cm	393	788	750	192
Conventionals	Conductivity	2006	µS/cm	414	773	785	191
Conventionals	Conductivity	2007	µS/cm	397	799	804	191
Conventionals	Conductivity	2008	µS/cm	465	758	771	189
Conventionals	Conductivity	2009	µS/cm	340	793	730	185
Conventionals	Conductivity	2010	µS/cm	304	825	707	196
Conventionals	Conductivity	2011	µS/cm	334	839	464	193
Conventionals	Conductivity	2012	µS/cm	330	891	444	187
Conventionals	Conductivity	2013	µS/cm	290	879	643	191
Conventionals	Conductivity	2014	µS/cm	292	824	1,500	186
Conventionals	Conductivity	2015	µS/cm	292	822	395	202
Conventionals	Conductivity	2016	µS/cm	352	817	427	210
Conventionals	Conductivity	2017	µS/cm	377	503	605	172
Conventionals	Nitrate + Nitrite as Nitrogen	1990	mg/L	0.72			0.10
Conventionals	Nitrate + Nitrite as Nitrogen	1993	mg/L	0.79			0.18
Conventionals	Nitrate + Nitrite as Nitrogen	1994	mg/L	0.50			ND
Conventionals	Nitrate + Nitrite as Nitrogen	1996	mg/L	1.65			ND
Conventionals	Nitrate + Nitrite as Nitrogen	1997	mg/L	0.75			ND
Conventionals	Nitrate + Nitrite as Nitrogen	1999	mg/L	0.43			ND
Conventionals	Nitrate + Nitrite as Nitrogen	2000	mg/L	0.33			0.10
Conventionals	Nitrate + Nitrite as Nitrogen	2002	mg/L	0.50			0.20
Conventionals	Nitrate + Nitrite as Nitrogen	2004	mg/L	0.85			0.06
Conventionals	Nitrate + Nitrite as Nitrogen	2005	mg/L	0.75			0.06
Conventionals	Nitrate + Nitrite as Nitrogen	2006	mg/L	0.71			0.04
Conventionals	Nitrate + Nitrite as Nitrogen	2007	mg/L	0.69			0.14
Conventionals	Nitrate + Nitrite as Nitrogen	2008	mg/L	0.83			0.04
Conventionals	Nitrate + Nitrite as Nitrogen	2009	mg/L	0.31		0.15	0.02

Table 4. Parameters Statistically Higher than Background: 1989 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Analyte Group	Parameter[1]	Monitoring Period	Unit	Mean Value Downgradient[2,3]			Mean Value Upgradient[2]
				BXS-1	BXS-2	BXS-3	BXS-4
Conventionals	Nitrate + Nitrite as Nitrogen	2010	mg/L	0.09		0.16	0.03
Conventionals	Nitrate + Nitrite as Nitrogen	2011	mg/L	48			0.02
Conventionals	Nitrate + Nitrite as Nitrogen	2012	mg/L	0.05		0.09	0.02
Conventionals	Nitrate + Nitrite as Nitrogen	2013	mg/L	0.08		0.10	0.03
Conventionals	Nitrate + Nitrite as Nitrogen	2014	mg/L	0.09		0.08	0.05
Conventionals	Nitrate + Nitrite as Nitrogen	2016	mg/L	0.30			0.04
Conventionals	pH	1992	--	6.1	6.3	6.4	7.9
Conventionals	pH	2000	--	6.1	6.4	6.5	7.9
Conventionals	pH	2001	--	6.1	6.4	6.7	7.9
Conventionals	Solids, Total Dissolved	1990	mg/L		397	436	228
Conventionals	Solids, Total Dissolved	1992	mg/L		352	351	147
Conventionals	Solids, Total Dissolved	1993	mg/L		330		141
Conventionals	Solids, Total Dissolved	1994	mg/L	161	330	418	134
Conventionals	Solids, Total Dissolved	1995	mg/L	188	361	492	141
Conventionals	Solids, Total Dissolved	1996	mg/L	224	423	604	153
Conventionals	Solids, Total Dissolved	1997	mg/L	236	456	613	150
Conventionals	Solids, Total Dissolved	1998	mg/L	273	473	562	137
Conventionals	Solids, Total Dissolved	1999	mg/L	256	524	517	156
Conventionals	Solids, Total Dissolved	2000	mg/L	297	544	527	140
Conventionals	Solids, Total Dissolved	2001	mg/L	261	299	346	135
Conventionals	Solids, Total Dissolved	2002	mg/L	298	466	518	145
Conventionals	Solids, Total Dissolved	2003	mg/L	291	525	572	132
Conventionals	Solids, Total Dissolved	2004	mg/L	228	439	493	127
Conventionals	Solids, Total Dissolved	2005	mg/L	255	516	449	135
Conventionals	Solids, Total Dissolved	2006	mg/L	259	507	526	145
Conventionals	Solids, Total Dissolved	2007	mg/L	254	471	476	152
Conventionals	Solids, Total Dissolved	2008	mg/L	298	481	489	142
Conventionals	Solids, Total Dissolved	2009	mg/L	215	500	438	127
Conventionals	Solids, Total Dissolved	2010	mg/L	189	513	368	145
Conventionals	Solids, Total Dissolved	2011	mg/L	206	538	375	134
Conventionals	Solids, Total Dissolved	2012	mg/L	205	543	347	128
Conventionals	Solids, Total Dissolved	2013	mg/L	191	549	333	103
Conventionals	Solids, Total Dissolved	2014	mg/L	173	509	322	134
Conventionals	Solids, Total Dissolved	2015	mg/L	153	462	297	119
Conventionals	Solids, Total Dissolved	2016	mg/L			296	119
Conventionals	Solids, Total Dissolved	2017	mg/L	206	373		134
Conventionals	Solids, Total Dissolved	2018	mg/L		435		146
Conventionals	Solids, Total Dissolved	2019	mg/L	180	375	298	130
Conventionals	Sulfate	1989	mg/L	5.9			2.3
Conventionals	Sulfate	1990	mg/L	6.6			1.9
Conventionals	Sulfate	1992	mg/L	9.1			2.0
Conventionals	Sulfate	1993	mg/L	10.0			2.0
Conventionals	Sulfate	1994	mg/L	11.8			1.9
Conventionals	Sulfate	1995	mg/L	12.0			1.8
Conventionals	Sulfate	1996	mg/L	10.7			1.7

Table 4. Parameters Statistically Higher than Background: 1989 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Analyte Group	Parameter[1]	Monitoring Period	Unit	Mean Value Downgradient[2,3]			Mean Value Upgradient[2]
				BXS-1	BXS-2	BXS-3	BXS-4
Conventionals	Sulfate	1997	mg/L	11.8			1.6
Conventionals	Sulfate	1998	mg/L	9.5			1.3
Conventionals	Sulfate	1999	mg/L	7.8			1.4
Conventionals	Sulfate	2001	mg/L	7.5			1.4
Conventionals	Sulfate	2002	mg/L	7.3			1.4
Conventionals	Sulfate	2005	mg/L	10.1			1.3
Conventionals	Sulfate	2006	mg/L	11.3			1.4
Conventionals	Sulfate	2007	mg/L	12.4			1.4
Conventionals	Sulfate	2008	mg/L	9.1			1.1
Conventionals	Sulfate	2009	mg/L	10.5			1.9
Conventionals	Sulfate	2010	mg/L	15.3			1.4
Conventionals	Sulfate	2011	mg/L	15.8			1.1
Conventionals	Sulfate	2012	mg/L	15.3			0.8
Conventionals	Sulfate	2013	mg/L	13			0.82
Conventionals	Sulfate	2014	mg/L	10			1.10
Conventionals	Sulfate	2015	mg/L	9			1.17
Conventionals	Sulfate	2016	mg/L	8			1.14
Conventionals	Sulfate	2016	mg/L	5			1.98
Conventionals	Sulfate	2018	mg/L	10			1.17
Conventionals	Sulfate	2019	mg/L	15			1.60
Conventionals	Tannin and Lignin	1990	mg/L			3.1	1.4
Conventionals	Tannin and Lignin	1993	mg/L		0.5		0.3
Conventionals	Tannin and Lignin	1994	mg/L		0.5	1.0	0.2
Conventionals	Tannin and Lignin	1995	mg/L			3.1	0.6
Conventionals	Tannin and Lignin	1996	mg/L		0.7	5.6	0.3
Conventionals	Tannin and Lignin	1998	mg/L			8.1	0.7
Conventionals	Tannin and Lignin	1999	mg/L			12.2	0.5
Conventionals	Tannin and Lignin	2000	mg/L		9.1	9.2	0.4
Conventionals	Tannin and Lignin	2002	mg/L		1.6	11.1	0.4
Conventionals	Tannin and Lignin	2003	mg/L			6.3	0.4
Conventionals	Tannin and Lignin	2004	mg/L		1.4		0.5
Conventionals	Tannin and Lignin	2005	mg/L			8.1	0.4
Conventionals	Tannin and Lignin	2006	mg/L			11.5	0.4
Conventionals	Tannin and Lignin	2007	mg/L		1.2	8.5	0.3
Conventionals	Tannin and Lignin	2008	mg/L		1.2	11.1	0.3
Conventionals	Tannin and Lignin	2009	mg/L		1.1	9.4	0.3
Conventionals	Tannin and Lignin	2010	mg/L		1.4	14.9	0.3
Conventionals	Tannin and Lignin	2011	mg/L		1.2	15.0	0.3
Conventionals	Tannin and Lignin	2012	mg/L		1.7	27	0.4
Conventionals	Tannin and Lignin	2013	mg/L		1.3	10	0.26
Conventionals	Tannin and Lignin	2014	mg/L		1.3	23	0.28
Conventionals	Tannin and Lignin	2015	mg/L		1.3	12	0.29
Conventionals	Tannin and Lignin	2016	mg/L		1.2	5	0.22
Conventionals	Tannin and Lignin	2017	mg/L		1.6		0.18
Conventionals	Tannin and Lignin	2018	mg/L		1.6		0.36

Table 4. Parameters Statistically Higher than Background: 1989 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Analyte Group	Parameter[1]	Monitoring Period	Unit	Mean Value Downgradient[2,3]			Mean Value Upgradient[2]
				BXS-1	BXS-2	BXS-3	BXS-4
Conventionals	Tannin and Lignin	2019	mg/L		2.7	139	0.72
Organics	PCP	2017	µg/L		1.2		0.18
Organics	PCP	2017	µg/L		1.6		0.18
Metals	Arsenic	1996	µg/L			9.0	4.0
Metals	Arsenic	1997	µg/L			15.0	5.0
Metals	Arsenic	1998	µg/L			20.0	4.6
Metals	Arsenic	1999	µg/L			34	5.8
Metals	Arsenic	2002	µg/L			10.4	3.8
Metals	Arsenic	2007	µg/L			110	5.9
Metals	Arsenic	2008	µg/L			79	5.9
Metals	Arsenic	2009	µg/L			75	6.9
Metals	Arsenic	2010	µg/L			152	5.9
Metals	Arsenic	2011	µg/L			142	6.1
Metals	Arsenic	2012	µg/L			149	5.5
Metals	Arsenic	2013	µg/L			140	6.4
Metals	Arsenic	2014	µg/L			174	5.9
Metals	Arsenic	2015	µg/L			174	6.0
Metals	Arsenic	2016	µg/L			163	6.3
Metals	Arsenic	2017	µg/L			171	9.3
Metals	Arsenic	2019	µg/L			60	5.0
Metals	Barium	1993	µg/L			38	28
Metals	Barium	1994	µg/L		38	51	25
Metals	Barium	1995	µg/L		45	58	27
Metals	Barium	1996	µg/L		48	74	26
Metals	Barium	1997	µg/L		50	58	21.0
Metals	Barium	1998	µg/L		51	65	26
Metals	Barium	1999	µg/L		51	58	27
Metals	Barium	2000	µg/L			88	27
Metals	Barium	2001	µg/L	28	51	60	27
Metals	Barium	2002	µg/L		50	78	28
Metals	Barium	2003	µg/L		46	55	29
Metals	Barium	2004	µg/L		48	71	23
Metals	Barium	2005	µg/L		44	88	29
Metals	Barium	2006	µg/L		46	95	31
Metals	Barium	2007	µg/L		46	85	29
Metals	Barium	2008	µg/L		44	93	28
Metals	Barium	2009	µg/L		45	92	78
Metals	Barium	2011	µg/L		50	127	26
Metals	Barium	2012	µg/L		51	126	28
Metals	Barium	2013	µg/L		52	104	26
Metals	Barium	2014	µg/L		51	133	28
Metals	Barium	2015	µg/L		47	143	28
Metals	Barium	2016	µg/L		42	129	30
Metals	Barium	2017	µg/L			129	29
Metals	Barium	2019	µg/L		41		27

Table 4. Parameters Statistically Higher than Background: 1989 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Analyte Group	Parameter[1]	Monitoring Period	Unit	Mean Value Downgradient[2,3]			Mean Value Upgradient[2]
				BXS-1	BXS-2	BXS-3	BXS-4
Metals	Cadmium	2002	µg/L		1.1	1.1	ND
Metals	Copper	1993	µg/L			8	5
Metals	Copper	2015	µg/L		2		2
Metals	Iron	1990	µg/L		140	1,950	48
Metals	Iron	1994	µg/L		748	1,950	45
Metals	Iron	1995	µg/L		1,120	341	50
Metals	Iron	1996	µg/L		1,520	9,490	46
Metals	Iron	1997	µg/L		1,220	17,800	50
Metals	Iron	1998	µg/L		1,130	20,700	56
Metals	Iron	1999	µg/L		950	34,500	30
Metals	Iron	2000	µg/L		665	37,740	48
Metals	Iron	2001	µg/L		715	6,538	43
Metals	Iron	2002	µg/L		729	10,474	42
Metals	Iron	2003	µg/L		814		42
Metals	Iron	2004	µg/L		784		38
Metals	Iron	2005	µg/L		758	10,013	43
Metals	Iron	2006	µg/L		813	47,648	40
Metals	Iron	2007	µg/L		743	87,825	39
Metals	Iron	2008	µg/L		596	72,025	48
Metals	Iron	2009	µg/L		709	67,678	60
Metals	Iron	2010	µg/L		455	104,675	31
Metals	Iron	2011	µg/L		434	106,500	45
Metals	Iron	2012	µg/L		404	98,250	55
Metals	Iron	2013	µg/L		421	100,275	60
Metals	Iron	2014	µg/L		419	119,000	66
Metals	Iron	2015	µg/L		379	120,500	63
Metals	Iron	2016	µg/L		379	111,750	69
Metals	Iron	2017	µg/L			110,000	669
Metals	Iron	2018	µg/L			82,517	856
Metals	Iron	2019	µg/L			90,650	88
Metals	Lead	1993	µg/L			2	1
Metals	Manganese	1989	µg/L	210	580	1,100	120
Metals	Manganese	1990	µg/L		650	1,820	99
Metals	Manganese	1993	µg/L		570		110
Metals	Manganese	1994	µg/L		670	1,110	120
Metals	Manganese	1995	µg/L		834	3,780	122
Metals	Manganese	1996	µg/L		1,120	10,800	121
Metals	Manganese	1997	µg/L		1,510	13,000	90
Metals	Manganese	1998	µg/L	175	1,650	13,800	126
Metals	Manganese	1999	µg/L	200	1,420	14,800	116
Metals	Manganese	2000	µg/L	331	1,450	15,025	124
Metals	Manganese	2001	µg/L	426	1,513	15,350	119
Metals	Manganese	2002	µg/L	430	1,502	15,763	119
Metals	Manganese	2003	µg/L		1,523	15,750	113
Metals	Manganese	2004	µg/L		1,420	16,625	103

Table 4. Parameters Statistically Higher than Background: 1989 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Analyte Group	Parameter[1]	Monitoring Period	Unit	Mean Value Downgradient[2,3]			Mean Value Upgradient[2]
				BXS-1	BXS-2	BXS-3	BXS-4
Metals	Manganese	2005	µg/L		1,305	13,503	112
Metals	Manganese	2006	µg/L		1,330	15,275	113
Metals	Manganese	2007	µg/L		1,323	13,925	114
Metals	Manganese	2008	µg/L	317	1,225	14,750	114
Metals	Manganese	2009	µg/L		1,570	11,093	1,140
Metals	Manganese	2010	µg/L			9,533	113
Metals	Manganese	2011	µg/L	144	1,375	12,403	107
Metals	Manganese	2012	µg/L	237	1,535	11,300	116
Metals	Manganese	2013	µg/L	218	1,643	13,233	115
Metals	Manganese	2014	µg/L	261	1,663	9,658	117
Metals	Manganese	2015	µg/L	284	1,583	7,500	115
Metals	Manganese	2016	µg/L	253	1,470	9,078	114
Metals	Manganese	2017	µg/L			7,595	460
Metals	Manganese	2018	µg/L		1,489	6,251	129
Metals	Manganese	2019	µg/L	228	1,667	4,642	141
Metals	Nickel	1993	µg/L		18.0		1.0
Metals	Nickel	1994	µg/L		18.0		ND
Metals	Nickel	1995	µg/L		21.0	30	ND
Metals	Nickel	1996	µg/L			25	ND
Metals	Nickel	1997	µg/L		34	20.0	ND
Metals	Nickel	1998	µg/L		43	29	ND
Metals	Nickel	1999	µg/L		36	22	ND
Metals	Nickel	2000	µg/L		37		ND
Metals	Nickel	2001	µg/L	20.3	38	17.5	10.0
Metals	Nickel	2002	µg/L	21	39	24	5.5
Metals	Nickel	2003	µg/L		37		10.0
Metals	Nickel	2004	µg/L		41		10.0
Metals	Nickel	2005	µg/L		36		10.0
Metals	Nickel	2006	µg/L		34		10.0
Metals	Nickel	2007	µg/L		33		10.0
Metals	Nickel	2008	µg/L		30	16.1	10.0
Metals	Nickel	2009	µg/L		57		34
Metals	Nickel	2011	µg/L		31		12.5
Metals	Nickel	2012	µg/L		32	16.3	7.7
Metals	Nickel	2013	µg/L	10	37	21	7
Metals	Nickel	2014	µg/L	9	35	17	3
Metals	Nickel	2015	µg/L	8	32	19	1
Metals	Nickel	2016	µg/L	19	29	8	2
Metals	Nickel	2017	µg/L	13	23	18	3
Metals	Nickel	2019	µg/L		39	30	7
Metals	Zinc	2002	µg/L	8.0	6.8		ND
Metals	Zinc	2005	µg/L	10.0			5.0
Metals	Zinc	2007	µg/L	6.2	17.3	12.4	4.4
Metals	Zinc	2008	µg/L		7.6		4.8
Metals	Zinc	2014	µg/L		4.5	6.1	3.4

Table 4. Parameters Statistically Higher than Background: 1989 through 2019

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Analyte Group	Parameter[1]	Monitoring Period	Unit	Mean Value Downgradient[2,3]			Mean Value Upgradient[2]
				BXS-1	BXS-2	BXS-3	BXS-4
Metals	Zinc	2015	µg/L		4.6	6.1	2.0
Metals	Zinc	2016	µg/L		4.4		2.9

Notes

µg/L = microgram per liter.

µS/cm = microSiemen per centimeter.

mg/L = milligram per liter.

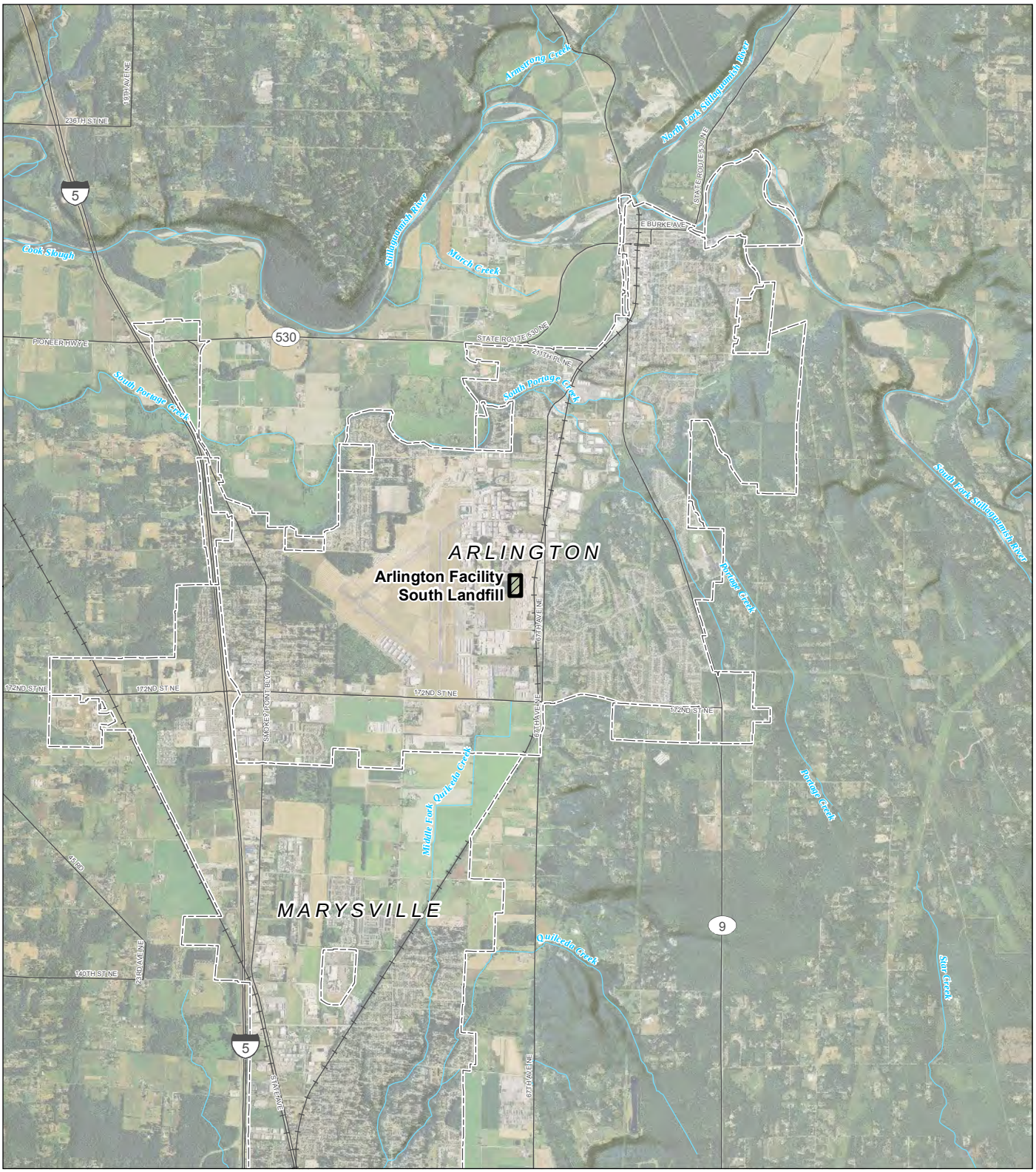
ND = not detected.

[1] Parameters listed only when at least one downgradient well has a higher mean value than the upgradient well.

[2] Mean values are yearly averages.

[3] Mean values in downgradient wells shown when exceeding the mean value of the upgradient well. Value in downgradient wells not shown if the mean value does not exceed the upgradient well's mean value.

Figures



LEGEND

- Cities
- Railroads
- Major Roads
- Watercourses

MAP NOTES:
Date: March 31, 2015
Data Sources: Air photo taken on July 15, 2013 by the USDA

FIGURE 1

Site Vicinity Map

Former J.H. Baxter South Woodwaste Landfill
Arlington, Washington

N

0 0.5 1
Miles

GSI Water Solutions, Inc.

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FIGURE 2

Groundwater Elevation Contour Map: First Quarter 2016

Former J.H. Baxter South Woodwaste Landfill Arlington, Washington

LEGEND

- Groundwater Elevation Contours (dashed where inferred)
- Monitoring Well (February 2016 Groundwater Elevation)
- Direction of Groundwater Flow

NOTES:

1. All elevations exist in NAVD88.

N

0 100 200 300

Feet

MAP NOTES:

Date: 3/23/2017

Data Sources: AMEC, ESRI, Air photo taken on July 15, 2013 by the USDA

GSI Water Solutions, Inc.

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FIGURE 3

Groundwater Elevation Contour Map: Third Quarter 2016

Former J.H. Baxter South Woodwaste Landfill Arlington, Washington

LEGEND

- Groundwater Elevation Contours (dashed where inferred)
- Monitoring Well (September 2016 Groundwater Elevation)
- Direction of Groundwater Flow

NOTES:

1. All elevations exist in NAVD88.

N

0 100 200 300

Feet

MAP NOTES:

Date: 3/23/2017

Data Sources: AMEC, ESRI, Air photo taken on July 15, 2013 by the USDA

GSI Water Solutions, Inc.

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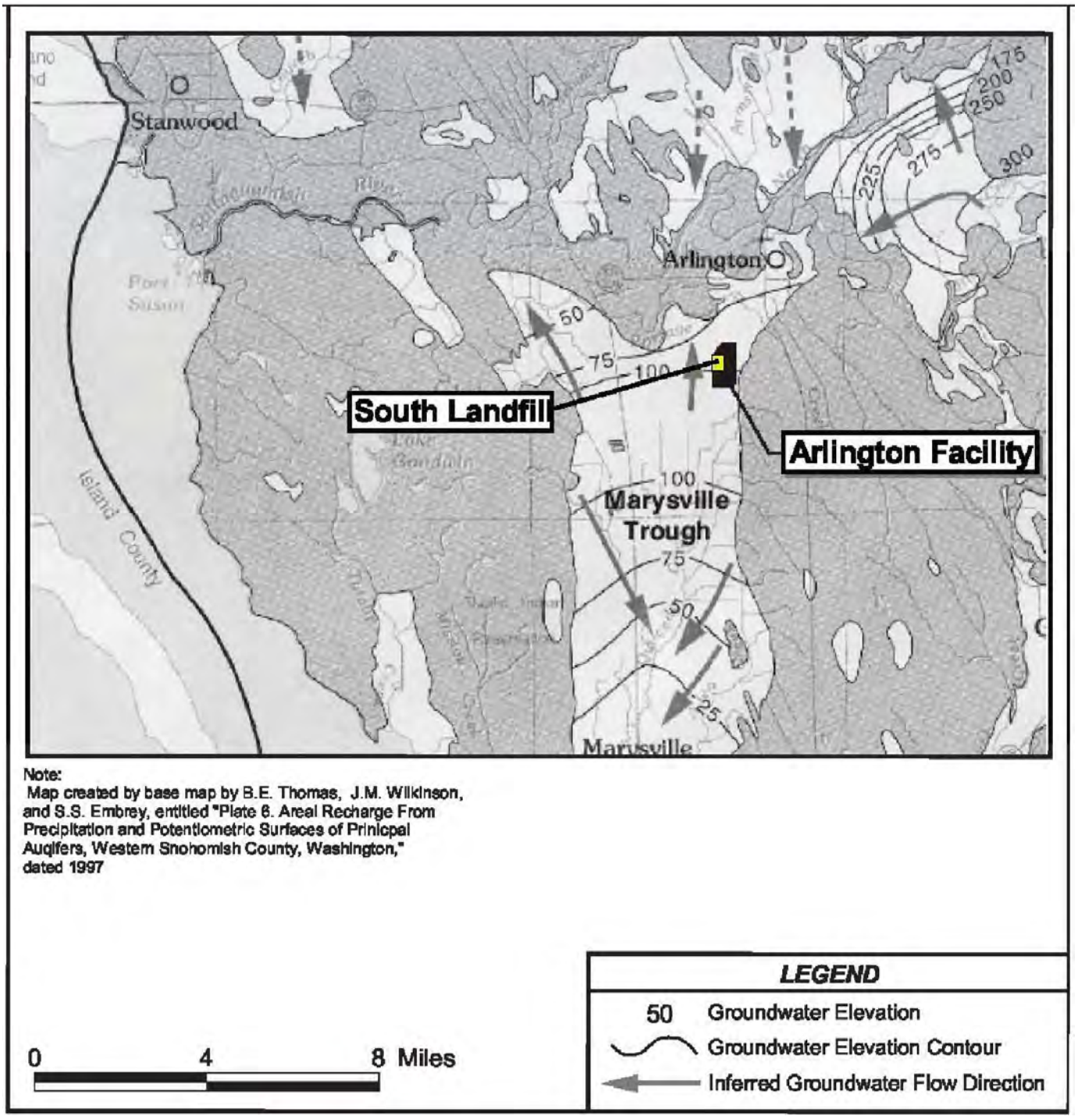

N

FIGURE 4

Regional Groundwater Flow

Former J.H. Baxter South Woodwaste Landfill
Arlington, Washington

MAP NOTES:
Date: April 13, 2015
Data Sources: AMEC Figure 4 from 2013 Annual Report

GSI Water Solutions, Inc.

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Figure 5
Ammonia Trend
South Wells

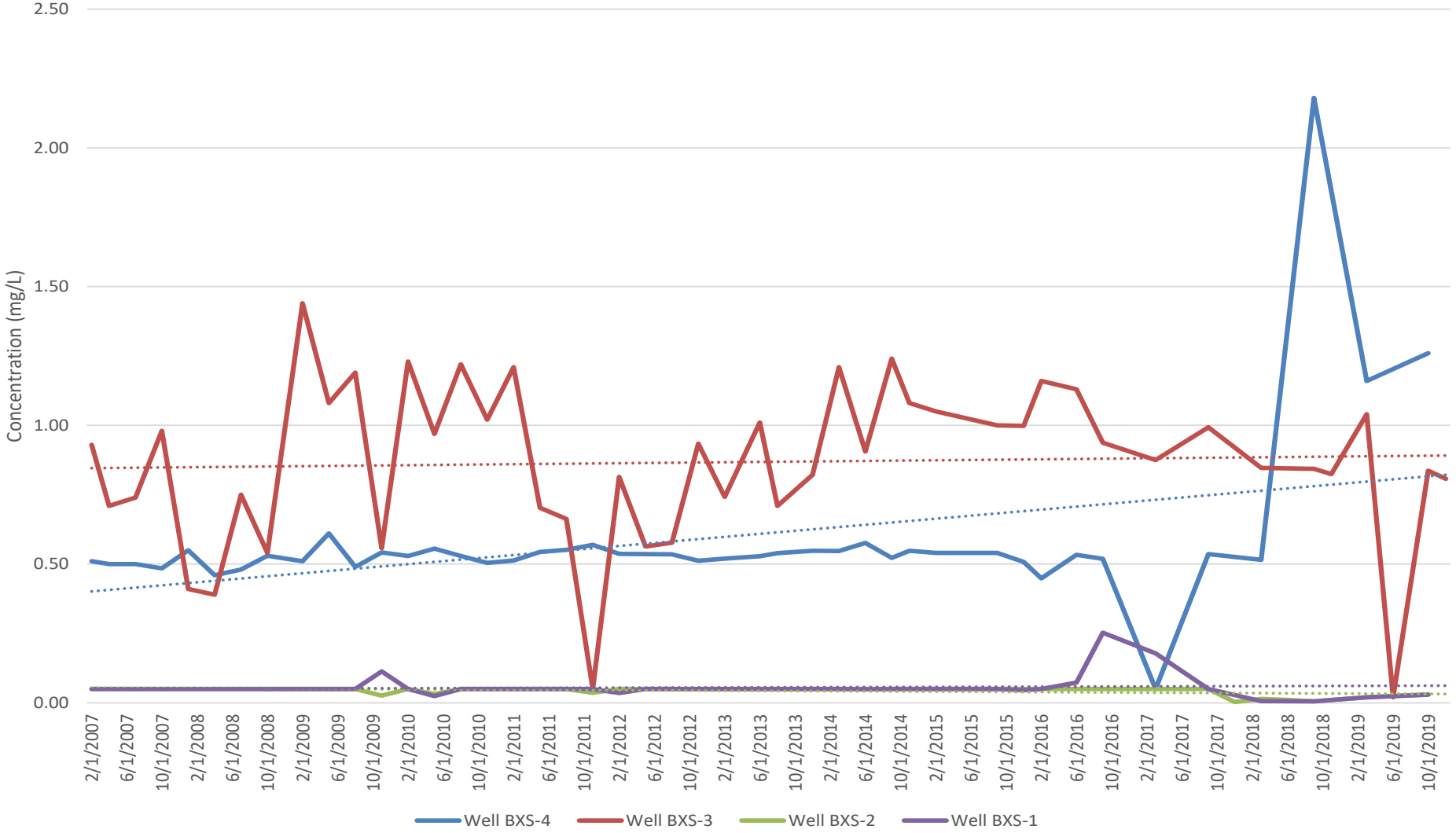


Figure 6
Arsenic Trend
South Wells

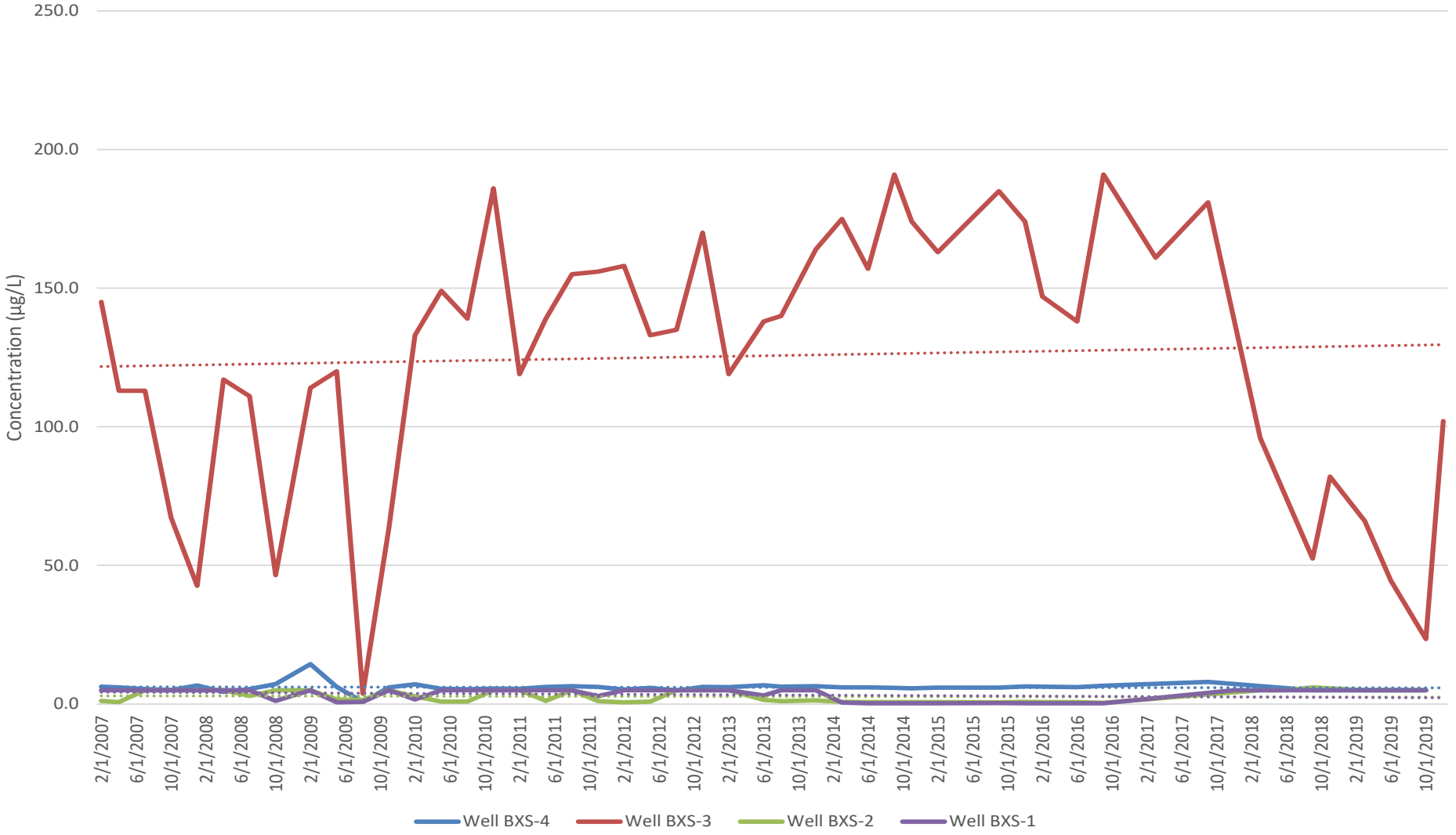


Figure 7
Barium Trend
South Wells

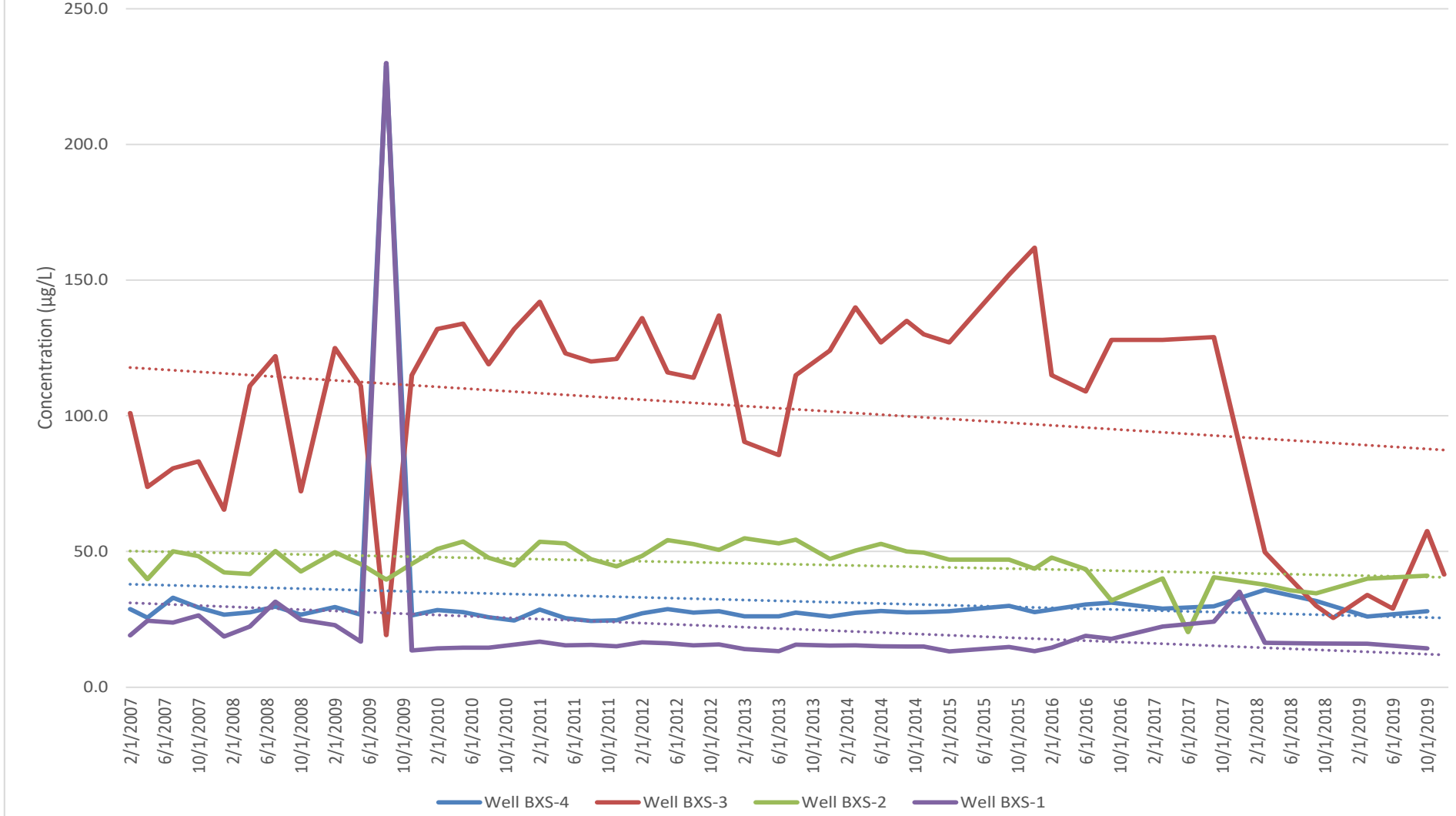


Figure 8
Chemical Oxygen Demand Trend
South Wells

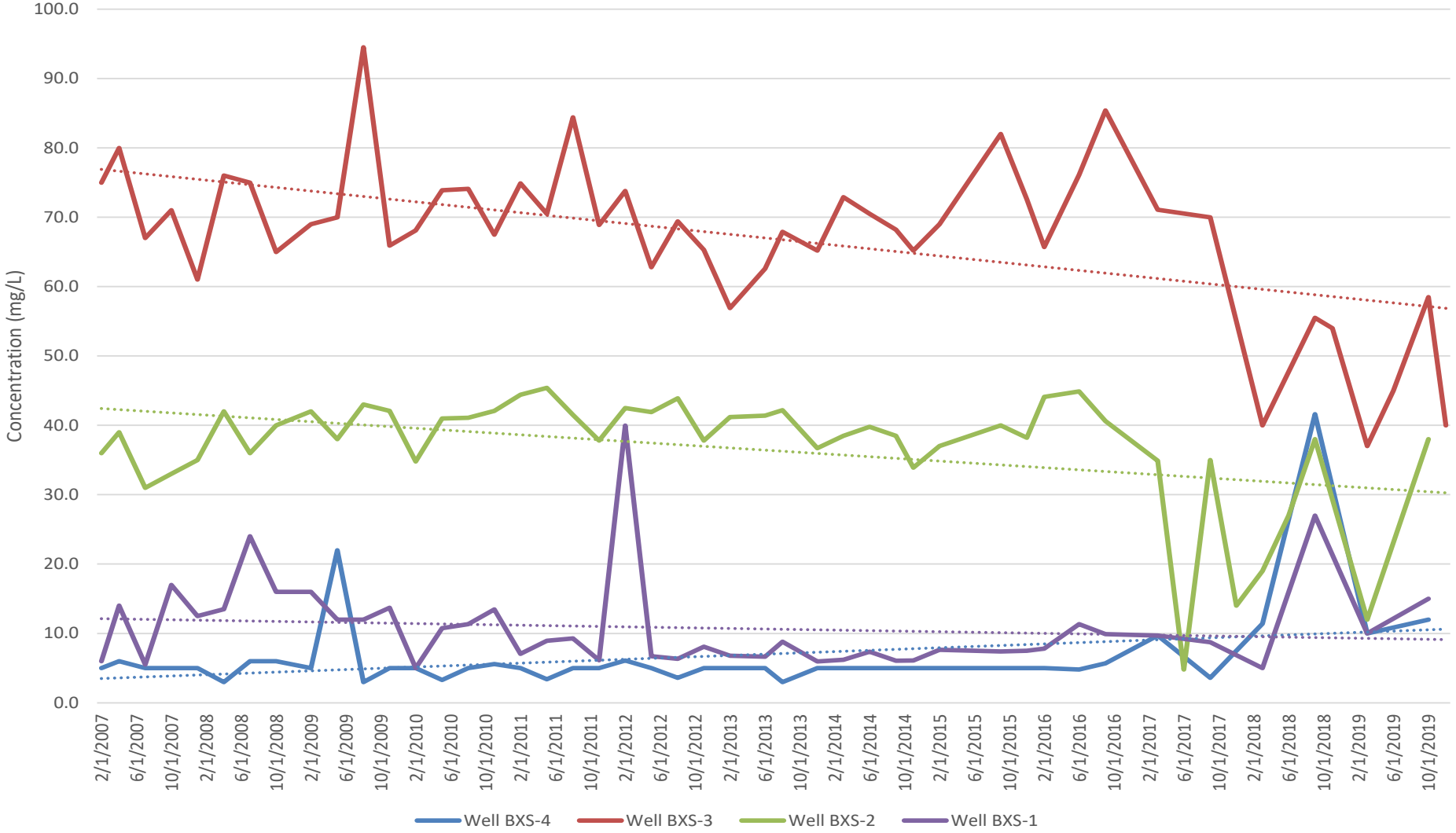


Figure 9
Chloride Trend
South Wells

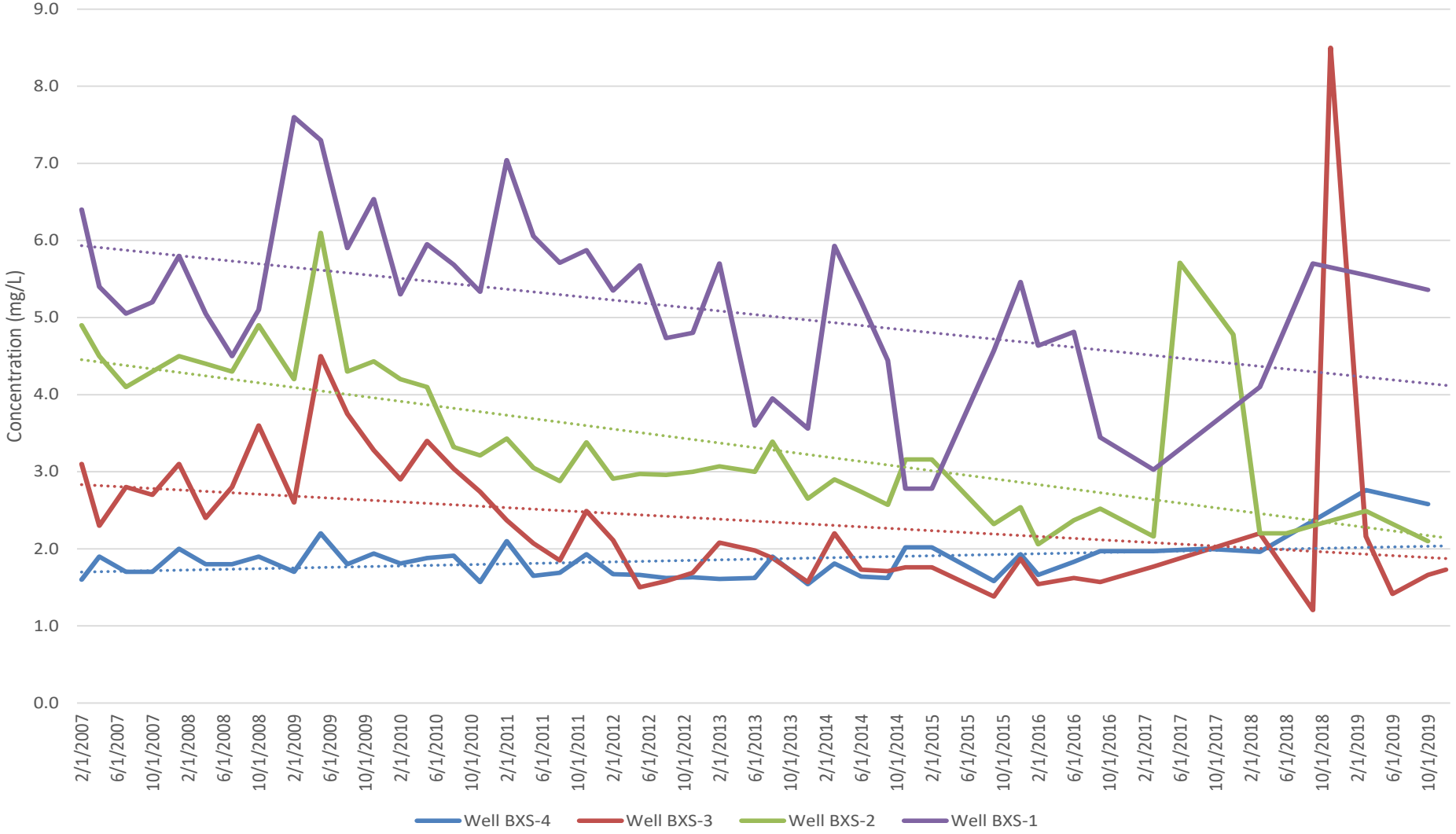


Figure 10
Iron Trend
South Wells

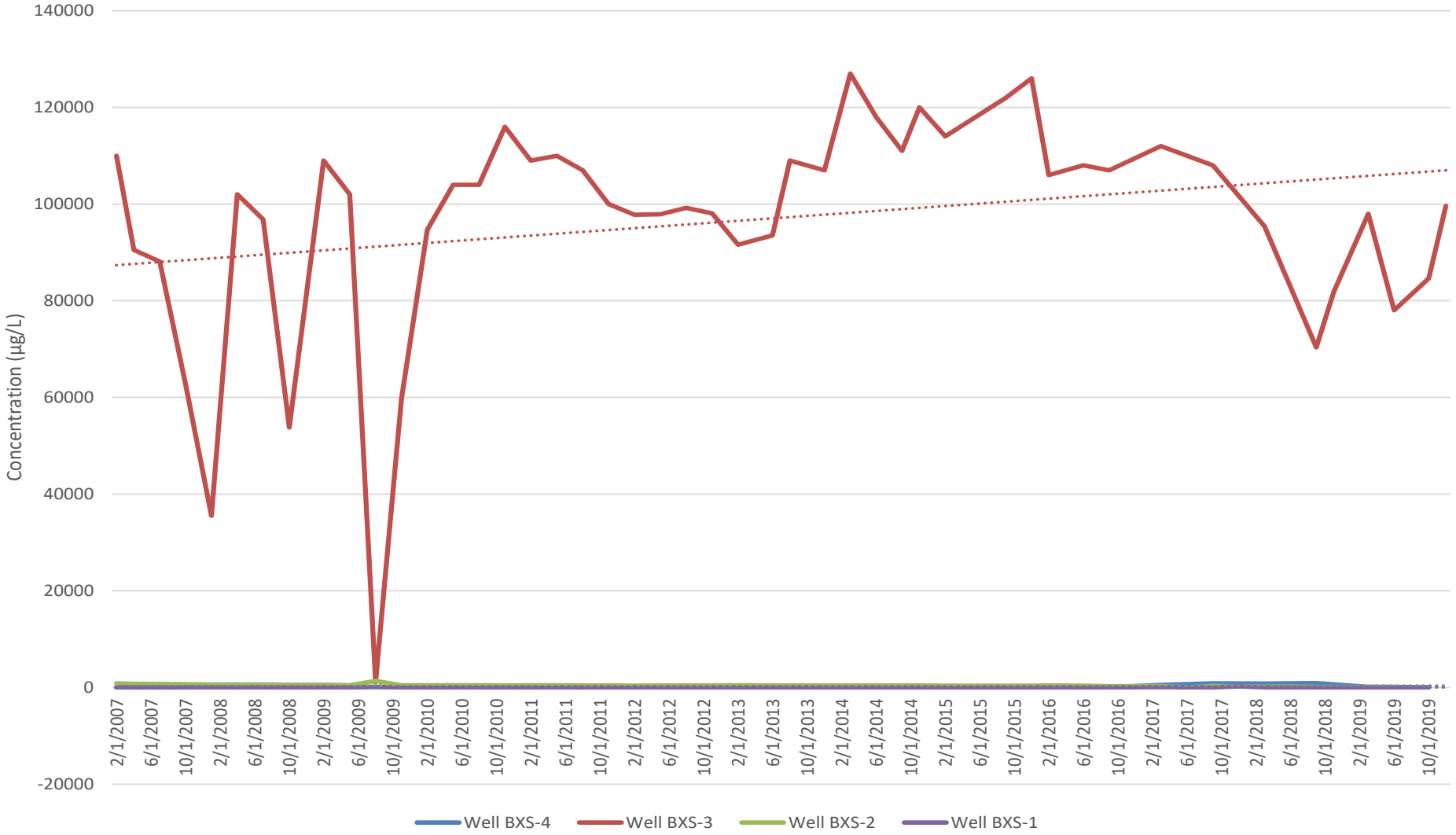


Figure 11
Manganese Trend
South Wells

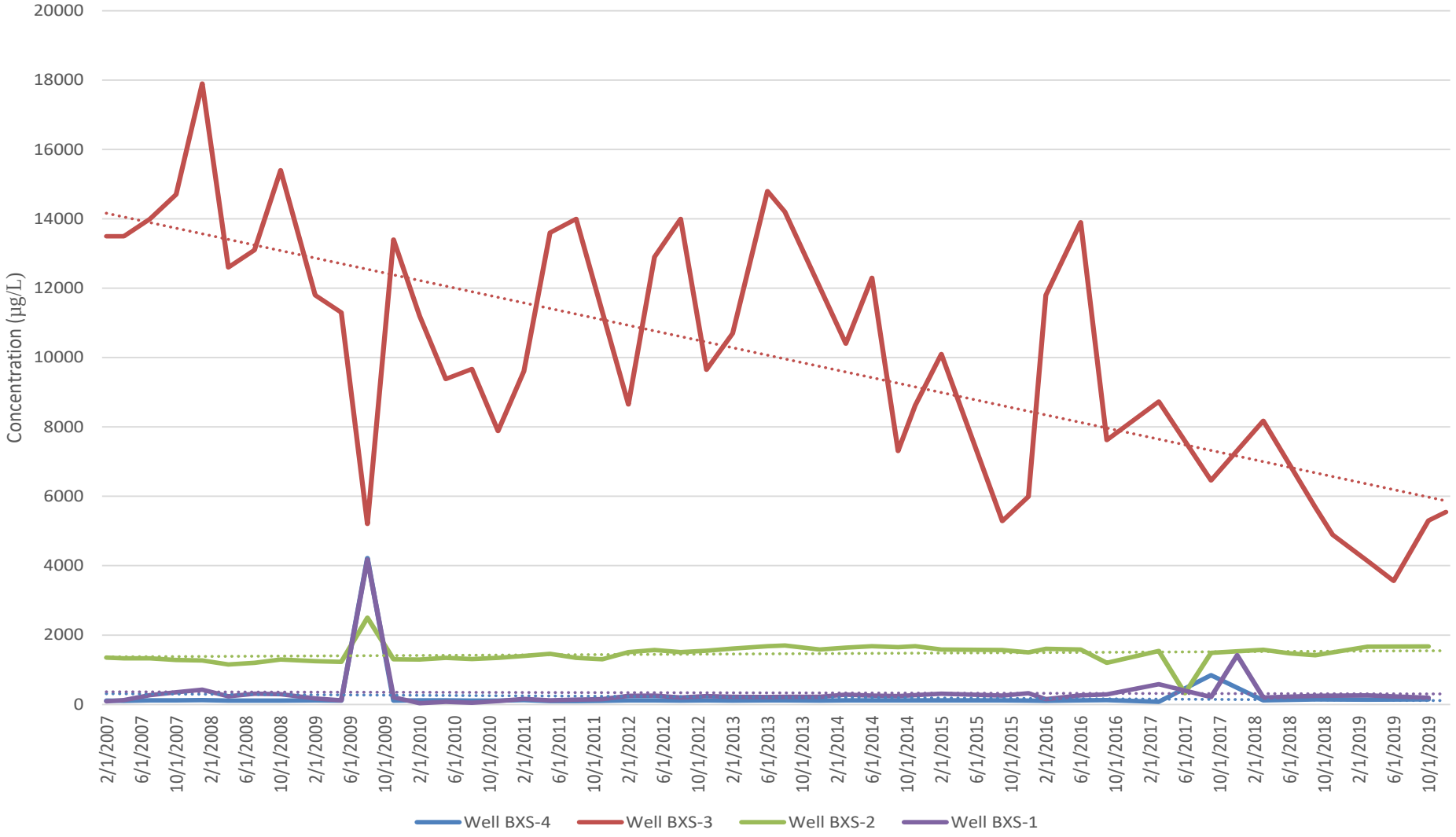


Figure 12
Nickel Trend
South Wells

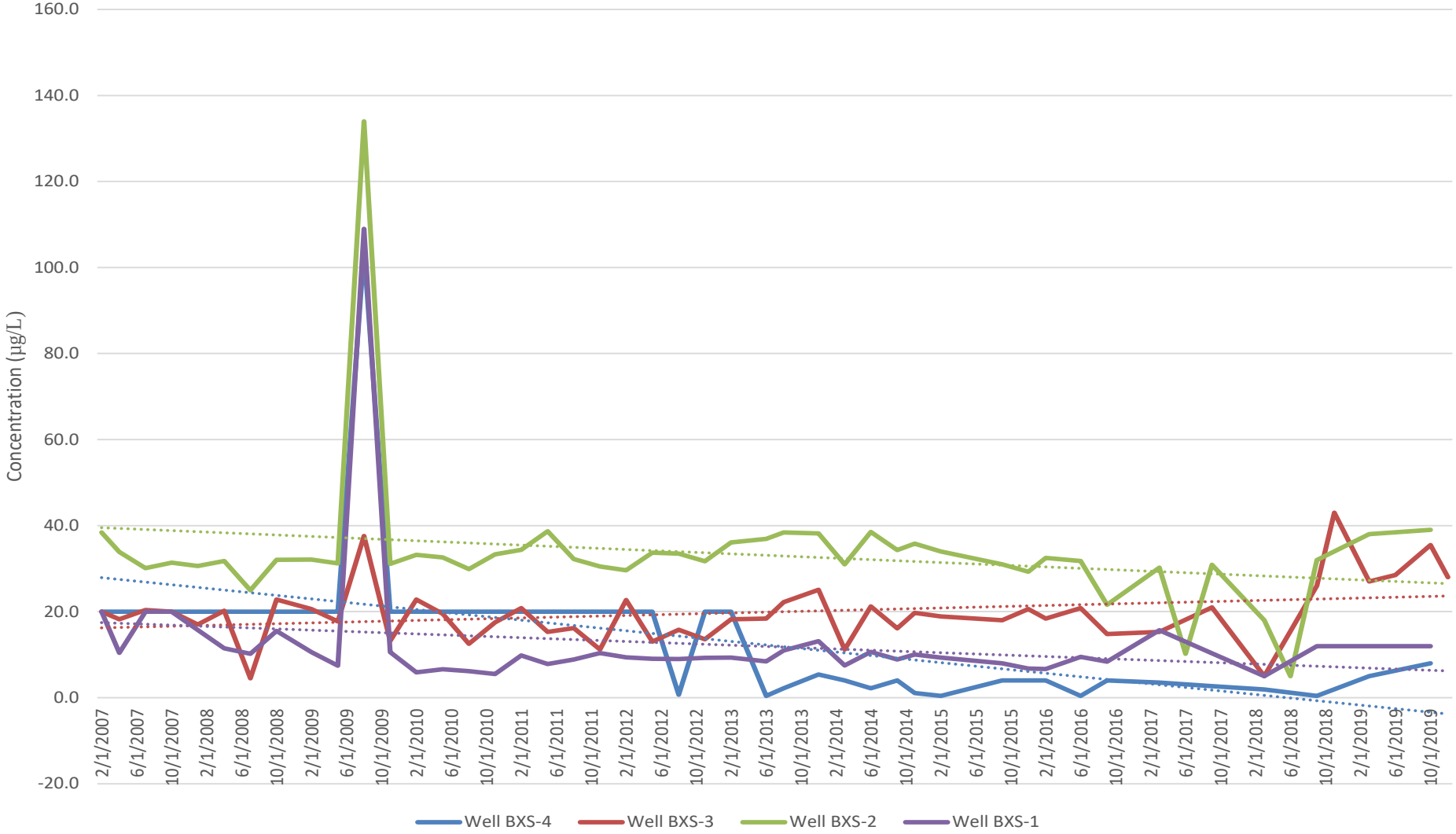


Figure 13
pH Trend
South Wells

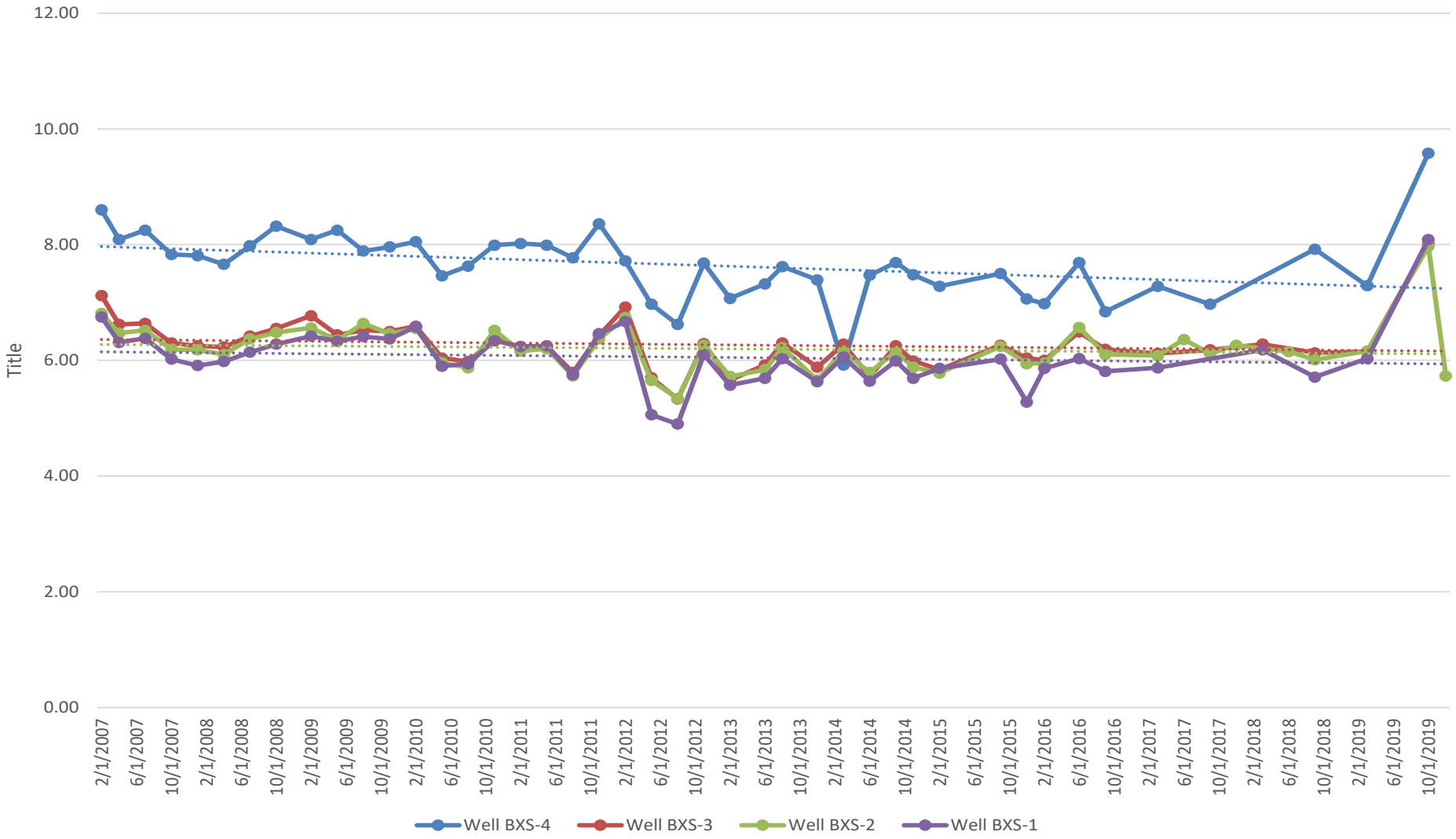


Figure 14
Sulfate Trend
South Wells

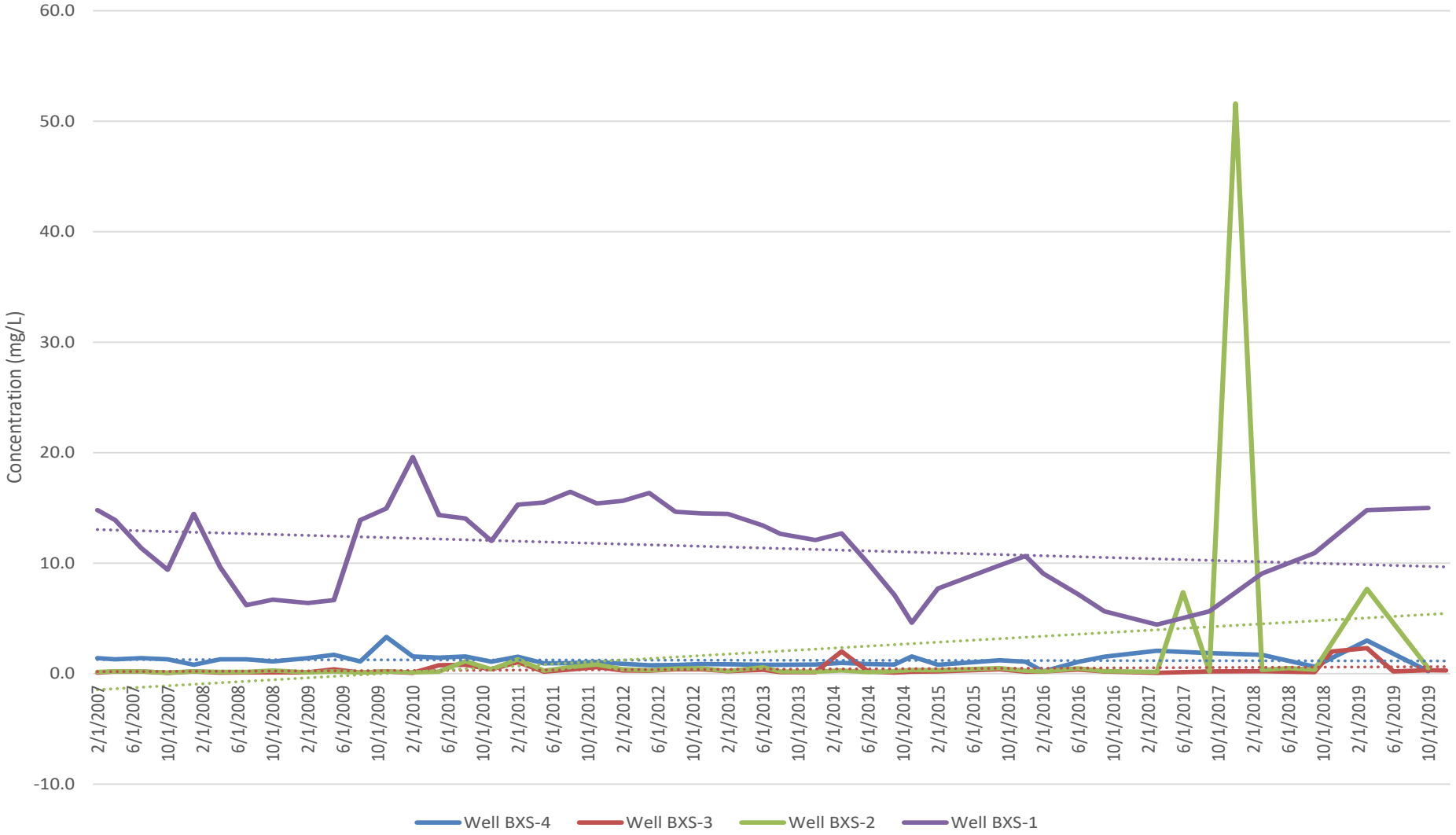


Figure 15
Tannin and Lignin Trend
South Wells

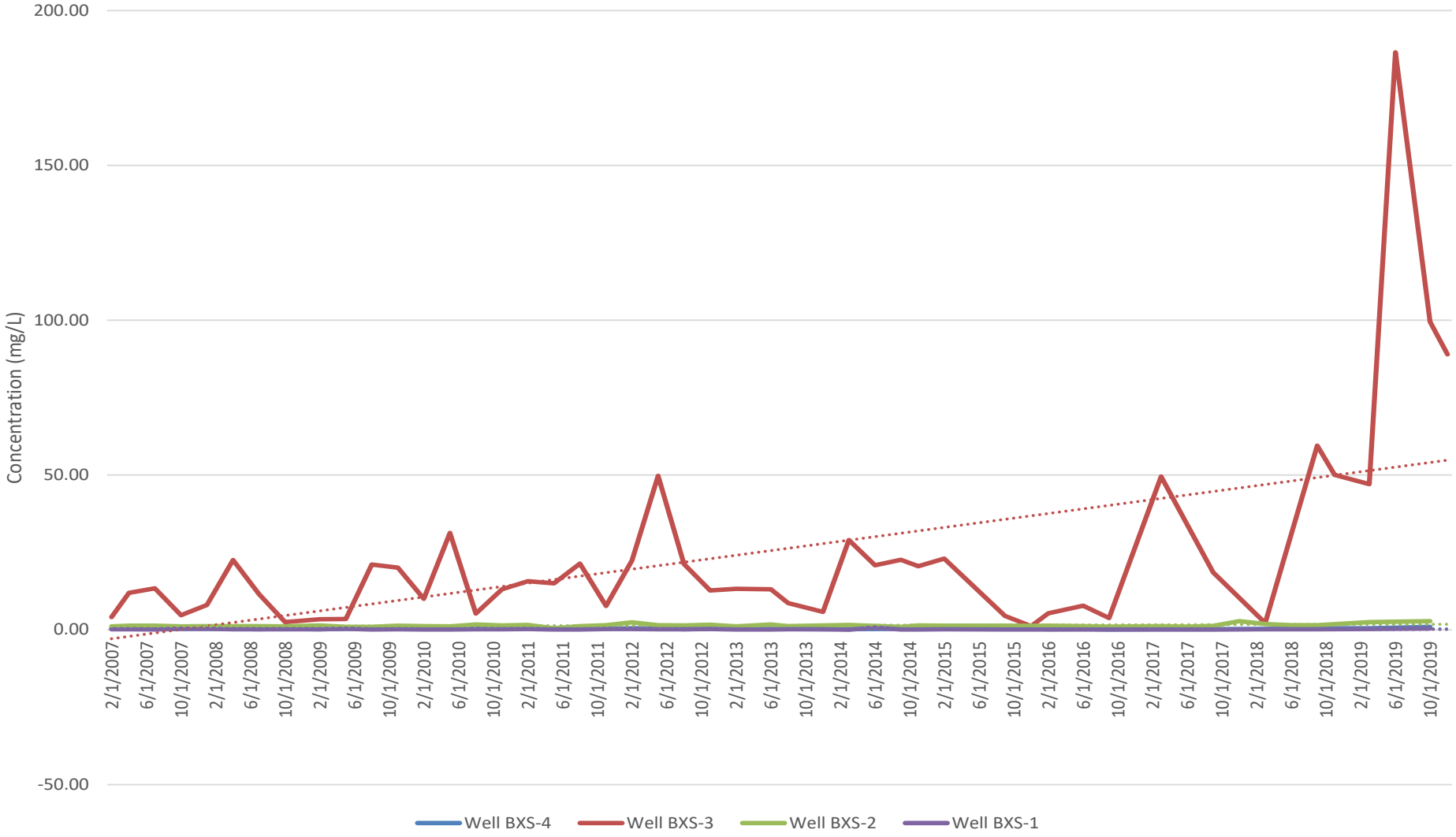


Figure 16
Total Dissolved Solids Trend
South Wells

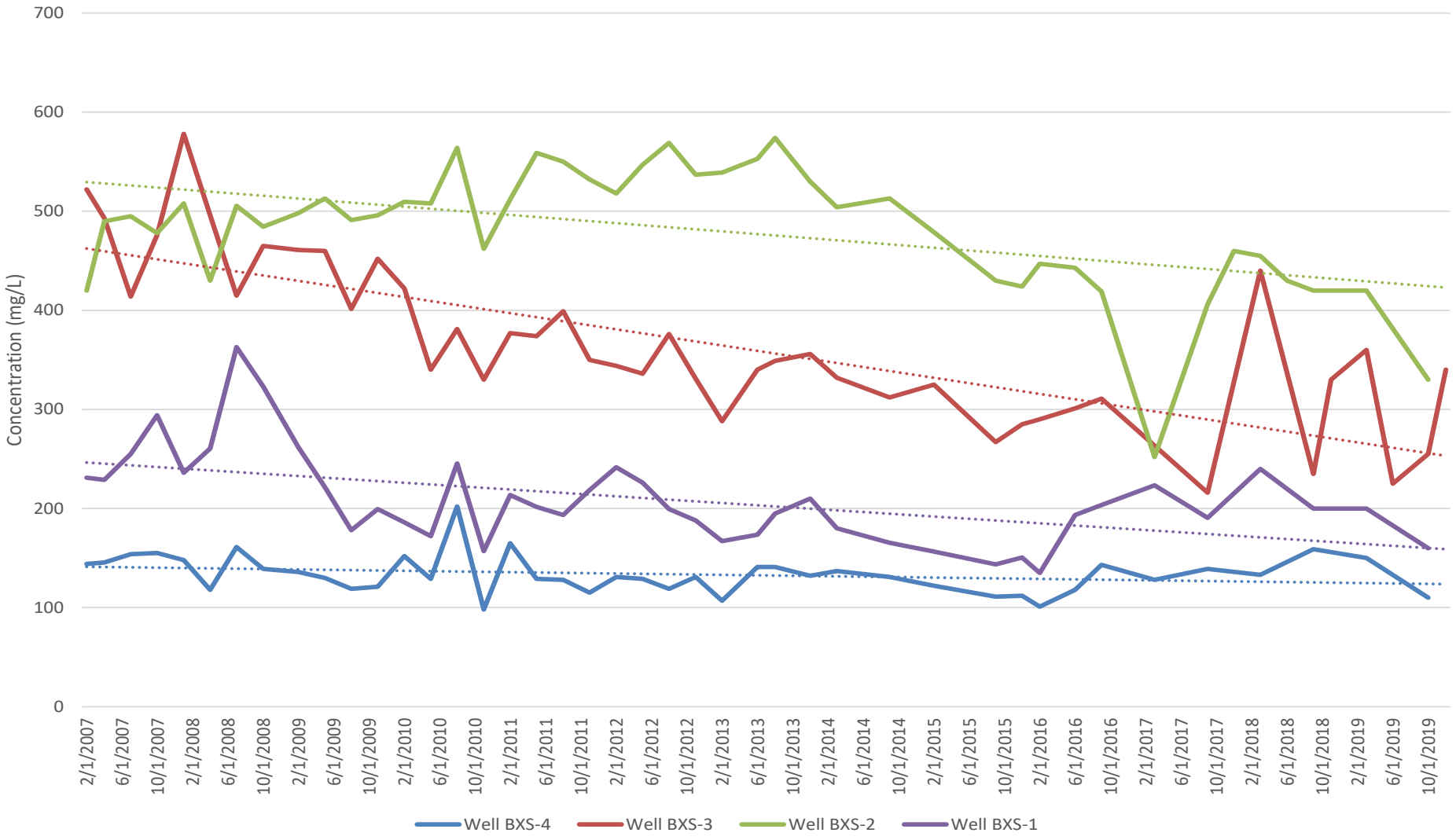
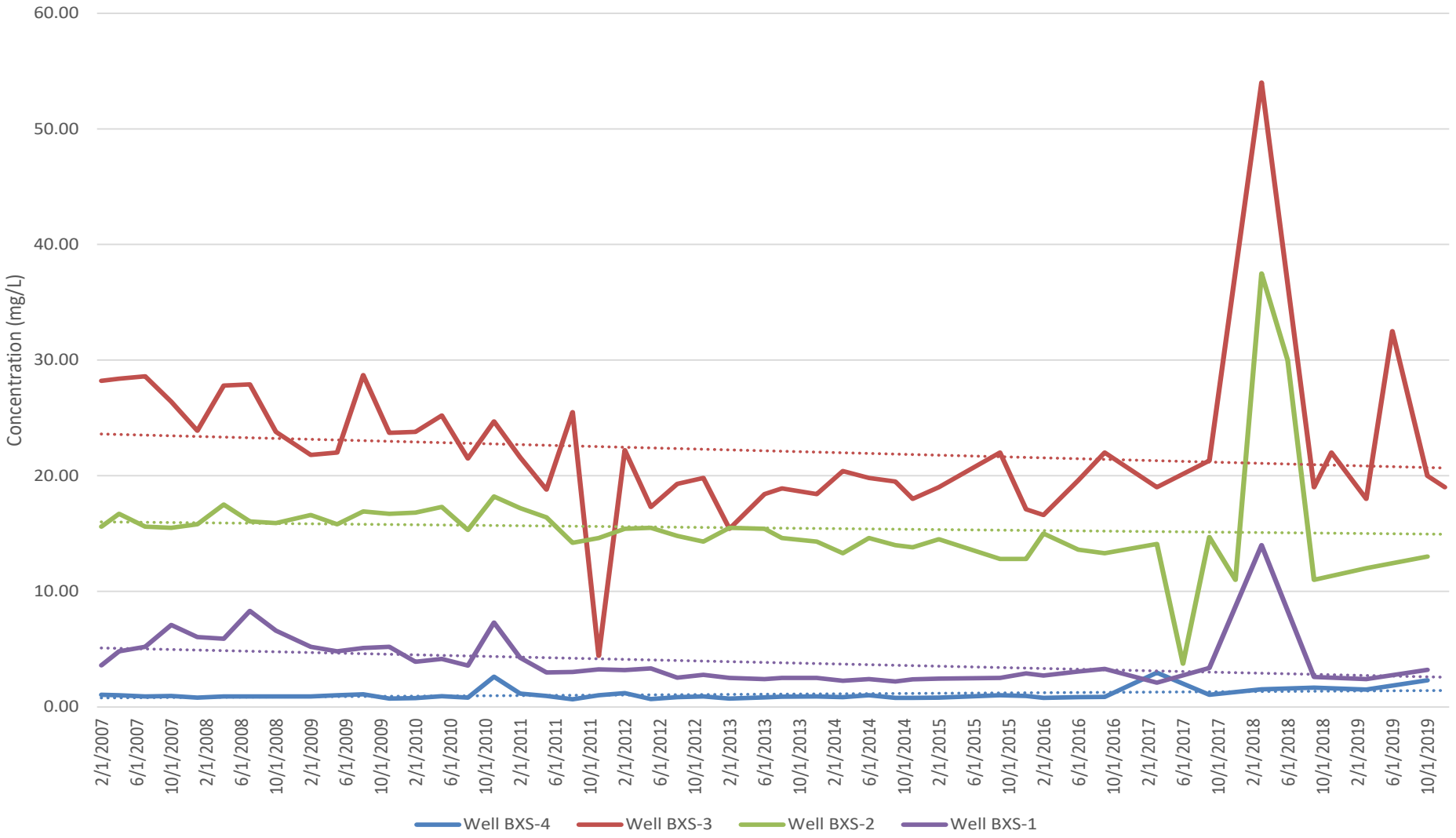


Figure 17
Total Organic Carbon Trend
South Wells



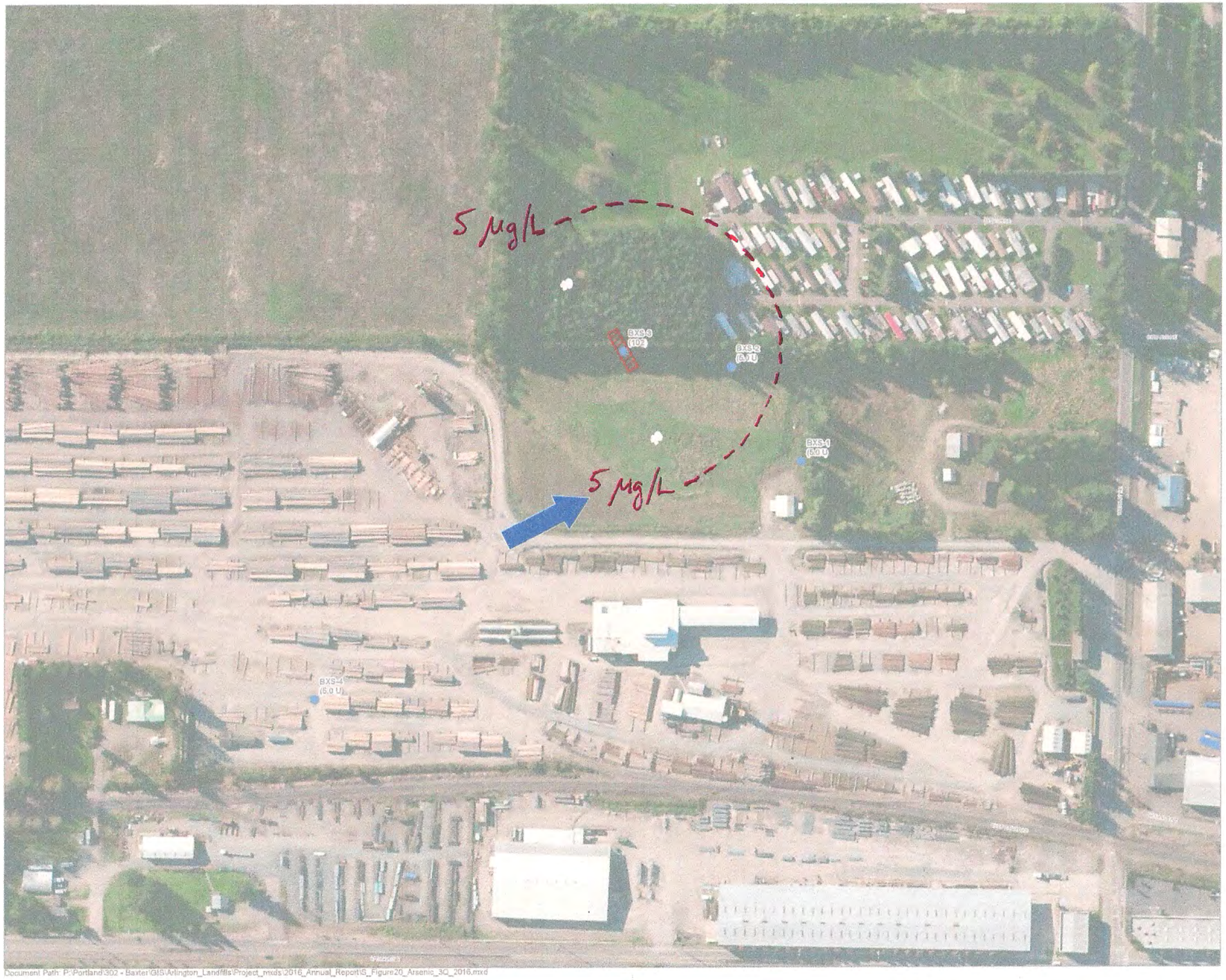


FIGURE 18

Arsenic Isopleth Map: 2019

Former J.H. Baxter
South Woodwaste Landfill
Arlington, Washington

LEGEND

- Monitoring Well (Peak 2019 Arsenic Concentration)
- Arsenic Contours (dashed where inferred)
- Modeled Source Area
- Direction of Groundwater Flow

NOTES:

1. All elevations exist in NAVD88.
2. J = estimated
3. U = undetected
4. Arsenic contouring estimated using Quick Domenico approximately.
5. Concentrations in micrograms/L.
6. Data from peak arsenic detections per well in 2019.

N

0 100 200 300
Feet

Date: April 15, 2020
Data Sources: AMEC, ESRI. Air photo taken on July 15, 2013 by the USDA

GSI Water Solutions, Inc.

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Appendix A

2019 Groundwater Monitoring Field Forms

Woodwaste Landfill Monitoring

Date: 3-16-19 Well ID: BX5-1 Tech: Kvam

Depth to Water: 34.28 Depth to Bottom: _____ Well Size: 2"

Purge type: Low-Flow/Standard Well type: Flush mount/Standpipe

Sample Analysis:

Flow Rate:

Start time: 1015

Time	Flow rate	Volume Removed (g)	DTW	PH	COND µS/cm 2019	TEMP (°C)	ORP	DO (mg/L)
1015		0	34.28	6.17	~~1060~~	10.6	14.2	2.54
1020		1.0g		5.98	233	11.64	13.4	0.51
1024		1.9g		6.01	232	11.50	11.8	0.29
1028		3.2g	34.28	6.03	231	11.62	10.9	0.27

All Parameters Stable at: 1028 Total Volume Removed: 732g

Sample time: 1030

Signature: Bruce Kvam Date: 3-16-19 Time: 1035

Pump voltage output = 10.5 volts

Woodwaste Landfill Monitoring

Date: 3-16-19 Well ID: BXS-2 Tech: Kvam

Depth to Water: 32.55 Depth to Bottom: _____ Well Size: 2"

Purge type: Low-Flow/Standard Well type: Flush mount/Standpipe

Sample Analysis:

Flow Rate:

Start time: 1100

Time	Flow rate	Volume Removed (g)	DTW	PH	COND (µS/cm)	TEMP (°C)	ORP	DO (mg/L)	Turbidity *
1101		0	32.55	6.16	447	12.28	35.1	1.98	Ø
1105		1.15g		6.08	441	11.76	30.3	0.44	
1108		1.80		6.09	466	12.26	29.9	0.38	
1112		2.15	32.58	6.16	482	12.44	30.5	0.25	

All Parameters Stable at: 1112 Total Volume Removed: 2.40g

Sample time: 1114

Signature: Bruce Kvam Date: 3-16-19 Time: 1120

* - Qualitative - no turbidity sensor of YSI 556

Woodwaste Landfill Monitoring

Date: 3-16-19 Well ID: BXS-3 Tech: Kvam

Depth to Water: 29.10 Depth to Bottom: _____ Well Size: 2"

Purge type: ~~Low-Flow~~/Standard Well type: Flush mount/Standpipe

Sample Analysis:

Flow Rate:

Start time: 1137

Time	Flow rate	Volume (g) Removed	DTW	PH	µS/cm COND	(°C) TEMP	ORP	(mg/L) DO	Turbidity *
1137		0	29.10	6.32	380	11.98	-23.5	3.24	Ø
1141		0.75		6.15	433	11.40	-97.1	0.45	Ø
1145		1.55		6.15	446	11.62	-112.4	0.24	Ø
1149		2.15	28.43	6.15	449	11.69	-117.1	0.20	Ø

All Parameters Stable at: 1149 Total Volume Removed: 2.50

Sample time: 1150

Signature: Bruce Kvam Date: 3-16-19 Time: 1155

Pump voltage output = 10.5 V

* - Qualitative - no turbidity sensor w/ YSI 556

Woodwaste Landfill Monitoring

Date: 3-16-19 Well ID: BXS-4 Tech: Kvam

Depth to Water: 10.72' Depth to Bottom: _____ Well Size: 2"

Purge type: (Low-Flow)/Standard Well type: Flush mount/(Standpipe)

Sample Analysis:

Flow Rate:

Start time: 0914

Time	Flow rate	Volume Removed (g)	DTW	PH	COND (µS/cm)	TEMP (°C)	ORP	DO (mg/L)
0914			10.72	7.71	220	5.55	-9.2	1.92
0918		0.5g		7.36	209	5.98	-34.6	0.64
0922		0.9g		7.30	~~113~~ 208	6.45	-57.5	0.39
0926		1.1g		7.29	~~134~~ 206	6.56	-70.4	0.44
0930		1.4g		7.28	~~135~~ 207	6.72	-77.5	3.40
0938		2.1g		~~7.44~~ 7.27	137 208	7.15	-90.9	0.18
0942		2.5g	11.05	7.29	~~139~~ 208	7.64	-92.5	0.16

All Parameters Stable at: 0942 Total Volume Removed: 2.7g

Sample time: 0945

Signature: Bruce Kvam Date: 3-16-19 Time: 0948

Pump voltage output 6.5V

Woodwaste Landfill Monitoring

Date: 06/01/19 Well ID: BXS-3 Tech: Kvam

Depth to Water: 29.71' Depth to Bottom: _____ Well Size: 2"

Purge type: Low-Flow/Standard Well type: Flush mount/Standpipe

Sample Analysis:

Flow Rate:

Start time: 0958

Time	Flow rate	Volume Removed (g)	DTW	PH +	COND (µS/cm)	TEMP (°C)	ORP (mV)	DO (mg/L)	Turbidity* (NTUs)
1000		0	29.71	6.86	1348	21.50	-0095.2	1.76	292
1005		0.75		12.81	1423	14.58	-0344.2	0.58	312
1010		1.65		11.90	1494	14.3	-305.4	0.30	310
1015		2.50		12.78	1491	14.3	-351.0	0.21	310
1020		3.15	29.78	13.22	1502	14.4	-376.3	0.10	307

All Parameters Stable at: 1020 Total Volume Removed:

Sample time: 1021

Signature: Bruce Kvam Date: 06/01/19 Time: 1030

+ attempted to re-calibrate pH probe, but "low-battery" message prevented calibration

* groundwater is colorless & turbidity-free (i.e. no visible turbidity); readings not accurate

Field duplicate samples (BXS-103) collected @ 1025

BXS-3 standpipe lock busted

Woodwaste Landfill Monitoring

Date: 10-12-19 Well ID: BXS-1 Tech: KVam

Depth to Water: 38.83' Depth to Bottom: _____ Well Size: 2"

Purge type: Low-Flow/Standard Well type: Flush mount/Standpipe

Sample Analysis:

Flow Rate:

Start time: 1103

Time	Flow rate	Volume Removed (gallons)	DTW	PH	COND (µS/cm)	TEMP (°C)	ORP	DO (mg/L)	Turbidity (NTUs)
1105		0	38.83	9.41	374	11.45	20	5.89	
1110		0.80		8.65	377	12.75	85	2.33	47.3
1116		2.00		8.29	370	12.21	98	1.48	44.6
1121		2.70		8.17	368	13.24	102	0.99	43.1
1126		3.25	38.83	8.09	366	13.27	103	0.82	41.9

All Parameters Stable at: 1126 Total Volume Removed: 3.35 gallons

Sample time: 1130

Signature: Bruce Kvam Date: 10-12-19 Time: 1133

pH values appear high

Woodwaste Landfill Monitoring

Date: 10-12-19 Well ID: BXS-2 Tech: Kram

Depth to Water: 37.04' Depth to Bottom: _____ Well Size: 2"

Purge type: Low-Flow/Standard Well type: Flush mount/Standpipe

Sample Analysis:

Flow Rate:

Start time: 1252

Time	Flow rate	gallons Volume Removed	DTW	PH	µS/cm COND	°C TEMP	ORP	mg/L DO	NTUs Turbidity
1254		0	37.04'	8.20	697	14.12	-43	4.48	46.2
1259		1.35		8.13	749	13.01	-4	0.00	44.3
1304	14.5v	1.85		8.07	770	13.29	5	0.00	43.9
1309		2.55		8.01	773	13.66	11	0.00	43.6
1314		3.25	37.07	7.97	773	13.60	16	0.00	43.6

All Parameters Stable at: 1314 Total Volume Removed: 3.50

Sample time: 1315

Signature: Bruce Kram Date: 10-12-19 Time: 1319

pH values appear high

Woodwaste Landfill Monitoring

Date: 10-12-19 Well ID: BXS-3 Tech: KVan

Depth to Water: 34.15' Depth to Bottom: _____ Well Size: 2"

Purge type: Low-Flow/Standard Well type: Flush mount/Standpipe

Sample Analysis:

Flow Rate:

Start time: 1159

Time	Flow rate	Volume Removed (gallons)	DTW	PH	COND (µS/cm)	TEMP (°C)	ORP	DO (mg/L)	Turbidity (NTUs)
1200		0	34.15'	8.01	614	13.16	-27	4.84	186
1205		0.80		8.00	686	12.92	-65	3.69	209
1210		1.50		8.02	747	13.01	-75	5.29	210
1215		2.10		8.02	751	13.07	-79	3.72	215
1220		2.65		8.02	753	13.24	-82	3.21	217

All Parameters Stable at: 1220 Total Volume Removed: 2.65 gallons

Sample time: 1221

Signature: Bruce Kvam Date: 10-12-19 Time: 1223

BXS-103 samples collected @ 1225

pH values appear high

Woodwaste Landfill Monitoring

Date: 10-12-19 Well ID: BXS-4 Tech: KVam

Depth to Water: 13.55 Depth to Bottom: _____ Well Size: 2"

Purge type: Low-Flow/Standard Well type: Flush mount/Standpipe

Sample Analysis:

Flow Rate:

Start time: 0946

Time	Flow rate	Volume Removed (gallons)	DTW	PH	COND (mS/cm)	TEMP (°C)	ORP	DO (mg/L)	NTUs Turbidity
0947		0	13.55	10.75	276	11.52	123	1.79	100-110
0952		0.5g		10.14	264	12.31	-82	0.42	59.8
0957		0.9g		9.80	262	11.96	-86	0.00	51.4
1002		1.10g		9.58	263	12.45	-83	0.00	51.7
1005 ~~1007~~		1.20g		~~8.95~~		~~12.18~~	~~-46~~	~~0.00~~	~~52.2~~
1035			14.02						

All Parameters Stable at: 1005 Total Volume Removed: 2.25 gallons

Sample time: finish @ 1030

Signature: Bruce Kvam Date: 10-12-19 Time: 1035

ptt values appear high

Woodwaste Landfill Monitoring

Date: 12-22-19 Well ID: BXS-3 Tech: Kvam

Depth to Water: 35.32' Depth to Bottom: _____ Well Size: 2"

Purge type: Low-Flow/Standard Well type: Flush mount/(Standpipe)

Sample Analysis:

Flow Rate:

Start time: 1213

Time	Flow rate	Volume Removed	DTW	PH	µS/cm COND	°C TEMP	ORP	mg/L DO
1214		0	35.32	5.74	570	12.00	-25.4	0.78
1221 ~~1219~~		2.0 g		5.85	177	11.64	-80	0.00
~~1226~~ 1226		2.5 g		5.78	168	12.45	-86.1	0.00
~~1231~~ 1231		3.0		5.75	449	12.07	-92.4	0.00
1236		3.25	35.62	5.73	449	10.53	-90.2	0.00

Using Hanna 98194

All Parameters Stable at: 1236 Total Volume Removed:

Sample time: 1240

Signature: Bruce Kram Date: 12-22-19 Time: 1242

Appendix B

2019 Laboratory Reports

Am Test Inc.
13600 NE 126TH PL
Suite C
Kirkland, WA 98034
(425) 885-1664
www.amtestlab.com

Professional Analytical Services

ANALYSIS REPORT

KVAM AQUATIC SCIENCES LLC
9314 NE 133RD ST
KIRKLAND, WA 98034
Attention: BRUCE KVAM
Project Name: ARLINGTON GROUNDWATER
All results reported on an as received basis.

Date Received: 03/18/19
Date Reported: 4/12/19

AMTEST Identification Number **19-A003507**
Client Identification **BXS-4**
Sampling Date **03/16/19, 09:45**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	150	mg/l		1	SM 2540C	MJ	03/21/19
Tannin and Lignin	0.49	mg/l		0.1	SM 5550B	JH	04/05/19

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	1.5	mg/l		0.5	SM 5310B	MJ	03/19/19
Chemical Oxygen Demand	< 10	mg/l		10	EPA 410.4	JH	04/02/19

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	2.76	mg/l		0.05	EPA 300.0	AG	03/19/19
Sulfate	3.00	mg/l		0.1	EPA 300.0	AG	03/19/19

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	1.16	mg/l		0.02	EPA 350.1	AG	04/01/19

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 19-A003507

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	< 0.005	mg/l		0.005	EPA 200.7	KQ	03/19/19
Dissolved Barium	0.0260	mg/l		0.0005	EPA 200.7	KQ	03/19/19
Dissolved Iron	0.131	mg/l		0.01	EPA 200.7	KQ	03/19/19
Dissolved Manganese	0.1370	mg/l		0.005	EPA 200.7	KQ	03/19/19
Dissolved Nickel	0.005	mg/l		0.005	EPA 200.7	KQ	03/19/19

AMTEST Identification Number **19-A003508**
Client Identification **BXS-1**
Sampling Date **03/16/19, 10:30**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	200	mg/l		1	SM 2540C	MJ	03/21/19
Tannin and Lignin	0.22	mg/l		0.1	SM 5550B	JH	04/05/19

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	2.4	mg/l		0.5	SM 5310B	MJ	03/19/19
Chemical Oxygen Demand	< 10	mg/l		10	EPA 410.4	JH	04/02/19

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	5.55	mg/l		0.05	EPA 300.0	AG	03/19/19
Sulfate	14.8	mg/l		0.1	EPA 300.0	AG	03/19/19

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	< 0.02	mg/l		0.02	EPA 350.1	AG	04/01/19

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 19-A003508

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	< 0.005	mg/l		0.005	EPA 200.7	KQ	03/19/19
Dissolved Barium	0.0160	mg/l		0.0005	EPA 200.7	KQ	03/19/19
Dissolved Iron	< 0.01	mg/l		0.01	EPA 200.7	KQ	03/19/19
Dissolved Manganese	0.2620	mg/l		0.005	EPA 200.7	KQ	03/19/19
Dissolved Nickel	0.012	mg/l		0.005	EPA 200.7	KQ	03/19/19

AMTEST Identification Number **19-A003509**
Client Identification **BXS-2**
Sampling Date **03/16/19, 11:14**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	420	mg/l		1	SM 2540C	MJ	03/21/19
Tannin and Lignin	2.5	mg/l		0.1	SM 5550B	JH	04/05/19

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	12.	mg/l		0.5	SM 5310B	MJ	03/19/19
Chemical Oxygen Demand	12.	mg/l		10	EPA 410.4	JH	04/02/19

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	2.49	mg/l		0.05	EPA 300.0	AG	03/19/19
Sulfate	7.65	mg/l		0.1	EPA 300.0	AG	03/19/19

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	< 0.02	mg/l		0.02	EPA 350.1	AG	04/01/19

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 19-A003509

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	< 0.005	mg/l		0.005	EPA 200.7	KQ	03/19/19
Dissolved Barium	0.0400	mg/l		0.0005	EPA 200.7	KQ	03/19/19
Dissolved Iron	0.117	mg/l		0.01	EPA 200.7	KQ	03/19/19
Dissolved Manganese	1.664	mg/l		0.005	EPA 200.7	KQ	03/19/19
Dissolved Nickel	0.038	mg/l		0.005	EPA 200.7	KQ	03/19/19

AMTEST Identification Number **19-A003510**
Client Identification **BXS-3**
Sampling Date **03/16/19, 11:50**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	360	mg/l		1	SM 2540C	MJ	03/21/19
Tannin and Lignin	47.	mg/l		0.1	SM 5550B	JH	04/05/19

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	18.	mg/l		0.5	SM 5310B	MJ	03/19/19
Chemical Oxygen Demand	37.	mg/l		10	EPA 410.4	JH	04/02/19

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	2.16	mg/l		0.05	EPA 300.0	AG	03/19/19
Sulfate	2.31	mg/l		0.1	EPA 300.0	AG	03/19/19

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	1.04	mg/l		0.02	EPA 350.1	AG	04/01/19

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 19-A003510

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	0.066	mg/l		0.005	EPA 200.7	KQ	03/19/19
Dissolved Barium	0.0340	mg/l		0.0005	EPA 200.7	KQ	03/19/19
Dissolved Iron	98.0	mg/l		0.01	EPA 200.7	KQ	03/19/19
Dissolved Manganese	4.136	mg/l		0.005	EPA 200.7	KQ	03/19/19
Dissolved Nickel	0.027	mg/l		0.005	EPA 200.7	KQ	03/19/19

AMTEST Identification Number **19-A003511**
Client Identification **BXN-4**
Sampling Date **03/17/19, 09:47**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	490	mg/l		1	SM 2540C	MJ	03/21/19
Tannin and Lignin	2.9	mg/l		0.1	SM 5550B	JH	04/05/19

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	3.4	mg/l		0.5	SM 5310B	MJ	03/19/19
Chemical Oxygen Demand	< 10	mg/l		10	EPA 410.4	JH	04/02/19

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	12.5	mg/l		0.05	EPA 300.0	AG	03/19/19
Sulfate	45.0	mg/l		0.1	EPA 300.0	AG	03/19/19

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	3.38	mg/l	D	0.2	EPA 350.1	AG	04/01/19
Total Nitrate + Nitrite	21.	mg/l		0.02	EPA 353.2	AG	03/21/19

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 19-A003511

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	< 0.005	mg/l		0.005	EPA 200.7	KQ	03/19/19
Dissolved Barium	0.110	mg/l		0.0005	EPA 200.7	KQ	03/19/19
Dissolved Iron	0.046	mg/l		0.01	EPA 200.7	KQ	03/19/19
Dissolved Manganese	1.755	mg/l		0.005	EPA 200.7	KQ	03/19/19

Polynuclear Aromatic Hydrocarbons (PAH)

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Liq/Liq Ext.	Y				EPA 3520	DP	03/21/19

Semi-Volatile Surrogates

ANALYTE	% RECOVERY	LIMITS	DATE
2-Fluorophenol	74.8 %	11.5 - 136.	3/27/19
D6-Phenol	80.1 %	0.0 - 105.	3/27/19
2,4,6-Tribromophenol	81.2 %	0.0 - 145.	3/27/19

Miscellaneous

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANLST	DATE
Pentachlorophenol	< 0.2	ug/l		0.2	EPA 625-SIM	NNL	03/27/19

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 19-A003512

AMTEST Identification Number **19-A003512**
Client Identification **BXN-2**
Sampling Date **03/17/19, 10:47**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	170	mg/l		1	SM 2540C	MJ	03/21/19
Tannin and Lignin	0.50	mg/l		0.1	SM 5550B	JH	04/05/19

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	1.3	mg/l		0.5	SM 5310B	MJ	03/19/19
Chemical Oxygen Demand	< 10	mg/l		10	EPA 410.4	JH	04/02/19

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	5.60	mg/l		0.05	EPA 300.0	AG	03/19/19
Sulfate	20.6	mg/l		0.1	EPA 300.0	AG	03/19/19

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	< 0.02	mg/l		0.02	EPA 350.1	AG	04/01/19
Total Nitrate + Nitrite	2.0	mg/l		0.02	EPA 353.2	AG	03/21/19

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	< 0.005	mg/l		0.005	EPA 200.7	KQ	03/19/19
Dissolved Barium	0.0080	mg/l		0.0005	EPA 200.7	KQ	03/19/19
Dissolved Iron	< 0.01	mg/l		0.01	EPA 200.7	KQ	03/19/19
Dissolved Manganese	2.747	mg/l		0.005	EPA 200.7	KQ	03/19/19

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 19-A003512

Polynuclear Aromatic Hydrocarbons (PAH)

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Liq/Liq Ext.	Y				EPA 3520	DP	03/21/19

Semi-Volatile Surrogates

ANALYTE	% RECOVERY	LIMITS	DATE
2-Fluorophenol	69.0 %	11.5 - 136.	3/27/19
D6-Phenol	67.0 %	0.0 - 105.	3/27/19
2,4,6-Tribromophenol	65.1 %	0.0 - 145.	3/27/19

Miscellaneous

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANLST	DATE
Pentachlorophenol	< 0.2	ug/l		0.2	EPA 625-SIM	NNL	03/27/19

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 19-A003513

AMTEST Identification Number **19-A003513**
Client Identification **BXN-1**
Sampling Date **03/17/19, 11:30**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	190	mg/l		1	SM 2540C	MJ	03/21/19
Tannin and Lignin	15.	mg/l		0.1	SM 5550B	JH	04/05/19

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	9.4	mg/l		0.5	SM 5310B	MJ	03/19/19
Chemical Oxygen Demand	< 10	mg/l		10	EPA 410.4	JH	04/02/19

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	17.0	mg/l		0.05	EPA 300.0	AG	03/19/19
Sulfate	24.9	mg/l		0.1	EPA 300.0	AG	03/19/19

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.246	mg/l		0.02	EPA 350.1	AG	04/01/19
Total Nitrate + Nitrite	< 0.02	mg/l		0.02	EPA 353.2	AG	03/21/19

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	0.034	mg/l		0.005	EPA 200.7	KQ	03/19/19
Dissolved Barium	0.0680	mg/l		0.0005	EPA 200.7	KQ	03/19/19
Dissolved Iron	45.7	mg/l		0.01	EPA 200.7	KQ	03/19/19
Dissolved Manganese	4.966	mg/l		0.005	EPA 200.7	KQ	03/19/19

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 19-A003513

Polynuclear Aromatic Hydrocarbons (PAH)

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Liq/Liq Ext.	Y				EPA 3520	DP	03/21/19

Semi-Volatile Surrogates

ANALYTE	% RECOVERY	LIMITS	DATE
2-Fluorophenol	70.5 %	11.5 - 136.	3/27/19
D6-Phenol	64.6 %	0.0 - 105.	3/27/19
2,4,6-Tribromophenol	78.0 %	0.0 - 145.	3/27/19

Miscellaneous

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANLST	DATE
Pentachlorophenol	< 0.2	ug/l		0.2	EPA 625-SIM	NNL	03/27/19

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 19-A003514

AMTEST Identification Number **19-A003514**
Client Identification **BXN-5**
Sampling Date **03/17/19, 11:35**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	200	mg/l		1	SM 2540C	MJ	03/21/19
Tannin and Lignin	12.	mg/l		0.1	SM 5550B	JH	04/05/19

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	9.3	mg/l		0.5	SM 5310B	MJ	03/19/19
Chemical Oxygen Demand	< 10	mg/l		10	EPA 410.4	JH	04/02/19

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	19.0	mg/l		0.05	EPA 300.0	AG	03/19/19
Sulfate	23.4	mg/l		0.1	EPA 300.0	AG	03/19/19

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.239	mg/l		0.02	EPA 350.1	AG	04/01/19
Total Nitrate + Nitrite	< 0.02	mg/l		0.02	EPA 353.2	AG	03/21/19

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	0.047	mg/l		0.005	EPA 200.7	KQ	03/19/19
Dissolved Barium	0.0790	mg/l		0.0005	EPA 200.7	KQ	03/19/19
Dissolved Iron	55.4	mg/l		0.01	EPA 200.7	KQ	03/19/19
Dissolved Manganese	5.384	mg/l		0.005	EPA 200.7	KQ	03/19/19

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 19-A003514

Polynuclear Aromatic Hydrocarbons (PAH)

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Liq/Liq Ext.	Y				EPA 3520	DP	03/21/19

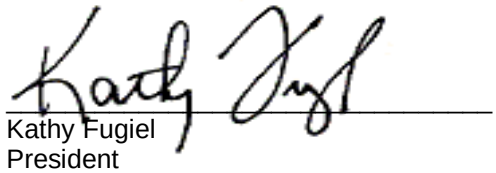
Semi-Volatile Surrogates

ANALYTE	% RECOVERY	LIMITS	DATE
2-Fluorophenol	81.0 %	11.5 - 136.	3/27/19
D6-Phenol	74.8 %	0.0 - 105.	3/27/19
2,4,6-Tribromophenol	77.8 %	0.0 - 145.	3/27/19

Miscellaneous

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANLST	DATE
Pentachlorophenol	< 0.2	ug/l		0.2	EPA 625-SIM	NNL	03/27/19

D = The reported value is from a dilution.



Kathy Fugiel
President

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(425) 885-1664
www.amtestlab.com

Professional Analytical Services

QC Summary for sample numbers: 19-A003507 to 19-A003514

DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	DUP VALUE	RPD
19-A003513	Total Organic Carbon	mg/l	9.4	9.2	2.2
19-A003513	Chloride	mg/l	17.0	18.2	6.8
19-A003420	Ammonia Nitrogen	mg/l	0.024	0.023	4.3
19-A003509	Ammonia Nitrogen	mg/l	< 0.02	< 0.02	
19-A003557	Ammonia Nitrogen	mg/l	< 0.02	< 0.02	
19-A003613	Ammonia Nitrogen	mg/l	< 0.02	< 0.05	
19-A003674	Ammonia Nitrogen	mg/l	< 0.02	< 0.02	
19-A003770	Ammonia Nitrogen	mg/l	4.20	4.14	1.4
19-A003873	Ammonia Nitrogen	mg/l	0.602	0.602	0.00
19-A003903	Ammonia Nitrogen	mg/l	< 0.02	< 0.05	
19-A003913	Ammonia Nitrogen	mg/l	< 0.02	< 0.05	
19-A004131	Ammonia Nitrogen	mg/l	0.034	0.032	6.1
19-A004258	Ammonia Nitrogen	mg/l	0.520	0.516	0.77
19-A004264	Ammonia Nitrogen	mg/l	< 0.02	< 0.02	
19-A003485	Total Nitrate + Nitrite	mg/l	< 0.02	< 0.02	
19-A003530	Total Nitrate + Nitrite	mg/l	0.11	0.12	8.7
19-A003559	Total Nitrate + Nitrite	mg/l	1.6	1.7	6.1
19-A003615	Total Nitrate + Nitrite	mg/l	1.4	1.4	0.00
19-A003622	Total Nitrate + Nitrite	mg/l	0.58	0.58	0.00
19-A003645	Total Nitrate + Nitrite	mg/l	0.34	0.34	0.00
19-A003512	Total Dissolved Solids	mg/l	170	160	6.1
19-A003548	Total Dissolved Solids	mg/l	140	140	0.00
19-A003513	Sulfate	mg/l	24.9	25.0	0.40

MATRIX SPIKES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	SMPL+ SPK	SPK AMT	RECOVERY
19-A003514	Total Organic Carbon	mg/l	9.3	34.	25.	98.80 %
19-A003514	Chemical Oxygen Demand	mg/l	< 10	96.	100	96.00 %
19-A003514	Chemical Oxygen Demand	mg/l	< 10	80.	100	80.00 %
19-A003516	Chemical Oxygen Demand	mg/l	12.	110	100	98.00 %
19-A003516	Chemical Oxygen Demand	mg/l	12.	110	100	98.00 %
19-A003645	Chemical Oxygen Demand	mg/l	< 1000	8000	10000	80.00 %
19-A003645	Chemical Oxygen Demand	mg/l	< 1000	7400	10000	74.00 %
19-A003513	Chloride	mg/l	17.0	19.4	2.00	120.00 %
19-A003420	Ammonia Nitrogen	mg/l	0.024	1.06	1.00	103.60 %
19-A003509	Ammonia Nitrogen	mg/l	< 0.02	1.02	1.00	102.00 %
19-A003557	Ammonia Nitrogen	mg/l	< 0.02	1.06	1.00	106.00 %
19-A003613	Ammonia Nitrogen	mg/l	< 0.02	1.04	1.00	104.00 %
19-A003674	Ammonia Nitrogen	mg/l	< 0.02	1.08	1.00	108.00 %
19-A003770	Ammonia Nitrogen	mg/l	4.20	15.5	10.0	113.00 %

QC Summary for sample numbers: 19-A003507 to 19-A003514...

MATRIX SPIKES continued....

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	SMPL+ SPK	SPK AMT	RECOVERY
19-A003873	Ammonia Nitrogen	mg/l	0.602	1.64	1.00	103.80 %
19-A003903	Ammonia Nitrogen	mg/l	< 0.02	1.11	1.00	111.00 %
19-A003913	Ammonia Nitrogen	mg/l	< 0.02	1.11	1.00	111.00 %
19-A004131	Ammonia Nitrogen	mg/l	0.034	1.14	1.00	110.60 %
19-A004258	Ammonia Nitrogen	mg/l	0.520	1.59	1.00	107.00 %
19-A004264	Ammonia Nitrogen	mg/l	< 0.02	1.12	1.00	112.00 %
19-A003485	Total Nitrate + Nitrite	mg/l	< 0.02	0.93	1.0	93.00 %
19-A003530	Total Nitrate + Nitrite	mg/l	0.11	1.1	1.0	99.00 %
19-A003559	Total Nitrate + Nitrite	mg/l	1.6	2.7	1.0	110.00 %
19-A003615	Total Nitrate + Nitrite	mg/l	1.4	2.3	1.0	90.00 %
19-A003622	Total Nitrate + Nitrite	mg/l	0.58	1.5	1.0	92.00 %
19-A003645	Total Nitrate + Nitrite	mg/l	0.34	1.3	1.0	96.00 %
19-A003513	Sulfate	mg/l	24.9	27.0	2.00	105.00 %
19-A003508	Tannin and Lignin	mg/l	0.22	0.42	0.20	100.00 %
19-A003508	Tannin and Lignin	mg/l	0.22	0.42	0.20	100.00 %
19-A003511	Dissolved Arsenic	mg/l	< 0.005	1.90	2.00	95.00 %
19-A003511	Dissolved Arsenic	mg/l	< 0.005	1.88	2.00	94.00 %
19-A003511	Dissolved Barium	mg/l	0.110	2.01	2.00	95.00 %
19-A003511	Dissolved Barium	mg/l	0.110	1.99	2.00	94.00 %
19-A002539	Dissolved Iron	mg/l	< 0.01	19.9	22.0	90.45 %
19-A002539	Dissolved Iron	mg/l	< 0.01	19.5	22.0	88.64 %
19-A003511	Dissolved Iron	mg/l	0.046	22.6	22.0	102.52 %
19-A003511	Dissolved Iron	mg/l	0.046	22.4	22.0	101.61 %
19-A002539	Dissolved Manganese	mg/l	0.0050	2.038	2.000	101.65 %
19-A002539	Dissolved Manganese	mg/l	0.0050	2.009	2.000	100.20 %
19-A003511	Dissolved Manganese	mg/l	1.755	3.592	2.000	91.85 %
19-A003511	Dissolved Manganese	mg/l	1.755	3.600	2.000	92.25 %
Blank	Pentachlorophenol	ug/l	< 0.2	2.9	10.	29.00 %
Blank	Pentachlorophenol	ug/l	< 0.2	2.0	10.	20.00 %

MATRIX SPIKE DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE + SPK	MSD VALUE	RPD
Spike	Chemical Oxygen Demand	mg/l	96.	80.	18.
Spike	Chemical Oxygen Demand	mg/l	110	110	0.00
Spike	Chemical Oxygen Demand	mg/l	8000	7400	7.8
Spike	Tannin and Lignin	mg/l	0.42	0.42	0.00
Spike	Dissolved Arsenic	mg/l	1.90	1.88	1.1
Spike	Dissolved Barium	mg/l	2.01	1.99	1.0
Spike	Dissolved Iron	mg/l	19.9	19.5	2.0
Spike	Dissolved Iron	mg/l	22.6	22.4	0.89
Spike	Dissolved Manganese	mg/l	2.038	2.009	1.4
Spike	Dissolved Manganese	mg/l	3.592	3.600	0.22
Spike	Pentachlorophenol	ug/l	2.9	2.0	37.

QC Summary for sample numbers: 19-A003507 to 19-A003514...

STANDARD REFERENCE MATERIALS

ANALYTE	UNITS	TRUE VALUE	MEASURED VALUE	RECOVERY
Total Organic Carbon	mg/l	25.	25.	100. %
Total Organic Carbon	mg/l	25.	25.	100. %
Chemical Oxygen Demand	mg/l	50.	40.	80.0 %
Chemical Oxygen Demand	mg/l	50.	38.	76.0 %
Chemical Oxygen Demand	mg/l	50.	43.	86.0 %
Chloride	mg/l	2.00	2.20	110. %
Ammonia Nitrogen	mg/l	1.00	0.993	99.3 %
Ammonia Nitrogen	mg/l	1.00	1.03	103. %
Ammonia Nitrogen	mg/l	1.00	1.01	101. %
Ammonia Nitrogen	mg/l	1.00	1.03	103. %
Total Nitrate + Nitrite	mg/l	1.0	0.91	91.0 %
Total Nitrate + Nitrite	mg/l	1.0	0.95	95.0 %
Total Nitrate + Nitrite	mg/l	1.0	0.95	95.0 %
Total Nitrate + Nitrite	mg/l	1.0	0.91	91.0 %
Total Nitrate + Nitrite	mg/l	1.0	0.91	91.0 %
Total Nitrate + Nitrite	mg/l	1.0	0.92	92.0 %
Total Dissolved Solids	mg/l	350	340	97.1 %
Total Dissolved Solids	mg/l	350	340	97.1 %
Sulfate	mg/l	2.00	2.28	114. %
Tannin and Lignin	mg/l	0.40	0.34	85.0 %
Dissolved Arsenic	mg/l	2.00	1.96	98.0 %
Dissolved Barium	mg/l	0.800	0.789	98.6 %
Dissolved Iron	mg/l	4.00	4.01	100. %
Dissolved Manganese	mg/l	0.8000	0.8080	101. %
Dissolved Nickel	mg/l	0.800	0.803	100. %
Pentachlorophenol	ug/l	50.	50.	100. %

BLANKS

ANALYTE	UNITS	RESULT
Total Organic Carbon	mg/l	< 0.5
Total Organic Carbon	mg/l	< 0.5
Chemical Oxygen Demand	mg/l	< 10
Chemical Oxygen Demand	mg/l	< 10
Chemical Oxygen Demand	mg/l	< 10
Chloride	mg/l	< 0.05
Ammonia Nitrogen	mg/l	< 0.02
Ammonia Nitrogen	mg/l	< 0.02
Ammonia Nitrogen	mg/l	< 0.02
Ammonia Nitrogen	mg/l	< 0.02
Total Nitrate + Nitrite	mg/l	< 0.02
Total Nitrate + Nitrite	mg/l	< 0.02
Total Nitrate + Nitrite	mg/l	< 0.02
Total Nitrate + Nitrite	mg/l	< 0.02
Total Nitrate + Nitrite	mg/l	< 0.02

QC Summary for sample numbers: 19-A003507 to 19-A003514...

BLANKS continued....

ANALYTE	UNITS	RESULT
Total Nitrate + Nitrite	mg/l	< 0.02
Total Dissolved Solids	mg/l	< 1
Total Dissolved Solids	mg/l	< 1
Sulfate	mg/l	< 0.1
Tannin and Lignin	mg/l	< 0.1
Dissolved Arsenic	mg/l	< 0.005
Dissolved Barium	mg/l	< 0.0005
Dissolved Iron	mg/l	< 0.01
Dissolved Manganese	mg/l	< 0.005
Dissolved Nickel	mg/l	< 0.005
2-Fluorophenol	%	77.2
D6-Phenol	%	77.0
2,4,6-Tribromophenol	%	77.2
Pentachlorophenol	ug/l	< 0.2

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Professional Analytical Services

ANALYSIS REPORT

KVAM AQUATIC SCIENCES LLC
9314 NE 133RD ST
KIRKLAND, WA 98034
Attention: BRUCE KVAM
Project Name: ARLINGTON GROUNDWATER
All results reported on an as received basis.

Date Received: 06/03/19
Date Reported: 6/21/19

AMTEST Identification Number **19-A007474**
Client Identification **BXS-3**
Sampling Date **06/01/19, 10:21**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	220	mg/l		1	SM 2540C	JH	06/11/19
Tannin and Lignin	320	mg/l		0.1	SM 5550B	JH	06/20/19

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	45.	mg/l		0.5	SM 5310B	NNL	07/13/19
Chemical Oxygen Demand	50.	mg/l		10	EPA 410.4	JH	06/06/19

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	1.45	mg/l		0.05	EPA 300.0	AG	06/17/19
Sulfate	0.22	mg/l		0.1	EPA 300.0	AG	06/17/19

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	< 0.02	mg/l		0.02	EPA 350.1	AG	06/07/19

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 19-A007474

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	0.041	mg/l		0.005	EPA 200.7	KF	06/18/19
Dissolved Barium	0.0290	mg/l		0.0005	EPA 200.7	KF	06/18/19
Dissolved Iron	76.5	mg/l		0.01	EPA 200.7	KF	06/18/19
Dissolved Manganese	3.555	mg/l		0.005	EPA 200.7	KF	06/18/19
Dissolved Nickel	0.028	mg/l		0.005	EPA 200.7	KF	06/18/19

AMTEST Identification Number **19-A007475**
Client Identification **BXS-103**
Sampling Date **06/01/19, 10:25**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	230	mg/l		1	SM 2540C	JH	06/11/19
Tannin and Lignin	53.	mg/l		0.1	SM 5550B	JH	06/20/19

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	20.	mg/l		0.5	SM 5310B	NNL	07/13/19
Chemical Oxygen Demand	40.	mg/l		10	EPA 410.4	JH	06/06/19

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	1.38	mg/l		0.05	EPA 300.0	AG	06/17/19
Sulfate	0.18	mg/l		0.1	EPA 300.0	AG	06/17/19

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	< 0.02	mg/l		0.02	EPA 350.1	AG	06/07/19

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 19-A007475

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	0.048	mg/l		0.005	EPA 200.7	KF	06/18/19
Dissolved Barium	0.0288	mg/l		0.0005	EPA 200.7	KF	06/18/19
Dissolved Iron	79.6	mg/l		0.01	EPA 200.7	KF	06/18/19
Dissolved Manganese	3.573	mg/l		0.005	EPA 200.7	KF	06/18/19
Dissolved Nickel	0.029	mg/l		0.005	EPA 200.7	KF	06/18/19

AMTEST Identification Number **19-A007476**
Client Identification **BXN-1**
Sampling Date **06/01/19, 11:57**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	320	mg/l		1	SM 2540C	JH	06/11/19
Tannin and Lignin	16.	mg/l		0.1	SM 5550B	JH	06/20/19

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	8.1	mg/l		0.5	SM 5310B	NNL	07/13/19
Chemical Oxygen Demand	13.	mg/l		10	EPA 410.4	JH	06/06/19

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	11.1	mg/l		0.05	EPA 300.0	AG	06/17/19
Sulfate	8.59	mg/l		0.1	EPA 300.0	AG	06/17/19

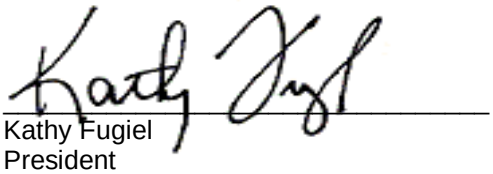
Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.042	mg/l		0.02	EPA 350.1	AG	06/07/19
Total Nitrate + Nitrite	< 0.02	mg/l		0.02	EPA 353.2	AG	06/04/19

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 19-A007476

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	0.022	mg/l		0.005	EPA 200.7	KF	06/18/19
Dissolved Barium	0.0639	mg/l		0.0005	EPA 200.7	KF	06/18/19
Dissolved Iron	44.4	mg/l		0.01	EPA 200.7	KF	06/18/19
Dissolved Manganese	6.393	mg/l		0.005	EPA 200.7	KF	06/18/19



Kathy Fugiel
President

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Professional Analytical Services

QC Summary for sample numbers: 19-A007474 to 19-A007476

DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	DUP VALUE	RPD
19-A007343	Total Organic Carbon	mg/l	1.1	1.3	17.
19-A007475	Total Organic Carbon	mg/l	20.	18.	11.
19-A007500	Chloride	mg/l	0.09	0.09	0.00
19-A007589	Chloride	mg/l	1.83	1.81	1.1
19-A007712	Chloride	mg/l	36.2	37.0	2.2
19-A007255	Ammonia Nitrogen	mg/l	0.145	0.140	3.5
19-A007401	Ammonia Nitrogen	mg/l	0.040	0.041	2.5
19-A007412	Ammonia Nitrogen	mg/l	< 0.02	< 0.02	
19-A007499	Ammonia Nitrogen	mg/l	< 0.02	< 0.02	
19-A007506	Ammonia Nitrogen	mg/l	0.703	0.662	6.0
19-A006973	Total Nitrate + Nitrite	mg/l	0.11	0.12	8.7
19-A006976	Total Nitrate + Nitrite	mg/l	0.43	0.44	2.3
19-A007051	Total Nitrate + Nitrite	mg/l	0.29	0.30	3.4
19-A007055	Total Nitrate + Nitrite	mg/l	0.059	0.059	0.00
19-A007327	Total Nitrate + Nitrite	mg/l	0.23	0.24	4.3
19-A007340	Total Nitrate + Nitrite	mg/l	1.7	1.8	5.7
19-A007370	Total Nitrate + Nitrite	mg/l	5.7	5.5	3.6
19-A007409	Total Nitrate + Nitrite	mg/l	0.47	0.48	2.1
19-A007419	Total Nitrate + Nitrite	mg/l	0.60	0.53	12.
19-A007502	Total Nitrate + Nitrite	mg/l	< 0.02	< 0.02	
19-A007523	Total Nitrate + Nitrite	mg/l	< 0.02	< 0.02	
19-A007686	Total Dissolved Solids	mg/l	31.	27.	14.
19-A007712	Total Dissolved Solids	mg/l	520	510	1.9
19-A007721	Total Dissolved Solids	mg/l	830	830	0.00
19-A007500	Sulfate	mg/l	0.45	0.45	0.00
19-A007589	Sulfate	mg/l	0.68	0.70	2.9
19-A007712	Sulfate	mg/l	78.4	79.7	1.6

QC Summary for sample numbers: 19-A007474 to 19-A007476...

MATRIX SPIKES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	SMPL+ SPK	SPK AMT	RECOVERY
19-A007344	Total Organic Carbon	mg/l	2.7	55.	50.	104.60 %
19-A007409	Total Organic Carbon	mg/l	3.2	58.	50.	109.60 %
19-A007476	Total Organic Carbon	mg/l	8.1	62.	50.	107.80 %
19-A007059	Chemical Oxygen Demand	mg/l	29.	120	100	91.00 %
19-A007059	Chemical Oxygen Demand	mg/l	29.	120	100	91.00 %
19-A007499	Chemical Oxygen Demand	mg/l	< 10	86.	100	86.00 %
19-A007499	Chemical Oxygen Demand	mg/l	< 10	90.	100	90.00 %
19-A007500	Chloride	mg/l	0.09	2.14	2.00	102.50 %
19-A007589	Chloride	mg/l	1.83	3.77	2.00	97.00 %
19-A007712	Chloride	mg/l	36.2	135.	100.	98.80 %
19-A007255	Ammonia Nitrogen	mg/l	0.145	1.16	1.00	101.50 %
19-A007401	Ammonia Nitrogen	mg/l	0.040	1.04	1.00	100.00 %
19-A007412	Ammonia Nitrogen	mg/l	< 0.02	1.08	1.00	108.00 %
19-A007499	Ammonia Nitrogen	mg/l	< 0.02	1.03	1.00	103.00 %
19-A007506	Ammonia Nitrogen	mg/l	0.703	1.68	1.00	97.70 %
19-A006973	Total Nitrate + Nitrite	mg/l	0.11	1.1	1.0	99.00 %
19-A006976	Total Nitrate + Nitrite	mg/l	0.43	1.5	1.0	107.00 %
19-A007051	Total Nitrate + Nitrite	mg/l	0.29	1.3	1.0	101.00 %
19-A007055	Total Nitrate + Nitrite	mg/l	0.059	1.0	1.0	94.10 %
19-A007327	Total Nitrate + Nitrite	mg/l	0.23	1.2	1.0	97.00 %
19-A007340	Total Nitrate + Nitrite	mg/l	1.7	2.7	1.0	100.00 %
19-A007370	Total Nitrate + Nitrite	mg/l	5.7	16.	10.	103.00 %
19-A007409	Total Nitrate + Nitrite	mg/l	0.47	1.4	1.0	93.00 %
19-A007419	Total Nitrate + Nitrite	mg/l	0.60	1.5	1.0	90.00 %
19-A007502	Total Nitrate + Nitrite	mg/l	< 0.02	1.0	1.0	100.00 %
19-A007523	Total Nitrate + Nitrite	mg/l	< 0.02	1.0	1.0	100.00 %
19-A007500	Sulfate	mg/l	0.45	2.82	2.00	118.50 %
19-A007589	Sulfate	mg/l	0.68	3.16	2.00	124.00 %
19-A007712	Sulfate	mg/l	78.4	195.	100.	116.60 %
19-A006332	Tannin and Lignin	mg/l	0.44	0.51	0.10	70.00 %
19-A006332	Tannin and Lignin	mg/l	0.44	0.51	0.10	70.00 %
19-A008249	Tannin and Lignin	mg/l	< 0.1	0.11	0.10	110.00 %
19-A008249	Tannin and Lignin	mg/l	< 0.1	0.11	0.10	110.00 %
19-A007476	Dissolved Arsenic	mg/l	0.022	0.071	0.050	98.00 %
19-A007476	Dissolved Arsenic	mg/l	0.022	0.072	0.050	100.00 %
19-A007476	Dissolved Barium	mg/l	0.0639	0.118	0.0500	108.20 %
19-A007476	Dissolved Barium	mg/l	0.0639	0.118	0.0500	108.20 %
19-A007476	Dissolved Iron	mg/l	44.4	138.	100.	93.60 %
19-A007476	Dissolved Iron	mg/l	44.4	138.	100.	93.60 %

QC Summary for sample numbers: 19-A007474 to 19-A007476...

MATRIX SPIKE DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE + SPK	MSD VALUE	RPD
Spike	Chemical Oxygen Demand	mg/l	120	120	0.00
Spike	Chemical Oxygen Demand	mg/l	86.	90.	4.5
Spike	Tannin and Lignin	mg/l	0.51	0.51	0.00
Spike	Tannin and Lignin	mg/l	0.11	0.11	0.00
Spike	Dissolved Arsenic	mg/l	0.071	0.072	1.4
Spike	Dissolved Barium	mg/l	0.118	0.118	0.00
Spike	Dissolved Iron	mg/l	138.	138.	0.00

STANDARD REFERENCE MATERIALS

ANALYTE	UNITS	TRUE VALUE	MEASURED VALUE	RECOVERY
Total Organic Carbon	mg/l	25.	27.	108. %
Total Organic Carbon	mg/l	25.	25.	100. %
Total Organic Carbon	mg/l	25.	26.	104. %
Chemical Oxygen Demand	mg/l	50.	43.	86.0 %
Chemical Oxygen Demand	mg/l	50.	45.	90.0 %
Chloride	mg/l	2.00	1.95	97.5 %
Chloride	mg/l	2.00	1.93	96.5 %
Ammonia Nitrogen	mg/l	1.00	0.957	95.7 %
Ammonia Nitrogen	mg/l	1.00	1.04	104. %
Ammonia Nitrogen	mg/l	1.00	1.04	104. %
Total Nitrate + Nitrite	mg/l	1.0	0.96	96.0 %
Total Nitrate + Nitrite	mg/l	1.0	0.91	91.0 %
Total Nitrate + Nitrite	mg/l	1.0	1.0	100. %
Total Nitrate + Nitrite	mg/l	1.0	0.98	98.0 %
Total Nitrate + Nitrite	mg/l	1.0	0.96	96.0 %
Total Nitrate + Nitrite	mg/l	1.0	1.0	100. %
Total Nitrate + Nitrite	mg/l	1.0	0.96	96.0 %
Total Nitrate + Nitrite	mg/l	1.0	0.92	92.0 %
Total Dissolved Solids	mg/l	350	380	109. %
Total Dissolved Solids	mg/l	350	360	103. %
Sulfate	mg/l	2.00	2.06	103. %
Sulfate	mg/l	2.00	1.98	99.0 %
Tannin and Lignin	mg/l	0.30	0.32	107. %
Dissolved Arsenic	mg/l	2.00	2.02	101. %
Dissolved Barium	mg/l	0.800	0.814	102. %
Dissolved Iron	mg/l	4.00	3.91	97.8 %
Dissolved Iron	mg/l	4.00	3.72	93.0 %
Dissolved Manganese	mg/l	0.8000	0.7977	99.7 %
Dissolved Manganese	mg/l	0.8000	0.7697	96.2 %
Dissolved Nickel	mg/l	0.800	0.810	101. %
Dissolved Nickel	mg/l	0.800	0.798	99.8 %

BLANKS

ANALYTE	UNITS	RESULT
Total Organic Carbon	mg/l	< 0.5
Total Organic Carbon	mg/l	< 0.5
Total Organic Carbon	mg/l	< 0.5

QC Summary for sample numbers: 19-A007474 to 19-A007476...

BLANKS continued....

ANALYTE	UNITS	RESULT
Chemical Oxygen Demand	mg/l	< 10
Chemical Oxygen Demand	mg/l	< 10
Chloride	mg/l	< 0.05
Chloride	mg/l	< 0.05
Ammonia Nitrogen	mg/l	< 0.02
Ammonia Nitrogen	mg/l	< 0.02
Ammonia Nitrogen	mg/l	< 0.02
Total Nitrate + Nitrite	mg/l	< 0.02
Total Nitrate + Nitrite	mg/l	< 0.02
Total Nitrate + Nitrite	mg/l	< 0.02
Total Nitrate + Nitrite	mg/l	< 0.02
Total Nitrate + Nitrite	mg/l	< 0.02
Total Nitrate + Nitrite	mg/l	< 0.02
Total Nitrate + Nitrite	mg/l	< 0.02
Total Nitrate + Nitrite	mg/l	< 0.02
Total Dissolved Solids	mg/l	< 1
Total Dissolved Solids	mg/l	< 10
Sulfate	mg/l	< 0.1
Sulfate	mg/l	< 0.1
Tannin and Lignin	mg/l	< 0.1
Dissolved Arsenic	mg/l	< 0.005
Dissolved Barium	mg/l	< 0.0005
Dissolved Iron	mg/l	< 0.01
Dissolved Iron	mg/l	< 0.01
Dissolved Manganese	mg/l	< 0.005
Dissolved Manganese	mg/l	< 0.005
Dissolved Nickel	mg/l	< 0.005

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Professional Analytical Services

ANALYSIS REPORT

KVAM AQUATIC SCIENCES LLC
9314 NE 133RD ST
KIRKLAND, WA 98034
Attention: BRUCE KVAM
Project Name: ARLINGTON GROUNDWATER
All results reported on an as received basis.

Date Received: 10/14/19
Date Reported: 11/ 5/19

AMTEST Identification Number **19-A016742**
Client Identification **BXS-4**
Sampling Date **10/12/19, 10:00**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	110	mg/l		1	SM 2540C	KF	10/16/19
Tannin and Lignin	0.95	mg/l		0.1	SM 5550B	DM	10/21/19

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	2.3	mg/l		0.5	SM 5310B	NNL	10/25/19
Chemical Oxygen Demand	12.	mg/l		10	EPA 410.4	DM	10/25/19

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	2.58	mg/l		0.05	EPA 300.0	SH	10/15/19
Sulfate	0.23	mg/l		0.1	EPA 300.0	SH	10/15/19

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	1.26	mg/l		0.02	EPA 350.1	SH	10/22/19

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 19-A016742

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	< 0.005	mg/l		0.005	EPA 200.7	HKL	10/23/19
Dissolved Barium	0.0277	mg/l		0.0005	EPA 200.7	HKL	10/23/19
Dissolved Iron	0.045	mg/l		0.01	EPA 200.7	HKL	10/23/19
Dissolved Manganese	0.145	mg/l		0.005	EPA 200.7	HKL	10/23/19
Dissolved Nickel	0.008	mg/l		0.005	EPA 200.7	HKL	10/23/19

AMTEST Identification Number **19-A016743**
Client Identification **BXS-1**
Sampling Date **10/12/19, 11:30**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	160	mg/l		1	SM 2540C	KF	10/16/19
Tannin and Lignin	0.39	mg/l		0.1	SM 5550B	DM	10/21/19

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	3.2	mg/l		0.5	SM 5310B	NNL	10/25/19
Chemical Oxygen Demand	15.	mg/l		10	EPA 410.4	DM	10/25/19

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	5.36	mg/l		0.05	EPA 300.0	SH	10/15/19
Sulfate	15.0	mg/l		0.1	EPA 300.0	SH	10/15/19

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.029	mg/l		0.02	EPA 350.1	SH	10/22/19

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 19-A016743

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	< 0.005	mg/l		0.005	EPA 200.7	HKL	10/23/19
Dissolved Barium	0.0143	mg/l		0.0005	EPA 200.7	HKL	10/23/19
Dissolved Iron	< 0.01	mg/l		0.01	EPA 200.7	HKL	10/23/19
Dissolved Manganese	0.193	mg/l		0.005	EPA 200.7	HKL	10/23/19
Dissolved Nickel	0.012	mg/l		0.005	EPA 200.7	HKL	10/23/19

AMTEST Identification Number **19-A016744**
Client Identification **BXS-3**
Sampling Date **10/12/19, 12:21**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	250	mg/l		1	SM 2540C	KF	10/16/19
Tannin and Lignin	100	mg/l		0.1	SM 5550B	DM	10/21/19

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	20.	mg/l		0.5	SM 5310B	NNL	10/25/19
Chemical Oxygen Demand	57.	mg/l		10	EPA 410.4	DM	10/25/19

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	1.74	mg/l		0.05	EPA 300.0	SH	10/15/19
Sulfate	0.30	mg/l		0.1	EPA 300.0	SH	10/15/19

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.823	mg/l		0.02	EPA 350.1	SH	10/22/19

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 19-A016744

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	0.023	mg/l		0.005	EPA 200.7	HKL	10/23/19
Dissolved Barium	0.0577	mg/l		0.0005	EPA 200.7	HKL	10/23/19
Dissolved Iron	83.8	mg/l		0.01	EPA 200.7	HKL	10/23/19
Dissolved Manganese	5.29	mg/l		0.005	EPA 200.7	HKL	10/23/19
Dissolved Nickel	0.035	mg/l		0.005	EPA 200.7	HKL	10/23/19

AMTEST Identification Number **19-A016745**
Client Identification **BXS-103**
Sampling Date **10/12/19, 12:25**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	330	mg/l		1	SM 2540C	KF	10/16/19
Tannin and Lignin	2.8	mg/l		0.1	SM 5550B	DM	10/21/19

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	13.	mg/l		0.5	SM 5310B	NNL	10/25/19
Chemical Oxygen Demand	38.	mg/l		10	EPA 410.4	DM	10/25/19

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	2.12	mg/l		0.05	EPA 300.0	SH	10/15/19
Sulfate	0.49	mg/l		0.1	EPA 300.0	SH	10/15/19

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.028	mg/l		0.02	EPA 350.1	SH	10/22/19

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 19-A016745

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	0.005	mg/l		0.005	EPA 200.7	HKL	10/23/19
Dissolved Barium	0.0411	mg/l		0.0005	EPA 200.7	HKL	10/23/19
Dissolved Iron	0.062	mg/l		0.01	EPA 200.7	HKL	10/23/19
Dissolved Manganese	1.67	mg/l		0.005	EPA 200.7	HKL	10/23/19
Dissolved Nickel	0.039	mg/l		0.005	EPA 200.7	HKL	10/23/19

AMTEST Identification Number **19-A016746**
Client Identification **BXS-2**
Sampling Date **10/12/19, 13:15**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	260	mg/l		1	SM 2540C	KF	10/16/19
Tannin and Lignin	99.	mg/l		0.1	SM 5550B	DM	10/21/19

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	20.	mg/l		0.5	SM 5310B	NNL	10/25/19
Chemical Oxygen Demand	60.	mg/l		10	EPA 410.4	DM	10/25/19

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	1.58	mg/l		0.05	EPA 300.0	SH	10/15/19
Sulfate	0.27	mg/l		0.1	EPA 300.0	SH	10/15/19

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.847	mg/l		0.02	EPA 350.1	SH	10/22/19

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 19-A016746

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	0.024	mg/l		0.005	EPA 200.7	HKL	10/23/19
Dissolved Barium	0.0573	mg/l		0.0005	EPA 200.7	HKL	10/23/19
Dissolved Iron	85.4	mg/l		0.01	EPA 200.7	HKL	10/23/19
Dissolved Manganese	5.31	mg/l		0.005	EPA 200.7	HKL	10/23/19
Dissolved Nickel	0.036	mg/l		0.005	EPA 200.7	HKL	10/23/19

AMTEST Identification Number **19-A016747**
Client Identification **BXN-4**
Sampling Date **10/12/19, 14:21**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	270	mg/l		1	SM 2540C	KF	10/16/19
Tannin and Lignin	0.86	mg/l		0.1	SM 5550B	DM	10/21/19

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	1.8	mg/l		0.5	SM 5310B	NNL	10/25/19
Chemical Oxygen Demand	< 10	mg/l		10	EPA 410.4	DM	10/25/19

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	4.35	mg/l		0.05	EPA 300.0	SH	10/15/19
Sulfate	51.9	mg/l		0.1	EPA 300.0	SH	10/15/19

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.146	mg/l		0.02	EPA 350.1	SH	10/22/19
Total Nitrate + Nitrite	2.3	mg/l		0.02	EPA 353.2	SH	10/25/19

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 19-A016747

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	< 0.005	mg/l		0.005	EPA 200.7	HKL	10/23/19
Dissolved Barium	0.0419	mg/l		0.0005	EPA 200.7	HKL	10/23/19
Dissolved Iron	0.014	mg/l		0.01	EPA 200.7	HKL	10/23/19
Dissolved Manganese	1.23	mg/l		0.005	EPA 200.7	HKL	10/23/19

AMTEST Identification Number **19-A016748**
Client Identification **BXN-2**
Sampling Date **10/12/19, 15:34**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	150	mg/l		1	SM 2540C	KF	10/16/19
Tannin and Lignin	0.88	mg/l		0.1	SM 5550B	DM	10/21/19

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	0.97	mg/l		0.5	SM 5310B	NNL	10/25/19
Chemical Oxygen Demand	< 10	mg/l		10	EPA 410.4	DM	10/25/19

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	22.2	mg/l		0.05	EPA 300.0	SH	10/15/19
Sulfate	11.7	mg/l		0.1	EPA 300.0	SH	10/15/19

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.025	mg/l		0.02	EPA 350.1	SH	10/22/19
Total Nitrate + Nitrite	1.9	mg/l		0.02	EPA 353.2	SH	10/25/19

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 19-A016748

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	< 0.005	mg/l		0.005	EPA 200.7	HKL	10/23/19
Dissolved Barium	0.0076	mg/l		0.0005	EPA 200.7	HKL	10/23/19
Dissolved Iron	< 0.01	mg/l		0.01	EPA 200.7	HKL	10/23/19
Dissolved Manganese	3.10	mg/l		0.005	EPA 200.7	HKL	10/23/19

AMTEST Identification Number **19-A016749**
Client Identification **RINSATE**
Sampling Date **10/12/19, 15:45**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	2.0	mg/l		1	SM 2540C	KF	10/16/19
Tannin and Lignin	0.28	mg/l		0.1	SM 5550B	DM	10/21/19

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	< 0.5	mg/l		0.5	SM 5310B	NNL	10/25/19
Chemical Oxygen Demand	< 10	mg/l		10	EPA 410.4	DM	10/25/19

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	0.14	mg/l		0.05	EPA 300.0	SH	10/15/19
Sulfate	< 0.1	mg/l		0.1	EPA 300.0	SH	10/15/19

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.029	mg/l		0.02	EPA 350.1	SH	10/22/19
Total Nitrate + Nitrite	< 0.02	mg/l		0.02	EPA 353.2	SH	10/25/19

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 19-A016749

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	< 0.005	mg/l		0.005	EPA 200.7	HKL	10/23/19
Dissolved Barium	0.0006	mg/l		0.0005	EPA 200.7	HKL	10/23/19
Dissolved Iron	0.010	mg/l		0.01	EPA 200.7	HKL	10/23/19
Dissolved Manganese	0.010	mg/l		0.005	EPA 200.7	HKL	10/23/19

AMTEST Identification Number **19-A016750**
Client Identification **BXN-1**
Sampling Date **10/12/19, 16:45**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	280	mg/l		1	SM 2540C	KF	10/16/19
Tannin and Lignin	18.	mg/l		0.1	SM 5550B	DM	10/21/19

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	4.2	mg/l		0.5	SM 5310B	NNL	10/25/19
Chemical Oxygen Demand	26.	mg/l		10	EPA 410.4	DM	10/25/19

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	27.0	mg/l		0.05	EPA 300.0	SH	10/16/19
Sulfate	21.4	mg/l		0.1	EPA 300.0	SH	10/16/19

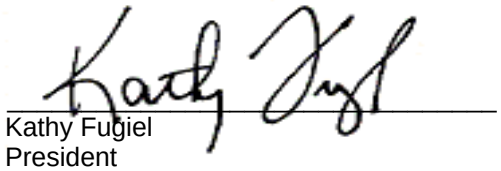
Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.142	mg/l		0.02	EPA 350.1	SH	10/22/19
Total Nitrate + Nitrite	< 0.02	mg/l		0.02	EPA 353.2	SH	10/25/19

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 19-A016750

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	0.009	mg/l		0.005	EPA 200.7	HKL	10/23/19
Dissolved Barium	0.0375	mg/l		0.0005	EPA 200.7	HKL	10/23/19
Dissolved Iron	23.6	mg/l		0.01	EPA 200.7	HKL	10/23/19
Dissolved Manganese	5.84	mg/l		0.005	EPA 200.7	HKL	10/23/19



Kathy Fugiel
President

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Professional Analytical Services

QC Summary for sample numbers: 19-A016742 to 19-A016750

DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	DUP VALUE	RPD
19-A016710	Total Organic Carbon	mg/l	4.5	4.6	2.2
19-A016743	Total Organic Carbon	mg/l	3.2	3.2	0.00
19-A016922	Total Organic Carbon	mg/l	4.9	4.5	8.5
19-A017022	Total Organic Carbon	mg/l	< 0.5	0.54	
19-A017061	Total Organic Carbon	mg/l	1.4	1.4	0.00
19-A017074	Total Organic Carbon	mg/l	4.9	4.6	6.3
19-A017137	Total Organic Carbon	mg/l	5.2	5.1	1.9
19-A016928	Chloride	mg/l	4.10	4.19	2.2
19-A016930	Chloride	mg/l	< 0.05	< 0.05	
19-A016744	Chloride	mg/l	1.74	1.73	0.58
19-A016755	Chloride	mg/l	120.	120.	0.00
19-A016995	Chloride	mg/l	15.3	15.2	0.66
19-A016715	Ammonia Nitrogen	mg/l	0.021	0.021	0.00
19-A016748	Ammonia Nitrogen	mg/l	0.025	0.027	7.7
19-A016922	Ammonia Nitrogen	mg/l	0.025	0.025	0.00
19-A016932	Ammonia Nitrogen	mg/l	23.6	23.2	1.7
19-A016952	Ammonia Nitrogen	mg/l	0.030	0.025	18.
19-A016716	Total Nitrate + Nitrite	mg/l	0.20	0.19	5.1
19-A016924	Total Nitrate + Nitrite	mg/l	0.31	0.31	0.00
19-A016563	Total Dissolved Solids	mg/l	200	200	0.00
19-A016748	Total Dissolved Solids	mg/l	150	150	0.00
19-A016905	Total Dissolved Solids	mg/l	89.	94.	5.5
19-A017024	Total Dissolved Solids	mg/l	550	560	1.8
19-A016744	Sulfate	mg/l	0.30	0.29	3.4
19-A016755	Sulfate	mg/l	52.0	52.1	0.19
19-A016995	Sulfate	mg/l	25.7	25.5	0.78

MATRIX SPIKES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	SMPL+ SPK	SPK AMT	RECOVERY
19-A016711	Total Organic Carbon	mg/l	1.4	29.	25.	110.40 %
19-A016744	Total Organic Carbon	mg/l	20.	74.	50.	108.00 %
19-A016923	Total Organic Carbon	mg/l	1.6	28.	25.	105.60 %
19-A017023	Total Organic Carbon	mg/l	6.4	31.	25.	98.40 %
19-A017062	Total Organic Carbon	mg/l	1.6	27.	25.	101.60 %
19-A017075	Total Organic Carbon	mg/l	< 0.5	26.	25.	104.00 %
19-A017138	Total Organic Carbon	mg/l	2.5	27.	25.	98.00 %
19-A016775	Chemical Oxygen Demand	mg/l	< 10	110	100	110.00 %
19-A016775	Chemical Oxygen Demand	mg/l	< 10	100	100	100.00 %
19-A016943	Chemical Oxygen Demand	mg/l	< 10	120	100	120.00 %
19-A016943	Chemical Oxygen Demand	mg/l	< 10	120	100	120.00 %

QC Summary for sample numbers: 19-A016742 to 19-A016750...

MATRIX SPIKES continued....

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	SMPL+ SPK	SPK AMT	RECOVERY
Duplicate	Chloride	mg/l	4.19	6.21	2.00	101.00 %
19-A016930	Chloride	mg/l	< 0.05	1.95	2.00	97.50 %
19-A016744	Chloride	mg/l	1.74	3.86	2.00	106.00 %
19-A016755	Chloride	mg/l	120.	312.	200.	96.00 %
19-A016995	Chloride	mg/l	15.3	34.4	20.0	95.50 %
19-A016715	Ammonia Nitrogen	mg/l	0.021	1.04	1.00	101.90 %
19-A016748	Ammonia Nitrogen	mg/l	0.025	1.06	1.00	103.50 %
19-A016922	Ammonia Nitrogen	mg/l	0.025	1.06	1.00	103.50 %
19-A016932	Ammonia Nitrogen	mg/l	23.6	44.0	20.0	102.00 %
19-A016952	Ammonia Nitrogen	mg/l	0.030	1.03	1.00	100.00 %
19-A016716	Total Nitrate + Nitrite	mg/l	0.20	1.0	1.0	80.00 %
19-A016924	Total Nitrate + Nitrite	mg/l	0.31	1.2	1.0	89.00 %
19-A016744	Sulfate	mg/l	0.30	2.47	2.00	108.50 %
19-A016755	Sulfate	mg/l	52.0	251.	200.	99.50 %
19-A016995	Sulfate	mg/l	25.7	45.6	20.0	99.50 %
19-A016749	Tannin and Lignin	mg/l	0.28	0.46	0.20	90.00 %
19-A016749	Tannin and Lignin	mg/l	0.28	0.46	0.20	90.00 %
19-A017054	Tannin and Lignin	mg/l	3.4	12.	10.	86.00 %
19-A016750	Dissolved Arsenic	mg/l	0.009	0.062	0.050	106.00 %
19-A016750	Dissolved Arsenic	mg/l	0.009	0.060	0.050	102.00 %
19-A016750	Dissolved Barium	mg/l	0.0375	0.0892	0.0500	103.40 %
19-A016750	Dissolved Barium	mg/l	0.0375	0.0894	0.0500	103.80 %
19-A016750	Dissolved Iron	mg/l	23.6	34.5	10.0	109.00 %
19-A016750	Dissolved Iron	mg/l	23.6	34.6	10.0	110.00 %
19-A016750	Dissolved Manganese	mg/l	5.84	5.96	0.050	234.00 %

MATRIX SPIKE DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE + SPK	MSD VALUE	RPD
Spike	Chemical Oxygen Demand	mg/l	110	100	9.5
Spike	Chemical Oxygen Demand	mg/l	120	120	0.00
Spike	Tannin and Lignin	mg/l	0.46	0.46	0.00
Spike	Dissolved Arsenic	mg/l	0.062	0.060	3.3
Spike	Dissolved Barium	mg/l	0.0892	0.0894	0.22
Spike	Dissolved Iron	mg/l	34.5	34.6	0.29
Spike	Dissolved Nickel	mg/l	0.103	0.103	0.00

STANDARD REFERENCE MATERIALS

ANALYTE	UNITS	TRUE VALUE	MEASURED VALUE	RECOVERY
Total Organic Carbon	mg/l	25.	26.	104. %
Total Organic Carbon	mg/l	25.	25.	100. %
Chemical Oxygen Demand	mg/l	50.	52.	104. %
Chemical Oxygen Demand	mg/l	50.	54.	108. %
Chloride	mg/l	2.00	1.98	99.0 %
Chloride	mg/l	2.00	2.00	100. %
Chloride	mg/l	2.00	2.00	100. %
Ammonia Nitrogen	mg/l	1.00	0.980	98.0 %
Ammonia Nitrogen	mg/l	1.00	0.996	99.6 %
Total Nitrate + Nitrite	mg/l	1.0	0.90	90.0 %
Total Nitrate + Nitrite	mg/l	1.0	0.97	97.0 %
Total Dissolved Solids	mg/l	350	360	103. %

QC Summary for sample numbers: 19-A016742 to 19-A016750...

STANDARD REFERENCE MATERIALS continued....

ANALYTE	UNITS	TRUE VALUE	MEASURED VALUE	RECOVERY
Sulfate	mg/l	2.00	2.07	104. %
Sulfate	mg/l	2.00	1.96	98.0 %
Sulfate	mg/l	2.00	1.96	98.0 %
Tannin and Lignin	mg/l	0.80	0.60	75.0 %
Tannin and Lignin	mg/l	0.40	0.35	87.5 %
Dissolved Arsenic	mg/l	2.00	2.08	104. %
Dissolved Barium	mg/l	0.800	0.842	105. %
Dissolved Iron	mg/l	4.00	4.28	107. %
Dissolved Manganese	mg/l	0.800	0.845	106. %
Dissolved Nickel	mg/l	0.800	0.845	106. %

BLANKS

ANALYTE	UNITS	RESULT
Total Organic Carbon	mg/l	< 0.5
Total Organic Carbon	mg/l	< 0.5
Chemical Oxygen Demand	mg/l	< 10
Chemical Oxygen Demand	mg/l	< 10
Chloride	mg/l	< 0.05
Chloride	mg/l	< 0.05
Chloride	mg/l	0.11
Ammonia Nitrogen	mg/l	< 0.02
Ammonia Nitrogen	mg/l	< 0.02
Total Nitrate + Nitrite	mg/l	< 0.02
Total Nitrate + Nitrite	mg/l	< 0.02
Total Dissolved Solids	mg/l	< 1
Sulfate	mg/l	< 0.1
Sulfate	mg/l	< 0.1
Sulfate	mg/l	< 0.1
Tannin and Lignin	mg/l	< 0.1
Dissolved Arsenic	mg/l	< 0.005
Dissolved Barium	mg/l	< 0.0005
Dissolved Iron	mg/l	< 0.01
Dissolved Manganese	mg/l	< 0.005
Dissolved Nickel	mg/l	< 0.005

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Professional Analytical Services

ANALYSIS REPORT

KVAM AQUATIC SCIENCES LLC
9314 NE 133RD ST
KIRKLAND, WA 98034
Attention: BRUCE KVAM
Project Name: ARLINGTON GROUNDWATER
All results reported on an as received basis.

Date Received: 12/23/19
Date Reported: 3/27/20

AMTEST Identification Number **19-A020840**
Client Identification **BXS-3**
Sampling Date **12/22/19, 12:40**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	340	mg/l		1	SM 2540C	KF	12/30/19
Tannin and Lignin	89.	mg/l		0.1	SM 5550B	KF	12/30/19

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	19.	mg/l		0.5	SM 5310B	NNL	01/06/20
Chemical Oxygen Demand	40.	mg/l		10	EPA 410.4	KF	12/27/19

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	1.73	mg/l		0.05	EPA 300.0	SH	12/23/19
Sulfate	0.29	mg/l		0.1	EPA 300.0	SH	12/23/19

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.807	mg/l		0.02	EPA 350.1	SH	12/27/19

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 19-A020840

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	0.102	mg/l		0.005	EPA 200.7	HKL	01/03/20
Dissolved Barium	0.0415	mg/l		0.005	EPA 200.7	HKL	01/03/20
Dissolved Iron	99.6	mg/l		0.05	EPA 200.7	HKL	01/03/20
Dissolved Manganese	5.55	mg/l		0.005	EPA 200.7	HKL	01/03/20
Dissolved Nickel	0.028	mg/l		0.01	EPA 200.7	HKL	03/27/20

AMTEST Identification Number **19-A020841**
Client Identification **Blank**
Sampling Date **12/22/19, 12:50**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	1.0	mg/l		1	SM 2540C	KF	12/30/19
Tannin and Lignin	< 0.1	mg/l		0.1	SM 5550B	KF	12/30/19

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	< 0.5	mg/l		0.5	SM 5310B	NNL	01/06/20
Chemical Oxygen Demand	< 10	mg/l		10	EPA 410.4	KF	12/27/19

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	< 0.05	mg/l		0.05	EPA 300.0	SH	12/23/19
Sulfate	< 0.1	mg/l		0.1	EPA 300.0	SH	12/23/19

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	< 0.02	mg/l		0.02	EPA 350.1	SH	12/27/19

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 19-A020841

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	< 0.005	mg/l		0.005	EPA 200.7	HKL	01/03/20
Dissolved Barium	< 0.0005	mg/l		0.005	EPA 200.7	HKL	01/03/20
Dissolved Iron	0.016	mg/l		0.05	EPA 200.7	HKL	01/03/20
Dissolved Manganese	< 0.005	mg/l		0.005	EPA 200.7	HKL	01/03/20
Dissolved Nickel	< 0.01	mg/l		0.01	EPA 200.7	HKL	03/27/20

Kathy Fugiel
President

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QC Summary for sample numbers: 19-A020840 to 19-A020843

DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	DUP VALUE	RPD
19-A021004	Total Organic Carbon	mg/l	10.	9.8	2.0
19-A021093	Total Organic Carbon	mg/l	1.7	1.5	12.
19-A021103	Total Organic Carbon	mg/l	7.6	7.0	8.2
20-A000090	Total Organic Carbon	mg/l	18.	13.	32.
19-A020843	Chloride	mg/l	18.0	18.3	1.7
19-A020617	Ammonia Nitrogen	mg/l	< 0.02	< 0.02	
19-A020756	Ammonia Nitrogen	mg/l	0.082	0.082	0.00
19-A020766	Ammonia Nitrogen	mg/l	0.124	0.125	0.80
19-A020842	Ammonia Nitrogen	mg/l	0.127	0.127	0.00
19-A020883	Ammonia Nitrogen	mg/l	0.054	0.052	3.8
19-A020863	Total Nitrate + Nitrite	mg/l	1.0	0.93	7.3
19-A021008	Total Nitrate + Nitrite	mg/l	< 0.02	< 0.02	
19-A021091	Total Nitrate + Nitrite	mg/l	2.4	2.4	0.00
19-A021101	Total Nitrate + Nitrite	mg/l	0.66	0.65	1.5
19-A021110	Total Nitrate + Nitrite	mg/l	0.18	0.17	5.7
19-A020920	Total Dissolved Solids	mg/l	37.	41.	10.
19-A020924	Total Dissolved Solids	mg/l	47.	35.	29.
19-A020843	Sulfate	mg/l	18.0	18.1	0.55
19-A020843	Tannin and Lignin	mg/l	26.	27.	3.8

MATRIX SPIKES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	SMPL+ SPK	SPK AMT	RECOVERY
19-A021005	Total Organic Carbon	mg/l	9.0	59.	50.	100.00 %
19-A021094	Total Organic Carbon	mg/l	5.0	56.	50.	102.00 %
19-A021104	Total Organic Carbon	mg/l	2.8	56.	50.	106.40 %
20-A000091	Total Organic Carbon	mg/l	< 0.5	52.	50.	104.00 %
19-A020843	Chemical Oxygen Demand	mg/l	< 10	55.	50.	110.00 %
19-A020843	Chemical Oxygen Demand	mg/l	< 10	52.	50.	104.00 %
19-A020843	Chloride	mg/l	18.0	35.7	20.0	88.50 %
19-A020617	Ammonia Nitrogen	mg/l	< 0.02	1.00	1.00	100.00 %
19-A020756	Ammonia Nitrogen	mg/l	0.082	1.10	1.00	101.80 %
19-A020766	Ammonia Nitrogen	mg/l	0.124	1.14	1.00	101.60 %
19-A020883	Ammonia Nitrogen	mg/l	0.054	1.05	1.00	99.60 %
19-A020863	Total Nitrate + Nitrite	mg/l	1.0	2.0	1.0	100.00 %
19-A021008	Total Nitrate + Nitrite	mg/l	< 0.02	0.90	1.0	90.00 %
19-A021091	Total Nitrate + Nitrite	mg/l	2.4	12.	10.	96.00 %
19-A021101	Total Nitrate + Nitrite	mg/l	0.66	1.6	1.0	94.00 %
19-A021110	Total Nitrate + Nitrite	mg/l	0.18	1.1	1.0	92.00 %
19-A020843	Sulfate	mg/l	18.0	37.7	20.0	98.50 %
19-A020843	Dissolved Arsenic	mg/l	0.056	0.554	0.500	99.60 %

QC Summary for sample numbers: 19-A020840 to 19-A020843...

MATRIX SPIKES continued....

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	SMPL+ SPK	SPK AMT	RECOVERY
19-A020843	Dissolved Arsenic	mg/l	0.056	0.554	0.500	99.60 %
19-A020843	Dissolved Barium	mg/l	0.0376	0.242	0.200	102.20 %
19-A020843	Dissolved Barium	mg/l	0.0376	0.242	0.200	102.20 %
19-A020627	Dissolved Iron	mg/l	< 0.01	9.64	9.85	97.87 %
19-A020627	Dissolved Iron	mg/l	< 0.01	9.94	9.85	100.91 %
19-A020638	Dissolved Iron	mg/l	< 0.01	9.79	9.85	99.39 %
19-A020638	Dissolved Iron	mg/l	< 0.01	9.78	9.85	99.29 %
19-A020843	Dissolved Iron	mg/l	36.2	46.1	9.85	100.51 %
19-A020843	Dissolved Iron	mg/l	36.2	46.2	9.85	101.52 %
19-A020627	Dissolved Manganese	mg/l	0.026	1.14	1.17	95.21 %
19-A020627	Dissolved Manganese	mg/l	0.026	1.16	1.17	96.92 %
19-A020638	Dissolved Manganese	mg/l	< 0.005	1.14	1.17	97.44 %
19-A020638	Dissolved Manganese	mg/l	< 0.005	1.14	1.17	97.44 %
19-A020843	Dissolved Manganese	mg/l	5.44	6.56	1.17	95.73 %
19-A020843	Dissolved Manganese	mg/l	5.44	6.57	1.17	96.58 %

MATRIX SPIKE DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE + SPK	MSD VALUE	RPD
Spike	Chemical Oxygen Demand	mg/l	55.	52.	5.6
Spike	Dissolved Arsenic	mg/l	0.554	0.554	0.00
Spike	Dissolved Barium	mg/l	0.242	0.242	0.00
Spike	Dissolved Iron	mg/l	9.64	9.94	3.1
Spike	Dissolved Iron	mg/l	9.79	9.78	0.10
Spike	Dissolved Iron	mg/l	46.1	46.2	0.22
Spike	Dissolved Manganese	mg/l	1.14	1.16	1.7
Spike	Dissolved Manganese	mg/l	1.14	1.14	0.00
Spike	Dissolved Manganese	mg/l	6.56	6.57	0.15

STANDARD REFERENCE MATERIALS

ANALYTE	UNITS	TRUE VALUE	MEASURED VALUE	RECOVERY
Total Organic Carbon	mg/l	25.	24.	96.0 %
Total Organic Carbon	mg/l	25.	25.	100. %
Total Organic Carbon	mg/l	25.	26.	104. %
Total Organic Carbon	mg/l	25.	25.	100. %
Chemical Oxygen Demand	mg/l	100	110	110. %
Chloride	mg/l	2.00	1.94	97.0 %
Ammonia Nitrogen	mg/l	1.00	0.959	95.9 %
Ammonia Nitrogen	mg/l	1.00	0.981	98.1 %
Total Nitrate + Nitrite	mg/l	1.0	0.96	96.0 %
Total Nitrate + Nitrite	mg/l	1.0	0.90	90.0 %
Total Nitrate + Nitrite	mg/l	1.0	0.96	96.0 %
Total Nitrate + Nitrite	mg/l	1.0	0.94	94.0 %
Total Nitrate + Nitrite	mg/l	1.0	0.98	98.0 %
Total Dissolved Solids	mg/l	350	340	97.1 %
Sulfate	mg/l	2.00	2.04	102. %
Tannin and Lignin	mg/l	0.80	0.81	101. %
Dissolved Arsenic	mg/l	2.00	1.95	97.5 %
Dissolved Arsenic	mg/l	2.00	1.96	98.0 %
Dissolved Arsenic	mg/l	2.00	1.94	97.0 %
Dissolved Barium	mg/l	0.800	0.792	99.0 %

QC Summary for sample numbers: 19-A020840 to 19-A020843...

STANDARD REFERENCE MATERIALS continued....

ANALYTE	UNITS	TRUE VALUE	MEASURED VALUE	RECOVERY
Dissolved Barium	mg/l	0.800	0.789	98.6 %
Dissolved Barium	mg/l	0.800	0.802	100. %
Dissolved Iron	mg/l	4.00	3.88	97.0 %
Dissolved Iron	mg/l	4.00	3.82	95.5 %
Dissolved Iron	mg/l	4.00	3.89	97.2 %
Dissolved Manganese	mg/l	0.800	0.790	98.8 %
Dissolved Manganese	mg/l	0.800	0.783	97.9 %
Dissolved Manganese	mg/l	0.800	0.798	99.8 %

BLANKS

ANALYTE	UNITS	RESULT
Total Organic Carbon	mg/l	< 0.5
Total Organic Carbon	mg/l	< 0.5
Total Organic Carbon	mg/l	< 0.5
Total Organic Carbon	mg/l	< 0.5
Chemical Oxygen Demand	mg/l	< 10
Chloride	mg/l	< 0.05
Ammonia Nitrogen	mg/l	< 0.02
Ammonia Nitrogen	mg/l	< 0.02
Total Nitrate + Nitrite	mg/l	< 0.02
Total Nitrate + Nitrite	mg/l	< 0.02
Total Nitrate + Nitrite	mg/l	< 0.02
Total Nitrate + Nitrite	mg/l	< 0.02
Total Nitrate + Nitrite	mg/l	< 0.02
Total Dissolved Solids	mg/l	< 1
Sulfate	mg/l	< 0.1
Tannin and Lignin	mg/l	< 0.1
Dissolved Arsenic	mg/l	< 0.005
Dissolved Arsenic	mg/l	< 0.005
Dissolved Arsenic	mg/l	< 0.005
Dissolved Barium	mg/l	< 0.0005
Dissolved Barium	mg/l	< 0.0005
Dissolved Barium	mg/l	< 0.0005
Dissolved Iron	mg/l	< 0.01
Dissolved Iron	mg/l	< 0.005
Dissolved Iron	mg/l	< 0.01
Dissolved Manganese	mg/l	< 0.005
Dissolved Manganese	mg/l	< 0.005
Dissolved Manganese	mg/l	< 0.005

Appendix C

Statistical Analysis of Groundwater Data

Table C-1. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Ammonia

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Student's T-Test Formula (*t*):

$$\frac{\bar{x} - m_0}{\sqrt{[(s^1/n) + (s^2/n)]}}$$

Critical Statistic:

$t_c = 2.447$	$v = 6$
$t_c = 2.571$	$v = 5$
$t_c = 2.776$	$v = 4$
$t_c = 3.182$	$v = 3$
$t_c = 4.303$	$v = 2$
$t_c = 12.706$	$v = 1$

BXS-4 (Upgradient Well)				
Date	**Ammonia Concentration[1]**	**Number of Samples (n)**	**Average Concentration (m_0)**	**Sample Variance (s^1)**
11/17/2014	0.55	--	--	--
2/23/2015	0.54	--	--	--
9/14/2015	0.54	--	--	--
12/7/2015	0.51	4	0.53	0.00028
2/29/2016	0.45	4	0.51	0.00161
6/16/2016	0.53	4	0.51	0.00152
9/26/2016	0.52	4	0.50	0.00128
3/8/2017	0.03	4	0.38	0.05767
6/10/2017	--	3	0.36	0.08336
9/16/2017	0.54	3	0.36	0.08511
12/14/2017	--	2	0.28	0.13261
3/17/2018	0.515	2	0.53	0.00031
6/16/2018	--	2	0.53	0.00031
9/29/2018	2.18	2	1.35	1.38611
11/17/2018	--	2	1.35	1.38611
3/16/2019	1.16	2	1.67	0.52020
6/1/2019	--	2	1.67	0.52020
10/12/2019	1.26	2	1.21	0.00500
12/22/2019	--	2	1.21	0.00500

BXS-3 (Downgradient Well)						
Date	**Ammonia Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student's T-Test Statistic (t)[2]**
11/17/2014	1.08	--	--	--	--	--
2/23/2015	1.05	--	--	--	--	--
9/14/2015	1.00	--	--	--	--	--
12/7/2015	1.00	4	1.03	0.002	0.04	**23.05**
2/29/2016	1.16	4	1.05	0.006	0.08	**12.70**
6/16/2016	1.13	4	1.07	0.007	0.09	**12.09**
9/26/2016	0.94	4	1.06	0.011	0.11	**10.00**
3/8/2017	0.88	4	1.03	0.019	0.14	**4.66**
6/10/2017	--	3	0.98	0.017	0.13	**3.42**
9/16/2017	0.99	3	0.94	0.003	0.06	**3.35**
12/14/2017	--	2	0.94	0.006	0.08	2.48
3/17/2018	0.847	2	0.92	0.010	0.10	5.39
6/16/2018	--	2	0.92	0.010	0.10	5.39
9/29/2018	0.844	2	0.85	0.000	0.00	-0.60
11/17/2018	0.824	3	0.84	0.000	0.01	-0.61
3/16/2019	1.04	3	0.90	0.014	0.12	-1.49
6/1/2019	0.01	4	0.68	0.209	0.46	-1.77
10/12/2019	0.85	4	0.68	0.209	0.46	-2.26
12/22/2019	0.81	4	0.68	0.208	0.46	-2.28

Table C-1. Statistical Analysis of Groundwater Quality Results for Downgradient Wells:
Ammonia

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

BXS-2 (Downgradient Well)						
Date	**Ammonia Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student's T-Test Statistic (t)[2]**
11/17/2014	0.05	--	--	--	--	--
2/23/2015	0.05	--	--	--	--	--
9/14/2015	0.05	--	--	--	--	--
12/7/2015	0.05	4	0.05	0.000	0.00	-57.24
2/29/2016	0.05	4	0.05	0.000	0.00	-22.81
6/16/2016	0.05	4	0.05	0.000	0.00	-23.39
9/26/2016	0.05	4	0.05	0.000	0.00	-25.24
3/8/2017	0.025	4	0.04	0.000	0.01	-2.81
6/10/2017	0.025	4	0.04	0.000	0.01	-1.92
9/16/2017	0.025	4	0.03	0.000	0.01	-1.96
12/14/2017	0.0025	4	0.02	0.000	0.01	-1.02
3/17/2018	0.0135	4	0.02	0.000	0.01	-37.53
6/16/2018	0.01	4	0.01	0.000	0.01	-38.56
9/29/2018	0.005	4	0.01	0.000	0.00	-1.61
11/17/2018	--	3	0.01	0.000	0.00	-1.61
3/16/2019	0.01	2	0.01	0.000	0.00	-3.26
6/1/2019	--	2	0.01	0.000	0.00	-3.26
10/12/2019	0.03	2	0.02	0.000	0.01	-23.34
12/22/2019	--	2	0.02	0.000	0.01	-23.34

BXS-1 (Downgradient Well)						
Date	**Ammonia Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student's T-Test Statistic (t)[2]**
11/17/2014	0.05	--	--	--	--	--
2/23/2015	0.05	--	--	--	--	--
9/14/2015	0.041	--	--	--	--	--
12/7/2015	0.05	4	0.05	0.000	0.00	-55.56
2/29/2016	0.02	4	0.04	0.000	0.01	-21.96
6/16/2016	0.05	4	0.04	0.000	0.01	-22.45
9/26/2016	0.46	4	0.15	0.044	0.21	-3.34
3/8/2017	0.17	4	0.18	0.040	0.20	-1.32
6/10/2017	--	3	0.23	0.044	0.21	-0.64
9/16/2017	0.025	3	0.22	0.049	0.22	-0.68
12/14/2017	--	2	0.10	0.011	0.10	-0.69
3/17/2018	0.006	2	0.02	0.000	0.01	-32.61
6/16/2018	--	2	0.02	0.000	0.01	-32.61
9/29/2018	0.005	2	0.01	0.000	0.00	-1.61
11/17/2018	--	2	0.01	0.000	0.00	-1.61
3/16/2019	0.01	2	0.01	0.000	0.00	-3.26
6/1/2019	--	2	0.01	0.000	0.00	-3.26
10/12/2019	0.03	2	0.02	0.000	0.01	-23.34
12/22/2019	--	2	0.02	0.000	0.01	-23.34

Notes

$\bar{x}$ = average concentration for downgradient well. m_o = average concentration for upgradient well. n = number of samples.

s^1 = sample variance in upgradient well. s^2 = sample variance in downgradient well. s = sample standard deviation.

t = Student's T-Test statistic. -- = analysis not applicable. * = statistic with no/zero difference

[1] For non-detect concentrations, half of the reporting limit (MRL) is used. [2] Statistic in **bold** or gray is a statistically valid detection (Student's T-Test).

Table C-2. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Chloride

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Student's T-Test Formula (*t*): $$\frac{\bar{x} - m_0}{\sqrt{[(s^1/n) + (s^2/n)]}}$$

Critical Statistic: $t_c = 2.447$ $v = 6$; $t_c = 2.571$ $v = 5$; $t_c = 2.776$ $v = 4$; $t_c = 3.182$ $v = 3$; $t_c = 4.303$ $v = 2$; $t_c = 12.706$ $v = 1$

BXS-4 (Upgradient Well)				
Date	Chloride Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
11/17/2014	2.02	--	--	--
2/23/2015	1.58	--	--	--
9/14/2015	1.93	--	--	--
12/7/2015	1.66	4	1.80	0.04442
2/29/2016	1.83	4	1.75	0.02527
6/16/2016	1.97	4	1.85	0.01909
9/26/2016	1.91	4	1.84	0.01809
3/8/2017	1.97	4	1.92	0.00440
6/10/2017	--	3	1.95	0.00120
9/16/2017	2.00	3	1.96	0.00210
12/14/2017	--	2	1.99	0.00045
3/17/2018	1.96	2	1.98	0.00080
6/16/2018	--	2	1.98	0.00080
9/29/2018	--	1	1.96	#DIV/0!
11/17/2018	--	1	1.96	#DIV/0!
3/16/2019	2.76	1	2.76	#DIV/0!
6/1/2019	--	1	2.76	#DIV/0!
10/12/2019	2.58	2	2.67	0.01620
12/22/2019	--	2	2.67	0.01620

BXS-3 (Downgradient Well)						
Date	Chloride Concentration[1]	Number of Samples (n)	Average Concentration ($\bar{x}$)	Sample Variance (s^2)	Sample Standard Deviation (s)	Student's T-Test Statistic (t)[2]
11/17/2014	1.76	--	--	--	--	--
2/23/2015	1.38	--	--	--	--	--
9/14/2015	1.87	--	--	--	--	--
12/7/2015	1.54	4	1.64	0.048	0.22	-1.05
2/29/2016	1.62	4	1.60	0.042	0.20	-1.14
6/16/2016	1.57	4	1.65	0.023	0.15	-1.93
9/26/2016	2.13	4	1.72	0.078	0.28	-0.82
3/8/2017	1.77	4	1.77	0.064	0.25	-1.13
6/10/2017	--	3	1.82	0.081	0.28	-0.77
9/16/2017	--	2	1.95	0.065	0.25	-0.05
12/14/2017	--	1	1.77	#DIV/0!	#DIV/0!	*
3/17/2018	2.20	1	2.20	#DIV/0!	#DIV/0!	*
6/16/2018	--	1	2.20	#DIV/0!	#DIV/0!	*
9/29/2018	1.21	2	1.70	0.495	0.70	*
11/17/2018	8.50	3	3.97	15.650	3.96	*
3/16/2019	2.16	3	3.96	15.721	3.96	*
6/1/2019	1.45	4	3.33	12.049	3.47	*
10/12/2019	2.10	4	3.55	10.982	3.31	0.53
12/22/2019	1.73	4	1.86	0.111	0.33	-4.28

Table C-2. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Chloride

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

BXS-2 (Downgradient Well)						
Date	**Chloride Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student's T-Test Statistic (t)[2]**
11/17/2014	3.16	--	--	--	--	--
2/23/2015	2.32	--	--	--	--	--
9/14/2015	2.54	--	--	--	--	--
12/7/2015	2.06	4	2.52	0.221	0.47	**2.81**
2/29/2016	2.37	4	2.32	0.039	0.20	**4.50**
6/16/2016	2.52	4	2.37	0.049	0.22	**4.02**
9/26/2016	2.53	4	2.37	0.048	0.22	**4.10**
3/8/2017	2.16	4	2.40	0.030	0.17	**5.13**
6/10/2017	5.71	4	3.23	2.763	1.66	1.54
9/16/2017	--	3	3.47	3.809	1.95	1.34
12/14/2017	4.78	3	4.22	3.389	1.84	2.10
3/17/2018	2.20	3	4.23	3.307	1.82	2.14
6/16/2018	2.20	3	3.06	2.219	1.49	1.26
9/29/2018	2.30	4	2.87	1.624	1.27	*
11/17/2018	--	3	2.23	0.003	0.06	*
3/16/2019	2.49	3	2.33	0.022	0.15	*
6/1/2019		2	2.40	0.018	0.13	*
10/12/2019	2.10	2	2.30	0.076	0.28	-1.75
12/22/2019	--	2	2.30	0.076	0.28	-1.75

BXS-1 (Downgradient Well)						
Date	**Chloride Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student's T-Test Statistic (t)[2]**
11/17/2014	5.04	--	--	--	--	--
2/23/2015	4.56	--	--	--	--	--
9/14/2015	5.41	--	--	--	--	--
12/7/2015	4.58	4	4.90	0.166	0.41	**13.52**
2/29/2016	4.90	4	4.86	0.157	0.40	**14.56**
6/16/2016	3.44	4	4.58	0.697	0.83	**6.46**
9/26/2016	3.41	4	4.08	0.594	0.77	**5.73**
3/8/2017	3.03	4	3.70	0.680	0.82	**4.29**
6/10/2017	--	3	3.29	0.052	0.23	**10.07**
9/16/2017	--	2	3.22	0.072	0.27	**6.57**
12/14/2017	--	1	3.03	#DIV/0!	#DIV/0!	*
3/17/2018	4.1	1	4.10	#DIV/0!	#DIV/0!	*
6/16/2018	--	1	4.10	#DIV/0!	#DIV/0!	*
9/29/2018	5.7	2	4.90	1.280	1.13	*
11/17/2018	--	2	4.90	1.280	1.13	*
3/16/2019	5.55	2	5.63	0.011	0.11	*
6/1/2019	--	2	5.63	0.011	0.11	*
10/12/2019	5.36	2	5.46	0.018	0.13	**21.28**
12/22/2019	--	2	5.46	0.018	0.13	**21.28**

Notes

$\bar{x}$ = average concentration for downgradient well. m_o = average concentration for upgradient well. n = number of samples.

s^1 = sample variance in upgradient well. s^2 = sample variance in downgradient well. s = sample standard deviation.

t = Student's T-Test statistic. -- = analysis not applicable. * = statistic with no/zero difference

[1] For non-detect concentrations, half of the reporting limit (MRL) is used. [2] Statistic in **bold** or gray is a statistically valid detection (Student's T-Test).

Table C-3. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Total Organic Carbon (TOC)

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Student's T-Test Formula (*t*): $\frac{\bar{x} - m_0}{\sqrt{[(s^1/n) + (s^2/n)]}}$

Critical Statistic:
$t_c = 2.447$ $v = 6$
$t_c = 2.571$ $v = 5$
$t_c = 2.776$ $v = 4$
$t_c = 3.182$ $v = 3$
$t_c = 4.303$ $v = 2$
$t_c = 12.706$ $v = 1$

BXS-4 (Upgradient Well)				
Date	**TOC Concentration[1]**	**Number of Samples (n)**	**Average Concentration (m_0)**	**Sample Variance (s^1)**
11/17/2014	0.78	--	--	--
2/23/2015	0.81	--	--	--
9/14/2015	1.00	--	--	--
12/7/2015	0.94	4	0.88	0.01096
2/29/2016	0.79	4	0.89	0.01030
6/16/2016	0.85	4	0.90	0.00870
9/26/2016	0.86	4	0.86	0.00380
3/8/2017	2.96	4	1.37	1.13163
6/10/2017	--	3	1.56	1.47703
9/16/2017	1.06	3	1.63	1.34333
12/14/2017	--	2	2.01	1.80500
3/17/2018	1.53	2	1.30	0.11045
6/16/2018	--	2	1.30	0.11045
9/29/2018	1.66	2	1.60	0.00845
11/17/2018	--	2	1.60	0.00845
3/16/2019	1.5	2	1.58	0.01280
6/1/2019	--	2	1.58	0.01280
10/12/2019	2.3	2	1.90	0.32000
12/22/2019	--	2	1.90	0.32000

BXS-3 (Downgradient Well)						
Date	**TOC Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student's T-Test Statistic (t)[2]**
11/17/2014	18.00	--	--	--	--	--
2/23/2015	19.00	--	--	--	--	--
9/14/2015	21.50	--	--	--	--	--
12/7/2015	17.10	4	18.90	3.607	1.90	**18.95**
2/29/2016	16.6	4	18.55	4.937	2.22	**15.88**
6/16/2016	19.6	4	18.70	5.207	2.28	**15.59**
9/26/2016	22.00	4	18.83	6.202	2.49	**14.42**
3/8/2017	19.00	4	19.30	4.920	2.22	**14.58**
6/10/2017	--	3	20.20	2.520	1.59	**16.15**
9/16/2017	21.30	3	20.77	2.463	1.57	**16.99**
12/14/2017	--	2	20.15	2.645	1.63	**12.16**
3/17/2018	54	2	37.65	534.645	23.12	2.22
6/16/2018	--	2	37.65	534.645	23.12	2.22
9/29/2018	19	2	36.50	612.500	24.75	1.99
11/17/2018	22.00	3	31.67	376.333	19.40	2.68
3/16/2019	18	3	19.67	4.333	2.08	**15.02**
6/1/2019	45	4	26.00	163.333	12.78	**3.82**
10/12/2019	20	4	26.25	158.917	12.61	**3.86**
12/22/2019	19.00	4	25.50	169.667	13.03	**3.62**

Table C-3. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Total Organic Carbon (TOC)

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

BXS-2 (Downgradient Well)						
Date	**TOC Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student's T-Test Statistic (t)[2]**
11/17/2014	13.80	--	--	--	--	--
2/23/2015	14.50	--	--	--	--	--
9/14/2015	12.80	--	--	--	--	--
12/7/2015	12.80	4	13.48	0.689	0.83	**30.10**
2/29/2016	15	4	13.78	1.309	1.14	**22.44**
6/16/2016	13.6	4	13.55	1.077	1.04	**24.29**
9/26/2016	13.30	4	13.68	0.889	0.94	**27.12**
3/8/2017	14.10	4	14.00	0.553	0.74	**19.47**
6/10/2017	3.75	4	11.19	24.694	4.97	**3.73**
9/16/2017	14.70	4	11.46	26.766	5.17	**3.68**
12/14/2017	11.00	4	10.89	25.271	5.03	**3.30**
3/17/2018	37.50	4	16.74	212.276	14.57	2.12
6/16/2018	30.00	4	23.30	157.260	12.54	**3.51**
9/29/2018	11.00	4	22.38	181.896	13.49	**3.08**
11/17/2018	--	3	26.17	186.583	13.66	3.12
3/16/2019	12.00	3	17.67	114.333	10.69	2.61
6/1/2019	--	2	11.50	0.500	0.71	**19.59**
10/12/2019	13.00	2	12.50	0.500	0.71	**16.55**
12/22/2019	--	2	12.50	0.500	0.71	**16.55**

BXS-1 (Downgradient Well)						
Date	**TOC Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student's T-Test Statistic (t)[2]**
11/17/2014	2.45	--	--	--	--	--
2/23/2015	2.47	--	--	--	--	--
9/14/2015	2.45	--	--	--	--	--
12/7/2015	3.00	4	2.59	0.074	0.27	**11.74**
2/29/2016	2.65	4	2.64	0.065	0.25	**12.82**
6/16/2016	3.07	4	2.79	0.086	0.29	**12.34**
9/26/2016	3.31	4	3.01	0.074	0.27	**15.36**
3/8/2017	2.10	4	2.78	0.281	0.53	2.38
6/10/2017	--	3	2.83	0.410	0.64	1.60
9/16/2017	3.38	3	2.93	0.518	0.72	1.65
12/14/2017	--	2	2.74	0.819	0.91	0.64
3/17/2018	14	2	8.69	56.392	7.51	1.39
6/16/2018	--	2	8.69	56.392	7.51	1.39
9/29/2018	2.6	2	8.30	64.980	8.06	1.18
11/17/2018	--	2	8.30	64.980	8.06	1.18
3/16/2019	2.4	2	2.50	0.020	0.14	**7.18**
6/1/2019	--	2	2.50	0.020	0.14	**7.18**
10/12/2019	3.2	2	2.80	0.320	0.57	1.59
12/22/2019	--	2	2.80	0.320	0.57	1.59

Notes

$\bar{x}$ = average concentration for downgradient well. m_o = average concentration for upgradient well. n = number of samples.

s^1 = sample variance in upgradient well. s^2 = sample variance in downgradient well. s = sample standard deviation.

t = Student's T-Test statistic. -- = analysis not applicable. * = statistic with no/zero difference

[1] For non-detect concentrations, half of the reporting limit (MRL) is used. [2] Statistic in **bold** or gray is a statistically valid detection (Student's T-Test).

Table C-4. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Chemical Oxygen Demand (COD)

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Student's T-Test Formula (*t*): $\frac{\bar{x} - m_0}{\sqrt{[\,(s^1/n) + (s^2/n)\,]}}$

Critical Statistic: $t_c = 2.447$ $v = 6$; $t_c = 2.571$ $v = 5$; $t_c = 2.776$ $v = 4$; $t_c = 3.182$ $v = 3$; $t_c = 4.303$ $v = 2$; $t_c = 12.706$ $v = 1$

BXS-4 (Upgradient Well)				
Date	**COD Concentration[1]**	**Number of Samples (n)**	**Average Concentration (m_0)**	**Sample Variance (s^1)**
11/17/2014	2.5	--	--	--
2/23/2015	2.5	--	--	--
9/14/2015	2.5	--	--	--
12/7/2015	2.5	4	2.50	0.00000
2/29/2016	5	4	3.13	1.56250
6/16/2016	4.8	4	3.70	1.92667
9/26/2016	5.7	4	4.50	1.92667
3/8/2017	9.7	4	6.30	5.28667
6/10/2017	--	3	6.73	6.80333
9/16/2017	3.6	3	6.33	9.60333
12/14/2017	--	2	6.65	18.60500
3/17/2018	11.4	2	7.50	30.42000
6/16/2018	--	2	7.50	30.42000
9/29/2018	41.6	2	26.50	456.02000
11/17/2018	--	2	26.50	456.02000
3/16/2019	10	2	25.80	499.28000
6/1/2019	--	2	25.80	499.28000
10/12/2019	12	2	11.00	2.00000
12/22/2019	--	2	11.00	2.00000

BXS-3 (Downgradient Well)						
Date	**COD Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student's T-Test Statistic (t)[2]**
11/17/2014	65.2	--	--	--	--	--
2/23/2015	69.3	--	--	--	--	--
9/14/2015	81.9	--	--	--	--	--
12/7/2015	72.6	4	72.25	50.550	7.11	**19.62**
2/29/2016	65.7	4	72.38	48.263	6.95	**19.62**
6/16/2016	76.1	4	74.08	45.883	6.77	**20.36**
9/26/2016	85.4	4	74.95	67.203	8.20	**16.95**
3/8/2017	71.1	4	74.58	70.116	8.37	**15.73**
6/10/2017	--	3	77.53	52.663	7.26	**15.90**
9/16/2017	70.0	3	75.50	73.810	8.59	**13.12**
12/14/2017	--	2	70.55	0.605	0.78	**20.62**
3/17/2018	40	2	55.00	450.000	21.21	3.06
6/16/2018	--	2	55.00	450.000	21.21	3.06
9/29/2018	55.5	2	47.75	120.125	10.96	1.25
11/17/2018	54.0	3	49.83	73.083	8.55	1.47
3/16/2019	37	3	48.83	105.583	10.28	1.36
6/1/2019	50	4	49.13	70.729	8.41	1.43
10/12/2019	60	4	50.25	94.917	9.74	**7.89**
12/22/2019	40.0	4	46.75	108.917	10.44	**6.73**

Table C-4. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Chemical Oxygen Demand (COD)

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

BXS-2 (Downgradient Well)						
Date	**COD Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student's T-Test Statistic (t)[2]**
11/17/2014	33.9	--	--	--	--	--
2/23/2015	36.9	--	--	--	--	--
9/14/2015	39.6	--	--	--	--	--
12/7/2015	38.2	4	37.15	5.910	2.43	**28.51**
2/29/2016	44.1	4	39.70	9.820	3.13	**21.68**
6/16/2016	44.9	4	41.70	10.887	3.30	**21.23**
9/26/2016	40.6	4	41.95	9.737	3.12	**21.93**
3/8/2017	34.9	4	41.13	20.709	4.55	**13.66**
6/10/2017	4.8	4	31.30	328.887	18.14	**2.67**
9/16/2017	35.0	4	28.83	263.629	16.24	**2.71**
12/14/2017	14.0	4	22.18	231.709	15.22	1.89
3/17/2018	19.0	4	18.20	160.027	12.65	1.44
6/16/2018	27.0	4	23.75	84.917	9.22	2.69
9/29/2018	38.0	4	24.50	109.667	10.47	-0.13
11/17/2018	--	3	28.00	91.000	9.54	0.09
3/16/2019	12.0	3	25.67	170.333	13.05	-0.01
6/1/2019	--	2	25.00	338.000	18.38	-0.04
10/12/2019	38.0	2	25.00	338.000	18.38	1.07
12/22/2019	--	2	25.00	338.000	18.38	1.07

BXS-1 (Downgradient Well)						
Date	**COD Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student's T-Test Statistic (t)[2]**
11/17/2014	5.6	--	--	--	--	--
2/23/2015	6.8	--	--	--	--	--
9/14/2015	8.2	--	--	--	--	--
12/7/2015	7.3	4	6.98	1.176	1.08	**8.25**
2/29/2016	8.6	4	7.73	0.676	0.82	**6.15**
6/16/2016	12.1	4	9.05	4.430	2.10	**4.24**
9/26/2016	9.9	4	9.48	4.189	2.05	**4.02**
3/8/2017	6.1	4	9.18	6.289	2.51	1.69
6/10/2017	--	3	9.37	9.213	3.04	1.14
9/16/2017	8.8	3	8.27	3.823	1.96	0.91
12/14/2017	--	2	7.45	3.645	1.91	0.24
3/17/2018	5	2	6.90	7.220	2.69	-0.14
6/16/2018	--	2	6.90	7.220	2.69	-0.14
9/29/2018	27	2	16.00	242.000	15.56	-0.56
11/17/2018	--	2	16.00	242.000	15.56	-0.56
3/16/2019	5	2	16.00	242.000	15.56	-0.51
6/1/2019	--	2	16.00	242.000	15.56	-0.51
10/12/2019	15	2	10.00	50.000	7.07	-0.20
12/22/2019	--	2	10.00	50.000	7.07	-0.20

Notes

$\bar{x}$ = average concentration for downgradient well. m_o = average concentration for upgradient well. n = number of samples.

s^1 = sample variance in upgradient well. s^2 = sample variance in downgradient well. s = sample standard deviation.

t = Student's T-Test statistic. -- = analysis not applicable. * = statistic with no/zero difference

[1] For non-detect concentrations, half of the reporting limit (MRL) is used. [2] Statistic in **bold** or gray is a statistically valid detection (Student's T-Test).

Table C-8. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Field pH

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Student's T-Test Formula (*t*): $\frac{\bar{x} - m_0}{\sqrt{[(s^1/n) + (s^2/n)]}}$

Critical Statistic: $t_c = 2.447$ $v = 6$; $t_c = 2.571$ $v = 5$; $t_c = 2.776$ $v = 4$; $t_c = 3.182$ $v = 3$; $t_c = 4.303$ $v = 2$; $t_c = 12.706$ $v = 1$

BXS-4 (Upgradient Well)				
Date	Field pH Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
11/17/2014	7.48	--	--	--
2/23/2015	7.28	--	--	--
9/14/2015	7.50	--	--	--
12/7/2015	7.06	4	7.33	0.04227
2/29/2016	6.98	4	7.21	0.05477
6/16/2016	7.69	4	7.31	0.11729
9/26/2016	6.84	4	7.14	0.14149
3/8/2017	7.28	4	7.20	0.14149
6/10/2017	--	3	7.27	0.18070
9/16/2017	6.97	3	7.03	0.05110
12/14/2017	--	2	7.13	0.04805
3/17/2018	--	1	6.97	#DIV/0!
6/16/2018	--	1	6.97	#DIV/0!
9/29/2018	7.92	1	7.92	#DIV/0!
11/17/2018	--	1	7.92	#DIV/0!
3/16/2019	7.29	2	7.61	0.19845
6/1/2019	--	2	7.61	0.19845
10/12/2019	9.58	2	8.44	2.62205
12/22/2019	--	2	8.44	2.62205

BXS-3 (Downgradient Well)						
Date	Field pH Concentration[1]	Number of Samples (n)	Average Concentration ($\bar{x}$)	Sample Variance (s^2)	Sample Standard Deviation (s)	Student's T-Test Statistic (t)[2]
11/17/2014	5.99	--	--	--	--	--
2/23/2015	5.84	--	--	--	--	--
9/14/2015	6.26	--	--	--	--	--
12/7/2015	6.04	4	6.03	0.030	0.17	-9.64
2/29/2016	6.00	4	6.04	0.030	0.17	-8.04
6/16/2016	6.49	4	6.20	0.051	0.23	-5.41
9/26/2016	6.19	4	6.18	0.049	0.22	-4.41
3/8/2017	6.12	4	6.20	0.044	0.21	-4.64
6/10/2017	--	3	6.27	0.039	0.20	-3.71
9/16/2017	6.18	3	6.16	0.001	0.04	-6.55
12/14/2017	--	2	6.15	0.002	0.04	-6.18
3/17/2018	6.28	2	6.23	0.005	0.07	*
6/16/2018	--	2	6.23	0.005	0.07	*
9/29/2018	6.13	2	6.21	0.011	0.11	*
11/17/2018	--	2	6.21	0.011	0.11	*
3/16/2019	6.15	2	6.14	0.000	0.01	-4.65
6/1/2019	--	2	6.14	0.000	0.01	-4.65
10/12/2019	8.02	2	7.09	1.748	1.32	-0.91
12/22/2019	--	2	7.09	1.748	1.32	-0.91

Table C-8. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Field pH

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

BXS-2 (Downgradient Well)						
Date	**Field pH Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student's T-Test Statistic (t)[2]**
11/17/2014	5.88	--	--	--	--	--
2/23/2015	5.78	--	--	--	--	--
9/14/2015	6.24	--	--	--	--	--
12/7/2015	5.94	4	5.96	0.039	0.20	-9.60
2/29/2016	5.95	4	5.98	0.037	0.19	-8.12
6/16/2016	6.57	4	6.18	0.089	0.30	-4.99
9/26/2016	6.10	4	6.14	0.088	0.30	-4.19
3/8/2017	6.08	4	6.18	0.074	0.27	-4.41
6/10/2017	6.36	4	6.28	0.054	0.23	-3.65
9/16/2017	6.12	4	6.17	0.017	0.13	-5.92
12/14/2017	6.26	4	6.21	0.017	0.13	-5.48
3/17/2018	--	3	6.25	0.015	0.12	*
6/16/2018	6.15	3	6.18	0.005	0.07	*
9/29/2018	6.01	3	6.14	0.016	0.13	*
11/17/2018	--	3	6.08	0.010	0.10	*
3/16/2019	6.16	3	6.11	0.007	0.08	-4.70
6/1/2019	--	3	6.09	0.011	0.11	-4.74
10/12/2019	7.97	3	7.07	1.638	1.28	-1.01
12/22/2019	5.73	3	6.62	1.413	1.19	-1.36

BXS-1 (Downgradient Well)						
Date	**Field pH Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student's T-Test Statistic (t)[2]**
11/17/2014	5.69	--	--	--	--	--
2/23/2015	5.86	--	--	--	--	--
9/14/2015	6.02	--	--	--	--	--
12/7/2015	5.28	4	5.71	0.101	0.32	-8.54
2/29/2016	5.86	4	5.76	0.106	0.33	-7.23
6/16/2016	6.03	4	5.80	0.125	0.35	-6.13
9/26/2016	5.81	4	5.75	0.105	0.32	-5.63
3/8/2017	5.87	4	5.89	0.009	0.10	-6.73
6/10/2017	--	3	5.90	0.013	0.11	-5.38
9/16/2017	--	2	5.84	0.002	0.04	-8.89
12/14/2017	--	1	5.87	#DIV/0!	#DIV/0!	*
3/17/2018	6.18	1	6.18	#DIV/0!	#DIV/0!	*
6/16/2018	--	1	6.18	#DIV/0!	#DIV/0!	*
9/29/2018	5.71	2	5.95	0.110	0.33	*
11/17/2018	--	2	5.95	0.110	0.33	*
3/16/2019	6.03	2	5.87	0.051	0.23	-4.91
6/1/2019	--	2	5.87	0.051	0.23	-4.91
10/12/2019	8.09	2	7.06	2.122	1.46	-0.89
12/22/2019	--	2	7.06	2.122	1.46	-0.89

Notes

$\bar{x}$ = average concentration for downgradient well. m_o = average concentration for upgradient well. n = number of samples.

s^1 = sample variance in upgradient well. s^2 = sample variance in downgradient well. s = sample standard deviation.

t = Student's T-Test statistic. -- = analysis not applicable. * = statistic with no/zero difference

[1] For non-detect concentrations, half of the reporting limit (MRL) is used. [2] Statistic in **bold** or gray is a statistically valid detection (Student's T-Test).

Table C-9. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Total Dissolved Solids (TDS)

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Student's T-Test Formula (*t*): $\frac{\bar{x} - m_0}{\sqrt{[(s^1/n) + (s^2/n)]}}$

Critical Statistic:

t_c = 2.447	*v* =6
t_c = 2.571	*v* =5
t_c = 2.776	*v* =4
t_c =3.182	*v* =3
t_c = 4.303	*v* =2
t_c = 12.706	*v* =1

BXS-4 (Upgradient Well)				
Date	**TDS Concentration[1]**	**Number of Samples (n)**	**Average Concentration (m_0)**	**Sample Variance (s^1)**
11/17/2014	NT	--	--	--
2/23/2015	122	--	--	--
9/14/2015	111	--	--	--
12/7/2015	112	--	--	--
2/29/2016	101	4	111.50	73.67
6/16/2016	118	4	110.50	49.67
9/26/2016	143	4	118.50	316.33
3/8/2017	128	4	122.50	311.00
6/10/2017	--	3	129.67	158.33
9/16/2017	139	3	136.67	60.33
12/14/2017	--	2	133.50	60.50
3/17/2018	133	2	136.00	18.00
6/16/2018	--	2	136.00	18.00
9/29/2018	159	2	146.00	338.00
11/17/2018	--	2	146.00	338.00
3/16/2019	150	2	154.50	40.50
6/1/2019	--	2	154.50	40.50
10/12/2019	110	2	130.00	800.00
12/22/2019	--	2	130.00	800.00

BXS-3 (Downgradient Well)						
Date	**TDS Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student's T-Test Statistic (t)[2]**
11/17/2014	NT	--	--	--	--	--
2/23/2015	325	--	--	--	--	--
9/14/2015	267	--	--	--	--	--
12/7/2015	285	--	--	--	--	--
2/29/2016	290	4	291.75	588.92	24.27	**14.01**
6/16/2016	301	4	285.75	200.92	14.17	**22.14**
9/26/2016	311	4	296.75	134.92	11.62	**16.78**
3/8/2017	--	3	300.67	110.33	10.50	**16.65**
6/10/2017	--	2	306.00	50.00	7.07	**19.99**
9/16/2017	216	2	263.50	4512.50	67.18	2.66
12/14/2017	--	1	216.00	#DIV/0!	#DIV/0!	*
3/17/2018	440	2	328.00	25088.00	158.39	1.71
6/16/2018	--	2	328.00	25088.00	158.39	1.71
9/29/2018	235	2	337.50	21012.50	144.96	1.85
11/17/2018	330	3	335.00	10525.00	102.59	3.12
3/16/2019	360	3	308.33	4258.33	65.26	**4.05**
6/1/2019	230	4	288.75	4372.92	66.13	**4.02**
10/12/2019	260	4	295.00	3633.33	60.28	**4.56**
12/22/2019	340	4	297.50	3891.67	62.38	**4.52**

Table C-9. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Total Dissolved Solids (TDS)

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

BXS-2 (Downgradient Well)						
Date	**TDS Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student's T-Test Statistic $(t)^2$**
11/17/2014	NT	--	--	--	--	--
2/23/2015	479	--	--	--	--	--
9/14/2015	430	--	--	--	--	--
12/7/2015	424	--	--	--	--	--
2/29/2016	447	4	445.00	608.67	24.67	**25.53**
6/16/2016	443	4	436.00	116.67	10.80	**50.48**
9/26/2016	419	4	433.25	190.92	13.82	**27.95**
3/8/2017	--	3	436.33	229.33	15.14	**25.27**
6/10/2017	252	3	371.33	10824.33	104.04	**3.99**
9/16/2017	406	3	359.00	8629.00	92.89	**4.13**
12/14/2017	460	3	372.67	11649.33	107.93	**3.82**
3/17/2018	455	4	393.25	9460.92	97.27	**5.28**
6/16/2018	430	4	437.75	620.25	24.90	**23.56**
9/29/2018	420	4	441.25	372.92	19.31	**18.23**
11/17/2018	--	3	435.00	325.00	18.03	**17.35**
3/16/2019	420	3	423.33	33.33	5.77	**48.01**
6/1/2019	--	2	420.00	0.00	0.00	**59.00**
10/12/2019	330	2	375.00	4050.00	63.64	**4.98**
12/22/2019	--	2	375.00	4050.00	63.64	**4.98**

BXS-1 (Downgradient Well)						
Date	**TDS Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student's T-Test Statistic $(t)^2$**
11/17/2014	NT	--	--	--	--	--
2/23/2015	157	--	--	--	--	--
9/14/2015	144	--	--	--	--	--
12/7/2015	151	--	--	--	--	--
2/29/2016	135	4	146.75	89.58	9.46	**5.52**
6/16/2016	194	4	156.00	684.67	26.17	**3.36**
9/26/2016	204	4	171.00	1104.67	33.24	**2.79**
3/8/2017	224	4	189.25	1463.58	38.26	**3.17**
6/10/2017	--	3	207.33	233.33	15.28	**6.80**
9/16/2017	191	3	206.33	276.33	16.62	**6.58**
12/14/2017	--	2	207.50	544.50	23.33	4.25
3/17/2018	240	2	215.50	1200.50	34.65	3.22
6/16/2018	--	2	215.50	1200.50	34.65	3.22
9/29/2018	200	2	220.00	800.00	28.28	3.10
11/17/2018	--	2	220.00	800.00	28.28	3.10
3/16/2019	200	2	200.00	0.00	0.00	**10.11**
6/1/2019	--	2	200.00	0.00	0.00	**10.11**
10/12/2019	160	2	180.00	800.00	28.28	1.77
12/22/2019	--	2	180.00	800.00	28.28	1.77

Notes

$\bar{x}$ = average concentration for downgradient well. m_o = average concentration for upgradient well. n = number of samples.

s^1 = sample variance in upgradient well. s^2 = sample variance in downgradient well. s = sample standard deviation.

t = Student's T-Test statistic. -- = analysis not applicable. * = statistic with no/zero difference

[1] For non-detect concentrations, half of the reporting limit (MRL) is used. [2] Statistic in **bold** or gray is a statistically valid detection (Student's T-Test).

Table C-10. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Sulfate

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Student's T-Test Formula (*t*): $\frac{\bar{x} - m_0}{\sqrt{[(s^1/n) + (s^2/n)]}}$

Critical Statistic: $t_c = 2.447$ $v = 6$

$t_c = 2.571$ $v = 5$

$t_c = 2.776$ $v = 4$

$t_c = 3.182$ $v = 3$

$t_c = 4.303$ $v = 2$

$t_c = 12.706$ $v = 1$

BXS-4 (Upgradient Well)				
Date	Sulfate Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
11/17/2014	1.56	--	--	--
2/23/2015	0.81	--	--	--
9/14/2015	1.20	--	--	--
12/7/2015	1.09	4	1.17	0.09630
2/29/2016	1.2	4	1.08	0.03390
6/16/2016	1.05	4	1.14	0.00590
9/26/2016	1.50	4	1.21	0.04140
3/8/2017	2.10	4	1.46	0.21563
6/10/2017	--	3	1.55	0.27750
9/16/2017	1.86	3	1.82	0.09120
12/14/2017	--	2	1.98	0.02880
3/17/2018	1.71	2	1.79	0.01125
6/16/2018	--	2	1.79	0.01125
9/29/2018	0.63	2	1.17	0.58320
11/17/2018	--	2	1.17	0.58320
3/16/2019	3	2	1.82	2.80845
6/1/2019	--	2	1.82	2.80845
10/12/2019	0.2	2	1.60	3.92000
12/22/2019	--	2	1.60	3.92000

BXS-3 (Downgradient Well)						
Date	Sulfate Concentration[1]	Number of Samples (n)	Average Concentration ($\bar{x}$)	Sample Variance (s^2)	Sample Standard Deviation (s)	Student's T-Test Statistic (t)[2]
11/17/2014	0.18	--	--	--	--	--
2/23/2015	0.22	--	--	--	--	--
9/14/2015	0.39	--	--	--	--	--
12/7/2015	0.18	4	0.24	0.010	0.10	-5.66
2/29/2016	1.16	4	0.49	0.209	0.46	-2.38
6/16/2016	1.13	4	0.72	0.254	0.50	-1.65
9/26/2016	0.94	4	0.85	0.210	0.46	-1.42
3/8/2017	0.10	4	0.83	0.248	0.50	-1.85
6/10/2017	--	3	0.72	0.300	0.55	-1.88
9/16/2017	0.10	3	0.38	0.235	0.48	-4.37
12/14/2017	--	2	0.10	0.000	0.00	-15.67
3/17/2018	0.22	2	0.16	0.007	0.08	-16.92
6/16/2018	--	2	0.16	0.007	0.08	-16.92
9/29/2018	0.125	2	0.17	0.005	0.07	-1.84
11/17/2018	2.00	3	0.78	1.116	1.06	-0.48
3/16/2019	2.3	3	1.48	1.389	1.18	-0.25
6/1/2019	0.22	4	1.16	1.320	1.15	-0.50
10/12/2019	0.3	4	1.21	1.207	1.10	-0.26
12/22/2019	0.30	4	0.78	1.028	1.01	-0.55

Table C-10. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Sulfate

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

BXS-2 (Downgradient Well)						
Date	**Sulfate Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student's T-Test Statistic (t)[2]**
11/17/2014	0.33	--	--	--	--	--
2/23/2015	0.34	--	--	--	--	--
9/14/2015	0.46	--	--	--	--	--
12/7/2015	0.27	4	0.35	0.006	0.08	-5.09
2/29/2016	0.5	4	0.39	0.011	0.11	-6.42
6/16/2016	0.48	4	0.43	0.011	0.11	-10.79
9/26/2016	0.20	4	0.36	0.023	0.15	-6.70
3/8/2017	0.20	4	0.35	0.028	0.17	-4.53
6/10/2017	7.36	4	2.06	12.502	3.54	0.28
9/16/2017	0.10	4	1.97	12.938	3.60	0.08
12/14/2017	51.60	4	14.82	612.948	24.76	1.04
3/17/2018	0.33	4	14.85	611.734	24.73	1.06
6/16/2018	0.50	4	13.13	657.736	25.65	0.88
9/29/2018	0.34	4	13.19	655.665	25.61	0.94
11/17/2018	--	3	0.39	0.009	0.10	-1.44
3/16/2019	7.70	3	2.85	17.673	4.20	0.38
6/1/2019	--	2	4.02	27.085	5.20	0.57
10/12/2019	0.50	2	4.10	25.920	5.09	0.65
12/22/2019	--	2	4.10	25.920	5.09	0.65

BXS-1 (Downgradient Well)						
Date	**Sulfate Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student's T-Test Statistic (t)[2]**
11/17/2014	8.42	--	--	--	--	--
2/23/2015	7.74	--	--	--	--	--
9/14/2015	9.66	--	--	--	--	--
12/7/2015	10.70	4	9.13	1.727	1.31	**11.80**
2/29/2016	9.00	4	9.28	1.537	1.24	**13.09**
6/16/2016	6.87	4	9.06	2.616	1.62	**9.78**
9/26/2016	6.00	4	8.14	4.495	2.12	**6.51**
3/8/2017	4.50	4	6.59	3.534	1.88	**5.30**
6/10/2017	--	3	5.79	1.437	1.20	**5.61**
9/16/2017	5.64	3	5.38	0.613	0.78	**7.35**
12/14/2017	--	2	5.07	0.650	0.81	**5.30**
3/17/2018	9.06	2	7.35	5.848	2.42	3.25
6/16/2018	--	2	7.35	5.848	2.42	3.25
9/29/2018	10.9	2	9.98	1.693	1.30	**8.26**
11/17/2018	--	2	9.98	1.693	1.30	**8.26**
3/16/2019	14.8	2	12.85	7.605	2.76	**4.84**
6/1/2019	--	2	12.85	7.605	2.76	**4.84**
10/12/2019	15	2	14.90	0.020	0.14	**9.48**
12/22/2019	--	2	14.90	0.020	0.14	**9.48**

Notes

$\bar{x}$ = average concentration for downgradient well. m_o = average concentration for upgradient well. n = number of samples.

s^1 = sample variance in upgradient well. s^2 = sample variance in downgradient well. s = sample standard deviation.

t = Student's T-Test statistic. -- = analysis not applicable. * = statistic with no/zero difference

[1] For non-detect concentrations, half of the reporting limit (MRL) is used. [2] Statistic in **bold** or gray is a statistically valid detection (Student's T-Test).

Table C-11. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Tannin and Lignin

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Student's T-Test Formula (*t*): $\frac{\bar{x} - m_0}{\sqrt{[(s^1/n) + (s^2/n)]}}$

Critical Statistic: $t_c = 2.447$ $v = 6$; $t_c = 2.571$ $v = 5$; $t_c = 2.776$ $v = 4$; $t_c = 3.182$ $v = 3$; $t_c = 4.303$ $v = 2$; $t_c = 12.706$ $v = 1$

BXS-4 (Upgradient Well)				
Date	**Tanin and Lignin Concentration[1]**	**Number of Samples (n)**	**Average Concentration (m_0)**	**Sample Variance (s^1)**
11/17/2014	0.29	--	--	--
2/23/2015	0.31	--	--	--
9/14/2015	0.22	--	--	--
12/7/2015	0.34	4	0.29	0.00260
2/29/2016	0.2	4	0.27	0.00463
6/16/2016	0.21	4	0.24	0.00429
9/26/2016	0.12	4	0.22	0.00829
3/8/2017	0.15	4	0.17	0.00180
6/10/2017	--	3	0.16	0.00210
9/16/2017	0.20	3	0.16	0.00163
12/14/2017	--	2	0.18	0.00125
3/17/2018	0.21	2	0.21	0.00005
6/16/2018	--	2	0.21	0.00005
9/29/2018	0.51	2	0.36	0.04500
11/17/2018	--	2	0.36	0.04500
3/16/2019	0.49	2	0.50	0.00020
6/1/2019	--	2	0.50	0.00020
10/12/2019	0.95	2	0.72	0.10580
12/22/2019	--	2	0.72	0.10580

BXS-3 (Downgradient Well)						
Date	**Tanin and Lignin Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student's T-Test Statistic (t)[2]**
11/17/2014	20.50	--	--	--	--	--
2/23/2015	23.00	--	--	--	--	--
9/14/2015	4.49	--	--	--	--	--
12/7/2015	1.13	4	12.28	122.498	11.07	2.17
2/29/2016	5.30	4	8.48	96.962	9.85	1.67
6/16/2016	7.80	4	4.68	7.586	2.75	**3.22**
9/26/2016	3.75	4	4.50	7.816	2.80	**3.06**
3/8/2017	49.50	4	16.59	484.221	22.01	1.49
6/10/2017	--	3	20.35	641.393	25.33	1.38
9/16/2017	18.50	3	23.92	545.271	23.35	1.76
12/14/2017	--	2	34.00	480.500	21.92	2.18
3/17/2018	2.2	2	10.35	132.845	11.53	1.24
6/16/2018	--	2	10.35	132.845	11.53	1.24
9/29/2018	59.5	2	30.85	1641.645	40.52	1.06
11/17/2018	50	3	37.23	943.063	30.71	2.08
3/16/2019	47	3	52.17	42.583	6.53	**13.71**
6/1/2019	320	4	119.13	17962.06	134.02	1.77
10/12/2019	100	4	129.25	16762.25	129.47	1.99
12/22/2019	89	4	139.00	15082.00	122.81	2.25

Table C-11. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Tannin and Lignin

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

BXS-2 (Downgradient Well)						
Date	**Tanin and Lignin Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student's T-Test Statistic (t)[2]**
11/17/2014	1.37	--	--	--	--	--
2/23/2015	1.33	--	--	--	--	--
9/14/2015	1.34	--	--	--	--	--
12/7/2015	1.23	4	1.32	0.004	0.06	**25.91**
2/29/2016	1.32	4	1.31	0.003	0.05	**24.47**
6/16/2016	1.19	4	1.27	0.005	0.07	**21.17**
9/26/2016	1.04	4	1.20	0.014	0.12	**13.20**
3/8/2017	1.18	4	1.18	0.013	0.11	**16.59**
6/10/2017	1.00	4	1.10	0.009	0.10	**17.10**
9/16/2017	1.26	4	1.12	0.015	0.12	**14.84**
12/14/2017	2.80	4	1.56	0.695	0.83	**3.32**
3/17/2018	1.85	4	1.73	0.638	0.80	**3.81**
6/16/2018	1.50	4	1.85	0.458	0.68	**4.87**
9/29/2018	1.50	4	1.91	0.377	0.61	**4.54**
11/17/2018	--	3	1.62	0.041	0.20	**6.61**
3/16/2019	2.50	3	1.83	0.333	0.58	**4.00**
6/1/2019	--	2	2.00	0.500	0.71	3.00
10/12/2019	2.80	2	2.65	0.045	0.21	**7.03**
12/22/2019	--	2	2.65	0.045	0.21	**7.03**

BXS-1 (Downgradient Well)						
Date	**Tanin and Lignin Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student's T-Test Statistic (t)[2]**
11/17/2014	0.11	--	--	--	--	--
2/23/2015	0.15	--	--	--	--	--
9/14/2015	0.09	--	--	--	--	--
12/7/2015	0.14	4	0.12	0.001	0.03	-5.78
2/29/2016	0.05	4	0.11	0.002	0.05	-3.89
6/16/2016	0.09	4	0.09	0.001	0.04	-3.99
9/26/2016	0.11	4	0.10	0.001	0.04	-2.43
3/8/2017	0.13	4	0.10	0.001	0.03	-2.75
6/10/2017	--	3	0.11	0.000	0.02	-1.73
9/16/2017	0.10	3	0.11	0.000	0.02	-1.74
12/14/2017	--	2	0.12	0.000	0.02	-2.06
3/17/2018	0.2	2	0.15	0.005	0.07	-1.09
6/16/2018	--	2	0.15	0.005	0.07	-1.09
9/29/2018	0.2	2	0.20	0.000	0.00	-1.07
11/17/2018	--	2	0.20	0.000	0.00	-1.07
3/16/2019	0.22	2	0.21	0.000	0.01	-20.51
6/1/2019	--	2	0.21	0.000	0.01	-20.51
10/12/2019	0.39	2	0.31	0.014	0.12	-1.69
12/22/2019	--	2	0.31	0.014	0.12	-1.69

Notes

$\bar{x}$ = average concentration for downgradient well. m_o = average concentration for upgradient well. n = number of samples.

s^1 = sample variance in upgradient well. s^2 = sample variance in downgradient well. s = sample standard deviation.

t = Student's T-Test statistic. -- = analysis not applicable. * = statistic with no/zero difference

[1] For non-detect concentrations, half of the reporting limit (MRL) is used. [2] Statistic in **bold** or gray is a statistically valid detection (Student's T-Test).

Table C-12. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Arsenic

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Student's T-Test Formula (*t*): $\frac{\bar{x} - m_0}{\sqrt{[(s^1/n) + (s^2/n)]}}$

Critical Statistic: $t_c = 2.447$ $v = 6$; $t_c = 2.571$ $v = 5$; $t_c = 2.776$ $v = 4$; $t_c = 3.182$ $v = 3$; $t_c = 4.303$ $v = 2$; $t_c = 12.706$ $v = 1$

BXS-4 (Upgradient Well)				
Date	Arsenic Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
11/17/2014	5.70	--	--	--
2/23/2015	5.90	--	--	--
9/14/2015	5.90	--	--	--
12/7/2015	6.32	4	5.96	0.06810
2/29/2016	6.3	4	6.11	0.05610
6/16/2016	6.1	4	6.16	0.03877
9/26/2016	6.56	4	6.32	0.03547
3/8/2017	10.50	4	7.37	4.40357
6/10/2017	--	3	7.72	5.84920
9/16/2017	8.00	3	8.35	3.97453
12/14/2017	--	2	9.25	3.12500
3/17/2018	--	1	8.00	#DIV/0!
6/16/2018	--	1	8.00	#DIV/0!
9/29/2018	5	1	5.00	#DIV/0!
11/17/2018	--	1	5.00	#DIV/0!
3/16/2019	5	2	5.00	0.00000
6/1/2019	--	2	5.00	0.00000
10/12/2019	5	2	5.00	0.00000
12/22/2019	--	2	5.00	0.00000

BXS-3 (Downgradient Well)						
Date	Arsenic Concentration[1]	Number of Samples (n)	Average Concentration ($\bar{x}$)	Sample Variance (s^2)	Sample Standard Deviation (s)	Student's T-Test Statistic (t)[2]
11/17/2014	174	--	--	--	--	--
2/23/2015	163	--	--	--	--	--
9/14/2015	185	--	--	--	--	--
12/7/2015	174	4	174.00	80.667	8.98	**37.40**
2/29/2016	147	4	167.25	262.917	16.21	**19.87**
6/16/2016	138	4	161.00	490.000	22.14	**13.99**
9/26/2016	191	4	162.50	595.000	24.39	**12.81**
3/8/2017	161	4	159.25	537.583	23.19	**13.05**
6/10/2017	--	3	163.33	706.333	26.58	**10.10**
9/16/2017	181	3	177.67	233.333	15.28	**19.04**
12/14/2017	--	2	171.00	200.000	14.14	**16.05**
3/17/2018	96	2	138.50	3612.500	60.10	*
6/16/2018	--	2	138.50	3612.500	60.10	*
9/29/2018	52.5	2	74.25	946.125	30.76	*
11/17/2018	82	3	76.83	493.083	22.21	*
3/16/2019	66	3	66.83	218.083	14.77	**7.25**
6/1/2019	48	4	62.13	234.063	15.30	**7.47**
10/12/2019	24	4	55.00	620.000	24.90	**4.02**
12/22/2019	102	4	60.00	1080.000	32.86	**3.35**

Table C-12. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Arsenic

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

BXS-2 (Downgradient Well)						
Date	**Arsenic Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student's T-Test Statistic (t)[2]**
11/17/2014	0.70	--	--	--	--	--
2/23/2015	0.70	--	--	--	--	--
9/14/2015	0.60	--	--	--	--	--
12/7/2015	0.76	4	0.69	0.004	0.07	-39.11
2/29/2016	0.69	4	0.69	0.004	0.07	-44.07
6/16/2016	0.7	4	0.69	0.004	0.07	-52.66
9/26/2016	0.47	4	0.66	0.016	0.13	-49.86
3/8/2017	10.50	4	3.09	24.415	4.94	-1.59
6/10/2017	10.50	4	5.54	32.778	5.73	-0.68
9/16/2017	5.50	4	6.74	23.042	4.80	-0.61
12/14/2017	--	3	8.83	8.333	2.89	-0.20
3/17/2018	5	3	7.00	9.250	3.04	*
6/16/2018	5	3	5.17	0.083	0.29	*
9/29/2018	6	3	5.33	0.333	0.58	*
11/17/2018	--	3	5.33	0.333	0.58	*
3/16/2019	5	3	5.33	0.333	0.58	1.00
6/1/2019	--	2	5.50	0.500	0.71	1.00
10/12/2019	5	2	5.00	0.000	0.00	*****
12/22/2019	--	2	5.00	0.000	0.00	*****

BXS-1 (Downgradient Well)						
Date	**Arsenic Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student's T-Test Statistic (t)[2]**
11/17/2014	0.30	--	--	--	--	--
2/23/2015	0.20	--	--	--	--	--
9/14/2015	0.50	--	--	--	--	--
12/7/2015	0.26	4	0.32	0.017	0.13	-38.69
2/29/2016	0.29	4	0.31	0.017	0.13	-42.84
6/16/2016	0.30	4	0.34	0.012	0.11	-51.63
9/26/2016	0.25	4	0.28	0.001	0.02	-63.69
3/8/2017	10.50	4	2.84	26.113	5.11	-1.64
6/10/2017	--	3	3.68	34.851	5.90	-1.10
9/16/2017	5.50	3	5.42	26.271	5.13	-0.92
12/14/2017	5.00	3	7.00	9.250	3.04	-1.04
3/17/2018	5.00	3	5.17	0.083	0.29	*
6/16/2018	--	3	5.17	0.083	0.29	*
9/29/2018	5.00	3	5.00	0.000	0.00	*
11/17/2018	--	2	5.00	0.000	0.00	*
3/16/2019	5.00	2	5.00	0.000	0.00	*
6/1/2019	--	2	5.00	0.000	0.00	*
10/12/2019	5.00	2	5.00	0.000	0.00	*
12/22/2019	--	2	5.00	0.000	0.00	*

Notes

$\bar{x}$ = average concentration for downgradient well. m_o = average concentration for upgradient well. n = number of samples.

s^1 = sample variance in upgradient well. s^2 = sample variance in downgradient well. s = sample standard deviation.

t = Student's T-Test statistic. -- = analysis not applicable. * = statistic with no/zero difference

[1] For non-detect concentrations, half of the reporting limit (MRL) is used. [2] Statistic in **bold** or gray is a statistically valid detection (Student's T-Test).

Table C-13. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Barium

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Student's T-Test Formula (*t*): $\frac{\bar{x} - m_0}{\sqrt{[(s^1/n) + (s^2/n)]}}$

Critical Statistic: $t_c = 2.447$ $v = 6$; $t_c = 2.571$ $v = 5$; $t_c = 2.776$ $v = 4$; $t_c = 3.182$ $v = 3$; $t_c = 4.303$ $v = 2$; $t_c = 12.706$ $v = 1$

BXS-4 (Upgradient Well)				
Date	Barium Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
11/17/2014	27.7	--	--	--
2/23/2015	27.7	--	--	--
9/14/2015	30.0	--	--	--
12/7/2015	27.7	4	28.28	1.32250
2/29/2016	28.6	4	28.50	1.18000
6/16/2016	30.5	4	29.20	1.64667
9/26/2016	31.2	4	29.50	2.64667
3/8/2017	28.9	4	29.80	1.56667
6/10/2017	--	3	30.20	1.39000
9/16/2017	30.0	3	30.03	1.32333
12/14/2017	--	2	29.45	0.60500
3/17/2018	35.9	2	32.95	17.40500
6/16/2018	--	2	32.95	17.40500
9/29/2018	31.8	2	33.85	8.40500
11/17/2018	--	2	33.85	8.40500
3/16/2019	26	2	28.90	16.82000
6/1/2019	--	2	28.90	16.82000
10/12/2019	28	2	27.00	2.00000
12/22/2019	--	2	27.00	2.00000

BXS-3 (Downgradient Well)						
Date	Barium Concentration[1]	Number of Samples (n)	Average Concentration ($\bar{x}$)	Sample Variance (s^2)	Sample Standard Deviation (s)	Student's T-Test Statistic (t)[2]
11/17/2014	130	--	--	--	--	--
2/23/2015	127	--	--	--	--	--
9/14/2015	152	--	--	--	--	--
12/7/2015	162	4	142.75	288.917	17.00	**13.44**
2/29/2016	115	4	139.00	472.667	21.74	**10.15**
6/16/2016	109	4	134.50	697.667	26.41	**7.96**
9/26/2016	128	4	128.50	561.667	23.70	**8.33**
3/8/2017	128	4	120.00	91.333	9.56	**18.72**
6/10/2017	--	3	121.67	120.333	10.97	**14.36**
9/16/2017	129	3	128.33	0.333	0.58	**132.28**
12/14/2017	--	2	128.50	0.500	0.71	**133.26**
3/17/2018	49.7	2	89.35	3144.245	56.07	1.42
6/16/2018	--	2	89.35	3144.245	56.07	1.42
9/29/2018	29.95	2	39.83	195.031	13.97	0.59
11/17/2018	25.5	3	35.05	165.918	12.88	0.16
3/16/2019	34	3	29.82	18.076	4.25	0.24
6/1/2019	29	4	29.61	12.217	3.50	0.21
10/12/2019	57.7	4	36.55	210.977	14.53	1.30
12/22/2019	41.5	4	40.55	157.110	12.53	2.14

Table C-13. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Barium

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

BXS-2 (Downgradient Well)						
Date	**Barium Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student's T-Test Statistic (t)[2]**
11/17/2014	49.6	--	--	--	--	--
2/23/2015	47.0	--	--	--	--	--
9/14/2015	46.6	--	--	--	--	--
12/7/2015	43.7	4	46.73	5.836	2.42	**13.79**
2/29/2016	47.8	4	46.28	3.196	1.79	**16.99**
6/16/2016	43.5	4	45.40	4.567	2.14	**13.00**
9/26/2016	31.9	4	41.73	46.829	6.84	**3.48**
3/8/2017	40.1	4	40.83	45.329	6.73	**3.22**
6/10/2017	20.3	4	33.95	106.517	10.32	0.72
9/16/2017	40.5	4	33.20	89.667	9.47	0.66
12/14/2017	--	3	33.63	133.373	11.55	0.63
3/17/2018	37.8	3	32.87	120.263	10.97	-0.01
6/16/2018	35.7	3	38.00	5.790	2.41	1.55
9/29/2018	34.6	3	36.03	2.643	1.63	0.97
11/17/2018	--	3	36.03	2.643	1.63	0.97
3/16/2019	40	3	36.77	8.143	2.85	2.36
6/1/2019	--	2	37.30	14.580	3.82	2.12
10/12/2019	41.1	2	40.55	0.605	0.78	**11.87**
12/22/2019	--	2	40.55	0.605	0.78	**11.87**

BXS-1 (Downgradient Well)						
Date	**Barium Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student's T-Test Statistic (t)[2]**
11/17/2014	15.3	--	--	--	--	--
2/23/2015	13.1	--	--	--	--	--
9/14/2015	14.4	--	--	--	--	--
12/7/2015	13.2	4	14.00	1.100	1.05	-18.34
2/29/2016	14.5	4	13.80	0.567	0.75	-22.25
6/16/2016	18.8	4	15.23	6.029	2.46	-10.09
9/26/2016	17.7	4	16.05	6.937	2.63	-8.69
3/8/2017	22.4	4	18.35	10.617	3.26	-6.56
6/10/2017	--	3	19.63	6.043	2.46	-6.71
9/16/2017	24.2	3	21.43	11.263	3.36	-4.20
12/14/2017	35.2	3	27.27	48.013	6.93	-0.54
3/17/2018	16.4	3	25.27	89.213	9.45	-1.24
6/16/2018	--	3	25.27	89.213	9.45	-1.24
9/29/2018	16.1	3	22.57	119.723	10.94	-1.70
11/17/2018	--	2	16.25	0.045	0.21	-8.56
3/16/2019	16	2	16.05	0.005	0.07	-4.43
6/1/2019	--	2	16.05	0.005	0.07	-4.43
10/12/2019	14.3	2	15.15	1.445	1.20	-9.03
12/22/2019	--	2	15.15	1.445	1.20	-9.03

Notes

$\bar{x}$ = average concentration for downgradient well. m_o = average concentration for upgradient well. n = number of samples.

s^1 = sample variance in upgradient well. s^2 = sample variance in downgradient well. s = sample standard deviation.

t = Student's T-Test statistic. -- = analysis not applicable. * = statistic with no/zero difference

[1] For non-detect concentrations, half of the reporting limit (MRL) is used. [2] Statistic in **bold** or gray is a statistically valid detection (Student's T-Test).

Table C-15. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Iron

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Student's T-Test Formula (*t*):

$$\frac{\bar{x} - m_0}{\sqrt{[\,(s^1/n) + (s^2/n)\,]}}$$

Critical Statistic:

$t_c = 2.447$	$v = 6$
$t_c = 2.571$	$v = 5$
$t_c = 2.776$	$v = 4$
$t_c = 3.182$	$v = 3$
$t_c = 4.303$	$v = 2$
$t_c = 12.706$	$v = 1$

BXS-4 (Upgradient Well)				
Date	**Iron Concentration[1]**	**Number of Samples (n)**	**Average Concentration (m_0)**	**Sample Variance (s^1)**
11/17/2014	70.0	--	--	--
2/23/2015	73.2	--	--	--
9/14/2015	53.5	--	--	--
12/7/2015	56.0	4	63.18	97.39
2/29/2016	95	4	69.43	367.39
6/16/2016	55.2	4	64.93	403.09
9/26/2016	68.0	4	68.55	345.21
3/8/2017	498.0	4	179.05	45488.14
6/10/2017	--	3	207.07	63522.61
9/16/2017	839.0	3	468.33	149270.33
12/14/2017	--	2	668.50	58140.50
3/17/2018	825	2	832.00	98.00
6/16/2018	--	2	832.00	98.00
9/29/2018	886	2	855.50	1860.50
11/17/2018	--	2	855.50	1860.50
3/16/2019	131	2	508.50	285012.50
6/1/2019	--	2	508.50	285012.50
10/12/2019	45	2	88.00	3698.00
12/22/2019	--	2	88.00	3698.00

BXS-3 (Downgradient Well)						
Date	**Iron Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student's T-Test Statistic (t)[2]**
11/17/2014	120,000	--	--	--	--	--
2/23/2015	114,000	--	--	--	--	--
9/14/2015	122,000	--	--	--	--	--
12/7/2015	126,000	4	120,500	25,000,000	5,000	**48.17**
2/29/2016	106,000	4	117,000	78,666,667	8,869	**26.37**
6/16/2016	108,000	4	115,500	99,666,667	9,983	**23.13**
9/26/2016	107,000	4	111,750	90,916,667	9,535	**23.43**
3/8/2017	112,000	4	108,250	6,916,667	2,630	**81.92**
6/10/2017	--	3	109,000	7,000,000	2,646	**70.90**
9/16/2017	108,000	3	109,000	7,000,000	2,646	**70.31**
12/14/2017	--	2	110,000	8,000,000	2,828	**54.47**
3/17/2018	95,400	2	101,700	79,380,000	8,910	**16.01**
6/16/2018	--	2	101,700	79,380,000	8,910	**16.01**
9/29/2018	70,350	2	82,875	313,751,250	17,713	**6.55**
11/17/2018	81,800	3	82,517	157,260,833	12,540	**11.28**
3/16/2019	98,000	3	83,383	193,010,833	13,893	**10.32**
6/1/2019	79,600	4	82,438	132,252,292	11,500	**14.22**
10/12/2019	85,400	4	86,200	67,600,000	8,222	**20.95**
12/22/2019	99,600	4	90,650	94,596,667	9,726	**18.62**

Table C-15. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Iron

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

BXS-2 (Downgradient Well)						
Date	**Iron Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student's T-Test Statistic (t)[2]**
3/17/2014	424	--	--	--	--	--
6/2/2014	421	--	--	--	--	--
9/29/2014	409	--	--	--	--	--
11/17/2014	421	4	419	44	6.7	**59.75**
2/23/2015	375	4	407	473	21.7	**23.25**
9/14/2015	358	4	391	856	29.3	**18.36**
12/7/2015	361	4	379	848	29.1	**17.96**
3/8/2017	279	4	343	1890	43.5	1.51
6/10/2017	8	4	252	27794	166.7	0.26
9/16/2017	328	4	244	25889	160.9	-0.95
12/14/2017	--	3	205	29707	172.4	-2.35
3/17/2018	161.5	3	166	25614	160.0	-7.19
6/16/2018	206	3	232	7431	86.2	-11.94
9/29/2018	105	3	158	2562	50.6	-16.52
11/17/2018	--	3	158	2562	50.6	-16.52
3/16/2019	117	3	143	3044	55.2	-0.97
6/1/2019	--	2	111	72	8.5	-1.05
10/12/2019	62	2	90	1513	38.9	0.03
12/22/2019	--	2	90	1513	38.9	0.03

BXS-1 (Downgradient Well)						
Date	**Iron Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student's T-Test Statistic (t)[2]**
11/17/2014	10.0	--	--	--	--	--
2/23/2015	10.0	--	--	--	--	--
9/14/2015	6.4	--	--	--	--	--
12/7/2015	9.0	4	8.85	2.890	1.70	-10.85
2/29/2016	10.0	4	8.85	2.890	1.70	-6.30
6/16/2016	3.0	4	7.10	9.773	3.13	-5.69
9/26/2016	10.0	4	8.00	11.333	3.37	-6.41
3/8/2017	54.0	4	19.25	547.583	23.40	-1.49
6/10/2017	--	3	22.33	764.333	27.65	-1.26
9/16/2017	38.0	3	34.00	496.000	22.27	-1.94
12/14/2017	198.0	3	96.67	7765.333	88.12	-3.21
3/17/2018	10.0	3	82.00	10288.000	101.43	-3.25
6/16/2018	--	3	82.00	10288.000	101.43	-3.25
9/29/2018	10.0	3	72.67	11781.333	108.54	-3.28
11/17/2018	--	2	10.00	0.000	0.00	-3.86
3/16/2019	10.0	2	10.00	0.000	0.00	-1.32
6/1/2019	--	2	10.00	0.000	0.00	-1.32
10/12/2019	10.0	2	10.00	0.000	0.00	-1.81
12/22/2019	--	2	10.00	0.000	0.00	-1.81

Notes

$\bar{x}$ = average concentration for downgradient well. m_o = average concentration for upgradient well. n = number of samples.

s^1 = sample variance in upgradient well. s^2 = sample variance in downgradient well. s = sample standard deviation.

t = Student's T-Test statistic. -- = analysis not applicable. * = statistic with no/zero difference

[1] For non-detect concentrations, half of the reporting limit (MRL) is used. [2] Statistic in **bold** or gray is a statistically valid detection (Student's T-Test).

Table C-16. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Manganese

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Student's T-Test Formula (*t*): $\frac{\bar{x} - m_0}{\sqrt{[(s^1/n) + (s^2/n)]}}$

Critical Statistic: $t_c = 2.447$ $v = 6$; $t_c = 2.571$ $v = 5$; $t_c = 2.776$ $v = 4$; $t_c = 3.182$ $v = 3$; $t_c = 4.303$ $v = 2$; $t_c = 12.706$ $v = 1$

BXS-4 (Upgradient Well)				
Date	**Manganese Concentration[1]**	**Number of Samples (n)**	**Average Concentration (m_0)**	**Sample Variance (s^1)**
11/17/2014	115	--	--	--
2/23/2015	120	--	--	--
9/14/2015	114	--	--	--
12/7/2015	110	4	114.75	16.91667
2/29/2016	105	4	112.25	40.25000
6/16/2016	118	4	111.75	30.91667
9/26/2016	124	4	114.25	70.91667
3/8/2017	74	4	105.33	490.68917
6/10/2017	--	3	105.43	735.96333
9/16/2017	145	3	114.43	1318.26333
12/14/2017	--	2	109.65	2499.24500
3/17/2018	115	2	130.00	450.00000
6/16/2018	--	2	130.00	450.00000
9/29/2018	143	2	129.00	392.00000
11/17/2018	--	2	129.00	392.00000
3/16/2019	137	2	140.00	18.00000
6/1/2019	--	2	140.00	18.00000
10/12/2019	145	2	141.00	32.00000
12/22/2019	--	2	141.00	32.00000

BXS-3 (Downgradient Well)						
Date	**Manganese Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student's T-Test Statistic (t)[2]**
11/17/2014	8,620	--	--	--	--	--
2/23/2015	10,100	--	--	--	--	--
9/14/2015	5,290	--	--	--	--	--
12/7/2015	5,990	4	7,500	5,059,533	2,249	**6.57**
2/29/2016	11,800	4	8,295	9,962,033	3,156	**5.19**
6/16/2016	13,900	4	9,245	18,144,700	4,260	**4.29**
9/26/2016	4,620	4	9,078	20,023,492	4,475	**4.01**
3/8/2017	8,730	4	9,763	16,260,558	4,032	**4.79**
6/10/2017	--	3	9,083	21,623,233	4,650	**3.34**
9/16/2017	6,460	3	6,603	4,238,433	2,059	**5.46**
12/14/2017	--	2	7,595	2,576,450	1,605	**6.59**
3/17/2018	8,179	2	7,320	1,477,481	1,216	**8.36**
6/16/2018	--	2	7,320	1,477,481	1,216	**8.36**
9/29/2018	5,683	2	6,931	3,116,256	1,765	**5.45**
11/17/2018	4,890	3	6,251	2,946,348	1,716	**6.18**
3/16/2019	4,136	3	4,903	598,039	773	**10.67**
6/1/2019	3,573	4	4,570	840,807	917	**9.66**
10/12/2019	5,310	4	4,477	599,318	774	**11.20**
12/22/2019	5,550	4	4,642	889,828	943	**9.54**

Table C-16. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Manganese

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

BXS-2 (Downgradient Well)						
Date	**Manganese Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student's T-Test Statistic (t)[2]**
11/17/2014	1,680	--	--	--	--	--
2/23/2015	1,580	--	--	--	--	--
9/14/2015	1,570	--	--	--	--	--
12/7/2015	1,500	4	1,583	5,492	74.11	**39.55**
2/29/2016	1,600	4	1,563	1,892	43.49	**65.99**
6/16/2016	1,580	4	1,563	1,892	43.49	**66.17**
9/26/2016	1,200	4	1,470	34,267	185.11	**14.63**
3/8/2017	1,540	4	1,480	35,467	188.33	**14.50**
6/10/2017	324	4	1,161	340,431	583.46	**3.61**
9/16/2017	1,490	4	1,139	317,316	563.31	**3.63**
12/14/2017	--	3	1,118	473,452	688.08	2.53
3/17/2018	1,577	3	1,130	489,299	699.50	2.47
6/16/2018	1,475	3	1,514	3,002	54.79	**39.53**
9/29/2018	1,416	3	1,489	6,591	81.18	**27.81**
11/17/2018	--	3	1,489	6,591	81.18	**27.81**
3/16/2019	1,664	3	1,518	16,784	129.55	**18.41**
6/1/2019	--	2	1,540	30,752	175.36	**11.29**
10/12/2019	1,670	2	1,667	18	4.24	**305.20**
12/22/2019	--	2	1,667	18	4.24	**305.20**

BXS-1 (Downgradient Well)						
Date	**Manganese Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student's T-Test Statistic (t)[2]**
11/17/2014	265	--	--	--	--	--
2/23/2015	311	--	--	--	--	--
9/14/2015	238	--	--	--	--	--
12/7/2015	321	4	284	1525	39.05	**8.61**
2/29/2016	150	4	255	6269	79.17	**3.59**
6/16/2016	249	4	240	4915	70.11	**3.63**
9/26/2016	290	4	253	5539	74.42	**3.69**
3/8/2017	584	4	318	34842	186.66	2.27
6/10/2017	--	3	374	33390	182.73	2.52
9/16/2017	216	3	363	37889	194.65	2.18
12/14/2017	1,417	3	739	378619	615.32	1.76
3/17/2018	198	3	610	488114	698.65	1.19
6/16/2018	--	3	610	488114	698.65	1.19
9/29/2018	250	3	622	475092	689.27	1.24
11/17/2018	--	2	224	1352	36.77	3.22
3/16/2019	262	2	256	72	8.49	**17.29**
6/1/2019	--	2	256	72	8.49	**17.29**
10/12/2019	193	2	228	2381	48.79	2.49
12/22/2019	--	2	228	2381	48.79	2.49

Notes

$\bar{x}$ = average concentration for downgradient well. m_o = average concentration for upgradient well. n = number of samples.

s^1 = sample variance in upgradient well. s^2 = sample variance in downgradient well. s = sample standard deviation.

t = Student's T-Test statistic. -- = analysis not applicable. * = statistic with no/zero difference

[1] For non-detect concentrations, half of the reporting limit (MRL) is used. [2] Statistic in **bold** or gray is a statistically valid detection (Student's T-Test).

Table C-17. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Nickel

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Student's T-Test Formula (*t*): $$\frac{\bar{x} - m_0}{\sqrt{[(s^1/n) + (s^2/n)]}}$$

Critical Statistic: $t_c = 2.447$ $v = 6$; $t_c = 2.571$ $v = 5$; $t_c = 2.776$ $v = 4$; $t_c = 3.182$ $v = 3$; $t_c = 4.303$ $v = 2$; $t_c = 12.706$ $v = 1$

BXS-4 (Upgradient Well)				
Date	Nickel Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
11/17/2014	1.1	--	--	--
2/23/2015	0.4	--	--	--
9/14/2015	2.0	--	--	--
12/7/2015	2.0	4	1.37	0.62890
2/29/2016	2.0	4	1.59	0.67240
6/16/2016	0.4	4	1.60	0.64000
9/26/2016	2.0	4	1.60	0.64000
3/8/2017	3.5	4	1.98	1.60250
6/10/2017	--	3	1.97	2.40333
9/16/2017	2.7	3	2.73	0.56333
12/14/2017	--	2	3.10	0.32000
3/17/2018	1.9	2	2.30	0.32000
6/16/2018	--	2	2.30	0.32000
9/29/2018	0.4	2	1.15	1.12500
11/17/2018	--	2	1.15	1.12500
3/16/2019	5	2	2.70	10.58000
6/1/2019	--	2	2.70	10.58000
10/12/2019	8	2	6.50	4.50000
12/22/2019	--	2	6.50	4.50000

BXS-3 (Downgradient Well)						
Date	Nickel Concentration[1]	Number of Samples (n)	Average Concentration ($\bar{x}$)	Sample Variance (s^2)	Sample Standard Deviation (s)	Student's T-Test Statistic (t)[2]
11/17/2014	19.7	--	--	--	--	--
2/23/2015	18.9	--	--	--	--	--
9/14/2015	18.0	--	--	--	--	--
12/7/2015	20.6	4	19.30	1.233	1.11	**26.29**
2/29/2016	18.4	4	18.98	1.309	1.14	**24.70**
6/16/2016	20.8	4	19.45	2.117	1.45	**21.50**
9/26/2016	14.8	4	18.65	7.770	2.79	**11.76**
3/8/2017	15.3	4	17.33	7.902	2.81	**9.96**
6/10/2017	--	3	16.97	11.083	3.33	**7.07**
9/16/2017	21.0	3	17.03	11.863	3.44	**7.03**
12/14/2017	--	2	18.15	16.245	4.03	**5.23**
3/17/2018	5	2	13.00	128.000	11.31	1.34
6/16/2018	--	2	13.00	128.000	11.31	1.34
9/29/2018	26	2	15.50	220.500	14.85	1.36
11/17/2018	43.0	3	24.67	362.333	19.04	2.13
3/16/2019	27	3	32.00	91.000	9.54	**4.91**
6/1/2019	29	4	31.25	62.917	7.93	**6.23**
10/12/2019	36	4	33.75	52.917	7.27	**6.93**
12/22/2019	28.0	4	30.00	16.667	4.08	**9.28**

Table C-17. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Nickel

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

BXS-2 (Downgradient Well)						
Date	**Nickel Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student's T-Test Statistic (t)[2]**
11/17/2014	35.8	--	--	--	--	--
2/23/2015	34.1	--	--	--	--	--
9/14/2015	30.5	--	--	--	--	--
12/7/2015	29.3	4	32.43	9.222	3.04	**19.79**
2/29/2016	32.5	4	31.60	4.520	2.13	**26.34**
6/16/2016	31.8	4	31.03	2.009	1.42	**36.16**
9/26/2016	21.6	4	28.80	24.927	4.99	**10.76**
3/8/2017	30.2	4	29.03	25.429	5.04	**10.41**
6/10/2017	10.2	4	23.45	98.090	9.90	**4.27**
9/16/2017	31.0	4	23.25	93.797	9.68	**4.22**
12/14/2017	--	3	23.80	138.880	11.78	3.04
3/17/2018	18	3	19.73	110.413	10.51	2.87
6/16/2018	5	3	18.00	169.000	13.00	2.09
9/29/2018	32	3	18.33	182.333	13.50	2.19
11/17/2018	--	3	18.33	182.333	13.50	2.19
3/16/2019	38	3	25.00	309.000	17.58	2.14
6/1/2019	--	2	35.00	18.000	4.24	**8.54**
10/12/2019	39	2	38.50	0.500	0.71	**20.24**
12/22/2019	--	2	38.50	0.500	0.71	**20.24**

BXS-1 (Downgradient Well)						
Date	**Nickel Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student's T-Test Statistic (t)[2]**
11/17/2014	10.0	--	--	--	--	--
2/23/2015	9.3	--	--	--	--	--
9/14/2015	7.7	--	--	--	--	--
12/7/2015	6.6	4	8.40	2.355	1.53	**8.14**
2/29/2016	6.6	4	7.55	1.607	1.27	**7.89**
6/16/2016	9.2	4	7.53	1.516	1.23	**8.07**
9/26/2016	8.4	4	7.70	1.720	1.31	**7.94**
3/8/2017	15.7	4	9.98	15.749	3.97	**3.84**
6/10/2017	--	3	11.10	16.030	4.00	**3.68**
9/16/2017	10.3	3	11.47	14.343	3.79	**3.92**
12/14/2017	--	2	13.00	14.580	3.82	3.63
3/17/2018	5	2	7.65	14.045	3.75	2.00
6/16/2018	--	2	7.65	14.045	3.75	2.00
9/29/2018	12	2	8.50	24.500	4.95	2.05
11/17/2018	--	2	8.50	24.500	4.95	2.05
3/16/2019	12	2	12.00	0.000	0.00	4.04
6/1/2019	--	2	12.00	0.000	0.00	4.04
10/12/2019	12	2	12.00	0.000	0.00	3.67
12/22/2019	--	2	12.00	0.000	0.00	3.67

Notes

$\bar{x}$ = average concentration for downgradient well. m_o = average concentration for upgradient well. n = number of samples.

s^1 = sample variance in upgradient well. s^2 = sample variance in downgradient well. s = sample standard deviation.

t = Student's T-Test statistic. -- = analysis not applicable. * = statistic with no/zero difference

[1] For non-detect concentrations, half of the reporting limit (MRL) is used. [2] Statistic in **bold** or gray is a statistically valid detection (Student's T-Test).

Appendix D

Arsenic Transport Model and Calculations (Source: GSI Water Solutions, Inc.)

Arsenic Transport Model and Calculations

Naturally occurring arsenic can become mobilized in landfill groundwater interactions due enhanced microbial activity around disposed organic material. Arsenic is used in some wood preservation applications and can become a source of arsenic leaching from treated waste materials, however, the woodwaste disposed at J.H. Baxter's North and South Landfill consists of almost entirely of wood shavings and some intermixed bark. The woodwaste in turn provides organic content which can fuel microbial induced anaerobic groundwater conditions. The observation of low pH, negative oxidation reduction potential (ORP), low dissolved oxygen content, and diminishing concentrations of sulfate across the Site indicate the occurrence of these reduced conditions (USGS, 2006). Consequently, arsenic bearing minerals such as orpiment (arsenic sulfide) or arsenic rich pyrite (iron sulfides) can become unstable, allowing the dissolution or desorption of previously immobile arsenic (EPA, 2007). High concentrations of dissolved iron and manganese in the downgradient well (BXS-3) suggest that the process of mineral desorption may be occurring within the Site.

As the reduced site groundwater blends with the more aerobic and oxidative background aquifer it is expected that downgradient groundwater rapidly returns to aerobic conditions. A multitude of complexing and precipitation processes can occur in oxic groundwater conditions to reduce arsenic mobility. Additional groundwater water quality data was taken from United States Geologic Survey (USGS) monitored wells in the proximity to landfill to better determine background aquifer conditions (Figure D-1). The water quality data (Table D-1) indicate that reduced site groundwater will mix with a generally higher pH and oxygenated background aquifer (high dissolved oxygen generally associated with positive oxidation potential values). These oxidizing conditions, in turn, induce more rapid sorption and precipitation of arsenic. Figure D-2 below demonstrates the mineral solubility of some common arsenic bearing minerals (pyrite and goethite) and their sorbing characteristics relative to oxidation potential (Eh) and pH that is likely ongoing downgradient of the Site. As show in the figure, a positive oxidation potential and increasing pH correspond to greater propensity for arsenic sorption.

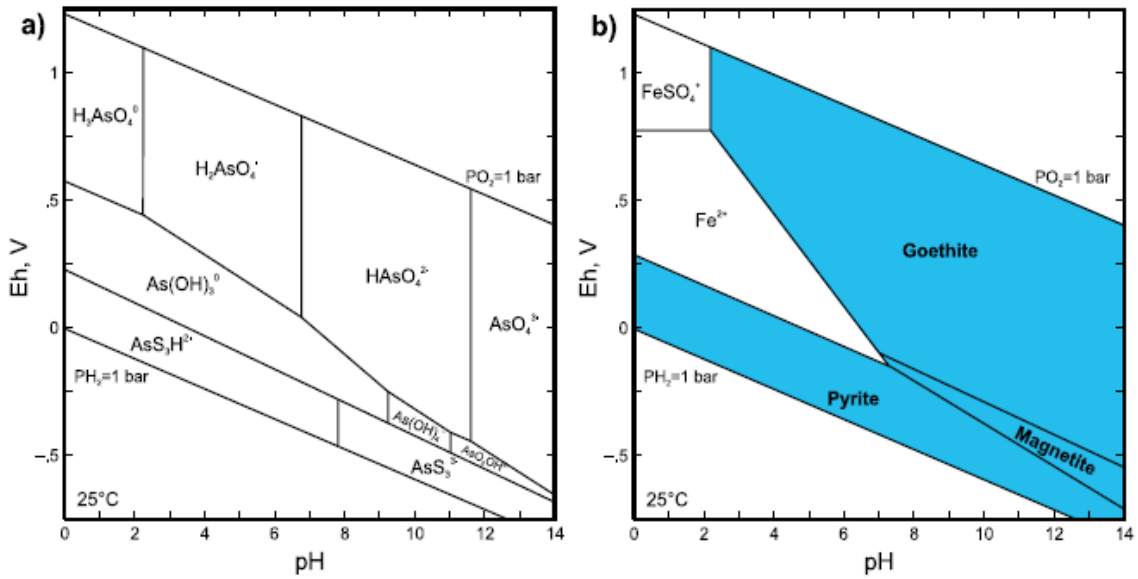


Figure D-2. Eh-pH diagrams for arsenic and iron at 25°C for coupled iron- and sulfate-reducing

systems. These paired diagrams show the relative distribution of potentially adsorbing arsenic species (left) relative to representative types of Fe-bearing sorbents (right) that are predicted to occur as a function of Eh and pH. (Figure 6.4, EPA 2007).

Conservative Solute Transport Model

To quantify the potential offsite migration of dissolved arsenic a conservative modeling approach was taken. Using the Quick Domenico model, an advection-dispersion calculation for solute transport, arsenic was modeled as if no redox or sorptive forces were occurring. As previously noted, the redox conditions of arsenic once mixed with the more oxic background aquifer the mobile arsenic fraction will likely be rapidly reduced. This conservative approach provides a "worst case" scenario for the persistence of the highest observed concentration of arsenic.

The Domenico model was developed using the Site's most recent groundwater data in conjunction with guidance from the Domenico Spreadsheet Analytical Model Manual developed by the California Regional Water Quality Board (SWRCB). Some of the assumptions in our calculation and this model include:

- The finite source dimension, delineated by interwell arsenic concentrations.
- Steady state source at the highest observed arsenic concentration.
- Contaminant concentration estimated at the centerline of the plume.
- No retardation (e.g., sorption) in transport process.

The sensitive parameters involved in the Domenico advection-dispersion model are conductivity and dispersivity. Generally, dispersivity values were scaled to the nearest downgradient monitoring well or receptor point, however, very large dispersion values are generally considered less conservative. The results of a water well survey, conducted on March 10, 2016 using the Washington Department of Ecology's Well Log Database, indicated the nearest downgradient water well is approximately 3,000 feet northwest of the landfill (Figure D-1). Consequently, the upper range of the United States Environmental Protection Agency (US EPA) recommended longitudinal dispersivity of 323 feet was selected (EPA 1996; SWRCB 1999). Associated transverse and vertical dispersivity values were calculated using this method.

The Domenico model was run for the upper range of site hydraulic conductivity (Table 2). The model was set to a 10-year run period, at which point the modeled concentration has reached the furthest downgradient extent given a constant source, the concentration being peak arsenic measured in 2018 (Table D-2). The largest areal extent with arsenic concentrations meeting or exceeding the Washington groundwater standard of 5 µg/L is plotted in Figure 18. Arsenic concentrations exceeding the groundwater standard were not found to persist greater than 310 feet downgradient of BXS-3.

References

California Regional Water Quality Control Board – Los Angeles Region (SWRCB) 1999. Domenico Spreadsheet Analytical Model Manual. December 1.

EPA 2007. *Monitored Natural Attenuation of Inorganic Contaminants in Groundwater: Volume 2*. EPA/600/R-07/140. Pg. 57-70. October.

United States Environmental Protection Agency (EPA) 1996. Soil screening guidance: technical background document E-25pp EPA/540/R-95/128, PB96-963502.

USGS 2006. "Redox conditions in Contaminated Ground Water". Scientific Investigations Report 2006-5056.

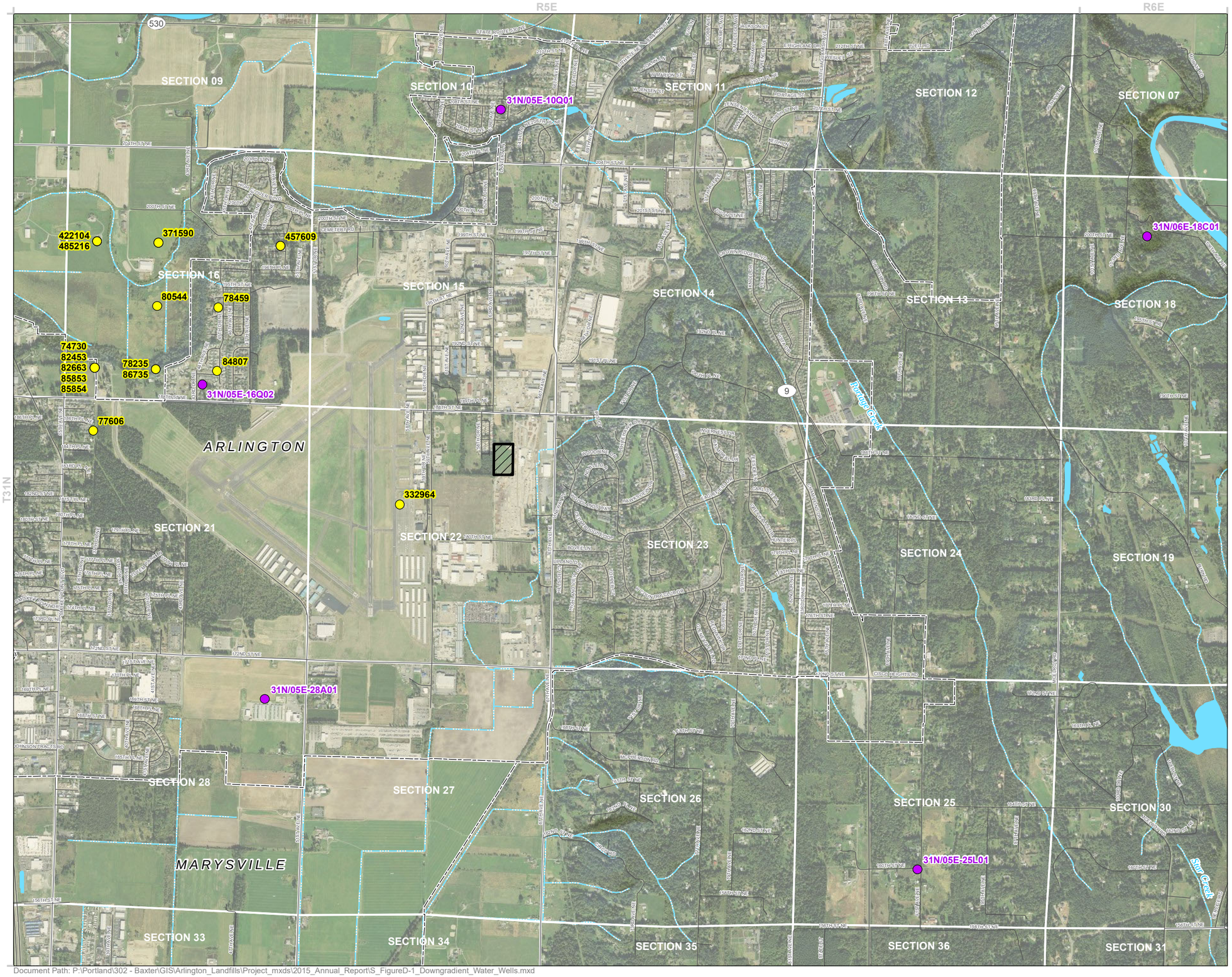


FIGURE D-1

Location of Potable Water Wellls Downgradient of South Landfill

Former J.H. Baxter North Woodwaste Landfill
Arlington, Washington

LEGEND

- Approximate Boundary of South Landfill
- Downgradient Potable Water Wells
- Background USGS Wells
- Cities
- Roads
- Watercourses
- Waterbodies

NOTE:
USGS = United States Geological Survey

N

0 1,000 2,000 3,000
Feet

MAP NOTES:
Date: March 21, 2016
Data Sources: WADOE, US BLM, USGS, ESRI,
Air photo taken on September 28, 2015 by the USDA

GSI Water Solutions, Inc.

Document Path: P:\Portland\302 - Baxter\GIS\Arlington_Landfills\Project_mxds\2015_Annual_Report\S_FigureD-1_Downgradient_Water_Wells.mxd

Table D-1. Background Groundwater Conditions
Former J.H. Baxter South Woodwaste Landfill
Arlington, Washington

USGS Well Name	USGS Well ID	Date Sampled	Hydrologic Unit Code	Latitude	Longitude	Surface Elevation (ft amsl)	Well Depth (ft)	Temp. (°C)	pH	Dissolved Oxygen (mg/L)	Organic Carbon, filtered (mg/L)	Dissolved Iron (µg/L)	Dissolved Manganese (µg/L)	Arsenic (µg/L)
31N/05E-25L01	480827122062701	7/27/1993	17110008	48.1406553	-122.1087496	460	79	11.4	8	0	0.2	230	84	4
31N/05E-10Q01	480903122094701	8/11/1993	17110008	48.1498214	-122.1651414	115	16.5	12.6	7.5	5.5	0.5	10	<1	2
31N/05E-13D02	481001122100801	7/30/1993	17110008	48.1678773	-122.1709758	125	48	11.2	7	9.6	0.2	<1	<1	<3
31N/05E-28A01	481039122065901	7/27/1993	17110008	48.1773229	-122.0898614	370	25	12.5	6.5	5.9	0.5	<1	62	<1
31N/05E-16Q02	481103122084001	7/27/1993	17110008	48.183989	-122.1456976	90	79	11.4	7	5	55	<1	96	10

Notes:

- AMSL = above mean sea level (NGVD29)

Table D-2

ADVECTIVE TRANSPORT WITH THREE DIMENSIONAL DISPERSION,1ST ORDER DECAY and RETARDATION - WITH CALIBRATION TOOL

Project:	Arsenic Conservative Solute Transport						
Date:	4/13/2020	Prepared by:	EBK				
		Contaminant:	Arsenic				

SOURCE CONC (MG/L)	Ax (ft)	Ay (ft)	Az (ft) >=.001	LAMBDA day-1	SOURCE WIDTH (ft)	SOURCE THICKNESS (ft)	Time (days) (days)
0.102	3.23E+02	4.20E+01	1.94E+00	1.00E-03	100	10	3650

Hydraulic Cond (ft/day)	Hydraulic Gradient (ft/ft)	Porosity (dec. frac.)	Soil Bulk Density (g/cm^{3})	KOC	Frac. Org. Carb.	Retard-ation (R)	V (=K*i/n*R) (ft/day)
1.70E+02	0.0195	0.3	1.7	1	1.00E-03	1.005666667	10.98773616

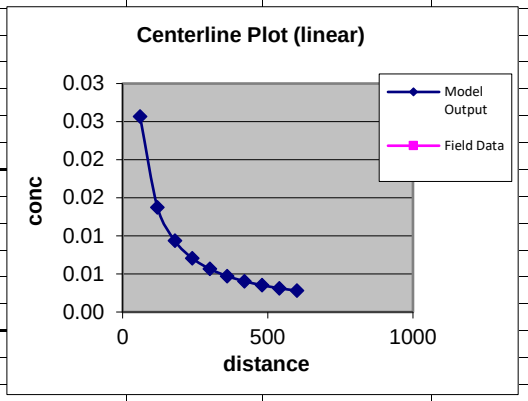
NEW QUICK_DOMENICO.XLS

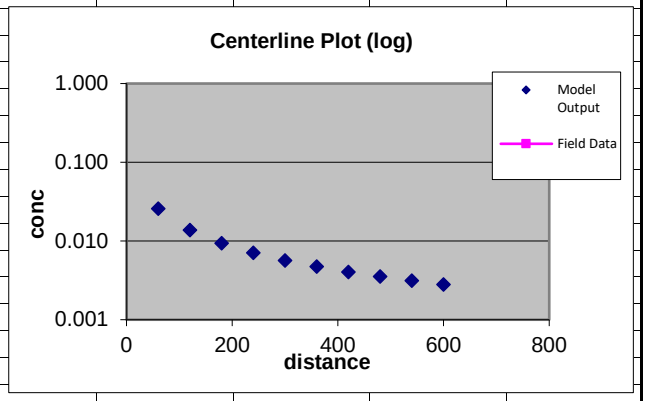
SPREADSHEET APPLICATION OF
"AN ANALYTICAL MODEL FOR
MULTIDIMENSIONAL TRANSPORT OF A
DECAYING CONTAMINANT SPECIES"
P.A. Domenico (1987)
Modified to Include Retardation

Point Concentration

x(ft)	y(ft)	z(ft)
310	0	0

	x(ft)	y(ft)	z(ft)
Conc. At	310	0	0
at	3650	days =	
			0.005
			mg/l





	AREAL MODEL	CALCULATION DOMAIN
	Length (ft)	600
	Width (ft)	100

	60	120	180	240	300	360	420	480	540	600
100	0.011	0.009	0.007	0.006	0.005	0.004	0.004	0.003	0.003	0.003
50	0.021	0.012	0.009	0.007	0.005	0.005	0.004	0.003	0.003	0.003
0	0.026	0.014	0.009	0.007	0.006	0.005	0.004	0.004	0.003	0.003
-50	0.021	0.012	0.009	0.007	0.005	0.005	0.004	0.003	0.003	0.003
-100	0.011	0.009	0.007	0.006	0.005	0.004	0.004	0.003	0.003	0.003

Field Data: Centerline C Concentration
Distance from Source