2020 Groundwater Monitoring Report
North Woodwaste Landfill
Arlington, Washington

Submitted to

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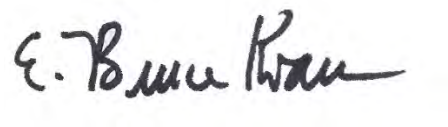

Date: 24 May 2021

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Date: 24 May 2021

Keith Woodburne, LG (#2955)

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1. Introduction

This report presents quarterly groundwater data collected in 2020 by Jeff Lervick PLE LLC for J.H. Baxter & Co's (Baxter) closed North Woodwaste Landfill (North Landfill, Site), located at the northwest corner of 198th Street NE and 67th Avenue NE in Arlington, Snohomish County, Washington (Figure 1, Source: GSI Water Solutions, Inc.). Baxter closed the North Landfill in 1991; it is covered with a vegetated soil cap.

Four monitoring wells were installed in 1988. Monitoring wells BXN-1, BXN-2, and BXN-3 are located hydraulically downgradient of the North Landfill. Monitoring well BXN-4 is located hydraulically upgradient of the North Landfill (Figures 2 and 3, Source: GSI Water Solutions, Inc.). Monitoring well BXN-4 represents the background groundwater quality providing the benchmark to compare with the water quality data from the 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 2020 was conducted in April, June, September, 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 BXN-1 and on a semi-annual basis from all the wells. Monitoring included measuring groundwater levels in wells that were sampled. Monitoring well BXN-3 was not sampled because it was damaged in 2010 and is currently inaccessible.

2. Hydrogeology

Hydrogeologic monitoring at BXN-1, BXN-2, and BXN-4 included collecting groundwater level measurements at these monitoring wells to understand the flow direction and gradient of shallow groundwater beneath the North Woodwaste Landfill.

2.1 Groundwater Elevations

Groundwater levels were measured at the three monitoring wells before purging the wells for groundwater sampling. Groundwater elevation data for 2020 are summarized in Table 1.

Based on measurements in BXN-1, groundwater elevations were highest during April and lowest during December. The static groundwater level in well BXN-1 fluctuated by 2.12 feet between April and December.

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. The groundwater flow direction throughout 2020 was toward the northwest and is consistent with the regional groundwater flow in the aquifer (Figure 4, Source: GSI Water Solutions, Inc.) and previous measurements of groundwater elevations in the North Woodwaste Landfill.

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 BXN-3 and BXN-4 (EMCON, 1989). Porosity (n_e) was assumed to be 0.300 (i.e., 30 percent).

The gradient (i) between wells BXN-4 and BXN-1, which are 1,200 feet apart, was 0.03 to 0.06 (Table 2). This slope results in velocity estimates of 1.7 to 3.9 feet per day. Table 2 shows the calculated hydraulic gradients and groundwater velocities during the 2020 monitoring events. The gradient and groundwater velocity are similar to previous years.

3. Groundwater Quality

Groundwater monitoring events were conducted on April 1, for the first quarter; June 26, for the second quarter; September 22, for the third quarter; and December 29, for the fourth quarter of 2020. Groundwater sampling was performed using submersible bladder pumps and tubing dedicated to each well. Sampling procedures are described in the latest SAP (GSI 2017).

Incorporating a flow-through cell, field measurements 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; samples for pentachlorophenol were collected annually. In accordance with the latest SAP, groundwater samples were analyzed by AmTest Laboratories of Kirkland, WA, for the following:

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

3.1 Groundwater Sampling

Beginning in the second quarter of 2011, field duplicates and equipment rinsate samples were collected from the North and South Landfills. Because groundwater samples were collected from both landfills on the same day, they are considered to be part of the same sampling event and the field quality control (QC) is applicable to both datasets.

Field measurements collected from February 2007 through December 2020 are summarized in Table 3A. Field sampling records are included in Appendix A. The analytical data from 2007 through 2020 are summarized in Tables 3B and 3C. Laboratory analytical reports and chain-of-custody (COC) forms for the 2020 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 2020 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. The June and December monitoring event duplicate sample were collected from monitoring well BXN-1 and labeled as BXN-101. During the April and September sampling events, a field rinsate blank was collected after sampling all wells and labelled as rinsate.

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. Following the RPD evaluation, no analytes were qualified as estimated concentrations.

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. Laboratory QA/QC results, including duplicates, matrix spikes and matrix spikes duplicates, standards, and method blanks analyses are attached in Appendix B.

All analyses were performed within the required holding time for the parameters of interest. The samples were analyzed for pH between 1 and 3 days after collection. The method used for pH analysis, Standard Method 4500-H+ B (APHA, 1998), does not list an analysis holding time. 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-measured pH is used for trend analysis and statistical evaluation.

No analytes were detected in method blanks above the MRL.

Laboratory duplicate RPDs (0-28%) 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 (BXN-1 and BXN-2) and the upgradient well (BXN-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 (BXN-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 groundwater samples from monitoring wells BXN-1, BXN-2, and BXN-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:

- Tannin & lignin, dissolved iron, and dissolved manganese in BXN-1
- Dissolved manganese in BXN-2

5.2 Concentration Trends over Time

Figures 5 through 17 show well concentration trends from 2007 through 2020 for each of the following parameters:

- **Ammonia as Nitrogen** (Figure 5)**:** Ammonia concentrations in BXN-4 have been consistently greater than downgradient wells. The trend line fitted to monitoring data for BXN-4 indicate ammonia levels are declining. In 2020, levels in all wells were similar. Ammonia concentrations in downgradient wells have been consistently low.
- **Arsenic** (Figure 6)**:** Arsenic concentrations in BXN-1 have been routinely higher than other wells. Concentrations at BXN-1 appear to be increasing. Concentrations in BXN-2 and BXN-1 have been consistently below the laboratory method detection limit.
- **Barium** (Figure 7)**:** Since 2016, barium concentrations in BXN-4 have been similar to BXN-1. Levels in BXN-2 have been consistently low. Conversely, barium in BXN-4 and BXN-1 fluctuates but appears to be decreasing and increasing, respectively.
- **Chemical Oxygen Demand (COD)** (Figure 8)**:** Except for a spike in BXN-1 in September 2017, COD has been consistently low in all monitoring wells. COD was highest in the background well early in the monitoring period but is now highest at BXN-1. COD in BXN-1 and BXN-4 has fluctuated over the monitoring period. Conversely, COD in BXN-2 has been more consistent and typically lower than the other wells.
- **Chloride** (Figure 9)**:** Chloride in BXN-1 peaked in September 2020. Similar to the background well, levels in BXN-1 have fluctuated over the monitoring period. Concentrations in BXN-1 are currently higher than the background well. Chloride in BXN-2 has been relatively consistent and lower than BXN-1 and BXN-4.
- **Iron** (Figure 10)**:** Iron concentrations have been consistently higher in BXN-1 compared to the other wells and the trend line suggests levels are increasing. With the exception of November 2009, values in BXN-2 and BXN-4 have been consistently low.

- **Manganese** (Figure 11)**:** Manganese concentrations have fluctuated in each well but appear to be increasing in BXN-1 and decreasing in BXN-2 and BXN-4. The increasing trend has resulted in BXN-1 concentrations exceeding other wells. The lowest manganese levels are currently in the upgradient well.
- **Nitrate plus Nitrite as Nitrogen** (Figure 12): Nitrate plus nitrite concentrations in BXN-4 have fluctuated over the monitoring period and been consistently higher than downgradient wells. The trend line fitted to the monitoring data for BXN-4 indicate nitrate plus nitrite values are increasing slightly. Levels in downgradient wells have consistently been low and lowest in BXN-1.
- **Pentachlorophenol (PCP):** PCP was not detected in 2020. Since 2014, PCP has not been detected in any wells.
- **Field pH** (Figure 13)**:** Field pH has been slightly acid and similar in all wells. With the exception of fluctuations in 2013-2014 and 2019, pH has been fairly consistent over the monitoring period.
- **Sulfate** (Figure 14)**:** Since 2007, sulfate concentrations in BXN-4 have been consistently greater than downgradient wells with the exception of December 2013. Although fluctuating, the trend in sulfate levels in BXN-4 appears to be increasing. Sulfate concentrations in downgradient wells have remained low and are declining slightly.
- **Tannin and Lignin** (Figure 15)**:** Tannin and lignin concentrations are highest in BXN-1, where they have also fluctuated more over the monitoring period compared to other wells. The trend line suggests recent increasing levels in BXN-1. Conversely, tannin and lignin are relatively stable and low in BXN-2 and BXN-4.
- **Total Dissolved Solids (TDS)** (Figure 16)**:** TDS concentrations have been low and similar in all wells over the monitoring period. The lone exception is 2014 when TDS spiked in BXN-4.
- **Total Organic Carbon (TOC)** (Figure 17)**:** TOC levels have been lowest in BXN-2. but still low and similar in all wells. Exceptions occurred in 2017 and 2018 when TOC spiked in BXN-1 and BXN-2. Values in BXN-1 peaked in 2020.

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 2020 that exceeded Washington water quality standards for groundwater, with the following exceptions:

- **Arsenic:** Arsenic concentrations exceeded Washington's water quality standard for groundwater of 0.05 µg/L in BXN-1 in all quarters of 2020. Concentrations ranged from <5 to 27 µg/L.

- **Iron:** Concentrations in BXN-1 exceeded the state standard of 300 µg/L in all quarters in 2020, ranging from 37,100 to 42,000 µg/L.
- **Manganese:** Concentrations in all wells exceeded Washington's groundwater standard of 50 µg/L in all quarters in 2020 ranging from 800 to 6,590 µg/L.
- **Nitrate+Nitrite:** Levels in BXN-4 exceeded the state standard of 10 mg/L in April 2020. Values peaked at 31 mg/L.
- **Field pH:** With the exception of April monitoring, pH levels in all wells in 2020 were below the groundwater standard of 6.5 to 8.5 for all quarterly monitoring events, ranging from 5.63-6.52.

Per the Snohomish Health District's request in a letter dated August 28, 2015, a dissolved arsenic plume delineation was performed in 2020. 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. 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 gradient and 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 2020 (Table 3C). In 2020, the largest areal extent with arsenic concentrations meeting or exceeding 5 µg/L is plotted in Figure 18. Figure 18 shows arsenic concentrations exceeding 5 µg/L were not found to persist greater than 77 feet downgradient of BXN-1, which is the shortest extent observed during the monitoring period.

6. Summary

Quarterly groundwater monitoring samples were collected from one upgradient well (BXN-4) and two downgradient wells (BXN-1 through BXN-2) during 2020 at the North Woodwaste Landfill. The samples were analyzed for 8 groundwater parameters and 4 dissolved metals.

Some groundwater samples collected during the 2020 monitoring events exceeded some Washington state standards for groundwater. Arsenic and iron concentrations in BXN-1 exceeded the standards for groundwater during all quarters. Nitrate+nitrite levels in BXN-4 exceeded 10 mg/L in April. In addition, all wells exceeded the state standard for manganese during all monitoring events. Furthermore, most field pH measurements in wells were lower than the standard (6.5) in 2020.

7. References

APHA. 1998. Standard Methods for the Examination of Water and Wastewater, 20th Edition. American Public Health Association.

EMCON. 1989. Hydrogeologic Report, J.H. Baxter North Woodwaste Landfill, Arlington, Washington. Prepared for J.H. Baxter by EMCON, Bothell, Washington. January 1989.

EPA. 1999a. Methods and Guidance for Analysis of Water, Version 2.0. U.S. Environmental Protection Agency. EPA-821-C-99-004. June 1999.

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EPA. 2010. USEPA CLP National Functional Guidelines for Inorganic Superfund Data Review, EPA-R-10-011. U.S. Environmental Protection Agency. January 2010.

GSI Water Solutions, Inc. (GSI) 2017. Revised groundwater sampling and analysis plan, north and south woodwaste landfills, Arlington, WA. Prepared for J.H. Baxter Co., Eugene, OR.

Washington. 2003. Washington Administrative Code (WAC) 173-200-040. Washington State Legislature. Last updated in 2003.

Tables

Table 1. Groundwater Elevation Summary for 2020

Former J.H. Baxter North Woodwaste Landfill

Arlington, Washington

Well ID	Inner Casing Diameter (inches)	Total Depth (ft bgs)	Screen Length (ft)	Screened Interval (ft bgs)	TOC Elevation (ft asd)	Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft asd)
BXN-1	2	58.18	10	48.18 - 58.18	95.50	4/1/2020	48.06	47.44
						6/26/2020	48.44	47.06
						9/22/2020	49.80	45.70
						12/29/2019	50.18	45.32
BXN-2	2	57.24	10	47.24 - 57.24	93.01	4/1/2020	44.40	48.61
						6/26/2020	NM	NM
						9/22/2020	46.03	46.98
						12/29/2019	NM	NM
BXN-3	2	58.66	10	48.66 - 58.66	97.23	4/1/2020	NM	NM
						6/26/2020	NM	NM
						9/22/2020	NM	NM
						12/29/2019	NM	NM
BXN-4	2	51.74	10	41.74 - 51.74	98.76	4/1/2020	43.02	55.74
						6/26/2020	NM	NM
						9/22/2020	45.26	53.5
						12/29/2019	NM	NM

Notes

bgs = below ground surface.

ft = feet.

asd = assumed site datum.

TOC = top of casing.

NM = not measured.

Table 2. Hydraulic Gradient and Groundwater Velocity btwn Wells BXN-4 and BXN-1 for 2020

Former J.H. Baxter North Woodwaste Landfill

Arlington, Washington

Date	Gradient (i) (ft/ft)	Hydraulic Conductivity (K) (cm/sec)	Porosity (n_e)	Velocity (v_x) (cm/sec)	Velocity (v_x) (ft/day)
4/1/2020	0.007	0.030 to 0.060	0.30	0.0007 to 0.001	2.0 to 3.9
				0.0000 to 0.000	0.0 to 0.0
9/22/2020	0.007			0.001 to 0.001	1.8 to 3.7

Notes

Gradient = BXN-4 groundwater elevation - BXN-1 groundwater elevation/1,200 ft.

cm = centimeter.

ft = feet.

NC = not calculated.

sec = second.

Table 3A. Summary of Groundwater Sampling Field Parameters: 2007 through 2020
Former J.H. Baxter North Woodwaste Landfill
Arlington, Washington

Date	pH (standard unit)				Conductivity (µS/cm)				Temperature (°C)				ORP (mV)				Dissolved Oxygen (mg/L)				Methane (percent)			
SMCL	6.5 - 8.5				--				--				--				--				--			
WA WQ Std	6.5 - 8.5				--				--				--				--				--			
Well ID	BXN-4	BXN-3	BXN-2	BXN-1	BXN-4	BXN-3	BXN-2	BXN-1	BXN-4	BXN-3	BXN-2	BXN-1	BXN-4	BXN-3	BXN-2	BXN-1	BXN-4	BXN-3	BXN-2	BXN-1	BXN-4	BXN-3	BXN-2	BXN-1
2/5/2007	7.17	7.33	7.12	7.07	117	369	391	449	11.4	12.2	11.1	11.1	165	47	200	88	4.90	7.60	8.90	10.20	NT	NT	NT	NT
4/18/2007	6.72	6.93	6.72	6.54	850	594	434	585	12.3	13.0	11.6	11.6	136	9	180	22	10.00	12.00	10.70	12.00	NT	NT	NT	NT
7/18/2007	6.72	6.96	6.86	6.74	961	543	586	789	13.0	13.2	12.3	12.5	138	-28	173	-1	2.04	2.96	3.07	2.07	0.0	0.0	0.0	0.0
10/10/2007	6.64	6.43	6.49	6.25	773	773	377	569	12.2	12.6	11.8	12.2	58	-11	146	9	2.79	2.93	2.01	2.44	0.0	0.0	0.0	0.0
1/10/2008	6.47	6.43	6.36	6.22	492	440	314	617	12.3	12.3	11.6	12.2	24	-20	161	-33	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0
4/30/2008	6.33	6.35	6.24	6.04	99	551	432	585	12.5	12.5	11.8	11.9	72	-7	147	23	0.00	0.00	0.00	0.00	NT	NT	NT	NT
7/30/2008	6.47	6.60	6.10	6.39	1070	485	389	618	12.8	12.9	12.1	12.7	84	20	2	5	0.60	0.21	0.00	0.17	0.0	0.0	0.0	0.0
10/22/2008	6.90	6.61	6.77	6.47	709	647	276	458	12.8	13.3	12.3	12.8	48	28	116	9	0.09	0.10	0.18	0.08	NT	NT	NT	NT
2/1/2009	6.66	6.87	6.78	6.68	104	469	388	505	12.5	12.8	11.8	12.3	124	-14	244	-20	1.63	2.12	1.85	2.06	0.0	0.0	0.0	0.0
5/1/2009	6.42	6.55	6.52	6.38	728	511	475	484	12.8	12.8	12.0	12.0	142	34	178	28	1.18	0.37	0.21	0.20	NT	NT	NT	NT
8/1/2009	6.59	6.61	6.65	6.61	104	707	7	468	12.7	13.0	12.6	12.4	95	9	135	-36	4.10	5.07	5.43	5.39	0.0	0.0	0.0	0.0
11/1/2009	6.67	6.54	6.54	6.43	106	473	343	448	12.3	12.4	12.0	12.1	72	-6	131	0.33	2.86	3.43	3.53	2.49	NT	NT	NT	NT
2/10/2010	6.68	6.80	6.62	6.53	1100	467	430	599	12.5	12.5	11.9	11.9	105	13	102	6	0.34	0.13	0.28	0.17	NT	NT	NT	NT
5/26/2010	6.00	NT	6.09	5.86	796	NT	322	614	12.7	NT	12.0	11.8	112	NT	119	-26	0.51	NT	0.21	0.12	0.0	0.0	0.0	0.0
8/18/2010	6.03	NT	6.05	5.79	90	NT	390	750	12.5	NT	11.9	11.7	57	NT	73	-64	0.00	NT	0.00	0.00	NT	NT	NT	NT
11/18/2010	6.48	NT	6.41	6.45	384	NT	317	467	12.8	NT	12.2	12.3	17	NT	25	-53	0.19	NT	0.45	0.44	0.0	NT	0.0	0.0
2/9/2011	6.21	NT	6.07	5.87	150	NT	520	100	0.1*	NT	-1.2*	-0.6*	57	NT	238	-52	3.30	NT	3.50	3.20	NT	NT	NT	NT
5/17/2011	7.00	NT	6.74	6.69	724.0	NT	354.0	510	12.6	NT	12.0	12.2	118.0	NT	259.0	-14	0.20	NT	0.00	0.11	0	NT	0.0	0.0
8/24/2011	6.81	NT	6.82	6.76	175	NT	362	771	13.2	NT	12.0	11.9	127	NT	190	-49	0.34	NT	0.54	0.51	NT	NT	NT	NT
11/3/2011	6.47	NT	6.50	6.27	126	NT	482	784	12.2	NT	11.8	11.7	166	NT	170	-14	0.51	NT	0.44	0.65	0	NT	0.0	0.0
2/14/2012	6.32	NT	6.22	6.05	103	NT	314	431	12.6	NT	11.8	11.6	153	NT	179	-4	0.40	NT	0.00	0.19	NT	NT	NT	NT
5/2/2012	6.96	NT	6.85	6.58	716	NT	343	697	12.4	NT	11.8	11.7	104	NT	157	-39	0.00	NT	0.43	0.00	0.0	NT	0.0	0.0
8/21/2012	6.84	NT	6.74	NT	857	NT	374	NT	12.7	NT	12.1	NT	125	NT	230	NT	1.52	NT	1.64	NT	NT	NT	NT	NT
11/13/2012	6.41	NT	6.50	6.27	127	NT	279	613	12.3	NT	11.7	11.7	97	NT	237	-76	0.99	NT	0.50	1.76	NT	NT	NT	NT
2/12/2013	6.81	NT	6.84	6.77	800	NT	300	700	12.2	NT	11.7	11.3	125	NT	134	-86	0.55	NT	0.58	0.61	NT	NT	NT	NT
6/4/2013	6.38	NT	6.37	6.53	670	NT	360	640	12.5	NT	12.0	11.5	127	NT	133	-66	0.94	NT	0.95	1.33	NT	NT	NT	NT
8/27/2013	6.63	NT	7.11	8.78	820	NT	280	580	12.6	NT	12.1	12.4	130	NT	108	-71	1.82	NT	1.71	8.75	NT	NT	NT	NT
12/2/2013	7.45	NT	7.78	10.24	740	NT	390	630	12.2	NT	12.0	11.5	106	NT	90	-65	5.57	NT	5.36	6.45	NT	NT	NT	NT
3/17/2014	7.84	NT	8.39	10.64	920	NT	250	620	12.4	NT	11.9	11.5	90	NT	61	-73	4.33	NT	1.28	1.80	NT	NT	NT	NT
6/2/2014	6.50	NT	6.42	8.12	780	NT	340	490	12.7	NT	12.0	14.0	139	NT	133	3	3.30	NT	6.80	8.90	NT	NT	NT	NT
9/29/2014	5.20	NT	5.49	8.41	780	NT	420	570	12.7	NT	12.1	12.4	129	NT	109	-56	NT	NT	NT	0.00	NT	NT	NT	NT
11/17/2014	6.41	NT	6.78	6.36	763	NT	305	714	12.1	NT	11.8	11.2	4	NT	-76	-92	0.00	NT	0.00	8.64	NT	NT	NT	NT
2/23/2015	6.32	NT	6.34	6.26	368	NT	226	311	12.8	NT	12.5	12.4	88	NT	24	-30	0.00	NT	0.00	0.86	NT	NT	NT	NT
9/14/2015	6.39	NT	6.62	6.16	996	NT	285	584	13.7	NT	13.3	14.8	164	NT	101	-55	0.00	NT	0.00	0.00	NT	NT	NT	NT
12/7/2015	6.28	NT	6.26	6.12	977	NT	259	516	13.1	NT	13.0	12.3	131	NT	62	-66	0.81	NT	0.33	7.77	NT	NT	NT	NT
2/29/2016	6.14	NT	6.39	6.14	561	NT	374	396	13.3	NT	12.5	12.3	174	NT	71	-85	6.08	NT	0.00	3.29	NT	NT	NT	NT
6/6/2016	7.14	NT	7.43	7.36	557	NT	279	350	13.1	NT	12.6	12.2	90	NT	55	-28	0.00	NT	0.00	0.00	NT	NT	NT	NT
9/26/2016	6.06	NT	6.19	6.08	628	NT	242	497	15.0	NT	14.4	14.1	159	NT	107	-55	1.52	NT	1.32	7.45	NT	NT	NT	NT
3/9/2017	6.09	NT	6.43	6.00	702	NT	187	529	14.2	NT	12.5	12.2	119	NT	152	51	0.83	NT	0.69	0.48	NT	NT	NT	NT
6/11/2017	NT	NT	NT	5.94	NT	NT	NT	317	NT	NT	NT	12.4	NT	NT	NT	-44.1	NT	NT	NT	0.49	NT	NT	NT	NT
9/17/2017	6.29	NT	6.50	5.93	617	NT	265	281	13.3	NT	12.9	13.2	223	NT	248	-63.6	1.60	NT	0.22	0.45	NT	NT	NT	NT
12/14/2017	NT	NT	NT	6.46	NT	NT	NT	567	NT	NT	NT	11.7	NT	NT	NT	-41.7	NT	NT	NT	3.73	NT	NT	NT	NT
3/18/2018	6.27	NT	6.52	6.43	453	NT	146	416	13.8	NT	12.8	13.5	29.1	NT	NT	5.6	0.92	NT	0.39	0.24	NT	NT	NT	NT
6/16/2018	NT	NT	NT	6.46	NT	NT	NT	305	NT	NT	NT	15.0	NT	NT	NT	-119.7	NT	NT	NT	0.28	NT	NT	NT	NT
9/30/2018	5.91	NT	6.01	6.00	616	NT	199	692	12.9	NT	12.6	12.8	246	NT	232	-23	0.04	NT	0.13	0.15	NT	NT	NT	NT
11/17/2018	NT	NT	NT	6.48	NT	NT	NT	596	NT	NT	NT	14.1	NT	NT	NT	-32.9	NT	NT	NT	1.02	NT	NT	NT	NT
3/17/2019	6.19	NT	6.30	6.27	570	NT	169	487	12.1	NT	12.2	11.9	38.8	NT	5.5	-89.2	0.43	NT	0.03	0.40	NT	NT	NT	NT
6/1/2019	NT	NT	NT	6.23	NT	NT	NT	1839	NT	NT	NT	15.8	NT	NT	NT	-76.2	NT	NT	NT	0.47	NT	NT	NT	NT
10/12/2019	8.09	NT	8.14	7.99	593	NT	336	691	14.3	NT	15.0	14.5	43	NT	89	-37	0.00	NT	0.00	0.00	NT	NT	NT	NT
12/22/2019	NT	NT	NT	6.12	NT	NT	NT	481	NT	NT	NT	12.3	NT	NT	NT	-40.6	NT	NT	NT	0.00	NT	NT	NT	NT
4/1/2020	6.32	NT	6.52	6.42	761	NT	255	599	13.2	NT	13.7	12.8	3.2	NT	12	8.1	6.00	NT	3.18	3.32	NT	NT	NT	NT
6/26/2020	NT	NT	NT	6.31	NT	NT	NT	824	NT	NT	NT	12.3	NT	NT	NT	-38	NT	NT	NT	0.00	NT	NT	NT	NT
9/22/2020	6.13	NT	6.33	6.36	393	NT	288	644	12.8	NT	13.1	12.2	92.4	NT	93.4	-23.5	0.90	NT	0.70	0.71	NT	NT	NT	NT
12/29/2020	NT	NT	NT	5.63	NT	NT	NT	860	NT	NT	NT	12.7	NT	NT	NT	-20	NT	NT	NT	0.92	NT	NT	NT	NT

Notes

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

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 2020
Former J.H. Baxter North 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	BXN-4	BXN-4 Dup	BXN-3	BXN-3 Dup	BXN-2	BXN-2 Dup	BXN-1	BXN-1 Dup	Field Blank	BXN-4	BXN-4 Dup	BXN-3	BXN-3 Dup	BXN-2	BXN-2 Dup	BXN-1	BXN-1 Dup	Field Blank
2/5/2007	6.72		6.77		6.64		6.65	6.73	5.79	1,180		432		458		571	578	4
4/18/2007	6.31		6.31		6.35		6.04	6.07	5.66	868		580		436		574	566	2
7/18/2007	6.47	6.48	6.67		6.55		6.48		6.04	846	850	479		523		679		2
10/10/2007	6.71	6.69	6.40		6.56		6.32		5.72	771	764	763		385		563		3
1/10/2008	6.62	6.65	6.67		6.68		6.38		5.10	975	1,000	448		311		619		5
4/30/2008	6.61	6.67	6.60		6.59		6.34		6.21	921	915	531		434		572		2,630
7/30/2008	6.41	6.48	6.55		6.76		6.38		5.30	1,180	1,170	549		468		657		4
10/22/2008	6.68	6.69	6.49		6.64		6.41			822	830	731		336		529		
2/1/2009	6.48	6.52	6.59		6.72		6.47		5.89	1,130	1,150	542		458		556		6
5/1/2009	6.33	6.34	6.46		6.33		6.25		5.64	684	681	462		446		422		2
8/1/2009	6.26	7.84	6.36		6.35		6.38		5.44	861	899	662		471		417		3
11/1/2009	6.53		6.53	6.56	6.47		6.35		6.40	957		471	470	343		434		3
2/10/2010	6.83	6.71	6.76		6.65		6.38		6.43	1,040	1,080	505		473		626		2 J
5/26/2010	6.33	6.36			6.37		6.17		4.93	813	819			333		599		4
8/18/2010	6.35				6.34		6.18	6.16	7.91	832				363		657	653	137
11/18/2010	6.49	6.53			6.44		6.23		6.00	1,010	948			341		475		3
2/9/2011	6.56				6.50		6.21			739				264		460		5
5/17/2011	6.59				6.47		6.40		6.06	638				371		423		3
8/24/2011	6.85				6.90		6.48		6.03	1,030				388		754		2 J
11/3/2011	6.73				6.56		6.41		7.33	1,110				444		714		2
2/14/2012	6.70				6.59		6.37		6.04	983				343		414		2
5/2/2012	6.87				6.76		6.41		6.86	583				318		575		3
8/21/2012	6.68				6.78				6.39	710				361				3
11/13/2012	6.89				7.10		6.81		7.42	1,120				284		589		2,490
2/12/2013	7.25				6.96		6.65		7.27	768				288		565		2 J
6/4/2013	7.25				7.12		6.69		7.32	817				431		647		2 J
8/27/2013	6.87				6.95		6.75		6.43	809				286		524		2 J
12/2/2013	7.14				6.87		6.92		6.20	732				415		548		2 J
3/17/2014	6.77				6.98		6.60		6.38	820				300		596		6.7
6/2/2014	6.78				6.78		6.59		5.97	782				337		490		1.7 J
9/29/2014	6.89				6.87		6.61		6.35	803				442		575		2.7
11/17/2014	6.98				6.99		6.64		7.77	626				283		511		3.4
2/25/2015	6.68				6.90		6.53		6.22	725				458		603		2.3
9/14/2015	6.66				6.95		6.55		7.00	973				293		546		1.6 J
12/7/2015	6.60				6.66		6.45			954				261		478		
2/29/2016	6.45				6.71		6.29		6.44	607				429		616		2.9
6/6/2016	6.37				6.80		6.64		5.80	604				341		358		1.5 J
9/26/2016	6.42				6.64		6.53		5.81	802				326		563		10.8
3/9/2017	6.64				6.54		6.48	6.50		704				463		488	494	
6/11/2017							6.49									444		
9/17/2017																		
12/14/2017																565		
3/18/2018																		
6/16/2018																		
9/30/2018																		
11/18/2018																		
3/17/2019																		
6/1/2019																		
10/12/2019																		
12/22/2019																		
4/1/2020																		
6/26/2020																		
9/22/2020																		
12/29/2020																		

Table 3B. Summary of Groundwater Conventional Parameters: 2007 through 2020
Former J.H. Baxter North Woodwaste Landfill
Arlington, Washington

Date	Chloride (mg/L)									Nitrate + Nitrite as N (mg/L)								
MCL/SMCL	none/250									10/none								
WA WQ Std	250									10								
Well ID	BXN-4	BXN-4 Dup	BXN-3	BXN-3 Dup	BXN-2	BXN-2 Dup	BXN-1	BXN-1 Dup	Field Blank	BXN-4	BXN-4 Dup	BXN-3	BXN-3 Dup	BXN-2	BXN-2 Dup	BXN-1	BXN-1 Dup	Field Blank
2/5/2007	82		5.4		12.4		10.3	10.1	0.2 U	32		0.27		0.51		0.04 J	0.04 J	0.03 J
4/18/2007	76		6.5		13.6		9.1	9.0	0.2 U	2.51		0.56		0.45		0.04 J	0.41	0.01 J
7/18/2007	67	73	4.7		10.9		5.6		0.2 U	1.37	1.43	0.15		0.38		0.04 J		0.01 J
10/10/2007	25.8	24.0	6.4		10.1		50		0.1 J	0.58	0.48	0.02		1.62		0.01		0.05 U
1/10/2008	49	50	7.6		8.4		49		0.2 U	8.55	8.65	0.86		1.88		0.02 J		0.05 U
4/30/2008	38	36	6.9		6.0		20.7		0.0 J	7.72	8.48	0.40		0.79		0.05 U		0.05 U
7/30/2008	103	102	5.9		8.4		14.3		0.2 U	14.6	13.90	1.72		0.60		0.02 J		0.05 U
10/22/2008	15.8	16.8	3.9		5.6		13.8			1.49	1.79	0.04 J		1.64		0.04 J		
2/1/2009	41	48	8.2		6.6		13.0		0.0 J	26.2	26.9	1.71		0.74		0.04 J		0.05
5/1/2009	50	51	11.1		34		20.2		0.2 U	2.99	2.90	2.27		0.59		0.05		0.02 J
8/1/2009	75	74	4.1		24.3		9.0		0.2 U	11.0	11.8	0.37		0.38		0.04 J		0.05 U
11/1/2009	49		7.1	6.2	10.2		34		0.2 U	13.8		0.55	0.56	1.50		0.02 J		0.05 U
2/10/2010	53	53	9.20		19.7		35		0.06 J	38	39	1.57		0.83		0.02 J		0.05 U
5/26/2010	43	44			17.3		26.2		0.04 J	15.6	16.0			1.69		0.08		0.04 J
8/18/2010	33				14.8		33	37	1.57	4.71				1.42		0.07	0.08	0.17
11/18/2010	72	72			8		25.1		0.40 U	12.2	11.5			0.94		0.02 J		0.05 U
2/9/2011	46				9.15		17		0.40 U	6.97				1.16		0.20		0.05 U
5/17/2011	15.6				9.9		9.88		0.40 U	1.94				0.57		0.05 J		0.01 J
8/24/2011	73				12.2		13.9		0.40 U	17.7				1.56		0.03 J		0.01 J
11/3/2011	63				24.4		105		0.40 U	26.90				1.11		0.03 J		0.05 U
2/14/2012	25.6				16.9		19.5		0.40 U	25.0				1.08		0.15		0.03 J
5/2/2012	15.1				12.3		54		0.40 U	2.92				1.06		0.03 J		0.05 U
8/21/2012	16.0				19.3				0.40 U	4.65				1.04				0.05 U
11/13/2012	79				8.5		28.1		0.40 U	21.9				2.11		0.05 U		0.05 U
2/12/2013	8.9				9.7		24.3		0.40 U	1.96				1.20		0.06		0.05 U
6/4/2013	13.0				10.5		5.8		0.40 U	2.00				0.93		0.05 U		0.05 U
8/27/2013	29.3				9.7		13.1		0.40 U	6.93 J				2.17		0.03 J		0.04 J
12/2/2013	4.11				9.4		11.3		0.40 U	4.69				1.02		0.10		0.01 J
3/17/2014	16.9				6.9		21.7		0.40 U	19.0				1.02		0.07 U		0.03 J
6/2/2014	23.7				19.5		13.7		0.40 U	22.5				1.56		0.05 U		0.05 U
9/29/2014	22.5				12.9		15.5		0.40 U	15.1				0.55		0.05 U		0.06
11/17/2014	17.6				5.84		37		0.40 U	8.36				2.34		0.05 U		0.03 J
2/25/2015	10.2				9.1		51		0.40 U	6.9				0.62		0.05 U		0.05 U
9/14/2015	52				5.16		15.4		0.20 U	12.3				2.76		0.03 J		0.05 U
12/7/2015	24.5				3.54		9.11			17.1				1.97		0.05 U		
2/29/2016	6.52				7.97		6.54		0.20 U	3.62				1.16		0.05 U		0.05 U
6/6/2016	27				6.27		6.29		0.20 U	0.851				1.47		0.05 U		0.05 U
9/26/2016	38				7.05		9.97		0.20 U	10.3				1.86		0.03 J		0.05 U
3/9/2017	13.2				7.32		9.49	9.61		5				0.65		0.05 U	0.04 J	
6/11/2017							5.75									0.05 U		
9/17/2017	22.0	22.8			5.47		3.25		0.20 U	9.84	9.27			2.02		0.96		0.039 J
12/14/2017							26.2									0.01 U		
3/18/2018	10.7				4.8		2.3		0.05 U	14.0				1.80		0.06		0.01 U
6/16/2018							7.8	7.19								0.01 U	0.01 U	
9/30/2018	37.5				5.1		10.5		0.09	21.0				2.40		0.01 U		0.01 U
11/18/2018							38.7	43.7								0.01 U	0.01 U	
3/17/2019	12.5				5.6		17	19		21.0				2.00		0.02 U	0.02 U	
6/1/2019							11.1									0.02 U		
10/12/2019	4.4				22.2		27		0.14	2.3				1.90		0.02 U		0.02 U
12/22/2019							18.6	18								0.21	0.26	
4/1/2020	13.1				6.78		5.68			31.0				1.40		0.06		
6/26/2020							27.9	27.8								1.19	1.19	
9/22/2020	7.2				22.5		27		3.6	3.6				1.70		0.02		0.02 U
12/29/2020							133	131								0.02 U	0.02 U	

Table 3B. Summary of Groundwater Conventional Parameters: 2007 through 2020
Former J.H. Baxter North Woodwaste Landfill
Arlington, Washington

Date	Solids, total dissolved (TDS) (mg/L)									Sulfate (mg/L)								
MCL/SMCL	none/500									none/250								
WA WQ Std	500									250								
Well ID	BXN-4	BXN-4 Dup	BXN-3	BXN-3 Dup	BXN-2	BXN-2 Dup	BXN-1	BXN-1 Dup	Field Blank	BXN-4	BXN-4 Dup	BXN-3	BXN-3 Dup	BXN-2	BXN-2 Dup	BXN-1	BXN-1 Dup	Field Blank
2/5/2007	739		284		290		360	363	5 U	24.1		11.1		20.0		11.8	11.3	0.2 U
4/18/2007	500		358		254		370	384	5 U	38		9.7		17.6		13.5	13.1	0.2 U
7/18/2007	474	481	304		294		400		5 U	25.5	25.4	18.7		14.1		9.7		0.2 U
10/10/2007	415	411	457		235		362		5 U	21.7	21.5	13.8		23.2		49		0.2 U
1/10/2008	511	517	229		207		315		5 U	32	34	15.0		19.3		15.2		0.2 U
4/30/2008	401	431	259		227		317		5 U	28.8	29.3	17.3		16.7		14.3		0.2 U
7/30/2008	641	773	325		262		373		5 U	28.7	28.8	12.7		19.7		9.7		0.2 U
10/22/2008	401	382	421		184		308			25.6	26.9	9.9		21.5		10.8		
2/1/2009	527	548	298		238		331		5 U	23.0	22.9	12.5		15.3		7.0		0.0 J
5/1/2009	425	438	308		291		278		7	32	32	19.6		16.9		8.6		0.2 U
8/1/2009	541	527	402		281		264		5 U	28.6	28.0	8.4		17.5		11.1		0.2 U
11/1/2009	515		269	266	204		258		5 U	24.3		17.8	14.7	21.8		10.7		0.2 U
2/10/2010	593	631	307		273		369		5	29.1	29.0	21.3		15.2		11.0		0.0 J
5/26/2010	128	420			182		333		5 U	28.1	28.6			18.9		12.3		0.4
8/18/2010	445				261		392	419	134	34				19.3		8.3	11.4	1.1
11/18/2010	488	473			169		240		5 U	41	42			14.9		15.3		0.4 U
2/9/2011	515				182		351		5 U	36				15.3		11.8		0.4 U
5/17/2011	371				200		328		5 U	39				15.9		7.2		0.4 U
8/24/2011	560				218		386		5 U	39				16.9		8.8		0.4 U
11/3/2011	593				300		403		5 U	39				16.0		13.5		0.4 U
2/14/2012	544				204		328		5 U	25.0				17.0		17.7		0.4 U
5/2/2012	346				222		431		6	30				18.7		14.2		0.4 U
8/21/2012	366				216				5 U	34				16.6				0.2 U
11/13/2012	536				158		328		5 U	34				16.4		8.9		0.2 U
2/12/2013	401				194		357		6	45				15.7		7.6		0.2 U
6/4/2013	374				243		377		5 U	54				18.6		3.8		0.2 U
8/27/2013	454				193		316		5 U	41				17.3		5.4		0.2 U
12/2/2013	413				261		320		6	16.2				19.2		10.7		0.2 U
3/17/2014	477				172		331		5 U	54				16.7		9.4		0.2 U
6/2/2014	NT				NT		NT		NT	37				18.9		11.1		0.2 U
9/29/2014	8,530 [1]				268		372		5 U	32				18.6		8.7		0.2 U
11/17/2014	NT				NT		NT		NT	33				19.2		14.4		0.2 U
2/25/2015	352				224		338		5 U	37				14.7		11.1		0.2 U
9/14/2015	485				139		322		5 U	43				20.3		10.2		0.2 U
12/7/2015	470				144		255			33				16.9		10.9		
2/29/2016	275				207		332		5 U	57				18.0		5.2		0.15 J
6/6/2016	314				181		186		5 U	42				21.2		10.3		0.2 U
9/26/2016	432				195		336		5.0 U	35				16.5		11.8		0.2 U
3/9/2017										41				12.4		8.9	8.8	
6/11/2017							252									7.3		
9/17/2017	375	380			178		175		1.5	41.9	42.2			19.6		3.0		0.2 U
12/14/2017							470									10.5		
3/18/2018	480				200		390		21	67.1 DE				15.2 E		3.4		0.1 U
6/16/2018							260	270								14.4	13.4	
9/30/2018	450				180		460		15	46.9				19.3		4.5		0.3
11/18/2018							460	420								5.7	6.7	
3/17/2019	490				170		190	200		45				20.6		24.9	23.4	
6/1/2019							320									8.6		
10/12/2019	270				150		280		2	51.9				11.7		21.4		0.1 U
12/22/2019							330	320								19.0	18	
4/1/2020	360				130		240			62.2				15.8		3.2		
6/26/2020							450	450								5.0	5.1	
9/22/2020	290				210		450		36	33.5				17.0		4.3		1.1
12/29/2020							500	520								8.8	8.9	

Table 3B. Summary of Groundwater Conventional Parameters: 2007 through 2020
Former J.H. Baxter North Woodwaste Landfill
Arlington, Washington

Date	Ammonia as N (mg/L)									Chemical Oxygen Demand (COD) (mg/L)								
MCL/SMCL	--									--								
WA WQ Std	--									--								
Well ID	BXN-4	BXN-4 Dup	BXN-3	BXN-3 Dup	BXN-2	BXN-2 Dup	BXN-1	BXN-1 Dup	Field Blank	BXN-4	BXN-4 Dup	BXN-3	BXN-3 Dup	BXN-2	BXN-2 Dup	BXN-1	BXN-1 Dup	Field Blank
2/5/2007	11.50		0.07		0.05 U		0.10	0.08	0.03 J	39		11.0		9.0		26.0	28.0	50 U
4/18/2007	10.10		0.08		0.05 U		0.07	0.04 J	0.05 U	35		26.0		12.0		29.0	21.0	4.0 J
7/18/2007	9.83	7.25	0.05 J		0.05 U		0.02 J		0.05 U	24.0	37	9.0		3.0 J		19.0		5.0 U
10/10/2007	12.3	12.4	0.02 J		0.05 U		0.12		0.05 U	34	34	5.0 U		17.0		32		5.0 U
1/10/2008	18.5	16.10	0.08		0.07		0.13		0.02 J	54	35	9.0		5.0 U		10.0		5.0 U
4/30/2008	14.2	14.10	0.05 U		0.05 U		0.05 U		0.05 U	14.0	15.0	9.0		7.0		11.0		5.0 U
7/30/2008	15.4	15.8	0.05 U		0.05 U		0.03 J		0.08	33	33	10.0		6.0		19.0		9.0
10/22/2008	12.9	13.6	0.03 J		0.05 U		0.05 J			18.0	18.0	13.0		5.0 U		9.0		
2/1/2009	15.9	15.9	0.06		0.05 U		0.22		0.05 U	39	27.0	10.0		5.0		38		5.0 U
5/1/2009	8.33	8.30	0.04 J		0.05 U		0.08		0.05 U	24.0	24.0	7.0		7.0		10.0		5.0 U
8/1/2009	10.4	10.7	0.02 J		0.05 U		0.06		0.01 J	50	57	15.0		5.0 J		14.0		3.0 J
11/1/2009	10.4		0.04 J	0.04 J	0.01 J		0.13		0.02 J	30		10.1	11.1	5.0 U		10.6		5.0 U
2/10/2010	6.64	6.41	0.03 J		0.05 U		0.13		0.05 U	14.9	16.4	5.0 U		5.0 U		19.9		5.0 U
5/26/2010	8.83	8.34			0.05 U		0.16		0.05 U	23.9	24.4			4.3 J		5.0 U		5.0 U
8/18/2010	7.89				0.05 U		0.19	0.17	0.05 U	24.1				4.2 J		21.7	19.4	5.0 U
11/18/2010	14.0	12.4			0.05 U		0.25		0.05 U	53	17.0			6.1		16.2		7.6
2/9/2011	6.73				0.05 U		0.16		0.05 U	34				7.0		24.6		5.0 U
5/17/2011	8.09				0.05 U		0.25		0.05 U	19.3				5.3		24.1		5.0 U
8/24/2011	10.2				0.05 U		0.44		0.05 U	22.4				4.4 J		33		5.0 U
11/3/2011	15.2				0.05 U		0.46		0.05 U	21.7				5.2		12.3		5.0 U
2/14/2012	13.4				0.05 U		0.23		0.05 U	29.8				9.1		12.6		3.5 J
5/2/2012	8.87				0.05 U		0.22		0.05 U	21.5				7.9		14.7		5.0 U
8/21/2012	12.5				0.05 U				0.05 U	17.9				4.1 J				5.0 U
11/13/2012	18.10				0.05 U		0.28		0.05 U	27.5				5.0 U		28.0		5.0 U
2/12/2013	10.10				0.05 U		0.32		0.05 U	13.0				3.1 J		31		5.0 U
6/4/2013	13.2				0.05 U		0.61		0.05 U	13.8				5.4		14.3		5.0 U
8/27/2013	12.3				0.05 U		0.27		0.05 U	19.6				5.5		45		5.0 U
12/2/2013	10.3				0.05 U		0.53		0.05 U	12.9				6.2		20.7		5.0 U
3/17/2014	10.10				0.05 U		0.54		0.05 U	11.3				4.1		27.8		5.0 U
6/2/2014	10.7				0.05 U		0.48		0.05 U	11.6				3.5		24.7		5.0 U
9/29/2014	13.7				0.05 U		0.49		0.05 U	13.2				4.9		23.4		5.0 U
11/17/2014	7.34				0.05 U		0.41		0.05 U	11.6				5.0 U		19.7		5.0 U
2/25/2015	8.40				0.05 U		0.26		0.05 U	10.8				7.9		19.9		5.0 U
9/14/2015	13.4				0.05 U		0.46		0.03 J	22.5				3.8 J		18.7		5.0 U
12/7/2015	0.05 U				0.24		0.05 U			16.0				5.8		15.5		
2/29/2016	5.69				0.05 U		0.26		0.025 J	8.6				3.2 J		62		5.0 U
6/6/2016	6.25				0.05 U		0.08 U		0.028 J	24.8				5.0 U		13.2		5.0 U
9/26/2016	8.78				0.05 U		0.45		0.05 U	27.1				4.7 J		29.7		5.0 U
3/9/2017	6.08				0.05 U		0.11	0.14		3.3 J				5.0 U		14.6 J	8.6 J	
6/11/2017							0.13									4.8 J		
9/17/2017	9.43	9.17			0.05 U		2.27		0.06	16.5	16.5			4.1 J		964		5.0 U
12/14/2017							0.56									38.0		
3/18/2018	3.8				0.01		0.40		0.01	10.0 U				10.0 U		76.0		10.0 U
6/16/2018							0.181	0.226								46.0 J	14.0 J	
9/30/2018	7.1				0.15		0.679		0.01 U	16.0				10.0 U		49.0		10.0 U
11/18/2018							0.581	0.578								10.0 U	12.0	
3/17/2019	3.38				0.02 U		0.25	0.239		10.0 U				10.0 U		10.0 U	10.0 U	
6/1/2019							0.042									8.1		
10/12/2019	0.146				0.03		0.142		0.03	10.0 U				10.0 U		26.0		10.0 U
12/22/2019							0.127	0.128								10.0 U	10.0 U	
4/1/2020	0.026				0.02 U		0.88			15.0				10.0 U		63.0		
6/26/2020							0.348	0.364								40.0	46.0	
9/22/2020	0.556				0.02 U		0.298		0.02 U	10.0 U				10.0 U		71.0		10.0 U
12/29/2020							0.323	0.323								10.0 U	15.0	

Table 3B. Summary of Groundwater Conventional Parameters: 2007 through 2020
Former J.H. Baxter North Woodwaste Landfill
Arlington, Washington

Date	Tannin and Lignin (mg/L)									Total Organic Carbon (TOC) (mg/L)								
MCL/SMCL	--									--								
WA WQ Std	--									--								
Well ID	BXN-4	BXN-4 Dup	BXN-3	BXN-3 Dup	BXN-2	BXN-2 Dup	BXN-1	BXN-1 Dup	Field Blank	BXN-4	BXN-4 Dup	BXN-3	BXN-3 Dup	BXN-2	BXN-2 Dup	BXN-1	BXN-1 Dup	Field Blank
2/5/2007	4.40		1.20		1.50		2.20	2.20	0.09 J	17.2		4.80		3.60		11.20	11.50	0.08 J
4/18/2007	2.30		2.00		1.60		2.00	2.10	0.20 U	12.6		8.30		3.50		9.20	7.40	0.25 J
7/18/2007	2.50	2.60	1.60		1.90		3.10		0.20 U	15.3	16.0	5.50		4.60		11.00		0.07 J
10/10/2007	3.70	3.60	1.80		1.90		1.30		0.20 U	13.7	13.3	5.60		5.10		6.80		0.08 J
1/10/2008	4.60	4.70	1.00		1.30		1.30		0.06 J	14.9	13.5	3.90		2.10		5.10		0.14 J
4/30/2008	3.10	2.60	1.20		1.80		1.70		0.20 U	4.40	10.6	3.30		2.80		5.10		0.50 U
7/30/2008	2.90	2.70	1.50		1.70		2.50		0.20 U	13.2	13.0	4.40		3.00		7.70		0.50 U
10/22/2008	3.60	3.50	1.60		1.20		0.70			6.80	7.00	5.90		1.80		3.40		
2/1/2009	2.30	2.70	0.90		1.50		1.70		0.20 U	10.3	9.90	3.50		2.10		12.0		0.50 U
5/1/2009	1.60	1.50	1.00		1.70		1.00		0.20 U	9.60	9.30	3.60		2.50		4.50		0.50 U
8/1/2009	2.70	2.80	1.80		1.50		1.00		0.20 U	17.4	18.6	5.80		3.00		4.90		0.17 J
11/1/2009	3.34		1.34	1.45	1.09		2.26		0.04 J	12.3		3.69	3.72	1.56		3.22		0.50 U
2/10/2010	2.45	2.60	2.22		1.88		10.2		0.20 U	8.58	9.17	2.53		2.29		8.90		0.50 U
5/26/2010	2.10	1.97			1.26		7.99		0.20 U	10.10	10.10			1.73		6.17		0.10 J
8/18/2010	1.63				1.14		1.95	1.86	0.04 J	8.43				1.74		6.55	6.37	0.50 U
11/18/2010	2.63	2.51			1.15		1.24		0.04 J	13.9	13.7			4.03		6.89		0.08 J
2/9/2011	2.06				1.36		3.74		0.09 J	13.10				2.10		9.74		0.50 U
5/17/2011	1.08				1.32		3.90		0.20 U	6.60				2.13		6.65		0.07 J
8/24/2011	0.81				0.96		2.95		0.20 U	8.12				2.18		12.10		0.50 U
11/3/2011	1.39				1.34		1.65		0.07 J	8.44				2.59		3.54		0.50 U
2/14/2012	2.96				1.61		5.53		0.10 J	8.86				2.25		2.89		0.08 J
5/2/2012	1.37				1.24		10.8		0.20 U	6.26				2.52		4.33		0.50 U
8/21/2012	1.40				1.20				0.20 U	5.96				1.63				0.50 U
11/13/2012	2.23				0.93		1.67		0.20 U	9.80				1.83		6.90		0.08 J
2/12/2013	1.33				0.72		1.62		0.20 U	5.43				1.45		8.20		0.50 U
6/4/2013	1.39				1.17		3.72		0.20 U	5.06				0.50 U		7.03		0.50 U
8/27/2013	1.55				0.72		1.72		0.20 U	6.61				1.75		7.30		0.50 U
12/2/2013	1.68				0.66		1.00		0.20 U	4.62				2.87		5.40		0.08 J
3/17/2014	1.02				0.54		4.91		0.20 U	3.96				1.66		7.65		0.50 U
6/2/2014	0.20 U				0.92		0.65		0.12 J	3.86				1.47		6.06		0.26 J
9/29/2014	1.80				0.92		15.9		0.20 U	5.25				2.12		6.48		0.50 U
11/17/2014	1.38				0.56		11.4		0.20 U	3.93				1.48		5.21		0.12 J
2/25/2015	1.22				1.10		4.81		0.06 J	3.71				2.29		5.49		0.25 J
9/14/2015	1.77				0.51		1.76		0.20 U	7.86				1.70 U		4.10		0.80
12/7/2015	1.33				0.47		1.31			4.93				1.09		3.82		
2/29/2016	0.54				0.77		3.78		0.20 U	3.22				1.81		17.0		0.13 J
6/6/2016	0.71				0.51		0.52		0.20 U	7.96				1.03		3.20		0.27 J
9/26/2016	1.53				0.66		2.00		0.20 U	8.61				1.55		7.47		0.50 U
3/9/2017	0.98				1.19		9.70	10.7		4.10				3.20		4.56	5.48	
6/11/2017							6.40									3.41		
9/17/2017	1.17	1.13			0.81		1.88		0.20 U	6.08	6.27			1.66 J		175		0.5 U
12/14/2017							28									27		
3/18/2018	0.74				0.67		4.6		0.10 U	5.20				42.0		42		2.3
6/16/2018							0.92	0.94								48	37	
9/30/2018	0.83				0.67		68		0.10 U	4.30				1.30		15		1.1
11/18/2018							25	25								6.9	7.1	
3/17/2019	2.9				0.50		15	12		3.40				1.30		9	9.3	
6/1/2019							16									8.1		
10/12/2019	0.86				0.88		18		0.28	1.80				0.97		4.2		0.5 U
12/22/2019							34	26								3.1	3.8	
4/1/2020	0.23				0.39		7.3			26.0				0.97		16		
6/26/2020							34	36								13	13	
9/22/2020	0.97				1.20		3.5		0.32	3.20				1.20		17		1.7
12/29/2020							29	29								4.0	4.5	

Table 3B. Summary of Groundwater Conventional Parameters: 2007 through 2020
Former J.H. Baxter North Woodwaste Landfill
Arlington, Washington

Date	Total Coliforms								
MCL/SMCL	MPN/100 mL								
WA WQ Std	1/100 mL								
Well ID	BXN-4	BXN-4 Dup	BXN-3	BXN-3 Dup	BXN-2	BXN-2 Dup	BXN-1	BXN-1 Dup	Field Blank
2/5/2007	2.0		2.0		25.0		1.0 U	1.0 U	1.0 U
4/18/2007	4.1		1.0 U		70		1.0	1.0 U	1.0 U
7/18/2007	165	159	1,986		291		124		1.0 U
10/10/2007	2,420	345	276		2,420 >		73		1.0 U
1/10/2008	7.4	6.3	2.0		9.8		3.1		3.1
4/30/2008	1.0 U	1.0 U	1.0 U		1.0		1.0		1.0 U
7/30/2008	81	57	64		49		326		18.7
10/22/2008	5.2	2.0	1.0		3.1		2.0		24.9
2/1/2009	1.0 U	1.0 U	1.0 U		4.2		1.0 U		1.0 U
5/1/2009	2.0	1.0	2.0		3.1		8.7		4.2
8/1/2009	22.2	20.7	15.0		109		59		1.0
11/1/2009	1.0		4.1	6.3	6.3		11.0		3.1
2/10/2010	17.3	5.2	9.6		3.1		4.1		1.0
5/26/2010	3.1	6.3			83		16.4		48
8/18/2010	1.0 U				44		1.0 U	3.1	18.9
11/18/2010	116	93			16.1		21.3		1.0
2/9/2011	31				6.3		1.0 U		1.0 U
5/17/2011	6.3				2.0		1.0 U		1.0 U
8/24/2011	7.5				8.5		1.0 U		1.0 U
11/3/2011	P				P		1.0 U		1.0 U
2/14/2012	28.2				1.0		1.0 U		1.0 U
5/2/2012									
8/21/2012	1.0 U				6.3				1.0 U
11/13/2012	1.0 U				1.0 U		2,420		1.0 U
2/12/2013	1.0 U				3.1		20.0		1.0 U
6/4/2013									
8/27/2013	1.0 U				1,414		66		1.0 U
12/2/2013	1.0 U				14.8		1.0 U		1.0 U
3/17/2014	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
9/29/2014	1.0 U				1.0 U		5.20		1.0 U
11/17/2014	1.0 U				1.0 U		1.00 U		1.0 U
2/25/2015	1.0 U				1.0 U		1.0 U		1.0 U
9/14/2015	11.1				8.7		165		1.0 U
12/7/2015	4.2				36		95		1.0 U
2/29/2016	1.0 U				NQ[2]		NQ[2]		1.0 U
6/6/2016	11.1				8.7		165		1.0 U
9/26/2016	1.0 U				1.0 U		1.0 U		1.0 U
3/9/2017									
6/11/2017									
9/17/2017									
12/14/2017									
3/18/2018									
6/16/2018									
9/30/2018									
11/18/2018									
3/17/2019	NT				NT		NT		
6/1/2019	NT				NT		NT		
10/12/2019	NT				NT		NT		
12/22/2019	NT				NT		NT		
4/1/2020	NT				NT		NT		
6/26/2020	NT				NT		NT		
9/22/2020	NT				NT		NT		
12/29/2020	NT				NT		NT		

Notes

mg/L = milligram per liter. MPN = most probable number. D = reported value is from a dilution. E = concentration is estimated because value exceeded calibration range.

J = estimated concentration less than the MRL but less than or = to the MDL. NT = not tested. U = analyte was not detected at or above the MRL/MDL.

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).

[1] TDS in BXN-4 on September 29, 2014 appears erroneous as it is unusually high. Conductivity, which also measures TDS, was normal on this date supporting the erroneous conclusion.

[2] Total Coliforms were not quantified during lab analysis. Coliforms reported as present or not present. Analysis indicating the presence of coliforms are presented as NQ (not quanitified).

Table 3C. Summary of Groundwater Metals: 2007 through 2020
Former J.H. Baxter North Woodwaste Landfill
Arlington, Washington

Date	Arsenic, dissolved (µg/L)									Barium, dissolved (µg/L)								
MCL/SMCL	10/none									2000/none								
WA WQ Std	0.05									1,000								
Well ID	BXN-4	BXN-4 Dup	BXN-3	BXN-3 Dup	BXN-2	BXN-2 Dup	BXN-1	BXN-1 Dup	Field Blank	BXN-4	BXN-4 Dup	BXN-3	BXN-3 Dup	BXN-2	BXN-2 Dup	BXN-1	BXN-1 Dup	Field Blank
2/5/2007	5.0 U		6.1		5.0 U		2.0 B	2.5 B	5.0 U	331		34		15.3		52	49	5.0 U
4/18/2007	5.0 U		6.4		5.0 U		4.2 B	4.4 B	1.5 B	178		39		12.0		41	41	3.0 B
7/18/2007	5.0 U	5.0 U	5.2		5.0 U		3.9 B		5.0 U	232	232	34		17.8		48		5.0 U
10/10/2007	5.0 U	5.0 U	4.7 B		5.0 U		3.0 B		5.0 U	171	176	51		12.6		50		5.0 U
1/10/2008	1.0 J	1.2 J	4.3 J		5.0 U		4.5 J		0.7 U	225	222	26.2		10.6		39		0.6 U
4/30/2008	5.0 U	5.0 U	4.3 J		1.1 J		3.5 J		0.7 U	187	195	31		12.5		30		0.6 U
7/30/2008	0.9 J	0.7 J	3.6 J		0.8 J		9.3		0.6 U	337	348	36		14.7		57		0.5 U
10/22/2008	5.0 U	5.0 U	5.0 U		5.0 U		4.3 J			145	140	41		9.2		29.3		
2/1/2009	5.0 U	5.0 U	3.7 J		1.3 J		9.3		5.0 U	278	269	40		14.1		46		5.0 U
5/1/2009	0.6 J	0.6 J	3.5 J		0.5 J		9.1		5.0 U	168	164	33		14.6		37		5.0 U
8/1/2009	0.8 J	6.1	0.9 J		6.0		6.1		5.0 U	15.6	25.1	43		36		38		5.0 U
11/1/2009	5.0 U		3.1 J	3.0 J	5.0 U		9.2		5.0 U	194		29.8	29.9	10.7		28.6		5.0 U
2/10/2010	5.0 U	1.1 J	3.3 J		1.6 J		10.6		5.0 U	273	292	33		16.0		44		5.0 U
5/26/2010	5.0 U	5.0 U			5.0 U		9.9		5.0 U	188	187			10.8		47		5.0 U
8/18/2010	5.0 U				5.0 U		11.5	12.0	3.0 J	173				9.4		44	44	1.5 J
11/18/2010	5.0 U	5.0 U			5.0 U		11.3		5.0 U	205	227			10.3		40		5.0 U
2/9/2011	5.0 U				5.0 U		13.6		5.0 U	231				10.6		64		5.0 U
5/17/2011	5.0 U				5.0 U		16.1		5.0 U	145				11.6		52		5.0 U
8/24/2011	5.0 U				5.0 U		18.7		5.0 U	202				11.6		70		5.0 U
11/3/2011	0.5 J				0.5 J		13.1		5.0 U	290				13.8		67		5.0 U
2/14/2012	5.0 U				5.0 U		9.0		5.0 U	220				10.9		47		0.6 J
5/2/2012	5.0 U				0.5 J		15.8		5.0 U	115				10.5		73		5.0 U
8/21/2012	5.0 U				5.0 U				5.0 U	150				11.0				5.0 U
11/13/2012	5.0 U				5.0 U		33		5.0 U	323				9.0		155		5.0 U
2/12/2013	5.0 U				5.0 U		26.6		5.0 U	130				9.2		121		5.0 U
6/4/2013	1.5 J				1.6 J		25.1		1.1 J	140				13.4		102		4.0 U
8/27/2013	5.0 U				5.0 U		27.8		5.0 U	171				9.2		107		4.0 U
12/2/2013	5.0 U				5.0 U		25.7		5.0 U	119				13.0		97		4.0 U
3/17/2014	0.50 U				0.50 U		24.5		0.50 U	165				10.0		93		4.0 U
6/2/2014	0.30 J				0.20 J		23.4		0.50 U	139				11.7		87		4.0 U
9/29/2014	0.34 J				0.21 J		21.8		0.50 U	165				15.2		89		4.0 U
11/17/2014	0.30 J				0.20 J		24		0.50 U	124				9.3		93		0.6 J
2/25/2015	0.42 J				0.21 J		23.2		0.50 U	125				14.4		68		0.1 J
9/14/2015	0.40 J				0.30 J		39		0.50 U	168				8.8		96		4.0 U
12/7/2015	0.35 J				0.22 J		22.5			182				7.9		55		
2/29/2016	0.35 J				0.27 J		28.2		0.50 U	102				12.5		85		4.0 U
6/6/2016	0.60				0.20 J		16.6		0.50 U	113				10.5		30.0		0.9 J
9/26/2016	0.40 J				0.50 U		12.6		0.50 U	163				0.6 J		70		4.0 U
3/9/2017	5.5 U				5.5 U		15 J	14 J		111				16.6		49.8	49.4	
6/11/2017							17									48		
9/17/2017	5.5 U	5.5 U			5.5 U		5.5 U		5.5 U	133	133			10.9		65		1.1 J
12/14/2017							47.0									127		
3/18/2018	5.0 U				5.0 U		31.0		5.0 U	163				6.5		107		0.5 U
6/16/2018							21.0	30.0								72	69.7	
9/30/2018	5.0 U				5.0 U		31.0		5.0 U	168				7.4		146		0.5 U
11/18/2018							14.0	16.0								127	122	
3/17/2019	5.0 U				5.0 U		31.0 J	47.0 J		110				8.0		68	79	
6/1/2019							22.0									64		
10/12/2019	5.0 U				5.0 U		9.0		5.0 U	41.9				7.6		38		0.6
12/22/2019							51.0	56.0								36.6	37.6	
4/1/2020	5.0 U				5.0 U		23.0			160				8.6		76		
6/26/2020							14.0	17.0								123	114	
9/22/2020	5.0 U				5.0 U		5.0 U		5.0 U	64.6				12.1		85		0.6
12/29/2020							26.0	27.0								62.6	66.3	

Table 3C. Summary of Groundwater Metals: 2007 through 2020
Former J.H. Baxter North Woodwaste Landfill
Arlington, Washington

Date	Iron, dissolved (µg/L)									Manganese, dissolved (µg/L)							
MCL/SMCL	300/300									50/50							
WA WQ Std	300									50							
Well ID	BXN-4	BXN-4 Dup	BXN-3	BXN-3 Dup	BXN-2	BXN-2 Dup	BXN-1	BXN-1 Dup	Field Blank	BXN-4	BXN-4 Dup	BXN-3	BXN-3 Dup	BXN-2	BXN-2 Dup	BXN-1	BXN-1 Dup	Field Blank
2/5/2007	35		7,600		20.0 U		7,000	6,200	20.0 U	7,270		2,460		5,900		3,200	2,910	5.0 U
4/18/2007	68		8,870		7.6 B		6,070	6,100	4.7 B	3,070		2,970		5,910		3,150	3,180	1.6 B
7/18/2007	48	51	5,900		20.0 U		8,980		20.0 U	3,380	3,340	1,960		8,030		3,960		5.0 U
10/10/2007	162	163	7,510		20.0 U		7,810		20.0 U	4,480	4,590	2,990		5,320		2,940		2.7 B
1/10/2008	444	406	4,510		11.0 J		9,010		3.0 U	6,600	6,750	1,690		4,460		3,000		1.6 B
4/30/2008	138	146	5,730		8.9 J		6,490		3.0 U	4,060	4,110	2,050		6,580		1,700		0.3 B
7/30/2008	149	158	3,960		11.9 J		22,300		4.0 U	4,560	4,720	1,860		6,880		3,640		0.2 U
10/22/2008	257	258	4,880		18.0 J		11,600			5,130	5,030	2,770		4,730		2,700		
2/1/2009	64	69	6,280		20.0 U		16,500		4.5 J	3,370	3,330	2,890		6,680		2,490		0.2 J
5/1/2009	105	110	4,800		11.7 J		13,400		20.0 U	2,460	2,490	2,170		7,330		2,000		0.4 J
8/1/2009	5.1 J	30	19.1 J		25,400		27,000		0.8 J	44	106	1,290		9,760		9,860		0.2 J
11/1/2009	135		3,760	3,570	6.7 J		10,300		20.0 U	5,320		1,540	1,530	4,570		2,340		0.7 J
2/10/2010	98	94	2,620		20.0 U		14,400		20.0 U	2,980	2,990	1,740		6,920		3,100		5.0 U
5/26/2010	89	91			9.4 J		15,400		20.0 U	1,910	1,970			3,900		3,310		5.0 U
8/18/2010	68				2.0 J		14,800	15,300	20.0 U	1,980				4,240		3,830	3,890	5.0 U
11/18/2010	736	222			3.8 J		11,700		20.0 U	3,890	3,720			4,260		3,270		5.0 U
2/9/2011	48				20.0 U		21,100		20.0 U	2,240				3,870		5,850		0.2 J
5/17/2011	49				13.9 J		20,300		6.8 J	1,160				4,900		5,200		5.0 U
8/24/2011	12.7 JN*				7.5 JN*		24,200		20.0 UN*	1,110				4,100		7,430		5.0 U
11/3/2011	29.9				21.2		14,900		20.0 U	1,840				5,030		3,940		0.5 J
2/14/2012	9.9 J				5.7 J		11,600		20.0 U	2,830				3,150		2,790		0.3 J
5/2/2012	21.0				3.9 J		23,100		20.0 U	1,450				3,300		5,310		5.0 U
8/21/2012	19.2 J				20.0 U				20.0 U	1,400				3,340				5.0 U
11/13/2012	14.5 J				20.0 U		33,100		20.0 U	2,510				2,490		3,160		5.0 U
2/12/2013	29.2				3.2 J		36,300		20.0 U	1,640				2,550		3,370		5.0 U
6/4/2013	225				9.20 J		45,600		4.10 J	1,530				3,840		6,370		6.2
8/27/2013	35				6.30 J		35,200		20.0 U	1,900				2,200		3,670		0.5 J
12/2/2013	102				5.80 J		36,900		20.0 U	2,500				2,710		3,470		0.1 J
3/17/2014	84				11.4 J		36,600		20.0 U	2,260				2,500		3,700		0.3 J
6/2/2014	25.7				20.0 U		35,800		20.0 U	1,870				2,960		3,730		1.0 U
9/29/2014	44				20.0 U		38,100		8.30 J	3,310				3,710		4,460		0.6 J
11/17/2014	67				40 U		39,900		40 U	2,330				2,220		3,930		0.2 J
2/25/2015	27				4.0 J		28,600		20.0 U	2,040				4,020		3,410		1.0 U
9/14/2015	23.2				4.0 U		40,000		20.0 U	3,550				2,240		5,190		1.0 U
12/7/2015	16 J				5.0 J		28,100			3,270				1,920		4,890		
2/29/2016	20 U				20.0 U		35,600		4.0 J	1,560				3,620		6,250		0.8 J
6/6/2016	18.1 J				3.0 J		11,800		20.0 U	1,440				2,970		2,360		1.0 U
9/26/2016	20 U				20.0 U		26,000		3.0 J	3,180				7.3		4,890		0.3 J
3/9/2017	1,270				4 J		23,300	23,900		1,960				5,350		4,050	3,900	
6/11/2017							24,900									3,750		
9/17/2017	47	54			10.5 U		951		10.5 U	2,450	2,430			3,360		3,120		0.55 U
12/14/2017							52,200									4,940		
3/18/2018	71				10.0		63,800		106	1,280				2,790		5,020		10.9
6/16/2018							34,700	37,500								4,073	3,928	
9/30/2018	10 U				10.0 U		67,600		16	2,366				2,748		7,422		5.0 U
11/18/2018							56,500	53,200								5,944	5,493	
3/17/2019	46				10.0 U		45,700	55,400		1,755				2,747		4,966	5,384	
6/1/2019							44,400									6,393		
10/12/2019	14				10.0 U		23,600		10	1,230				3,100		5,840		10.0
12/22/2019							34,800	36,200								5,400	5,440	
4/1/2020	50 U				10.0 U		42,000			800				2,500		5,930		
6/26/2020							41,900	40,300								6,430	6,270	
9/22/2020	50 U				50.0 U		37,100		10	1,250				3,240		6,590		10.0
12/29/2020							40,200	41,900								6,100	6,310	

Table 3C. Summary of Groundwater Metals: 2007 through 2020
Former J.H. Baxter North Woodwaste Landfill
Arlington, Washington

Date	Cadmium, dissolved (µg/L)									Copper, dissolved (µg/L)								
MCL/SMCL	5/none									1,300/1,000								
WA WQ Std	10									1,000								
Well ID	BXN-4	BXN-4 Dup	BXN-3	BXN-3 Dup	BXN-2	BXN-2 Dup	BXN-1	BXN-1 Dup	Field Blank	BXN-4	BXN-4 Dup	BXN-3	BXN-3 Dup	BXN-2	BXN-2 Dup	BXN-1	BXN-1 Dup	Field Blank
2/5/2007	5.0 U		5.0 U		5.0 U		5.0 U	5.0 U	5.0 U	24.5		10.0 U		10.0 U		10.0 U	10.0 U	10.0 U
4/18/2007	5.0 U		1.0 B		5.0 U		5.0 U	0.7 B	5.0 U	19.7		10.0 U		10.0 U		10.0 U	10.0 U	10.0 U
7/18/2007	5.0 U	5.0 U	5.0 U		5.0 U		5.0 U		5.0 U	24.4	27.4	10.0 U		6.0 B		7.5 B		10.0 U
10/10/2007	5.0 U	5.0 U	5.0 U		5.0 U		5.0 U		5.0 U	25.0	24.4	10.0 U		10.0 U		10.0 U		10.0 U
1/10/2008	1.1 J	2.2 J	1.5 J		1.5 J		1.8 J		0.6 U	16.1	18.3	10.0 U		10.0 U		10.0 U		7.0 U
4/30/2008	0.9 J	0.9 J	0.9 J		1.1 J		1.3 J		0.6 U	17.1	17.2	10.0 U		10.0 U		10.0 U		7.0 U
7/30/2008	0.3 J	0.4 J	0.3 J		0.2 J		0.9 J		0.2 U	20.0	20.9	10.0 U		1.8 J		1.8 J		1.4 B
10/22/2008	5.0 U	5.0 U	5.0 U		5.0 U		5.0 U			14.1	14.6	10.0 U		10.0 U		10.0 U		
2/1/2009	0.4 J	0.4 J	0.2 J		0.3 J		0.4 J		0.2 J	20.4	19.3	10.0 U		1.0 J		2.4 J		10.0 U
5/1/2009	5.0 U	5.0 U	5.0 U		5.0 U		5.0 U		5.0 U	14.8	14.1	10.0 U		10.0 U		10.0 U		5.8 J
8/1/2009	5.0 U	5.0 U	5.0 U		5.0 U		5.0 U		5.0 U	2.9 J	10.0 U	2.1 J		10.0 U		10.0 U		10.0 U
11/1/2009	5.0 U		5.0 U	5.0 U	5.0 U		5.0 U		5.0 U	17.5		10.0 U	10.0 U	10.0 U		10.0 U		10.0 U
2/10/2010	5.0 U	5.0 U	5.0 U		5.0 U		5.0 U		5.0 U	19.2	23.3	2.0 J		2.2 J		4.3 J		10.0 U
5/26/2010	5.0 U	5.0 U			5.0 U		5.0 U		5.0 U	20.0	19.6			10.0 U		0.8 J		10.0 U
8/18/2010	5.0 U				5.0 U		2.5 J	5.0 U	5.0 U	17.4				10.0 U		10.0 U	10.0 U	10.0 U
11/18/2010	5.0 U	5.0 U			5.0 U		2.3 J		5.0 U	5.7 J	13.9			6.7 J		9.5 J		5.8 J
2/9/2011										23.7				10.0 U		3.9 J		10.0 U
5/17/2011										19.1				3.8 J		4.8 J		2.2 J
8/24/2011										12.3				10.0 U		10.0 U		10.0 U
11/3/2011	5.0 U				5.0 U		2.9 J			15.8				10.0 U		10.0 U		10.0 U
2/14/2012	5.0 U				5.0 U		5.0 U		5.0 U	19.1				1.1 J		2.4 J		10.0 U
5/2/2012	5.0 U				5.0 U		5.0 U		5.0 U	20.4				1.7 J		10.0 U		10.0 U
8/21/2012	NT				NT		NT		NT	22.3				1.1 J				10.0 U
11/13/2012	NT				NT		NT		NT	20.8				10.0 U		10.0 U		10.0 U
2/12/2013	NT				NT		NT		NT	17.4				1.1 J		0.8 J		10.0 U
6/4/2013	NT				NT		NT		NT	22.1				2.4 J		4.0 U		4.0 U
8/27/2013	NT				NT		NT		NT	19.2				1.7 J		1.0 J		4.0 U
12/2/2013	NT				NT		NT		NT	16.7				2.5 J		2.3 J		4.0 U
3/17/2014	NT				NT		NT		NT	13.1				4.0 U		4.0 U		4.0 U
6/2/2014	NT				NT		NT		NT	10.2				1.4 J		1.6 J		4.0 U
9/29/2014	NT				NT		NT		NT	16.6				4.0 U		4.0 U		1.2 J
11/17/2014	NT				NT		NT		NT	15.0				4.0 U		4.0 U		1.0 J
2/25/2015	NT				NT		NT		NT	13.1				1.73		0.82		0.03 J
9/14/2015	NT				NT		NT		NT	15.2				2.2 J		0.9 J		4.0 U
12/7/2015	NT				NT		NT		NT	8.7				4.0 U		4.0 U		
2/29/2016	NT				NT		NT		NT	9.2				4.0 U		4.0 U		4.00 U
6/6/2016	NT				NT		NT		NT	14.1				4.0 U		4.0 U		2.2 J
9/26/2016	NT				NT		NT		NT	13.5				4.0 U		4.0 U		0.9 J
3/9/2017	NT				NT		NT		NT	NT				NT		NT	NT	
6/11/2017	NT				NT		NT		NT							2.1 U		
9/17/2017	NT				NT		NT		NT	10.1	10.4			2.1 U		2.1 U		2.1 U
12/14/2017	NT				NT		NT		NT	NT				NT		NT		NT
3/18/2018	NT				NT		NT		NT	NT				NT		NT		NT
6/16/2018	NT				NT		NT		NT	NT				NT		NT		NT
9/30/2018	NT				NT		NT		NT	NT				NT		NT		NT
11/18/2018	NT				NT		NT		NT	NT				NT		NT		NT
3/17/2019	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
4/1/2020	NT				NT		NT		NT	NT				NT		NT		NT
6/26/2020	NT				NT		NT		NT	NT				NT		NT		NT
9/22/2020	NT				NT		NT		NT	NT				NT		NT		NT
12/29/2020	NT				NT		NT		NT	NT				NT		NT		NT

Table 3C. Summary of Groundwater Metals: 2007 through 2020
Former J.H. Baxter North Woodwaste Landfill
Arlington, Washington

Date	Nickel, dissolved (µg/L)									Zinc, dissolved (µg/L)								
MCL/SMCL	--									none/5000								
WA WQ Std	--									5,000								
Well ID	BXN-4	BXN-4 Dup	BXN-3	BXN-3 Dup	BXN-2	BXN-2 Dup	BXN-1	BXN-1 Dup	Field Blank	BXN-4	BXN-4 Dup	BXN-3	BXN-3 Dup	BXN-2	BXN-2 Dup	BXN-1	BXN-1 Dup	Field Blank
2/5/2007	188		41		52		50	53	20.0 U	2.5 B		2.9 B		3.3 B		2.6 B	4.5 B	10.0 U
4/18/2007	103		43		47		42	42	20.0 U	38		12.6		25.1		44	43	10.0 U
7/18/2007	120	125	40		64		36		20.0 U	7.0 B	5.6 B	3.7 B		5.9 B		9.8 B		10.0 U
10/10/2007	139	136	104		36		41		20.0 U	10.4	11.1	16.6		34		28.3		10.0 U
1/10/2008	109	111	40		32		41		2.0 U	10.0 U	10.0 U	10.0 U		10.0 U		7.1 J		7.0 U
4/30/2008	108	107	44		47		49		2.0 U	10.0 U	10.0 U	10.0 U		10.0 U		10.4		7.0 U
7/30/2008	95	99	52		39		31		0.5 U	3.2 J	3.1 J	1.2 J		3.4 J		3.3 J		1.5 B
10/22/2008	62	61	121		28.0		46			6.8 J	3.0 J	10.0 U		10.0 U		4.3 J		
2/1/2009	83	78	56		42		43		20.0 U	2.4 J	4.6 J	1.2 J		3.3 J		5.2 J		1.6 J
5/1/2009	63	63	68		47		37		20.0 U	2.5 J	1.7 J	10.0 U		3.1 J		4.7 J		5.0 J
8/1/2009	7.5 J	20.0 U	32		13.6 J		14.2 J		20.0 U	2.0 J	10.0 U	6.1 J		1.7 J		0.9 J		2.4 J
11/1/2009	74		70	71	32		25.7		20.0 U	1.7 J		10.0 U	10.0 U	10.0 U		4.0 J		10.0 U
2/10/2010	70	78	71		47		43		20.0 U	1.8 J	3.5 J	10.0 U		1.8 J		2.9 J		10.0 U
5/26/2010	62	62			28.4		42		20.0 U	7.3 J	1.5 J			1.3 J		7.3 J		10.0 U
8/18/2010	90				29.7		37	36	20.0 U	3.5 J				1.0 J		6.3 J	6.7 J	1.9 J
11/18/2010	117	104			29.3		42		20.0 U	10.0 U	10.0 U			10.0 U		10.0 U		10.0 U
2/9/2011	104				28.8		42		20.0 U	2.9 J				1.9 J		3.2 J		0.3 J
5/17/2011	70				37		37		20.0 U									
8/24/2011	88				32		26.3		20.0 U	3.1 J				1.6 J		2.0 J		10.0 U
11/3/2011	103				39		32		20.0 U	3.2 J				2.4 J		4.7 J		10.0 U
2/14/2012	123				24.8		32		20.0 U	3.8 J				1.6 J		3.4 J		0.7 J
5/2/2012	82				25.9		38		20.0 U	1.3 J				0.9 J		1.6 J		10.0 U
8/21/2012	78				26.7				20.0 U	10.0 U				10.0 U				10.0 U
11/13/2012	106				21.0		21.2		20.0 U	1.1 J				10.0 U		2.5 J		10.0 U
2/12/2013	82				22.7		24.4		20.0 U	1.1 J				10.0 U		2.0 J		10.0 U
6/4/2013	86				32		39		4.0 U	1.1 J				1.0 J		3.4 J		4.0 U
8/27/2013	90				22.2		27.3		4.0 U	1.3 J				2.4 J		2.0 J		4.0 U
12/2/2013	85				33		38		4.0 U	1.6 J				0.9 J		2.2 J		4.0 U
3/17/2014	63				20.4		31		4.0 U	1.4 J				0.8 J		2.1 J		4.0 U
6/2/2014	62				28.2		33		4.0 U	1.1 J				0.4 J		1.4 J		4.0 U
9/29/2014	80				34		45		0.4 J	2.4 J				1.2 J		2.2 J		4.0 U
11/17/2014	74				20.9		32		4.0 U	3.9 J				0.9 J		1.9 J		5.0 U
2/25/2015	68				28.8		32		0.1 J	1.9 J				1.0 J		2.5 J		0.5 U
9/14/2015	64				17.2		33		0.4 J	5.2				1.3 J		2.8 J		4.0 U
12/7/2015	57				12.2		45			3.2 J				1.6 J		2.6 J		
2/29/2016	58				26.7		42		4.0 U	2.2 J				1.3 J		4.2		4.0 U
6/6/2016	63				21.5		14.9		4.0 U	4.3				4.0 U		4.0 U		1.0 J
9/26/2016	92				4.0 U		22.2		4.0 U	1.9 J				0.5 J		19.0		4.0 U
3/9/2017	61				39		37.8	38.2		NT				NT		NT	NT	
6/11/2017							23									0.7 J		
9/17/2017	71	70			24.4		18.3		2.1 U	1.9 J	2.3 J			1.9 J		2.3 J		0.7 J
12/14/2017							2.1 U									NT		
3/18/2018	NT				NT		NT			NT				NT		NT		
6/16/2018	NT				NT		NT			NT				NT		NT		
9/30/2018	NT				NT		NT			NT				NT		NT		
11/18/2018	NT				NT		56	53		NT				NT		NT		
3/17/2019	NT				NT		NT			NT				NT		NT		
6/1/2019	NT				NT		NT			NT				NT		NT		
10/12/2019	NT				NT		NT			NT				NT		NT		
12/22/2019	NT				NT		NT			NT				NT		NT		
4/1/2020	NT				NT		NT			NT				NT		NT		
6/26/2020	NT				NT		NT			NT				NT		NT		
9/22/2020	43				30		66			NT				NT		NT		
12/29/2020	NT				NT		45	47		NT				NT		NT		

Notes

µg/L = microgram per liter. B = detected in laboratory blank. 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. NT = not tested. R = rejected value. 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 3D. Summary of Groundwater Pentachlorophenol: 2009 to 2020

Former J.H. Baxter North Woodwaste Landfill

Arlington, Washington

Date	Pentachlorophenol (µg/L)								
MCL/SMCL	1/								
WA WQ Std	--								
	BXN-4	**BXN-4 Dup**	**BXN-3**	**BXN-3 Dup**	**BXN-2**	**BXN-2 Dup**	**BXN-1**	**BXN-1 Dup**	**Field Blank**
9/1/2009	0.5 U		1.5		0.5 U		0.5 U		NT
11/18/2009	0.5 U		0.5 U	0.5 U	0.24 J		0.5 U		NT
2/10/2010	0.5 U	0.5 U	0.5 U		0.5 U		0.5 U		0.5 U
8/21/2012	0.5 U		NT		0.5 U		NT		0.5 U
11/13/2012	0.5 U		NT		0.5 U		0.5 U		41
2/12/2013	0.5 U		NT		0.5 U		0.5 U		0.5 U
6/4/2013	0.5 U		NT		0.5 U		0.5 U		0.5 U
8/27/2013	0.5 U		NT		0.5 U		0.5 U		0.5 U
12/2/2013	0.5 U		NT		0.5 U		0.5 U		0.5 U
3/17/2014	0.5 U		NT		0.5 U		0.5 U		0.5 U
6/2/2014	0.5 U		NT		0.5 U		0.5 U		0.5 U
9/29/2014	0.19 NJ		NT		0.5 U		0.5 U		0.5 U
9/26/2016	0.1 U		NT		0.1 U		0.1 U		0.1 U
3/9/2017	0.5 U		NT		0.5 U		0.5 U	0.5 U	0.5 U
3/18/2018	0.2 U		NT		0.2 U		0.2 U		0.2 U
3/17/2019	0.2 U		NT		0.2 U		0.2 U	0.2 U	0.2 U
4/1/2020	2.0 U		NT		2.0 U		2.0 U		NT

Notes

µg/L = micrograms per liter. R = rejected value. 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.

MCL = Federal maximum contaminant levels for drinking water.

NJ = result is tentaitvely identified and the associated numerical valus is the estimated concentration in the sample.

SMCL = Federal secondary maximum contaminant levels for drinking water.

U = analyte was not detected above the reported sample quantification limit.

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

September 2009 samples collected by buyer's consultant and analyzed by ALS Laboratory Group, Everett, WA.

November 2009 and February 2010 samples collected as part of quarterly monitoring activities.

August and November 2012 samples collected as part of quarterly monitoring activities.

All 2013 through 2020 samples collected as part of monitoring activities.

Table 4. Parameters Statistically Higher than Background: 1989 to 2020

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

Analyte Group	Parameter[1]	Monitoring Period	Unit	Mean Value Downgradient[2,3]			Mean Value Upgradient[2]
				BXN-1	BXN-2	BXN-3	BXN-4
Conventionals	Ammonia as Nitrogen	1989	mg/L			0.36	0.06
Conventionals	Ammonia as Nitrogen	1991	mg/L			0.595	0.04
Conventionals	Ammonia as Nitrogen	1992	mg/L			0.26	ND
Conventionals	Ammonia as Nitrogen	1993	mg/L			0.57	0.08
Conventionals	Ammonia as Nitrogen	1994	mg/L			0.23	ND
Conventionals	Ammonia as Nitrogen	1995	mg/L			0.23	ND
Metals	Arsenic	1991	µg/L			21	9
Metals	Arsenic	1992	µg/L			20	ND
Metals	Arsenic	1993	µg/L			27	3
Metals	Arsenic	1994	µg/L			32	2.5
Metals	Arsenic	1995	µg/L			31	2.5
Metals	Arsenic	1996	µg/L			27	2.5
Metals	Arsenic	1997	µg/L			17	2.5
Metals	Arsenic	1998	µg/L			19	2.5
Metals	Arsenic	1999	µg/L			18	2.5
Metals	Arsenic	2001	µg/L			18.5	2.5
Metals	Arsenic	2002	µg/L			19.83	1.41
Metals	Arsenic	2003	µg/L			16.73	1.33
Metals	Arsenic	2004	µg/L			13.73	2.07
Metals	Arsenic	2005	µg/L			12.63	2.33
Metals	Arsenic	2006	µg/L			6.53	3.53
Metals	Arsenic	2007	µg/L			5	ND (< 5 µg/L)
Metals	Arsenic	2008	µg/L	5.4		3.68	1.73
Metals	Arsenic	2009	µg/L	8.43		2.8	1.6
Metals	Arsenic	2010	µg/L	10.83			ND (<5 µg/L)
Metals	Arsenic	2011	µg/L	15.38			2
Metals	Arsenic	2012	µg/L	19.23			2.5
Metals	Arsenic	2013	µg/L	26.3			3.05
Metals	Arsenic	2014	µg/L	23.43			0.32
Metals	Arsenic	2015	µg/L	27.1			0.37
Metals	Arsenic	2016	µg/L	19.98			0.43
Metals	Arsenic	2017	µg/L	17.98			8.00
Metals	Arsenic	2018	µg/L	24.25			5.00
Metals	Arsenic	2019	µg/L	34			5.00
Metals	Barium	1993	µg/L			84	29
Metals	Barium	1994	µg/L			89	32
Metals	Barium	1995	µg/L			124	49
Conventionals	Carbon, Total Organic	1989	mg/L			12.6	2.52
Conventionals	Carbon, Total Organic	1991	mg/L	9.2		9.54	1.48
Conventionals	Carbon, Total Organic	2018	mg/L	27.98			4.7
Conventionals	Carbon, Total Organic	2019	mg/L	6.35			3.68
Conventionals	Chemical Oxygen Demand	1989	mg/L	43			10
Conventionals	Chemical Oxygen Demand	1991	mg/L	33		45	12.25
Conventionals	Chemical Oxygen Demand	1992	mg/L		66		16

Table 4. Parameters Statistically Higher than Background: 1989 to 2020

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

Analyte Group	Parameter[1]	Monitoring Period	Unit	Mean Value Downgradient[2,3]			Mean Value Upgradient[2]
				BXN-1	BXN-2	BXN-3	BXN-4
Conventionals	Chemical Oxygen Demand	2014	mg/L	23.9			11.9
Conventionals	Chemical Oxygen Demand	2015	mg/L	18.45			15.23
Conventionals	Chemical Oxygen Demand	2018	mg/L	52			13.00
Conventionals	Conductivity	1989	µS/cm	505		564	254
Conventionals	Conductivity	1991	µS/cm	449		597	229
Metals	Iron	1989	µg/L			38,670	7,770
Metals	Iron	1991	µg/L			38,670	7,770
Metals	Iron	1992	µg/L			26,300	14
Metals	Iron	1993	µg/L			39,050	30
Metals	Iron	1994	µg/L			52,500	54
Metals	Iron	1995	µg/L			53,400	52
Metals	Iron	1997	µg/L			35,600	50
Metals	Iron	1998	µg/L			22,300	190
Metals	Iron	2000	µg/L	4,160		19,850	35
Metals	Iron	2001	µg/L	2,788		25,875	58
Metals	Iron	2002	µg/L	3,333		35,519	47
Metals	Iron	2003	µg/L			25,225	130
Metals	Iron	2004	µg/L			23,175	87
Metals	Iron	2005	µg/L	3,275		20,925	131
Metals	Iron	2006	µg/L	4,463		9,648	102
Metals	Iron	2007	µg/L	7,465		7,470	78
Metals	Iron	2008	µg/L	12,350		4,770	213
Metals	Iron	2009	µg/L	12,350		3,715	77
Metals	Iron	2010	µg/L	14,075		873	248
Metals	Iron	2011	µg/L	20,125			35
Metals	Iron	2012	µg/L	22,600			16.15
Metals	Iron	2013	µg/L	38,500			16.025
Metals	Iron	2014	µg/L	37,600			55
Metals	Iron	2015	µg/L	28,100			33
Metals	Iron	2016	µg/L	25,375			17.03
Metals	Iron	2017	µg/L	25,488			327
Metals	Iron	2018	µg/L	55,650			38
Metals	Iron	2019	µg/L	33,900			30
Metals	Iron	2020	µg/L	40,313			50
Metals	Manganese	1989	µg/L	7,190		2,260	10
Metals	Manganese	1991	µg/L	7,190		2,260	10
Metals	Manganese	1992	µg/L	3,060		1,400	ND
Metals	Manganese	1993	µg/L	3,090	435	2,108	9
Metals	Manganese	1994	µg/L	2,650	2,200	2,070	149

Table 4. Parameters Statistically Higher than Background: 1989 to 2020

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

Analyte Group	Parameter[1]	Monitoring Period	Unit	Mean Value Downgradient[2,3]			Mean Value Upgradient[2]
				BXN-1	BXN-2	BXN-3	BXN-4
Metals	Manganese	1995	µg/L			2,070	149
Metals	Manganese	2001	µg/L	1,848		3,938	6,328
Metals	Manganese	2009	µg/L		7,085		2,798
Metals	Manganese	2011	µg/L	5,605	4,475		1,588
Metals	Manganese	2012	µg/L	3,753	3,070		2,046
Metals	Manganese	2013	µg/L	4,220	2,825		157
Metals	Manganese	2014	µg/L	3,955	2,848		2,443
Metals	Manganese	2015	µg/L	4,890			3,270
Metals	Manganese	2017	µg/L	4,388			2,035
Metals	Manganese	2018	µg/L	5,615			1,823
Metals	Manganese	2019	µg/L	5,764	2,924		1,493
Metals	Manganese	2020	µg/L	6,254	2,870		1,025
Metals	Nickel	1993	µg/L		57	64	31
Metals	Nickel	1994	µg/L	75	62		39
Conventionals	Nitrate + Nitrite as Nitrogen	2000	mg/L	0.9	1.4		0.1
Conventionals	pH	1989	--			6.29	6.14
Conventionals	pH	1992	--		6.38	6.48	6.14
Conventionals	pH	1993	--			6.37	6.22
Conventionals	pH	2014	--		6.91		6.86
Conventionals	pH	2017	--		6.67		6.47
Conventionals	Solids, Total Dissolved	1991	mg/L	305		347	201
Conventionals	Solids, Total Dissolved	1996	mg/L			44	0.042
Conventionals	Solids, Total Dissolved	1999	mg/L	0.79		20	0.036
Conventionals	Solids, Total Dissolved	2001	mg/L			357	341
Conventionals	Sulfate	2001	mg/L	18.3			15.75
Conventionals	Sulfate	2002	mg/L	19.6			16.7
Conventionals	Tannin and Lignin	1991	mg/L	4.37		8.5	0.3
Conventionals	Tannin and Lignin	1992	mg/L	1.01			0.23
Conventionals	Tannin and Lignin	1993	mg/L			2.45	0.48
Conventionals	Tannin and Lignin	1994	mg/L	0.72		5.05	0.45
Conventionals	Tannin and Lignin	1996	mg/L			0.096	0.057
Conventionals	Tannin and Lignin	2001	mg/L			7.43	5.63
Conventionals	Tannin and Lignin	2011	mg/L	3.06			1.34
Conventionals	Tannin and Lignin	2014	mg/L	8.22			1.06
Conventionals	Tannin and Lignin	2019	mg/L	20.75			1.88
Conventionals	Tannin and Lignin	2020	mg/L	18.7			0.60
Metals	Zinc	2010	µg/L			5.28	4.4
Metals	Zinc	2013	µg/L	2.4			ND (<10 µg/L)

Notes

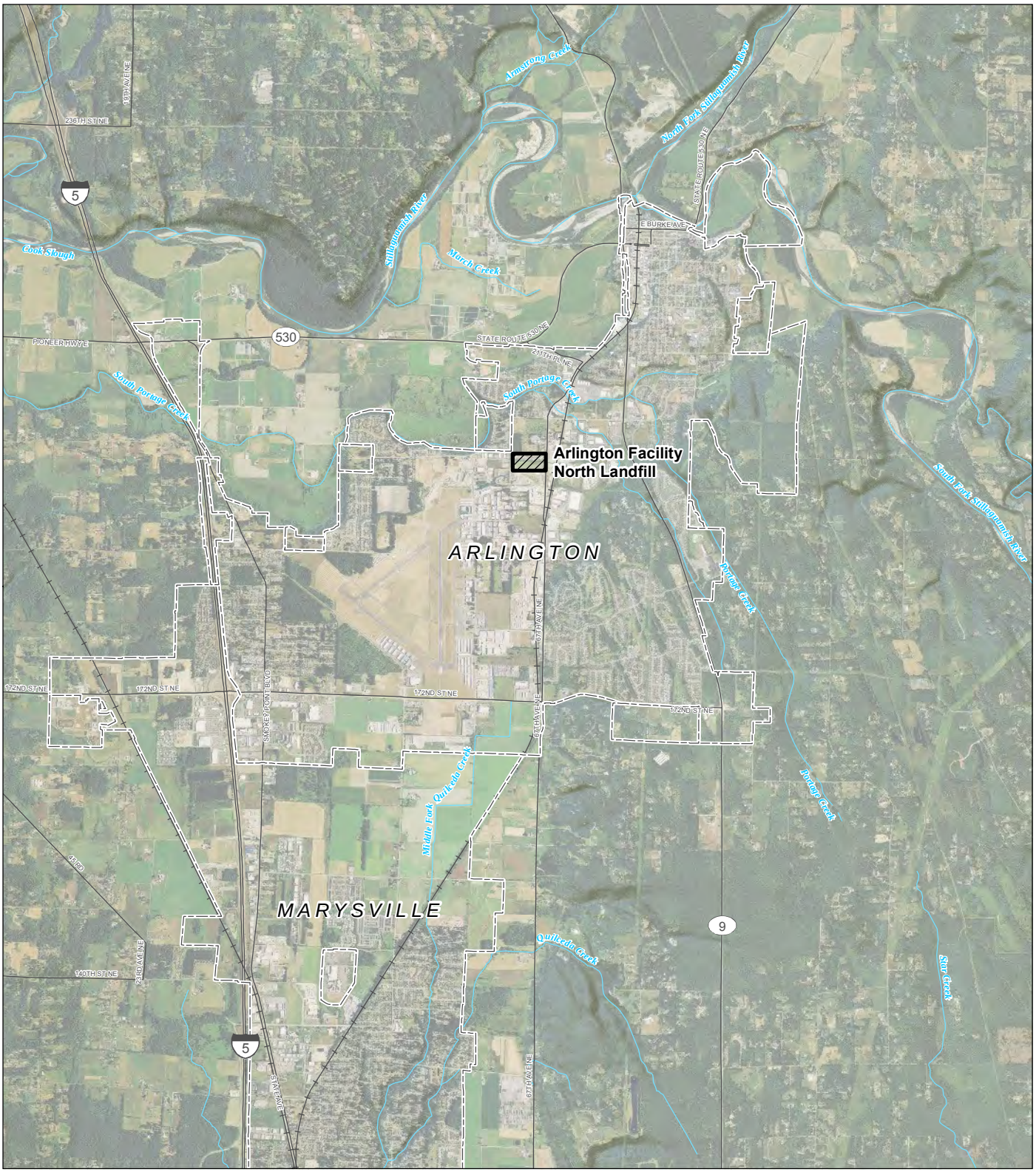
µg/L = microgram per liter. µS/cm = microSiemen per centimeter. mg/L = milligram per liter. ND = not detected.

[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 North 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
North Woodwaste Landfill
Arlington, Washington

LEGEND

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

NOTES:

1. All elevations exist in NAVD88.
2. NM = not measured.
3. BXN-3 is damaged.

N

0 75 150 225
Feet

Date: March 28, 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
North Woodwaste Landfill
Arlington, Washington

LEGEND

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

NOTES:

1. All elevations exist in NAVD88.
2. NM = not measured.
3. BXN-3 is damaged.

N

0 75 150 225
Feet

Date: March 28, 2017
Data Sources: AMEC, ESRI, Air photo taken on July 15, 2013 by the USDA

GSI Water Solutions, Inc.

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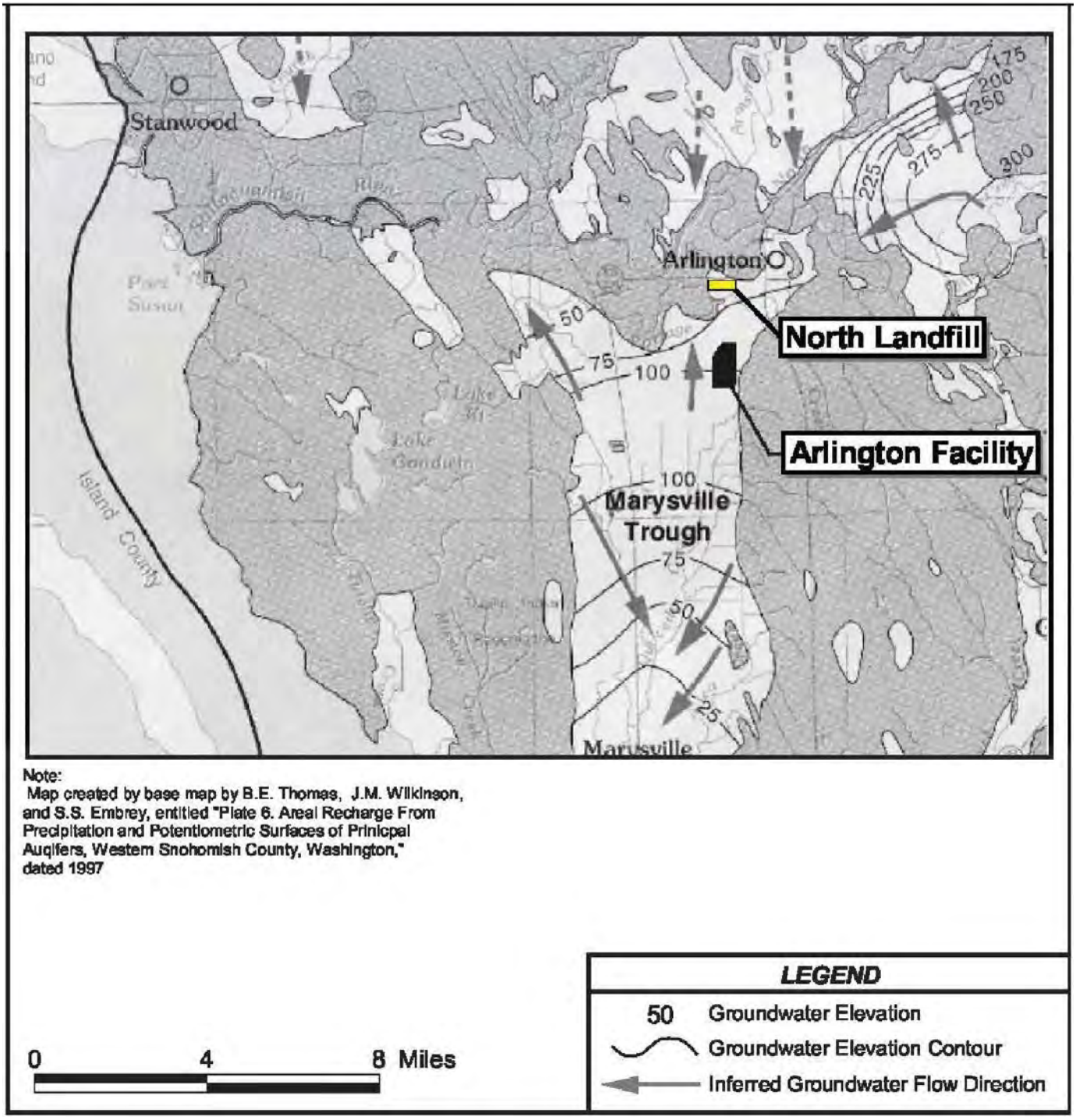

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FIGURE 4

Regional Groundwater Flow

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

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

GSI Water Solutions, Inc.

Document Path: P:\Portland\302 - Baxter\GIS\Arlington_Landfills\Project_mxds\North\2014_Annual_Report\Figure4_Regional_GW_Flow.mxd

Figure 5
Ammonia Trend
North Wells

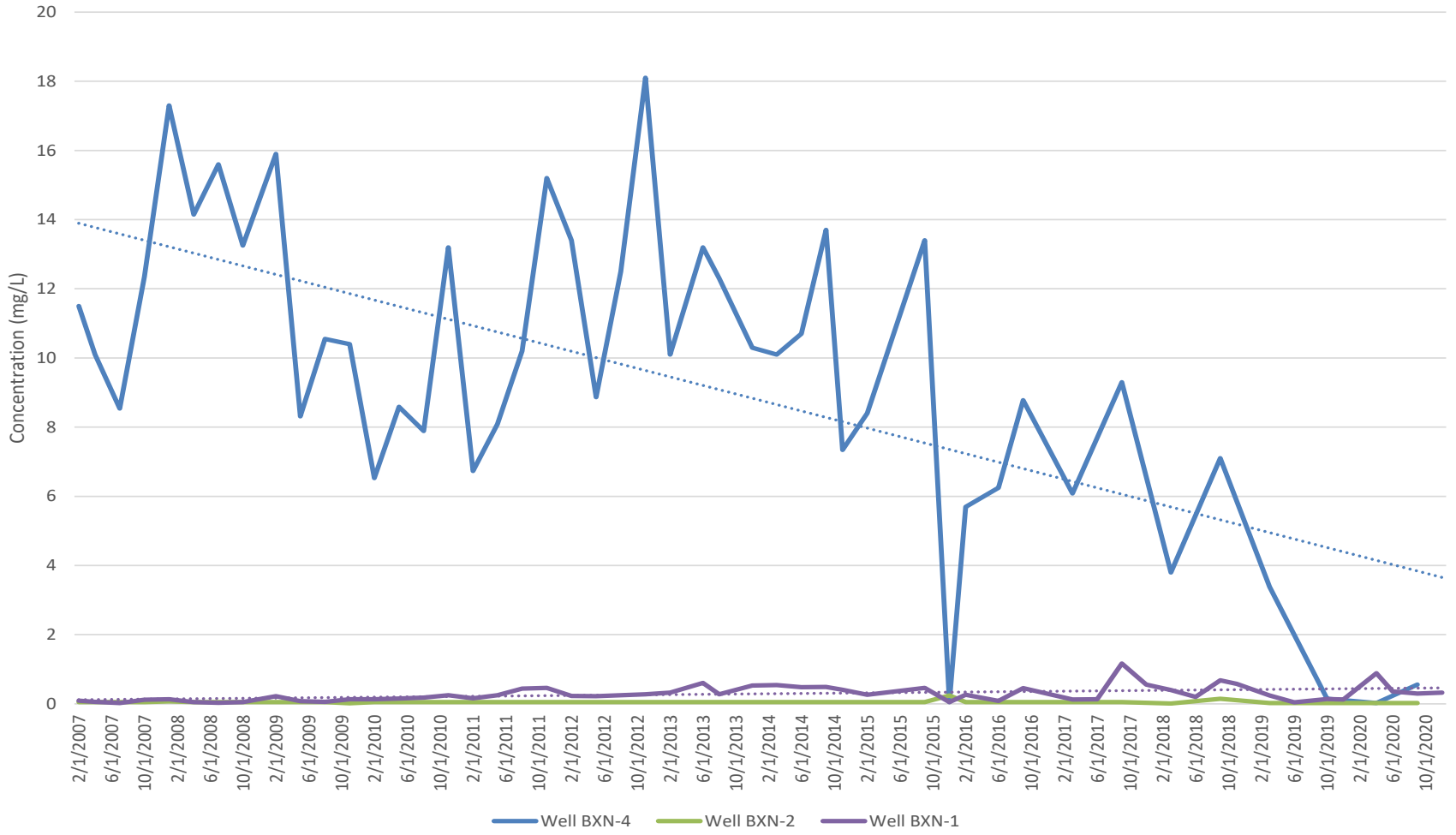


Figure 6
Arsenic Trend
North Wells

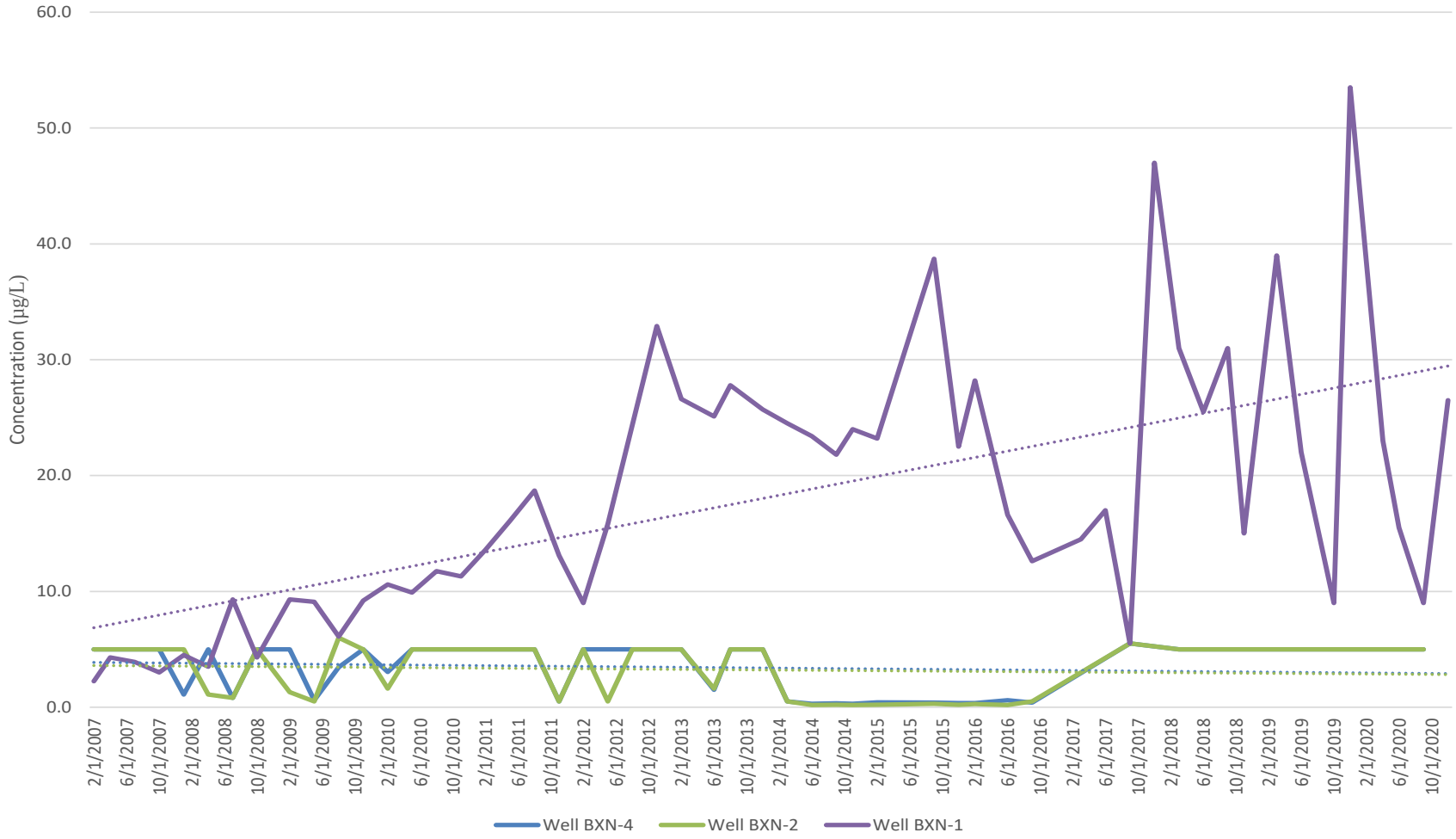


Figure 7
Barium Trend
North Wells

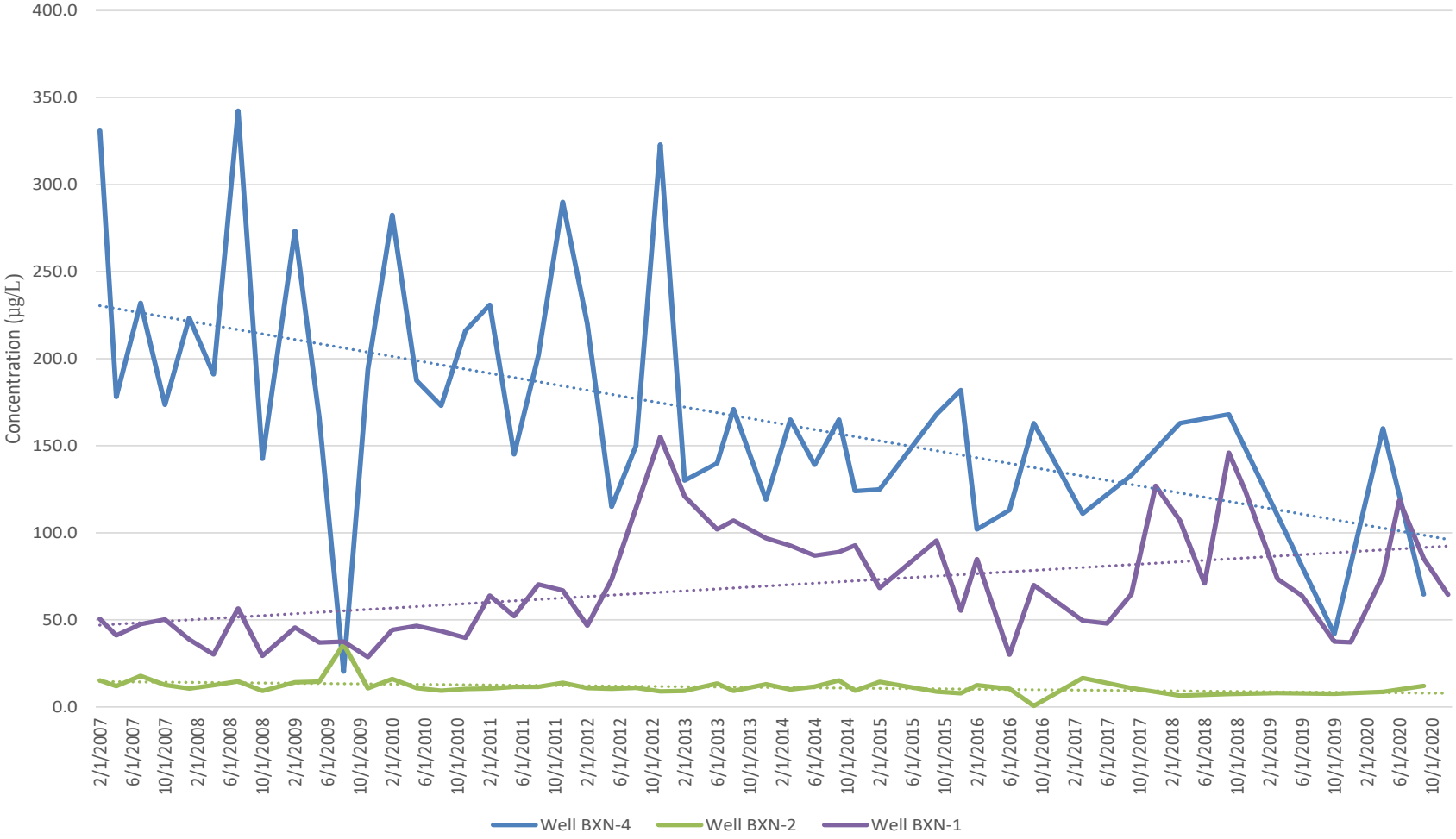


Figure 8
COD Trend
North Wells

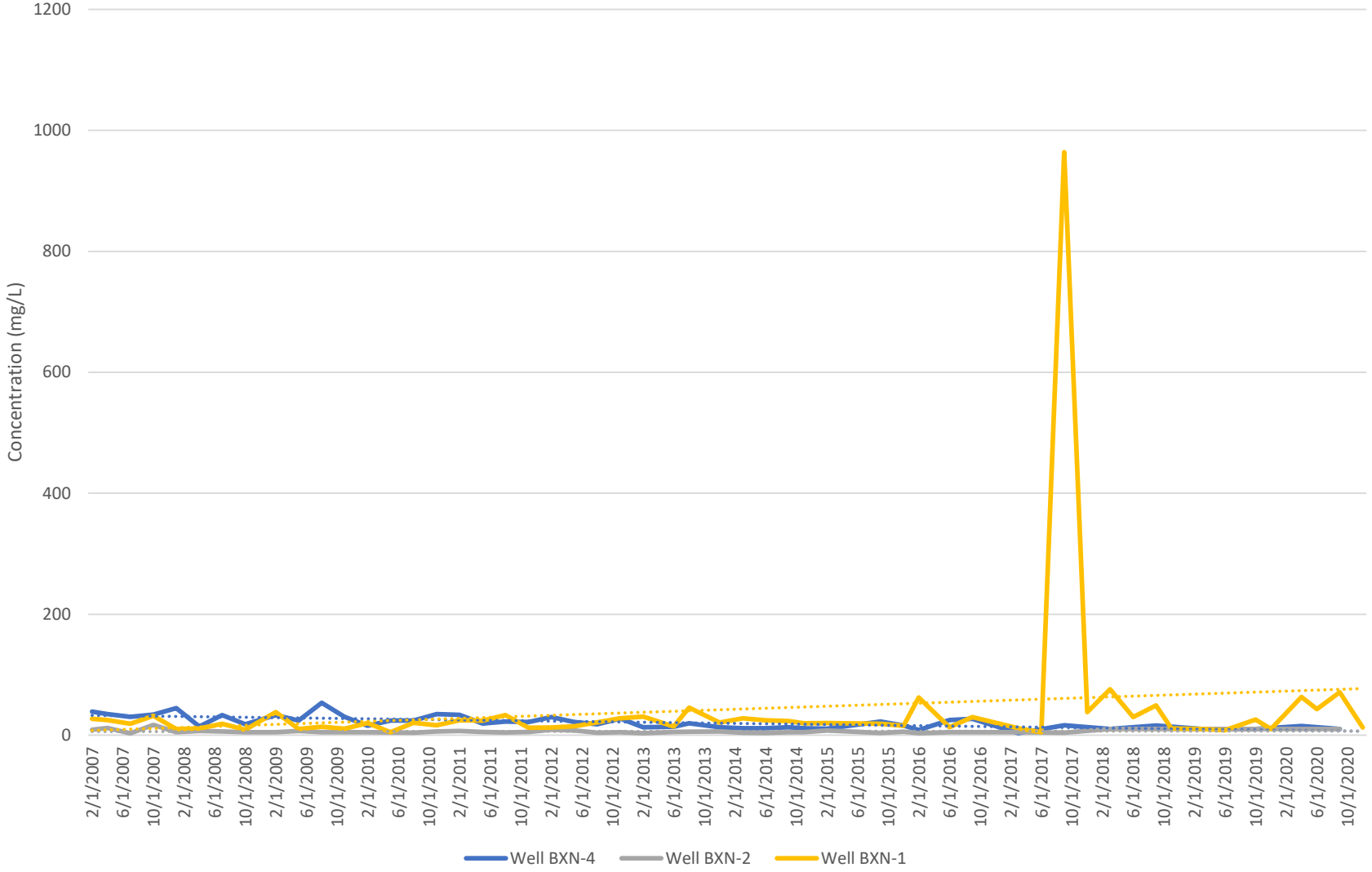


Figure 9
Chloride Trend
North Wells

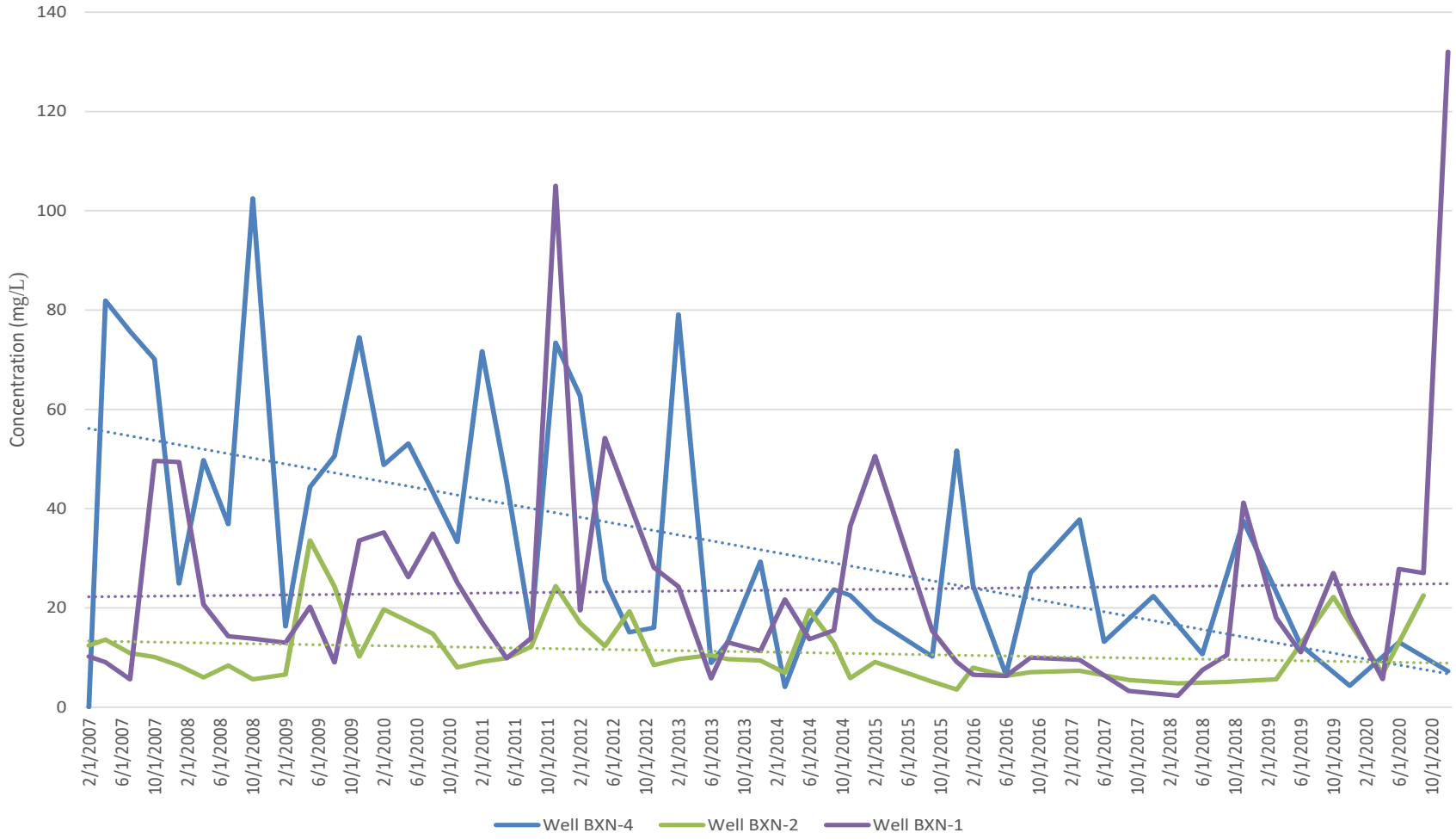


Figure 10
Iron Trend
North Wells

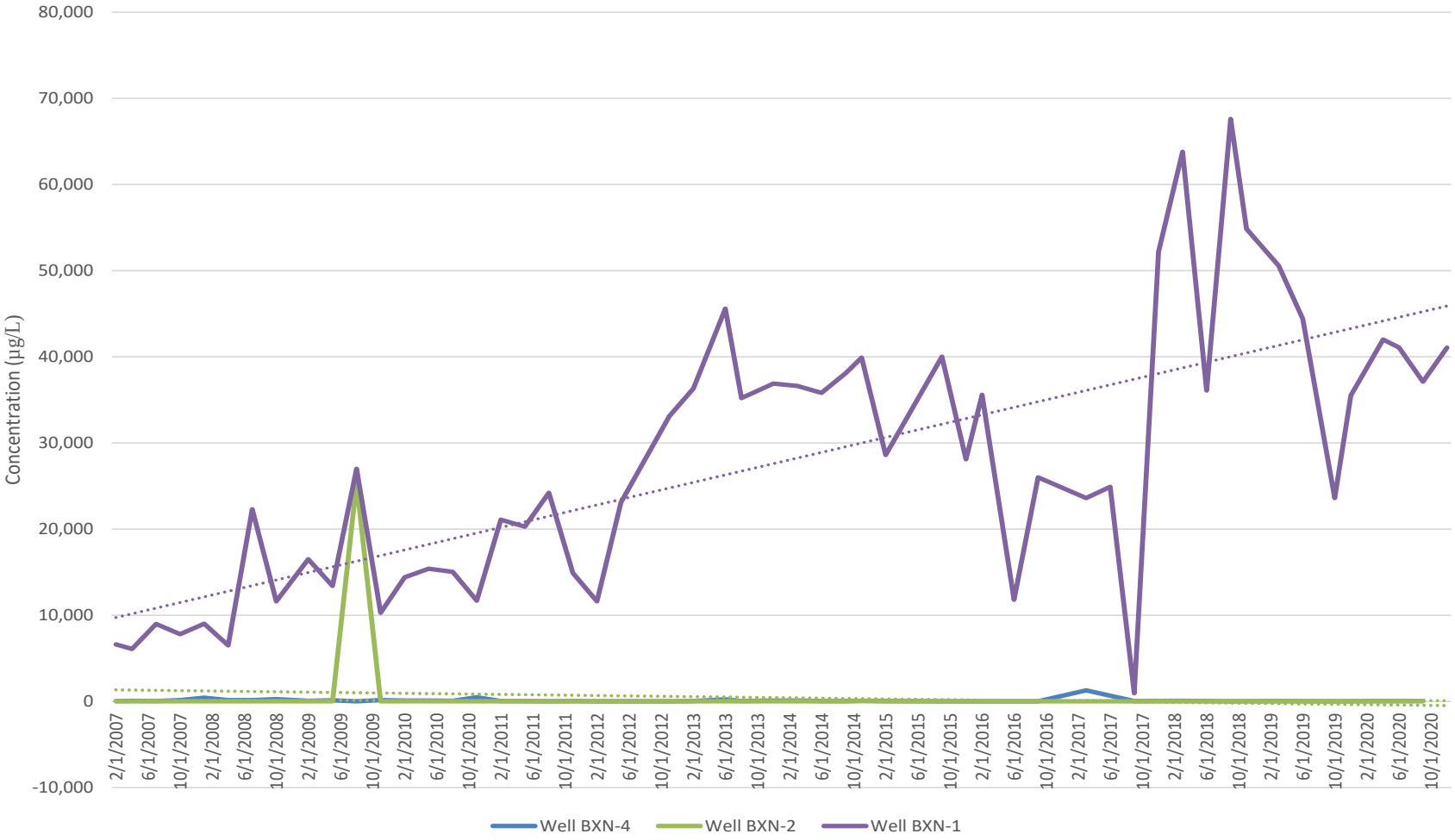


Figure 11
Manganese Trend
North Wells

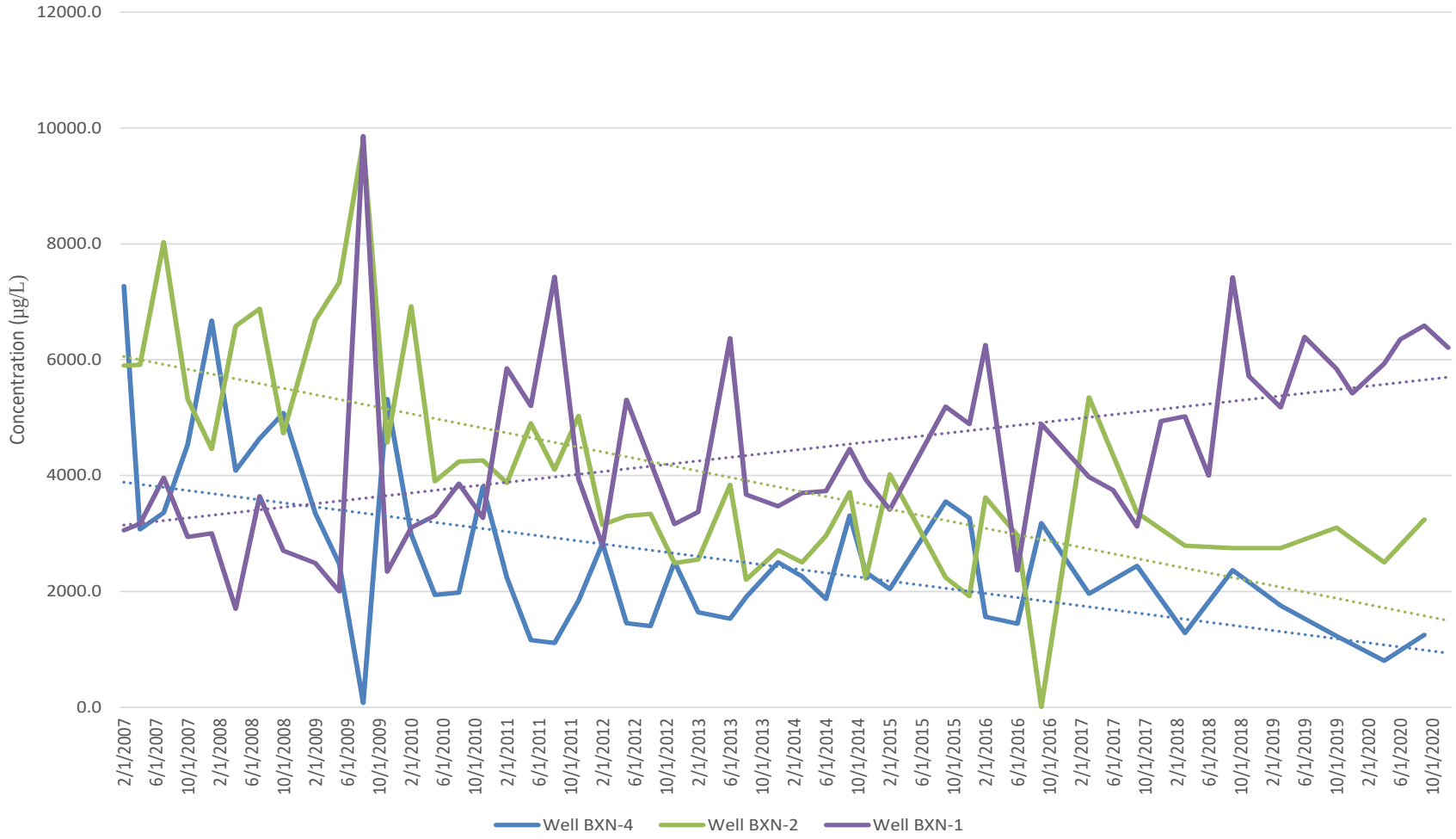


Figure 12
Nitrate+Nitrite Trend
North Wells

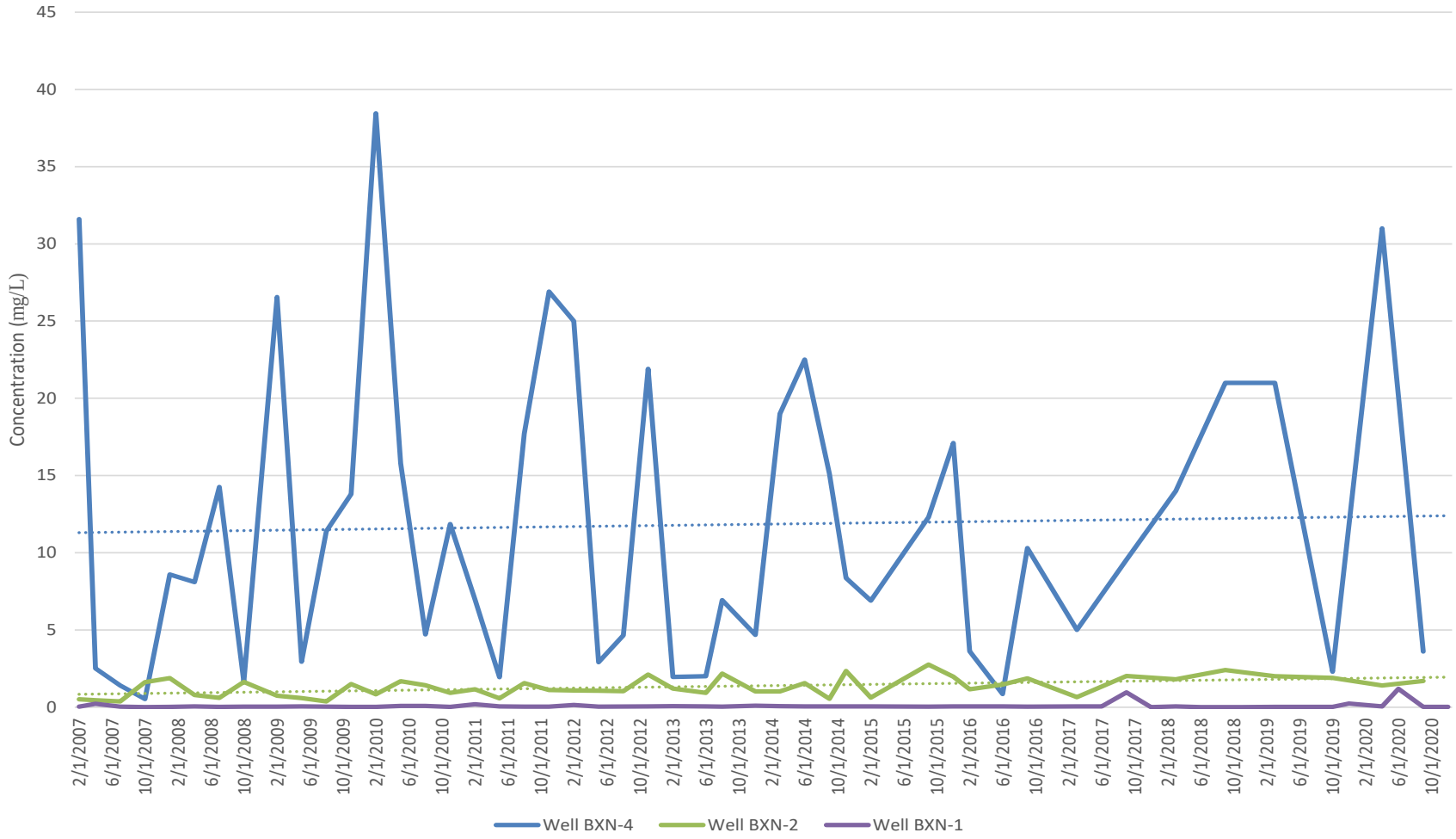


Figure 13
Field pH Trend
North Wells

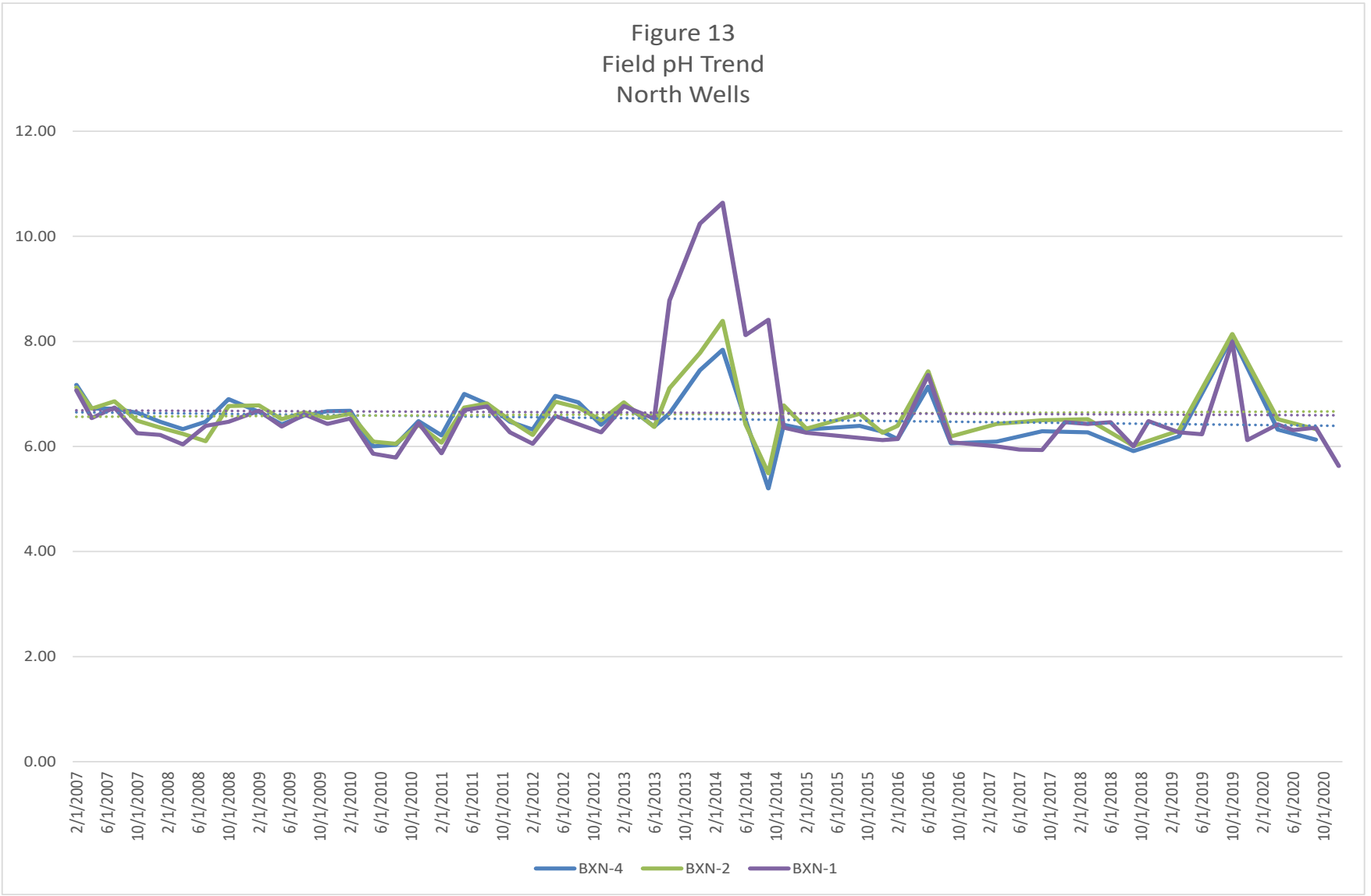


Figure 14
Sulfate Trend
North Wells

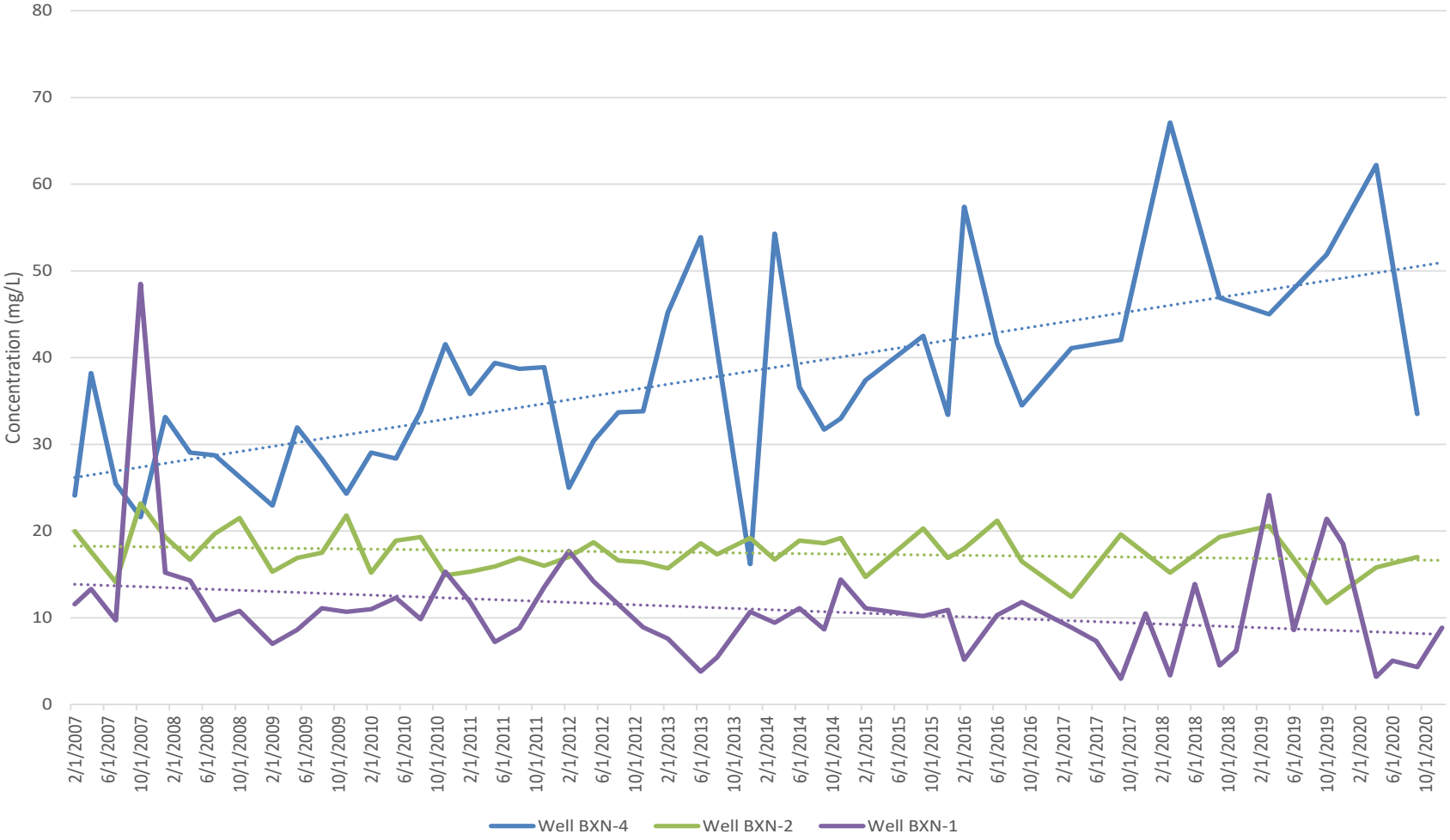


Figure 15
Tannin & Lignin Trend
North Wells

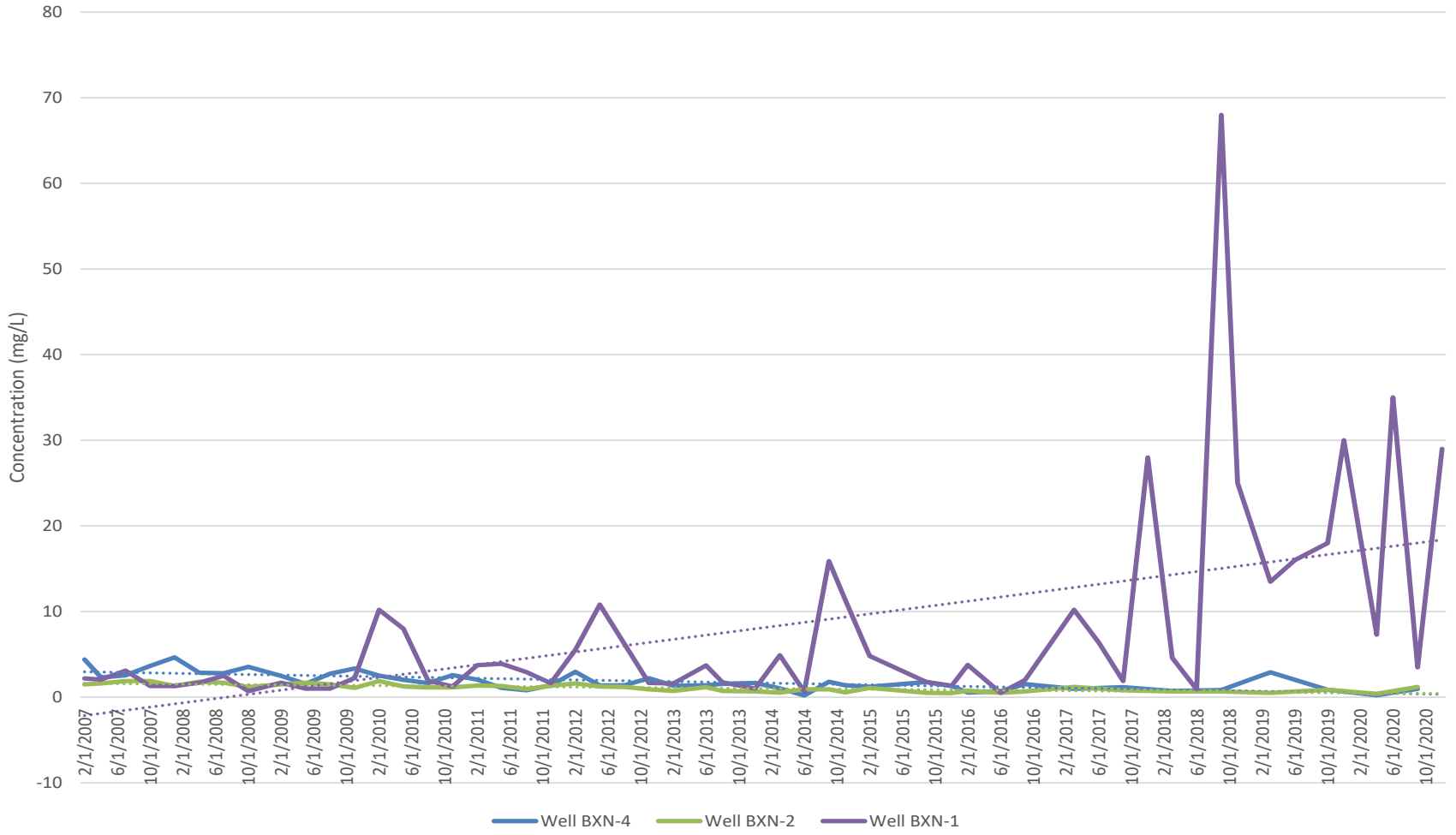


Figure 16
TDS Trend
North Wells

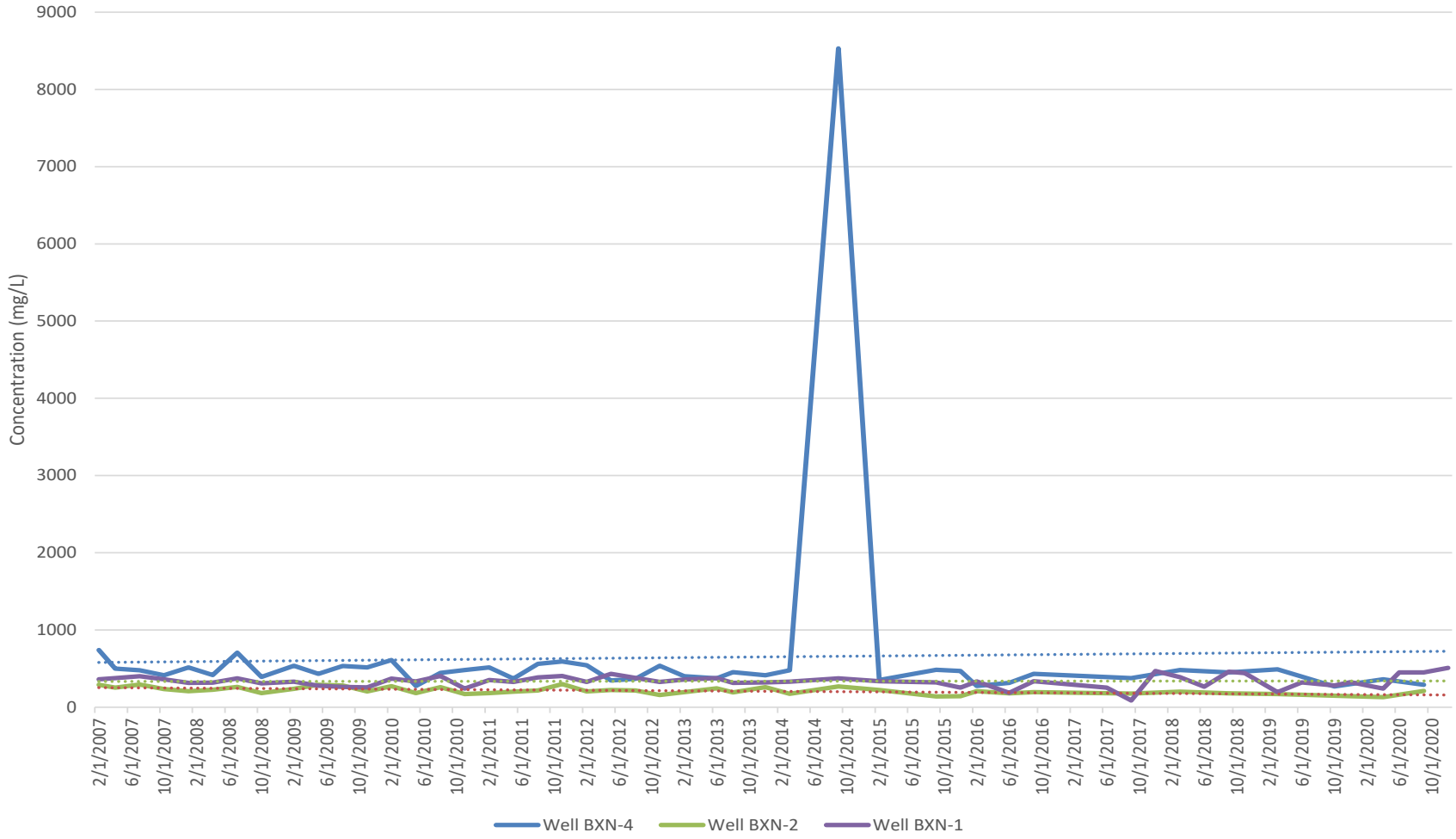


Figure 17
TOC Trend
North Wells

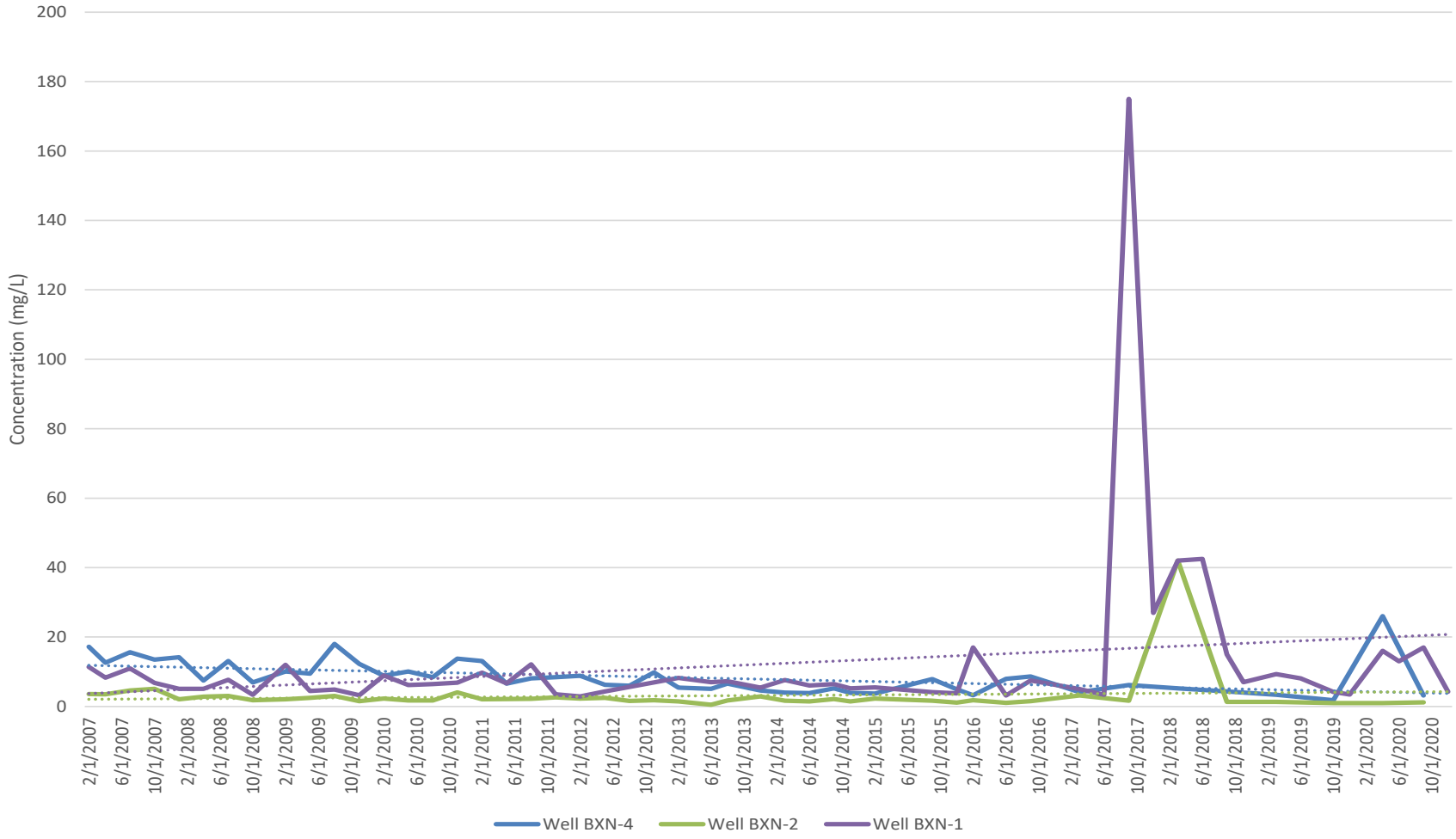


FIGURE 18

Arsenic Isopleth Map: 2020

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

LEGEND

- Monitoring Well (Peak 2020 Arsenic Concentration)
- Arsenic Contours (dashed where inferred)
- Modeled Source Area
- Direction of Groundwater Flow

NOTES:

1. Arsenic contouring estimated using Quick Domenico approximation.
2. NM = not measured.
3. U = undetected.
4. BXN-3 is damaged.
5. Concentrations in micrograms/L.
6. Data from peak arsenic detections per well in 2020.

N

0 75 150 225
Feet

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

GSI Water Solutions, Inc.

Appendix A

2020 Groundwater Monitoring Field Forms

Woodwaste Landfill Monitoring

Date: 4-1-20 Well ID: BXM-1 Tech: KVan

Depth to Water: 48.06' Depth to Bottom: 58.18' Well Size: 2"

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

Sample Analysis:

Flow Rate:

Start time: 1706

Time	Flow rate	Gallons Volume Removed	DTW	PH *	µS/cm COND	°C TEMP	ORP	mg/L DO
1701		0	48.06	6.43	638	12.01	46.0	9.07
1706		1.45		6.41	606	12.49	9.2	4.07
1711		2.50		6.43	595	12.36	8.4	3.37
1716		3.55		6.42	599	12.80	8.1	3.32

All Parameters Stable at: 1716 Total Volume Removed: 73.55 gallons

Sample time: 1717

Signature: Ben Kvan Date: 4-1-20 Time: 1720

14.0-14.4 Volts to pump RINSATE Samples collected @ 1737

* YSI model 556 w/ flow-thru cell

Woodwaste Landfill Monitoring

Date: 4-1-20 Well ID: BXN-2 Tech: Kvam

Depth to Water: 44.40' Depth to Bottom: 57.24' Well Size: 2"

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

Sample Analysis:

Flow Rate:

Start time: 1608

Time	Flow rate	Volume Removed (gallons)	DTW	PH *	COND (µS/cm @ °C)	TEMP (°C)	ORP	DO (mg/L)
1609		0	44.40	7.28	194	14.56	40.3	10.09
1614		0.9		6.68	238	13.26	12.5	3.66
1619		1.40		6.56	245	13.91	11.7	3.30
1624		2.20	44.40	6.52	255	13.73	12.0	3.18

All Parameters Stable at: 1624 Total Volume Removed: >2.20 gallons

Sample time: 1625

Signature: Bruce Kvam Date: 4-1-20 Time: 1630

13.5-13.8 volts * pump H_2O

* YSI model 556 w/ flow-thru cell

Woodwaste Landfill Monitoring

Date: 4-1-20 Well ID: BXN-4 Tech: Kvam

Depth to Water: 43.02' Depth to Bottom: 51.74' Well Size: 2"

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

Sample Analysis:

Flow Rate:

Start time: 1503

Time	Flow rate	Volume Removed (gallons)	DTW	pH *	COND (µS/cm)	TEMP (°C)	ORP	DO (mg/L)	Turbidity
1504		0	43.02'	6.01	890	12.84	64.6	10.78	—
1509		1.25		6.21	844	12.92	7.6	7.47	—
1514		2.25		6.24	822	13.08	0.4	6.94	—
1519		3.45		6.29	791	13.14	1.8	6.49	—
1524		4.80	43.02'	6.32	761	13.21	3.2	6.00	—

All Parameters Stable at: 1524 Total Volume Removed: 74.80 gallons

Sample time: 1525

Signature: Bruce Kvam Date: 4-1-20 Time: 1530

* YSI model 556 w/flow-thru cell

Woodwaste Landfill Monitoring

Date: 6-26-20 Well ID: BXN-1 Tech: KVaw

Depth to Water: 48.44 Depth to Bottom: 53.18' Well Size: 2"

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

Sample Analysis:

Flow Rate:

Start time: 1340

Time	Flow rate	gallons Volume Removed	DTW	PH*	µS/cm COND	(°C) TEMP	ORP	(mg/L) DO	(NTUs) Turb	(g/L) TDS
1348		0	48.44	6.38	793	16.21	-23.0	0.73	146	0.511
1346		1.30		6.41	862	12.56	-35.0	0.00	19.7	0.554
1351		2.90		6.34	831	12.46	-37.0	0.00	2.9	0.532
1356		4.10	48.44	6.31	824	12.26	-38.0	0.00	0.0	0.527

All Parameters Stable at: 1356 Total Volume Removed: 4.50 gallons

Sample time: 1357

Signature: Bruce Kvaw Date: 6-26-20 Time: 1405

* using Horiba WQ meter w/ flow-thru cell

17.0 volts to pump H_2O BXN-101 samples collected @ 1400

Woodwaste Landfill Monitoring

Date: 9-22-20 Well ID: BXN-1 Tech: KVann

Depth to Water: 49.80' Depth to Bottom: 58.18' Well Size: 2"

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

Sample Analysis:

Flow Rate:

Start time: 1607

Time	Flow rate	gallons Volume Removed	DTW	PH *	µS/cm COND	°C TEMP	ORP	mg/L DO	
1608		0	49.80'	6.28	664	15.00	-13.8	2.72	turbid H_2O
1613		0.75		6.39	687	12.10	-30.9	1.42	
1618		1.80		6.35	662	12.05	-26.5	1.01	clearing
1623		2.80		6.36	651	12.13	-25.9	0.81	colorless
1628		3.75	49.80	6.36	644	12.16	-23.5	0.71	"

All Parameters Stable at: 1628 Total Volume Removed: 3.75 gallons

Sample time: 1629

Signature: Bruce Ryan Date: 9-22-20 Time: 1635

16.1 volts to pump H_2O

* YSI 556 MPS in flow-thru cell

RINSATE samples collected @ 1640. Same washout of metals, NOx3, TOC

BXN-1 samples look more turbid than suggested by H_2O rinsate samples. in flow-thru cell

Woodwaste Landfill Monitoring

Date: 9-22-20 Well ID: BXM-2 Tech: KVam

Depth to Water: 46.03' Depth to Bottom: 57.24' Well Size: 2"

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

Sample Analysis:

Flow Rate:

Start time: 1519

Time	Flow rate	gallons Volume Removed	DTW	PH*	µS/cm COND	°C TEMP	ORP	mg/L DO
1520		0	46.03	6.55	247	17.50	102.1	3.70
1525		0.70		6.32	308	12.94	90.9	1.34
1530		1.60		6.34	301	12.95	99.2	1.00
1535		2.50		6.39	294	12.93	98.7	0.83
1540		3.25	46.03	6.33	288	13.12	93.4	0.70

All Parameters Stable at: 1540 Total Volume Removed: 73.25 gallons

Sample time: 1541

Signature: Bruce Kram Date: 9-22-20 Time: 1545

* YSI 556 MPS w/ Flow-thru cell

15.9 volts to pump H2O

Woodwaste Landfill Monitoring

Date: 9-22-20 Well ID: BXN-4 Tech: KVan

Depth to Water: ~~42.56~~ 45.26 Depth to Bottom: 51.74' Well Size: 2"

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

Sample Analysis:

Flow Rate:

Start time: 1417

Time	Flow rate	gallons Volume Removed	DTW ~~45.26~~	PH *	µS/cm COND	°C TEMP	ORP	mg/L DO
1418		0	~~42.56~~	6.25	459	15.89	30.4	3.48
1423		0.75		6.10	418	12.79	68.1	1.69
1428		1.80		6.10	401	12.76	80.6	1.42
1433		2.75		6.15	394	12.84	86.6	1.07
1438		3.60	45.26	6.13	393	12.82	92.4	0.90

All Parameters Stable at: 1438 Total Volume Removed: 73.60 gallons

Sample time: 1439

Signature: Bruce Kvam Date: 9-22-20 Time: 1445

* YSI 556 MPS w/flow-thru cell

16.1 volts to pump H_2O

Woodwaste Landfill Monitoring

Date: 12-29-20 Well ID: BXN-1 Tech: K-Vann

Depth to Water: 50.18' Depth to Bottom: 58.18' Well Size: 2"

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

Sample Analysis:

Flow Rate:

Start time: 1426

Time	Flow rate	gallons Volume Removed	DTW	pH *	µS/cm COND	°C TEMP	ORP	mg/L DO	NTUs Turbidity
1427		0	50.18	6.08	741	10.89	-8	2.11	309
1432		1.15		5.70	830	12.72	-11	1.00	95.1
1437		2.25		5.66	847	12.75	-14	0.93	57.0
1442		3.15		5.64	853	12.81	-17	0.92	39.2
1447		4.10	50.18	5.63	860	12.73	-20	0.92	51.9

All Parameters Stable at: 1447 Total Volume Removed: ~5.0 gallons

Sample time: 1450

Signature: Beau Kraft Date: 12-29-20 Time: 1455

* Horiba WQ meter w/ flow-thru cell

~ 14.1 volts to pump @ 50 ft

BXN-101 samples collected @ 1455

Appendix B

2020 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: 04/02/20
Date Reported: 5/22/20

AMTEST Identification Number **20-A004612**
Client Identification **BXN-1**
Sampling Date **04/01/20, 17:17**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	240	mg/l		1	SM 2540C	KF	04/06/20
Tannin and Lignin	7.3	mg/l		0.1	SM 5550B	DM	04/16/20

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	16.	mg/l		0.5	SM 5310B	NNL	04/14/20
Chemical Oxygen Demand	63.	mg/l		10	EPA 410.4	DM	04/16/20

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	5.68	mg/l		0.05	EPA 300.0	SH	04/03/20
Sulfate	3.18	mg/l		0.1	EPA 300.0	SH	04/03/20

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.883	mg/l		0.02	EPA 350.1	SH	04/10/20
Total Nitrate + Nitrite	0.058	mg/l		0.02	EPA 353.2	SH	04/07/20

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 20-A004612

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	0.023	mg/l		0.005	EPA 200.7	HKL	04/09/20
Dissolved Barium	0.0756	mg/l		0.005	EPA 200.7	HKL	04/09/20
Dissolved Iron	42.0	mg/l		0.05	EPA 200.7	HKL	04/09/20
Dissolved Manganese	5.93	mg/l		0.005	EPA 200.7	HKL	04/09/20

Semi-Volatiles

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Pentachlorophenol	< 2	ug/l		1.9	EPA 625	NNL	05/19/20

Polynuclear Aromatic Hydrocarbons (PAH)

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Liq/Liq Ext.	Y				EPA 3520	NNL	04/08/20

Semi-Volatile Surrogates

ANALYTE	% RECOVERY	LIMITS	DATE
2-Fluorophenol	100. %	0.0 - 120.	5/19/20
D6-Phenol	115. %	0.0 - 120.	5/19/20
D5-Nitrobenzene	62.4 %	40.0 - 120.	5/19/20
2-Fluorobiphenyl	61.6 %	40.0 - 120.	5/19/20
2,4,6-Tribromophenol	110. %	0.0 - 120.	5/19/20
D14-Terphenyl	77.7 %	40.0 - 120.	5/19/20

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 20-A004613

AMTEST Identification Number **20-A004613**
Client Identification **BXN-2**
Sampling Date **04/01/20, 16:25**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	130	mg/l		1	SM 2540C	KF	04/06/20
Tannin and Lignin	0.39	mg/l		0.1	SM 5550B	DM	04/16/20

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	0.97	mg/l		0.5	SM 5310B	NNL	04/14/20
Chemical Oxygen Demand	< 10	mg/l		10	EPA 410.4	DM	04/16/20

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	6.78	mg/l		0.05	EPA 300.0	SH	04/03/20
Sulfate	15.8	mg/l		0.1	EPA 300.0	SH	04/03/20

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	< 0.02	mg/l		0.02	EPA 350.1	SH	04/10/20
Total Nitrate + Nitrite	1.4	mg/l		0.02	EPA 353.2	SH	04/07/20

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	< 0.005	mg/l		0.005	EPA 200.7	HKL	04/09/20
Dissolved Barium	0.0086	mg/l		0.005	EPA 200.7	HKL	04/09/20
Dissolved Iron	< 0.05	mg/l		0.05	EPA 200.7	HKL	04/09/20
Dissolved Manganese	2.50	mg/l		0.005	EPA 200.7	HKL	04/09/20

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 20-A004613

Semi-Volatiles

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Pentachlorophenol	< 2	ug/l		1.9	EPA 625	NNL	05/19/20

Polynuclear Aromatic Hydrocarbons (PAH)

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Liq/Liq Ext.	Y				EPA 3520	NNL	04/08/20

Semi-Volatile Surrogates

ANALYTE	% RECOVERY	LIMITS	DATE
2-Fluorophenol	1.2 %	0.0 - 120.	5/19/20
D6-Phenol	8.8 %	0.0 - 120.	5/19/20
D5-Nitrobenzene	69.2 %	40.0 - 120.	5/19/20
2-Fluorobiphenyl	71.6 %	40.0 - 120.	5/19/20
2,4,6-Tribromophenol	2.4 %	0.0 - 120.	5/19/20
D14-Terphenyl	83.5 %	40.0 - 120.	5/19/20

AMTEST Identification Number **20-A004614**
Client Identification **BXN-4**
Sampling Date **04/01/20, 15:25**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	360	mg/l		1	SM 2540C	KF	04/06/20
Tannin and Lignin	0.23	mg/l		0.1	SM 5550B	DM	04/16/20

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	26.	mg/l		0.5	SM 5310B	NNL	04/14/20
Chemical Oxygen Demand	15.	mg/l		10	EPA 410.4	DM	04/16/20

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	13.1	mg/l		0.05	EPA 300.0	SH	04/03/20
Sulfate	62.2	mg/l		0.1	EPA 300.0	SH	04/03/20

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.026	mg/l		0.02	EPA 350.1	SH	04/10/20
Total Nitrate + Nitrite	31.	mg/l		0.02	EPA 353.2	SH	04/07/20

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	< 0.005	mg/l		0.005	EPA 200.7	HKL	04/09/20
Dissolved Barium	0.160	mg/l		0.005	EPA 200.7	HKL	04/09/20
Dissolved Iron	< 0.05	mg/l		0.05	EPA 200.7	HKL	04/09/20
Dissolved Manganese	0.800	mg/l		0.005	EPA 200.7	HKL	04/09/20

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 20-A004614

Semi-Volatiles

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Pentachlorophenol	< 2	ug/l		1.9	EPA 625	NNL	05/19/20

Polynuclear Aromatic Hydrocarbons (PAH)

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Liq/Liq Ext.	Y				EPA 3520	NNL	04/08/20

Semi-Volatile Surrogates

ANALYTE	% RECOVERY	LIMITS	DATE
2-Fluorophenol	8.7 %	0.0 - 120.	5/19/20
D6-Phenol	27.2 %	0.0 - 120.	5/19/20
D5-Nitrobenzene	68.2 %	40.0 - 120.	5/19/20
2-Fluorobiphenyl	68.4 %	40.0 - 120.	5/19/20
2,4,6-Tribromophenol	12.4 %	0.0 - 120.	5/19/20
D14-Terphenyl	83.4 %	40.0 - 120.	5/19/20

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 20-A004615

AMTEST Identification Number **20-A004615**
Client Identification **BXS-1**
Sampling Date **04/01/20, 12:30**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	140	mg/l		1	SM 2540C	KF	04/06/20
Tannin and Lignin	< 0.1	mg/l		0.1	SM 5550B	DM	04/16/20

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	2.4	mg/l		0.5	SM 5310B	NNL	04/14/20
Chemical Oxygen Demand	< 10	mg/l		10	EPA 410.4	DM	04/16/20

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Sulfate	17.2	mg/l		0.1	EPA 300.0	SH	04/03/20

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	< 0.02	mg/l		0.02	EPA 350.1	SH	04/10/20

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	< 0.005	mg/l		0.005	EPA 200.7	HKL	04/09/20
Dissolved Barium	0.0144	mg/l		0.005	EPA 200.7	HKL	04/09/20
Dissolved Iron	< 0.05	mg/l		0.05	EPA 200.7	HKL	04/09/20
Dissolved Manganese	0.032	mg/l		0.005	EPA 200.7	HKL	04/09/20
Dissolved Nickel	< 0.01	mg/l		0.01	EPA 200.7	HKL	04/09/20

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 20-A004616

AMTEST Identification Number **20-A004616**
Client Identification **BXS-2**
Sampling Date **04/01/20, 13:21**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	330	mg/l		1	SM 2540C	KF	04/06/20
Tannin and Lignin	3.9	mg/l		0.1	SM 5550B	DM	04/16/20

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	13.	mg/l		0.5	SM 5310B	NNL	04/14/20
Chemical Oxygen Demand	29.	mg/l		10	EPA 410.4	DM	04/16/20

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Sulfate	0.12	mg/l		0.1	EPA 300.0	SH	04/03/20

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	< 0.02	mg/l		0.02	EPA 350.1	SH	04/10/20

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	< 0.005	mg/l		0.005	EPA 200.7	HKL	04/09/20
Dissolved Barium	0.0380	mg/l		0.005	EPA 200.7	HKL	04/09/20
Dissolved Iron	0.256	mg/l		0.05	EPA 200.7	HKL	04/09/20
Dissolved Manganese	1.52	mg/l		0.005	EPA 200.7	HKL	04/09/20
Dissolved Nickel	0.036	mg/l		0.01	EPA 200.7	HKL	04/09/20

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 20-A004617

AMTEST Identification Number **20-A004617**
Client Identification **BXS-3**
Sampling Date **04/01/20, 14:15**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	250	mg/l		1	SM 2540C	KF	04/06/20
Tannin and Lignin	24.	mg/l		0.1	SM 5550B	DM	04/16/20

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	18.	mg/l		0.5	SM 5310B	NNL	04/14/20
Chemical Oxygen Demand	66.	mg/l		10	EPA 410.4	DM	04/16/20

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Sulfate	< 0.1	mg/l		0.1	EPA 300.0	SH	04/03/20

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.673	mg/l		0.02	EPA 350.1	SH	04/10/20

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	0.066	mg/l		0.005	EPA 200.7	HKL	04/09/20
Dissolved Barium	0.0419	mg/l		0.005	EPA 200.7	HKL	04/09/20
Dissolved Iron	80.4	mg/l		0.05	EPA 200.7	HKL	04/09/20
Dissolved Manganese	6.27	mg/l		0.005	EPA 200.7	HKL	04/09/20
Dissolved Nickel	0.032	mg/l		0.01	EPA 200.7	HKL	04/09/20

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 20-A004618

AMTEST Identification Number **20-A004618**
Client Identification **BXS-4**
Sampling Date **04/01/20, 11:28**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	120	mg/l		1	SM 2540C	KF	04/06/20
Tannin and Lignin	1.1	mg/l		0.1	SM 5550B	DM	04/16/20

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	6.7	mg/l		0.5	SM 5310B	NNL	04/14/20
Chemical Oxygen Demand	66.	mg/l		10	EPA 410.4	DM	04/16/20

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Sulfate	0.55	mg/l		0.1	EPA 300.0	SH	04/03/20

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	3.29	mg/l		0.02	EPA 350.1	SH	04/10/20

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	< 0.005	mg/l		0.005	EPA 200.7	HKL	04/09/20
Dissolved Barium	0.0235	mg/l		0.005	EPA 200.7	HKL	04/09/20
Dissolved Iron	0.101	mg/l		0.05	EPA 200.7	HKL	04/09/20
Dissolved Manganese	0.138	mg/l		0.005	EPA 200.7	HKL	04/09/20
Dissolved Nickel	< 0.01	mg/l		0.01	EPA 200.7	HKL	04/09/20

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 20-A004619

AMTEST Identification Number **20-A004619**
Client Identification **RINSATE**
Sampling Date **04/01/20, 17:37**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	2.1	mg/l		1	SM 2540C	KF	04/06/20
Tannin and Lignin	0.34	mg/l		0.1	SM 5550B	DM	04/16/20

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	< 0.5	mg/l		0.5	SM 5310B	NNL	04/14/20
Chemical Oxygen Demand	< 10	mg/l		10	EPA 410.4	DM	04/16/20

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Sulfate	< 0.1	mg/l		0.1	EPA 300.0	SH	04/03/20

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	< 0.02	mg/l		0.02	EPA 350.1	SH	04/10/20

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	< 0.005	mg/l		0.005	EPA 200.7	HKL	04/09/20
Dissolved Barium	< 0.005	mg/l		0.005	EPA 200.7	HKL	04/09/20
Dissolved Iron	< 0.05	mg/l		0.05	EPA 200.7	HKL	04/09/20
Dissolved Manganese	< 0.005	mg/l		0.005	EPA 200.7	HKL	04/09/20
Dissolved Nickel	< 0.01	mg/l		0.01	EPA 200.7	HKL	04/09/20

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 20-A004620

AMTEST Identification Number **20-A004620**
Client Identification **BXS-103**
Sampling Date **04/01/20, 14:17**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	240	mg/l		1	SM 2540C	KF	04/06/20
Tannin and Lignin	27.	mg/l		0.1	SM 5550B	DM	04/16/20

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	20.	mg/l		0.5	SM 5310B	NNL	04/14/20
Chemical Oxygen Demand	57.	mg/l		10	EPA 410.4	DM	04/16/20

Minerals

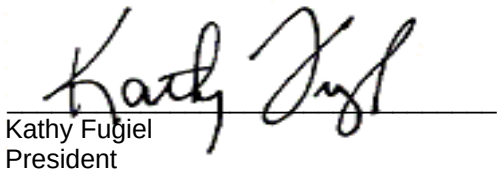
PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Sulfate	< 0.1	mg/l		0.1	EPA 300.0	SH	04/03/20

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.676	mg/l		0.02	EPA 350.1	SH	04/10/20

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	0.072	mg/l		0.005	EPA 200.7	HKL	04/09/20
Dissolved Barium	0.0446	mg/l		0.005	EPA 200.7	HKL	04/09/20
Dissolved Iron	83.0	mg/l		0.05	EPA 200.7	HKL	04/09/20
Dissolved Manganese	6.44	mg/l		0.005	EPA 200.7	HKL	04/09/20
Dissolved Nickel	0.032	mg/l		0.01	EPA 200.7	HKL	04/09/20



Kathy Fugiel
President

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Professional Analytical Services

QC Summary for sample numbers: 20-A004612 to 20-A004620

DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	DUP VALUE	RPD
20-A004615	Total Organic Carbon	mg/l	2.4	2.5	4.1
20-A004678	Total Organic Carbon	mg/l	9.5	9.6	1.0
20-A004776	Total Organic Carbon	mg/l	4.2	4.3	2.4
20-A004893	Total Organic Carbon	mg/l	1.5	1.6	6.5
20-A004920	Total Organic Carbon	mg/l	11.	9.6	14.
20-A004618	Ammonia Nitrogen	mg/l	3.29	3.22	2.2
20-A004637	Ammonia Nitrogen	mg/l	< 0.02	< 0.02	
20-A004647	Ammonia Nitrogen	mg/l	< 0.02	< 0.02	
20-A004680	Ammonia Nitrogen	mg/l	0.023	0.024	4.3
20-A004778	Ammonia Nitrogen	mg/l	< 0.02	< 0.02	
20-A004844	Ammonia Nitrogen	mg/l	36.8	36.5	0.82
20-A004633	Total Nitrate + Nitrite	mg/l	0.042	0.036	15.
20-A004643	Total Nitrate + Nitrite	mg/l	< 0.02	< 0.02	
20-A004659	Total Nitrate + Nitrite	mg/l	0.51	0.53	3.8
20-A004680	Total Nitrate + Nitrite	mg/l	0.17	0.15	12.
20-A004697	Total Nitrate + Nitrite	mg/l	0.26	0.30	14.
20-A004612	Total Dissolved Solids	mg/l	240	250	4.1
20-A004620	Sulfate	mg/l	< 0.1	< 0.1	

MATRIX SPIKES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	SMPL+ SPK	SPK AMT	RECOVERY
20-A004616	Total Organic Carbon	mg/l	13.	63.	50.	100.00 %
20-A004679	Total Organic Carbon	mg/l	9.0	59.	50.	100.00 %
20-A004777	Total Organic Carbon	mg/l	4.1	55.	50.	101.80 %
20-A004894	Total Organic Carbon	mg/l	2.1	51.	50.	97.80 %
20-A004921	Total Organic Carbon	mg/l	2.4	27.	25.	98.40 %
20-A004613	Chemical Oxygen Demand	mg/l	< 10	98.	100	98.00 %
20-A004613	Chemical Oxygen Demand	mg/l	< 10	110	100	110.00 %
20-A004619	Chemical Oxygen Demand	mg/l	< 10	92.	100	92.00 %
20-A004619	Chemical Oxygen Demand	mg/l	< 10	130	100	130.00 %
20-A004858	Chemical Oxygen Demand	mg/l	12.	120	100	108.00 %
20-A004858	Chemical Oxygen Demand	mg/l	12.	120	100	108.00 %
20-A004618	Ammonia Nitrogen	mg/l	3.29	14.0	10.0	107.10 %
20-A004637	Ammonia Nitrogen	mg/l	< 0.02	1.04	1.00	104.00 %
20-A004647	Ammonia Nitrogen	mg/l	< 0.02	1.02	1.00	102.00 %
20-A004680	Ammonia Nitrogen	mg/l	0.023	1.09	1.00	106.70 %
20-A004778	Ammonia Nitrogen	mg/l	< 0.02	1.07	1.00	107.00 %
20-A004844	Ammonia Nitrogen	mg/l	36.5	89.8	50.0	106.60 %
20-A004633	Total Nitrate + Nitrite	mg/l	0.042	0.90	1.0	85.80 %
20-A004643	Total Nitrate + Nitrite	mg/l	< 0.02	0.84	1.0	84.00 %

QC Summary for sample numbers: 20-A004612 to 20-A004620...

MATRIX SPIKES continued....

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	SMPL+ SPK	SPK AMT	RECOVERY
20-A004659	Total Nitrate + Nitrite	mg/l	0.51	1.4	1.0	89.00 %
20-A004680	Total Nitrate + Nitrite	mg/l	0.17	1.0	1.0	83.00 %
20-A004697	Total Nitrate + Nitrite	mg/l	0.26	1.1	1.0	84.00 %
20-A004620	Sulfate	mg/l	< 0.1	2.18	2.00	109.00 %
20-A004547	Tannin and Lignin	mg/l	0.26	0.74	0.40	120.00 %
20-A004547	Tannin and Lignin	mg/l	0.26	0.74	0.40	120.00 %
20-A004620	Dissolved Arsenic	mg/l	0.072	0.551	0.500	95.80 %
20-A004620	Dissolved Arsenic	mg/l	0.072	0.555	0.500	96.60 %
20-A004620	Dissolved Barium	mg/l	0.0446	0.237	0.200	96.20 %
20-A004620	Dissolved Barium	mg/l	0.0446	0.237	0.200	96.20 %
20-A004620	Dissolved Iron	mg/l	83.0	92.3	9.85	94.42 %
20-A004620	Dissolved Iron	mg/l	83.0	92.4	9.85	95.43 %
20-A004620	Dissolved Manganese	mg/l	6.44	7.49	1.17	89.74 %
20-A004620	Dissolved Manganese	mg/l	6.44	7.51	1.17	91.45 %
20-A004620	Dissolved Nickel	mg/l	0.032	1.126	1.180	92.71 %
20-A004620	Dissolved Nickel	mg/l	0.032	1.125	1.180	92.63 %
Blank	Pentachlorophenol	ug/l	< 2	7.5	10.0	75.00 %
Blank	Pentachlorophenol	ug/l	< 2	8.9	10.0	89.00 %

MATRIX SPIKE DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE + SPK	MSD VALUE	RPD
Spike	Chemical Oxygen Demand	mg/l	98.	110	12.
Spike	Chemical Oxygen Demand	mg/l	92.	130	34.
Spike	Chemical Oxygen Demand	mg/l	120	120	0.00
Spike	Tannin and Lignin	mg/l	0.74	0.74	0.00
Spike	Dissolved Arsenic	mg/l	0.551	0.555	0.72
Spike	Dissolved Barium	mg/l	0.237	0.237	0.00
Spike	Dissolved Iron	mg/l	92.3	92.4	0.11
Spike	Dissolved Manganese	mg/l	7.49	7.51	0.27
Spike	Dissolved Nickel	mg/l	1.126	1.125	0.09
Spike	Pentachlorophenol	ug/l	7.5	8.9	17.

STANDARD REFERENCE MATERIALS

ANALYTE	UNITS	TRUE VALUE	MEASURED VALUE	RECOVERY
Total Organic Carbon	mg/l	25.	25.	100. %
Chemical Oxygen Demand	mg/l	50.	55.	110. %
Chemical Oxygen Demand	mg/l	50.	49.	98.0 %
Chloride	mg/l	2.00	2.10	105. %
Ammonia Nitrogen	mg/l	1.00	1.02	102. %
Ammonia Nitrogen	mg/l	1.00	1.02	102. %
Total Nitrate + Nitrite	mg/l	1.0	0.90	90.0 %
Total Nitrate + Nitrite	mg/l	1.0	0.90	90.0 %
Total Nitrate + Nitrite	mg/l	1.0	0.90	90.0 %
Total Dissolved Solids	mg/l	350	360	103. %
Sulfate	mg/l	2.00	2.08	104. %
Tannin and Lignin	mg/l	0.50	0.49	98.0 %
Dissolved Arsenic	mg/l	2.00	2.00	100. %
Dissolved Barium	mg/l	0.800	0.778	97.2 %
Dissolved Iron	mg/l	4.00	4.02	100. %
Dissolved Manganese	mg/l	0.800	0.780	97.5 %

QC Summary for sample numbers: 20-A004612 to 20-A004620...

STANDARD REFERENCE MATERIALS continued....

ANALYTE	UNITS	TRUE VALUE	MEASURED VALUE	RECOVERY
Dissolved Nickel	mg/l	0.800	0.809	101. %
Pentachlorophenol	ug/l	15.0	15.6	104. %

BLANKS

ANALYTE	UNITS	RESULT
Total Organic Carbon	mg/l	< 0.5
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
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	< 0.1
Dissolved Barium	mg/l	< 0.005
Dissolved Iron	mg/l	< 0.05
Dissolved Manganese	mg/l	< 0.005
Dissolved Nickel	mg/l	< 0.01
Pentachlorophenol	ug/l	< 2
2-Fluorophenol	%	47.0
D6-Phenol	%	53.7
D5-Nitrobenzene	%	43.0
2-Fluorobiphenyl	%	56.9
2,4,6-Tribromophenol	%	43.2
D14-Terphenyl	%	65.0

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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: 06/29/20
Date Reported: 7/20/20

AMTEST Identification Number **20-A009050**
Client Identification **BXS-3**
Sampling Date **06/26/20, 12:59**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	320	mg/l		1	SM 2540C	DM	06/30/20
Tannin and Lignin	86.	mg/l		0.1	SM 5550B	DM	07/02/20

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	22.	mg/l		0.5	SM 5310B	NNL	06/30/20
Chemical Oxygen Demand	74.	mg/l		10	EPA 410.4	DM	07/02/20

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Sulfate	< 0.1	mg/l		0.1	EPA 300.0	DM	06/30/20

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.819	mg/l		0.02	EPA 350.1	AY	07/01/20

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 20-A009050

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	0.041	mg/l		0.005	EPA 200.7	HKL	07/06/20
Dissolved Barium	0.0316	mg/l		0.005	EPA 200.7	HKL	07/06/20
Dissolved Iron	79.4	mg/l		0.05	EPA 200.7	HKL	07/06/20
Dissolved Manganese	4.62	mg/l		0.005	EPA 200.7	HKL	07/06/20
Dissolved Nickel	0.030	mg/l		0.01	EPA 200.7	HKL	07/06/20

AMTEST Identification Number **20-A009051**
Client Identification **BXN-1**
Sampling Date **06/26/20, 13:57**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	450	mg/l		1	SM 2540C	DM	06/30/20
Tannin and Lignin	34.	mg/l		0.1	SM 5550B	DM	07/02/20

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	13.	mg/l		0.5	SM 5310B	NNL	06/30/20
Chemical Oxygen Demand	40.	mg/l		10	EPA 410.4	DM	07/02/20

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Sulfate	5.03	mg/l		0.1	EPA 300.0	DM	06/30/20

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.348	mg/l		0.02	EPA 350.1	AY	07/01/20

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 20-A009051

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	0.014	mg/l		0.005	EPA 200.7	HKL	07/06/20
Dissolved Barium	0.123	mg/l		0.005	EPA 200.7	HKL	07/06/20
Dissolved Iron	41.9	mg/l		0.05	EPA 200.7	HKL	07/06/20
Dissolved Manganese	6.43	mg/l		0.005	EPA 200.7	HKL	07/06/20
Dissolved Nickel	0.056	mg/l		0.01	EPA 200.7	HKL	07/06/20

AMTEST Identification Number **20-A009052**
Client Identification **BXN-101**
Sampling Date **06/26/20, 14:00**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	450	mg/l		1	SM 2540C	DM	06/30/20
Tannin and Lignin	36.	mg/l		0.1	SM 5550B	DM	07/02/20

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	13.	mg/l		0.5	SM 5310B	NNL	06/30/20
Chemical Oxygen Demand	46.	mg/l		10	EPA 410.4	DM	07/02/20

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Sulfate	5.07	mg/l		0.1	EPA 300.0	DM	06/30/20

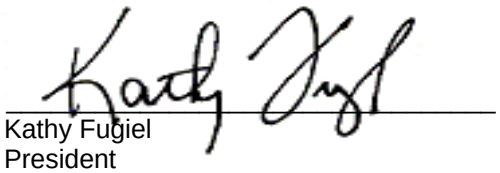
Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.364	mg/l		0.02	EPA 350.1	AY	07/01/20

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 20-A009052

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	0.017	mg/l		0.005	EPA 200.7	HKL	07/06/20
Dissolved Barium	0.114	mg/l		0.005	EPA 200.7	HKL	07/06/20
Dissolved Iron	40.3	mg/l		0.05	EPA 200.7	HKL	07/06/20
Dissolved Manganese	6.27	mg/l		0.005	EPA 200.7	HKL	07/06/20
Dissolved Nickel	0.055	mg/l		0.01	EPA 200.7	HKL	07/06/20



Kathy Fugiel
President

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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: 06/29/20
Date Reported: 4/19/21

AMTEST Identification Number **20-A009051**
Client Identification **BXN-1**
Sampling Date **06/26/20, 13:57**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	450	mg/l		1	SM 2540C	DM	06/30/20
Tannin and Lignin	34.	mg/l		0.2	SM 5550B	DM	07/02/20

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	13.	mg/l		0.5	SM 5310B	NNL	06/30/20
Chemical Oxygen Demand	40.	mg/l		10	EPA 410.4	DM	07/02/20

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	27.9	mg/l		0.05	EPA 300.0	AY	07/22/20
Sulfate	5.03	mg/l		0.1	EPA 300.0	DM	06/30/20

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.348	mg/l		0.02	EPA 350.1	AY	07/01/20
Nitrite	< 0.005	mg/l		0.005	EPA 300.0	DM	06/30/20
Nitrate	1.19	mg/l		0.025	EPA 300.0	DM	06/30/20

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 20-A009051

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	0.014	mg/l		0.005	EPA 200.7	HKL	07/06/20
Dissolved Barium	0.123	mg/l		0.005	EPA 200.7	HKL	07/06/20
Dissolved Iron	41.9	mg/l		0.02	EPA 200.7	HKL	07/06/20
Dissolved Manganese	6.43	mg/l		0.005	EPA 200.7	HKL	07/06/20
Dissolved Nickel	0.056	mg/l		0.01	EPA 200.7	HKL	07/06/20

AMTEST Identification Number **20-A009052**
Client Identification **BXN-101**
Sampling Date **06/26/20, 14:00**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	450	mg/l		1	SM 2540C	DM	06/30/20
Tannin and Lignin	36.	mg/l		0.2	SM 5550B	DM	07/02/20

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	13.	mg/l		0.5	SM 5310B	NNL	06/30/20
Chemical Oxygen Demand	46.	mg/l		10	EPA 410.4	DM	07/02/20

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	27.8	mg/l		0.05	EPA 300.0	AY	07/22/20
Sulfate	5.07	mg/l		0.1	EPA 300.0	DM	06/30/20

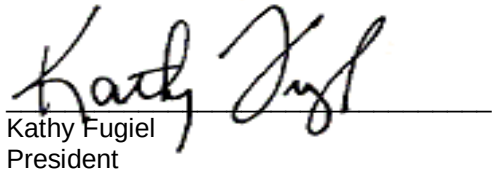
Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.364	mg/l		0.02	EPA 350.1	AY	07/01/20
Nitrite	< 0.005	mg/l		0.005	EPA 300.0	DM	06/30/20
Nitrate	1.19	mg/l		0.025	EPA 300.0	DM	06/30/20

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 20-A009052

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	0.017	mg/l		0.005	EPA 200.7	HKL	07/06/20
Dissolved Barium	0.114	mg/l		0.005	EPA 200.7	HKL	07/06/20
Dissolved Iron	40.3	mg/l		0.02	EPA 200.7	HKL	07/06/20
Dissolved Manganese	6.27	mg/l		0.005	EPA 200.7	HKL	07/06/20
Dissolved Nickel	0.055	mg/l		0.01	EPA 200.7	HKL	07/06/20



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President

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Professional Analytical Services

QC Summary for sample numbers: 20-A009050 to 20-A009052

DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	DUP VALUE	RPD
20-A008833	Total Organic Carbon	mg/l	7.5	7.6	1.3
20-A008862	Total Organic Carbon	mg/l	2.1	2.2	4.7
20-A008929	Total Organic Carbon	mg/l	11.	10.	9.5
20-A009022	Total Organic Carbon	mg/l	4.3	4.4	2.3
20-A009051	Total Organic Carbon	mg/l	13.	12.	8.0
20-A008727	Ammonia Nitrogen	mg/l	0.028	0.037	28.
20-A008774	Ammonia Nitrogen	mg/l	< 0.02	< 0.02	
20-A008834	Ammonia Nitrogen	mg/l	0.023	0.027	16.
20-A008864	Ammonia Nitrogen	mg/l	< 0.02	< 0.02	
20-A008887	Ammonia Nitrogen	mg/l	0.022	0.023	4.4
20-A009013	Ammonia Nitrogen	mg/l	0.039	0.044	12.
20-A009023	Ammonia Nitrogen	mg/l	0.021	0.020	4.9
20-A009108	Ammonia Nitrogen	mg/l	0.108	0.107	0.93
20-A008856	Total Dissolved Solids	mg/l	85.	75.	12.
20-A008921	Total Dissolved Solids	mg/l	190	180	5.4
20-A009051	Total Dissolved Solids	mg/l	450	450	0.00
20-A009114	Sulfate	mg/l	81.4	81.6	0.25

MATRIX SPIKES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	SMPL+ SPK	SPK AMT	RECOVERY
20-A008834	Total Organic Carbon	mg/l	1.5	50.	50.	97.00 %
20-A008864	Total Organic Carbon	mg/l	0.94	51.	50.	100.12 %
20-A009013	Total Organic Carbon	mg/l	17.	66.	50.	98.00 %
20-A009023	Total Organic Carbon	mg/l	3.4	52.	50.	97.20 %
20-A009052	Total Organic Carbon	mg/l	13.	63.	50.	100.00 %
20-A008868	Chemical Oxygen Demand	mg/l	18.	140	100	122.00 %
20-A008868	Chemical Oxygen Demand	mg/l	18.	150	100	132.00 %
20-A008929	Chemical Oxygen Demand	mg/l	40.	130	100	90.00 %
20-A008929	Chemical Oxygen Demand	mg/l	40.	150	100	110.00 %
20-A008727	Ammonia Nitrogen	mg/l	0.028	1.09	1.00	106.20 %
20-A008774	Ammonia Nitrogen	mg/l	< 0.02	1.05	1.00	105.00 %
20-A008834	Ammonia Nitrogen	mg/l	0.023	1.07	1.00	104.70 %
20-A008864	Ammonia Nitrogen	mg/l	< 0.02	1.06	1.00	106.00 %
20-A008887	Ammonia Nitrogen	mg/l	0.022	1.10	1.00	107.80 %
20-A009013	Ammonia Nitrogen	mg/l	0.039	1.09	1.00	105.10 %
20-A009023	Ammonia Nitrogen	mg/l	0.021	1.07	1.00	104.90 %
20-A009108	Ammonia Nitrogen	mg/l	0.108	1.16	1.00	105.20 %
20-A009114	Sulfate	mg/l	81.4	136.	40.0	136.50 %
20-A007859	Tannin and Lignin	mg/l	0.76	1.1	0.40	85.00 %
20-A007859	Tannin and Lignin	mg/l	0.76	1.2	0.40	110.00 %

QC Summary for sample numbers: 20-A009050 to 20-A009052...

MATRIX SPIKES continued....

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	SMPL+ SPK	SPK AMT	RECOVERY
20-A009052	Dissolved Arsenic	mg/l	0.017	0.989	1.00	97.20 %
20-A009052	Dissolved Arsenic	mg/l	0.017	0.988	1.00	97.10 %
20-A008872	Dissolved Barium	mg/l	0.0252	0.993	1.00	96.78 %
20-A008872	Dissolved Barium	mg/l	0.0252	1.00	1.00	97.48 %
20-A009052	Dissolved Barium	mg/l	0.114	1.08	1.00	96.60 %
20-A009052	Dissolved Barium	mg/l	0.114	1.07	1.00	95.60 %
20-A008700	Dissolved Iron	mg/l	< 0.05	6.30	6.00	105.00 %
20-A008700	Dissolved Iron	mg/l	< 0.05	6.24	6.00	104.00 %
20-A008710	Dissolved Iron	mg/l	< 0.05	5.80	6.00	96.67 %
20-A008710	Dissolved Iron	mg/l	< 0.05	5.75	6.00	95.83 %
20-A008714	Dissolved Iron	mg/l	< 0.05	5.79	6.00	96.50 %
20-A008714	Dissolved Iron	mg/l	< 0.05	5.79	6.00	96.50 %
20-A008872	Dissolved Iron	mg/l	0.277	6.00	6.00	95.38 %
20-A008872	Dissolved Iron	mg/l	0.277	6.02	6.00	95.72 %
20-A009052	Dissolved Iron	mg/l	40.3	46.7	6.00	106.67 %
20-A009052	Dissolved Iron	mg/l	40.3	46.0	6.00	95.00 %
20-A008700	Dissolved Manganese	mg/l	< 0.005	1.11	1.00	111.00 %
20-A008700	Dissolved Manganese	mg/l	< 0.005	1.10	1.00	110.00 %
20-A008710	Dissolved Manganese	mg/l	< 0.005	1.01	1.00	101.00 %
20-A008710	Dissolved Manganese	mg/l	< 0.005	1.01	1.00	101.00 %
20-A008714	Dissolved Manganese	mg/l	< 0.005	1.02	1.00	102.00 %
20-A008714	Dissolved Manganese	mg/l	< 0.005	1.01	1.00	101.00 %
20-A008872	Dissolved Manganese	mg/l	1.53	2.52	1.00	99.00 %
20-A008872	Dissolved Manganese	mg/l	1.53	2.55	1.00	102.00 %
20-A009052	Dissolved Manganese	mg/l	6.27	7.50	1.00	123.00 %
20-A009052	Dissolved Manganese	mg/l	6.27	7.47	1.00	120.00 %
20-A008872	Dissolved Nickel	mg/l	< 0.01	0.951	1.000	95.10 %
20-A008872	Dissolved Nickel	mg/l	< 0.01	0.954	1.000	95.40 %
20-A009052	Dissolved Nickel	mg/l	0.055	0.964	1.000	90.90 %
20-A009052	Dissolved Nickel	mg/l	0.055	0.962	1.000	90.70 %

MATRIX SPIKE DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE + SPK	MSD VALUE	RPD
Spike	Chemical Oxygen Demand	mg/l	140	150	6.9
Spike	Chemical Oxygen Demand	mg/l	130	150	14.
Spike	Tannin and Lignin	mg/l	1.1	1.2	8.7
Spike	Dissolved Arsenic	mg/l	0.989	0.988	0.10
Spike	Dissolved Barium	mg/l	0.993	1.00	0.70
Spike	Dissolved Barium	mg/l	1.08	1.07	0.93
Spike	Dissolved Iron	mg/l	6.30	6.24	0.96
Spike	Dissolved Iron	mg/l	5.80	5.75	0.87
Spike	Dissolved Iron	mg/l	5.79	5.79	0.00
Spike	Dissolved Iron	mg/l	6.00	6.02	0.33
Spike	Dissolved Iron	mg/l	46.7	46.0	1.5
Spike	Dissolved Manganese	mg/l	1.11	1.10	0.90
Spike	Dissolved Manganese	mg/l	1.01	1.01	0.00
Spike	Dissolved Manganese	mg/l	1.02	1.01	0.99
Spike	Dissolved Manganese	mg/l	2.52	2.55	1.2
Spike	Dissolved Manganese	mg/l	7.50	7.47	0.40
Spike	Dissolved Nickel	mg/l	0.951	0.954	0.31
Spike	Dissolved Nickel	mg/l	0.964	0.962	0.21

QC Summary for sample numbers: 20-A009050 to 20-A009052...

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.	43.	86.0 %
Chemical Oxygen Demand	mg/l	25.	24.	96.0 %
Ammonia Nitrogen	mg/l	1.00	1.01	101. %
Ammonia Nitrogen	mg/l	1.00	0.992	99.2 %
Ammonia Nitrogen	mg/l	1.00	1.01	101. %
Total Dissolved Solids	mg/l	350	360	103. %
Total Dissolved Solids	mg/l	350	360	103. %
Sulfate	mg/l	2.00	2.17	108. %
Tannin and Lignin	mg/l	0.80	0.69	86.2 %
Dissolved Arsenic	mg/l	2.00	1.95	97.5 %
Dissolved Arsenic	mg/l	2.00	1.95	97.5 %
Dissolved Barium	mg/l	0.800	0.782	97.8 %
Dissolved Barium	mg/l	0.800	0.773	96.6 %
Dissolved Iron	mg/l	2.09	2.09	100. %
Dissolved Iron	mg/l	2.00	2.06	103. %
Dissolved Iron	mg/l	2.00	2.08	104. %
Dissolved Iron	mg/l	2.00	2.05	102. %
Dissolved Iron	mg/l	20.0	19.5	97.5 %
Dissolved Manganese	mg/l	2.00	1.99	99.5 %
Dissolved Manganese	mg/l	2.00	1.98	99.0 %
Dissolved Manganese	mg/l	2.00	1.97	98.5 %
Dissolved Manganese	mg/l	0.800	0.808	101. %
Dissolved Manganese	mg/l	0.800	0.807	101. %
Dissolved Nickel	mg/l	0.800	0.778	97.2 %
Dissolved Nickel	mg/l	0.800	0.778	97.2 %

BLANKS

ANALYTE	UNITS	RESULT
Total Organic Carbon	mg/l	< 0.5
Total Organic Carbon	mg/l	< 0.5
Chemical Oxygen Demand	mg/l	< 10
Ammonia Nitrogen	mg/l	< 0.02
Ammonia Nitrogen	mg/l	< 0.02
Ammonia Nitrogen	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 Arsenic	mg/l	< 0.005
Dissolved Barium	mg/l	< 0.005
Dissolved Barium	mg/l	< 0.005

QC Summary for sample numbers: 20-A009050 to 20-A009052...

BLANKS continued....

ANALYTE	UNITS	RESULT
Dissolved Iron	mg/l	< 0.05
Dissolved Iron	mg/l	< 0.05
Dissolved Iron	mg/l	< 0.05
Dissolved Iron	mg/l	< 0.05
Dissolved Iron	mg/l	< 5
Dissolved Manganese	mg/l	< 0.005
Dissolved Manganese	mg/l	< 0.005
Dissolved Manganese	mg/l	< 0.005
Dissolved Manganese	mg/l	< 0.005
Dissolved Manganese	mg/l	< 0.005
Dissolved Nickel	mg/l	< 0.01
Dissolved Nickel	mg/l	< 0.01

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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: 09/23/20
Date Reported: 4/13/21

AMTEST Identification Number **20-A015244**
Client Identification **BXS-4**
Sampling Date **09/22/20, 11:20**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	330	mg/l		1	SM 2540C	DM	10/02/20
Tannin and Lignin	5.1	mg/l		0.2	SM 5550B	DM	10/01/20

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	3.8	mg/l		0.5	SM 5310B	KF	09/28/20
Chemical Oxygen Demand	71.	mg/l		10	EPA 410.4	DM	10/08/20

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Sulfate	0.29	mg/l		0.1	EPA 300.0	AY	09/23/20

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	6.36	mg/l		0.02	EPA 350.1	KS	10/06/20

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 20-A015244

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	< 0.005	mg/l		0.005	EPA 200.7	JDR	10/09/20
Dissolved Barium	0.0241	mg/l		0.005	EPA 200.7	JDR	10/09/20
Dissolved Iron	< 0.05	mg/l		0.02	EPA 200.7	JDR	10/09/20
Dissolved Manganese	0.169	mg/l		0.005	EPA 200.7	JDR	10/09/20
Dissolved Nickel	< 0.01	mg/l		0.01	EPA 200.7	JDR	10/09/20

AMTEST Identification Number **20-A015245**
Client Identification **BXS-2**
Sampling Date **09/22/20, 12:23**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	390	mg/l		1	SM 2540C	DM	10/02/20
Tannin and Lignin	1.7	mg/l		0.2	SM 5550B	DM	10/01/20

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	13.	mg/l		0.5	SM 5310B	KF	09/28/20
Chemical Oxygen Demand	18.	mg/l		10	EPA 410.4	DM	10/08/20

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Sulfate	0.22	mg/l		0.1	EPA 300.0	AY	09/23/20

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.027	mg/l		0.02	EPA 350.1	KS	10/06/20

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 20-A015245

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	< 0.005	mg/l		0.005	EPA 200.7	JDR	10/09/20
Dissolved Barium	0.0376	mg/l		0.005	EPA 200.7	JDR	10/09/20
Dissolved Iron	< 0.05	mg/l		0.02	EPA 200.7	JDR	10/09/20
Dissolved Manganese	1.59	mg/l		0.005	EPA 200.7	JDR	10/09/20
Dissolved Nickel	0.034	mg/l		0.01	EPA 200.7	JDR	10/09/20

AMTEST Identification Number **20-A015246**
Client Identification **BXS-102**
Sampling Date **09/22/20, 12:27**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	390	mg/l		1	SM 2540C	DM	10/02/20
Tannin and Lignin	1.8	mg/l		0.2	SM 5550B	DM	10/01/20

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	12.	mg/l		0.5	SM 5310B	KF	09/28/20
Chemical Oxygen Demand	15.	mg/l		10	EPA 410.4	DM	10/08/20

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Sulfate	0.21	mg/l		0.1	EPA 300.0	AY	09/23/20

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.021	mg/l		0.02	EPA 350.1	KS	10/06/20

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 20-A015246

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	< 0.005	mg/l		0.005	EPA 200.7	JDR	10/09/20
Dissolved Barium	0.0388	mg/l		0.005	EPA 200.7	JDR	10/09/20
Dissolved Iron	< 0.05	mg/l		0.02	EPA 200.7	JDR	10/09/20
Dissolved Manganese	1.62	mg/l		0.005	EPA 200.7	JDR	10/09/20
Dissolved Nickel	0.034	mg/l		0.01	EPA 200.7	JDR	10/09/20

AMTEST Identification Number **20-A015247**
Client Identification **BXS-1**
Sampling Date **09/22/20, 13:37**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	190	mg/l		1	SM 2540C	DM	10/02/20
Tannin and Lignin	0.13	mg/l		0.2	SM 5550B	DM	10/01/20

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	3.4	mg/l		0.5	SM 5310B	KF	09/28/20
Chemical Oxygen Demand	< 10	mg/l		10	EPA 410.4	DM	10/08/20

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Sulfate	13.8	mg/l		0.1	EPA 300.0	AY	09/24/20

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	< 0.02	mg/l		0.02	EPA 350.1	KS	10/06/20

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 20-A015247

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	< 0.005	mg/l		0.005	EPA 200.7	JDR	10/09/20
Dissolved Barium	0.0182	mg/l		0.005	EPA 200.7	JDR	10/09/20
Dissolved Iron	< 0.05	mg/l		0.02	EPA 200.7	JDR	10/09/20
Dissolved Manganese	0.038	mg/l		0.005	EPA 200.7	JDR	10/09/20
Dissolved Nickel	0.011	mg/l		0.01	EPA 200.7	JDR	10/09/20

AMTEST Identification Number **20-A015248**
Client Identification **BXN-4**
Sampling Date **09/22/20, 14:39**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	290	mg/l		1	SM 2540C	DM	10/02/20
Tannin and Lignin	0.97	mg/l		0.2	SM 5550B	DM	10/01/20

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	3.2	mg/l		0.5	SM 5310B	KF	09/28/20
Chemical Oxygen Demand	< 10	mg/l		10	EPA 410.4	DM	10/08/20

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	7.24	mg/l		0.05	EPA 300.0	AY	09/23/20
Sulfate	33.5	mg/l		0.1	EPA 300.0	AY	09/24/20

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.556	mg/l		0.02	EPA 350.1	KS	10/06/20
Total Nitrate + Nitrite	3.6	mg/l		0.02	EPA 353.2	KS	10/01/20

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 20-A015248

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	< 0.005	mg/l		0.005	EPA 200.7	JDR	10/09/20
Dissolved Barium	0.0646	mg/l		0.005	EPA 200.7	JDR	10/09/20
Dissolved Iron	< 0.05	mg/l		0.02	EPA 200.7	JDR	10/09/20
Dissolved Manganese	1.25	mg/l		0.005	EPA 200.7	JDR	10/09/20
Dissolved Nickel	0.043	mg/l		0.01	EPA 200.7	JDR	10/09/20

AMTEST Identification Number **20-A015249**
Client Identification **BXN-2**
Sampling Date **09/22/20, 15:41**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	210	mg/l		1	SM 2540C	DM	10/02/20
Tannin and Lignin	1.2	mg/l		0.2	SM 5550B	DM	10/01/20

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	1.2	mg/l		0.5	SM 5310B	KF	09/28/20
Chemical Oxygen Demand	< 10	mg/l		10	EPA 410.4	DM	10/08/20

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	22.5	mg/l		0.05	EPA 300.0	AY	09/24/20
Sulfate	17.0	mg/l		0.1	EPA 300.0	AY	09/24/20

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	< 0.02	mg/l		0.02	EPA 350.1	KS	10/06/20
Total Nitrate + Nitrite	1.7	mg/l		0.02	EPA 353.2	KS	10/01/20

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 20-A015249

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	< 0.005	mg/l		0.005	EPA 200.7	JDR	10/09/20
Dissolved Barium	0.0121	mg/l		0.005	EPA 200.7	JDR	10/09/20
Dissolved Iron	< 0.05	mg/l		0.02	EPA 200.7	JDR	10/09/20
Dissolved Manganese	3.24	mg/l		0.005	EPA 200.7	JDR	10/09/20
Dissolved Nickel	0.030	mg/l		0.01	EPA 200.7	JDR	10/09/20

AMTEST Identification Number **20-A015250**
Client Identification **BXN-1**
Sampling Date **09/22/20, 16:29**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	450	mg/l		1	SM 2540C	DM	10/02/20
Tannin and Lignin	3.5	mg/l		0.2	SM 5550B	DM	10/01/20

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	17.	mg/l		0.5	SM 5310B	KF	09/28/20
Chemical Oxygen Demand	71.	mg/l		10	EPA 410.4	DM	10/08/20

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	10.3	mg/l		0.05	EPA 300.0	AY	09/23/20
Sulfate	4.30	mg/l		0.1	EPA 300.0	AY	09/23/20

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.298	mg/l		0.02	EPA 350.1	KS	10/06/20
Total Nitrate + Nitrite	0.020	mg/l		0.02	EPA 353.2	KS	10/01/20

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 20-A015250

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	< 0.005	mg/l		0.005	EPA 200.7	JDR	10/09/20
Dissolved Barium	0.0853	mg/l		0.005	EPA 200.7	JDR	10/09/20
Dissolved Iron	37.1	mg/l		0.02	EPA 200.7	JDR	10/09/20
Dissolved Manganese	6.59	mg/l		0.005	EPA 200.7	JDR	10/09/20
Dissolved Nickel	0.066	mg/l		0.01	EPA 200.7	JDR	10/09/20

AMTEST Identification Number **20-A015251**
Client Identification **RINSATE**
Sampling Date **09/22/20, 16:40**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	36.	mg/l		1	SM 2540C	DM	10/02/20
Tannin and Lignin	0.32	mg/l		0.2	SM 5550B	DM	10/01/20

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	1.7	mg/l		0.5	SM 5310B	NNL	09/29/20
Chemical Oxygen Demand	< 10	mg/l		10	EPA 410.4	DM	10/08/20

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	3.61	mg/l		0.05	EPA 300.0	AY	09/23/20
Sulfate	1.08	mg/l		0.1	EPA 300.0	AY	09/23/20

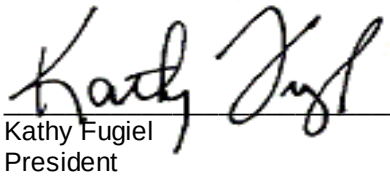
Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	< 0.02	mg/l		0.02	EPA 350.1	KS	10/06/20
Total Nitrate + Nitrite	< 0.02	mg/l		0.02	EPA 353.2	KS	10/01/20

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 20-A015251

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	< 0.005	mg/l		0.005	EPA 200.7	JDR	10/09/20
Dissolved Barium	< 0.005	mg/l		0.005	EPA 200.7	JDR	10/09/20
Dissolved Iron	1.20	mg/l		0.02	EPA 200.7	JDR	10/09/20
Dissolved Manganese	0.225	mg/l		0.005	EPA 200.7	JDR	10/09/20
Dissolved Nickel	< 0.01	mg/l		0.01	EPA 200.7	JDR	10/09/20



Kathy Fugiel
President

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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: 09/25/20
Date Reported: 10/23/20

AMTEST Identification Number **20-A015605**
Client Identification **BXS-3**
Sampling Date **09/25/20, 11:10**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	310	mg/l		1	SM 2540C	DM	10/05/20
Tannin and Lignin	94.	mg/l		0.1	SM 5550B	DM	10/01/20

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	19.	mg/l		0.5	SM 5310B	NNL	09/30/20
Chemical Oxygen Demand	35.	mg/l		10	EPA 410.4	DM	10/08/20

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Sulfate	0.15	mg/l		0.1	EPA 300.0	AY	09/28/20

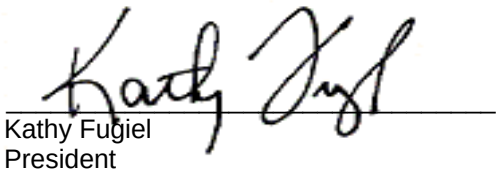
Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.571	mg/l		0.02	EPA 350.1	KS	10/06/20

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 20-A015605

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	0.105	mg/l		0.005	EPA 200.7	JDR	10/09/20
Dissolved Barium	0.0578	mg/l		0.005	EPA 200.7	JDR	10/09/20
Dissolved Iron	85.9	mg/l		0.05	EPA 200.7	JDR	10/09/20
Dissolved Manganese	6.83	mg/l		0.005	EPA 200.7	JDR	10/09/20
Dissolved Nickel	0.030	mg/l		0.01	EPA 200.7	JDR	10/09/20



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Professional Analytical Services

QC Summary for sample numbers: 20-A015244 to 20-A015251

DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	DUP VALUE	RPD
20-A014065	Total Organic Carbon	mg/l	< 0.5	< 0.5	
20-A014741	Total Organic Carbon	mg/l	< 0.5	< 0.5	
20-A015205	Total Organic Carbon	mg/l	2.0	2.0	0.00
20-A015391	Total Organic Carbon	mg/l	4.3	3.8	12.
20-A015401	Total Organic Carbon	mg/l	2.0	2.0	0.00
20-A015411	Total Organic Carbon	mg/l	8.2	6.9	17.
20-A015516	Total Organic Carbon	mg/l	11.	11.	0.00
20-A015248	Chloride	mg/l	7.24	7.21	0.42
20-A015251	Chloride	mg/l	3.61	3.61	0.00
20-A015264	Ammonia Nitrogen	mg/l	0.031	0.032	3.2
20-A015366	Ammonia Nitrogen	mg/l	0.253	0.255	0.79
20-A015396	Ammonia Nitrogen	mg/l	0.025	0.025	0.00
20-A015406	Ammonia Nitrogen	mg/l	0.048	0.045	6.5
20-A015416	Ammonia Nitrogen	mg/l	0.109	0.112	2.7
20-A015514	Ammonia Nitrogen	mg/l	0.050	0.050	0.00
20-A015611	Ammonia Nitrogen	mg/l	0.152	0.152	0.00
20-A015751	Ammonia Nitrogen	mg/l	< 0.02	< 0.02	
20-A015826	Ammonia Nitrogen	mg/l	0.085	0.088	3.5
20-A015879	Ammonia Nitrogen	mg/l	0.071	0.072	1.4
20-A015893	Ammonia Nitrogen	mg/l	< 0.02	< 0.02	
20-A015992	Ammonia Nitrogen	mg/l	33.2	33.1	0.30
20-A016008	Ammonia Nitrogen	mg/l	< 0.02	< 0.02	
20-A016036	Ammonia Nitrogen	mg/l	0.042	0.040	4.9
20-A015204	Total Nitrate + Nitrite	mg/l	0.077	0.085	9.9
20-A015214	Total Nitrate + Nitrite	mg/l	0.69	0.69	0.00
20-A015249	Total Nitrate + Nitrite	mg/l	1.7	1.8	5.7
20-A015374	Total Nitrate + Nitrite	mg/l	0.22	0.21	4.7
20-A015440	Total Nitrate + Nitrite	mg/l	3.7	3.9	5.3
20-A015518	Total Nitrate + Nitrite	mg/l	2.4	2.4	0.00
20-A015620	Total Nitrate + Nitrite	mg/l	2.5	2.4	4.1
20-A015245	Total Dissolved Solids	mg/l	390	380	2.6
20-A015246	Total Dissolved Solids	mg/l	390	390	0.00
20-A015251	Sulfate	mg/l	1.08	1.08	0.00

QC Summary for sample numbers: 20-A015244 to 20-A015251...

MATRIX SPIKES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	SMPL+ SPK	SPK AMT	RECOVERY
20-A014568	Total Organic Carbon	mg/l	1.0	53.	50.	104.00 %
20-A014789	Total Organic Carbon	mg/l	1.7	51.	50.	98.60 %
20-A015206	Total Organic Carbon	mg/l	1.1	51.	50.	99.80 %
20-A015392	Total Organic Carbon	mg/l	3.5	53.	50.	99.00 %
20-A015402	Total Organic Carbon	mg/l	4.1	54.	50.	99.80 %
20-A015412	Total Organic Carbon	mg/l	2.4	53.	50.	101.20 %
20-A015517	Total Organic Carbon	mg/l	11.	61.	50.	100.00 %
20-A015622	Chemical Oxygen Demand	mg/l	32.	130	100	98.00 %
20-A015622	Chemical Oxygen Demand	mg/l	32.	110	100	78.00 %
20-A015245	Chemical Oxygen Demand	mg/l	18.	130	100	112.00 %
20-A015245	Chemical Oxygen Demand	mg/l	18.	120	100	102.00 %
20-A015248	Chloride	mg/l	7.24	9.30	2.00	103.00 %
20-A015251	Chloride	mg/l	3.61	5.72	2.00	105.50 %
20-A015264	Ammonia Nitrogen	mg/l	0.031	1.02	1.00	98.90 %
20-A015366	Ammonia Nitrogen	mg/l	0.253	1.22	1.00	96.70 %
20-A015396	Ammonia Nitrogen	mg/l	0.025	0.943	1.00	91.80 %
20-A015406	Ammonia Nitrogen	mg/l	0.048	0.958	1.00	91.00 %
20-A015416	Ammonia Nitrogen	mg/l	0.109	1.08	1.00	97.10 %
20-A015514	Ammonia Nitrogen	mg/l	0.050	1.01	1.00	96.00 %
20-A015611	Ammonia Nitrogen	mg/l	0.152	1.14	1.00	98.80 %
20-A015751	Ammonia Nitrogen	mg/l	< 0.02	0.917	1.00	91.70 %
20-A015826	Ammonia Nitrogen	mg/l	0.085	1.14	1.00	105.50 %
20-A015879	Ammonia Nitrogen	mg/l	0.071	1.00	1.00	92.90 %
20-A015893	Ammonia Nitrogen	mg/l	< 0.02	0.988	1.00	98.80 %
20-A015992	Ammonia Nitrogen	mg/l	33.2	53.4	20.0	101.00 %
20-A016008	Ammonia Nitrogen	mg/l	< 0.02	0.938	1.00	93.80 %
20-A016036	Ammonia Nitrogen	mg/l	0.042	1.02	1.00	97.80 %
20-A015204	Total Nitrate + Nitrite	mg/l	0.077	0.99	1.0	91.30 %
20-A015214	Total Nitrate + Nitrite	mg/l	0.69	1.7	1.0	101.00 %
20-A015249	Total Nitrate + Nitrite	mg/l	1.7	12.	10.	103.00 %
20-A015374	Total Nitrate + Nitrite	mg/l	0.22	1.2	1.0	98.00 %
20-A015440	Total Nitrate + Nitrite	mg/l	3.7	14.	10.	103.00 %
20-A015518	Total Nitrate + Nitrite	mg/l	2.4	3.5	1.0	110.00 %
20-A015620	Total Nitrate + Nitrite	mg/l	2.5	4.5	2.0	100.00 %
20-A015251	Sulfate	mg/l	1.08	3.16	2.00	104.00 %
20-A015247	Tannin and Lignin	mg/l	0.13	0.52	0.40	97.50 %
20-A015247	Tannin and Lignin	mg/l	0.13	0.51	0.40	95.00 %
20-A015928	Tannin and Lignin	mg/l	0.40	0.78	0.40	95.00 %
20-A015928	Tannin and Lignin	mg/l	0.40	0.76	0.40	90.00 %
20-A015605	Dissolved Arsenic	mg/l	0.105	1.08	1.00	97.50 %
20-A015605	Dissolved Arsenic	mg/l	0.105	1.08	1.00	97.50 %
20-A015605	Dissolved Barium	mg/l	0.0578	1.04	1.00	98.22 %
20-A015605	Dissolved Barium	mg/l	0.0578	1.04	1.00	98.22 %
20-A015605	Dissolved Iron	mg/l	85.9	92.7	6.00	113.33 %
20-A015605	Dissolved Iron	mg/l	85.9	92.9	6.00	116.67 %
20-A015605	Dissolved Manganese	mg/l	6.83	7.90	1.00	107.00 %
20-A015605	Dissolved Manganese	mg/l	6.83	7.92	1.00	109.00 %
20-A015605	Dissolved Nickel	mg/l	0.030	1.020	1.000	99.00 %
20-A015605	Dissolved Nickel	mg/l	0.030	1.015	1.000	98.50 %

QC Summary for sample numbers: 20-A015244 to 20-A015251...

MATRIX SPIKE DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE + SPK	MSD VALUE	RPD
Spike	Chemical Oxygen Demand	mg/l	130	110	17.
Spike	Chemical Oxygen Demand	mg/l	130	120	8.0
Spike	Tannin and Lignin	mg/l	0.52	0.51	1.9
Spike	Tannin and Lignin	mg/l	0.78	0.76	2.6
Spike	Dissolved Arsenic	mg/l	1.08	1.08	0.00
Spike	Dissolved Barium	mg/l	1.04	1.04	0.00
Spike	Dissolved Iron	mg/l	92.7	92.9	0.22
Spike	Dissolved Manganese	mg/l	7.90	7.92	0.25
Spike	Dissolved Nickel	mg/l	1.020	1.015	0.49

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. %
Total Organic Carbon	mg/l	25.	25.	100. %
Chemical Oxygen Demand	mg/l	100	91.	91.0 %
Chemical Oxygen Demand	mg/l	100	97.	97.0 %
Chloride	mg/l	2.00	2.15	108. %
Chloride	mg/l	2.00	2.15	108. %
Chloride	mg/l	2.00	2.07	104. %
Chloride	mg/l	2.00	2.05	102. %
Ammonia Nitrogen	mg/l	1.00	0.969	96.9 %
Ammonia Nitrogen	mg/l	1.00	0.986	98.6 %
Ammonia Nitrogen	mg/l	1.00	0.983	98.3 %
Total Nitrate + Nitrite	mg/l	1.0	0.99	99.0 %
Total Nitrate + Nitrite	mg/l	1.0	1.0	100. %
Total Nitrate + Nitrite	mg/l	1.0	0.97	97.0 %
Total Dissolved Solids	mg/l	350	340	97.1 %
Total Dissolved Solids	mg/l	350	340	97.1 %
Sulfate	mg/l	2.00	2.01	100. %
Sulfate	mg/l	2.00	2.04	102. %
Sulfate	mg/l	2.00	1.98	99.0 %
Sulfate	mg/l	2.00	1.96	98.0 %
Tannin and Lignin	mg/l	0.80	0.73	91.2 %
Tannin and Lignin	mg/l	0.80	0.82	102. %
Dissolved Arsenic	mg/l	2.00	1.98	99.0 %
Dissolved Arsenic	mg/l	2.00	1.98	99.0 %
Dissolved Barium	mg/l	0.800	0.796	99.5 %
Dissolved Barium	mg/l	0.800	0.811	101. %
Dissolved Iron	mg/l	2.00	1.99	99.5 %
Dissolved Iron	mg/l	2.00	2.04	102. %
Dissolved Manganese	mg/l	0.800	0.824	103. %
Dissolved Manganese	mg/l	0.800	0.829	104. %
Dissolved Nickel	mg/l	0.800	0.793	99.1 %
Dissolved Nickel	mg/l	0.800	0.794	99.2 %

QC Summary for sample numbers: 20-A015244 to 20-A015251...

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
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	< 0.05
Chloride	mg/l	< 0.05
Ammonia Nitrogen	mg/l	< 1.02
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 Dissolved Solids	mg/l	< 1
Total Dissolved Solids	mg/l	< 1
Sulfate	mg/l	< 0.1
Sulfate	mg/l	< 0.1
Sulfate	mg/l	< 0.1
Sulfate	mg/l	< 0.1
Tannin and Lignin	mg/l	< 0.1
Tannin and Lignin	mg/l	< 0.1
Dissolved Arsenic	mg/l	< 0.005
Dissolved Arsenic	mg/l	< 0.005
Dissolved Barium	mg/l	< 0.005
Dissolved Barium	mg/l	< 0.005
Dissolved Iron	mg/l	< 0.05
Dissolved Iron	mg/l	< 0.05
Dissolved Manganese	mg/l	< 0.005
Dissolved Manganese	mg/l	< 0.005
Dissolved Nickel	mg/l	< 0.01
Dissolved Nickel	mg/l	< 0.01

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QC Summary for sample number: 20-A015605

DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	DUP VALUE	RPD
20-A015827	Total Organic Carbon	mg/l	1.8	1.8	0.00
20-A015878	Total Organic Carbon	mg/l	1.1	1.1	0.00
20-A015892	Total Organic Carbon	mg/l	7.7	7.9	2.6
20-A015264	Ammonia Nitrogen	mg/l	0.031	0.032	3.2
20-A015366	Ammonia Nitrogen	mg/l	0.253	0.255	0.79
20-A015396	Ammonia Nitrogen	mg/l	0.025	0.025	0.00
20-A015406	Ammonia Nitrogen	mg/l	0.048	0.045	6.5
20-A015416	Ammonia Nitrogen	mg/l	0.109	0.112	2.7
20-A015514	Ammonia Nitrogen	mg/l	0.050	0.050	0.00
20-A015611	Ammonia Nitrogen	mg/l	0.152	0.152	0.00
20-A015751	Ammonia Nitrogen	mg/l	< 0.02	< 0.02	
20-A015826	Ammonia Nitrogen	mg/l	0.085	0.088	3.5
20-A015879	Ammonia Nitrogen	mg/l	0.071	0.072	1.4
20-A015893	Ammonia Nitrogen	mg/l	< 0.02	< 0.02	
20-A015992	Ammonia Nitrogen	mg/l	33.2	33.1	0.30
20-A016008	Ammonia Nitrogen	mg/l	< 0.02	< 0.02	
20-A016036	Ammonia Nitrogen	mg/l	0.042	0.040	4.9
20-A015497	Total Dissolved Solids	mg/l	88.	85.	3.5
20-A015498	Total Dissolved Solids	mg/l	75.	79.	5.2
20-A015605	Sulfate	mg/l	0.15	0.15	0.00

MATRIX SPIKES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	SMPL+ SPK	SPK AMT	RECOVERY
20-A015828	Total Organic Carbon	mg/l	1.5	52.	50.	101.00 %
20-A015879	Total Organic Carbon	mg/l	1.7	50.	50.	96.60 %
20-A015893	Total Organic Carbon	mg/l	4.6	54.	50.	98.80 %
20-A015622	Chemical Oxygen Demand	mg/l	32.	130	100	98.00 %
20-A015622	Chemical Oxygen Demand	mg/l	32.	110	100	78.00 %
20-A015245	Chemical Oxygen Demand	mg/l	18.	130	100	112.00 %
20-A015245	Chemical Oxygen Demand	mg/l	18.	120	100	102.00 %
20-A015264	Ammonia Nitrogen	mg/l	0.031	1.02	1.00	98.90 %
20-A015366	Ammonia Nitrogen	mg/l	0.253	1.22	1.00	96.70 %
20-A015396	Ammonia Nitrogen	mg/l	0.025	0.943	1.00	91.80 %
20-A015406	Ammonia Nitrogen	mg/l	0.048	0.958	1.00	91.00 %
20-A015416	Ammonia Nitrogen	mg/l	0.109	1.08	1.00	97.10 %
20-A015514	Ammonia Nitrogen	mg/l	0.050	1.01	1.00	96.00 %
20-A015611	Ammonia Nitrogen	mg/l	0.152	1.14	1.00	98.80 %
20-A015751	Ammonia Nitrogen	mg/l	< 0.02	0.917	1.00	91.70 %
20-A015826	Ammonia Nitrogen	mg/l	0.085	1.14	1.00	105.50 %
20-A015879	Ammonia Nitrogen	mg/l	0.071	1.00	1.00	92.90 %

QC Summary for sample number: 20-A015605...

MATRIX SPIKES continued....

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	SMPL+ SPK	SPK AMT	RECOVERY
20-A015893	Ammonia Nitrogen	mg/l	< 0.02	0.988	1.00	98.80 %
20-A015992	Ammonia Nitrogen	mg/l	33.2	53.4	20.0	101.00 %
20-A016008	Ammonia Nitrogen	mg/l	< 0.02	0.938	1.00	93.80 %
20-A016036	Ammonia Nitrogen	mg/l	0.042	1.02	1.00	97.80 %
20-A015605	Sulfate	mg/l	0.15	2.33	2.00	109.00 %
20-A015247	Tannin and Lignin	mg/l	0.13	0.52	0.40	97.50 %
20-A015247	Tannin and Lignin	mg/l	0.13	0.51	0.40	95.00 %
20-A015928	Tannin and Lignin	mg/l	0.40	0.78	0.40	95.00 %
20-A015928	Tannin and Lignin	mg/l	0.40	0.76	0.40	90.00 %
20-A015605	Dissolved Arsenic	mg/l	0.105	1.08	1.00	97.50 %
20-A015605	Dissolved Arsenic	mg/l	0.105	1.08	1.00	97.50 %
20-A015605	Dissolved Barium	mg/l	0.0578	1.04	1.00	98.22 %
20-A015605	Dissolved Barium	mg/l	0.0578	1.04	1.00	98.22 %
20-A015605	Dissolved Iron	mg/l	85.9	92.7	6.00	113.33 %
20-A015605	Dissolved Iron	mg/l	85.9	92.9	6.00	116.67 %
20-A015605	Dissolved Manganese	mg/l	6.83	7.90	1.00	107.00 %
20-A015605	Dissolved Manganese	mg/l	6.83	7.92	1.00	109.00 %
20-A015605	Dissolved Nickel	mg/l	0.030	1.020	1.000	99.00 %
20-A015605	Dissolved Nickel	mg/l	0.030	1.015	1.000	98.50 %

MATRIX SPIKE DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE + SPK	MSD VALUE	RPD
Spike	Chemical Oxygen Demand	mg/l	130	110	17.
Spike	Chemical Oxygen Demand	mg/l	130	120	8.0
Spike	Tannin and Lignin	mg/l	0.52	0.51	1.9
Spike	Tannin and Lignin	mg/l	0.78	0.76	2.6
Spike	Dissolved Arsenic	mg/l	1.08	1.08	0.00
Spike	Dissolved Barium	mg/l	1.04	1.04	0.00
Spike	Dissolved Iron	mg/l	92.7	92.9	0.22
Spike	Dissolved Manganese	mg/l	7.90	7.92	0.25
Spike	Dissolved Nickel	mg/l	1.020	1.015	0.49

STANDARD REFERENCE MATERIALS

ANALYTE	UNITS	TRUE VALUE	MEASURED VALUE	RECOVERY
Total Organic Carbon	mg/l	25.	24.	96.0 %
Chemical Oxygen Demand	mg/l	100	91.	91.0 %
Chemical Oxygen Demand	mg/l	100	97.	97.0 %
Ammonia Nitrogen	mg/l	1.00	0.969	96.9 %
Ammonia Nitrogen	mg/l	1.00	0.986	98.6 %
Ammonia Nitrogen	mg/l	1.00	0.983	98.3 %
Total Dissolved Solids	mg/l	350	360	103. %
Sulfate	mg/l	2.00	2.07	104. %
Sulfate	mg/l	2.00	2.01	100. %
Tannin and Lignin	mg/l	0.80	0.73	91.2 %
Tannin and Lignin	mg/l	0.80	0.82	102. %
Dissolved Arsenic	mg/l	2.00	1.98	99.0 %
Dissolved Arsenic	mg/l	2.00	1.98	99.0 %
Dissolved Barium	mg/l	0.800	0.796	99.5 %
Dissolved Barium	mg/l	0.800	0.811	101. %
Dissolved Iron	mg/l	2.00	1.99	99.5 %

QC Summary for sample number: 20-A015605...

STANDARD REFERENCE MATERIALS continued....

ANALYTE	UNITS	TRUE VALUE	MEASURED VALUE	RECOVERY
Dissolved Iron	mg/l	2.00	2.04	102. %
Dissolved Manganese	mg/l	0.800	0.824	103. %
Dissolved Manganese	mg/l	0.800	0.829	104. %
Dissolved Nickel	mg/l	0.800	0.793	99.1 %
Dissolved Nickel	mg/l	0.800	0.794	99.2 %

BLANKS

ANALYTE	UNITS	RESULT
Total Organic Carbon	mg/l	< 0.5
Chemical Oxygen Demand	mg/l	< 10
Chemical Oxygen Demand	mg/l	< 10
Ammonia Nitrogen	mg/l	< 1.02
Ammonia Nitrogen	mg/l	< 0.02
Ammonia Nitrogen	mg/l	< 0.02
Total Dissolved Solids	mg/l	< 1
Sulfate	mg/l	< 0.1
Sulfate	mg/l	< 0.1
Tannin and Lignin	mg/l	< 0.1
Tannin and Lignin	mg/l	< 0.1
Dissolved Arsenic	mg/l	< 0.005
Dissolved Arsenic	mg/l	< 0.005
Dissolved Barium	mg/l	< 0.005
Dissolved Barium	mg/l	< 0.005
Dissolved Iron	mg/l	< 0.05
Dissolved Iron	mg/l	< 0.05
Dissolved Manganese	mg/l	< 0.005
Dissolved Manganese	mg/l	< 0.005
Dissolved Nickel	mg/l	< 0.01
Dissolved Nickel	mg/l	< 0.01

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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: 12/30/20
Date Reported: 1/19/21

AMTEST Identification Number **20-A020324**
Client Identification **BXS-3**
Sampling Date **12/29/20, 13:50**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	330	mg/l		1	SM 2540C	DM	01/05/21
Tannin and Lignin	53.	mg/l		0.2	SM 5550B	DM	12/31/20

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	8.8	mg/l		0.5	SM 5310B	NNL	01/18/21
Chemical Oxygen Demand	42.	mg/l		10	EPA 410.4	DM	01/14/21

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Sulfate	0.19	mg/l		0.1	EPA 300.0	KS	12/31/20

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.425	mg/l		0.02	EPA 350.1	KS	01/04/21

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 20-A020324

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	0.086	mg/l		0.005	EPA 200.7	JDR	01/04/21
Dissolved Barium	0.0470	mg/l		0.005	EPA 200.7	JDR	01/04/21
Dissolved Iron	67.1	mg/l		0.02	EPA 200.7	JDR	01/04/21
Dissolved Manganese	8.30	mg/l		0.005	EPA 200.7	JDR	01/04/21
Dissolved Nickel	0.029	mg/l		0.01	EPA 200.7	JDR	01/04/21

AMTEST Identification Number **20-A020325**
Client Identification **BXN-1**
Sampling Date **12/29/20, 14:50**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	500	mg/l		1	SM 2540C	DM	01/05/21
Tannin and Lignin	29.	mg/l		0.2	SM 5550B	DM	12/31/20

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	4.0	mg/l		0.5	SM 5310B	NNL	01/11/21
Chemical Oxygen Demand	< 10	mg/l		10	EPA 410.4	DM	12/30/20

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	133.	mg/l		0.05	EPA 300.0	KS	01/13/21
Sulfate	8.82	mg/l		0.1	EPA 300.0	KS	12/31/20

Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.323	mg/l		0.02	EPA 350.1	KS	01/04/21
Total Nitrate + Nitrite	< 0.02	mg/l		0.02	EPA 353.2	KS	01/06/21

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 20-A020325

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	0.026	mg/l		0.005	EPA 200.7	JDR	01/04/21
Dissolved Barium	0.0626	mg/l		0.005	EPA 200.7	JDR	01/04/21
Dissolved Iron	40.2	mg/l		0.02	EPA 200.7	JDR	01/04/21
Dissolved Manganese	6.10	mg/l		0.005	EPA 200.7	JDR	01/04/21
Dissolved Nickel	0.045	mg/l		0.01	EPA 200.7	JDR	01/04/21

AMTEST Identification Number **20-A020326**
Client Identification **BXN-101**
Sampling Date **12/29/20, 14:55**

Conventionals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Dissolved Solids	520	mg/l		1	SM 2540C	DM	01/05/21
Tannin and Lignin	29.	mg/l		0.2	SM 5550B	DM	12/31/20

Demand

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Total Organic Carbon	4.5	mg/l		0.5	SM 5310B	NNL	01/11/21
Chemical Oxygen Demand	15.	mg/l		10	EPA 410.4	DM	12/30/20

Minerals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Chloride	131.	mg/l		0.05	EPA 300.0	KS	01/13/21
Sulfate	8.86	mg/l		0.1	EPA 300.0	KS	12/31/20

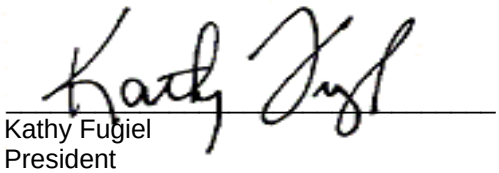
Nutrients

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Ammonia Nitrogen	0.323	mg/l		0.02	EPA 350.1	KS	01/04/21
Total Nitrate + Nitrite	< 0.02	mg/l		0.02	EPA 353.2	KS	01/06/21

KVAM AQUATIC SCIENCES LLC
Project Name: ARLINGTON GROUNDWATER
AmTest ID: 20-A020326

Dissolved Metals

PARAMETER	RESULT	UNITS	Q	D.L.	METHOD	ANALYST	DATE
Dissolved Arsenic	0.027	mg/l		0.005	EPA 200.7	JDR	01/04/21
Dissolved Barium	0.0663	mg/l		0.005	EPA 200.7	JDR	01/04/21
Dissolved Iron	41.9	mg/l		0.02	EPA 200.7	JDR	01/04/21
Dissolved Manganese	6.31	mg/l		0.005	EPA 200.7	JDR	01/04/21
Dissolved Nickel	0.047	mg/l		0.01	EPA 200.7	JDR	01/04/21



Kathy Fugiel
President

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QC Summary for sample numbers: 20-A020324 to 20-A020326

DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	DUP VALUE	RPD
21-A000192	Total Organic Carbon	mg/l	6.3	7.0	11.
21-A000209	Total Organic Carbon	mg/l	0.70	0.76	8.2
21-A000262	Total Organic Carbon	mg/l	< 0.5	< 0.5	
21-A000337	Total Organic Carbon	mg/l	2.3	1.9	19.
21-A000339	Total Organic Carbon	mg/l	10.	10.	0.00
21-A000290	Total Organic Carbon	mg/l	9.1	9.3	2.2
21-A000603	Total Organic Carbon	mg/l	8.3	8.5	2.4
21-A000334	Chloride	mg/l	5.51	5.52	0.18
20-A020382	Ammonia Nitrogen	mg/l	0.052	0.053	1.9
20-A020360	Total Nitrate + Nitrite	mg/l	< 0.02	< 0.02	
20-A020278	Total Dissolved Solids	mg/l	33.	36.	8.7
20-A020324	Total Dissolved Solids	mg/l	330	350	5.9
20-A020287	Sulfate	mg/l	2.43	2.42	0.41

MATRIX SPIKES

SAMPLE #	ANALYTE	UNITS	SAMPLE VALUE	SMPL+ SPK	SPK AMT	RECOVERY
21-A000193	Total Organic Carbon	mg/l	4.8	53.	50.	96.40 %
21-A000210	Total Organic Carbon	mg/l	< 0.5	48.	50.	96.00 %
21-A000328	Total Organic Carbon	mg/l	4.8	56.	50.	102.40 %
21-A000338	Total Organic Carbon	mg/l	5.0	51.	50.	92.00 %
21-A000340	Total Organic Carbon	mg/l	8.7	61.	50.	104.60 %
21-A000290	Total Organic Carbon	mg/l	9.1	61.	50.	103.80 %
21-A000604	Total Organic Carbon	mg/l	< 0.5	51.	50.	102.00 %
20-A020095	Chemical Oxygen Demand	mg/l	< 10	92.	100	92.00 %
20-A020095	Chemical Oxygen Demand	mg/l	< 10	85.	100	85.00 %
20-A020205	Chemical Oxygen Demand	mg/l	18.	120	100	102.00 %
20-A020205	Chemical Oxygen Demand	mg/l	18.	100	100	82.00 %
21-A000334	Chloride	mg/l	5.51	7.26	2.00	87.50 %
20-A020382	Ammonia Nitrogen	mg/l	0.052	0.984	1.00	93.20 %
20-A020360	Total Nitrate + Nitrite	mg/l	< 0.02	0.96	1.0	96.00 %
20-A020287	Sulfate	mg/l	2.43	4.39	2.00	98.00 %
20-A020202	Tannin and Lignin	mg/l	0.23	0.72	0.40	122.50 %
20-A020202	Tannin and Lignin	mg/l	0.23	0.78	0.40	137.50 %
20-A020087	Dissolved Barium	mg/l	0.0063	0.988	1.00	98.17 %
20-A020087	Dissolved Barium	mg/l	0.0063	0.995	1.00	98.87 %

QC Summary for sample numbers: 20-A020324 to 20-A020326...

MATRIX SPIKE DUPLICATES

SAMPLE #	ANALYTE	UNITS	SAMPLE + SPK	MSD VALUE	RPD
Spike	Chemical Oxygen Demand	mg/l	92.	85.	7.9
Spike	Chemical Oxygen Demand	mg/l	120	100	18.
Spike	Tannin and Lignin	mg/l	0.72	0.78	8.0
Spike	Dissolved Barium	mg/l	0.988	0.995	0.71

STANDARD REFERENCE MATERIALS

ANALYTE	UNITS	TRUE VALUE	MEASURED VALUE	RECOVERY
Total Organic Carbon	mg/l	25.	23.	92.0 %
Total Organic Carbon	mg/l	25.	25.	100. %
Total Organic Carbon	mg/l	25.	26.	104. %
Total Organic Carbon	mg/l	25.	26.	104. %
Total Organic Carbon	mg/l	25.	26.	104. %
Chemical Oxygen Demand	mg/l	100	100	100. %
Chemical Oxygen Demand	mg/l	100	100	100. %
Chloride	mg/l	2.00	1.89	94.5 %
Chloride	mg/l	2.00	1.85	92.5 %
Ammonia Nitrogen	mg/l	1.00	1.02	102. %
Total Nitrate + Nitrite	mg/l	1.0	0.99	99.0 %
Total Dissolved Solids	mg/l	350	360	103. %
Total Dissolved Solids	mg/l	350	350	100. %
Sulfate	mg/l	2.00	1.93	96.5 %
Sulfate	mg/l	2.00	1.92	96.0 %
Tannin and Lignin	mg/l	0.80	0.78	97.5 %
Dissolved Arsenic	mg/l	2.00	2.05	102. %
Dissolved Arsenic	mg/l	2.00	2.03	102. %
Dissolved Barium	mg/l	0.800	0.813	102. %
Dissolved Barium	mg/l	0.800	0.797	99.6 %
Dissolved Iron	mg/l	2.00	2.06	103. %
Dissolved Iron	mg/l	2.00	2.00	100. %
Dissolved Manganese	mg/l	0.800	0.796	99.5 %
Dissolved Manganese	mg/l	0.800	0.782	97.8 %
Dissolved Nickel	mg/l	0.800	0.819	102. %
Dissolved Nickel	mg/l	0.800	0.812	102. %

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
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
Ammonia Nitrogen	mg/l	< 0.02
Total Nitrate + Nitrite	mg/l	< 0.02

QC Summary for sample numbers: 20-A020324 to 20-A020326...

BLANKS continued....

ANALYTE	UNITS	RESULT
Total Dissolved Solids	mg/l	< 1
Total Dissolved Solids	mg/l	< 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 Arsenic	mg/l	< 0.005
Dissolved Barium	mg/l	< 0.005
Dissolved Barium	mg/l	< 0.005
Dissolved Iron	mg/l	< 0.005
Dissolved Iron	mg/l	< 0.005
Dissolved Manganese	mg/l	< 0.005
Dissolved Manganese	mg/l	< 0.005
Dissolved Nickel	mg/l	< 0.01
Dissolved Nickel	mg/l	< 0.01

Appendix C

Statistical Analysis of Groundwater Data

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

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

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

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

BXN-4 (Upgradient Well)				
Date	Ammonia Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
11/17/2014	7.34	--	--	--
2/25/2015	8.40	--	--	--
9/14/2015	13.40	--	--	--
12/7/2015	0.03	4	7.29	30.449
2/29/2016	5.69	4	6.88	31.076
6/6/2016	6.25	4	6.34	30.051
9/26/2016	8.78	4	5.19	13.646
3/9/2017	6.08	4	6.70	1.978
6/11/2017	--	3	7.04	2.287
9/17/2017	9.30	3	8.05	2.988
12/14/2017	--	2	7.69	5.184
3/18/2018	3.8	2	6.55	15.125
6/16/2018	--	2	6.55	15.125
9/30/2018	7.1	2	5.45	5.445
11/18/2018	--	2	5.45	5.445
3/17/2019	3.38	2	5.24	6.919
6/1/2019	--	2	5.24	6.919
10/12/2019	0.15	2	1.77	5.216
12/22/2019	--	2	1.77	5.216
4/1/2020	0.03	2	0.09	0.007
6/26/2020	--	2	0.09	0.007
9/22/2020	0.56	2	0.30	0.140
12/29/2020	--	2	0.30	0.140

BXN-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	0.025	--	--	--	--	--
2/25/2015	0.025	--	--	--	--	--
9/14/2015	0.03	--	--	--	--	--
12/7/2015	0.02	4	0.02	0.000	0.00	-2.63
2/29/2016	0.03	4	0.02	0.000	0.00	-2.46
6/6/2016	0.03	4	0.02	0.000	0.00	-2.30
9/26/2016	0.03	4	0.02	0.000	0.00	-2.79
3/9/2017	0.03	4	0.03	0.000	0.00	-9.49
6/11/2017	--	3	0.03	0.000	0.00	-8.03
9/17/2017	0.03	3	0.03	0.000	0.00	-8.04
12/14/2017	--	2	0.03	0.000	0.00	-4.76
3/18/2018	0.01	2	0.02	0.000	0.01	-2.38
6/16/2018	--	2	0.02	0.000	0.01	-2.38
9/30/2018	0.15	2	0.08	0.010	0.10	-3.25
11/18/2018	--	2	0.08	0.010	0.10	-3.25
3/17/2019	0.01	2	0.08	0.010	0.10	-2.77
6/1/2019	--	2	0.08	0.010	0.10	-2.77
10/12/2019	0.03	2	0.02	0.000	0.01	-1.08
12/22/2019	--	2	0.02	0.000	0.01	-1.08
4/1/2020	0.02	2	0.03	0.000	0.01	-1.08
6/26/2020	--	2	0.03	0.000	0.01	-1.08
9/22/2020	0.02	2	0.02	0.000	0.00	-1.04
12/29/2020	--	2	0.02	0.000	0.00	-1.04

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

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

BXN-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	0.405	--	--	--	--	--
2/25/2015	0.262	--	--	--	--	--
9/14/2015	0.46	--	--	--	--	--
12/7/2015	0.025	4	0.29	0.038	0.19	-2.54
2/29/2016	0.264	4	0.25	0.032	0.18	**-2.38**
6/6/2016	0.084	4	0.21	0.039	0.20	**-2.24**
9/26/2016	0.454	4	0.21	0.038	0.19	-2.69
3/9/2017	0.11	4	0.23	0.029	0.17	-9.14
6/11/2017	0.13	4	0.19	0.030	0.17	-7.80
9/17/2017	2.27	4	0.74	1.064	1.03	-6.51
12/14/2017	0.556	4	0.77	1.047	1.02	-4.10
3/18/2018	0.4	4	0.84	0.941	0.97	**-2.05**
6/16/2018	0.18	4	0.85	0.918	0.96	**-2.04**
9/30/2018	0.68	4	0.45	0.046	0.22	-3.02
11/18/2018	0.58	4	0.46	0.048	0.22	-3.02
3/17/2019	0.25	4	0.42	0.060	0.24	**-2.58**
6/1/2019	0.04	4	0.39	0.087	0.30	**-2.60**
10/12/2019	0.14	4	0.25	0.055	0.23	-0.93
12/22/2019	0.13	4	0.14	0.007	0.09	-1.01
4/1/2020	0.88	4	0.30	0.153	0.39	1.01
6/26/2020	0.355	4	0.38	0.124	0.35	1.54
9/22/2020	0.3	4	0.42	0.105	0.32	0.39
12/29/2020	0.32	4	0.46	0.078	0.28	0.56

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 North Woodwaste Landfill. *Arlington, Washington*

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

$t_c = 2.571$ $v = 5$

$t_c = 2.776$ $v = 4$

$t_c = 3.182$ $v = 3$

$t_c = 4.303$ $v = 2$

$t_c = 12.706$ $v = 1$

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

BXN-4 (Upgradient Well)				
Date	Chloride Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
11/17/2014	17.60	--	--	--
2/25/2015	10.20	--	--	--
9/14/2015	51.70	--	--	--
12/7/2015	24.50	4	26.00	327.647
2/29/2016	6.52	4	23.23	420.386
6/6/2016	27.00	4	27.43	345.010
9/26/2016	37.80	4	23.96	168.411
3/9/2017	13.20	4	21.13	196.228
6/11/2017	--	3	26.00	152.040
9/17/2017	22.40	3	24.47	154.493
12/14/2017	--	2	17.80	42.320
3/18/2018	10.7	2	16.55	68.445
6/16/2018	--	2	16.55	68.445
9/30/2018	37.5	2	24.10	359.120
11/18/2018	--	2	24.10	359.120
3/17/2019	12.5	2	25.00	312.500
6/1/2019	--	2	25.00	312.500
10/12/2019	4.4	2	8.45	32.805
12/22/2019	--	2	8.45	32.805
4/1/2020	13.1	2	8.75	37.845
6/26/2020	--	2	8.75	37.845
9/22/2020	7.2	2	10.15	17.405
12/29/2020	--	2	10.15	17.405

BXN-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	5.84	--	--	--	--	--
2/25/2015	9.10	--	--	--	--	--
9/14/2015	5.16	--	--	--	--	--
12/7/2015	3.54	4	5.91	5.453	2.34	-2.20
2/29/2016	7.97	4	6.44	6.488	2.55	-1.84
6/6/2016	6.27	4	5.74	3.477	1.86	-2.38
9/26/2016	7.05	4	6.21	3.645	1.91	-1.95
3/9/2017	7.32	4	7.15	0.495	0.70	-1.99
6/11/2017	--	3	6.88	0.297	0.55	-2.68
9/17/2017	5.47	3	6.61	0.999	1.00	-2.48
12/14/2017	--	2	6.40	1.711	1.31	-2.43
3/18/2018	4.8	2	5.14	0.224	0.47	-1.95
6/16/2018	--	2	5.14	0.224	0.47	-1.95
9/30/2018	5.1	2	4.95	0.045	0.21	-1.43
11/18/2018	--	2	4.95	0.045	0.21	-1.43
3/17/2019	5.6	2	5.35	0.125	0.35	-1.57
6/1/2019	--	2	5.35	0.125	0.35	-1.57
10/12/2019	22.2	2	13.90	137.780	11.74	0.59
12/22/2019	--	2	13.90	137.780	11.74	0.59
4/1/2020	6.78	2	14.49	118.888	10.90	0.65
6/26/2020	--	2	14.49	118.888	10.90	0.65
9/22/2020	22.5	2	14.64	123.559	11.12	0.53
12/29/2020	--	2	14.64	123.559	11.12	0.53

Table C-2. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Chloride
Former J.H. Baxter North Woodwaste Landfill. *Arlington, Washington*

BXN-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	36.50	--	--	--	--	--
2/25/2015	50.60	--	--	--	--	--
9/14/2015	15.40	--	--	--	--	--
12/7/2015	9.11	4	27.90	366.188	19.14	0.14
2/29/2016	6.54	4	20.41	418.868	20.47	-0.21
6/6/2016	6.29	4	9.34	17.973	4.24	-1.95
9/26/2016	9.97	4	7.98	3.389	1.84	-1.76
3/9/2017	9.55	4	8.09	3.769	1.94	-1.84
6/11/2017	5.75	4	7.89	4.741	2.18	-2.51
9/17/2017	3.25	4	7.13	10.294	3.21	-2.36
12/14/2017	26.2	4	11.19	106.876	10.34	-0.96
3/18/2018	2.3	4	9.38	127.931	11.31	-0.88
6/16/2018	7.8	4	9.88	124.069	11.14	-0.83
9/30/2018	10.5	4	11.69	105.165	10.25	-0.86
11/18/2018	38.7	4	14.82	265.123	16.28	-0.59
3/17/2019	19	4	18.99	195.484	13.98	-0.42
6/1/2019	11.1	4	19.83	173.343	13.17	-0.37
10/12/2019	27	4	23.95	138.830	11.78	2.17
12/22/2019	18.6	4	18.93	42.183	6.49	2.02
4/1/2020	5.68	4	15.60	85.872	9.27	1.08
6/26/2020	27.85	4	19.78	105.819	10.29	1.64
9/22/2020	27	4	19.78	105.819	10.29	1.62
12/29/2020	132	4	48.13	3231.312	56.84	1.33

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

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

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

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

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

BXN-4 (Upgradient Well)				
Date	TOC Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
11/17/2014	3.93	--	--	--
2/25/2015	3.71	--	--	--
9/14/2015	7.86	--	--	--
12/7/2015	4.93	4	5.11	3.649
2/29/2016	3.22	4	4.93	4.332
6/6/2016	7.96	4	5.99	5.391
9/26/2016	8.61	4	5.83	4.601
3/9/2017	4.10	4	6.01	5.506
6/11/2017	--	3	6.71	4.088
9/17/2017	6.18	3	6.30	5.095
12/14/2017	--	2	5.14	2.163
3/18/2018	5.20	2	5.69	0.480
6/16/2018	--	2	5.69	0.480
9/30/2018	4.30	2	4.75	0.405
11/18/2018	--	2	4.75	0.405
3/17/2019	3.40	2	4.30	0.810
6/1/2019	--	2	4.30	0.810
10/12/2019	1.80	2	3.68	2.103
12/22/2019	--	2	3.68	2.103
4/1/2020	26	2	8.14	101.258
6/26/2020	--	2	8.14	101.258
9/22/2020	3.2	2	7.32	85.074
12/29/2020	--	2	7.32	85.074

BXN-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	1.48	--	--	--	--	--
2/25/2015	2.29	--	--	--	--	--
9/14/2015	1.70	--	--	--	--	--
12/7/2015	1.09	4	1.64	0.251	0.50	-3.51
2/29/2016	1.81	4	1.72	0.243	0.49	-3.00
6/6/2016	1.03	4	1.41	0.164	0.40	-3.89
9/26/2016	1.55	4	1.37	0.140	0.37	-4.10
3/9/2017	3.20	4	1.90	0.859	0.93	-3.26
6/11/2017	--	3	1.93	1.284	1.13	-3.58
9/17/2017	1.66	3	2.14	0.851	0.92	-2.95
12/14/2017	--	2	2.43	1.186	1.09	-2.09
3/18/2018	42	2	21.83	813.658	28.52	0.80
6/16/2018	--	2	21.83	813.658	28.52	0.80
9/30/2018	1.3	2	21.65	828.245	28.78	0.83
11/18/2018	--	2	21.65	828.245	28.78	0.83
3/17/2019	1.3	2	1.30	0.000	0.00	-4.71
6/1/2019	--	2	1.30	0.000	0.00	-4.71
10/12/2019	0.97	2	1.14	0.054	0.23	-2.45
12/22/2019	--	2	1.14	0.054	0.23	-2.45
4/1/2020	0.97	2	0.97	0.000	0.00	-1.01
6/26/2020	--	2	0.97	0.000	0.00	-1.01
9/22/2020	1.2	2	1.09	0.026	0.16	-0.96
12/29/2020	--	2	1.09	0.026	0.16	-0.96

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

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

BXN-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	5.21	--	--	--	--	--
2/25/2015	5.49	--	--	--	--	--
9/14/2015	4.10	--	--	--	--	--
12/7/2015	3.82	4	4.66	0.670	0.82	-0.44
2/29/2016	17.00	4	7.60	39.783	6.31	0.80
6/6/2016	3.20	4	7.03	44.320	6.66	0.29
9/26/2016	7.47	4	7.87	40.576	6.37	0.61
3/9/2017	5.02	4	8.17	37.694	6.14	0.66
6/11/2017	3.41	4	4.78	3.889	1.97	-1.27
9/17/2017	175.00	4	47.73	7202.31	84.87	0.98
12/14/2017	27.00	4	52.61	6773.54	82.30	1.15
3/18/2018	42	4	61.85	5942.23	77.09	1.46
6/16/2018	48	4	73.00	4702.00	68.57	1.96
9/30/2018	15	4	33.00	222.00	14.90	**3.79**
11/18/2018	6.9	4	27.98	403.40	20.08	2.31
3/17/2019	9	4	19.80	364.98	19.10	1.62
6/1/2019	8.1	4	9.83	12.86	3.59	**2.90**
10/12/2019	4.2	4	7.13	4.76	2.18	2.30
12/22/2019	3.8	4	6.35	7.63	2.76	1.56
4/1/2020	16	4	8.03	32.03	5.66	-0.02
6/26/2020	13	4	9.25	38.28	6.19	0.14
9/22/2020	17	4	12.45	36.14	6.01	0.71
12/29/2020	4.25	4	12.56	33.60	5.80	0.74

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 North Woodwaste Landfill. *Arlington, Washington*

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

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

BXN-4 (Upgradient Well)				
Date	COD Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
11/17/2014	11.6	--	--	--
2/25/2015	10.8	--	--	--
9/14/2015	22.5	--	--	--
12/7/2015	16.0	4	15.23	28.749
2/29/2016	8.6	4	14.48	38.249
6/6/2016	24.8	4	17.98	52.949
9/26/2016	27.1	4	19.13	72.116
3/9/2017	3.3	4	15.95	138.897
6/11/2017	--	3	18.40	172.330
9/17/2017	16.5	3	15.63	142.173
12/14/2017	--	2	9.90	87.120
3/18/2018	10	2	13.25	21.125
6/16/2018	--	2	13.25	21.125
9/30/2018	16	2	13.00	18.000
11/18/2018	--	2	13.00	18.000
3/17/2019	10	2	13.00	18.000
6/1/2019	--	2	13.00	18.000
10/12/2019	10	2	10.00	0.000
12/22/2019	--	2	10.00	0.000
4/1/2020	15	2	12.50	12.500
6/26/2020	--	2	12.50	12.500
9/22/2020	10	2	12.50	12.500
12/29/2020	--	2	12.50	12.500

BXN-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	2.5	--	--	--	--	--
2/25/2015	7.9	--	--	--	--	--
9/14/2015	3.8	--	--	--	--	--
12/7/2015	5.8	4	5.00	5.580	2.36	-3.49
2/29/2016	3.2	4	5.83	4.203	2.05	-2.65
6/6/2016	2.5	4	4.80	2.000	1.41	-3.55
9/26/2016	4.7	4	4.05	2.203	1.48	-3.50
3/9/2017	5.0	4	3.85	1.430	1.20	-2.04
6/11/2017	--	3	4.07	1.863	1.37	-1.88
9/17/2017	4.1	3	4.60	0.210	0.46	-1.60
12/14/2017	--	2	4.55	0.405	0.64	-0.81
3/18/2018	10	2	7.05	17.405	4.17	-1.41
6/16/2018	--	2	7.05	17.405	4.17	-1.41
9/30/2018	10	2	10.00	0.000	0.00	-1.00
11/18/2018	--	2	10.00	0.000	0.00	-1.00
3/17/2019	10	2	10.00	0.000	0.00	-1.00
6/1/2019	--	2	10.00	0.000	0.00	-1.00
10/12/2019	10	2	10.00	0.000	0.00	*
12/22/2019	--	2	10.00	0.000	0.00	*
4/1/2020	10	2	10.00	0.000	0.00	-1.00
6/26/2020	--	2	10.00	0.000	0.00	-1.00
9/22/2020	10	2	10.00	0.000	0.00	-1.00
12/29/2020	--	2	10.00	0.000	0.00	-1.00

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

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

BXN-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	19.7	--	--	--	--	--
2/25/2015	19.9	--	--	--	--	--
9/14/2015	18.7	--	--	--	--	--
12/7/2015	15.5	4	18.45	4.143	2.04	1.12
2/29/2016	62.4	4	29.13	495.549	22.26	1.27
6/6/2016	13.2	4	27.45	547.977	23.41	0.77
9/26/2016	29.7	4	30.20	514.060	22.67	0.91
3/9/2017	11.6	4	29.23	556.083	23.58	1.01
6/11/2017	4.8	4	14.83	111.603	10.56	-0.39
9/17/2017	964.0	4	252.53	225086.73	474.43	1.00
12/14/2017	38.0	4	254.60	223870.99	473.15	1.03
3/18/2018	76	4	270.70	214475.03	463.11	1.11
6/16/2018	46	4	281.00	207596.00	455.63	1.18
9/30/2018	49	4	52.25	272.25	16.50	**4.47**
11/18/2018	10	4	45.25	734.25	27.10	2.32
3/17/2019	10	4	28.75	470.25	21.69	1.40
6/1/2019	8.1	4	19.28	393.50	19.84	0.61
10/12/2019	20.6	4	12.18	32.35	5.69	0.76
12/22/2019	10	4	12.18	32.35	5.69	0.76
4/1/2020	63	4	25.43	657.75	25.65	0.99
6/26/2020	43	4	34.15	559.16	23.65	1.79
9/22/2020	71	4	46.75	738.92	27.18	2.48
12/29/2020	12.5	4	47.38	679.23	26.06	2.63

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-5. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Nitrate + Nitrite as Nitrogen

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

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

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

BXN-4 (Upgradient Well)				
Date	$NO_3 + NO_2$ Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
11/17/2014	8.36	--	--	--
2/25/2015	6.90	--	--	--
9/14/2015	12.30	--	--	--
12/7/2015	17.10	4	11.17	20.857
2/29/2016	3.62	4	9.98	35.338
6/6/2016	0.85	4	8.47	56.906
9/26/2016	10.30	4	7.97	52.796
3/9/2017	5.00	4	4.94	15.732
6/11/2017	--	3	5.38	22.431
9/17/2017	9.55	3	8.28	8.226
12/14/2017	--	2	7.28	10.351
3/18/2018	14	2	11.78	9.901
6/16/2018	--	2	11.78	9.901
9/30/2018	21	2	17.50	24.500
11/18/2018	--	2	17.50	24.500
3/17/2019	21	2	21.00	0.000
6/1/2019	--	2	21.00	0.000
10/12/2019	2.3	2	11.65	174.845
12/22/2019	--	2	11.65	174.845
4/1/2020	31	2	16.65	411.845
6/26/2020	--	2	16.65	411.845
9/22/2020	3.6	2	17.30	375.380
12/29/2020	--	2	17.30	375.380

BXN-2 (Downgradient Well)						
Date	$NO_3 + NO_2$ 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	2.340	--	--	--	--	--
2/25/2015	0.617	--	--	--	--	--
9/14/2015	2.760	--	--	--	--	--
12/7/2015	1.970	4	1.92	0.861	0.93	-3.97
2/29/2016	1.160	4	1.63	0.880	0.94	-3.58
6/6/2016	1.470	4	1.84	0.488	0.70	-2.87
9/26/2016	1.860	4	1.62	0.138	0.37	-2.77
3/9/2017	0.650	4	1.29	0.261	0.51	-1.83
6/11/2017	--	3	1.33	0.381	0.62	-1.47
9/17/2017	2.020	3	1.51	0.561	0.75	-3.96
12/14/2017	--	2	1.34	0.938	0.97	-2.50
3/18/2018	1.8	2	1.91	0.024	0.16	-4.43
6/16/2018	--	2	1.91	0.024	0.16	-4.43
9/30/2018	2.4	2	2.10	0.180	0.42	-4.38
11/18/2018	--	2	2.10	0.180	0.42	-4.38
3/17/2019	2	2	2.20	0.080	0.28	-94.00
6/1/2019	--	2	2.20	0.080	0.28	-94.00
10/12/2019	1.9	2	1.95	0.005	0.07	-1.04
12/22/2019	--	2	1.95	0.005	0.07	-1.04
4/1/2020	1.4	2	1.65	0.125	0.35	-1.05
6/26/2020	--	2	1.65	0.125	0.35	-1.05
9/22/2020	1.7	2	1.55	0.045	0.21	-1.15
12/29/2020	--	2	1.55	0.045	0.21	-1.15

Table C-5. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Nitrate + Nitrite as Nitrogen

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

BXN-1 (Downgradient Well)						
Date	**$NO_3 + NO_2$ 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	0.025	--	--	--	--	--
2/25/2015	0.025	--	--	--	--	--
9/14/2015	0.032	--	--	--	--	--
12/7/2015	0.050	4	0.03	0.000	0.01	-4.88
2/29/2016	0.050	4	0.04	0.000	0.01	-4.35
6/6/2016	0.050	4	0.05	0.000	0.01	-3.69
9/26/2016	0.034	4	0.05	0.000	0.01	-3.47
3/9/2017	0.045	4	0.04	0.000	0.01	-2.47
6/11/2017	0.050	4	0.04	0.000	0.01	**-1.95**
9/17/2017	0.096	4	0.06	0.001	0.03	-4.97
12/14/2017	0.005	4	0.05	0.001	0.04	-3.18
3/18/2018	0.058	4	0.05	0.001	0.04	-5.27
6/16/2018	0.005	4	0.04	0.002	0.04	-5.27
9/30/2018	0.005	4	0.02	0.001	0.03	-4.99
11/18/2018	0.005	4	0.02	0.001	0.03	-4.99
3/17/2019	0.020	4	0.01	0.000	0.01	-5597.67
6/1/2019	0.020	4	0.01	0.000	0.01	-4846.86
10/12/2019	0.020	4	0.02	0.000	0.01	**-1.24**
12/22/2019	0.210	4	0.07	0.009	0.10	**-1.24**
4/1/2020	0.060	4	0.08	0.008	0.09	**-1.15**
6/26/2020	1.190	4	0.37	0.306	0.55	**-1.13**
9/22/2020	0.020	4	0.37	0.306	0.55	**-1.24**
12/29/2020	0.020	4	0.32	0.335	0.58	**-1.24**

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-6. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Field pH

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

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

$t_c = 2.571$ $v = 5$

$t_c = 2.776$ $v = 4$

$t_c = 3.182$ $v = 3$

$t_c = 4.303$ $v = 2$

$t_c = 12.706$ $v = 1$

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

BXN-4 (Upgradient Well)				
Date	pH Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
11/17/2014	6.41	--	--	--
2/25/2015	6.32	--	--	--
9/14/2015	6.39	--	--	--
12/7/2015	6.28	4	6.35	0.004
2/29/2016	6.45	4	6.36	0.006
6/6/2016	6.37	4	6.37	0.005
9/26/2016	6.42	4	6.38	0.006
3/9/2017	6.64	4	6.47	0.014
6/11/2017	--	3	6.48	0.021
9/17/2017	--	2	6.53	0.024
12/14/2017	--	1	6.64	#DIV/0!
3/18/2018	6.27	1	6.27	#DIV/0!
6/16/2018	--	1	6.27	#DIV/0!
9/30/2018	5.91	2	6.09	0.065
11/18/2018	--	2	6.09	0.065
3/17/2019	6.19	2	6.05	0.039
6/1/2019	--	2	6.05	0.039
10/12/2019	8.09	2	7.14	1.805
12/22/2019	--	2	7.14	1.805
4/1/2020	6.32	2	7.21	1.566
6/26/2020	--	2	7.21	1.566
9/22/2020	6.13	2	6.23	0.018
12/29/2020	--	2	6.23	0.018

BXN-2 (Downgradient Well)						
Date	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	6.78	--	--	--	--	--
2/25/2015	6.34	--	--	--	--	--
9/14/2015	6.62	--	--	--	--	--
12/7/2015	6.26	4	6.50	0.059	0.24	1.20
2/29/2016	6.71	4	6.48	0.047	0.22	1.09
6/6/2016	6.80	4	6.60	0.056	0.24	1.84
9/26/2016	6.64	4	6.60	0.056	0.24	1.82
3/9/2017	6.54	4	6.67	0.012	0.11	**2.51**
6/11/2017	--	3	6.66	0.017	0.13	1.63
9/17/2017	--	2	6.59	0.005	0.07	0.50
12/14/2017	--	1	6.54	#DIV/0!	#DIV/0!	*
3/18/2018	6.52	1	6.52	#DIV/0!	#DIV/0!	*
6/16/2018	--	1	6.52	#DIV/0!	#DIV/0!	*
9/30/2018	6.01	2	6.27	0.130	0.36	0.56
11/18/2018	--	2	6.27	0.130	0.36	0.56
3/17/2019	6.3	2	6.16	0.042	0.21	0.52
6/1/2019	--	2	6.16	0.042	0.21	0.52
10/12/2019	8.14	2	7.22	1.693	1.30	0.06
12/22/2019	--	2	7.22	1.693	1.30	0.06
4/1/2020	6.52	2	7.33	1.312	1.15	0.10
6/26/2020	--	2	7.33	1.312	1.15	0.10
9/22/2020	6.33	2	6.43	0.018	0.13	1.49
12/29/2020	--	2	6.43	0.018	0.13	1.49

Table C-6. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Field pH

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

BXN-1 (Downgradient Well)						
Date	**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	6.36	--	--	--	--	--
2/25/2015	6.26	--	--	--	--	--
9/14/2015	6.16	--	--	--	--	--
12/7/2015	6.12	4	6.23	0.012	0.11	-2.03
2/29/2016	6.29	4	6.21	0.006	0.08	-3.03
6/6/2016	6.64	4	6.30	0.056	0.24	-0.57
9/26/2016	6.53	4	6.40	0.055	0.23	0.12
3/9/2017	6.49	4	6.49	0.021	0.15	0.19
6/11/2017	6.49	4	6.54	0.005	0.07	0.67
9/17/2017	--	3	6.50	0.001	0.02	-0.24
12/14/2017	6.46	3	6.48	0.000	0.02	*
3/18/2018	6.43	4	6.46	0.001	0.03	*
6/16/2018	6.46	4	6.45	0.000	0.02	*
9/30/2018	6.00	4	6.34	0.051	0.23	1.17
11/18/2018	6.48	4	6.34	0.053	0.23	1.18
3/17/2019	6.27	4	6.30	0.050	0.22	1.41
6/1/2019	6.23	4	6.25	0.039	0.20	1.14
10/12/2019	7.99	4	6.74	0.704	0.84	-0.38
12/22/2019	6.12	4	6.65	0.799	0.89	-0.46
4/1/2020	6.42	4	6.69	0.766	0.88	-0.52
6/26/2020	6.31	4	6.71	0.744	0.86	-0.50
9/22/2020	6.36	4	6.30	0.017	0.13	0.67
12/29/2020	5.63	4	6.18	0.136	0.37	-0.22

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-7. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Total Dissolved Solids (TDS)

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

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

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

BXN-4 (Upgradient Well)				
Date	TDS Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
9/29/2014	8530	--	--	--
2/25/2015	352	--	--	--
9/14/2015	485	--	--	--
12/7/2015	470	4	2459.25	16383095.583
2/29/2016	275	4	395.50	9991.000
6/6/2016	314	4	386.00	11454.000
9/26/2016	432	4	372.75	8658.250
3/9/2017	--	3	340.33	6682.333
6/11/2017	--	2	373.00	6962.000
9/17/2017	377.5	2	404.75	1485.125
12/14/2017	--	1	377.50	#DIV/0!
3/18/2018	200	2	288.75	15753.125
6/16/2018	--	2	288.75	15753.125
9/30/2018	280	2	240.00	3200.000
11/18/2018	--	2	240.00	3200.000
3/17/2019	490	2	385.00	22050.000
6/1/2019	--	2	385.00	22050.000
10/12/2019	270	2	380.00	24200.000
12/22/2019	--	2	380.00	24200.000
4/1/2020	360	2	315.00	4050.000
6/26/2020	--	2	315.00	4050.000
9/22/2020	290	2	325.00	2450.000
12/29/2020	--	2	325.00	2450.000

BXN-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]
9/29/2014	268	--	--	--	--	--
2/25/2015	224	--	--	--	--	--
9/14/2015	139	--	--	--	--	--
12/7/2015	144	4	193.75	3966.917	62.98	-38.35
2/29/2016	207	4	178.50	1877.667	43.33	-3.98
6/6/2016	181	4	167.75	1035.583	32.18	-4.16
9/26/2016	195	4	181.75	746.250	27.32	-3.69
3/9/2017	--	3	194.33	169.333	13.01	-3.06
6/11/2017	--	2	188.00	98.000	9.90	-3.11
9/17/2017	178	2	186.50	144.500	12.02	-7.65
12/14/2017	--	1	178.00	#DIV/0!	#DIV/0!	*
3/18/2018	480	2	329.00	45602.000	213.55	0.23
6/16/2018	--	2	329.00	45602.000	213.55	0.23
9/30/2018	450	2	465.00	450.000	21.21	**5.27**
11/18/2018	--	2	465.00	450.000	21.21	**5.27**
3/17/2019	170	2	310.00	39200.000	197.99	-0.43
6/1/2019	--	2	310.00	39200.000	197.99	-0.43
10/12/2019	150	2	160.00	200.000	14.14	-1.99
12/22/2019	--	2	160.00	200.000	14.14	-1.99
4/1/2020	130	2	140.00	200.000	14.14	-3.80
6/26/2020	--	2	140.00	200.000	14.14	-3.80
9/22/2020	210	2	170.00	3200.000	56.57	-2.92
12/29/2020	--	2	170.00	3200.000	56.57	-2.92

Table C-7. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Total Dissolved Solids (TDS)

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

BXN-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]**
9/29/2014	372	--	--	--	--	--
2/25/2015	338	--	--	--	--	--
9/14/2015	322	--	--	--	--	--
12/7/2015	255	4	321.75	2414.917	49.14	-38.38
2/29/2016	332	4	311.75	1474.917	38.40	-1.56
6/6/2016	186	4	273.75	4590.917	67.76	-1.86
9/26/2016	336	4	277.25	5090.250	71.35	-1.56
3/9/2017	--	3	284.67	7305.333	85.47	-0.82
6/11/2017	252	3	258.00	5652.000	75.18	-1.57
9/17/2017	175	3	254.33	6484.333	80.53	-2.79
12/14/2017	470	3	299.00	23413.000	153.01	*
3/18/2018	390	4	321.75	17678.917	132.96	0.30
6/16/2018	260	4	323.75	17322.917	131.62	0.32
9/30/2018	460	4	395.00	9366.667	96.78	1.53
11/18/2018	460	4	392.50	8891.667	94.30	1.52
3/17/2019	200	4	345.00	18233.333	135.03	-0.32
6/1/2019	320	4	360.00	15733.333	125.43	-0.20
10/12/2019	280	4	315.00	11833.333	108.78	-0.53
12/22/2019	330	4	282.50	3491.667	59.09	-0.86
4/1/2020	240	4	292.50	1691.667	41.13	-0.45
6/26/2020	450	4	325.00	8300.000	91.10	0.16
9/22/2020	450	4	367.50	10425.000	102.10	0.69
12/29/2020	510	4	412.50	14025.000	118.43	1.27

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: Sulfate

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

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

$t_c = 2.571$ $v = 5$

$t_c = 2.776$ $v = 4$

$t_c = 3.182$ $v = 3$

$t_c = 4.303$ $v = 2$

$t_c = 12.706$ $v = 1$

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

BXN-4 (Upgradient Well)				
Date	Sulfate Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
11/17/2014	33.00	--	--	--
2/25/2015	37.40	--	--	--
9/14/2015	42.50	--	--	--
12/7/2015	33.40	4	36.58	19.549
2/29/2016	57.40	4	42.68	110.236
6/6/2016	41.70	4	43.75	99.737
9/26/2016	34.50	4	41.75	122.403
3/9/2017	6.08	4	34.92	461.080
6/11/2017	--	3	27.43	354.720
9/17/2017	9.43	3	16.67	241.237
12/14/2017	--	2	7.76	5.611
3/18/2018	67.1	2	38.27	1662.914
6/16/2018	--	2	38.27	1662.914
9/30/2018	46.9	2	57.00	204.020
11/18/2018	--	2	57.00	204.020
3/17/2019	45	2	45.95	1.805
6/1/2019	--	2	45.95	1.805
10/12/2019	51.9	2	48.45	23.805
12/22/2019	--	2	48.45	23.805
4/1/2020	62.2	2	57.05	53.045
6/26/2020	--	2	57.05	53.045
9/22/2020	33.5	2	47.85	411.845
12/29/2020	--	2	47.85	411.845

BXN-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	19.20	--	--	--	--	--
2/25/2015	14.70	--	--	--	--	--
9/14/2015	20.30	--	--	--	--	--
12/7/2015	16.90	4	17.78	6.209	2.49	-7.41
2/29/2016	18.00	4	17.48	5.429	2.33	-10.08
6/6/2016	21.20	4	19.10	3.967	1.99	-10.17
9/26/2016	16.50	4	18.15	4.537	2.13	-9.62
3/9/2017	12.40	4	17.03	13.349	3.65	-1.64
6/11/2017	--	3	16.70	19.390	4.40	-0.96
9/17/2017	19.60	3	16.17	13.043	3.61	-0.05
12/14/2017	--	2	16.00	25.920	5.09	2.08
3/18/2018	15.2	2	17.40	9.680	3.11	-0.72
6/16/2018	--	2	17.40	9.680	3.11	-0.72
9/30/2018	19.3	2	17.25	8.405	2.90	-3.86
11/18/2018	--	2	17.25	8.405	2.90	-3.86
3/17/2019	20.6	2	19.95	0.845	0.92	-22.59
6/1/2019	--	2	19.95	0.845	0.92	-22.59
10/12/2019	11.7	2	16.15	39.605	6.29	-5.74
12/22/2019	--	2	16.15	39.605	6.29	-5.74
4/1/2020	15.8	2	13.75	8.405	2.90	-7.81
6/26/2020	--	2	13.75	8.405	2.90	-7.81
9/22/2020	17	2	16.40	0.720	0.85	-2.19
12/29/2020	--	2	16.40	0.720	0.85	-2.19

Table C-8. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Sulfate
Former J.H. Baxter North Woodwaste Landfill. *Arlington, Washington*

BXN-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	14.40	--	--	--	--	--
2/25/2015	11.10	--	--	--	--	--
9/14/2015	10.20	--	--	--	--	--
12/7/2015	10.90	4	11.65	3.510	1.87	-10.38
2/29/2016	5.16	4	9.34	7.914	2.81	-12.72
6/6/2016	10.30	4	9.14	7.136	2.67	-13.40
9/26/2016	11.80	4	9.54	8.906	2.98	-12.08
3/9/2017	8.90	4	9.04	8.093	2.84	-2.39
6/11/2017	7.30	4	9.58	3.703	1.92	-1.64
9/17/2017	2.97	4	7.74	13.592	3.69	-0.98
12/14/2017	10.50	4	7.42	10.498	3.24	-0.14
3/18/2018	3.4	4	6.04	12.625	3.55	-1.12
6/16/2018	13.9	4	7.69	29.048	5.39	-1.06
9/30/2018	4.5	4	8.08	24.816	4.98	-4.70
11/18/2018	5.7	4	6.88	22.816	4.78	-4.83
3/17/2019	24.9	4	12.25	88.570	9.41	-7.02
6/1/2019	8.6	4	10.93	89.763	9.47	-7.25
10/12/2019	21.4	4	15.15	88.777	9.42	-5.70
12/22/2019	19	4	18.48	49.209	7.01	-6.09
4/1/2020	3.2	4	13.05	73.983	8.60	-6.56
6/26/2020	5.05	4	12.16	87.666	9.36	-6.45
9/22/2020	4.3	4	7.89	55.461	7.45	-2.70
12/29/2020	8.85	4	5.35	6.022	2.45	-2.95

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: Tannin & Lignin

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

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

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

BXN-4 (Upgradient Well)				
Date	Tannin + Lignin Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
11/17/2014	1.38	--	--	--
2/25/2015	1.22	--	--	--
9/14/2015	1.77	--	--	--
12/7/2015	1.33	4	1.43	0.057
2/29/2016	0.54	4	1.22	0.259
6/6/2016	0.71	4	1.09	0.322
9/26/2016	1.53	4	1.03	0.227
3/9/2017	0.98	4	0.94	0.188
6/11/2017	--	3	1.07	0.175
9/17/2017	1.17	3	1.23	0.078
12/14/2017	--	2	1.08	0.018
3/18/2018	0.74	2	0.96	0.092
6/16/2018	--	2	0.96	0.092
9/30/2018	0.83	2	0.79	0.004
11/18/2018	--	2	0.79	0.004
3/17/2019	2.90	2	1.87	2.142
6/1/2019	--	2	1.87	2.142
10/12/2019	0.86	2	1.88	2.081
12/22/2019	--	2	1.88	2.081
4/1/2020	0.23	2	0.55	0.198
6/26/2020	--	2	0.55	0.198
9/22/2020	0.97	2	0.60	0.274
12/29/2020	--	2	0.60	0.274

BXN-2 (Downgradient Well)						
Date	Tannin + 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	0.56	--	--	--	--	--
2/25/2015	1.10	--	--	--	--	--
9/14/2015	0.51	--	--	--	--	--
12/7/2015	0.47	4	0.66	0.087	0.30	-4.02
2/29/2016	0.77	4	0.71	0.084	0.29	-1.72
6/6/2016	0.51	4	0.57	0.019	0.14	-1.79
9/26/2016	0.66	4	0.60	0.019	0.14	-1.71
3/9/2017	1.19	4	0.78	0.085	0.29	-0.60
6/11/2017	--	3	0.79	0.128	0.36	-0.90
9/17/2017	0.81	3	0.89	0.075	0.27	-1.51
12/14/2017	--	2	1.00	0.072	0.27	-0.35
3/18/2018	0.67	2	0.74	0.010	0.10	-0.95
6/16/2018	--	2	0.74	0.010	0.10	-0.95
9/30/2018	0.67	2	0.67	0.000	0.00	-2.56
11/18/2018	--	2	0.67	0.000	0.00	-2.56
3/17/2019	0.5	2	0.59	0.014	0.12	-1.23
6/1/2019	--	2	0.59	0.014	0.12	-1.23
10/12/2019	0.88	2	0.69	0.072	0.27	-1.15
12/22/2019	--	2	0.69	0.072	0.27	-1.15
4/1/2020	0.39	2	0.64	0.120	0.35	0.23
6/26/2020	--	2	0.64	0.120	0.35	0.23
9/22/2020	1.2	2	0.80	0.328	0.57	0.36
12/29/2020	--	2	0.80	0.328	0.57	0.36

Table C-9. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Tannin & Lignin

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

BXN-1 (Downgradient Well)						
Date	**Tannin + 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	11.40	--	--	--	--	--
2/25/2015	4.81	--	--	--	--	--
9/14/2015	1.76	--	--	--	--	--
12/7/2015	1.31	4	4.82	21.660	4.65	1.46
2/29/2016	3.78	4	2.92	2.750	1.66	1.96
6/6/2016	0.52	4	1.84	1.931	1.39	1.01
9/26/2016	2	4	1.90	1.932	1.39	1.19
3/9/2017	10.2	4	4.13	18.179	4.26	1.49
6/11/2017	6.4	4	4.78	19.292	4.39	1.68
9/17/2017	1.88	4	5.12	15.892	3.99	1.95
12/14/2017	28	4	11.62	130.812	11.44	1.84
3/18/2018	4.6	4	10.22	143.954	12.00	1.54
6/16/2018	0.92	4	8.85	165.417	12.86	1.23
9/30/2018	68	4	25.38	951.143	30.84	1.59
11/18/2018	25	4	24.63	948.153	30.79	1.55
3/17/2019	15	4	27.23	836.318	28.92	1.75
6/1/2019	16	4	31.00	628.667	25.07	2.32
10/12/2019	18	4	18.50	20.333	4.51	**6.72**
12/22/2019	34	4	20.75	79.583	8.92	**4.12**
4/1/2020	7.3	4	18.83	123.923	11.13	**3.28**
6/26/2020	35	4	23.58	178.389	13.36	**3.44**
9/22/2020	3.5	4	19.95	284.843	16.88	2.29
12/29/2020	29	4	18.70	244.260	15.63	2.31

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: Arsenic

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

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

$t_c = 2.571$ $v = 5$

$t_c = 2.776$ $v = 4$

$t_c = 3.182$ $v = 3$

$t_c = 4.303$ $v = 2$

$t_c = 12.706$ $v = 1$

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

BXN-4 (Upgradient Well)				
Date	Arsenic Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
11/17/2014	0.30	--	--	--
2/25/2015	0.42	--	--	--
9/14/2015	0.40	--	--	--
12/7/2015	0.35	4	0.37	0.003
2/29/2016	0.35	4	0.38	0.001
6/6/2016	0.60	4	0.43	0.014
9/26/2016	0.40	4	0.43	0.014
3/9/2017	10.50	4	2.96	25.262
6/11/2017	--	3	3.83	33.343
9/17/2017	5.50	3	5.47	25.503
12/14/2017	--	2	8.00	12.500
3/18/2018	5	2	5.25	0.125
6/16/2018	--	2	5.25	0.125
9/30/2018	5	2	5.00	0.000
11/18/2018	--	2	5.00	0.000
3/17/2019	5	2	5.00	0.000
6/1/2019	--	2	5.00	0.000
10/12/2019	5	2	5.00	0.000
12/22/2019	--	2	5.00	0.000
4/1/2020	5	2	5.00	0.000
6/26/2020	--	2	5.00	0.000
9/22/2020	5	2	5.00	0.000
12/29/2020	--	2	5.00	0.000

BXN-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	0.20	--	--	--	--	--
2/25/2015	0.21	--	--	--	--	--
9/14/2015	0.30	--	--	--	--	--
12/7/2015	0.22	4	0.23	0.002	0.05	-3.82
2/29/2016	0.27	4	0.25	0.002	0.04	-4.70
6/6/2016	0.20	4	0.25	0.002	0.05	-2.78
9/26/2016	0.25	4	0.24	0.001	0.03	-3.09
3/9/2017	10.50	4	2.81	26.318	5.13	-0.04
6/11/2017	--	3	3.65	35.193	5.93	-0.04
9/17/2017	5.50	3	5.42	26.271	5.13	-0.01
12/14/2017	--	2	8.00	12.500	3.54	0.00
3/18/2018	5	2	5.25	0.125	0.35	0.00
6/16/2018	--	2	5.25	0.125	0.35	0.00
9/30/2018	5	2	5.00	0.000	0.00	*
11/18/2018	--	2	5.00	0.000	0.00	*
3/17/2019	5	2	5.00	0.000	0.00	*
6/1/2019	--	2	5.00	0.000	0.00	*
10/12/2019	5	2	5.00	0.000	0.00	*
12/22/2019	--	2	5.00	0.000	0.00	*
4/1/2020	5	2	5.00	0.000	0.00	*
6/26/2020	--	2	5.00	0.000	0.00	*
9/22/2020	5	2	5.00	0.000	0.00	*
12/29/2020	--	2	5.00	0.000	0.00	*

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

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

BXN-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	24.00	--	--	--	--	--
2/25/2015	23.20	--	--	--	--	--
9/14/2015	38.70	--	--	--	--	--
12/7/2015	22.50	4	27.10	60.180	7.76	**6.89**
2/29/2016	28.20	4	28.15	55.910	7.48	**7.43**
6/6/2016	16.60	4	26.50	88.580	9.41	**5.54**
9/26/2016	12.60	4	19.98	46.603	6.83	**5.73**
3/9/2017	14.50	4	17.98	49.136	7.01	**3.48**
6/11/2017	17.00	4	15.18	4.149	2.04	**3.25**
9/17/2017	5.50	4	12.40	24.407	4.94	1.81
12/14/2017	47.00	4	21.00	324.833	18.02	1.39
3/18/2018	31.0	4	25.13	321.396	17.93	2.22
6/16/2018	21.0	4	26.13	303.729	17.43	2.39
9/30/2018	31.0	4	32.50	115.667	10.75	**5.11**
11/18/2018	14.0	4	24.25	68.917	8.30	**4.64**
3/17/2019	47.0	4	28.25	204.917	14.31	**3.25**
6/1/2019	22.0	4	28.50	200.333	14.15	**3.32**
10/12/2019	9.0	4	23.00	284.667	16.87	2.13
12/22/2019	56.0	4	33.50	473.667	21.76	2.62
4/1/2020	23.0	4	27.50	401.667	20.04	2.25
6/26/2020	15.5	4	25.88	436.063	20.88	2.00
9/22/2020	5.0	4	24.88	485.063	22.02	1.80
12/29/2020	26.5	4	17.50	90.500	9.51	2.63

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: Barium

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

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

$t_c = 2.571$ $v = 5$

$t_c = 2.776$ $v = 4$

$t_c = 3.182$ $v = 3$

$t_c = 4.303$ $v = 2$

$t_c = 12.706$ $v = 1$

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

BXN-4 (Upgradient Well)				
Date	**Barium Concentration[1]**	**Number of Samples (n)**	**Average Concentration (m_0)**	**Sample Variance (s^1)**
11/17/2014	124.0	--	--	--
2/25/2015	125.0	--	--	--
9/14/2015	168.0	--	--	--
12/7/2015	182.0	4	149.75	882.917
2/29/2016	102.0	4	144.25	1381.583
6/6/2016	113.0	4	141.25	1571.583
9/26/2016	163.0	4	140.00	1488.667
3/9/2017	111.00	4	122.25	760.917
6/11/2017	--	3	129.00	868.000
9/17/2017	133.00	3	135.67	681.333
12/14/2017	--	2	122.00	242.000
3/18/2018	163	2	148.00	450.000
6/16/2018	--	2	148.00	450.000
9/30/2018	168	2	165.50	12.500
11/18/2018	--	2	165.50	12.500
3/17/2019	110	2	139.00	1682.000
6/1/2019	--	2	139.00	1682.000
10/12/2019	41.9	2	75.95	2318.805
12/22/2019	--	2	75.95	2318.805
4/1/2020	16	2	28.95	335.405
6/26/2020	--	2	28.95	335.405
9/22/2020	64.6	2	40.30	1180.980
12/29/2020	--	2	40.30	1180.980

BXN-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	9.3	--	--	--	--	--
2/25/2015	14.4	--	--	--	--	--
9/14/2015	8.8	--	--	--	--	--
12/7/2015	7.9	4	10.10	8.553	2.92	-9.35
2/29/2016	12.5	4	10.90	9.407	3.07	-8.93
6/6/2016	10.5	4	9.93	4.109	2.03	-8.82
9/26/2016	0.6	4	7.88	27.069	5.20	-8.76
3/9/2017	16.6	4	10.05	46.137	6.79	-7.90
6/11/2017	--	3	9.23	65.203	8.07	-6.79
9/17/2017	10.9	3	9.37	65.763	8.11	-8.00
12/14/2017	--	2	13.75	16.245	4.03	-9.53
3/18/2018	6.5	2	8.70	9.680	3.11	-9.19
6/16/2018	--	2	8.70	9.680	3.11	-9.19
9/30/2018	7.4	2	6.95	0.405	0.64	-62.42
11/18/2018	--	2	6.95	0.405	0.64	-62.42
3/17/2019	8	2	7.70	0.180	0.42	-4.53
6/1/2019	--	2	7.70	0.180	0.42	-4.53
10/12/2019	7.6	2	7.80	0.080	0.28	-2.00
12/22/2019	--	2	7.80	0.080	0.28	-2.00
4/1/2020	8.6	2	8.10	0.500	0.71	-1.61
6/26/2020	--	2	8.10	0.500	0.71	-1.61
9/22/2020	12.1	2	10.35	6.125	2.47	-1.23
12/29/2020	--	2	10.35	6.125	2.47	-1.23

Table C-11. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Barium

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

BXN-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	92.8	--	--	--	--	--
2/25/2015	68.3	--	--	--	--	--
9/14/2015	95.5	--	--	--	--	--
12/7/2015	55.3	4	77.98	378.222	19.45	-4.04
2/29/2016	84.9	4	76.00	315.747	17.77	-3.94
6/6/2016	30.0	4	66.43	879.076	29.65	-3.57
9/26/2016	70.0	4	60.05	547.363	23.40	-4.23
3/9/2017	49.6	4	58.63	573.536	23.95	-3.48
6/11/2017	48.0	4	49.40	267.573	16.36	-4.22
9/17/2017	64.8	4	58.10	120.253	10.97	-4.84
12/14/2017	127.0	4	72.35	1384.703	37.21	-2.30
3/18/2018	107	4	86.70	1337.827	36.58	-2.59
6/16/2018	70.9	4	92.43	878.109	29.63	-2.64
9/30/2018	146	4	112.73	1031.036	32.11	-3.25
11/18/2018	124.5	4	112.10	1008.807	31.76	-3.32
3/17/2019	79	4	105.10	1300.007	36.06	-0.99
6/1/2019	64	4	103.38	1469.229	38.33	-1.02
10/12/2019	38	4	76.38	1316.229	36.28	0.01
12/22/2019	37.6	4	54.65	416.090	20.40	-0.60
4/1/2020	76	4	53.90	369.640	19.23	1.55
6/26/2020	118.5	4	67.53	1479.169	38.46	1.66
9/22/2020	85	4	79.28	1106.303	33.26	1.32
12/29/2020	64.5	4	86.00	539.833	23.23	1.70

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: Iron

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

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

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

BXN-4 (Upgradient Well)				
Date	Iron Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
11/17/2014	66.5	--	--	--
2/25/2015	27.0	--	--	--
9/14/2015	23.2	--	--	--
12/7/2015	16.0	4	33.18	514.39
2/29/2016	10.0	4	19.05	57.21
6/6/2016	18.1	4	16.83	29.84
9/26/2016	10.0	4	13.53	17.30
3/9/2017	1270.0	4	327.03	395215.40
6/11/2017	--	3	432.70	525819.87
9/17/2017	51.0	3	443.67	512540.33
12/14/2017	--	2	660.50	742980.50
3/18/2018	71	2	61.00	200.00
6/16/2018	--	2	61.00	200.00
9/30/2018	5	2	38.00	2178.00
11/18/2018	--	2	38.00	2178.00
3/17/2019	46	2	25.50	840.50
6/1/2019	--	2	25.50	840.50
10/12/2019	14	2	30.00	512.00
12/22/2019	--	2	30.00	512.00
4/1/2020	50	2	32.00	648.00
6/26/2020	--	2	32.00	648.00
9/22/2020	50	2	50.00	0.00
12/29/2020	--	2	50.00	0.00

BXN-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]
11/17/2014	10.0	--	--	--	--	--
2/25/2015	2.0	--	--	--	--	--
9/14/2015	2.0	--	--	--	--	--
12/7/2015	5.0	4	4.75	14.250	3.77	-2.47
2/29/2016	10.0	4	4.75	14.250	3.77	-1.24
6/6/2016	3.0	4	5.00	12.667	3.56	-1.03
9/26/2016	10.0	4	7.00	12.667	3.56	-0.57
3/9/2017	4.0	4	6.75	14.250	3.77	-1.02
6/11/2017	--	3	5.67	14.333	3.79	-1.02
9/17/2017	10.5	3	8.17	13.083	3.62	-1.05
12/14/2017	--	2	7.25	21.125	4.60	-1.07
3/18/2018	10	2	10.25	0.125	0.35	-5.07
6/16/2018	--	2	10.25	0.125	0.35	-5.07
9/30/2018	10	2	10.00	0.000	0.00	-0.85
11/18/2018	--	2	10.00	0.000	0.00	-0.85
3/17/2019	10	2	10.00	0.000	0.00	-0.76
6/1/2019	--	2	10.00	0.000	0.00	-0.76
10/12/2019	10	2	10.00	0.000	0.00	-1.25
12/22/2019	--	2	10.00	0.000	0.00	-1.25
4/1/2020	10	2	10.00	0.000	0.00	-1.22
6/26/2020	--	2	10.00	0.000	0.00	-1.22
9/22/2020	50	2	30.00	800.000	28.28	-1.00
12/29/2020	--	2	30.00	800.000	28.28	-1.00

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

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

BXN-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	39,900	--	--	--	--	--
2/25/2015	28,600	--	--	--	--	--
9/14/2015	40,000	--	--	--	--	--
12/7/2015	28,100	4	34,150	44,896,667	6700.50	**10.18**
2/29/2016	35,600	4	33,075	33,035,833	5747.68	**11.50**
6/6/2016	11,800	4	28,875	153,715,833	12398.22	**4.66**
9/26/2016	26,000	4	25,375	98,882,500	9943.97	**5.10**
3/9/2017	23,900	4	24,325	95,662,500	9780.72	**4.90**
6/11/2017	24,900	4	21,650	43,856,667	6622.44	**6.36**
9/17/2017	951	4	18,938	144,523,634	12021.80	**3.07**
12/14/2017	52,200	4	25,488	439,487,600	20963.96	2.36
3/18/2018	63,800	4	35,463	795,255,950	28200.28	2.51
6/16/2018	34,700	4	37,913	750,255,984	27390.80	2.76
9/30/2018	67,600	4	54,575	218,469,167	14780.70	**7.38**
11/18/2018	56,500	4	55,650	216,283,333	14706.57	**7.56**
3/17/2019	55,400	4	53,550	188,283,333	13721.64	**7.80**
6/1/2019	44,400	4	55,975	89,909,167	9482.04	**11.80**
10/12/2019	23,600	4	44,975	232,909,167	15261.36	**5.89**
12/22/2019	36,200	4	39,900	179,960,000	13414.92	**5.94**
4/1/2020	42,000	4	36,550	86,383,333	9294.26	**7.86**
6/26/2020	41,100	4	35,725	71,835,833	8475.60	**8.42**
9/22/2020	37,100	4	39,100	8,273,333	2876.34	**27.15**
12/29/2020	41,050	4	40,313	4,777,292	2185.70	**36.84**

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: Manganese

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

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

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

BXN-4 (Upgradient Well)				
Date	**Manganese Concentration[1]**	**Number of Samples (n)**	**Average Concentration (m_0)**	**Sample Variance (s^1)**
11/17/2014	2,330	--	--	--
2/25/2015	2,040	--	--	--
9/14/2015	3,550	--	--	--
12/7/2015	3,270	4	2,798	527,292
2/29/2016	1,560	4	2,605	915,500
6/6/2016	1,440	4	2,455	1,231,500
9/26/2016	3,180	4	2,363	995,625
3/9/2017	1,960	4	2,035	632,100
6/11/2017	--	3	2,193	797,733
9/17/2017	2,440	3	2,527	377,733
12/14/2017	--	2	2,200	115,200
3/18/2018	1,280	2	1,860	672,800
6/16/2018	--	2	1,860	672,800
9/30/2018	2,366	2	1,823	589,698
11/18/2018	--	2	1,823	589,698
3/17/2019	1,755	2	2,061	186,661
6/1/2019	--	2	2,061	186,661
10/12/2019	1,230	2	1,493	137,813
12/22/2019	--	2	1,493	137,813
4/1/2020	800	2	1,015	92,450
6/26/2020	--	2	1,015	92,450
9/22/2020	1,250	2	1,025	101,250
12/29/2020	--	2	1,025	101,250

BXN-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	2,220	--	--	--	--	--
2/25/2015	4,020	--	--	--	--	--
9/14/2015	2,240	--	--	--	--	--
12/7/2015	1,920	4	2,600	917,600	957.91	-0.33
2/29/2016	3,620	4	2,950	1,052,933	1026.13	0.49
6/6/2016	2,970	4	2,688	579,558	761.29	0.35
9/26/2016	7	4	2,129	2,491,884	1578.57	-0.25
3/9/2017	5,350	4	2,987	4,954,453	2225.86	0.81
6/11/2017	--	3	2,776	7,164,406	2676.64	0.36
9/17/2017	3,360	3	2,906	7,290,857	2700.16	0.24
12/14/2017	--	2	4,355	1,980,050	1407.14	2.11
3/18/2018	2,790	2	3,075	162,450	403.05	1.88
6/16/2018	--	2	3,075	162,450	403.05	1.88
9/30/2018	2,748	2	2,769	882	29.70	1.74
11/18/2018	--	2	2,769	882	29.70	1.74
3/17/2019	2,747	2	2,748	1	0.71	2.25
6/1/2019	--	2	2,748	1	0.71	2.25
10/12/2019	3,100	2	2,924	62,305	249.61	**4.52**
12/22/2019	--	2	2,924	62,305	249.61	**4.52**
4/1/2020	2,500	2	2,800	180,000	424.26	**4.84**
6/26/2020	--	2	2,800	180,000	424.26	**4.84**
9/22/2020	3,240	2	2,870	273,800	523.26	4.26
12/29/2020	--	2	2,870	273,800	523.26	4.26

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

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

BXN-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	3,930	--	--	--	--	--
2/25/2015	3,410	--	--	--	--	--
9/14/2015	5,190	--	--	--	--	--
12/7/2015	4,890	4	4,355	685,700	828.07	**2.83**
2/29/2016	6,250	4	4,935	1,373,967	1172.16	**3.08**
6/6/2016	2,360	4	4,673	2,717,092	1648.36	2.23
9/26/2016	4,890	4	4,598	2,636,092	1623.60	2.35
3/9/2017	4,050	4	4,388	2,648,692	1627.48	**2.60**
6/11/2017	3,750	4	3,763	1,107,025	1052.15	2.13
9/17/2017	3,120	4	3,953	540,825	735.41	**2.79**
12/14/2017	4,940	4	3,965	572,700	756.77	**3.94**
3/18/2018	5,020	4	4,208	862,892	928.92	**3.16**
6/16/2018	4,073	4	4,288	790,459	889.08	**3.32**
9/30/2018	7,422	4	5,364	2,066,719	1437.61	**3.93**
11/18/2018	5,944	4	5,615	2,035,093	1426.57	**4.23**
3/17/2019	5,384	4	5,706	1,923,891	1387.04	**4.81**
6/1/2019	6,393	4	6,286	744,171	862.65	**7.99**
10/12/2019	5,840	4	5,890	171,487	414.11	**13.15**
12/22/2019	5,440	4	5,764	216,931	465.76	**12.17**
4/1/2020	5,930	4	5,901	153,049	391.21	**16.81**
6/26/2020	6,350	4	5,890	139,400	373.36	**17.12**
9/22/2020	6,530	4	6,063	235,425	485.21	**15.22**
12/29/2020	6,205	4	6,254	64,256	253.49	**20.25**

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 (BXN-1) 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 found (Table D-1) indicates 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.

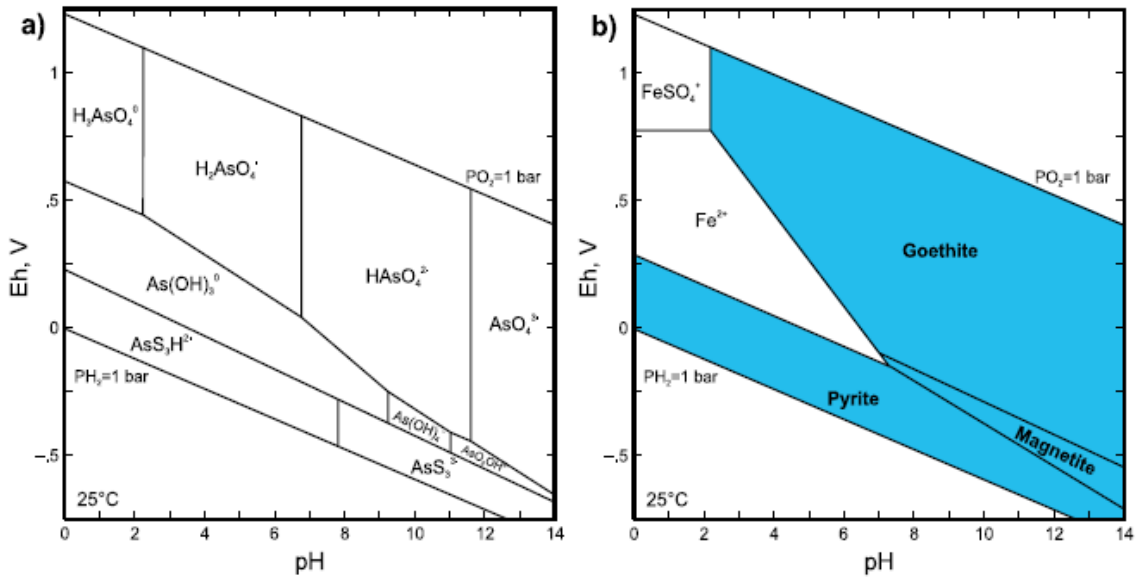


Figure D-2. Eh-pH diagrams for arsenic and iron at 25°C for coupled iron- and sulfate-reducing

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 (3650 days), at which point the modeled concentration has reached the furthest downgradient extent given a constant source (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 77 feet downgradient of BXN-1.

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 North Landfill

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

LEGEND

- Approximate Boundary of North Landfill
- Downgradient Potable Water Wells
- Roads
- Watercourses
- Waterbodies

N

0 250 500 750
Feet

MAP NOTES:
Date: March 14, 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\N_FigureD-1_Downgradient_Water_Wells.mxd

Table D-1. Background Groundwater Conditions

Former J.H. Baxter North Woodwaste Landfill

Arlington, Washington

USGS Well ID	Hydrologic Unit Code	Surface Elevation (ft amsl)	Well Depth (ft)	Date Sampled	Temp. (°C)	pH (unfiltered)	Dissolved Oxygen (mg/L)	Organic Carbon, filtered (mg/L)	Dis. Iron (µg/L)	Dis. Manganese (µg/L)	Arsenic (µg/L)
480827122062701	17110008	460	79	7/27/1993	11.4	8	0	0.2	230	84	4
480903122094701	17110008	115	16.5	8/11/1993	12.6	7.5	5.5	0.5	10	<1	2
481001122100801	17110008	125	48	7/30/1993	11.2	7	9.6	0.2	<1	<1	<3
481039122065901	17110008	370	25	7/27/1993	12.5	6.5	5.9	0.5	<1	62	<1
481103122084001	17110008	90	79	7/27/1993	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:	5/17/2021	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)
0.027	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	0.07	0.3	1.7	1	1.00E-03	1.005666667	39.44315545

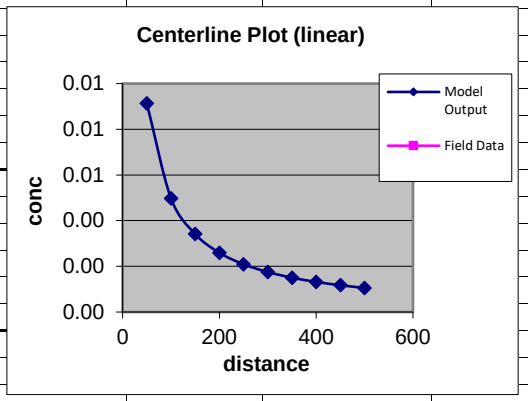
NEW QUICK_DOMENICO.XLS

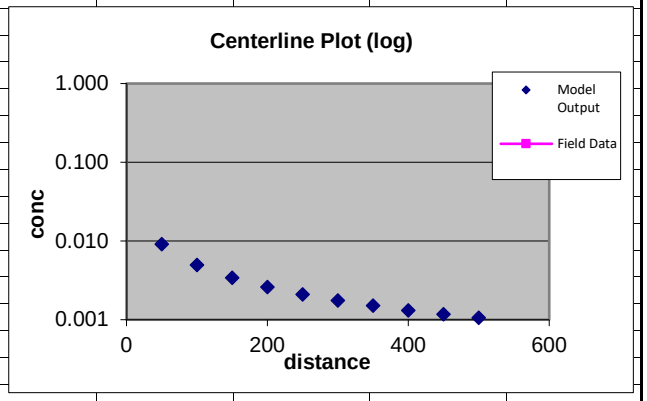
SPREADSHEET APPLICATION OF
"AN ANALYTICAL MODEL FOR
MULTIDIMENSIONAL TRANSPORT OF A
DECAYING CONTAMINANT SPECIES"
P.A. Domenico (1987)
Modified to Include Retardation

Point Concentration

x(ft)	y(ft)	z(ft)
77	0	0

	x(ft)	y(ft)	z(ft)
Conc. At	77	0	0
at	3650	days =	
			0.005
			mg/l





	AREAL MODEL	CALCULATION DOMAIN
	Length (ft)	500
	Width (ft)	100

	50	100	150	200	250	300	350	400	450	500
100	0.003	0.003	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001
50	0.006	0.004	0.003	0.002	0.002	0.001	0.001	0.001	0.001	0.001
0	0.008	0.004	0.003	0.002	0.002	0.002	0.001	0.001	0.001	0.001
-50	0.006	0.004	0.003	0.002	0.002	0.001	0.001	0.001	0.001	0.001
-100	0.003	0.003	0.002	0.002	0.001	0.001	0.001	0.001	0.001	0.001

Field Data:	Centerline C	Concentration
	Distance from Source	