2023 Groundwater Monitoring Report
North Woodwaste Landfill
Arlington, Washington

Submitted to

Snohomish Health District
3020 Rucker Avenue, Suite 104
Everett, Washington 98201

Prepared for

Jeff Lervick PLE LLC
P.O. Box 72
Stanwood, WA 98292

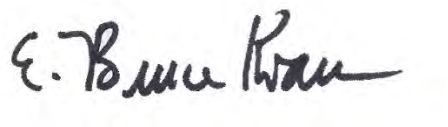
Prepared by

Kvam Aquatic Sciences, LLC
9314 NE 133rd Street
Kirkland, WA 98034

July 2024

2023 Groundwater Monitoring Report
North Woodwaste Landfill
Arlington, Washington

Prepared for Jeff Lervick PLE LLC by:



Bruce Kvam, Principal Biologist

Date: 31 July 2024

Contents

Section Page

1. Introduction 1
2. Hydrogeology 1
2.1 Groundwater Elevations 1
2.2 Groundwater Velocities 2
3. Groundwater Quality 2
3.1 Groundwater Sampling 2
4. Data Review 3
4.1 Field Quality Assurance (QA) /QC 3
4.2 Laboratory QA/QC 3
4.3 Statistical Analysis of Data 4
5. Discussion of Results 5
5.1 Statistical Results 5
5.2 Concentration Trends over Time 5
5.3 Comparison to Standards 6
5.3.1 Comparison to Washington State Standards 6
6. Summary 7
7. References 8

Tables

Table 1 Groundwater Elevation Summary for 2023
Table 2 Hydraulic Gradient and Groundwater Velocity
Table 3A Summary of Groundwater Sampling Field Parameters: 2007 through 2023
Table 3B Summary of Groundwater Conventional Parameters: 2007 through 2023
Table 3C Summary of Groundwater Metals: 2007 through 2023
Table 3D Summary of Groundwater Pentachlorophenol: 2009-2023
Table 4 Parameters Statistically Higher than Background: 1988 through 2023

Contents

Figures

Figure 1 Site Vicinity Map (Source: GSI)
Figure 2 Groundwater Elevation Contour Map: First Quarter 2023 (Source: GSI)
Figure 3 Groundwater Elevation Contour Map: Fourth Quarter 2023 (Source: GSI)
Figure 4 Regional Groundwater Flow (Source: GSI)
Figure 5 Ammonia Trends
Figure 6 Arsenic Trends
Figure 7 Barium Trends
Figure 8 Chemical Oxygen Demand Trends
Figure 9 Chloride Trends
Figure 10 Iron Trends
Figure 11 Manganese Trends
Figure 12 Nitrate+Nitrite Trends
Figure 13 Field pH Trends
Figure 14 Sulfate Trends
Figure 15 Tannin and Lignin Trends
Figure 16 Total Dissolved Solids Trends
Figure 17 Total Organic Carbon Trends
Figure 18 Arsenic Isopleth Map: 2023 (Source: GSI)

Appendices

Appendix A 2023 Groundwater Monitoring Field Forms
Appendix B 2023 Laboratory Reports
Appendix C Statistical Analysis of Groundwater Data
Appendix D Arsenic Transport Model and Calculations (Source: GSI)

1. Introduction

This report presents quarterly groundwater data collected in 2023 by Jeff Lervick PLE LLC for J.H. Baxter & Co's (Baxter) closed North Woodwaste Landfill (North Landfill), 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 background groundwater quality providing the benchmark to compare with 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 2023 was conducted in March, 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 2023 are summarized in Table 1.

Based on measurements in BXN-1, groundwater elevations were highest during June and lowest during December. In 2023, the static groundwater level in well BXN-1 fluctuated by 2.25 feet between June 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 2023 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 approximately 0.0007 in March and September (Table 2). This slope results in velocity estimates of 2.0 to 4.0 feet per day. Table 2 shows the calculated hydraulic gradients and groundwater velocities during the 2023 monitoring events. The gradient and groundwater velocity are similar to previous years.

3. Groundwater Quality

Groundwater monitoring events were conducted on March 27, for the first quarter; June 9, for the second quarter; September 21, for the third quarter; and December 28, for the fourth quarter of 2023. Groundwater sampling was performed using submersible stainless-steel pumps or dedicated submersible purge pumps using 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. These parameters were allowed to stabilize 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 2023 are summarized in Table 3A. Field sampling records are included in Appendix A. The analytical data from 2007 through 2023 are summarized in Tables 3B and 3C. Laboratory analytical reports and

chain-of-custody (COC) forms for the 2023 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 2023 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 March and June monitoring field duplicates were collected from monitoring well BXN-1. The duplicate sample was labeled as BXN-101.

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, the following analytes were qualified as estimated concentrations:

- COD, BXN-1, June 2023

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.

No analytes were detected in method blanks above the MRL.

Laboratory duplicate RPDs (0-33%) 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 summarized 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 downgradient wells compared to the upgradient well are:

- Ammonia, chemical oxygen demand, chloride, pH, tannin and lignin, and dissolved arsenic, iron and manganese in BXN-1

5.2 Concentration Trends over Time

Figures 5 through 17 show well concentration trends from 2007 through 2023 for each of the following parameters:

- **Ammonia as Nitrogen** (Figure 5)**:** Ammonia concentrations in the background well (BXN-4) were consistently greater than downgradient wells. Since 2020, levels in all wells have been similar and low.
- **Arsenic** (Figure 6)**:** Arsenic concentrations in BXN-1 have been routinely higher than BXN-4 and BXN-2. Concentrations at BXN-1 appear to be increasing. Levels in BXN-2 and BXN-4 have been consistently below the laboratory method detection limit.
- **Barium** (Figure 7)**:** Barium concentrations in BXN-4 have been greater than downgradient wells but similar to BXN-1 since 2018. Levels in BXN-2 have been consistently low. Conversely, barium in BXN-4 and BXN-1 fluctuates and 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 BXN-4 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 but levels in BXN-2 have been consistent and typically lower than the other wells.
- **Chloride** (Figure 9)**:** Chloride levels fluctuate in all wells but appear to be declining in BXN-4. Despite fluctuations, chloride in BXN-2 has shown a level trend. Since 2020, chloride concentrations peaked in BXN-1 resulting in an increasing trend.
- **Iron** (Figure 10)**:** Iron concentrations have been consistently higher in BXN-1 compared to BXN-4 and BXN-2. Although values were low in Dec 2023, 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 in BXN-4 have generally been lower than downgradient wells. Levels have fluctuated in each well but appear to be increasing in BXN-1 and decreasing in BXN-2 and BXN-4. Although values were low

in Dec 2023, manganese concentrations in BXN-1 have exceeded levels in other wells since 2017.

- **Nitrate plus Nitrite as Nitrogen** (Figure 12): Nitrate plus nitrite concentrations in BXN-4 have fluctuated over the monitoring period but have 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 BXN-1 and BXN-2 have been consistently low and lowest in BXN-1.
- **Pentachlorophenol (PCP):** PCP was not detected in 2023. 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 shifts to more alkaline water 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 and September 2021. Although fluctuating, the trend in sulfate levels in BXN-4 appears to be increasing. Sulfate concentrations in downgradient wells are low and are stable or declining slightly.
- **Tannin and Lignin** (Figure 15)**:** Since 2018, tannin and lignin concentrations in BXN-1 have been greater than upgradient wells. Although levels fluctuate, 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 in BXN-4 are low and similar to downgradient wells. The lone exception is 2014 when TDS spiked in BXN-4 relative to the other wells.
- **Total Organic Carbon (TOC)** (Figure 17)**:** TOC levels in BXN-4 are low and generally similar to downgradient wells. TOC is routinely lowest in BXN-2. Since 2021, TOC concentrations have been highest in BXN-1 and trend lines indicate TOC is increasing slightly but declining or stable in background wells.

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 2023 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 all wells in 2023. Concentrations peaked in BXN-1 at 46.8 µg/L.

- **Iron:** Concentrations in BXN-1 exceeded the state standard of 300 µg/L in all quarters in 2023, ranging from 1,020 to 45,000 µg/L.
- **Manganese:** Concentrations in all wells exceeded Washington's groundwater standard of 50 µg/L in all quarters in 2023 ranging from 686 to 6,860 µg/L.
- **Nitrate+Nitrite:** Levels in BXN-4, the upgradient well, exceeded the state standard of 10 mg/L in September 2023. Values peaked at 13.3 mg/L.
- **Field pH:** All pH measurements in all wells were below the groundwater standard of 6.5 to 8.5 in 2023, ranging from 6.05-6.39

Per the Snohomish Health District's request in a letter dated August 28, 2015, a dissolved arsenic plume delineation was performed in 2023. 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 2023 (Table 3C). In 2023, the 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 165 feet downgradient of BXN-1. Using the Washington State Well Report Viewer, the nearest water well downgradient of the BXN-1 plume is greater than 3,000 feet to the northwest.

6. Summary

Quarterly groundwater monitoring samples were collected from one upgradient well (BXN-4) and two downgradient wells (BXN-1 and BXN-2) during 2023 at the North Woodwaste Landfill. The samples were analyzed for 8 groundwater parameters and 4 dissolved metals.

Some groundwater samples collected during the 2023 monitoring events exceeded some Washington state standards for groundwater. Dissolved iron and manganese concentrations in BXN-1 exceeded the standards for groundwater during all quarters. Nitrate+nitrite levels in BXN-4 exceeded 10 mg/L in September. In addition, all wells exceeded the state standard for arsenic and manganese during all monitoring events. Furthermore, all field pH measurement in all wells were lower than the standard (6.5) in 2023.

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.

EPA. 1999b. USEPA CLP National Functional Guidelines for Organic Data Review, EPA-540-R-99-008. U.S. Environmental Protection Agency. October 1999.

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 2023

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	3/27/2023	47.50	48.00
						6/9/2023	47.35	48.15
						9/21/2023	49.40	46.10
						12/28/2023	49.60	45.90
BXN-2	2	57.24	10	47.24 - 57.24	93.01	3/27/2023	43.73	49.28
						6/9/2023	NM	NM
						9/21/2023	45.58	47.43
						12/28/2023	NM	NM
BXN-3	2	58.66	10	48.66 - 58.66	97.23	3/27/2023	NM	NM
						6/9/2023	NM	NM
						9/21/2023	NM	NM
						12/28/2023	NM	NM
BXN-4	2	51.74	10	41.74 - 51.74	98.76	3/27/2023	42.00	56.76
						6/9/2023	NM	NM
						9/21/2023	44.60	54.16
						12/28/2023	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 2023

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)
3/27/2023	0.007	0.030 to 0.060	0.30	0.0007 to 0.001	2.1 to 4.1
9/21/2023	0.007			0.001 to 0.001	1.9 to 3.8

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 2023
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
3/11/2021	6.04	NT	6.19	6.04	672	NT	349	687	13.8	NT	13.2	12.8	147	NT	141	-85	3.33	NT	4.78	3.00	NT	NT	NT	NT
6/16/2021	NT	NT	NT	6.22	NT	NT	NT	809	NT	NT	NT	14.1	NT	NT	NT	-86	NT	NT	NT	0.00	NT	NT	NT	NT
9/30/2021	5.91	NT	6.19	NT	616	NT	219	NT	13.4	NT	13.5	NT	192	NT	156	NT	0.38	NT	0.52	NT	NT	NT	NT	NT
12/23/2021	NT	NT	NT	5.53	NT	NT	NT	592	NT	NT	NT	13.2	NT	NT	NT	-62.2	NT	NT	NT	0.51	NT	NT	NT	NT
3/11/2022	6.41	NT	6.70	6.44	711	NT	254	787	12.3	NT	12.5	12.5	64	NT	11	-61	6.97	NT	6.31	5.76	NT	NT	NT	NT
6/30/2022	NT	NT	NT	6.18	NT	NT	NT	718	NT	NT	NT	13.2	NT	NT	NT	-41.9	NT	NT	NT	5.10	NT	NT	NT	NT
9/21/2022	6.15	NT	6.34	6.32	756	NT	277	965	14.2	NT	14.0	12.7	65.1	NT	58.1	-64	1.71	NT	0.79	0.53	NT	NT	NT	NT
12/19/2022	6.29	NT	6.25	6.38	517	NT	333	675	11.8	NT	12.9	11.8	13.1	NT	3.5	-47.2	0.45	NT	0.31	0.32	NT	NT	NT	NT

Table 3A. Summary of Groundwater Sampling Field Parameters: 2007 through 2023
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
3/27/2023	6.22	NT	6.39	6.29	1263	NT	467	1728	13.9	NT	14.1	13.5	114	NT	97.9	-51	0.51	NT	0.01	0.09	49.1	NT	49.0	44.4
6/9/2023	NT	NT	NT	6.40	NT	NT	NT	632	NT	NT	NT	12.0	NT	NT	NT	-31.3	NT	NT	NT	0.83	NT	NT	NT	NT
9/21/2023	6.14	NT	6.05	6.15	605	NT	277	986	14.1	NT	13.7	12.7	84.7	NT	44.9	-23.3	0.42	NT	0.24	0.15	NT	NT	NT	NT
12/28/2023	NT	NT	NT	6.39	NT	NT	NT	771	NT	NT	NT	12.8	NT	NT	NT	-406.5	NT	NT	NT	1.60	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 2023
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																		
3/11/2021																		
6/16/2021																		
9/30/2021																		
12/23/2021																		
3/11/2022																		
6/30/2022																		
9/21/2022																		
12/19/2022																		
3/27/2023																		
6/9/2023																		
9/21/2023																		
12/28/2023																		

Table 3B. Summary of Groundwater Conventional Parameters: 2007 through 2023
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	
3/11/2021	16.0	14.9			7.43		17.4			20.0	18.0			1.60		0.02 U		
6/16/2021							9.64	9.55								0.02 U	0.02 U	
9/30/2021	1.5				29.2		NT			24.0				3.00		NT		
12/23/2021							40.2	44.4								0.05	0.039	
3/11/2022	9.4				7.0		47.7			18.7				0.251		0.02 U		
6/30/2022							24.1	23.8								0.296 J	0.16 J	
9/21/2022	24.0				4.67		44.9			24.8				2.41		0.173		
12/19/2022							135		0.05 U							0.246		0.02 U
3/27/2023	7.0				6.3		53.0	52.3	0.1 U	9.41				2.5		0.221	0.212	0.02 U
6/9/2023							40.0	40.8								0.22	0.23	
9/21/2023	13.3				9.45		96.4		0.1 U	13.3				3.24		0.167		0.02 U
12/28/2023							162									0.049		

Table 3B. Summary of Groundwater Conventional Parameters: 2007 through 2023
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	
3/11/2021	390	390			200		410			38.9	38.9			18.5		5.1		
6/16/2021							400	410								2.1	2.0	
9/30/2021	420				150		NT			14.3				30.1		NT		
12/23/2021							370	380								4.9	5.0	
3/11/2022	390				140		450			33.1				16.9		5.7		
6/30/2022							540	510								9.9 J	3.9 J	
9/21/2022	420				160		410			35.0				18.5		3.3		
12/19/2022							730		100							6.3		0.1 U
3/27/2023	360				140		340	360	6	52.4				17.4		3.9	3.7	0.1 U
6/9/2023							340	350								5.9	6.0	
9/21/2023	330				160		210		5 U	34.0				23.6		2.6		0.1 U
12/28/2023							650									8.8		

Table 3B. Summary of Groundwater Conventional Parameters: 2007 through 2023
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							0.32	0.32								10.0 U	15.0	
3/11/2021	0.477	0.505			0.02 U		0.421			12.0	15.0			10.0 U		38.0		
6/16/2021							0.40	0.39								86.0	83.0	
9/30/2021	0.93				0.02 U		NT			10.0 U				10.0 U		NT		
12/23/2021							0.593	0.568								26.0	26.0	
3/11/2022	0.325				0.02 U		0.473			10.0 U				10.0 U		35.0		
6/30/2022							0.62	0.60								35.0	38.0	
9/21/2022	0.17				0.167		0.137			10.0 U				10.0 U		16.0		
12/19/2022							0.584		0.02 U							29.0		10.0 U
3/27/2023	0.174				0.02 U		0.629	0.693	0.02 U	10.0 U				10.0 U		52.0	57.0	10.0 U
6/9/2023							0.481	0.50								32.0 J	21.0	
9/21/2023	0.117				0.02 U		0.504		0.02 U	10.0 U				10.0 U		12.0		10.0 U
12/28/2023							0.518									21.0		

Table 3B. Summary of Groundwater Conventional Parameters: 2007 through 2023
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	4.5	
3/11/2021	0.54	0.58			0.53		0.2 U			5.60	12.0 J			7.70		22		
6/16/2021							27	27								17	16	
9/30/2021	0.77				0.44		NT			5.00				1.10		NT		
12/23/2021							21	21								18	13	
3/11/2022	0.36				0.24		25			8.90				1.90		22		
6/30/2022							36	42								45	37	
9/21/2022	0.33				0.29		24			4.5				1.5		16		
12/19/2022							17		0.1 U							8.1		0.5 U
3/27/2023	0.44				0.31		9.1	10	0.1 U	3.70				2.00		17	17	0.5 U
6/9/2023							2.7	2.9								12	12	
9/21/2023	0.49				0.17		0.98		0.11	3.4				2.2		11		0.5 U
12/28/2023							17									7.3		

Table 3B. Summary of Groundwater Conventional Parameters: 2007 through 2023
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		
3/11/2021	NT				NT		NT		
6/16/2021	NT				NT		NT		
9/30/2021	NT				NT		NT		
12/23/2021	NT				NT		NT		
3/11/2022	NT				NT		NT		
6/30/2022	NT				NT		NT		
9/21/2022	NT				NT		NT		
12/19/2022	NT				NT		NT		
3/27/2023	NT				NT		NT		
6/9/2023	NT				NT		NT		
9/21/2023	NT				NT		NT		
12/28/2023	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 9-29-2014 appears erroneous as it is unusally 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 presence of coliforms listed as NQ (not quanitified).

Table 3C. Summary of Groundwater Metals: 2007 through 2023
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	
3/11/2021	5.0 U	5.0 U			5.0 U		34.0			120	104			9.6		50.8		
6/16/2021							14.0	8.0 J								99.2	85.0	
9/30/2021	5.0 U				5.0 U		NT			124				6.9		NT		
12/23/2021							5.0 U	5.0 U								35.2	39.2	
3/11/2022	20.0 U				20.0 U		20.0 U			104				5.0 U		61.7		
6/30/2022							20.0 U	20.0 U								102	104	
9/21/2022	20.0 U				20.0 U		20.0 U			141				5.7		80.3		
12/19/2022							27.0									87.2		
3/27/2023	0.33				0.17		19.9	18.2	0.08 U	41.4				10.0 U		36.7	41.5	10.0 U
6/9/2023							46.8	33.3								113	95.5	
9/21/2023	0.34				0.15		7.05		0.08 U	87.4				10.0 U		106.0		10.0 U
12/28/2023							7.5									10.0 U		

Table 3C. Summary of Groundwater Metals: 2007 through 2023
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		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 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 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 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 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 U		37,100		10	1,250				3,240		6,590		10.0
12/29/2020							40,200	41,900								6,100	6,310	
3/11/2021	20 U	20 U			20 U		37,100			449	453			2,360		4,260		
6/16/2021							39,700	30,300								4,710	4,490	
9/30/2021	20 U				20 U		NT			1,340				1,570		NT		
12/23/2021							7,590	7,580								5,080	5,520	
3/11/2022	77				30 U		29,400			519				1,360		5,570		
6/30/2022							51,500	52,300								6,030	6,250	
9/21/2022	30 U				30 U		19,900			359				968		6,870		
12/19/2022							44,500									5,120		
3/27/2023	30 U				30 U		39,100	38,600	30 U	686				940		6,670	6,860	10.0 U
6/9/2023							45,000	33,100								4,600	4,440	
9/21/2023	30 U				30 U		21,300		30 U	1,340				1,130		5,900		10.0 U
12/28/2023							1,020									719		

Table 3C. Summary of Groundwater Metals: 2007 through 2023
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
3/11/2021																		
6/16/2021	NT				NT		NT		NT	NT				NT		NT		NT
9/30/2021	NT				NT		NT		NT	NT				NT		NT		NT
12/23/2021	NT				NT		NT		NT	NT				NT		NT		NT
3/11/2022																		
6/30/2022	NT				NT		NT		NT	NT				NT		NT		NT
9/21/2022	NT				NT		NT		NT	NT				NT		NT		NT
12/19/2022	NT				NT		NT		NT	NT				NT		NT		NT
3/27/2023	NT				NT		NT		NT	NT				NT		NT		NT
6/9/2023	NT				NT		NT		NT	NT				NT		NT		NT
9/21/2023	NT				NT		NT		NT	NT				NT		NT		NT
12/28/2023	NT				NT		NT		NT	NT				NT		NT		NT

Table 3C. Summary of Groundwater Metals: 2007 through 2023
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		
3/11/2021										NT				NT		NT		
6/16/2021	NT				NT		61	58		NT				NT		NT		
9/30/2021	NT				NT		NT	NT		NT				NT		NT		
12/23/2021	NT				NT		NT	NT		NT				NT		NT		
3/11/2022										NT				NT		NT		
6/30/2022	NT				NT		61	58		NT				NT		NT		
9/21/2022	NT				NT		NT	NT		NT				NT		NT		
12/19/2022	NT				NT		NT	NT		NT				NT		NT		
3/27/2023	NT				NT		NT	NT		NT				NT		NT		
6/9/2023	NT				NT		NT	NT		NT				NT		NT		
9/21/2023	NT				NT		NT	NT		NT				NT		NT		
12/28/2023	NT				NT		NT	NT		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 2023

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
3/11/2021	0.5 U	0.5 U	NT		0.5 U		0.5 U		NT
12/19/2022	0.2 U		NT		0.2 U		0.2 U		NT
9/21/2023	0.5 U		NT		0.5 U		0.5 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, February 2010, August & November 2012 samples collected as part of quarterly monitoring activities; 2013-2023 samples collected annually.

Table 4. Parameters Statistically Higher than Background: 1989 to 2023

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			0.60	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
Conventionals	Ammonia as Nitrogen	2023	mg/L	0.55			0.15
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			19.8	1.4
Metals	Arsenic	2003	µg/L			16.7	1.3
Metals	Arsenic	2004	µg/L			13.7	2.1
Metals	Arsenic	2005	µg/L			12.6	2.3
Metals	Arsenic	2006	µg/L			6.5	3.5
Metals	Arsenic	2007	µg/L			5	ND (< 5 µg/L)
Metals	Arsenic	2008	µg/L	5.4		3.7	1.7
Metals	Arsenic	2009	µg/L	8.4		2.8	1.6
Metals	Arsenic	2010	µg/L	10.8			ND (<5 µg/L)
Metals	Arsenic	2011	µg/L	15.4			2
Metals	Arsenic	2012	µg/L	19.2			2.5
Metals	Arsenic	2013	µg/L	26.3			3.1
Metals	Arsenic	2014	µg/L	23.4			0.3
Metals	Arsenic	2015	µg/L	27.1			0.4
Metals	Arsenic	2016	µg/L	20.0			0.4
Metals	Arsenic	2017	µg/L	21.0			8.0
Metals	Arsenic	2018	µg/L	24.3			ND (<5 µg/L)
Metals	Arsenic	2019	µg/L	34			ND (<5 µg/L)
Metals	Arsenic	2023	µg/L	23.3			0.34
Metals	Barium	1993	µg/L			84	29
Metals	Barium	1994	µg/L			89	32
Metals	Barium	1995	µg/L			124	49

Table 4. Parameters Statistically Higher than Background: 1989 to 2023

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	Carbon, Total Organic	1989	mg/L			12.6	2.5
Conventionals	Carbon, Total Organic	1991	mg/L	9.2		9.5	1.5
Conventionals	Carbon, Total Organic	2018	mg/L	28.0			4.8
Conventionals	Carbon, Total Organic	2019	mg/L	6.3			2.6
Conventionals	Chemical Oxygen Demand	1989	mg/L	43			10
Conventionals	Chemical Oxygen Demand	1991	mg/L	33		45	12.3
Conventionals	Chemical Oxygen Demand	1992	mg/L		66		16
Conventionals	Chemical Oxygen Demand	2014	mg/L	23.9			11.9
Conventionals	Chemical Oxygen Demand	2015	mg/L	18.5			15.2
Conventionals	Chemical Oxygen Demand	2018	mg/L	45			13.0
Conventionals	Chemical Oxygen Demand	2022	mg/L	29.1			5.0
Conventionals	Chemical Oxygen Demand	2023	mg/L	31			5.0
Conventionals	Chloride	2022	mg/L	63			16.7
Conventionals	Chloride	2023	mg/L	85			10.2
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

Table 4. Parameters Statistically Higher than Background: 1989 to 2023

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	Iron	2017	µg/L	25,488			661
Metals	Iron	2018	µg/L	55,650			38
Metals	Iron	2019	µg/L	39,900			30
Metals	Iron	2020	µg/L	40,313			50
Metals	Iron	2021	µg/L	26,562			20
Metals	Iron	2022	µg/L	36,763			46
Metals	Iron	2023	µg/L	36,425			15
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
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	3,965			2,200
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	Manganese	2021	µg/L	4,720			896
Metals	Manganese	2022	µg/L	5,925			439
Metals	Manganese	2023	µg/L	5,873			686
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	pH	2023	--	6.35			6.19
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			15.8

Table 4. Parameters Statistically Higher than Background: 1989 to 2023

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	Sulfate	2002	mg/L	19.6			16.7
Conventionals	Tannin and Lignin	1991	mg/L	4.4		8.5	0.3
Conventionals	Tannin and Lignin	1992	mg/L	1.0			0.2
Conventionals	Tannin and Lignin	1993	mg/L			2.5	0.5
Conventionals	Tannin and Lignin	1994	mg/L	0.7		5.1	0.5
Conventionals	Tannin and Lignin	1996	mg/L			0.1	0.1
Conventionals	Tannin and Lignin	2001	mg/L			7.4	5.6
Conventionals	Tannin and Lignin	2011	mg/L	3.1			1.3
Conventionals	Tannin and Lignin	2014	mg/L	8.2			1.1
Conventionals	Tannin and Lignin	2019	mg/L	24.4			1.9
Conventionals	Tannin and Lignin	2020	mg/L	18.7			0.6
Conventionals	Tannin and Lignin	2022	mg/L	26.3			0.3
Conventionals	Tannin and Lignin	2023	mg/L	17.9			0.4
Metals	Zinc	2010	µg/L			5.3	4.4
Metals	Zinc	2013	µg/L	2.4			ND (<10 µg/L)

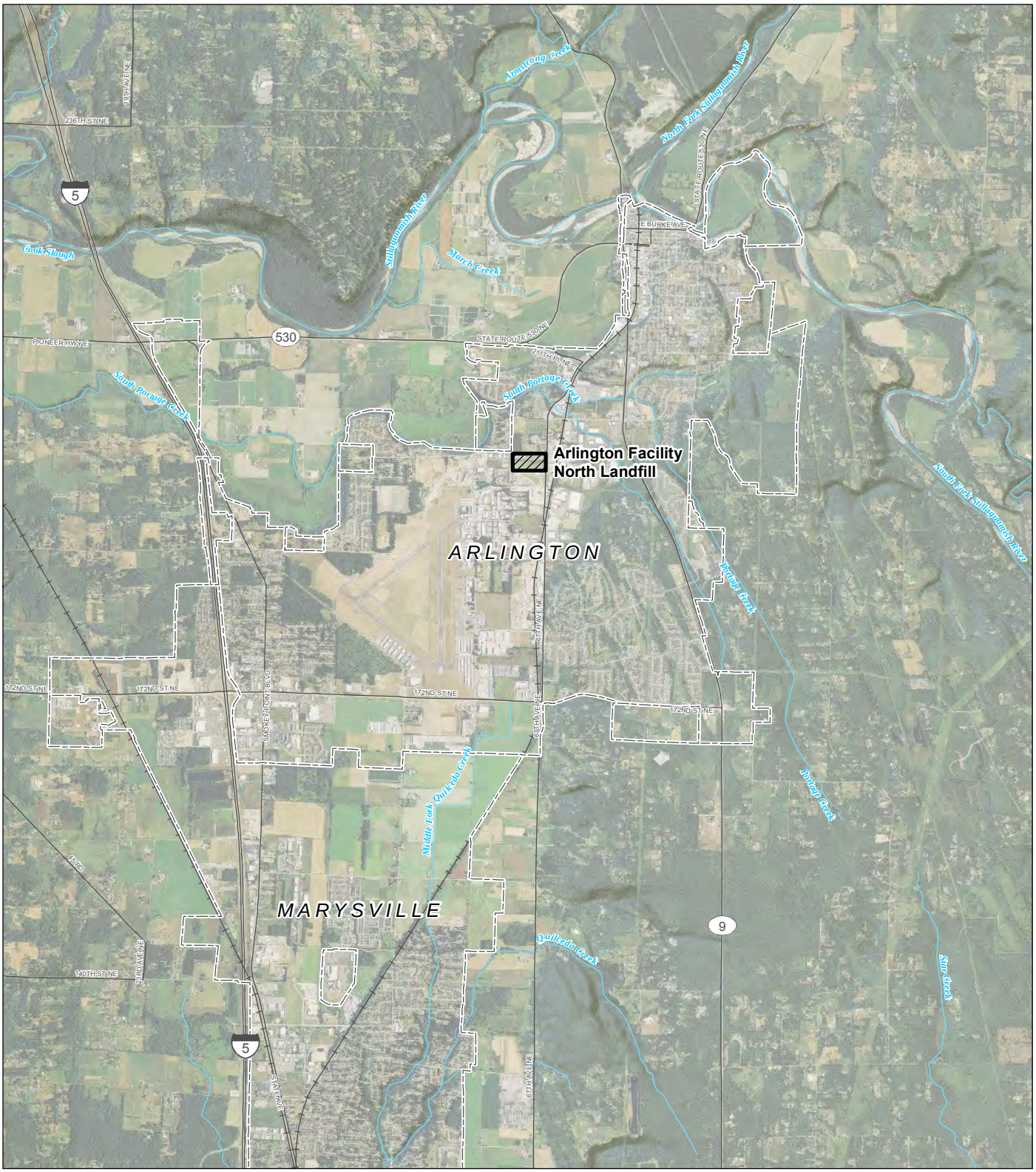
Notes

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 > mean value of the upgradient well. Value in downgradient wells not shown if mean value is not > 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.

Document Path: P:\Portland\302 - Baxter\GIS\Arlington_Landfills\Project_mxds\North\2014_Annual_Report\Figure1_Site_Vicinity_Map.mxd

FIGURE 2

Groundwater Elevation Contour Map: First Quarter 2023

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

LEGEND

- Monitoring Well (February 2023 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.

Document Path: P:\Portland\302 - Baxter\GIS\Arlington_Landfills\Project_mxds\2016_Annual_Report\N_Figure2_GW_Elev_1Q_2016.mxd

FIGURE 3

Groundwater Elevation Contour Map: Third Quarter 2023

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

LEGEND

- Monitoring Well (September 2023 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.

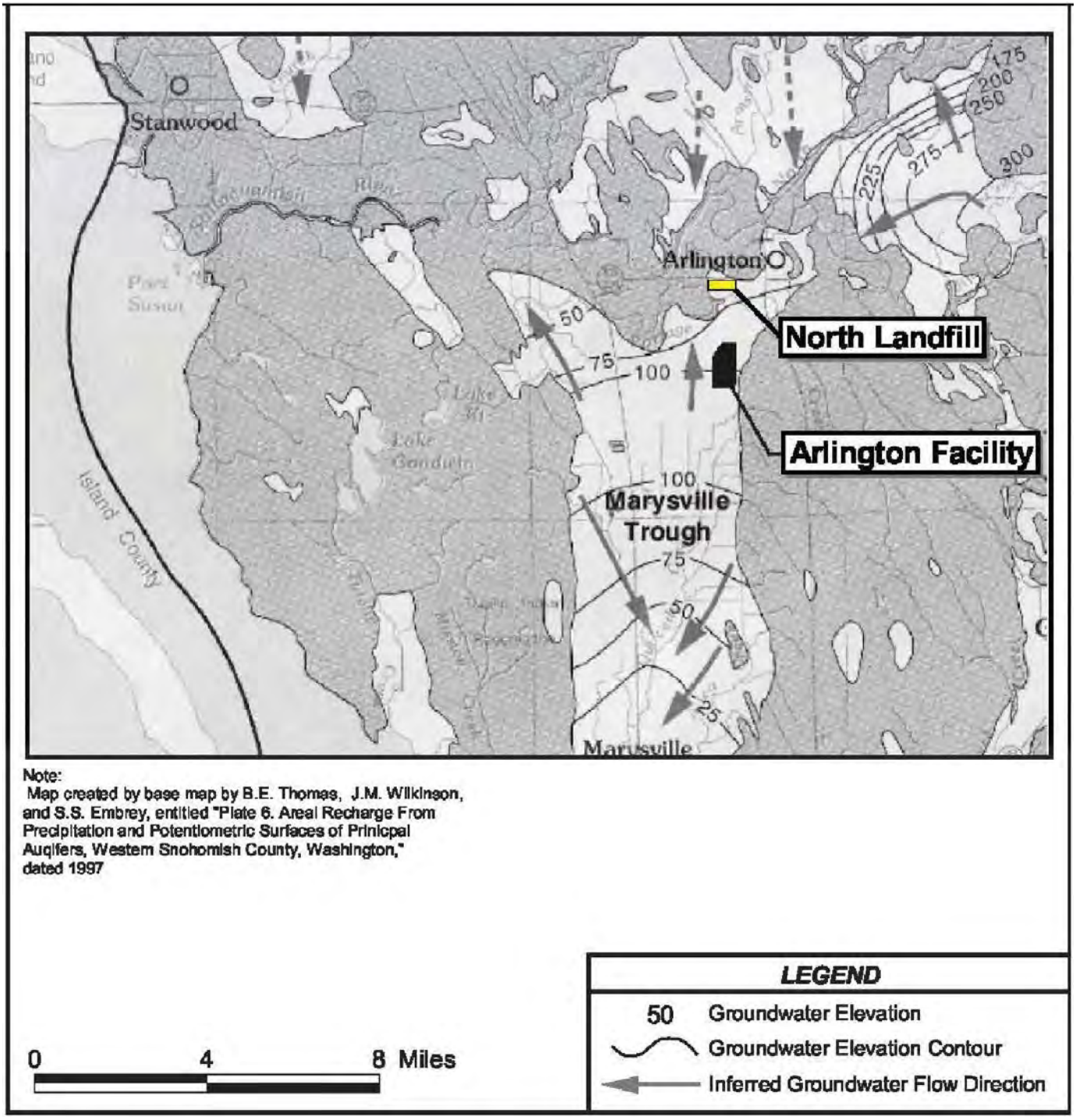
N

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.

Document Path: P:\Portland\302 - Baxter\GIS\Arlington_Landfills\Project_mxds\2016_Annual_Report\N_Figure3_GW_Elev_3Q_2016.mxd



N

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

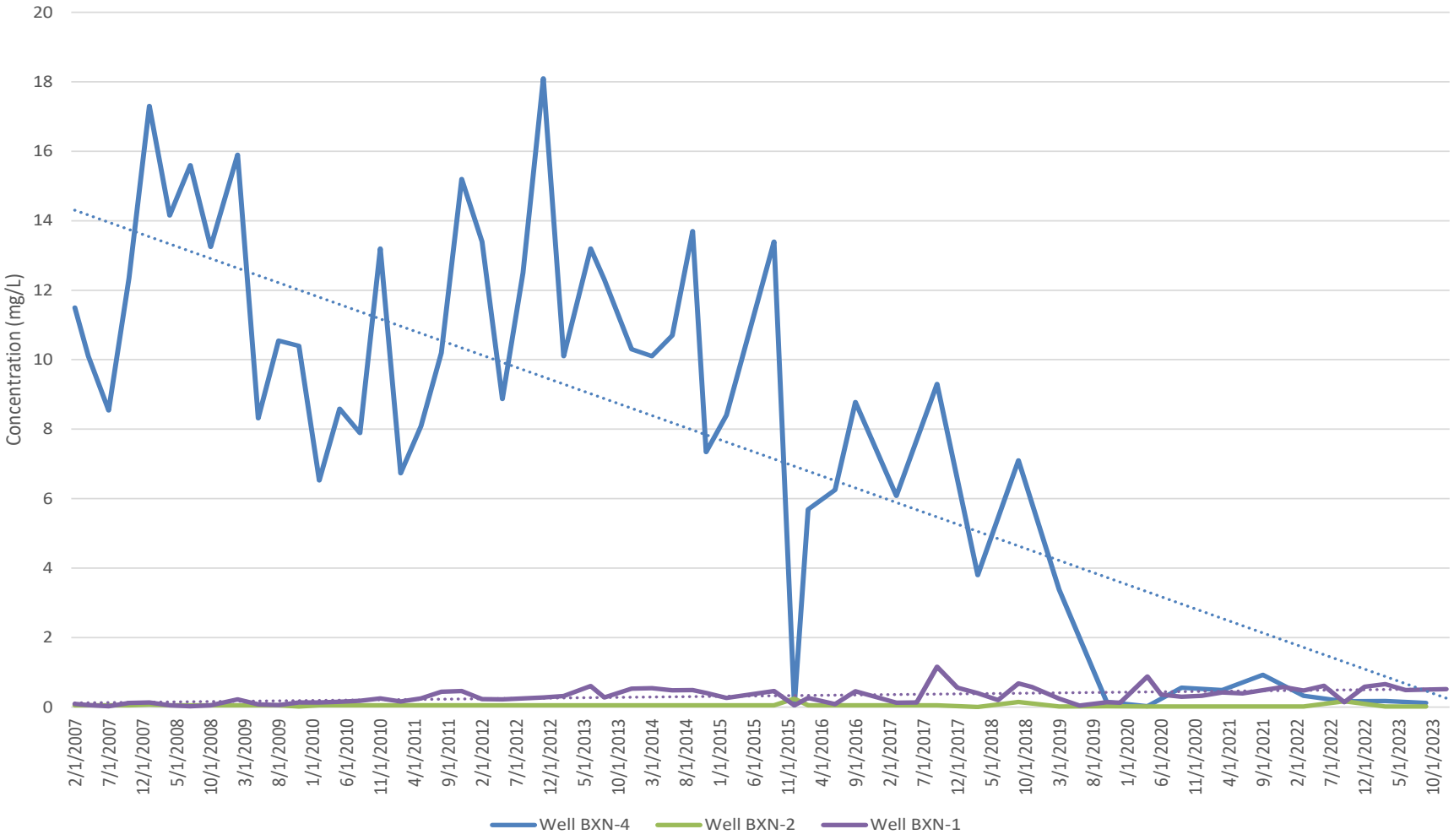


Figure 6
Arsenic Trend
North Wells

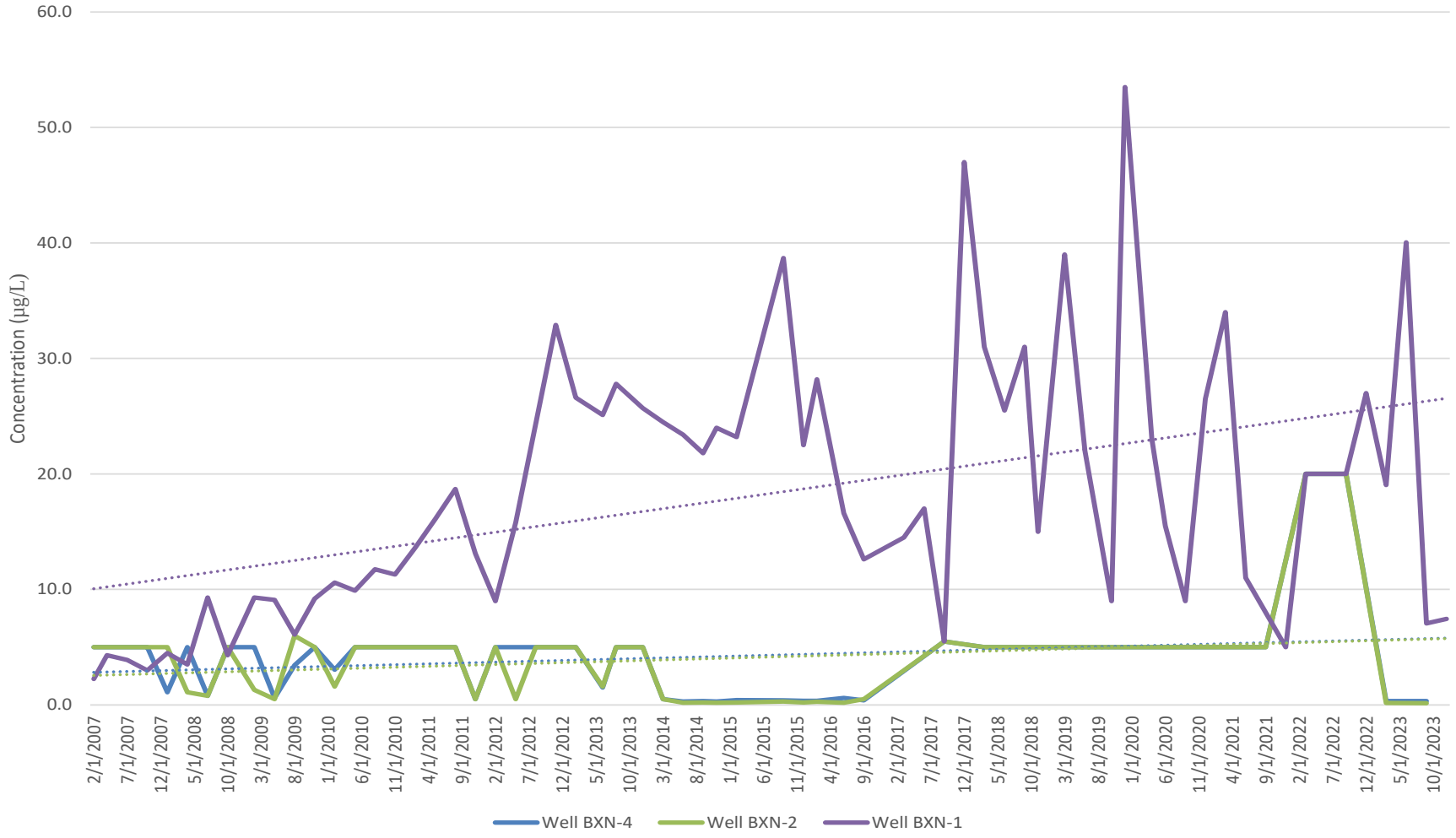


Figure 7
Barium Trend
North Wells

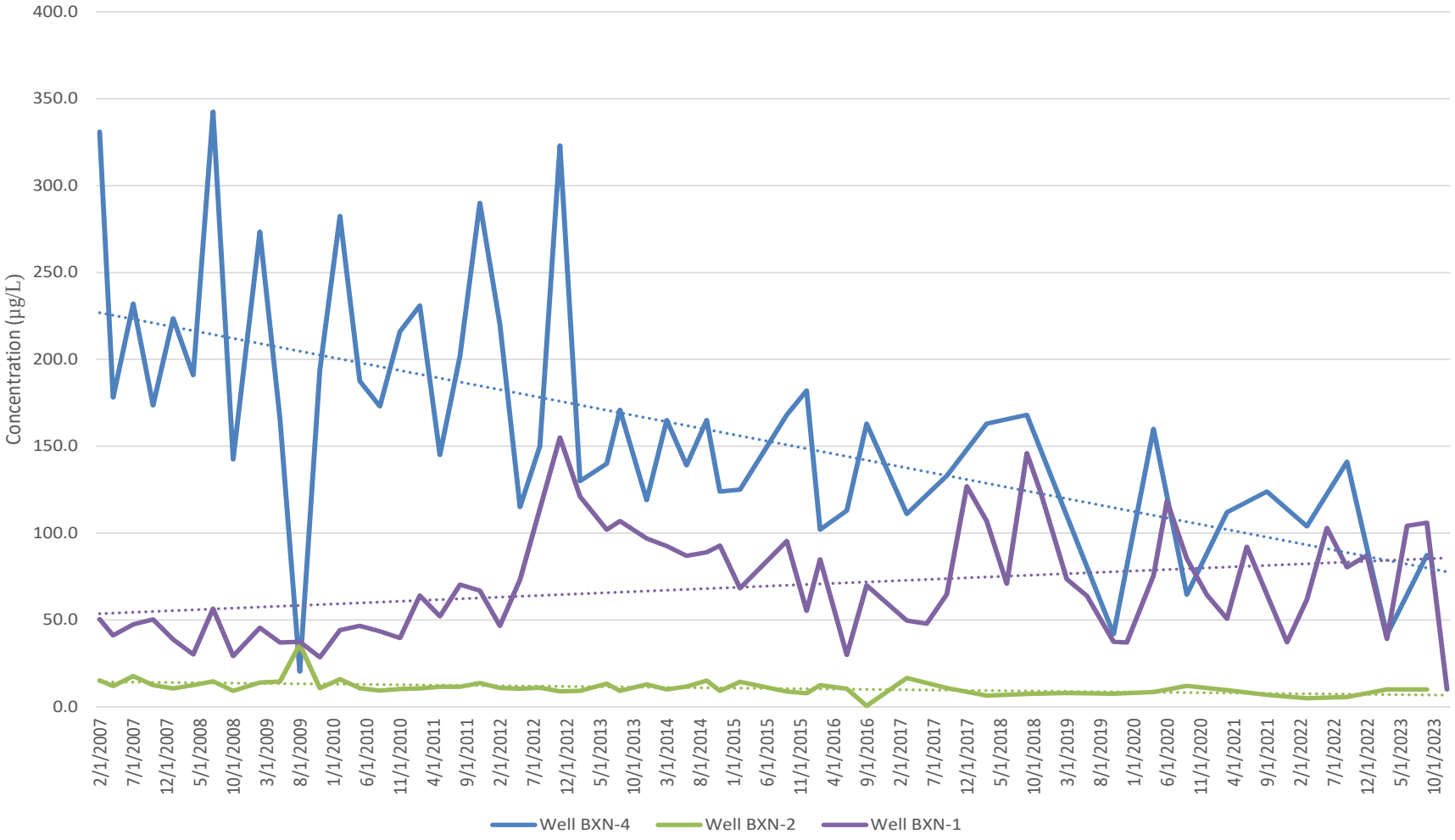


Figure 8
COD Trend
North Wells

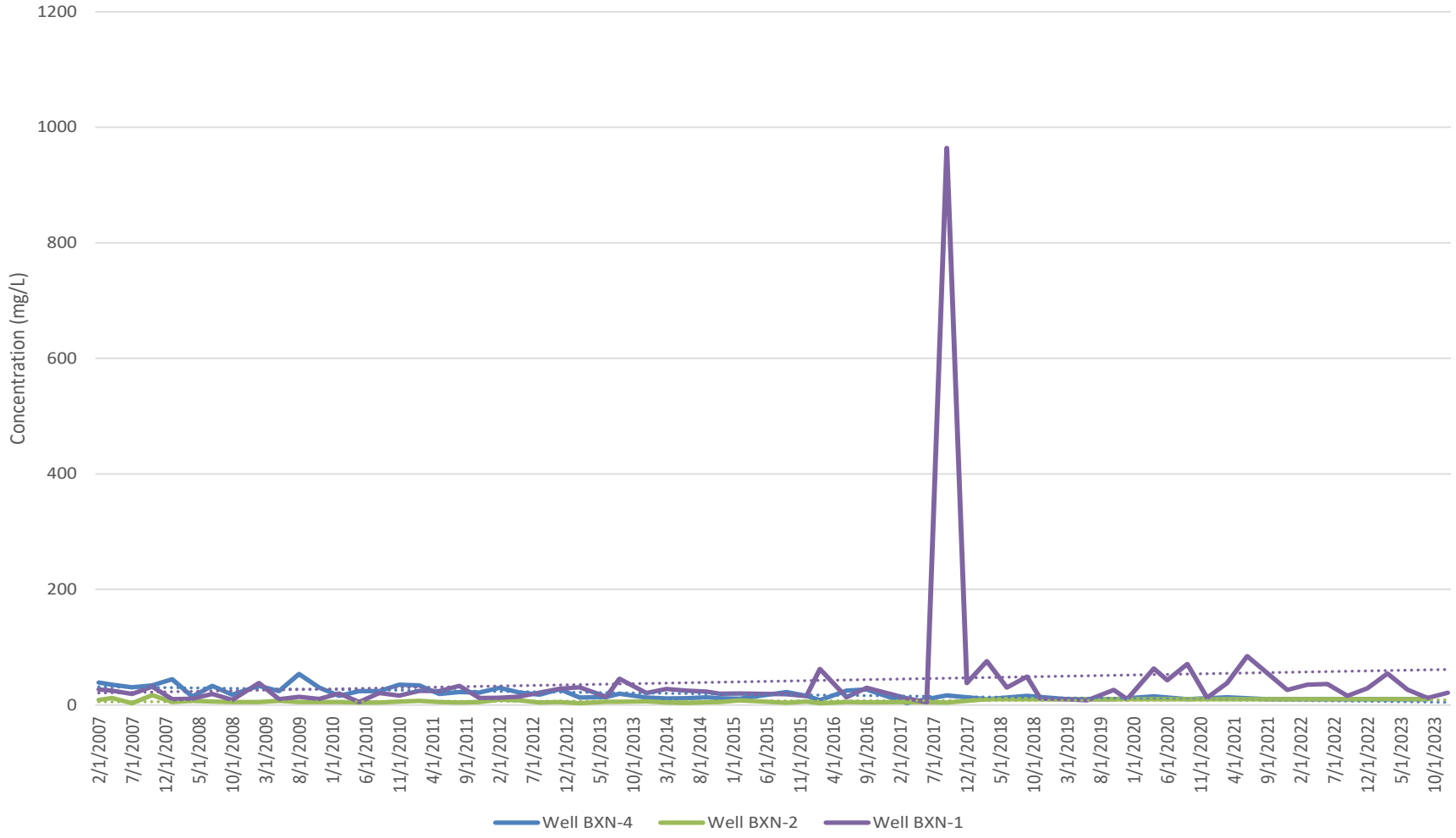


Figure 9
Chloride Trend
North Wells

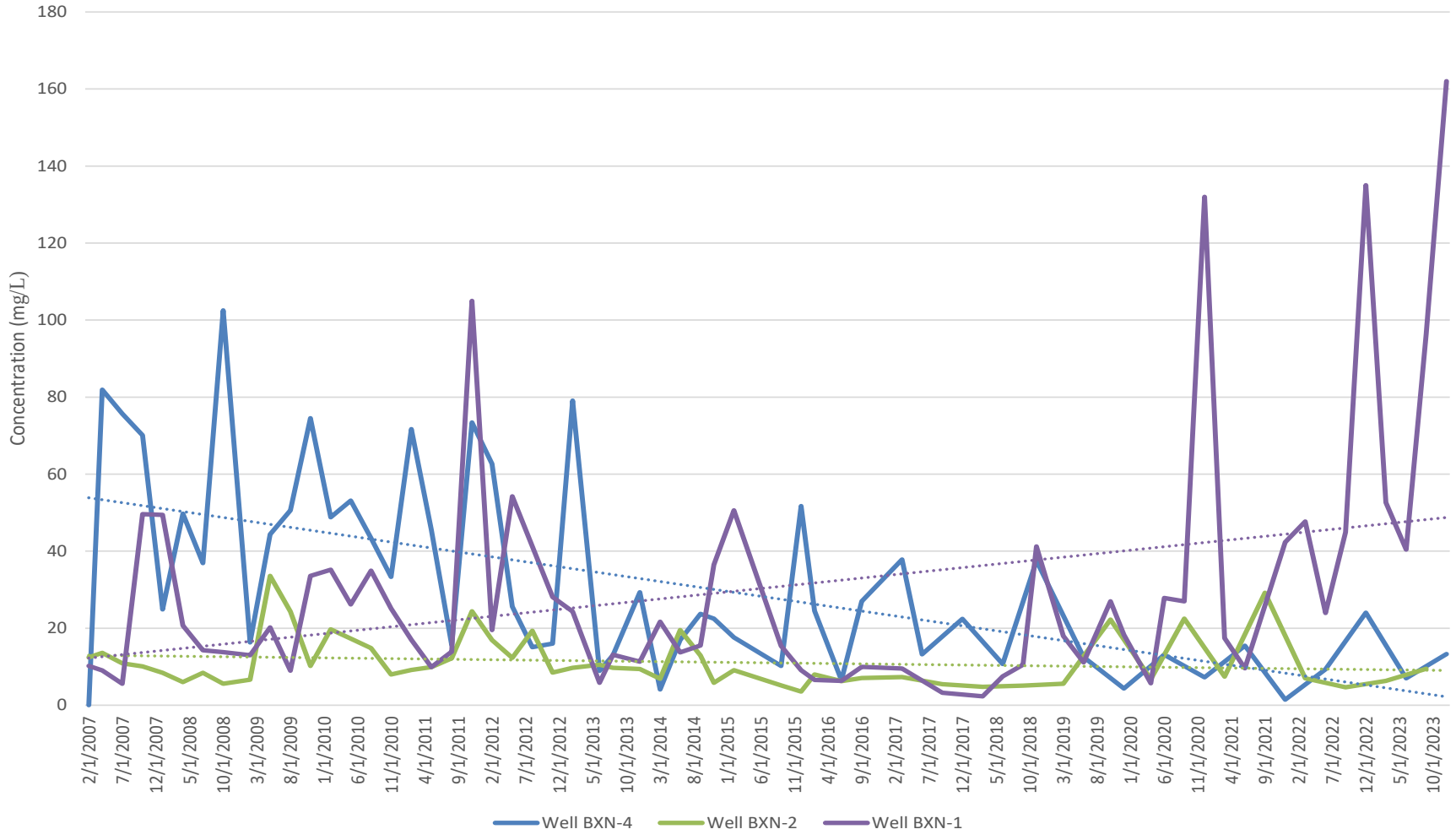


Figure 10
Iron Trend
North Wells

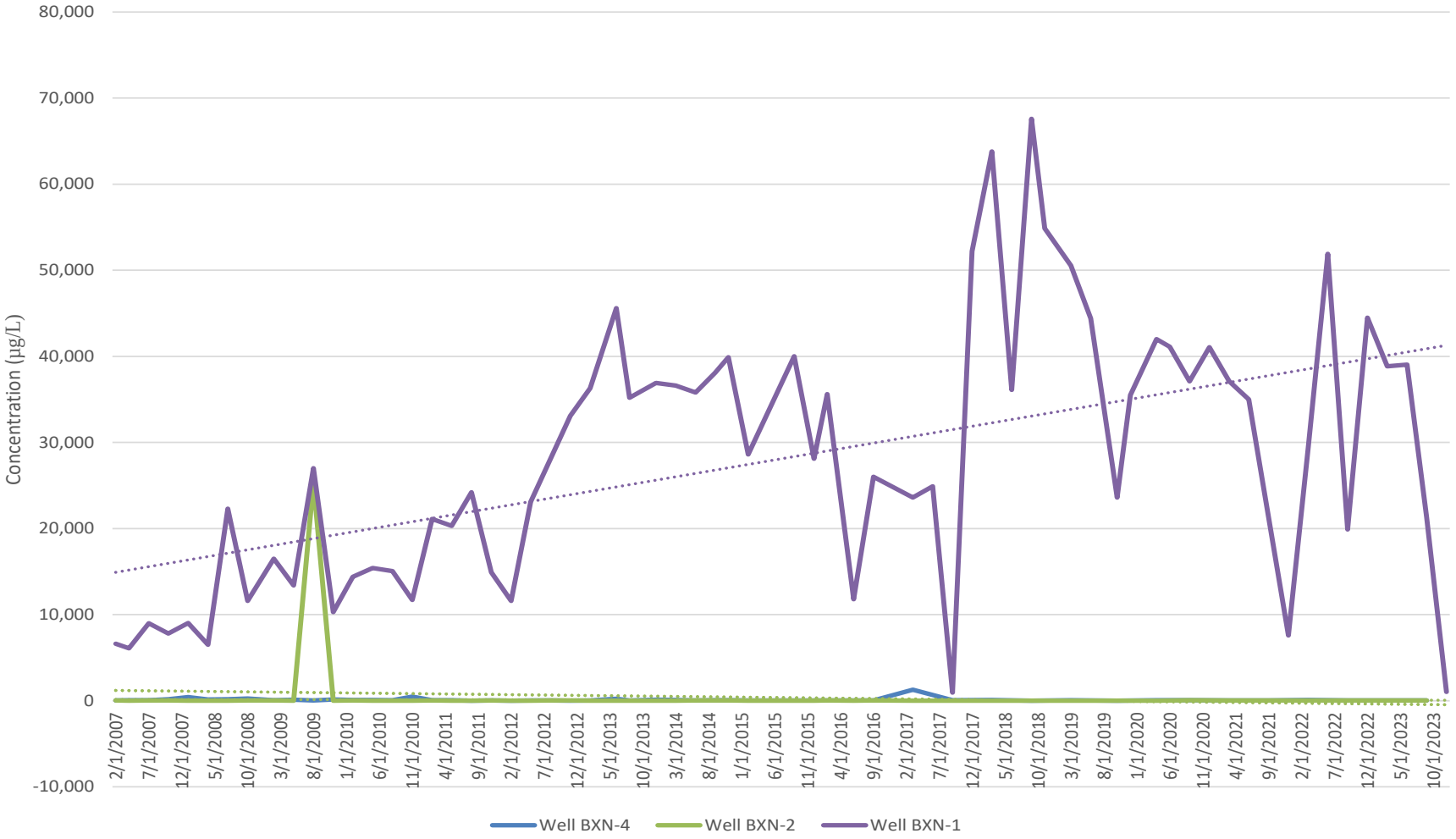


Figure 11
Manganese Trend
North Wells

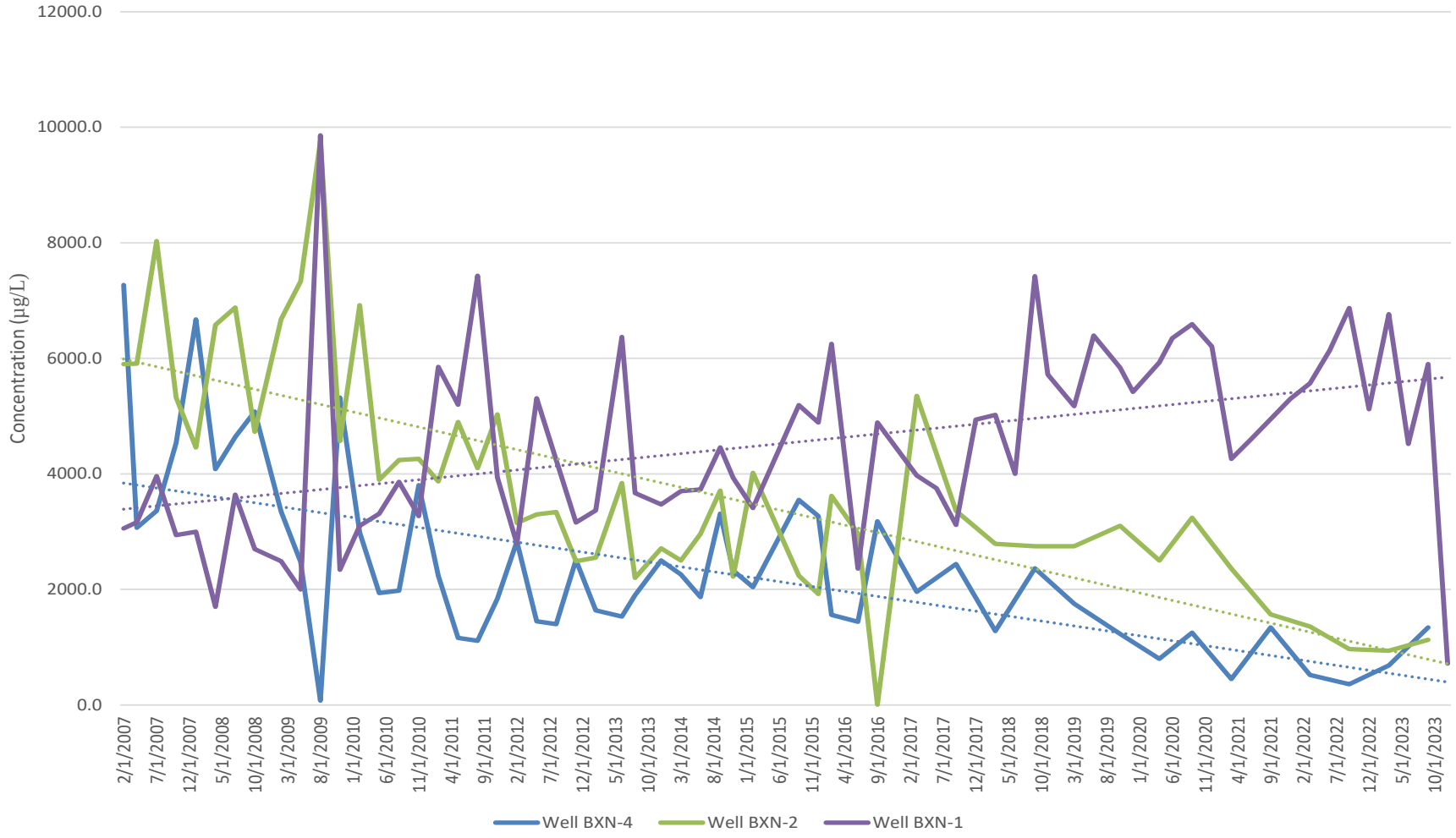


Figure 12
Nitrate+Nitrite Trend
North Wells

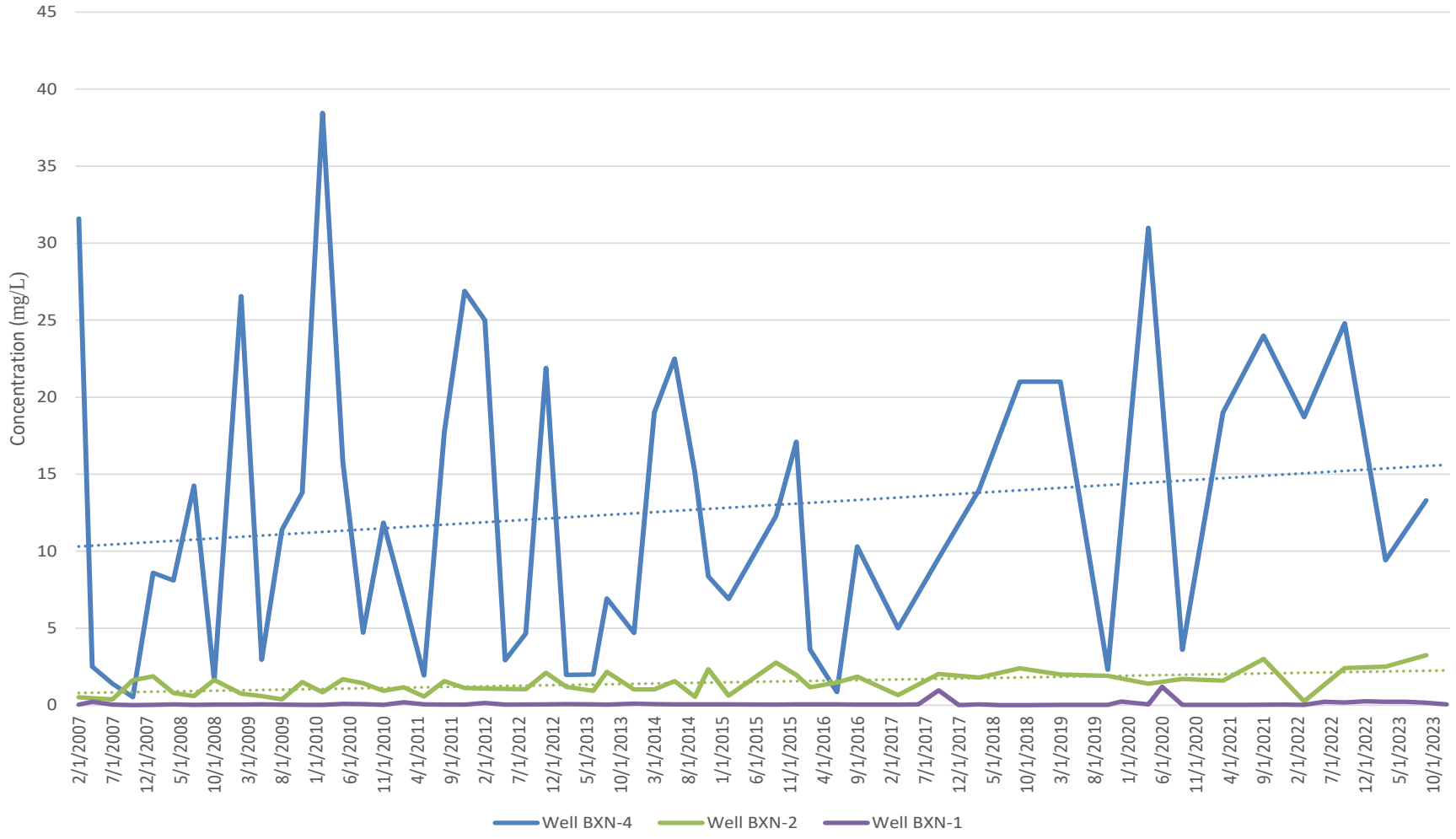


Figure 13
Field pH Trend
North Wells

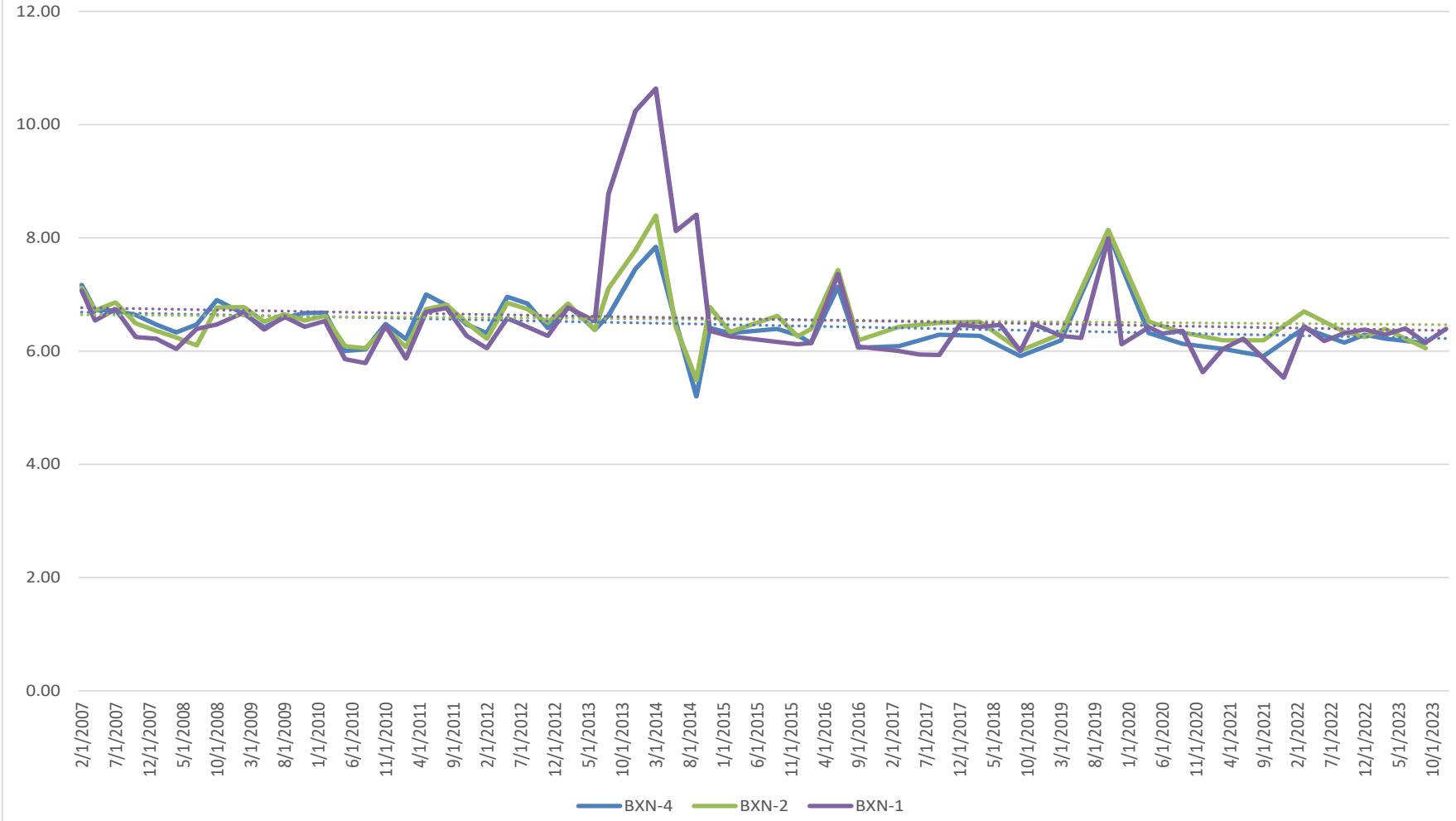


Figure 14
Sulfate Trend
North Wells

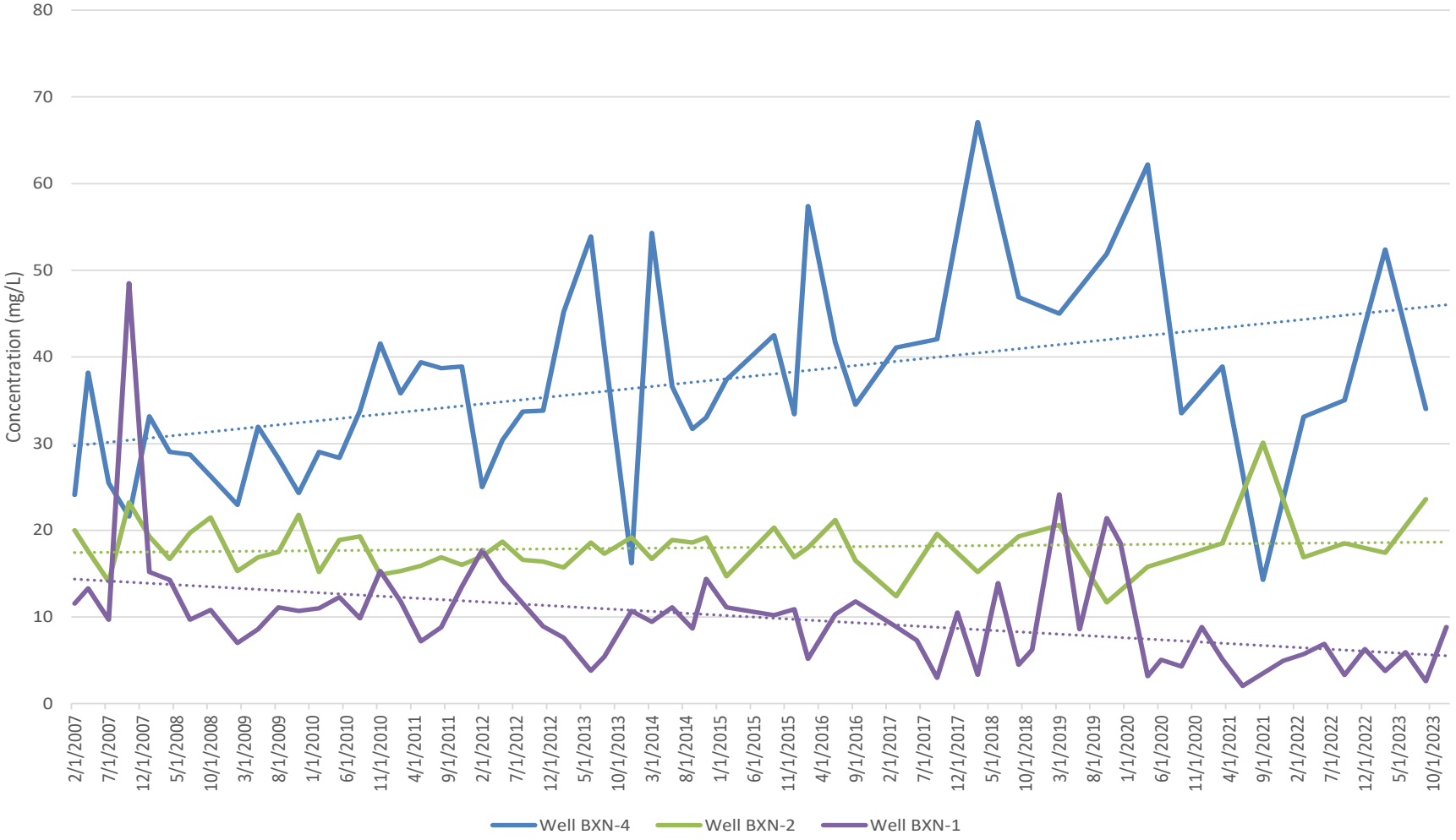


Figure 15
Tannin & Lignin Trend
North Wells

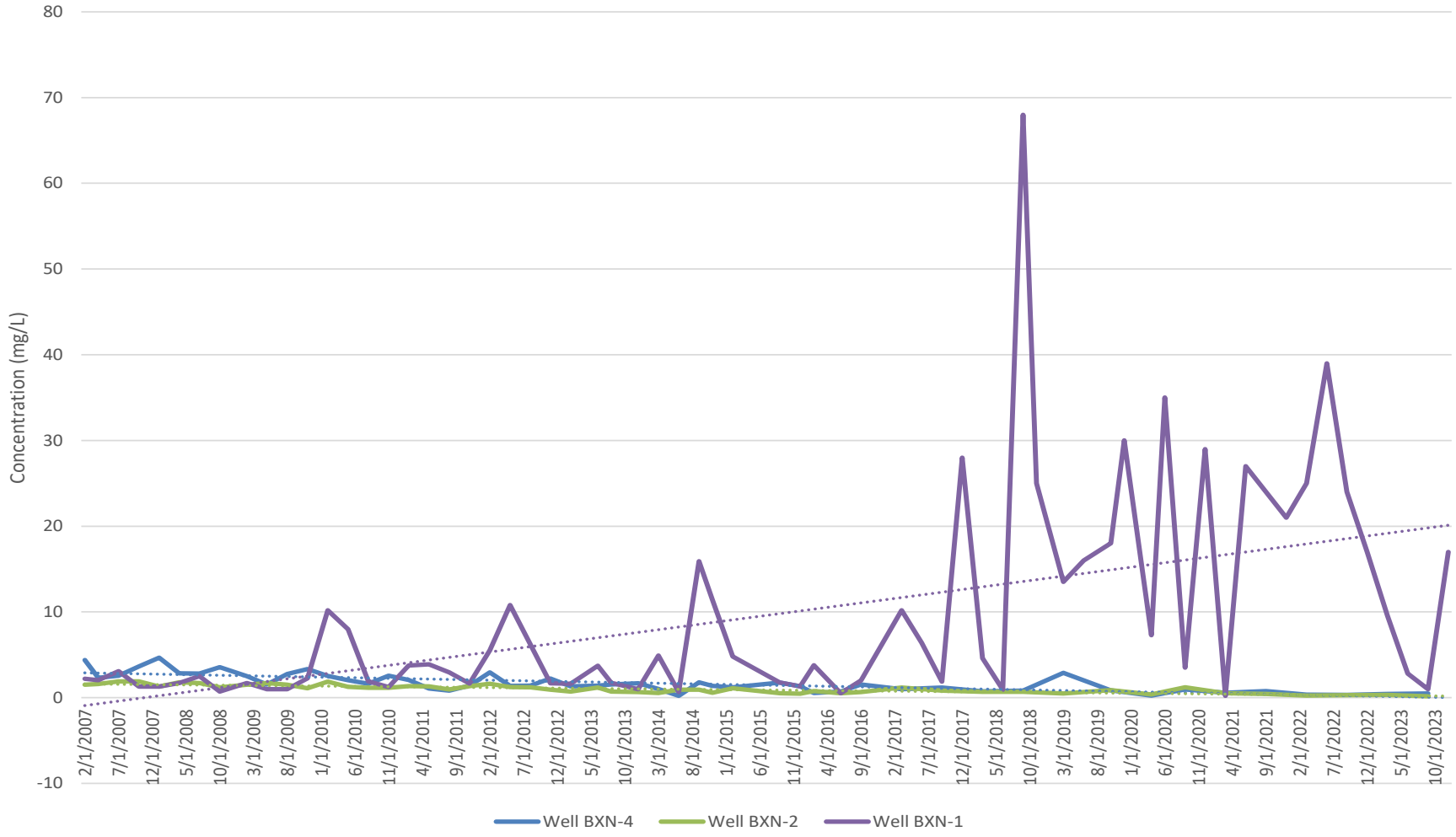


Figure 16
TDS Trend
North Wells

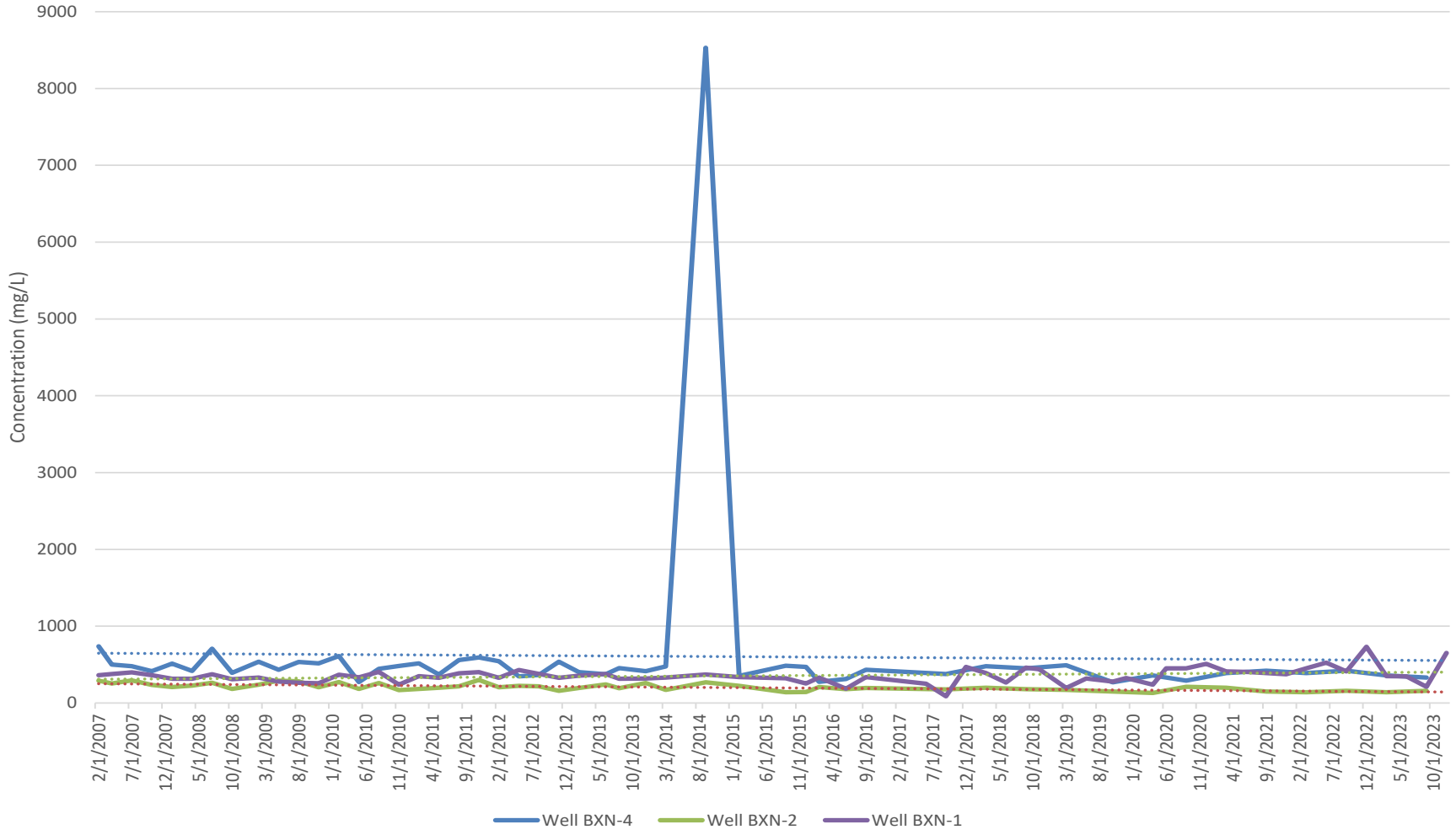
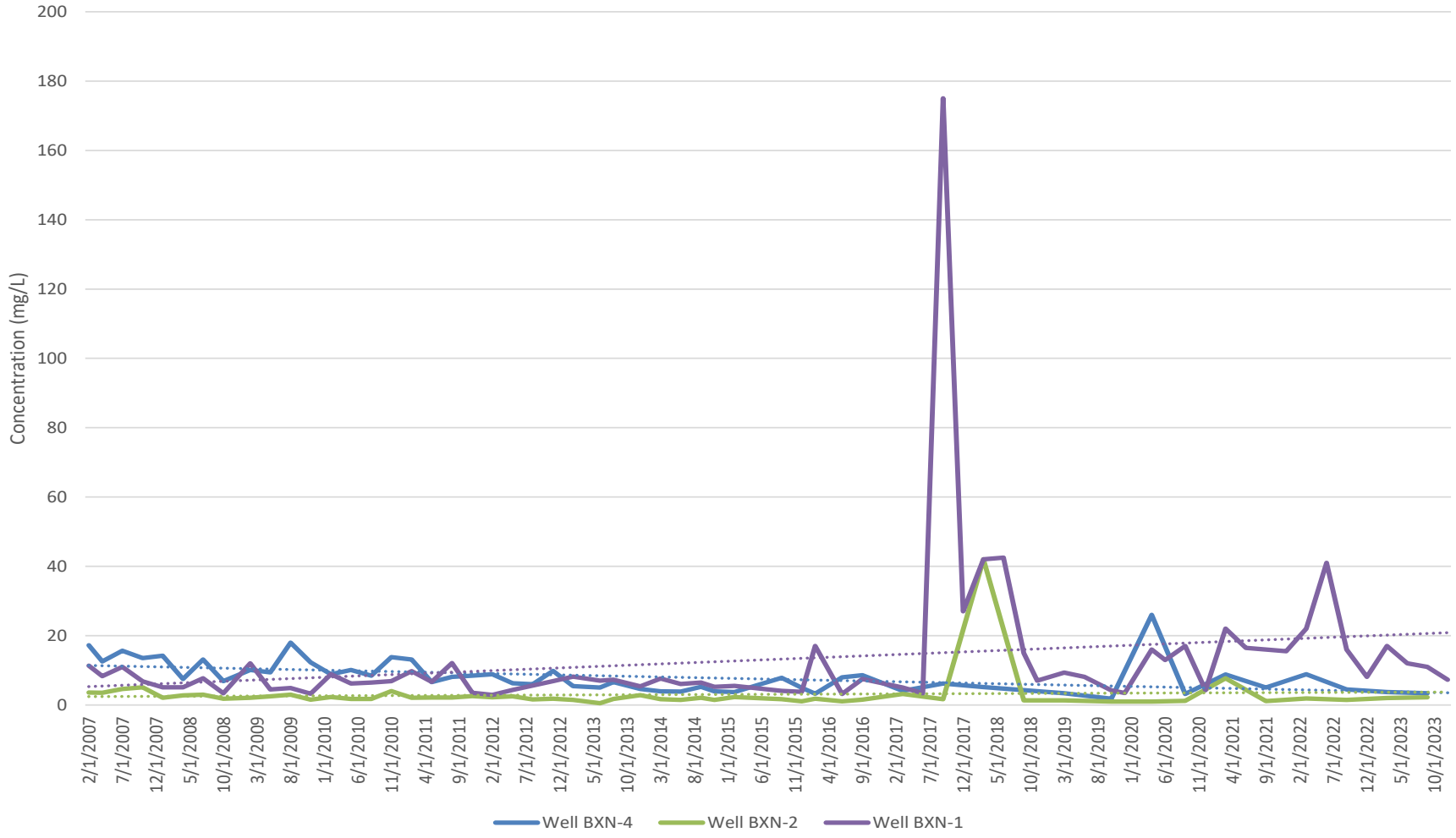


Figure 17
TOC Trend
North Wells



Appendix A

2023

Groundwater Monitoring Field Forms

Woodwaste Landfill Monitoring

Date: 3-27-23 Well ID: BXN-1 Tech: Kvam

Depth to Water: 47.50' Depth to Bottom: 58.18' Well Size: 2"

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

Sample Analysis:

Flow Rate:

Start time: 1621

Time	Flow rate	(gallons) Volume Removed	DTW	pH *	(µS/cm) COND	(°C) TEMP	ORP	(mg/L) DO	(NTUs) Turbidity
1622		0	47.50	6.74	1949	14.75	-3.3	2.53	104
1627		1.20		6.29	2171	13.30	-49.0	0.15	48.3
1632		2.20		6.24	2201	13.20	-53.3	0.06	42.1
1637		2.75		6.28	2210	13.40	-51.0	0.09	43.5
1642		3.20	47.50	6.29	2206	13.45	-51.0	0.09	44.4

All Parameters Stable at: 1642 Total Volume Removed: 3.50 gallons

Sample time: 1643

Signature: Bruce Kvam Date: 3/27/23 Time: 1710

BXN-101 Samples collected @ 1649

RINSATE Samples collected @ 1708

* Water quality measured with Aquaread Aquameter w/ flow-thru cell.

Woodwaste Landfill Monitoring

Date: 3-27-23 Well ID: BXN-2 Tech: KVam

Depth to Water: 43.73' Depth to Bottom: 57.24' Well Size: 2"

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

Sample Analysis:

Flow Rate:

Start time: 1524

Time	Flow rate	(gallons) Volume Removed	DTW	pH	(µS/cm) COND	(°C) TEMP	ORP	(mg/L) DO	(NTUs) Turbidity
1525		0	43.73	7.44	540	15.85	66.0	1.23	45.6
1530		1.0		6.56	581	13.95	90.0	0.29	44.6
1535		1.60		6.41	585	14.30	106.0	0.10	4.8
1540		2.70		6.41	589	14.10	105.0	0.02	43.9
1545		3.45	43.73	6.39	587	14.10	97.9	0.01	49.0

All Parameters Stable at: 1545 Total Volume Removed: 3.80 gallons

Sample time: 1546

Signature: Brian Kvam Date: 3-27-23 Time: 1548

Woodwaste Landfill Monitoring

Date: 3-27-23 Well ID: BXN-4 Tech: Kram

Depth to Water: 42.00' Depth to Bottom: 51.74' Well Size: 2"

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

Sample Analysis:

Flow Rate:

Start time: 1416

Time	Flow rate	(gallons) Volume Removed	DTW	pH	(µS/cm) COND	(°C) TEMP	ORP	(mg/L) DO	(NTUs) Turbidity
1417		0	42.00	6.30	1874	16.45	78.0	2.54	48.3
1422		1.25		6.26	1922	14.10	94.7	0.88	49.8
1427		2.55		6.23	1766	14.00	103.0	0.68	54.3
1432		4.20		6.22	1687	13.90	116.0	0.57	50.4
1437		5.50		6.24	1647	13.80	111.0	0.53	48.4
1442		6.50	42.00	6.22	1595	13.90	114.0	0.51	49.1

All Parameters Stable at: 1442 Total Volume Removed: 6.75 gallons

Sample time: 1443

Signature: Bruce Kram Date: 3-27-23 Time: 1450

Woodwaste Landfill Monitoring

Date: 6-9-23 Well ID: BXN-1 Tech: KVam

Depth to Water: 47.35' Depth to Bottom: 58.18' Well Size: 2"

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

Sample Analysis:

Flow Rate:

Start time: 1211

Time	Flow rate	Volume Removed (gallons)	DTW	pH	COND (µS/cm)	TEMP (C)	ORP	DO (mg/L)	~~NTU~~ † Turbidity
1212		0	47.35	6.37	630	12.41	-7.3	3.59	NM
1217		0.70		6.34	639	11.97	-22.8	2.03	NM
1222		1.65		6.30	637	11.96	-27.2	1.19	NM
1227		2.65		6.39	633	11.98	-28.7	0.95	NM
1232		3.30	47.35	6.40	632	11.99	-31.3	0.83	NM

All Parameters Stable at: 1232 Total Volume Removed: 24.1 gallons

Sample time: 1233

Signature: Bruce Kvam Date: 6-9-23 Time: 1241

† wiring issue MRS w/ flow-thru cell

† H2O in flow-thru cell is colorless & shows no suspended material

BXN-101 samples collected at 1240

Woodwaste Landfill Monitoring

Date: 9-21-23 Well ID: BXN-1 Tech: KVam

Depth to Water: 49.40' Depth to Bottom: 58.18' Well Size: 2"

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

Sample Analysis:

Flow Rate:

Start time: 1647

Time	Flow rate	Volume Removed (gallons)	DTW	pH	COND (mS/cm)	TEMP (°C)	ORP	DO (mg/L)	Turbidity +
1648		0	49.40	6.19	0.923	15.01	65.5	9.29	NM
1653		2.90		6.07	0.963	12.56	10.4	0.36	NM
+3.25 1658		4.30		6.11	0.930	12.66	-8.2	0.24	NM
1703		5.95		6.13	0.937	12.66	-17.0	0.19	NM
+6.25 1708		7.55		6.15	0.987	12.64	-21.0	0.17	NM
1713		9.65	49.40	6.15	0.986	12.67	-23.3	0.15	NM

All Parameters Stable at: 1713 Total Volume Removed: 10.25 gallons

Sample time: 1714

Signature: Bruce Kam Date: 9-21-23 Time: 1733

+ groundwater is colorless & transparent

RINSATE Samples collected @ 1732

Woodwaste Landfill Monitoring

Date: 9-21-23 Well ID: BXM-2 Tech: KVam

Depth to Water: 45.58' Depth to Bottom: 57.24' Well Size: 2"

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

Sample Analysis:

Flow Rate:

Start time: 1350

Time	Flow rate	Volume (gallons) Removed	DTW	pH *	COND (mS/cm)	TEMP (°C)	ORP	DO (mg/L)	Turbidity +
1357		0	45.58	6.87	0.217	17.21	59.0	8.50	NM
1556		1.10		6.06	0.212	13.77	54.1	0.54	NM
1601		2.80		6.02	0.230	13.62	47.7	0.32	NM
+2.80 1606		3.55		6.01	0.230	13.66	45.8	0.26	NM
1611		5.10	45.58	6.05	0.227	13.66	44.9	0.24	NM

All Parameters Stable at:

Total Volume Removed: ~~75.10~~ 75.30 gallons

Sample time: 1612

Signature: Brian Kvam Date: 9-21-23 Time: 1614

+ groundwater is colorless & transparent

* using YSI 556 MPS w/ flow-thru cell

Woodwaste Landfill Monitoring

Date: 9-21-23 Well ID: BXN-4 Tech: Kvam

Depth to Water: 44.60' Depth to Bottom: 57.74' Well Size: 2"

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

Sample Analysis:

Flow Rate:

Start time: 1451

Time	Flow rate	Volume (gallons) Removed	DTW	pH	COND (mS/cm)	TEMP (°C)	ORP	DO (mg/L)	Turbidity +
1452		0	44.60	6.43	0.554	21.02	88.5	8.16	NM
1457 ~~1455~~		0.55		6.12	0.633	14.59	90.2	0.89	NM
1502 ~~14~~		1.10		6.12	0.630	14.74	87.5	0.68	NM
1508		2.15		6.14	0.610	14.22	84.6	0.45	NM
1513		3.00		6.14	0.605	14.11	84.7	0.42	NM

All Parameters Stable at: 1513 Total Volume Removed: 3.35 gallons

Sample time: 1514

Signature: Bruce Kvam Date: 9-21-23 Time: 1515

+ groundwater is colorless & transparent

Woodwaste Landfill Monitoring

Date: 12-28-23 Well ID: BXN-1 Tech: KVam

Depth to Water: 49.60 Depth to Bottom: 58.18' Well Size: 2"

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

Sample Analysis:

Flow Rate:

Start time: 1055

Time	Flow rate	(Gallons) Volume Removed	DTW	pH *	(µS/cm) COND	(°C) TEMP	ORP	(mg/L) DO	Turbidity
1056		0	49.60	6.40	735	12.69	-100.2	4.00	NM
1101		3.5		6.40	774	12.83	-454.7	2.56	
1106		4.5		6.40	774	12.79	-458.2	2.30	
1111		6.25		6.40	771	12.73	-436.2	2.12	
1116		7.85		6.40	769	12.68	-440.9	1.91	
1121		9.50		6.39	773	12.77	-421.2	1.73	
1126		10.90	49.60	6.39	771	12.77	-406.5	1.60	

All Parameters Stable at: 1126

Total Volume Removed: 11.5 gallons

Sample time: 1128 +9.75 +9.75

Signature: Bruce Kram Date: 12-28-23 Time: 1130

* - Water quality measured with YSI model 556 w/ flow-thru cell.

Appendix C

2023

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*

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

BXN-4 (Upgradient Well)					
Date	Ammonia Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)	
2/29/2016	5.69	4	5.69	#DIV/0!	t_c = 2.447 v =6
6/6/2016	6.25	4	5.97	0.157	
9/26/2016	8.78	4	6.91	2.710	t_c = 2.571 v =5
3/9/2017	6.08	4	6.70	1.978	t_c = 2.776 v =4
6/11/2017	--	3	7.04	2.287	t_c =3.182 v =3
9/17/2017	9.30	3	8.05	2.988	t_c = 4.303 v =2
12/14/2017	--	2	7.69	5.184	t_c = 12.706 v =1
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	
3/11/2021	0.5	2	0.53	0.002	
6/16/2021	--	2	0.53	0.002	
9/30/2021	0.93	2	0.72	0.092	
12/23/2021	--	2	0.72	0.092	
3/11/2022	0.33	2	0.63	0.180	
6/30/2022	--	2	0.63	0.180	
9/21/2022	0.17	2	0.25	0.013	
12/19/2022	--	2	0.25	0.013	
3/27/2023	0.17	2	0.17	0.000	
6/9/2023	--	2	0.17	0.000	
9/21/2023	0.12	2	0.15	0.001	
12/28/2023	--	2	0.15	0.001	

BXN-3 (Downgradient Well)						
Date	Ammonia Concentration[1]	Number of Samples (n)	Average Concentration ($\bar{x}$)	Sample Variance (s^2)	Sample Standard Deviation (s)	Student T-Test Statistic (t)[2,3]
2/29/2016	0.03	4	0.03	#DIV/0!	#DIV/0!	*
6/6/2016	0.03	4	0.03	0.000	0.00	-30.03
9/26/2016	0.03	4	0.03	0.000	0.00	-8.36
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
3/11/2021	0.02	2	0.02	0.000	0.00	-17.00
6/16/2021	--	2	0.02	0.000	0.00	-17.00
9/30/2021	0.02	2	0.02	0.000	0.00	-3.23
12/23/2021	--	2	0.02	0.000	0.00	-3.23
3/11/2022	0.02	2	0.02	0.000	0.00	-2.03
6/30/2022	--	2	0.02	0.000	0.00	-2.03
9/21/2022	0.17	2	0.10	0.011	0.11	-1.41
12/19/2022	--	2	0.10	0.011	0.11	-1.41
3/27/2023	0.02	2	0.10	0.011	0.11	-1.00
6/9/2023	--	2	0.10	0.011	0.11	-1.00
9/21/2023	0.02	2	0.02	0.000	0.00	-5.00
12/28/2023	--	2	0.02	0.000	0.00	-5.00

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]**
2/29/2016	0.264	4	0.26	#DIV/0!	#DIV/0!	*
6/6/2016	0.084	4	0.17	0.016	0.13	-27.87
9/26/2016	0.454	4	0.27	0.034	0.19	-8.02
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
3/11/2021	0.42	4	0.35	0.003	0.05	-4.54
6/16/2021	0.4	4	0.36	0.003	0.06	-4.04
9/30/2021	--	3	0.38	0.003	0.05	-1.54
12/23/2021	0.58	3	0.47	0.010	0.10	-1.12
3/11/2022	0.47	3	0.48	0.008	0.09	-0.48
6/30/2022	0.61	3	0.55	0.005	0.07	-0.25
9/21/2022	0.14	4	0.45	0.046	0.22	1.49
12/19/2022	0.58	4	0.45	0.046	0.22	1.49
3/27/2023	0.66	4	0.50	0.058	0.24	2.72
6/9/2023	0.49	4	0.47	0.052	0.23	2.60
9/21/2023	0.5	4	0.56	0.006	0.08	**8.80**
12/28/2023	0.52	4	0.54	0.006	0.08	**8.48**

Notes

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

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

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

[1] For non-detect concentrations, half of the reporting limit (MRL) is used.

[2] Statistic in bold or gray is a statistically valid detection (Student's T-Test).

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

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

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

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

BXN-4 (Upgradient Well)				
Date	Chloride Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
2/29/2016	6.52	4	6.52	#DIV/0!
6/6/2016	27.00	4	16.76	209.715
9/26/2016	37.80	4	23.77	252.418
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
3/11/2021	15.5	2	11.35	34.445
6/16/2021	--	2	11.35	34.445
9/30/2021	1.5	2	8.50	98.000
12/23/2021	--	2	8.50	98.000
3/11/2022	9.36	2	5.43	30.890
6/30/2022	--	2	5.43	30.890
9/21/2022	24	2	16.68	107.165
12/19/2022	--	2	16.68	107.165
3/27/2023	7	2	15.50	144.500
6/9/2023	--	2	15.50	144.500
9/21/2023	13.3	2	10.15	19.845
12/28/2023	--	2	10.15	19.845

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]
2/29/2016	7.97	4	7.97	#DIV/0!	#DIV/0!	*
6/6/2016	6.27	4	7.12	1.445	1.20	*
9/26/2016	7.05	4	7.10	0.724	0.85	*
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
3/11/2021	7.43	2	14.97	113.552	10.66	0.42
6/16/2021	--	2	14.97	113.552	10.66	0.42
9/30/2021	29.2	2	18.32	236.966	15.39	0.76
12/23/2021	--	2	18.32	236.966	15.39	0.76
3/11/2022	7	2	18.10	246.420	15.70	1.08
6/30/2022	--	2	18.10	246.420	15.70	1.08
9/21/2022	4.67	2	5.84	2.714	1.65	-1.46
12/19/2022	--	2	5.84	2.714	1.65	-1.46
3/27/2023	6.3	2	5.49	1.328	1.15	-1.17
6/9/2023	--	2	5.49	1.328	1.15	-1.17
9/21/2023	9.45	2	7.88	4.961	2.23	-0.65
12/28/2023	--	2	7.88	4.961	2.23	-0.65

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]**
2/29/2016	6.54	4	6.54	#DIV/0!	#DIV/0!	*
6/6/2016	6.29	4	6.42	0.031	0.18	*
9/26/2016	9.97	4	7.60	4.228	2.06	*
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
3/11/2021	17.4	4	51.06	2933.956	54.17	1.45
6/16/2021	9.6	4	46.50	3299.640	57.44	1.21
9/30/2021	--	3	53.00	4695.960	68.53	1.11
12/23/2021	42.3	3	23.10	291.690	17.08	1.21
3/11/2022	47.7	3	33.20	425.010	20.62	2.22
6/30/2022	23.95	3	37.98	154.991	12.45	**3.97**
9/21/2022	44.9	4	39.71	115.287	10.74	2.54
12/19/2022	135	4	62.89	2423.517	49.23	1.80
3/27/2023	52.7	4	64.14	2379.142	48.78	1.88
6/9/2023	40.4	4	68.25	2006.070	44.79	2.20
9/21/2023	96.4	4	81.13	1867.449	43.21	**3.25**
12/28/2023	162	4	87.88	3019.449	54.95	**2.81**

Notes

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

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

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

[1] For non-detect concentrations, half of the reporting limit (MRL) is used.

[2] Statistic in bold or gray is a statistically valid detection (Student's T-Test).

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

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

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

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

BXN-4 (Upgradient Well)				
Date	TOC Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
2/29/2016	3.22	4	3.22	#DIV/0!
6/6/2016	7.96	4	5.59	11.234
9/26/2016	8.61	4	6.01	5.506
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
3/11/2021	8.8	2	7.53	71.209
6/16/2021	--	2	7.53	71.209
9/30/2021	5	2	7.50	71.370
12/23/2021	--	2	7.50	71.370
3/11/2022	8.9	2	8.16	69.486
6/30/2022	--	2	8.16	69.486
9/21/2022	4.5	2	8.31	67.915
12/19/2022	--	2	8.31	67.915
3/11/2022	3.7	2	8.59	64.305
6/30/2022	--	2	8.59	64.305
9/21/2022	3.4	2	5.36	6.083
12/19/2022	--	2	5.36	6.083

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]
2/29/2016	1.81	4	1.81	#DIV/0!	#DIV/0!	*
6/6/2016	1.03	4	1.42	0.304	0.55	-2.46
9/26/2016	1.55	4	1.46	0.158	0.40	-3.82
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
3/11/2021	7.7	2	4.45	21.125	4.60	-0.45
6/16/2021	--	2	4.45	21.125	4.60	-0.45
9/30/2021	1.1	2	4.40	21.780	4.67	-0.45
12/23/2021	--	2	4.40	21.780	4.67	-0.45
3/11/2022	1.9	2	1.50	0.320	0.57	-1.13
6/30/2022	--	2	1.50	0.320	0.57	-1.13
9/21/2022	1.5	2	1.70	0.080	0.28	-1.13
12/19/2022	--	2	1.70	0.080	0.28	-1.13
3/11/2022	2	2	1.75	0.125	0.35	-1.20
6/30/2022	--	2	1.75	0.125	0.35	-1.20
9/21/2022	2.2	2	2.10	0.020	0.14	-1.86
12/19/2022	--	2	2.10	0.020	0.14	-1.86

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]**
2/29/2016	17.00	4	17.00	#DIV/0!	#DIV/0!	*
6/6/2016	3.20	4	10.10	95.220	9.76	0.87
9/26/2016	7.47	4	9.22	49.916	7.07	0.86
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
3/11/2021	22	4	14.06	56.35	7.51	0.93
6/16/2021	16.5	4	14.94	56.93	7.55	1.05
9/30/2021	--	3	14.25	82.56	9.09	0.85
12/23/2021	15.5	3	18.00	12.25	3.50	1.67
3/11/2022	22	3	18.00	12.25	3.50	1.58
6/30/2022	41	3	26.17	175.58	13.25	1.86
9/21/2022	16	4	23.63	142.90	11.95	1.83
12/19/2022	8.1	4	21.78	196.67	14.02	1.48
3/11/2022	17	4	20.53	202.17	14.22	1.31
6/30/2022	12	4	13.28	16.57	4.07	0.78
9/21/2022	11	4	12.03	13.74	3.71	2.62
12/19/2022	7.3	4	11.83	15.99	4.00	2.44

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*

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

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

BXN-4 (Upgradient Well)				
Date	COD Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
2/29/2016	8.6	4	8.60	#DIV/0!
6/6/2016	24.8	4	16.70	131.220
9/26/2016	27.1	4	20.17	101.663
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
3/11/2021	13.5	2	11.75	6.125
6/16/2021	--	2	11.75	6.125
9/30/2021	10	2	11.75	6.125
12/23/2021	--	2	11.75	6.125
3/11/2022	5	2	7.50	12.500
6/30/2022	--	2	7.50	12.500
9/21/2022	5	2	5.00	0.000
12/19/2022	--	2	5.00	0.000
3/27/2023	5	2	5.00	0.000
6/9/2023	--	2	5.00	0.000
9/21/2023	5	2	5.00	0.000
12/28/2023	--	2	5.00	0.000

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]
2/29/2016	3.2	4	#REF!	#REF!	#REF!	*
6/6/2016	2.5	4	#REF!	#REF!	#REF!	*
9/26/2016	4.7	4	3.47	1.263	1.12	-3.29
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
3/11/2021	10	2	10.00	0.000	0.00	-1.00
6/16/2021	--	2	10.00	0.000	0.00	-1.00
9/30/2021	10	2	10.00	0.000	0.00	-1.00
12/23/2021	--	2	10.00	0.000	0.00	-1.00
3/11/2022	5	2	7.50	12.500	3.54	0.00
6/30/2022	--	2	7.50	12.500	3.54	0.00
9/21/2022	5	2	5.00	0.000	0.00	*
12/19/2022	--	2	5.00	0.000	0.00	*
3/27/2023	5	2	5.00	0.000	0.00	*
6/9/2023	--	2	5.00	0.000	0.00	*
9/21/2023	5	2	5.00	0.000	0.00	*
12/28/2023	--	2	5.00	0.000	0.00	*

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]**
2/29/2016	62.4	4	62.40	#DIV/0!	#DIV/0!	*
6/6/2016	13.2	4	37.80	1210.320	34.79	1.15
9/26/2016	29.7	4	35.10	627.030	25.04	1.11
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
3/11/2021	38	4	41.13	575.06	23.98	2.42
6/16/2021	84.5	4	51.50	1057.50	32.52	2.43
9/30/2021	--	3	45.00	1332.75	36.51	1.57
12/23/2021	26	3	49.50	954.75	30.90	2.11
3/11/2022	35	3	48.50	992.25	31.50	2.23
6/30/2022	36.5	3	32.50	32.25	5.68	**6.06**
9/21/2022	16	4	28.38	89.56	9.46	**4.94**
12/19/2022	29	4	29.13	87.06	9.33	**5.17**
3/27/2023	54.5	4	34.00	258.50	16.08	**3.61**
6/9/2023	26.5	4	31.50	266.83	16.34	**3.24**
9/21/2023	12	4	30.50	312.17	17.67	**2.89**
12/28/2023	21	4	28.50	336.17	18.33	2.56

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

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

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

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

BXN-4 (Upgradient Well)				
Date	$NO_3 + NO_2$ Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
2/29/2016	3.62	4	3.62	#DIV/0!
6/6/2016	0.85	4	2.24	3.834
9/26/2016	10.30	4	4.92	23.596
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
3/11/2021	19	2	11.30	118.580
6/16/2021	--	2	11.30	118.580
9/30/2021	24	2	21.50	12.500
12/23/2021	--	2	21.50	12.500
3/11/2022	18.7	2	21.35	14.045
6/30/2022	--	2	21.35	14.045
9/21/2022	24.8	2	21.75	18.605
12/19/2022	--	2	21.75	18.605
3/27/2023	9.41	2	17.11	118.426
6/9/2023	--	2	17.11	118.426
9/21/2023	13.3	2	11.36	7.566
12/28/2023	--	2	11.36	7.566

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]
2/29/2016	1.160	4	1.16	#DIV/0!	#DIV/0!	*
6/6/2016	1.470	4	1.32	0.048	0.22	*
9/26/2016	1.860	4	1.50	0.123	0.35	*
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
3/11/2021	1.6	2	1.65	0.005	0.07	-1.25
6/16/2021	--	2	1.65	0.005	0.07	-1.25
9/30/2021	3	2	2.30	0.980	0.99	-7.40
12/23/2021	--	2	2.30	0.980	0.99	-7.40
3/11/2022	0.25	2	1.63	3.781	1.94	-6.61
6/30/2022	--	2	1.63	3.781	1.94	-6.61
9/21/2022	2.41	2	1.33	2.333	1.53	-6.31
12/19/2022	--	2	1.33	2.333	1.53	-6.31
3/27/2023	2.5	2	2.46	0.004	0.06	-1.90
6/9/2023	--	2	2.46	0.004	0.06	-1.90
9/21/2023	3.24	2	2.87	0.274	0.52	-4.29
12/28/2023	--	2	2.87	0.274	0.52	-4.29

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]**
2/29/2016	0.050	4	0.05	#DIV/0!	#DIV/0!	*
6/6/2016	0.050	4	0.05	0.000	0.00	*
9/26/2016	0.034	4	0.04	0.000	0.01	*
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**
3/11/2021	0.020	4	0.31	0.342	0.59	**-1.43**
6/16/2021	0.020	4	0.02	0.000	0.00	**-1.46**
9/30/2021	--	3	0.02	0.000	0.00	-8.59
12/23/2021	0.045	3	0.03	0.000	0.01	-8.59
3/11/2022	0.020	3	0.03	0.000	0.01	-8.05
6/30/2022	0.228	3	0.10	0.013	0.11	-8.02
9/21/2022	0.170	4	0.12	0.010	0.10	-7.09
12/19/2022	0.250	4	0.17	0.011	0.10	-7.08
3/27/2023	0.220	4	0.22	0.001	0.03	**-2.19**
6/9/2023	0.220	4	0.22	0.001	0.03	**-2.19**
9/21/2023	0.170	4	0.22	0.001	0.03	-5.73
12/28/2023	0.050	4	0.17	0.006	0.08	-5.75

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*

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

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

BXN-4 (Upgradient Well)				
Date	pH Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
2/29/2016	6.45	4	6.45	#DIV/0!
6/6/2016	6.37	4	6.41	0.003
9/26/2016	6.42	4	6.41	0.002
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
3/11/2021	6.04	2	6.09	0.004
6/16/2021	--	2	6.09	0.004
9/30/2021	5.91	2	5.98	0.008
12/23/2021	--	2	5.98	0.008
3/11/2022	6.41	2	6.16	0.125
6/30/2022	--	2	6.16	0.125
9/21/2022	6.15	2	6.28	0.034
12/19/2022	--	2	6.28	0.034
3/27/2023	6.22	2	6.19	0.002
6/9/2023	--	2	6.19	0.002
9/21/2023	6.14	2	6.18	0.003
12/28/2023	--	2	6.18	0.003

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]
2/29/2016	6.71	4	6.71	#DIV/0!	#DIV/0!	*
6/6/2016	6.80	4	6.76	0.004	0.06	*
9/26/2016	6.64	4	6.72	0.006	0.08	*
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
3/11/2021	6.19	2	6.26	0.010	0.10	2.10
6/16/2021	--	2	6.26	0.010	0.10	2.10
9/30/2021	6.19	2	6.19	0.000	0.00	3.31
12/23/2021	--	2	6.19	0.000	0.00	3.31
3/11/2022	6.7	2	6.45	0.130	0.36	0.80
6/30/2022	--	2	6.45	0.130	0.36	0.80
9/21/2022	6.34	2	6.52	0.065	0.25	1.08
12/19/2022	--	2	6.52	0.065	0.25	1.08
3/27/2023	6.39	2	6.37	0.001	0.04	4.18
6/9/2023	--	2	6.37	0.001	0.04	4.18
9/21/2023	6.05	2	6.22	0.058	0.24	0.23
12/28/2023	--	2	6.22	0.058	0.24	0.23

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]
2/29/2016	6.29	4	6.29	#DIV/0!	#DIV/0!	*
6/6/2016	6.64	4	6.47	0.061	0.25	*
9/26/2016	6.53	4	6.49	0.032	0.18	*
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
3/11/2021	6.04	4	6.09	0.112	0.33	0.00
6/16/2021	6.22	4	6.06	0.100	0.32	-0.14
9/30/2021	--	3	5.96	0.091	0.30	-0.06
12/23/2021	5.53	3	5.93	0.128	0.36	-0.21
3/11/2022	6.44	3	6.06	0.225	0.47	-0.26
6/30/2022	6.18	3	6.05	0.220	0.47	-0.30
9/21/2022	6.32	4	6.12	0.165	0.41	-0.67
12/19/2022	6.37	4	6.33	0.012	0.11	0.34
3/27/2023	6.29	4	6.29	0.006	0.08	1.97
6/9/2023	6.4	4	6.35	0.002	0.05	**3.74**
9/21/2023	6.15	4	6.30	0.012	0.11	1.78
12/28/2023	6.39	4	6.31	0.013	0.12	1.81

Notes

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

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

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

[1] For non-detect concentrations, half of the reporting limit (MRL) is used.

[2] Statistic in bold or gray is a statistically valid detection (Student's T-Test).

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

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

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

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

$t_c = 2.571$ $v = 5$

$t_c = 2.776$ $v = 4$

$t_c = 3.182$ $v = 3$

$t_c = 4.303$ $v = 2$

$t_c = 12.706$ $v = 1$

BXN-4 (Upgradient Well)				
Date	TDS Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
2/29/2016	275	4	275.00	#DIV/0!
6/6/2016	314	4	294.50	760.500
9/26/2016	432	4	340.33	6682.333
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
3/11/2021	390	2	340.00	5000.000
6/16/2021	--	2	340.00	5000.000
9/30/2021	420	2	405.00	450.000
12/23/2021	--	2	405.00	450.000
3/11/2022	390	2	405.00	450.000
6/30/2022	--	2	405.00	450.000
9/21/2022	420	2	405.00	450.000
12/19/2022	--	2	405.00	450.000
3/27/2023	360	2	390.00	1800.000
6/9/2023	--	2	390.00	1800.000
9/21/2023	330	2	345.00	450.000
12/28/2023	--	2	345.00	450.000

BXN-2 (Downgradient Well)						
Date	TDS Concentration[1]	Number of Samples (n)	Average Concentration (x)	Sample Variance (s^2)	Sample Standard Deviation (s)	Student's T-Test Statistic (t)[2]
2/29/2016	207	4	207.00	#DIV/0!	#DIV/0!	*
6/6/2016	181	4	194.00	338.000	18.38	*
9/26/2016	195	4	194.33	169.333	13.01	*
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
3/11/2021	200	2	205.00	50.000	7.07	-2.69
6/16/2021	--	2	205.00	50.000	7.07	-2.69
9/30/2021	150	2	175.00	1250.000	35.36	-7.89
12/23/2021	--	2	175.00	1250.000	35.36	-7.89
3/11/2022	140	2	145.00	50.000	7.07	-16.44
6/30/2022	--	2	145.00	50.000	7.07	-16.44
9/21/2022	160	2	150.00	200.000	14.14	-14.14
12/19/2022	--	2	150.00	200.000	14.14	-14.14
3/27/2023	140	2	150.00	200.000	14.14	-7.59
6/9/2023	--	2	150.00	200.000	14.14	-7.59
9/21/2023	160	2	150.00	200.000	14.14	-10.82
12/28/2023	--	2	150.00	200.000	14.14	-10.82

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]**
2/29/2016	332	4	332.00	#DIV/0!	#DIV/0!	*
6/6/2016	186	4	259.00	10658.000	103.24	*
9/26/2016	336	4	284.67	7305.333	85.47	*
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
3/11/2021	410	4	455.00	1700.000	41.23	2.13
6/16/2021	405	4	443.75	2356.250	48.54	1.87
9/30/2021	--	3	441.67	3508.333	59.23	0.98
12/23/2021	375	3	396.67	358.333	18.93	-0.45
3/11/2022	450	3	410.00	1425.000	37.75	0.19
6/30/2022	525	3	450.00	5625.000	75.00	0.98
9/21/2022	410	4	440.00	4150.000	64.42	0.99
12/19/2022	730	4	528.75	20272.917	142.38	1.70
3/27/2023	350	4	503.75	28022.917	167.40	1.28
6/9/2023	345	4	458.75	33572.917	183.23	0.71
9/21/2023	210	4	408.75	50072.917	223.77	0.56
12/28/2023	650	4	388.75	34539.583	185.85	0.46

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*

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

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

BXN-4 (Upgradient Well)				
Date	Sulfate Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
2/29/2016	57.40	4	57.40	#DIV/0!
6/6/2016	41.70	4	49.55	123.245
9/26/2016	34.50	4	44.53	137.123
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
3/11/2021	38.9	2	36.20	14.580
6/16/2021	--	2	36.20	14.580
9/30/2021	14.3	2	26.60	302.580
12/23/2021	--	2	26.60	302.580
3/11/2022	33.1	2	23.70	176.720
6/30/2022	--	2	23.70	176.720
9/21/2022	35	2	34.05	1.805
12/19/2022	--	2	34.05	1.805
3/27/2023	52.4	2	43.70	151.380
6/9/2023	--	2	43.70	151.380
9/21/2023	34	2	43.20	169.280
12/28/2023	--	2	43.20	169.280

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]
2/29/2016	18.00	4	18.00	#DIV/0!	#DIV/0!	*
6/6/2016	21.20	4	19.60	5.120	2.26	*
9/26/2016	16.50	4	18.57	5.763	2.40	*
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
3/11/2021	18.5	2	17.75	1.125	1.06	-6.58
6/16/2021	--	2	17.75	1.125	1.06	-6.58
9/30/2021	30.1	2	24.30	67.280	8.20	-0.17
12/23/2021	--	2	24.30	67.280	8.20	-0.17
3/11/2022	16.9	2	23.50	87.120	9.33	-0.02
6/30/2022	--	2	23.50	87.120	9.33	-0.02
9/21/2022	18.5	2	17.70	1.280	1.13	-13.16
12/19/2022	--	2	17.70	1.280	1.13	-13.16
3/27/2023	17.4	2	17.95	0.605	0.78	-2.95
6/9/2023	--	2	17.95	0.605	0.78	-2.95
9/21/2023	23.6	2	20.50	19.220	4.38	-2.34
12/28/2023	--	2	20.50	19.220	4.38	-2.34

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]**
2/29/2016	5.16	4	5.16	#DIV/0!	#DIV/0!	*
6/6/2016	10.30	4	7.73	13.210	3.63	*
9/26/2016	11.80	4	9.09	12.127	3.48	*
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
3/11/2021	5.1	4	5.83	4.201	2.05	-10.52
6/16/2021	2.1	4	5.09	7.901	2.81	-10.22
9/30/2021	--	3	5.35	11.438	3.38	**-1.71**
12/23/2021	5	3	4.07	2.903	1.70	**-1.83**
3/11/2022	5.7	3	4.27	3.643	1.91	**-2.05**
6/30/2022	6.9	3	5.87	0.923	0.96	**-1.89**
9/21/2022	3.3	4	5.23	2.262	1.50	-23.79
12/19/2022	6.3	4	5.55	2.490	1.58	-23.08
3/27/2023	3.8	4	5.08	3.203	1.79	-4.42
6/9/2023	6	4	4.85	2.310	1.52	-4.45
9/21/2023	2.6	4	4.68	3.156	1.78	-4.17
12/28/2023	8.8	4	5.30	7.427	2.73	-4.08

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*

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

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

BXN-4 (Upgradient Well)				
Date	Tannin + Lignin Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
2/29/2016	0.54	4	0.54	#DIV/0!
6/6/2016	0.71	4	0.63	0.014
9/26/2016	1.53	4	0.93	0.280
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
3/11/2021	0.56	2	0.77	0.084
6/16/2021	--	2	0.77	0.084
9/30/2021	0.77	2	0.67	0.022
12/23/2021	--	2	0.67	0.022
3/11/2022	0.36	2	0.57	0.084
6/30/2022	--	2	0.57	0.084
9/21/2022	0.33	2	0.35	0.000
12/19/2022	--	2	0.35	0.000
3/27/2023	0.44	2	0.39	0.006
6/9/2023	--	2	0.39	0.006
9/21/2023	0.49	2	0.47	0.001
12/28/2023	--	2	0.47	0.001

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]
2/29/2016	0.77	4	0.77	#DIV/0!	#DIV/0!	*
6/6/2016	0.51	4	0.64	0.034	0.18	0.14
9/26/2016	0.66	4	0.65	0.017	0.13	-1.03
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
3/11/2021	0.53	2	0.87	0.224	0.47	0.25
6/16/2021	--	2	0.87	0.224	0.47	0.25
9/30/2021	0.44	2	0.49	0.004	0.06	-1.58
12/23/2021	--	2	0.49	0.004	0.06	-1.58
3/11/2022	0.24	2	0.34	0.020	0.14	-0.99
6/30/2022	--	2	0.34	0.020	0.14	-0.99
9/21/2022	0.29	2	0.27	0.001	0.04	-2.74
12/19/2022	--	2	0.27	0.001	0.04	-2.74
3/27/2023	0.31	2	0.30	0.000	0.01	-1.52
6/9/2023	--	2	0.30	0.000	0.01	-1.52
9/21/2023	0.17	2	0.24	0.010	0.10	-3.03
12/28/2023	--	2	0.24	0.010	0.10	-3.03

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]**
2/29/2016	3.78	4	3.78	#DIV/0!	#DIV/0!	*
6/6/2016	0.52	4	2.15	5.314	2.31	1.32
9/26/2016	2	4	2.10	2.664	1.63	1.37
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
3/11/2021	0.2	4	16.93	310.823	17.63	1.83
6/16/2021	27	4	14.93	230.423	15.18	1.86
9/30/2021	--	3	18.73	258.613	16.08	1.95
12/23/2021	21	3	16.07	197.813	14.06	1.90
3/11/2022	25	3	24.33	9.333	3.06	**13.39**
6/30/2022	39	3	28.33	89.333	9.45	**5.09**
9/21/2022	24	4	27.25	64.250	8.02	**6.71**
12/19/2022	17	4	26.25	84.917	9.22	**5.62**
3/27/2023	9.6	4	22.40	157.040	12.53	**3.51**
6/9/2023	2.8	4	13.35	84.037	9.17	**2.83**
9/21/2023	0.98	4	7.60	53.075	7.29	1.96
12/28/2023	17	4	7.60	53.075	7.29	1.96

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*

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

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

BXN-4 (Upgradient Well)				
Date	Arsenic Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
2/29/2016	0.35	4	0.35	#DIV/0!
6/6/2016	0.60	4	0.48	0.031
9/26/2016	0.40	4	0.45	0.018
3/9/2017	10.50	4	2.96	25.262
6/11/2017	--	3	3.83	33.343
9/17/2017	2.75	3	4.55	27.933
12/14/2017	--	2	6.63	30.031
3/18/2018	2.5	2	2.63	0.031
6/16/2018	--	2	2.63	0.031
9/30/2018	2.5	2	2.50	0.000
11/18/2018	--	2	2.50	0.000
3/17/2019	2.5	2	2.50	0.000
6/1/2019	--	2	2.50	0.000
10/12/2019	2.5	2	2.50	0.000
12/22/2019	--	2	2.50	0.000
4/1/2020	2.5	2	2.50	0.000
6/26/2020	--	2	2.50	0.000
9/22/2020	2.5	2	2.50	0.000
12/29/2020	--	2	2.50	0.000
3/11/2021	2.5	2	2.50	0.000
6/16/2021	--	2	2.50	0.000
9/30/2021	2.5	2	2.50	0.000
12/23/2021	--	2	2.50	0.000
3/11/2022	10	2	6.25	28.125
6/30/2022	--	2	6.25	28.125
9/21/2022	10	2	10.00	0.000
12/19/2022	--	2	10.00	0.000
3/27/2023	0.33	2	5.17	46.754
6/9/2023	--	2	5.17	46.754
9/21/2023	0.34	2	0.34	0.000
12/28/2023	--	2	0.34	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]
2/29/2016	0.27	4	0.27	#DIV/0!	#DIV/0!	*
6/6/2016	0.20	4	0.24	0.002	0.05	-2.61
9/26/2016	0.25	4	0.24	0.001	0.04	-3.06
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	2.75	3	4.50	28.563	5.34	-0.01
12/14/2017	--	2	6.63	30.031	5.48	0.00
3/18/2018	2.5	2	2.63	0.031	0.18	0.00
6/16/2018	--	2	2.63	0.031	0.18	0.00
9/30/2018	2.5	2	2.50	0.000	0.00	*
11/18/2018	--	2	2.50	0.000	0.00	*
3/17/2019	2.5	2	2.50	0.000	0.00	*
6/1/2019	--	2	2.50	0.000	0.00	*
10/12/2019	2.5	2	2.50	0.000	0.00	*
12/22/2019	--	2	2.50	0.000	0.00	*
4/1/2020	2.5	2	2.50	0.000	0.00	*
6/26/2020	--	2	2.50	0.000	0.00	*
9/22/2020	2.5	2	2.50	0.000	0.00	*
12/29/2020	--	2	2.50	0.000	0.00	*
3/11/2021	2.5	2	2.50	0.000	0.00	*
6/16/2021	--	2	2.50	0.000	0.00	*
9/30/2021	2.5	2	2.50	0.000	0.00	*
12/23/2021	--	2	2.50	0.000	0.00	*
3/11/2022	10	2	6.25	28.125	5.30	0.00
6/30/2022	--	2	6.25	28.125	5.30	0.00
9/21/2022	10	2	10.00	0.000	0.00	*
12/19/2022	--	2	10.00	0.000	0.00	*
3/27/2023	0.17	2	5.09	48.314	6.95	-0.01
6/9/2023	--	2	5.09	48.314	6.95	-0.01
9/21/2023	0.15	2	0.16	0.000	0.01	-15.65
12/28/2023	--	2	0.16	0.000	0.01	-15.65

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]**
2/29/2016	28.20	4	28.20	#DIV/0!	#DIV/0!	*
6/6/2016	16.60	4	22.40	67.280	8.20	**5.34**
9/26/2016	12.60	4	19.13	65.653	8.10	**4.61**
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	2.75	4	11.71	38.947	6.24	1.64
12/14/2017	47.00	4	20.31	355.141	18.85	1.34
3/18/2018	31.0	4	24.44	359.266	18.95	2.30
6/16/2018	21.0	4	25.44	343.432	18.53	2.46
9/30/2018	31.0	4	32.50	115.667	10.75	**5.58**
11/18/2018	14.0	4	24.25	68.917	8.30	**5.24**
3/17/2019	47.0	4	28.25	204.917	14.31	**3.60**
6/1/2019	22.0	4	28.50	200.333	14.15	**3.67**
10/12/2019	9.0	4	23.00	284.667	16.87	2.43
12/22/2019	56.0	4	33.50	473.667	21.76	**2.85**
4/1/2020	23.0	4	27.50	401.667	20.04	2.49
6/26/2020	15.5	4	25.88	436.063	20.88	2.24
9/22/2020	2.5	4	24.25	519.750	22.80	1.91
12/29/2020	26.5	4	16.88	112.896	10.63	2.71
3/11/2021	34.0	4	19.63	188.063	13.71	2.50
6/16/2021	11.0	4	18.50	205.500	14.34	2.23
9/30/2021	--	3	23.83	137.583	11.73	3.15
12/23/2021	2.5	3	15.83	265.583	16.30	1.42
3/11/2022	10.0	3	7.83	21.583	4.65	0.34
6/30/2022	10.0	3	7.50	18.750	4.33	0.28
9/21/2022	10.0	4	8.13	14.063	3.75	-1.00
12/19/2022	27.0	4	14.25	72.250	8.50	1.00
3/27/2023	19.1	4	16.53	67.169	8.20	1.79
6/9/2023	40.1	4	24.05	162.737	12.76	2.36
9/21/2023	7.1	4	23.31	192.544	13.88	**3.31**
12/28/2023	7.5	4	18.44	239.669	15.48	2.34

Notes

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

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

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

[1] For non-detect concentrations, half of the reporting limit (MRL) is used.

[2] Statistic in bold or gray is a statistically valid detection (Student's T-Test).

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

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

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

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

BXN-4 (Upgradient Well)				
Date	Barium Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
2/29/2016	102.0	4	102.00	#DIV/0!
6/6/2016	113.0	4	107.50	60.500
9/26/2016	163.0	4	126.00	1057.000
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
3/11/2021	112	2	88.30	1123.380
6/16/2021	--	2	88.30	1123.380
9/30/2021	124	2	118.00	72.000
12/23/2021	--	2	118.00	72.000
3/11/2022	104	2	114.00	200.000
6/30/2022	--	2	114.00	200.000
9/21/2022	141	2	122.50	684.500
12/19/2022	--	2	122.50	684.500
3/27/2023	41.4	2	91.20	4960.080
6/9/2023	--	2	91.20	4960.080
9/21/2023	87.4	2	64.40	1058.000
12/28/2023	--	2	64.40	1058.000

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]
2/29/2016	12.5	4	12.50	#DIV/0!	#DIV/0!	*
6/6/2016	10.5	4	11.50	2.000	1.41	*
9/26/2016	0.6	4	7.87	40.603	6.37	*
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
3/11/2021	9.6	2	10.85	3.125	1.77	-3.26
6/16/2021	--	2	10.85	3.125	1.77	-3.26
9/30/2021	6.9	2	8.25	3.645	1.91	-17.85
12/23/2021	--	2	8.25	3.645	1.91	-17.85
3/11/2022	2.5	2	4.70	9.680	3.11	-10.67
6/30/2022	--	2	4.70	9.680	3.11	-10.67
9/21/2022	5.7	2	4.10	5.120	2.26	-6.38
12/19/2022	--	2	4.10	5.120	2.26	-6.38
3/27/2023	5	2	5.35	0.245	0.49	-1.72
6/9/2023	--	2	5.35	0.245	0.49	-1.72
9/21/2023	5	2	5.00	0.000	0.00	-2.58
12/28/2023	--	2	5.00	0.000	0.00	-2.58

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]**
2/29/2016	84.9	4	84.90	#DIV/0!	#DIV/0!	*
6/6/2016	30.0	4	57.45	1507.005	38.82	*
9/26/2016	70.0	4	61.63	806.003	28.39	*
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
3/11/2021	50.8	4	79.70	866.593	29.44	-0.31
6/16/2021	92.1	4	73.10	357.953	18.92	-0.60
9/30/2021	--	3	69.13	442.523	21.04	-3.61
12/23/2021	37.2	3	60.03	817.443	28.59	-3.30
3/11/2022	61.7	3	63.67	756.403	27.50	**-2.68**
6/30/2022	103	3	67.30	1105.930	33.26	**-2.16**
9/21/2022	80.3	4	70.55	779.537	27.92	**-2.24**
12/19/2022	87.2	4	83.05	292.870	17.11	**-1.94**
3/27/2023	61.7	4	83.05	292.870	17.11	-0.16
6/9/2023	103	4	83.05	292.870	17.11	-0.16
9/21/2023	80.3	4	83.05	292.870	17.11	0.76
12/28/2023	87.2	4	83.05	292.870	17.11	0.76

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*

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

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

BXN-4 (Upgradient Well)				
Date	Iron Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
2/29/2016	10.0	4	10.00	#DIV/0!
6/6/2016	18.1	4	14.05	32.81
9/26/2016	10.0	4	12.70	21.87
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	25	2	19.50	60.50
6/26/2020	--	2	19.50	60.50
9/22/2020	25	2	25.00	0.00
12/29/2020	--	2	25.00	0.00
3/11/2021	10	2	17.50	112.50
6/16/2021	--	2	17.50	112.50
9/30/2021	10	2	10.00	0.00
12/23/2021	--	2	10.00	0.00
3/11/2022	77	2	43.50	2244.50
6/30/2022	--	2	43.50	2244.50
9/21/2022	15	2	46.00	1922.00
12/19/2022	--	2	46.00	1922.00
3/27/2023	15	2	15.00	0.00
6/9/2023	--	2	15.00	0.00
9/21/2023	15	2	15.00	0.00
12/28/2023	--	2	15.00	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]
2/29/2016	10.0	4	10.00	#DIV/0!	#DIV/0!	*
6/6/2016	3.0	4	6.50	24.500	4.95	*
9/26/2016	10.0	4	7.67	16.333	4.04	*
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	5	2	7.50	12.500	3.54	-0.92
11/18/2018	--	2	7.50	12.500	3.54	-0.92
3/17/2019	5	2	5.00	0.000	0.00	-1.00
6/1/2019	--	2	5.00	0.000	0.00	-1.00
10/12/2019	5	2	5.00	0.000	0.00	-1.56
12/22/2019	--	2	5.00	0.000	0.00	-1.56
4/1/2020	5	2	5.00	0.000	0.00	-2.64
6/26/2020	--	2	5.00	0.000	0.00	-2.64
9/22/2020	25	2	15.00	200.000	14.14	-1.00
12/29/2020	--	2	15.00	200.000	14.14	-1.00
3/11/2021	10	2	17.50	112.500	10.61	0.00
6/16/2021	--	2	17.50	112.500	10.61	0.00
9/30/2021	10	2	10.00	0.000	0.00	*
12/23/2021	--	2	10.00	0.000	0.00	*
3/11/2022	15	2	12.50	12.500	3.54	-0.92
6/30/2022	--	2	12.50	12.500	3.54	-0.92
9/21/2022	15	2	15.00	0.000	0.00	-1.00
12/19/2022	--	2	15.00	0.000	0.00	-1.00
3/27/2023	15	2	15.00	0.000	0.00	*
6/9/2023	--	2	15.00	0.000	0.00	*
9/21/2023	15	2	15.00	0.000	0.00	*
12/28/2023	--	2	15.00	0.000	0.00	*

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]**
2/29/2016	35,600	4	35,600	#DIV/0!	#DIV/0!	*
6/6/2016	11,800	4	23,700	283,220,000	16829.14	*
9/26/2016	26,000	4	24,467	143,373,333	11973.86	*
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	**8.43**
9/22/2020	37,100	4	39,100	8,273,333	2876.34	**27.17**
12/29/2020	41,050	4	40,313	4,777,292	2185.70	**36.86**
3/11/2021	37,100	4	39,088	5,267,292	2295.06	**34.05**
6/16/2021	35,000	4	37,563	6,385,625	2526.98	**29.71**
9/30/2021	--	3	37,717	9,435,833	3071.78	**21.26**
12/23/2021	7,585	3	26,562	271,187,908	16467.78	2.79
3/11/2022	29,400	3	23,995	209,806,075	14484.68	2.86
6/30/2022	51,900	3	29,628	490,993,908	22158.38	2.31
9/21/2022	19,900	4	27,196	350,989,390	18734.71	**2.90**
12/19/2022	44,500	4	36,425	209,035,833	14458.07	**5.03**
3/27/2023	38,850	4	38,788	187,103,958	13678.59	**5.67**
6/9/2023	39,050	4	35,575	116,054,167	10772.84	**6.60**
9/21/2023	21,300	4	35,925	101,914,167	10095.25	**7.11**
12/28/2023	1,020	4	25,055	325,981,100	18054.95	2.77

Notes

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

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

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

[1] For non-detect concentrations, half of the reporting limit (MRL) is used.

[2] Statistic in bold or gray is a statistically valid detection (Student's T-Test).

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

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

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

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

BXN-4 (Upgradient Well)				
Date	Manganese Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
2/29/2016	1,560	4	1,560	#DIV/0!
6/6/2016	1,440	4	1,500	7,200
9/26/2016	3,180	4	2,060	944,400
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
3/11/2021	451	2	851	319,201
6/16/2021	--	2	851	319,201
9/30/2021	1,340	2	896	395,161
12/23/2021	--	2	896	395,161
3/11/2022	519	2	930	337,021
6/30/2022	--	2	930	337,021
9/21/2022	359	2	439	12,800
12/19/2022	--	2	439	12,800
3/27/2023	686	2	523	53,465
6/9/2023	--	2	523	53,465
9/21/2023	1,340	2	1,013	213,858
12/28/2023	--	2	1,013	213,858

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]
2/29/2016	3,620	4	3,620	#DIV/0!	#DIV/0!	*
6/6/2016	2,970	4	3,295	211,250	459.62	**7.68**
9/26/2016	7	4	2,199	3,708,615	1925.78	0.13
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
3/11/2021	2,360	2	2,800	387,200	622.25	3.28
6/16/2021	--	2	2,800	387,200	622.25	3.28
9/30/2021	1,570	2	1,965	312,050	558.61	1.80
12/23/2021	--	2	1,965	312,050	558.61	1.80
3/11/2022	1,360	2	1,465	22,050	148.49	1.26
6/30/2022	--	2	1,465	22,050	148.49	1.26
9/21/2022	968	2	1,164	76,832	277.19	3.42
12/19/2022	--	2	1,164	76,832	277.19	3.42
3/27/2023	940	2	954	392	19.80	2.63
6/9/2023	--	2	954	392	19.80	2.63
9/21/2023	1,130	2	1,035	18,050	134.35	0.06
12/28/2023	--	2	1,035	18,050	134.35	0.06

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]**
2/29/2016	6,250	4	6,250	#DIV/0!	#DIV/0!	*
6/6/2016	2,360	4	4,305	7,566,050	2750.65	2.04
9/26/2016	4,890	4	4,500	3,897,100	1974.11	2.22
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**
3/11/2021	4,260	4	5,836	1,121,923	1059.21	**7.52**
6/16/2021	4,600	4	5,399	1,288,173	1134.98	**6.55**
9/30/2021	--	3	5,022	1,079,108	1038.80	**5.53**
12/23/2021	5,300	3	4,720	281,200	530.28	**7.09**
3/11/2022	5,570	3	5,157	250,633	500.63	**8.42**
6/30/2022	6,140	3	5,670	183,900	428.84	**9.89**
9/21/2022	6,870	4	5,970	482,600	694.69	**15.52**
12/19/2022	5,120	4	5,925	571,100	755.71	**14.20**
3/27/2023	6,765	4	6,224	645,290	803.30	**13.15**
6/9/2023	4,520	4	5,819	1,391,840	1179.76	**8.65**
9/21/2023	5,900	4	5,576	947,256	973.27	**7.78**
12/28/2023	719	4	4,476	7,128,094	2669.85	2.52

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.

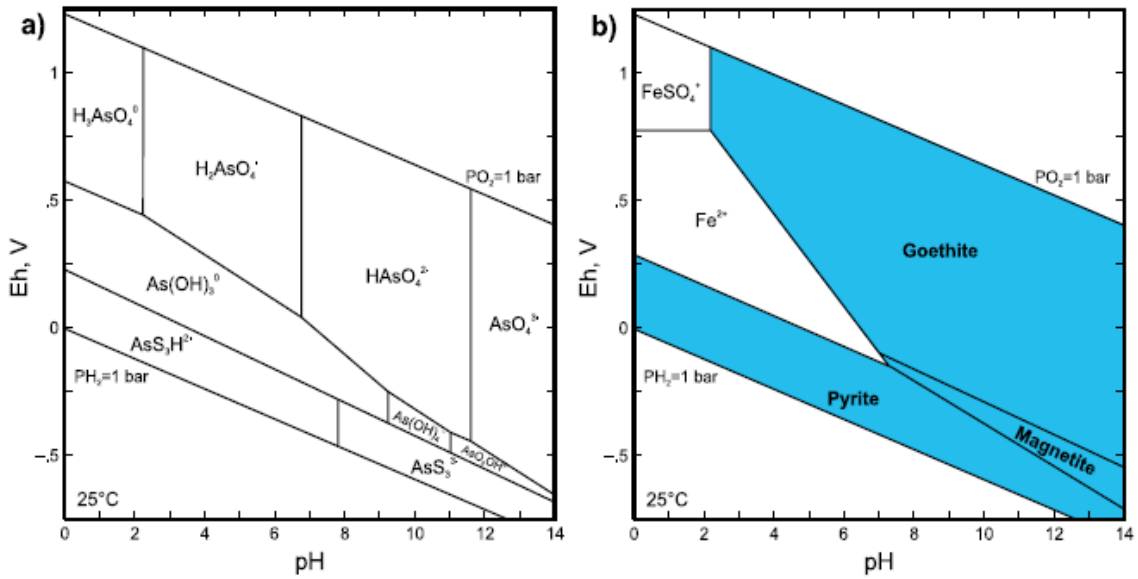


Figure D-2. Eh-pH diagrams for arsenic and iron at 25°C for coupled iron- and sulfate-reducing

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, 2024 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, Well ID 86626). 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, the concentration being peak arsenic measured in 2023 (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 165 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:	2/27/2024	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)
0.0468	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	0.0075	0.3	1.7	1	1.00E-03	1.005666667	4.22605237

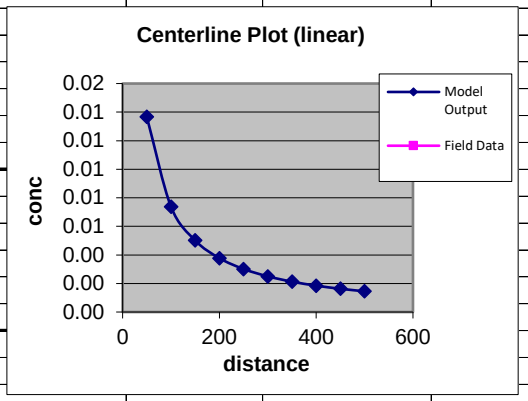
NEW QUICK_DOMENICO.XLS

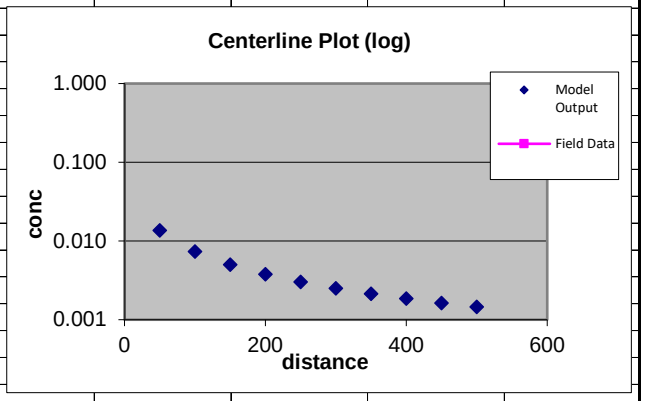
SPREADSHEET APPLICATION OF
"AN ANALYTICAL MODEL FOR
MULTIDIMENSIONAL TRANSPORT OF A
DECAYING CONTAMINANT SPECIES"
P.A. Domenico (1987)
Modified to Include Retardation

Point Concentration

x(ft)	y(ft)	z(ft)
165	0	0

	x(ft)	y(ft)	z(ft)
Conc. At	165	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	0.005	0.004	0.003	0.003	0.002	0.002	0.002	0.002	0.001	0.001
50	0.011	0.006	0.005	0.004	0.003	0.002	0.002	0.002	0.002	0.001
0	0.014	0.007	0.005	0.004	0.003	0.002	0.002	0.002	0.002	0.001
-50	0.011	0.006	0.005	0.004	0.003	0.002	0.002	0.002	0.002	0.001
-100	0.005	0.004	0.003	0.003	0.002	0.002	0.002	0.002	0.001	0.001

Field Data:	Centerline C	Concentration
	Distance from Source	