2015 Groundwater Monitoring Report
South Woodwaste Landfill
Arlington, Washington

JHBaxter

RECEIVED
APR 0 4 2016
DEPARTMENT OF ECOLOGY

Submitted to

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

Prepared for

J.H. Baxter & Co.
P.O. Box 10797
Eugene, OR 97440

March 2016

Prepared by

GSI Water Solutions, Inc.
55 SW Yamhill Street, Suite 300 Portland, OR 97204
P: 503.239.8799 F: 503.239.8940
info@gsiws.com www.gsiws.com

Ent 11-18-16
MW

SW6.6

2015 Groundwater Monitoring Report
South Woodwaste Landfill
Arlington, Washington

JHBaxter

Submitted to

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

Prepared for

J.H. Baxter & Co.
P.O. Box 10797
Eugene, OR 97440

March 2016

Prepared by

GSI Water Solutions, Inc.

[illegible]
[illegible]
[illegible]

Contents

Tables

Contents

Section **Page**

Figures

Appendices

1. Introduction

This report presents quarterly groundwater data collected from February to December 2015 by the J.H. Baxter & Company (Baxter) for Baxter's closed South Woodwaste Landfill (South Landfill, Site), located at 6520 188th Street NE in Arlington, Snohomish County, Washington (Figure 1). Baxter closed the South Landfill in 1991; it is covered with a vegetated soil cap.

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

Quarterly monitoring events were conducted in February, September, and December 2015. A second quarter monitoring event was not conducted in 2015 due to limited staffing availability.

For ease of comparison, GSI Water Solutions, Inc. (GSI), assembled this report, along with the attached tables, figures, and appendices, in the same general format as previous monitoring reports for the Site.

2. Hydrogeology

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

2.1 Groundwater Elevations

Groundwater levels were measured at the four monitoring wells prior to pumping the wells for groundwater sampling. Groundwater elevation data for 2015 are summarized in Table 1.

Groundwater elevations were highest for all four wells during the February 2015 monitoring event. Groundwater elevations were lowest for all four wells during the September 2015 monitoring event. Wells BXS-1 and BXS-2 exhibited minimal or no change in groundwater elevation between the June and September monitoring events. This may be an effect of increased groundwater extraction rates by the nearby J.H. Baxter groundwater recirculation system beginning in July 2015. The static groundwater level in wells BXS-1, BXS-2, BXS-3, and BXS-4 fluctuated throughout the year by 4.88 feet, 4.94 feet, 8.36 feet, and 3.40 feet, respectively.

Groundwater elevation contour maps for February 2015 (Figure 2) and September 2015 (Figure 3) are provided for reference. The groundwater flow direction throughout the year was toward the northwest and is consistent with the regional groundwater flow in the aquifer (Figure 4).

2.2 Groundwater Velocities

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

$$v_x = - Ki / n_e$$

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

The gradient (i) was 0.016 to 0.020 (Table 2), resulting in velocity estimates of 4.5 to 11.3 feet per day. Table 2 shows the calculated hydraulic gradients and groundwater velocities during the 2015 monitoring events. The gradient and groundwater velocity is consistent with previous years.

3. Groundwater Quality

Groundwater monitoring events were conducted on February 23, 2015, for the first quarter; September 14, 2015, for the third quarter; and December 7, 2015, for the fourth quarter. Groundwater sampling was performed using dedicated submersible bladder pumps. The sampling procedures used originally were described in Appendix C of EMCON's Hydrogeologic Report (EMCON, 1989).

Field measurements were taken for pH, conductivity, temperature, oxidation-reduction potential (ORP), and dissolved oxygen prior to groundwater sampling. Groundwater samples were analyzed by ALS Environmental Laboratories (ALS) of Kelso, Washington, for the following:

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

Additionally, total coliform was analyzed by Edge Analytical Laboratory (Edge) of Burlington, Washington.

3.1 Groundwater Sampling

Beginning in the second quarter of 2011, field duplicates were collected from the closed South Landfill, and equipment rinsate blanks were collected at the closed North Landfill (19600 67th Avenue NE, Arlington, Washington). 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.

Well headspace was not tested for methane during the 2015 quarterly events. Field measurement data collected from February 2007 through December 2015 are summarized in Table 3A. Field sampling records are included in Appendix A. The analytical data from 2007 through 2015 are summarized in Tables 3B and 3C. Laboratory analytical reports and chain-of-custody (COC) forms for the 2015 groundwater monitoring events are included in Appendix B.

4. Data Review

This section describes the data review process that was performed to evaluate the adequacy and quality of the analytical data from the 2015 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 February, September, and December 2015 monitoring event field duplicate samples were collected from monitoring well BXS-1, and labeled as BXS-5. The field rinsate blank for each monitoring event was collected at monitoring well BXN-4, and labeled as BXN-6, from the North Landfill.

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 5 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 5 times the associated MRL, the reported values are considered estimated if the absolute difference between primary and duplicate is greater than the value of the MRL. The following analytes for the primary and duplicate samples at monitoring well BXS-1 were qualified by GSI as estimated detections (J-flag) because of potential analytical imprecision:

- **September 2015:** Nitrate plus nitrite as nitrogen
- **December 2015:** Zinc

In addition to the field duplicates collected from the South landfill, a field rinsate blank was collected from the North landfill during each quarterly sampling event. The field rinsate blank collected during the December 2015 monitoring event was noted on the COC form but was not found upon reception at the analytical lab. It is assumed that the field rinsate blank was unintentionally excluded from the shipment. December 2015 sampling results are consequently not evaluated against field rinsate detections. The following were detections in the field rinsate blanks at a level above the method detection limit (MDL):

- **February 2015:** Barium, copper, manganese, nickel, tannin and lignin, and TOC
- **September 2015:** Nickel, ammonia, and TOC

GSI validated the data in accordance with EPA's blank qualification guidelines, which state:

- For any analytes detected in the blanks below the MRLs, associated field sample detections that are below MRLs should be reported at the MRL and as a non-detect value (EPA, 1999b).
- For any analytes detected in the blanks below the MRLs, associated field sample detections above the MRL, but less than 5 times the blank concentration, are reported as is, but qualified as non-detect values (EPA, 1999b).

Based on EPA's guidelines, manganese concentrations from the March, September, and November 2014 monitoring events; nickel concentrations from the September 2014 monitoring event; and TOC and barium concentrations from the November 2014 monitoring event were not qualified during validation because the concentrations were greater than 5 times the field rinsate blank concentration. The following analytes were qualified by GSI during validation based on the field rinsate blank detections:

- **February 2015**
    - **Copper:** BXS-4 was detected above the MRL but less than five times the detected value in the rinsate blank. The result was subsequently qualified as non-detect.
    - **Nickel:** BXS-4 was detected above the MRL but less than five times the detected value in the rinsate blank. The result was subsequently qualified as non-detect.
    - **Tannin and Lignin:** BXS-1 and BXS-5 (BXS-1 duplicate) samples were detected above the MDL, but below the MRL. These results were reported at the MRL and as a non-detect value.
    - **TOC:** BXS-4 was detected above the MRL but less than five times the detected value in the rinsate blank. The result was subsequently qualified as non-detect.
- **September 2015**
    - **Ammonia:** BXS-1 was detected above the MDL, but below the MRL. This result was reported at the MRL and as a non-detect value.
    - **TOC:** BXS-1, BXS-4, and BXS-5 (BXS-1 duplicate) were detected above the MRL but less than five times the detected value in the rinsate blank. The result was subsequently qualified as non-detect.

Field rinsate blank detections were below the secondary maximum contaminant levels (SMCL) and/or other laboratory results for field samples were consistent with historical values, indicating that the contamination is minimal. Results from the field blank sample are shown in Tables 3B and 3C.

4.2 Laboratory QA/QC

The sample coolers for each quarterly monitoring event arrived at the laboratories in good condition, with no broken bottles, below EPA's 6° Celsius (C) recommendation, and with proper COC documentation. Samples for total coliform were analyzed by Edge. The remaining analyses were performed by ALS.

With the exception of pH, all analyses were performed within the required holding time for the parameters of interest. The samples were analyzed for pH between 1 and 3 days after collection. The method used for pH analysis, Standard Methods 4500-H+ B (APHA, 1998), does not list an analysis holding time. The EPA method for pH analysis of water samples, Method 150.1 (EPA, 1999a), specifies that pH analyses be performed "as soon as possible preferably in the field at the time of sampling." For that reason, the field-analyzed pH results are used for trend analysis and statistical evaluation.

The method blanks did not have any analytes detected above the MRL. The following analytes were detected in the method blank at a level above the MDL, but below the MRL:

- **February 2015:** Copper, manganese

Conductivity also was detected in the method blanks, however, it is not considered to affect data quality because it is a physical property of the water. Additionally, primary samples were within historical ranges for conductivity.

For the remaining laboratory method blank detections, GSI validated the data in accordance with EPA's blank qualification guidelines (EPA, 1999b). Manganese concentrations from the February 2015 monitoring event were not altered during validation because the concentrations were greater than 5 times the laboratory method blank concentration. Copper concentrations from the February 2015 monitoring event was not altered during validation based on the laboratory method blank because it was modified during validation based on the field rinsate blank.

Laboratory duplicate RPDs were below laboratory limits or, for sample concentrations below 5 times the MRL, the difference between parent and duplicate sample concentrations were below the MRL, and data were not adversely affected. The only exception is the TOC RPD criterion for the replicate analyses in the BXS-4 sample from the September and December 2015 monitoring events were not applicable because the analyte concentration was not significantly greater than the MRL. 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 within laboratory limits, or the analyte concentration was significantly higher than the added spike concentration, preventing accurate evaluation of the spike recovery. The only exception was the chloride MS from the December 2015 monitoring event that was outside the laboratory control criteria. The matrix spike recoveries for sample BXS-4 were outside control criteria because of suspected matrix interference. As a result of the interference, the results for this analyte contained a potential low bias. No further corrective action was taken.

The laboratory reports are complete and contain results for all samples and corresponding analyses requested on the COC forms.

4.3 Statistical Analysis of Data

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

- **Non-Detects:** Non-detect results were replaced with a value of half the laboratory MRL.
- **Data Distribution:** A key assumption in the Student's t-test is that the data are normally distributed.
- **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 0.025. 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 the background well (BXS-4) concentrations are shown in **bold** in the tables included in Appendix C. Statistically significant detections below background concentrations are shown in gray in the tables included in Appendix C. Historical statistically higher values above the background well concentrations since 1989 are shown in Table 4.

5. Discussion of Results

5.1 Statistical Results

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

- Ammonia and arsenic in BXS-3

- Sulfate and total coliforms in BXS-1
- Tannin and lignin, barium, and iron in BXS-3 and BXS-2
- Chloride, copper, and zinc in BXS-2 and BXS-1
- TOC, COD, field conductivity, TDS, manganese, and nickel in BXS-3, BXS-2, and BXS-1

Additionally, field pH was statistically lower in the BXS-3, BXS-2, and BXS-1 compared to the upgradient well.

5.2 Concentration Trends over Time

Figures 5 through 18 show the concentration trends from 2007 through 2015 for each of the following parameters:

- **Ammonia as Nitrogen** (Figure 5): BXS-3 concentrations in 2015 were above those in BXS-4 (upgradient well), with concentrations ranging from 1.00 to 1.05 milligrams per liter (mg/L). Ammonia in BXS-3 showed an increasing trend since fourth quarter 2011, but has stabilized or decreased during 2015. BXS-1 and BXS-2 were well below background concentrations and were stable.
- **Arsenic** (Figure 6): Arsenic in BXS-3 was above the concentrations detected in the upgradient well and showed an increasing trend in concentration. Arsenic concentrations in BXS-1 and BXS-2 were below background and are stable.
- **Barium** (Figure 7): BXS-3 and BXS-2 barium concentrations in 2015 were above those in BXS-4 (upgradient well), with concentrations ranging from 127 to 162 µg/L and 43.7 to 46.6 µg/L, respectively. BXS-3 concentrations shows in increased trend in 2015. Barium concentrations in BXS-1, the most downgradient of the monitoring wells, continued to be below those in BXS-4 (upgradient well). BXS-1 and BXS-2 barium concentrations were stable.
- **COD** (Figure 8): BXS-3, BXS-2, and BXS-1 COD concentrations were above those in BXS-4 (upgradient well). BXS-1, BXS-2, BXS-3, and BXS-4 COD concentrations have been relatively consistent.
- **Chloride** (Figure 9): BXS-2 and BXS-1 chloride concentrations were above those in BXS-4 (upgradient well) in 2015. Chloride concentrations appear to be decreasing or stable in the downgradient wells.
- **Field Conductivity** (Figure 10): Field conductivity in BXS-3, BXS-2, and BXS-1 was higher than in BXS-4 (upgradient well). BXS-1, BXS-2, BXS-3, and BXS-4 conductivity was within historical levels and has been relatively stable.
- **Iron** (Figure 11): BXS-3 and BXS-2 concentrations in 2015 were above those in BXS-4 (upgradient well), with concentrations ranging from 114,000 to 126,000 µg/L and 358 to 375 µg/L, respectively. BXS-1, BXS-2, and BXS-4 concentrations have been stable since 2007. Iron concentrations in BXS-3 were stable between 2010 and first quarter 2013 and showed an increasing trend since 2013.

- **Manganese** (Figure 12): BXS-3, BXS-2, and BXS-1 manganese concentrations were above those in BXS-4 (upgradient well) in 2015. Concentrations in BXS-3 in 2015 had an overall downward trend. BXS-1, BXS-2, and BXS-4 manganese concentrations were stable.
- **Nickel** (Figure 13): BXS-3, BXS-2, and BXS-1 nickel concentrations were above those in BXS-4 (upgradient well) in 2014. BXS-1, BXS-2, BXS-3, and BXS-4 nickel concentrations were stable.
- **Sulfate** (Figure 14): BXS-1 sulfate concentrations in 2015 were above those in BXS-4 (upgradient well), with concentrations ranging from 7.7 to 10.7 mg/L. Sulfate concentrations in BXS-1 showed a downward trend in 2014 but have increased in 2015. BXS-2, BXS-3, and BXS-4 sulfate concentrations were low and stable.
- **Tannin and Lignin** (Figure 15): BXS-3 and BXS-2 tannin and lignin concentrations were above those in BXS-4 (upgradient well) in 2015. Tannin and lignin concentrations in BXS-1 were slightly below the background concentration. Tannin and lignin concentrations in the wells were stable, with the exception of BXS-3, which decreased significantly during 2015.
- **TOC** (Figure 16): BXS-3, BXS-2, and BXS-1 TOC concentrations were above those in BXS-4 (upgradient well) in 2015. BXS-1, BXS-2, BXS-3, and BXS-4 TOC concentrations were within historical levels, with a slightly overall downward trend in BXS-3 and BXS-2.
- **Field pH** (Figure 17): BXS-4 (upgradient well) field pH was higher that the pH in BXS-3, BXS-2, and BXS-1 (downgradient wells) in 2015. The field pH in BXS-1, BXS-2, BXS-3, and BXS-4 were within historical levels.
- **TDS** (Figure 18): TDS in BXS-3, BXS-2, and BXS-1 was higher than that present in BXS-4 (upgradient well). TDS concentrations in BXS-3, BXS-2, and BXS-1 were within historical levels, with an overall downward trend.

5.3 Comparison to Standards

Federal maximum contaminant levels (MCL) are established by EPA as the primary drinking water standards. Federal SMCLs are related to criteria other than adverse health effects. SMCLs are non-enforceable guidelines for cosmetic and aesthetic purposes, and are not considered to be a risk to human health.

In the state of Washington (Washington), water quality standards for groundwater are provided in the Washington Administrative Code (WAC) 173-200-040 (Washington, 2003). Washington water quality standards are similar to the federal standards for most of the Site-related analytes where available, with the exception of arsenic, barium, cadmium, and copper. MCLs, SMCLs, and Washington water quality standards for groundwater are listed in Tables 3A, 3B, and 3C.

5.3.1 Comparison to MCLs

Of the monitored parameters, there are MCLs for total coliforms, arsenic, barium, cadmium (no longer analyzed), copper, nickel, and nitrate plus nitrate as nitrogen. There were no detections in 2015 that exceeded the associated MCL, with the following exceptions:

- **Total Coliforms:** BXS-1 exceeded the MCL of 1/100 milliliter (mL) in September and December 2015, with a count of 3.1 and 2.0 most probable number (MPN) per 100 mL, respectively. However, there is no reason to associate coliform to the wood waste present in the landfill.
- **Arsenic:** BXS-3 exceeded the MCL of 10 µg/L in all four 2015 quarterly monitoring events, with concentrations ranging from 163 to 185 µg/L in 2015.

Per the Snohomish County Health District's request in a letter dated August 28, 2015, a dissolved arsenic plume delineation was performed. 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 the State of California and Pennsylvania to screen potential landfill impacts and the plume extent plotted on Figure 19. A description of the model inputs and results are provided in Appendix D.

5.3.2 Comparison to SMCLs

Among the monitored parameters, there are SMCLs for pH, chloride, TDS, sulfate, iron, manganese, and zinc. There were no detections in 2015 that exceeded the associated SMCL, with the following exceptions:

- **Field pH:** BXS-3, BXS-2, and BXS-1 were below the SMCL of 6.5 to 8.5 for all three quarterly monitoring events, with levels ranging from 5.28 to 6.26 in 2015.
- **Iron:** BXS-3 and BXS-2 exceeded the SMCL of 300 µg/L in all three quarterly monitoring events, with concentrations ranging from 114,000 to 126,000 µg/L and 358 to 375 µg/L, respectively, in 2015.
- **Manganese:** All four monitoring wells exceeded the SMCL of 50 µg/L in all four quarterly monitoring events. Concentrations were highest in BXS-3, ranging from 5,290 to 10,100 µg/L in 2015.

5.3.3 Comparison to Washington State Standards

Washington water quality standards for groundwater are similar to the MCL or SMCL for Site-related compounds, with the exception of arsenic, barium, cadmium (no longer analyzed), and copper. Of these metals, there were no detections in 2015 that exceeded the associated Washington standard, with the following exception:

- **Arsenic:** All four monitoring wells exceeded Washington's water quality standard for groundwater of 0.05 µg/L in all four quarterly monitoring events. Concentrations were highest in BXS-3, ranging from 163 to 185 µg/L in 2015.

6. Summary

Quarterly groundwater monitoring samples were collected from one upgradient well (BXS-4) and three downgradient wells (BXS-1 through BXS-3) during 2015 at the former J.H. Baxter South Woodwaste Landfill. The samples were analyzed for 11 groundwater quality parameters and 7 dissolved metals.

Groundwater samples collected during the 2015 monitoring events did not exceed the MCLs for any of the monitored parameters, with the exception of total coliform and arsenic. Total coliform was detected in monitoring well BXS-1 in the September 2015 and December 2015 monitoring events, exceeding the MCL. The concentrations of arsenic in monitoring well BXS-3 exceeded the MCL in all three quarterly monitoring events.

There were no exceedances of the SMCL for chloride, sulfate, and zinc during the monitoring events in 2015. However, there was at least one well that exceeded the SMCL for field pH, iron, and manganese during one or more groundwater monitoring events in 2015.

Of the metals with a more conservative Washington water quality standard than the MCL, only arsenic was present above the standard. The arsenic concentrations in the four monitoring wells in all four quarterly monitoring events in 2015 exceeded the Washington water quality standard.

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 South 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.

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

Tables

Tables

Table 1. Groundwater Elevation Summary for 2015

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Well ID	Inner Casing Diameter (inches)	Total Depth (ft bgs)	Screen Length (ft)	Screened Interval (ft bgs)	TOC Elevation[1] (ft msl)	Date	Depth to Groundwater (ft below TOC)	Groundwater Elevation (ft msl)
BXS-1	2	47.90	10	37.90 - 47.90	142.65	2/23/2015	31.72	110.93
						9/14/2015	36.60	106.05
						12/7/2015	36.20	106.45
BXS-2	2	45.40	10	35.40 - 45.40	142.89	2/23/2015	29.76	113.13
						9/14/2015	34.70	108.19
						12/7/2015	34.70	108.19
BXS-3	2	44.15	10	34.15 - 44.15	142.07	2/23/2015	25.04	117.03
						9/14/2015	33.40	108.67
						12/7/2015	28.53	113.54
BXS-4	2	47.40	10	37.40 - 47.40	143.42	2/23/2015	13.00	130.42
						9/14/2015	16.40	127.02
						12/7/2015	13.66	129.76

Notes

bgs = below ground surface.

ft = feet.

msl = mean sea level.

TOC = top of casing.

[1] Wells resurveyed in October 2002.

Table 2. Hydraulic Gradient and Groundwater Velocity

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Gradient (i)	Hydraulic Conductivity (K) (cm/sec)	Porosity (n_e)	Velocity (v_x) (cm/sec)	Velocity (v_x) (ft/day)
2/23/2015	0.016	0.0300 to 0.0600	0.300	0.002 -- 0.003	4.5 -- 9.1
9/14/2015	0.017			0.002 -- 0.003	4.9 -- 9.9
12/7/2015	0.020			0.002 to 0.004	5.7 to 11.3

Notes

cm = centimeter.

ft = feet.

NC = not calculated.

sec = second.

Table 3A. Summary of Groundwater Sampling Field Parameters: 2007 through 2015

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	pH				Conductivity				Temperature				ORP				Dissolved Oxygen				Methane			
	(standard unit)				(µS/cm)				(°C)				(mV)				(mg/L)				(percent)			
SMCL	6.5 - 8.5				--				--				--				--				--			
WA WQ Std	6.5 - 8.5				--				--				--				--				--			
Well ID	BXS-4	BXS-3	BXS-2	BXS-1	BXS-4	BXS-3	BXS-2	BXS-1	BXS-4	BXS-3	BXS-2	BXS-1	BXS-4	BXS-3	BXS-2	BXS-1	BXS-4	BXS-3	BXS-2	BXS-1	BXS-4	BXS-3	BXS-2	BXS-1
2/5/2007	8.60	7.12	6.81	6.75	166	730	672	299	9.5	13.2	12.1	11.4	-40	-103	1	241	9.80	2.40	3.00	2.30	NT	NT	NT	NT
4/18/2007	8.09	6.62	6.47	6.31	176	808	796	379	9.5	13.1	12.3	11.7	-136	-113	45	187	1.20	1.80	1.20	0.80	NT	NT	NT	NT
7/18/2007	8.25	6.64	6.52	6.38	222	867	922	415	9.8	13.1	12.5	12.0	-145	-113	62	219	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0
10/9/2007	7.83	6.30	6.19	6.02	199	810	804	495	9.8	12.8	12.5	12.0	-148	-97	40	226	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0
1/9/2008	7.81	6.25	6.18	5.91	196	788	772	369	9.3	12.1	12.1	11.4	-147	-67	54	251	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0
4/30/2008	7.66	6.23	6.10	5.98	201	846	794	485	9.1	12.9	12.2	11.8	-157	-126	32	138	0.00	0.00	0.08	0.15	NT	NT	NT	NT
7/29/2008	7.98	6.42	6.37	6.14	180	726	732	510	9.4	12.9	12.4	12.0	-150	-90	31	185	0.33	0.37	1.77	5.80	0.0	0.0	0.0	0.0
10/22/2008	8.32	6.55	6.48	6.28	177	722	733	496	9.6	12.7	12.4	12.0	-173	-93	20	157	0.07	0.12	0.14	1.10	NT	NT	NT	NT
2/1/2009	8.09	6.77	6.56	6.42	176	734	749	401	9.2	12.7	12.0	11.6	-154	-118	59	299	2.33	2.04	1.87	2.66	0.0	0.0	0.0	0.0
5/1/2009	8.25	6.44	6.35	6.33	185	736	812	335	9.4	13.2	12.6	12.0	-192	-99	86	121	1.21	0.08	0.10	0.53	NT	NT	NT	NT
8/1/2009	7.89	6.52	6.64	6.41	185	695	797	309	9.4	12.6	12.3	11.9	-172	-128	36	245	8.60	6.28	6.03	6.04	0.0	0.0	0.0	0.0
11/1/2009	7.96	6.50	6.46	6.37	192	755	815	315	9.3	12.2	12.0	11.5	-167	-98	52	257	6.73	2.86	1.98	1.18	NT	NT	NT	NT
2/10/2010	8.05	6.59	6.55	6.58	180	726	799	274	9.3	12.9	12.1	12.0	-183	-73	-3	74	0.11	0.17	0.31	1.23	NT	NT	NT	NT
5/26/2010	7.46	6.04	5.96	5.90	189	719	853	288	9.3	12.8	17.0	12.0	-247	-142	59	129	0.00	0.00	0.00	0.00	0.0	0.0	0.0	0.0
8/18/2010	7.63	5.98	5.87	5.94	230	690	833	309	9.7	12.5	12.3	12.3	-285	-51	141	258	0.00	0.18	0.38	0.93	NT	NT	NT	NT
11/18/2010	7.99	6.37	6.52	6.34	184	694	813	344	9.7	12.8	12.1	11.9	-287	-193	-42	-30	0.43	0.12	1.98	0.24	0.0	0.0	0.0	0.0
2/9/2011	8.02	6.22	6.16	6.24	187	710	844	334	9.5	12.8	11.9	12.0	-164	-128	36	-167	0.10	0.11	0.26	0.28	NT	NT	NT	NT
5/17/2011	7.99	6.24	6.20	6.25	183.0	732	929.0	315	9.9	12.8	12.2	12.6	-205.0	-120	32.0	158	0.36	0.38	0.43	0.45	0.2	0.1	0.0	0.0
8/24/2011	7.77	5.79	5.73	5.75	190	741	833	337	10.2	13.0	12.4	12.4	-172	-115	45	164	0.09	0.09	0.19	0.18	NT	NT	NT	NT
11/3/2011	8.36	6.43	6.37	6.46	192	673	852	346	9.8	12.5	12.0	12.0	-274	-140	39	150	1.12	1.04	1.19	1.29	0.1	0.0	0.0	0.0
2/14/2012	7.72	6.92	6.74	6.67	192	696	865	359	10.4	13.1	12.5	12.6	-142	-118	74	302	3.10	4.17	4.21	5.76	NT	NT	NT	NT
5/2/2012	6.97	5.70	5.65	5.06	193	693	914	319	10.4	13.1	12.7	12.6	-98	-49	141	396	1.37	1.86	2.23	3.94	0.0	0.0	0.0	0.0
8/21/2012	6.62	5.33	5.34	4.90	192	707	895	308	10.7	13.1	12.8	12.8	-84	-47	182	330	1.53	1.97	2.39	2.28	NT	NT	NT	NT
11/13/2012	7.68	6.29	6.26	6.10	147	520	641	239	12.5	12.5	12.9	10.5	-125	-82	216	439	2.39	4.73	7.79	6.45	NT	NT	NT	NT
2/12/2013	7.07	5.66	5.72	5.57	184	529	869	278	9.7	12.4	11.8	12.0	-118	-92	76	337	2.16	3.68	0.82	0.91	NT	NT	NT	NT
6/4/2013	7.32	5.92	5.84	5.69	190	635	892	271	10.1	12.2	12.0	12.2	-141	-99	90	313	0.83	2.62	1.52	0.44	NT	NT	NT	NT
8/25/2013	7.62	6.30	6.22	6.03	193	709	871	299	10.2	12.2	12.0	12.5	-119	-104	118	315	0.36	0.80	2.96	2.22	NT	NT	NT	NT
12/2/2013	7.39	5.88	5.66	5.63	198	699	882	313	9.8	11.9	11.6	12.1	-124	-112	135	328	1.02	5.46	5.74	2.36	NT	NT	NT	NT
3/17/2014	5.92	6.28	6.16	6.06	189	730	817	299	10.0	12.2	11.6	12.7	-112	-94	128	268	1.85	8.84	12.60	2.07	NT	NT	NT	NT
6/2/2014	7.47	5.72	5.79	5.64	213	793	952	318	10.1	12.3	12.2	13.3	-92	-86	84	213	0.15	0.00	0.00	0.00	NT	NT	NT	NT
9/29/2014	7.69	6.25	6.15	5.99	212	733	918	306	10.5	12.3	12.0	12.5	-126	-94	106	273	0.00	0.00	0.00	0.00	NT	NT	NT	NT
11/17/2014	7.48	5.99	5.88	5.69	192	675	822	285	10.2	11.9	11.6	12.2	-117	-77	111	285	0.00	10.75	0.71	0.00	NT	NT	NT	NT
2/23/2015	7.28	5.84	5.78	5.86	194	682	798	269	10.2	12.4	11.8	12.8	-102	-71	125	299	1.02	1.28	1.25	1.58	NT	NT	NT	NT
9/14/2015	7.50	6.26	6.24	6.02	196	674	778	268	10.8	12.2	11.9	13.3	-136	-107	142	114	1.09	1.33	1.32	1.23	NT	NT	NT	NT
12/7/2015	7.06	6.04	5.94	5.28	187	676	732	286	10.3	12.0	11.7	12.4	-143	-112	159	286	1.25	1.04	1.07	1.18	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 2015

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	pH									Conductivity									Chloride								
	(standard unit)									(µS/cm)									(mg/L)								
MCL/SMCL	6.5 - 8.5									--									250								
WA WQ Std	6.5 - 8.5									--									250								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
2/1/2007	7.81	7.90	6.38		6.36		6.36		5.79	193	192	517		743		338		4	1.6	1.6	3.1		4.9		6.4		0.2 U
4/18/2007	7.61	7.45	6.05		6.10		5.94		5.66	195	199	565		779		377		2	1.9	1.9	2.3		4.5		5.4		0.2 U
7/18/2007	7.69		6.34		6.96		6.28	6.23	6.04	201		518		798		410	401	2	1.7		2.8		4.1		5.1	5.0	0.2 U
10/9/2007	7.82	7.85	6.36		6.35		6.18		5.72	200	201	638		814		482		3	1.7	1.7	2.7		4.3		5.2		0.1 J
1/9/2008	7.75		6.41		6.46		6.23	6.25	5.10	215		681		747		375	360	5	2.0		3.1		4.5		5.8	5.8	0.2 U
4/30/2008	7.76		6.36		6.44		6.38	6.38	6.21	188		658		797		475	472	2630	1.8		2.4		4.4		5.0	5.1	0.0 J
7/29/2008	7.83		6.32		6.45	6.40	6.27		5.30	206		659		853	865	592		4	1.8		2.8		4.2	4.4	4.5		0.2 U
10/22/2008	7.83		6.33		6.41	6.40	6.49			210		700		892	877	592			1.9		3.6		4.9	4.9	5.1		
2/1/2009	7.94		6.30		6.50		6.67	6.42	5.89	209		604		889		489	479	6	1.7		2.6		4.2		7.6	7.6	0.0 J
5/1/2009	7.92		6.29		6.29		6.38	6.30	5.64	171		496		768		357	328	2	2.2		4.5		6.1		7.3	7.3	0.2 U
8/1/2009	6.32		6.45	6.42	6.40		6.31		5.44	176		412	413	757		299		3	1.8		3.8	3.7	4.3		5.9		0.2 U
11/1/2009	7.66		6.41		6.41		6.42	6.42	6.40	194		598		823		299	314	3	1.9		3.3		4.4		6.5	6.6	0.2 U
2/10/2010	8.04		6.38		6.56	6.56	6.70		6.43	187		634		848	854	298		2 J	1.81		2.90		4.20	4.20	5.30		0.06 J
5/26/2010	7.87		6.26		6.33		6.41	6.48	4.93	192		461		881		297	300	4	1.88		3.40		4.10		5.90	6.00	0.04 J
8/18/2010	7.83		6.15		6.30		6.42	6.46	7.91	209		423		805		311	316	137	1.91		3.04		3.32		5.67	5.70	1.57
11/18/2010	7.72		5.99		6.27		6.35	6.34	6.00	172		543		901		377	364	3	1.57		2.74		3.21		5.38	5.29	0.40 U
2/9/2011	7.88		6.23		6.38		6.49	6.51		155		371		729		296	296	5	2.10		2.37		3.43		6.99	7.09	0.40 U
5/17/2011	7.79		6.28		6.42		6.32	6.50	6.06	219		377		801		321	310	3	1.65		2.07		3.05		6.17	5.94	0.40 U
8/24/2011	8.14		6.45		6.47		6.46	6.74	6.03	202		603		941		359	359	2 J	1.69		1.85		2.88		5.71	5.71	0.40 U
11/3/2011	7.78		6.35		6.49		6.75	6.57	7.33	195		505		884		360	361	2	1.93		2.49		3.38		6.01	5.74	0.40 U
2/14/2012	7.94		6.42		6.54		6.64	6.59	6.04	194		425		873		363	361	2	1.67		2.11		2.91		5.33	5.37	0.40 U
5/2/2012	7.91		6.35		6.68		6.70	6.59	6.86	168		435		925		329	288	3	1.66		1.50		2.97		5.70	5.65	0.40 U
8/21/2012	7.66		6.32		6.62		6.43	6.69	6.39	192		451		898		311	315	3	1.62		1.58		2.96		4.75	4.72	0.40 U
11/13/2012	8.09		6.62		6.63		6.81	6.77	7.42	193		463		867		316	326	2490	1.63		1.69		3.00		4.80	4.80	0.40 U
2/12/2013	8.28		6.60		7.03		7.07	6.93	7.27	194		377		939		303	299	2 J	1.61		2.08		3.07		5.70	5.70	0.40 U
6/4/2013	8.21		6.60		6.75		6.94	6.78	7.32	202		516		945		290	299	2 J	1.62		1.98		3.00		3.60	3.60	0.40 U
8/27/2013	8.04		6.54		6.62		6.69	6.63	6.43	188		428		876		293	292	2 J	1.90		1.88		3.39		4.00	3.90	0.40 U
12/2/2013	8.13		6.58		6.88		6.93	6.79	6.20	193		513		866		312	310	2 J	1.54		1.57		2.65		3.56	3.56	0.40 U
3/17/2014	8.30		6.57		6.76		6.80	6.75	6.38	170		408		774		314	260	7	1.81		2.20 J		2.90		5.97	5.89	0.40 U
6/2/2014	8.00		6.44		6.42		6.52	6.48	5.97	192		4,790		861		290	292	2 J	1.64		1.73		2.74		5.23	5.18	0.40 U
9/29/2014	8.04		6.59		7.26		7.11	7.34	6.35	192		396		840		281	284	3	1.62		1.71		2.57		4.44	4.45	0.40 U
11/17/2014	7.61		6.23		6.69		7.04	6.75	7.77	190		406		819		281	294	3	2.02		1.76		3.16		5.04 J	0.52 J	0.40 U
2/23/2015	7.90 H		6.33 H		6.59 H		6.78 H	6.55 H	6.22 H	209		430		876		292	279	2	1.58		1.38		2.32		4.56	4.58	0.40 U
9/14/2015	7.92 H		6.31 H		6.61 H		6.71 H	6.51 H	7.00 H	204		348		807		283	280	2 J	1.93		1.87		2.54		5.41	5.51	0.20 U
12/7/2015	7.82 H		6.19 H		6.52 H		6.49 H	6.54 H		204		396		784		312	303		1.66		1.54		2.06		4.58	4.69	

Table 3B. Summary of Groundwater Conventional Parameters: 2007 through 2015

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Nitrate + Nitrite as N									Solids, total dissolved (TDS)									Sulfate								
	(mg/L)									(mg/L)									(mg/L)								
MCL/SMCL	10									500									250								
WA WQ Std	10									500									250								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
2/1/2007	0.28	0.58	0.96		0.94		0.75		0.03 J	142	146	522		420		231		5 U	1.4	1.4	0.1 J		0.2 J		14.8		0.2 U
4/18/2007	0.23	1.21	0.20		0.63		0.85		0.01 J	151	140	493		490		229		5 U	1.3	1.3	0.2 U		0.2 U		13.9		0.2 U
7/18/2007	0.05 U		0.19		0.08		0.70	0.68	0.01 J	154		414		495		262	248	5 U	1.4		0.2 U		0.2 U		11.3	11.4	0.2 U
10/9/2007	0.05 U	0.05 U	0.17		0.05 U		0.47		0.05 U	159	151	476		478		294		5 U	1.3	1.3	0.1 J		0.1 J		9.4		0.2 U
1/9/2008	0.05 U		0.07		0.05 U		0.58	0.54	0.05 U	148		578		508		239	233	5 U	0.8		0.2 U		0.2 U		14.0	14.9	0.2 U
4/30/2008	0.05 U		0.05 U		0.05 U		0.74	0.73	0.05 U	118		496		430		265	256	5 U	1.3		0.1 J		0.2 J		9.6	9.7	0.2 U
7/29/2008	0.10		0.15		0.05 U	0.05 U	1.48		0.05 U	161		415		506	505	363		5 U	1.3		0.1 J		0.1 J	0.2	6.2		0.2 U
10/22/2008	0.05 U		0.10		0.03 J	0.01 J	0.51			139		465		478	491	323			1.1		0.1 J		0.2 J	0.4	6.7		
2/1/2009	0.05 U		0.17		0.01 J		0.99	1.02	0.05	136		461		498		261	263	5 U	1.4		0.1 J		0.1 J		6.4	6.4	0.0 J
5/1/2009	0.01 J		0.21		0.03 J		0.12	0.13	0.02 J	130		460		513		223	220	7	1.7		0.4		0.2 U		6.7	6.6	0.2 U
8/1/2009	0.05 U		0.17	0.17	0.02 J		0.11		0.05 U	119		378	425	491		178		5 U	1.1		0.1 J	0.1 J	0.1 J		13.9		0.2 U
11/1/2009	0.05 U		0.06		0.05 U		0.05 U	0.05 U	0.05 U	121		452		496		198	201	5 U	3.3		0.2 U		0.2 U		15.0	14.9	0.2 U
2/10/2010	0.05 U		0.13		0.05 U	0.05 U	0.04 J		0.05 U	152		422		518	501	186		5	1.6		0.1 J		0.1 J	0.1 J	19.6		0.0 J
5/26/2010	0.03 J		0.22		0.04 J		0.11	0.11	0.04 J	129		340		508		166	178	5 U	1.5		0.8		0.2 J		15.3	13.4	0.4
8/18/2010	0.04 J		0.18		0.04 J		0.14	0.14	0.17	202		381		564		250	241	134	1.6		0.8		1.1		14.1	14.0	1.1
11/18/2010	0.05 U		0.12		0.05 U		0.09	0.09	0.05 U	98		330		462		153	161	5 U	1.1		0.4 U		0.4 U		12.3	11.7	0.4 U
2/9/2011	0.05 U		190.0		0.05 U		0.05 U	0.05 U	0.05 U	165		377		512		211	216	5 U	1.5		1.0		1.3		15.2	15.4	0.4 U
5/17/2011	0.01 J		0.14		0.02 J		0.15	0.14	0.01 J	129		374		559		209	194	5 U	0.9		0.2 J		0.3 J		15.9	15.1	0.4 U
8/24/2011	0.01 J		0.10		0.01 J		0.06	0.06	0.01 J	128		399		550		188	199	5 U	1.0		0.4 J		0.6		16.2	16.7	0.4 U
11/3/2011	0.05 U		0.14		0.01 J		0.10	0.09	0.05 U	115		350		532		217	220	5 U	1.1		0.6		0.8		15.8	15.0	0.4 U
2/14/2012	0.03 J		0.13		0.02 J		0.08	0.08	0.03 J	131		344		518		214	269	5 U	0.9		0.3 J		0.4 J		15.7	15.6	0.4 U
5/2/2012	0.05 U		0.10		0.01 J		0.05 J	0.03 J	0.05 U	129		336		547		230	222	5.5	0.8		0.3 J		0.3 J		16.4	16.3	0.4 U
8/21/2012	0.05 U		0.10		0.05 U		0.05	0.07	0.05 U	119		376		569		189	210	5 U	0.8		0.4		0.5		14.7	14.6	0.2 U
11/13/2012	0.01 J		0.05 U		0.01 J		0.04 J	0.03 J	0.05 U	131		331		537		188	188	5 U	0.9		0.4		0.5		14.5	14.5	0.2 U
2/12/2013	0.02 J		0.13		0.05 U		0.09	0.09	0.05 U	107		288		539		160	174	5.5	0.8		0.2		0.3		14.3	14.6	0.2 U
6/4/2013	0.05 U		0.05		0.05 U		0.09	0.07	0.05 U	141		340		553		179	168	5 U	0.8		0.4		0.6		13.5	13.3	0.2 U
8/27/2013	0.02 J		0.03 J		0.02 J		0.13	0.14	0.04 J	141		349		574		201	189	5 U	0.8		0.1 J		0.2 J		12.7	12.6	0.2 U
12/2/2013	0.05 U		0.20		0.01 J		0.03 J	0.03 J	0.01 J	132		356		530		223	197	5.5	0.8		0.1 J		0.2 J		12.3	11.9	0.2 U
3/17/2014	0.05 U		0.18 U		0.05 U		0.13 U	0.13 U	0.03 J	137		332		504		176	184	5 U	1.0		2.0 Ui		0.3		12.7	12.7	0.2 U
6/2/2014	0.05 U		0.05 U		0.05 U		0.14	0.14	0.05 U	NT		NT		NT		NT	NT	NT	0.9		0.2 U		0.1 J		10.1	9.9	0.2 U
9/29/2014	0.05 U		0.05 U		0.05 U		0.05 U	0.05 U	0.06	131		312		513		169	162	5 U	0.8		0.1 J		0.2		7.2	7.0	0.2 U
11/17/2014	0.05 U		0.05 U		0.05 U		0.05 U	0.05 U	0.03 J	NT		NT		NT		NT	NT	NT	1.6		0.2 J*		0.3		8.4 J*	0.8 J*	0.2 U
2/23/2015	0.05 U		0.05 U		0.05 U		0.07	0.07	0.05 U	122		325		479		156	157	5 U	0.8		0.2		0.3		7.7	7.7	0.2 U
9/14/2015	0.05 U		0.03 J		0.05 U		0.16 J	0.09 J	0.05 U	111		267		430		140	147	5 U	1.2		0.4		0.5		9.7	9.9	0.2 U
12/7/2015	0.05 U		0.05 U		0.05 U		0.37	0.36		112		285		424		146	155		1.1		0.2 J		0.3		10.7	10.6	

Table 3B. Summary of Groundwater Conventional Parameters: 2007 through 2015

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Ammonia as N (mg/L)									Chemical Oxygen Demand (COD) (mg/L)									Tannin and Lignin (mg/L)								
MCL/SMCL	--									--									--								
WA WQ Std	--									--									--								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
2/1/2007	0.50	0.52	0.93		0.05 U		0.05 U		0.03 J	5.0 U	5.0 U	75.0		36.0		6.0		50.0 U	0.30	0.40	4.10		1.10		0.16 J		0.09 J
4/18/2007	0.50	0.50	0.71		0.05 U		0.05 U		0.05 U	6.0	6.0	80.0		39.0		14.0		4.0 J	0.30	0.30	11.90		1.30		0.20 U		0.20 U
7/18/2007	0.50		0.74		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		67.0		31.0		5.0 U	6.0	5.0 U	0.30		13.40		1.30		0.12 J	0.13 J	0.20 U
10/9/2007	0.48	0.49	0.98		0.05 U		0.05 U		0.05 U	5.0 U	5.0 U	71.0		33.0		17.0		5.0 U	0.30	0.30	4.70		1.10		0.30		0.20 U
1/9/2008	0.55		0.41		0.05 U		0.05 U	0.05 U	0.02 J	5.0 U		61.0		35.0		12.0	13.0	5.0 U	0.30		8.00		1.20		0.30	0.30	0.06 J
4/30/2008	0.46		0.39		0.05 U		0.05 U	0.05 U	0.05 U	3.0 J		76.0		42.0		13.0	14.0	5.0 U	0.30		22.50		1.20		0.20	0.20	0.20 U
7/29/2008	0.48		0.75		0.05 U	0.05 U	0.05 U		0.08	6.0		75.0		37.0	35.0	24.0		9.0	0.20		11.50		1.20	1.20	0.20		0.20 U
10/22/2008	0.53		0.54		0.05 U	0.05 U	0.05 U			6.0		65.0		39.0	41.0	16.0			0.30		2.50		1.10	1.10	0.20		
2/1/2009	0.51		1.44		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		69.0		42.0		16.0	16.0	5.0 U	0.20		3.40		1.40		0.17 J	0.20	0.20 U
5/1/2009	0.61		1.08		0.05 U		0.05 U	0.05 U	0.05 U	22.0		70.0		38.0		13.0	11.0	5.0 U	0.30		3.50		0.90		0.30	0.30	0.20 U
8/1/2009	0.49		1.24	1.14	0.05 U		0.05 U		0.01 J	3.0 J		106.0	83.0	43.0		12.0		3.0 J	0.30		10.70	31.40	0.90		0.09 J		0.20 U
11/1/2009	0.54		0.56		0.03 J		0.05 J	0.18	0.02 J	5.0 U		65.9		42.1		13.7	13.7	5.0 U	0.39		20.10		1.32		0.19 J	0.18 J	0.04 J
2/10/2010	0.53		1.23		0.05 U	0.05 U	0.05 U		0.05 U	5.0 U		68.1		34.8	34.8	5.0 U		5.0 U	0.28		10.00		1.30	1.04	0.07 J		0.20 U
5/26/2010	0.56		0.97		0.03 J		0.03 J	0.02 J	0.05 U	3.3 J		73.9		41.0		11.0	10.5	5.0 U	0.32		31.30		1.10		0.11 J	0.11 J	0.20 U
8/18/2010	0.53		1.22		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		74.1		41.1		10.9	11.8	5.0 U	0.34		5.22		1.68		0.18 J	0.14 J	0.04 J
11/18/2010	0.50		1.02		0.05 U		0.05 U	0.05 U	0.05 U	5.6		67.5		42.1		14.7	12.2	7.6	0.36		13.10		1.43		0.15 J	0.16 J	0.04 J
2/9/2011	0.51		1.21		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		74.9		44.4		9.1	5.0 U	5.0 U	0.42		15.70		1.58		0.21	0.25	0.09 J
5/17/2011	0.54		0.70		0.05 U		0.05 U	0.05 U	0.05 U	3.4 J		70.5		45.4		8.2	9.7	5.0 U	0.30		15.00		0.46		0.10 J	0.14 J	0.20 U
8/24/2011	0.55		0.66		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		84.4		41.5		9.8	8.8	5.0 U	0.26		21.40		1.15		0.09 J	0.12 J	0.20 U
11/3/2011	0.57		0.05 U		0.04 J		0.05 U	0.05 U	0.05 U	5.0 U		68.9		37.8		4.7 J	7.6	5.0 U	0.36		7.70		1.51		0.24	0.24	0.07 J
2/14/2012	0.54		0.81		0.05 U		0.02 J	0.05 U	0.05 U	6.1		73.8		42.5		19.7	60.2	3.5 J	0.50		22.40		2.36		0.22	0.20	0.10 J
5/2/2012	0.54		0.56		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		62.8		41.9		8.4	5.0 U	5.0 U	0.41		49.70		1.46		0.13 J	0.18 J	0.20 U
8/21/2012	0.54		0.58		0.05 U		0.05 U	0.05 U	0.05 U	3.6 J		69.4		43.9		6.6	6.1	5.0 U	0.20 J		21.20		1.42		0.20 U	0.20 U	0.20 U
11/13/2012	0.51		0.93		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		65.3		37.8		5.9	10.3	5.0 U	0.33		12.70		1.63		0.17	0.27	0.20 U
2/12/2013	0.52		0.74		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		56.9		41.2		6.3	7.3	5.0 U	0.31		13.20		1.06		0.09 J	0.09 J	0.20 U
6/4/2013	0.53		1.01		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		62.6		41.4		5.9	7.4	5.0 U	0.25		13.10		1.73		0.06 J	0.07 J	0.20 U
8/27/2013	0.54		0.71		0.05 U		0.05 U	0.05 U	0.05 U	3.0 J		67.9		42.2		7.5	10.1	5.0 U	0.28		8.60		1.18		0.13 J	0.15 J	0.20 U
12/2/2013	0.55		0.82		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		65.2		36.7		6.7	5.2	5.0 U	0.18 J		5.75		1.38		0.10 J	0.20 U	0.20 U
3/17/2014	0.55		1.21		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		72.9		38.5		6.7	5.7	5.0 U	0.23		29.00		1.52		0.03 J	0.06 J	0.20 U
6/2/2014	0.58		0.91		0.05 U		0.05 U	0.05 J	0.05 U	5.0 U		70.5		39.8		7.1	7.6	5.0 U	0.28		20.80		1.27		0.20 U	1.15 J	0.12 J
9/29/2014	0.52		1.24		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		68.2		38.5		6.3	5.8	5.0 U	0.30		22.60		0.92		0.10 J	0.08 J	0.20 U
11/17/2014	0.55		1.08		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		65.2		33.9		5.6	6.6	5.0 U	0.29		20.50		1.37		0.11 J	0.10 J	0.20 U
2/23/2015	0.54		1.05		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		69.3		36.9		6.8	8.5	5.0 U	0.31		23.00		1.33		0.20 U	0.20 U	0.060 J
9/14/2015	0.54		1.00		0.05 U		0.05 U	0.05 U	0.03 J	5.0 U		81.9		39.6		8.2	6.6	5.0 U	0.22		4.49		1.34		0.09 J	0.08 J	0.20 U
12/7/2015	0.51		1.00		0.05 U		0.05 U	0.04 J		5.0 U		72.6		38.2		7.3	7.7		0.34		1.13		1.23		0.14 J	0.11 J	

Table 3B. Summary of Groundwater Conventional Parameters: 2007 through 2015

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Total Organic Carbon (TOC) (mg/L)									Total Coliforms MPN/100 mL								
MCL/SMCL	--									1/100 mL								
WA WQ Std	--									1/100 mL								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
2/1/2007	1.10	1.00	28.20		15.60		3.60		0.08 J	1.0 U	1.0 U	1.0 U		1.0 U		1.0 U		1.0 U
4/18/2007	1.00	1.00	28.40		16.70		4.80		0.25 J	1.0 U	1.0 U	1.0 U		1.0 U		1.0 U		1.0 U
7/18/2007	0.90		28.60		15.60		5.20	5.20	0.07 J	1.0		6.0		##### >		1.0 U	1.0	1.0 U
10/9/2007	1.00	0.90	26.40		15.50		7.10		0.08 J	1.0 U	1.0 U	1.0 U		5.1		1.0 U		1.0 U
1/9/2008	0.80		23.90		15.80		6.00	6.10	0.14 J	1.0 U		1.0 U		1.0 U		1.0 U	1.0 U	3.1
4/30/2008	0.90		27.80		17.50		5.90	5.90	0.50 U	1.0 U		1.0 U		2.0		1.0 U	1.0 U	1.0 U
7/29/2008	0.90		27.90		15.90	16.20	8.30		0.50 U	1.0 U		1.0 U		248.9	70.8	1.0 U		18.7
10/22/2008	0.90		23.80		15.50	16.30	6.60			1.0 U		1.0 U		1.0 U	1.0 U	1.0 U		24.9
2/1/2009	0.90		21.80		16.60		5.20	5.20	0.50 U	1.0 U		1.0 U		17.5		1.0	1.0 U	1.0 U
5/1/2009	1.00		22.00		15.80		4.70	4.90	0.50 U	1.0 U		1.0		1.0		1.0 U	1.0 U	4.2
8/1/2009	1.10		29.00	28.40	16.90		5.10		0.17 J	1.0 U		1.0 U	1.0 U	1.0 U		1.0 U		1.0
11/1/2009	0.72		23.70		16.70		5.27	5.15	0.50 U	1.0 U		1.0 U		1.0 U		1.0 U	1.0 U	3.1
2/10/2010	0.77		23.80		17.10	16.50	3.91		0.50 U	1.0 U		1.0 U		1.0	1.0	1.0 U		1.0
5/26/2010	0.93		25.20		17.30		4.17	4.14	0.10 J	1.0 U		1.0 U		2.0		165.2	165.2	47.8
8/18/2010	0.81		21.50		15.30		3.70	3.46	0.50 U	1.0 U		1.0 U		1.0		9.7	3.0	18.9
11/18/2010	2.61		24.70		18.20		7.41	7.18	0.08 J	1.0		5.2		2.0		1.0	1.0 U	1.0
2/9/2011	1.15		21.60		17.20		4.37	4.16	0.50 U	1.0 U		1.0 U		1.0 U		1.0 U	1.0 U	1.0 U
5/17/2011	0.94		18.80		16.40		2.94	3.01	0.07 J	2.0		1.0 U		1.0 U		1.0 U	1.0	1.0 U
8/24/2011	0.67		25.50		14.20		2.98	3.06	0.50 U	1.0 U		1.0 U		18.1		1.0 U	1.0 U	1.0 U
11/3/2011	1.00		4.41		14.60		3.13	3.35	0.50 U	1.0 U		P		P		P		1.0 U
2/14/2012	1.19		22.20		15.40		3.09	3.28	0.08 J	2.0		1.0 U		5.2		1.0 U	1.0 U	1.0 U
5/2/2012	0.68		17.30		15.50		2.64	4.04	0.50 U									
8/21/2012	0.84		19.30		14.80		2.51	2.56	0.50 U	1.0 U		1.0 U		1.0 U		2.0	1.0 U	1.0 U
11/13/2012	0.90		19.80		14.30		2.74	2.81	0.08 J	1.0 U		1.0 U		1.0		1.0 U		1.0 U
2/12/2013	0.73		15.40		15.50		2.54	2.46	0.50 U	1.0 U		10.0 U		1.0 U		1.0 U	1.0 U	1.0 U
6/4/2013	0.82		18.40		15.40		2.39	2.44	0.50 U									
8/27/2013	0.88		18.90		14.60		2.54	2.49	0.50 U	1.0 U		1.0 U		1.0 U		1.0 U	1.0 U	1.0 U
12/2/2013	0.90		18.40		14.30		2.48	2.54	0.08 J	1.0 U		1.0 U		1.0 U		40.8 J	24.1 J	1.0 U
3/17/2014	0.84		20.40		13.30		2.29	2.23	0.50 U	1.0 U		1.0 U		1.0 U		1.0 U	1.0 U	1.0 U
6/2/2014	1.00 U		19.80		14.60		2.34	2.48	0.26 J	1.0 U		1.0 U		1.0 U		1.0 U	1.0 U	1.0 U
9/29/2014	0.78		19.50		14.00		2.25	2.15	0.50 U	1.0 U		1.0 U		1.0 U		1.0 U	1.0 U	1.0 U
11/17/2014	0.78		18.00		13.80		2.45	2.32	0.12 J	1.0 U		1.0 U		1.0 U		4.1	1.0 U	1.0 U
2/23/2015	0.81 U		19.00		14.50		2.47	2.44	0.25 J	1.0 U		1.0 U		1.0 U		1.0 U	1.0 U	1.0 U
9/14/2015	1.00 U		21.50		12.80		2.45 U	2.56 U	0.80	1.0 U		1.0 U		1.0 U		3.1	3.1	1.0 U
12/7/2015	0.94		17.10		12.80		3.00	2.78		1.0 U		1.0 U		1.0 U		2.0	3.1	1.0 U

Notes

µS/cm = microSiemen per cent NT = not tested. mg/L = milligram per liter.

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

J* = result is an estimated concentration because of lab imprecision.

MCL = Federal maximum contaminant levels for drinking water.

MPN = most probable number.

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).

Table 3C. Summary of Groundwater Metals: 2007 through 2015

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Arsenic, dissolved									Barium, dissolved									Iron, dissolved								
	(µg/L)									(µg/L)									(µg/L)								
MCL/SMCL	10									2,000									300								
WA WQ Std	0.05									1,000									300								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
2/1/2007	6.8	5.8	145.0		1.1 B		5.0 U		5.0 U	28.6	28.9	101		47.0		19.1		5.0 U	38.6	36.7	110,000		846		20 U		20 U
4/18/2007	6.0	6.0	113.0		0.7 B		5.0 U		1.5 B	25.6	25.6	73.8		39.8		24.5		3.0 B	42.8	36.4	90,500		771		10.1 B		4.7 B
7/18/2007	5.4		113.0		5.0 U		5.0 U	5.0 U	5.0 U	33.0		80.6		50.1		24.6	23.0	5.0 U	38.3		88,100		699		20 U	20 U	20 U
10/9/2007	5.4	4.8 B	67.2		5.0 U		5.0 U		5.0 U	29.4	29.3	83.2		48.3		26.5		5.0 U	36.1	36	62,700		656		20 U		20 U
1/9/2008	6.7		42.6		5.0 U		5.0 U	5.0 U	0.7 U	26.7		65.4		42.3		18.3	19.0	0.6 U	41.3		35,500		608		7.8 J	8.2 J	3 U
4/30/2008	4.4 J		117.0		5.0 U		5.0 U	5.0 U	0.7 U	27.6		111		41.7		22.1	22.6	0.6 U	41.5		102,000		624		8.8 J	8.3 J	3 U
7/30/2008	5.4		111.0		0.8 J	5.0 U	5.0 U		0.6 U	29.7		122		49.5	50.9	31.5		0.5 U	35.2		96,800		593	591	20 U		4 U
10/22/2008	7.2		46.5		5.0 U	5.0 U	1.1 J			26.7		72.2		41.9	43.3	24.8			74.8		53,800		560	571	8.8 J		
2/1/2009	14.4		114.0		5.0 U		5.0 U	5.0 U	5.0 U	29.5		125		49.7		23.2	22.6	5.0 U	54.6		109,000		542		4.6 J	20 U	4.5 J
5/1/2009	6.2		120.0		1.6 J		0.6 J	0.7 J	5.0 U	26.7		111.0		45.4		16.7	16.8	5.0 U	51.7		102,000		473		6.1 J	4.9 J	20 U
8/1/2009	0.8 J		5.0 U	2.5 J	1.5 J		0.8 J		5.0 U	229		15.6	22.7	39.6		230		5.0 U	91.1		11.6 J	2,280	1340		91		0.8 J
11/1/2009	6.0		63.5		5.0 U		5.0 U	5.0 U	5.0 U	26.5		115.0		45.5		13.9	13.1	5.0 U	43.6		59,700		480		4.7 J	4.2 J	20 U
2/10/2010	7.1		133		3.0 J	2.5 J	1.6 J		5.0 U	28.4		132.0		49.6	52.2	14.3		5.0 U	33.7		94,700		465	493	20 U		20 U
5/26/2010	5.5		149		0.9 J		5.0 U	5.0 U	5.0 U	27.7		134.0		53.7		14.5	14.6	5.0 U	43.5		104,000		451		3.5 J	8.9 J	20 U
8/18/2010	5.3		139		0.9 J		5.0 U	5.0 U	3.0 J	25.8		119.0		47.7		14.9	14.3	1.5 J	38.6		104,000		482		3.7 J	1.6 J	20 U
11/18/2010	5.6		186		5.0 U		5.0 U	5.0 U	5.0 U	24.6		132.0		44.9		15.7	15.7	5.0 U	20 U		116,000		420		8.7 J	6 J	20 U
2/9/2011	5.5		119		5.0 U		5.0 U	5.0 U	5.0 U	28.6		142.0		53.6		16.9	16.6	5.0 U	46.8		109,000		466		20 U	20 U	20 U
5/17/2011	6.2		139		1.1 J		5.0 U	5.0 U	5.0 U	25.4		123.0		53.0		15.3	15.5	5.0 U	55.6		110,000		470		11.7 J	13 J	6.8 J
8/24/2011	6.4		155		5.0 U		5.0 U	5.0 U	5.0 U	24.4		120.0		47.2		15.8	15.3	5.0 U	35.1		107,000		412		20 U	1 J	20 U
11/3/2011	6.2		156		1.0 J		5.0 U	0.6 J	5.0 U	24.7		121.0		44.5		15.0	15.2	5.0 U	42.1		100,000		388		7.7 J	7.6 J	20 U
2/14/2012	5.2		158		0.6 J		5.0 U	5.0 U	5.0 U	27.2		136.0		48.4		16.7	16.3	0.6 J	42.8		97,800		375		20 U	20 U	20 U
5/2/2012	5.8		133		0.9 J		5.0 U	5.0 U	5.0 U	28.8		116.0		54.2		16.4	15.9	5.0 U	55.1		97,900		430		20 UJ	20 UJ	20 U
8/21/2012	4.9 J		135		5.0 U		5.0 U	5.0 U	5.0 U	27.5		114.0		52.7		15.3	15.5	5.0 U	43.4		99,200		417		20 U	20 U	20 U
11/13/2012	6.2		170		5.0 U		5.0 U	5.0 U	5.0 U	28.0		137.0		50.6		15.7	15.8	5.0 U	77.5		98,100		395		20 U	20 U	20 U
2/12/2013	6.1		119		5.0 U		5.0 U	5.0 U	5.0 U	26.1		90.4		54.9		13.9	14.2	5.0 U	60.1		91,600		450		4.4 J	4.6 J	20 U
6/4/2013	6.8		138		1.5 J		5.0 U	1.1 J	1.1 J	26.1		85.5		53.0		13.3	13.3	4.0 U	58.4		93,500		416		3.7 J	5.9 J	4.1 J
8/27/2013	6.3		140		1.0 J		5.0 U	5.0 U	5.0 U	27.5		115		54.4		16.1	15.2	4.0 U	64.6		109,000		416		20 U	5.8 J	20 U
12/2/2013	6.4		164		1.3 J		5.0 U	5.0 U	5.0 U	26.0		124		47.3		15.1	15.6	4.0 U	55.5		107,000		400		20 U	3 J	20 U
3/17/2014	6.00		175		0.78		0.50 U	0.50 U	0.50 U	27.4		140		50.3		15.4	15.5	4.0 U	69.3		127,000		424		20 U	8.5 J	20 U
6/2/2014	6.00		157		0.70		0.20 J	0.30 J	0.50 U	28.1		127		52.8		15.2	15	4.0 U	52.4		118,000		421		20 U	20 U	20 U
9/29/2014	5.86		191		0.69		0.25 J	0.24 J	0.50 U	27.6		135		50.0		14.9	15	4.0 U	72.7		111,000		409		20 U	20 U	8.3 J
11/17/2014	5.7		174		0.7		0.3 J	0.3 J	0.5 U	27.7		130		49.6		15.3	14.7	0.6 J	70		120,000		421		20 U	20 U	40 U
2/23/2015	5.90		163		0.70		0.20 J	0.30 J	0.50 U	27.7		127		47		13.1	13.3	0.1	73.2		114,000		375		0.1 U	10.2 J	20 U
9/14/2015	5.90		185		0.60		0.50 U	0.20 J	0.50 U	30		152		46.6		14.4	15.2	4.0 U	53.5		122,000		358		6.4 J	3.9 J	20 U
12/7/2015	6.32		174		0.76		0.26 J	0.26 J		27.7		162		43.7		13.2	13.4		56		126,000		361		9 J	20 U	

Table 3C. Summary of Groundwater Metals: 2007 through 2015

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Manganese, dissolved									Cadmium, dissolved									Copper, dissolved								
	(µg/L)									(µg/L)									(µg/L)								
MCL/SMCL	50									5									1,300								
WA WQ Std	50									10									1,000								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
2/1/2007	112	114	13,500		1350		89.5		5 U	5.0 U	5.0 U	5.0 U		5.0 U		5.0 U		5.0 U	10.0 U	10.0 U	10.0 U		10.0 U		3.0 B		10.0 U
4/18/2007	107	106	13,500		1330		123		1.6 B	5.0 U	5.0 U	2.9 B		0.7 B		1.9 B		5.0 U	10.0 U	10.0 U	10.0 U		10.0 U		10.0 U		10.0 U
7/18/2007	118		14,000		1330		268	268	5 U	5.0 U		5.0 U		5.0 U		5.0 U	5.0 U		10.0 U		4.4 B		5.4 B		4.2 B	6.0 B	10.0 U
10/9/2007	121	120	14,700		1280		353		2.7 B	5.0 U	5.0 U	5.0 U		5.0 U		5.0 U			10.0 U	10.0 U	10.0 U		10.0 U		10.0 U		10.0 U
1/9/2008	125		17,900		1270		422	428	1.6 B	5.0 U		1.8 J		1.4 J		5.0 U	1.3 J		10.0 U		10.0 U		10.0 U		10.0 U	10.0 U	7.0 U
4/30/2008	110		12,600		1150		240	234	0.3 B	5.0 U		5.0 U		1.1 J		5.0 U	0.7 J		10.0 U		10.0 U		10.0 U		10.0 U	10.0 U	7.0 U
7/30/2008	111		13,100		1190	1210	309		0.2 U	5.0 U		4.3 J		5.0 U	5.0 U	0.2 J			10.0 U		10.0 U		1.4 J	1.4 J	3.3 J		1.4 B
10/22/2008	111		15,400		1290	1300	297			5.0 U		5.0 U		5.0 U	5.0 U	5.0 U			10.0 U		10.0 U		10.0 U	10.0 U	10.0 U		
2/1/2009	120		11,800		1250		175	174	0.2 J	5.0 U		1.2 J		5.0 U		0.2 J	0.3 J	0.2 J	10.0 U		10.0 U		2.1 J		1.6 J	2.6 J	10.0 U
5/1/2009	108		11,300		1230		114	116	0.4 J	5.0 U		2.1 J		5.0 U		5.0 U	5.0 U	5.0 U	10.0 U		10.0 U		10.0 U		10.0 U	10.0 U	5.8 J
8/1/2009	4220		7870	2540	2500		4180		0.2 J	5.0 U		5.0 U	5.0 U	5.0 U		5.0 U		5.0 U	22.2		10.0 U	10.0 U	10.0 U		21.2		10.0 U
11/1/2009	110		13,400		1300		204	204	0.7 J	5.0 U		5.0 U		5.0 U		5.0 U	5.0 U	5.0 U	10.0 U		10.0 U		10.0 U		10.0 U	10.0 U	10.0 U
2/10/2010	116		11,200		1260	1330	36.2		5 U	5.0 U		5.0 U		5.0 U	5.0 U	5.0 U		5.0 U	1.3 J		2.0 J		3.8 J	4.1 J	3.9 J		10.0 U
5/26/2010	115		9,380		1340		77.6	78	5 U	5.0 U		5.0 U		5.0 U		5.0 U	5.0 U	5.0 U	10.0 U		10.0 U		1.6 J		2.0 J	2.3 J	10.0 U
8/18/2010	108		9,670		1310		48	47.2	5 U	5.0 U		3.0 J		5.0 U		5.0 U	5.0 U	5.0 U	4.2 J		6.9 J		4.4 J		4.0 J	6.8 J	10.0 U
11/18/2010	112		7,880		1340		92.8	95.4	5 U	5.0 U		4.5 J		5.0 U		5.0 U	5.0 U	5.0 U	10.0 U		10.0 U		10.0 U		10.0 U	10.0 U	5.8 J
2/9/2011	125		9,610		1400		159	160	0.2 J									5.0 U	10.0 U		3.3 J		10.0 U		2.0 J	2.0 J	10.0 U
5/17/2011	100		13,600		1460		122	116	5 U									5.0 U	10.0 U		10.0 U		2.8 J		10.0 U	10.0 U	2.2 J
8/24/2011	97.2		14,000		1340		144	136	5 U									5.0 U	10.0 U		10.0 U		10.0 U		10.0 U	10.0 U	10.0 U
11/3/2011	105				1300		149	150	0.5 J	5.0 U		2.9 J		2.6 J		5.0 U		5.0 U	10.0 U		10.0 U		10.0 U		10.0 U	2.3 J	10.0 U
2/14/2012	114		8,650		1510		252	242	0.3 J	5.0 U		5.0 U		5.0 U		5.0 U	5.0 U	5.0 U	10.0 U		5.2 J		1.7 J		1.7 J	2.9	10.0 U
5/2/2012	116		12,900		1570		254	252	5 U	5.0 U		5.0 U		0.6 J		5.0 U	5.0 U	5.0 U	0.6 J		10.0 U		1.7 J		2.1 J	2.2	10.0 U
8/21/2012	113		14,000		1510		201	200	5 U	NT		NT		NT		NT		NT	10.0 U		10.0 U		1.5 J		2.1 J	1.9	10.0 U
11/13/2012	119		9,650		1550		242	244	5 U	NT		NT		NT		NT		NT	10.0 U		10.0 U		3.4 J		10.0 U	10.0 U	10.0 U
2/12/2013	110		10,700		1610		220	220	5 U	NT		NT		NT		NT		NT	10.0 U		10.0 U		1.5 J		1.4 J	1.7 J	10.0 U
6/4/2013	118		14,800		1680		212	209	6.2	NT		NT		NT		NT		NT	4.0 U		4.0 U		2.8 J		2.1 J	2.0 J	4.0 U
8/27/2013	119		14,200		1700		224	219	0.5 J	NT		NT		NT		NT		NT	4.0 U		4.0 U		2.3 J		2.0 J	1.6 J	4.0 U
12/2/2013	111				1580		217	221	0.1 J	NT		NT		NT		NT		NT	4.0 U		4.0 U		3.6 J		2.6 J	2.9 J	4.0 U
3/17/2014	119		10,400		1640		287	282	0.3 J	NT		NT		NT		NT		NT	4.0 U		4.0 U		4.0 U		4.0 U	4.0 U	4.0 U
6/2/2014	116		12,300		1680		253	250	1 U	NT		NT		NT		NT		NT	4.0 U		4.0 U		2.6 J		2.0 J	2.1 J	4.0 U
9/29/2014	118		7,310		1650		240	241	0.6 J	NT		NT		NT		NT		NT	4.0 U		4.0 U		4.0 U		4.0 U	4.0 U	1.2 J
11/17/2014	115		8,620		1680		265	267	0.2 J	NT		NT		NT		NT		NT	4.0 U		4.0 U		4.0 U		4.0 U	4.0 U	1.0 J
2/23/2015	120		10,100		1580		311	301	0.958	NT		NT		NT		NT		NT	0.13 U		0.34		2.32		1.78	1.78	0.030 J
9/14/2015	114		5,290		1570		238	268	1 U	NT		NT		NT		NT		NT	4.0 U		4.0 U		2.1 J		13.6	10.1	4.0 U
12/7/2015	110		5,990		1500		321	330		NT		NT		NT		NT		NT	4.0 U		1.3 J		3.4 J		3.4 J	2.2 J	

Table 3C. Summary of Groundwater Metals: 2007 through 2015

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Nickel, dissolved (µg/L)									Zinc, dissolved (µg/L)								
MCL/SMCL	100									5,000								
WA WQ Std	--									5,000								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
2/1/2007	20.0 U	20.0 U	20.0 U		38.4		20.0 U		20.0 U	2.4 B	10.0 U	12.9		5.8 B		4.0 B		10.0 U
4/18/2007	20.0 U	20.0 U	18.2 B		33.9		10.4 B		20.0 U	10.0 U	10.0 U	8.5 B		30.2		10.0 U		10.0 U
7/18/2007	20.0 U		20.4		30.1		20.0 U	20.0 U	20.0 U	10.0 U		12.4		11.1		8.0 B	6.5 B	10.0 U
10/9/2007	20.0 U	20.0 U	20.0 U		31.4		20.0 U		20.0 U	10.0 U	12.9	15.9		22.3		7.9 B		10.0 U
1/9/2008	20.0 U		17.0 J		30.6		16.0 J	15.5 J	2.0 U	8.3 J		10.0 U		14.8		10.0 U	8.0 J	7.0 U
4/30/2008	20.0 U		20.2		31.8		11.1 J	11.8 J	2.0 U	10.0 U		10.0 U		10.0 U		10.0 U	10.0 U	7.0 U
7/30/2008	20.0 U		4.5 J		24.8	25.1	10.2 J		0.5 U	1.0 J		4.8 J		4.4 J	4.2 J	9.1 J		1.5 B
10/22/2008	20.0 U		22.8		31.7	32.4	15.5 J			10.0 U		3.9 J		6.2 J	7.1 J	12.1		
2/1/2009	20.0 U		20.6		32.1		10.7 J	10.5 J	20.0 U	1.5 J		2.1 J		6.5 J		3.6 J	3.5 J	1.6 J
5/1/2009	20.0 U		17.7 J		31.2		7.0 J	7.9 J	20.0 U	10.0 U		3.9 J		3.7 J		1.5 J	2.2 J	5.0 J
8/1/2009	104.0		48.5	26.7	134.0		109.0		20.0 U	3.8 J		2.6 J	2.4 J	10.0 U		3.4 J		2.4 J
11/1/2009	20.0 U		13.2 J		31.1		11.1 J	10.1 J	20.0 U	10.0 U		1.5 J		2.8 J		1.5 J	10.0 U	10.0 U
2/10/2010	20.0 U		22.8		32.4	34.0	5.9 J		20.0 U	10.0 U		1.6 J		5.3 J	5.8 J	1.7 J		10.0 U
5/26/2010	20.0 U		19.5 J		32.6		6.5 J	6.7 J	20.0 U	10.0 U		10.0 U		3.5 J		2.1 J	2.5 J	10.0 U
8/18/2010	20.0 U		12.5 J		29.9		6.8 J	5.5 J	20.0 U	10.0 U		10.0 U		1.7 J		10.0 U	10.0 U	1.9 J
11/18/2010	20.0 U		17.5 J		33.3		5.8 J	5.2 J	20.0 U	10.0 U		2.3 J		4.8 J		10.0 U	1.9 J	10.0 U
2/9/2011	20.0 U		20.8		34.4		10.0 J	9.6 J	20.0 U	0.4 J		20.0 U		4.9 J		3.1 J	2.5 J	0.3 J
5/17/2011	20.0 U		15.3 J		38.7		8.7 J	7.0 J	20.0 U									
8/24/2011	20.0 U		16.2 J		32.2		8.5 J	9.2 J	20.0 U	10.0 U		4.2 J		4.7 J		1.7 J	3.1 J	10.0 U
11/3/2011	20.0 U		11.2 J		30.5		10.6 J	10.1 J	20.0 U	10.0 U		3.0 J		4.0 J		1.0 J	1.3 J	10.0 U
2/14/2012	20.0 U		22.7		29.6		9.4 J	9.3 J	20.0 U	0.7 J		6.8 J		5.5 J		3.0 J	3.2 J	0.7 J
5/2/2012	20.0 U		13.0 J		33.7		9.2 J	8.9 J	20.0 U	0.4 J		10.0 U		4.3 J		2.5 J	2.3 J	10.0 U
8/21/2012	0.7 J		15.8 J		33.5		8.9 J	9.1 J	20.0 U	10.0 U		0.8 J		2.3 J		2.6 J	2.5 J	10.0 U
11/13/2012	20.0 U		13.6 J		31.7		8.8 J	9.7 J	20.0 U	10.0 U		0.8 J		3.8 J		2.7 J	2.3 J	10.0 U
2/12/2013	20.0 U		18.2 J		36.1		9.2 J	9.4 J	20.0 U	10.0 U		0.9 J		3.2 J		2.4 J	2.1 J	10.0 U
6/4/2013	0.4 J		18.4		36.9		8.5	8.4	4.0 U	4.0 U		2.7 J		3.8 J		2.4 J	2.5	4.0 U
8/27/2013	2.2 J		22.2		38.4		11.2	10.8	4.0 U	4.0 U		2.9 J		3.6 J		2.7 J	2.5 J	4.0 U
12/2/2013	5.4		25.1		38.2		12.8	13.5	4.0 U	4.0 U		1.9 J		3.7 J		3.1 J	3.1 J	4.0 U
3/17/2014	4.0 U		11.2		31.0		7.4	7.6	4.0 U	4.0 U		0.8 J		4.4		2.8 J	2.8 J	4.0 U
6/2/2014	2.2 J		21.2		38.5		10.9	10.4	4.0 U	4.0 U		1.3 J		3.4 J		2.2 J	2.2 J	4.0 U
9/29/2014	4.0 U		16.1		34.3		8.8	9.0	0.4 J	0.5 J		1.7 J		5.6		3.2 J	2.4 J	4.0 U
11/17/2014	1.1 J		19.7		35.8		10.0	10.1	4.0 U	5.0 U		2.3 J		4.4 J		2.1 J	2.6 J	5.0 U
2/23/2015	0.4 U		18.9		34.1		9.3	9.3	0.1 J	0.4 J		2.1		6.5		2.9	2.9	0.5 U
9/14/2015	4.0 U		18.0		30.5		7.7	8.3	0.4 J	4.0 U		2.0 J		3.1 J		362.0	268.0	4.0 U
12/7/2015	4.0 U		20.6		29.3		6.6	6.9		3.2 J		0.5 J		4.4		13.7 J	6.7 J	

Notes

µg/L = microgram per liter. B = detected in laboratory method blank.

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

J* = result is an estimated concentration because of lab imprecision.

MCL = Federal maximum contaminant levels for drinking water.

NT = not tested.

SMCL = Federal secondary maximum contaminant levels for drinking water.

R = rejected value.

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).

Table 3B. Summary of Groundwater Conventional Parameters: 2007 through 2015

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

Date	Nitrate + Nitrite as N (mg/L)								
MCL/SMCL	10								
WA WQ Std	10								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
2/1/2007	0.28	0.58	0.96		0.94		0.75		0.03 J
4/18/2007	0.23	1.21	0.20		0.63		0.85		0.01 J
7/18/2007	0.05 U		0.19		0.08		0.70	0.68	0.01 J
10/9/2007	0.05 U	0.05 U	0.17		0.05 U		0.47		0.05 U
1/9/2008	0.05 U		0.07		0.05 U		0.58	0.54	0.05 U
4/30/2008	0.05 U		0.05 U		0.05 U		0.74	0.73	0.05 U
7/29/2008	0.10		0.15		0.05 U	0.05 U	1.48		0.05 U
10/22/2008	0.05 U		0.10		0.03 J	0.01 J	0.51		
2/1/2009	0.05 U		0.17		0.01 J		0.99	1.02	0.05
5/1/2009	0.01 J		0.21		0.03 J		0.12	0.13	0.02 J
8/1/2009	0.05 U		0.17	0.17	0.02 J		0.11		0.05 U
11/1/2009	0.05 U		0.06		0.05 U		0.05 U	0.05 U	0.05 U
2/10/2010	0.05 U		0.13		0.05 U	0.05 U	0.04 J		0.05 U
5/26/2010	0.03 J		0.22		0.04 J		0.11	0.11	0.04 J
8/18/2010	0.04 J		0.18		0.04 J		0.14	0.14	0.17
11/18/2010	0.05 U		0.12		0.05 U		0.09	0.09	0.05 U
2/9/2011	0.05 U		190.0		0.05 U		0.05 U	0.05 U	0.05 U
5/17/2011	0.01 J		0.14		0.02 J		0.15	0.14	0.01 J
8/24/2011	0.01 J		0.10		0.01 J		0.06	0.06	0.01 J
11/3/2011	0.05 U		0.14		0.01 J		0.10	0.09	0.05 U
2/14/2012	0.03 J		0.13		0.02 J		0.08	0.08	0.03 J
5/2/2012	0.05 U		0.10		0.01 J		0.05 J	0.03 J	0.05 U
8/21/2012	0.05 U		0.10		0.05 U		0.05	0.07	0.05 U
11/13/2012	0.01 J		0.05 U		0.01 J		0.04 J	0.03 J	0.05 U
2/12/2013	0.02 J		0.13		0.05 U		0.09	0.09	0.05 U
6/4/2013	0.05 U		0.05		0.05 U		0.09	0.07	0.05 U
8/27/2013	0.02 J		0.03 J		0.02 J		0.13	0.14	0.04 J
12/2/2013	0.05 U		0.20		0.01 J		0.03 J	0.03 J	0.01 J
3/17/2014	0.05 U		0.18 U		0.05 U		0.13 U	0.13 U	0.03 J
6/2/2014	0.05 U		0.05 U		0.05 U		0.14	0.14	0.05 U
9/29/2014	0.05 U		0.05 U		0.05 U		0.05 U	0.05 U	0.06
11/17/2014	0.05 U		0.05 U		0.05 U		0.05 U	0.05 U	0.03 J
2/23/2015	0.05 U		0.05 U		0.05 U		0.07	0.07	0.05 U
9/14/2015	0.05 U		0.03 J		0.05 U		0.16 J	0.09 J	0.05 U
12/7/2015	0.05 U		0.05 U		0.05 U		0.37	0.36	

Date	Solids, total dissolved (TDS) (mg/L)								
MCL/SMCL	500								
WA WQ Std	500								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
2/1/2007	142	146	522		420		231		5 U
4/18/2007	151	140	493		490		229		5 U
7/18/2007	154		414		495		262	248	5 U
10/9/2007	159	151	476		478		294		5 U
1/9/2008	148		578		508		239	233	5 U
4/30/2008	118		496		430		265	256	5 U
7/29/2008	161		415		506	505	363		5 U
10/22/2008	139		465		478	491	323		
2/1/2009	136		461		498		261	263	5 U
5/1/2009	130		460		513		223	220	7
8/1/2009	119		378	425	491		178		5 U
11/1/2009	121		452		496		198	201	5 U
2/10/2010	152		422		518	501	186		5
5/26/2010	129		340		508		166	178	5 U
8/18/2010	202		381		564		250	241	134
11/18/2010	98		330		462		153	161	5 U
2/9/2011	165		377		512		211	216	5 U
5/17/2011	129		374		559		209	194	5 U
8/24/2011	128		399		550		188	199	5 U
11/3/2011	115		350		532		217	220	5 U
2/14/2012	131		344		518		214	269	5 U
5/2/2012	129		336		547		230	222	5.5
8/21/2012	119		376		569		189	210	5 U
11/13/2012	131		331		537		188	188	5 U
2/12/2013	107		288		539		160	174	5.5
6/4/2013	141		340		553		179	168	5 U
8/27/2013	141		349		574		201	189	5 U
12/2/2013	132		356		530		223	197	5.5
3/17/2014	137		332		504		176	184	5 U
6/2/2014	NT		NT		NT		NT	NT	NT
9/29/2014	131		312		513		169	162	5 U
11/17/2014	NT		NT		NT		NT	NT	NT
2/23/2015	122		325		479		156	157	5 U
9/14/2015	111		267		430		140	147	5 U
12/7/2015	112		285		424		146	155	

Date	Sulfate (mg/L)								
MCL/SMCL	250								
WA WQ Std	250								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
2/1/2007	1.4	1.4	0.1 J		0.2 J		14.8		0.2 U
4/18/2007	1.3	1.3	0.2 U		0.2 U		13.9		0.2 U
7/18/2007	1.4		0.2 U		0.2 U		11.3	11.4	0.2 U
10/9/2007	1.3	1.3	0.1 J		0.1 J		9.4		0.2 U
1/9/2008	0.8		0.2 U		0.2 U		14.0	14.9	0.2 U
4/30/2008	1.3		0.1 J		0.2 J		9.6	9.7	0.2 U
7/29/2008	1.3		0.1 J		0.1 J	0.2	6.2		0.2 U
10/22/2008	1.1		0.1 J		0.2 J	0.4	6.7		
2/1/2009	1.4		0.1 J		0.1 J		6.4	6.4	0.0 J
5/1/2009	1.7		0.4		0.2 U		6.7	6.6	0.2 U
8/1/2009	1.1		0.1 J	0.1 J	0.1 J		13.9		0.2 U
11/1/2009	3.3		0.2 U		0.2 U		15.0	14.9	0.2 U
2/10/2010	1.6		0.1 J		0.1 J	0.1 J	19.6		0.0 J
5/26/2010	1.5		0.8		0.2 J		15.3	13.4	0.4
8/18/2010	1.6		0.8		1.1		14.1	14.0	1.1
11/18/2010	1.1		0.4 U		0.4 U		12.3	11.7	0.4 U
2/9/2011	1.5		1.0		1.3		15.2	15.4	0.4 U
5/17/2011	0.9		0.2 J		0.3 J		15.9	15.1	0.4 U
8/24/2011	1.0		0.4 J		0.6		16.2	16.7	0.4 U
11/3/2011	1.1		0.6		0.8		15.8	15.0	0.4 U
2/14/2012	0.9		0.3 J		0.4 J		15.7	15.6	0.4 U
5/2/2012	0.8		0.3 J		0.3 J		16.4	16.3	0.4 U
8/21/2012	0.8		0.4		0.5		14.7	14.6	0.2 U
11/13/2012	0.9		0.4		0.5		14.5	14.5	0.2 U
2/12/2013	0.8		0.2		0.3		14.3	14.6	0.2 U
6/4/2013	0.8		0.4		0.6		13.5	13.3	0.2 U
8/27/2013	0.8		0.1 J		0.2 J		12.7	12.6	0.2 U
12/2/2013	0.8		0.1 J		0.2 J		12.3	11.9	0.2 U
3/17/2014	1.0		2.0 Ui		0.3		12.7	12.7	0.2 U
6/2/2014	0.9		0.2 U		0.1 J		10.1	9.9	0.2 U
9/29/2014	0.8		0.1 J		0.2		7.2	7.0	0.2 U
11/17/2014	1.6		0.2 J*		0.3		8.4 J*	0.8 J*	0.2 U
2/23/2015	0.8		0.2		0.3		7.7	7.7	0.2 U
9/14/2015	1.2		0.4		0.5		9.7	9.9	0.2 U
12/7/2015	1.1		0.2 J		0.3		10.7	10.6	

Table 3B. Summary of Groundwater Conventional Parameters: 2007 through 2015

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

Date	Ammonia as N (mg/L)									Chemical Oxygen Demand (COD) (mg/L)									Tannin and Lignin (mg/L)								
MCL/SMCL	--									--									--								
WA WQ Std	--									--									--								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
2/1/2007	0.50	0.52	0.93		0.05 U		0.05 U		0.03 J	5.0 U	5.0 U	75.0		36.0		6.0		50.0 U	0.30	0.40	4.10		1.10		0.16 J		0.09 J
4/18/2007	0.50	0.50	0.71		0.05 U		0.05 U		0.05 U	6.0	6.0	80.0		39.0		14.0		4.0 J	0.30	0.30	11.90		1.30		0.20 U		0.20 U
7/18/2007	0.50		0.74		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		67.0		31.0		5.0 U	6.0	5.0 U	0.30		13.40		1.30		0.12 J	0.13 J	0.20 U
10/9/2007	0.48	0.49	0.98		0.05 U		0.05 U		0.05 U	5.0 U	5.0 U	71.0		33.0		17.0		5.0 U	0.30	0.30	4.70		1.10		0.30		0.20 U
1/9/2008	0.55		0.41		0.05 U		0.05 U	0.05 U	0.02 J	5.0 U		61.0		35.0		12.0	13.0	5.0 U	0.30		8.00		1.20		0.30	0.30	0.06 J
4/30/2008	0.46		0.39		0.05 U		0.05 U	0.05 U	0.05 U	3.0 J		76.0		42.0		13.0	14.0	5.0 U	0.30		22.50		1.20		0.20	0.20	0.20 U
7/29/2008	0.48		0.75		0.05 U	0.05 U	0.05 U		0.08	6.0		75.0		37.0	35.0	24.0		9.0	0.20		11.50		1.20	1.20	0.20		0.20 U
10/22/2008	0.53		0.54		0.05 U	0.05 U	0.05 U			6.0		65.0		39.0	41.0	16.0			0.30		2.50		1.10	1.10	0.20		
2/1/2009	0.51		1.44		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		69.0		42.0		16.0	16.0	5.0 U	0.20		3.40		1.40		0.17 J	0.20	0.20 U
5/1/2009	0.61		1.08		0.05 U		0.05 U	0.05 U	0.05 U	22.0		70.0		38.0		13.0	11.0	5.0 U	0.30		3.50		0.90		0.30	0.30	0.20 U
8/1/2009	0.49		1.24	1.14	0.05 U		0.05 U		0.01 J	3.0 J		106.0	83.0	43.0		12.0		3.0 J	0.30		10.70	31.40	0.90		0.09 J		0.20 U
11/1/2009	0.54		0.56		0.03 J		0.05 J	0.18	0.02 J	5.0 U		65.9		42.1		13.7	13.7	5.0 U	0.39		20.10		1.32		0.19 J	0.18 J	0.04 J
2/10/2010	0.53		1.23		0.05 U	0.05 U	0.05 U		0.05 U	5.0 U		68.1		34.8	34.8	5.0 U		5.0 U	0.28		10.00		1.30	1.04	0.07 J		0.20 U
5/26/2010	0.56		0.97		0.03 J		0.03 J	0.02 J	0.05 U	3.3 J		73.9		41.0		11.0	10.5	5.0 U	0.32		31.30		1.10		0.11 J	0.11 J	0.20 U
8/18/2010	0.53		1.22		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		74.1		41.1		10.9	11.8	5.0 U	0.34		5.22		1.68		0.18 J	0.14 J	0.04 J
11/18/2010	0.50		1.02		0.05 U		0.05 U	0.05 U	0.05 U	5.6		67.5		42.1		14.7	12.2	7.6	0.36		13.10		1.43		0.15 J	0.16 J	0.04 J
2/9/2011	0.51		1.21		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		74.9		44.4		9.1	5.0 U	5.0 U	0.42		15.70		1.58		0.21	0.25	0.09 J
5/17/2011	0.54		0.70		0.05 U		0.05 U	0.05 U	0.05 U	3.4 J		70.5		45.4		8.2	9.7	5.0 U	0.30		15.00		0.46		0.10 J	0.14 J	0.20 U
8/24/2011	0.55		0.66		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		84.4		41.5		9.8	8.8	5.0 U	0.26		21.40		1.15		0.09 J	0.12 J	0.20 U
11/3/2011	0.57		0.05 U		0.04 J		0.05 U	0.05 U	0.05 U	5.0 U		68.9		37.8		4.7 J	7.6	5.0 U	0.36		7.70		1.51		0.24	0.24	0.07 J
2/14/2012	0.54		0.81		0.05 U		0.02 J	0.05 U	0.05 U	6.1		73.8		42.5		19.7	60.2	3.5 J	0.50		22.40		2.36		0.22	0.20	0.10 J
5/2/2012	0.54		0.56		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		62.8		41.9		8.4	5.0 U	5.0 U	0.41		49.70		1.46		0.13 J	0.18 J	0.20 U
8/21/2012	0.54		0.58		0.05 U		0.05 U	0.05 U	0.05 U	3.6 J		69.4		43.9		6.6	6.1	5.0 U	0.20 J		21.20		1.42		0.20 U	0.20 U	0.20 U
11/13/2012	0.51		0.93		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		65.3		37.8		5.9	10.3	5.0 U	0.33		12.70		1.63		0.17	0.27	0.20 U
2/12/2013	0.52		0.74		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		56.9		41.2		6.3	7.3	5.0 U	0.31		13.20		1.06		0.09 J	0.09 J	0.20 U
6/4/2013	0.53		1.01		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		62.6		41.4		5.9	7.4	5.0 U	0.25		13.10		1.73		0.06 J	0.07 J	0.20 U
8/27/2013	0.54		0.71		0.05 U		0.05 U	0.05 U	0.05 U	3.0 J		67.9		42.2		7.5	10.1	5.0 U	0.28		8.60		1.18		0.13 J	0.15 J	0.20 U
12/2/2013	0.55		0.82		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		65.2		36.7		6.7	5.2	5.0 U	0.18 J		5.75		1.38		0.10 J	0.20 U	0.20 U
3/17/2014	0.55		1.21		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		72.9		38.5		6.7	5.7	5.0 U	0.23		29.00		1.52		0.03 J	0.06 J	0.20 U
6/2/2014	0.58		0.91		0.05 U		0.05 U	0.05 J	0.05 U	5.0 U		70.5		39.8		7.1	7.6	5.0 U	0.28		20.80		1.27		0.20 U	1.15 J	0.12 J
9/29/2014	0.52		1.24		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		68.2		38.5		6.3	5.8	5.0 U	0.30		22.60		0.92		0.10 J	0.08 J	0.20 U
11/17/2014	0.55		1.08		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		65.2		33.9		5.6	6.6	5.0 U	0.29		20.50		1.37		0.11 J	0.10 J	0.20 U
2/23/2015	0.54		1.05		0.05 U		0.05 U	0.05 U	0.05 U	5.0 U		69.3		36.9		6.8	8.5	5.0 U	0.31		23.00		1.33		0.20 U	0.20 U	0.060 J
9/14/2015	0.54		1.00		0.05 U		0.05 U	0.05 U	0.03 J	5.0 U		81.9		39.6		8.2	6.6	5.0 U	0.22		4.49		1.34		0.09 J	0.08 J	0.20 U
12/7/2015	0.51		1.00		0.05 U		0.05 U	0.04 J		5.0 U		72.6		38.2		7.3	7.7		0.34		1.13		1.23		0.14 J	0.11 J	

Table 3B. Summary of Groundwater Conventional Parameters: 2007 through 2015

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Total Organic Carbon (TOC) (mg/L)									Total Coliforms MPN/100 mL								
MCL/SMCL	--									1/100 mL								
WA WQ Std	--									1/100 mL								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
2/1/2007	1.10	1.00	28.20		15.60		3.60		0.08 J	1.0 U	1.0 U	1.0 U		1.0 U		1.0 U		1.0 U
4/18/2007	1.00	1.00	28.40		16.70		4.80		0.25 J	1.0 U	1.0 U	1.0 U		1.0 U		1.0 U		1.0 U
7/18/2007	0.90		28.60		15.60		5.20	5.20	0.07 J	1.0		6.0		##### >		1.0 U	1.0	1.0 U
10/9/2007	1.00	0.90	26.40		15.50		7.10		0.08 J	1.0 U	1.0 U	1.0 U		5.1		1.0 U		1.0 U
1/9/2008	0.80		23.90		15.80		6.00	6.10	0.14 J	1.0 U		1.0 U		1.0 U		1.0 U	1.0 U	3.1
4/30/2008	0.90		27.80		17.50		5.90	5.90	0.50 U	1.0 U		1.0 U		2.0		1.0 U	1.0 U	1.0 U
7/29/2008	0.90		27.90		15.90	16.20	8.30		0.50 U	1.0 U		1.0 U		248.9	70.8	1.0 U		18.7
10/22/2008	0.90		23.80		15.50	16.30	6.60			1.0 U		1.0 U		1.0 U	1.0 U	1.0 U		24.9
2/1/2009	0.90		21.80		16.60		5.20	5.20	0.50 U	1.0 U		1.0 U		17.5		1.0	1.0 U	1.0 U
5/1/2009	1.00		22.00		15.80		4.70	4.90	0.50 U	1.0 U		1.0		1.0		1.0 U	1.0 U	4.2
8/1/2009	1.10		29.00	28.40	16.90		5.10		0.17 J	1.0 U		1.0 U	1.0 U	1.0 U		1.0 U		1.0
11/1/2009	0.72		23.70		16.70		5.27	5.15	0.50 U	1.0 U		1.0 U		1.0 U		1.0 U	1.0 U	3.1
2/10/2010	0.77		23.80		17.10	16.50	3.91		0.50 U	1.0 U		1.0 U		1.0	1.0	1.0 U		1.0
5/26/2010	0.93		25.20		17.30		4.17	4.14	0.10 J	1.0 U		1.0 U		2.0		165.2	165.2	47.8
8/18/2010	0.81		21.50		15.30		3.70	3.46	0.50 U	1.0 U		1.0 U		1.0		9.7	3.0	18.9
11/18/2010	2.61		24.70		18.20		7.41	7.18	0.08 J	1.0		5.2		2.0		1.0	1.0 U	1.0
2/9/2011	1.15		21.60		17.20		4.37	4.16	0.50 U	1.0 U		1.0 U		1.0 U		1.0 U	1.0 U	1.0 U
5/17/2011	0.94		18.80		16.40		2.94	3.01	0.07 J	2.0		1.0 U		1.0 U		1.0 U	1.0	1.0 U
8/24/2011	0.67		25.50		14.20		2.98	3.06	0.50 U	1.0 U		1.0 U		18.1		1.0 U	1.0 U	1.0 U
11/3/2011	1.00		4.41		14.60		3.13	3.35	0.50 U	1.0 U		P		P		P		1.0 U
2/14/2012	1.19		22.20		15.40		3.09	3.28	0.08 J	2.0		1.0 U		5.2		1.0 U	1.0 U	1.0 U
5/2/2012	0.68		17.30		15.50		2.64	4.04	0.50 U									
8/21/2012	0.84		19.30		14.80		2.51	2.56	0.50 U	1.0 U		1.0 U		1.0 U		2.0	1.0 U	1.0 U
11/13/2012	0.90		19.80		14.30		2.74	2.81	0.08 J	1.0 U		1.0 U		1.0		1.0 U		1.0 U
2/12/2013	0.73		15.40		15.50		2.54	2.46	0.50 U	1.0 U		10.0 U		1.0 U		1.0 U	1.0 U	1.0 U
6/4/2013	0.82		18.40		15.40		2.39	2.44	0.50 U									
8/27/2013	0.88		18.90		14.60		2.54	2.49	0.50 U	1.0 U		1.0 U		1.0 U		1.0 U	1.0 U	1.0 U
12/2/2013	0.90		18.40		14.30		2.48	2.54	0.08 J	1.0 U		1.0 U		1.0 U		40.8 J	24.1 J	1.0 U
3/17/2014	0.84		20.40		13.30		2.29	2.23	0.50 U	1.0 U		1.0 U		1.0 U		1.0 U	1.0 U	1.0 U
6/2/2014	1.00 U		19.80		14.60		2.34	2.48	0.26 J	1.0 U		1.0 U		1.0 U		1.0 U	1.0 U	1.0 U
9/29/2014	0.78		19.50		14.00		2.25	2.15	0.50 U	1.0 U		1.0 U		1.0 U		1.0 U	1.0 U	1.0 U
11/17/2014	0.78		18.00		13.80		2.45	2.32	0.12 J	1.0 U		1.0 U		1.0 U		4.1	1.0 U	1.0 U
2/23/2015	0.81 U		19.00		14.50		2.47	2.44	0.25 J	1.0 U		1.0 U		1.0 U		1.0 U	1.0 U	1.0 U
9/14/2015	1.00 U		21.50		12.80		2.45 U	2.56 U	0.80	1.0 U		1.0 U		1.0 U		3.1	3.1	1.0 U
12/7/2015	0.94		17.10		12.80		3.00	2.78		1.0 U		1.0 U		1.0 U		2.0	3.1	1.0 U

Notes

µS/cm = microSiemen per cent NT = not tested. mg/L = milligram per liter.

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

J* = result is an estimated concentration because of lab imprecision.

MCL = Federal maximum contaminant levels for drinking water.

MPN = most probable number.

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).

Table 3C. Summary of Groundwater Metals: 2007 through 2015

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Arsenic, dissolved									Barium, dissolved									Iron, dissolved								
	(µg/L)									(µg/L)									(µg/L)								
MCL/SMCL	10									2,000									300								
WA WQ Std	0.05									1,000									300								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
2/1/2007	6.8	5.8	145.0		1.1 B		5.0 U		5.0 U	28.6	28.9	101		47.0		19.1		5.0 U	38.6	36.7	110,000		846		20 U		20 U
4/18/2007	6.0	6.0	113.0		0.7 B		5.0 U		1.5 B	25.6	25.6	73.8		39.8		24.5		3.0 B	42.8	36.4	90,500		771		10.1 B		4.7 B
7/18/2007	5.4		113.0		5.0 U		5.0 U	5.0 U	5.0 U	33.0		80.6		50.1		24.6	23.0	5.0 U	38.3		88,100		699		20 U	20 U	20 U
10/9/2007	5.4	4.8 B	67.2		5.0 U		5.0 U		5.0 U	29.4	29.3	83.2		48.3		26.5		5.0 U	36.1	36	62,700		656		20 U		20 U
1/9/2008	6.7		42.6		5.0 U		5.0 U	5.0 U	0.7 U	26.7		65.4		42.3		18.3	19.0	0.6 U	41.3		35,500		608		7.8 J	8.2 J	3 U
4/30/2008	4.4 J		117.0		5.0 U		5.0 U	5.0 U	0.7 U	27.6		111		41.7		22.1	22.6	0.6 U	41.5		102,000		624		8.8 J	8.3 J	3 U
7/30/2008	5.4		111.0		0.8 J	5.0 U	5.0 U		0.6 U	29.7		122		49.5	50.9	31.5		0.5 U	35.2		96,800		593	591	20 U		4 U
10/22/2008	7.2		46.5		5.0 U	5.0 U	1.1 J			26.7		72.2		41.9	43.3	24.8			74.8		53,800		560	571	8.8 J		
2/1/2009	14.4		114.0		5.0 U		5.0 U	5.0 U	5.0 U	29.5		125		49.7		23.2	22.6	5.0 U	54.6		109,000		542		4.6 J	20 U	4.5 J
5/1/2009	6.2		120.0		1.6 J		0.6 J	0.7 J	5.0 U	26.7		111.0		45.4		16.7	16.8	5.0 U	51.7		102,000		473		6.1 J	4.9 J	20 U
8/1/2009	0.8 J		5.0 U	2.5 J	1.5 J		0.8 J		5.0 U	229		15.6	22.7	39.6		230		5.0 U	91.1		11.6 J	2,280	1340		91		0.8 J
11/1/2009	6.0		63.5		5.0 U		5.0 U	5.0 U	5.0 U	26.5		115.0		45.5		13.9	13.1	5.0 U	43.6		59,700		480		4.7 J	4.2 J	20 U
2/10/2010	7.1		133		3.0 J	2.5 J	1.6 J		5.0 U	28.4		132.0		49.6	52.2	14.3		5.0 U	33.7		94,700		465	493	20 U		20 U
5/26/2010	5.5		149		0.9 J		5.0 U	5.0 U	5.0 U	27.7		134.0		53.7		14.5	14.6	5.0 U	43.5		104,000		451		3.5 J	8.9 J	20 U
8/18/2010	5.3		139		0.9 J		5.0 U	5.0 U	3.0 J	25.8		119.0		47.7		14.9	14.3	1.5 J	38.6		104,000		482		3.7 J	1.6 J	20 U
11/18/2010	5.6		186		5.0 U		5.0 U	5.0 U	5.0 U	24.6		132.0		44.9		15.7	15.7	5.0 U	20 U		116,000		420		8.7 J	6 J	20 U
2/9/2011	5.5		119		5.0 U		5.0 U	5.0 U	5.0 U	28.6		142.0		53.6		16.9	16.6	5.0 U	46.8		109,000		466		20 U	20 U	20 U
5/17/2011	6.2		139		1.1 J		5.0 U	5.0 U	5.0 U	25.4		123.0		53.0		15.3	15.5	5.0 U	55.6		110,000		470		11.7 J	13 J	6.8 J
8/24/2011	6.4		155		5.0 U		5.0 U	5.0 U	5.0 U	24.4		120.0		47.2		15.8	15.3	5.0 U	35.1		107,000		412		20 U	1 J	20 U
11/3/2011	6.2		156		1.0 J		5.0 U	0.6 J	5.0 U	24.7		121.0		44.5		15.0	15.2	5.0 U	42.1		100,000		388		7.7 J	7.6 J	20 U
2/14/2012	5.2		158		0.6 J		5.0 U	5.0 U	5.0 U	27.2		136.0		48.4		16.7	16.3	0.6 J	42.8		97,800		375		20 U	20 U	20 U
5/2/2012	5.8		133		0.9 J		5.0 U	5.0 U	5.0 U	28.8		116.0		54.2		16.4	15.9	5.0 U	55.1		97,900		430		20 UJ	20 UJ	20 U
8/21/2012	4.9 J		135		5.0 U		5.0 U	5.0 U	5.0 U	27.5		114.0		52.7		15.3	15.5	5.0 U	43.4		99,200		417		20 U	20 U	20 U
11/13/2012	6.2		170		5.0 U		5.0 U	5.0 U	5.0 U	28.0		137.0		50.6		15.7	15.8	5.0 U	77.5		98,100		395		20 U	20 U	20 U
2/12/2013	6.1		119		5.0 U		5.0 U	5.0 U	5.0 U	26.1		90.4		54.9		13.9	14.2	5.0 U	60.1		91,600		450		4.4 J	4.6 J	20 U
6/4/2013	6.8		138		1.5 J		5.0 U	1.1 J	1.1 J	26.1		85.5		53.0		13.3	13.3	4.0 U	58.4		93,500		416		3.7 J	5.9 J	4.1 J
8/27/2013	6.3		140		1.0 J		5.0 U	5.0 U	5.0 U	27.5		115		54.4		16.1	15.2	4.0 U	64.6		109,000		416		20 U	5.8 J	20 U
12/2/2013	6.4		164		1.3 J		5.0 U	5.0 U	5.0 U	26.0		124		47.3		15.1	15.6	4.0 U	55.5		107,000		400		20 U	3 J	20 U
3/17/2014	6.00		175		0.78		0.50 U	0.50 U	0.50 U	27.4		140		50.3		15.4	15.5	4.0 U	69.3		127,000		424		20 U	8.5 J	20 U
6/2/2014	6.00		157		0.70		0.20 J	0.30 J	0.50 U	28.1		127		52.8		15.2	15	4.0 U	52.4		118,000		421		20 U	20 U	20 U
9/29/2014	5.86		191		0.69		0.25 J	0.24 J	0.50 U	27.6		135		50.0		14.9	15	4.0 U	72.7		111,000		409		20 U	20 U	8.3 J
11/17/2014	5.7		174		0.7		0.3 J	0.3 J	0.5 U	27.7		130		49.6		15.3	14.7	0.6 J	70		120,000		421		20 U	20 U	40 U
2/23/2015	5.90		163		0.70		0.20 J	0.30 J	0.50 U	27.7		127		47		13.1	13.3	0.1	73.2		114,000		375		0.1 U	10.2 J	20 U
9/14/2015	5.90		185		0.60		0.50 U	0.20 J	0.50 U	30		152		46.6		14.4	15.2	4.0 U	53.5		122,000		358		6.4 J	3.9 J	20 U
12/7/2015	6.32		174		0.76		0.26 J	0.26 J		27.7		162		43.7		13.2	13.4		56		126,000		361		9 J	20 U	

Table 3C. Summary of Groundwater Metals: 2007 through 2015

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Manganese, dissolved									Cadmium, dissolved									Copper, dissolved								
	(µg/L)									(µg/L)									(µg/L)								
MCL/SMCL	50									5									1,300								
WA WQ Std	50									10									1,000								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
2/1/2007	112	114	13,500		1350		89.5		5 U	5.0 U	5.0 U	5.0 U		5.0 U		5.0 U		5.0 U	10.0 U	10.0 U	10.0 U		10.0 U		3.0 B		10.0 U
4/18/2007	107	106	13,500		1330		123		1.6 B	5.0 U	5.0 U	2.9 B		0.7 B		1.9 B		5.0 U	10.0 U	10.0 U	10.0 U		10.0 U		10.0 U		10.0 U
7/18/2007	118		14,000		1330		268	268	5 U	5.0 U		5.0 U		5.0 U		5.0 U	5.0 U		10.0 U		4.4 B		5.4 B		4.2 B	6.0 B	10.0 U
10/9/2007	121	120	14,700		1280		353		2.7 B	5.0 U	5.0 U	5.0 U		5.0 U		5.0 U			10.0 U	10.0 U	10.0 U		10.0 U		10.0 U		10.0 U
1/9/2008	125		17,900		1270		422	428	1.6 B	5.0 U		1.8 J		1.4 J		5.0 U	1.3 J		10.0 U		10.0 U		10.0 U		10.0 U	10.0 U	7.0 U
4/30/2008	110		12,600		1150		240	234	0.3 B	5.0 U		5.0 U		1.1 J		5.0 U	0.7 J		10.0 U		10.0 U		10.0 U		10.0 U	10.0 U	7.0 U
7/30/2008	111		13,100		1190	1210	309		0.2 U	5.0 U		4.3 J		5.0 U	5.0 U	0.2 J			10.0 U		10.0 U		1.4 J	1.4 J	3.3 J		1.4 B
10/22/2008	111		15,400		1290	1300	297			5.0 U		5.0 U		5.0 U	5.0 U	5.0 U			10.0 U		10.0 U		10.0 U	10.0 U	10.0 U		
2/1/2009	120		11,800		1250		175	174	0.2 J	5.0 U		1.2 J		5.0 U		0.2 J	0.3 J	0.2 J	10.0 U		10.0 U		2.1 J		1.6 J	2.6 J	10.0 U
5/1/2009	108		11,300		1230		114	116	0.4 J	5.0 U		2.1 J		5.0 U		5.0 U	5.0 U	5.0 U	10.0 U		10.0 U		10.0 U		10.0 U	10.0 U	5.8 J
8/1/2009	4220		7870	2540	2500		4180		0.2 J	5.0 U		5.0 U	5.0 U	5.0 U		5.0 U		5.0 U	22.2		10.0 U	10.0 U	10.0 U		21.2		10.0 U
11/1/2009	110		13,400		1300		204	204	0.7 J	5.0 U		5.0 U		5.0 U		5.0 U	5.0 U	5.0 U	10.0 U		10.0 U		10.0 U		10.0 U	10.0 U	10.0 U
2/10/2010	116		11,200		1260	1330	36.2		5 U	5.0 U		5.0 U		5.0 U	5.0 U	5.0 U		5.0 U	1.3 J		2.0 J		3.8 J	4.1 J	3.9 J		10.0 U
5/26/2010	115		9,380		1340		77.6	78	5 U	5.0 U		5.0 U		5.0 U		5.0 U	5.0 U	5.0 U	10.0 U		10.0 U		1.6 J		2.0 J	2.3 J	10.0 U
8/18/2010	108		9,670		1310		48	47.2	5 U	5.0 U		3.0 J		5.0 U		5.0 U	5.0 U	5.0 U	4.2 J		6.9 J		4.4 J		4.0 J	6.8 J	10.0 U
11/18/2010	112		7,880		1340		92.8	95.4	5 U	5.0 U		4.5 J		5.0 U		5.0 U	5.0 U	5.0 U	10.0 U		10.0 U		10.0 U		10.0 U	10.0 U	5.8 J
2/9/2011	125		9,610		1400		159	160	0.2 J									5.0 U	10.0 U		3.3 J		10.0 U		2.0 J	2.0 J	10.0 U
5/17/2011	100		13,600		1460		122	116	5 U									5.0 U	10.0 U		10.0 U		2.8 J		10.0 U	10.0 U	2.2 J
8/24/2011	97.2		14,000		1340		144	136	5 U									5.0 U	10.0 U		10.0 U		10.0 U		10.0 U	10.0 U	10.0 U
11/3/2011	105				1300		149	150	0.5 J	5.0 U		2.9 J		2.6 J		5.0 U		5.0 U	10.0 U		10.0 U		10.0 U		10.0 U	2.3 J	10.0 U
2/14/2012	114		8,650		1510		252	242	0.3 J	5.0 U		5.0 U		5.0 U		5.0 U	5.0 U	5.0 U	10.0 U		5.2 J		1.7 J		1.7 J	2.9	10.0 U
5/2/2012	116		12,900		1570		254	252	5 U	5.0 U		5.0 U		0.6 J		5.0 U	5.0 U	5.0 U	0.6 J		10.0 U		1.7 J		2.1 J	2.2	10.0 U
8/21/2012	113		14,000		1510		201	200	5 U	NT		NT		NT		NT		NT	10.0 U		10.0 U		1.5 J		2.1 J	1.9	10.0 U
11/13/2012	119		9,650		1550		242	244	5 U	NT		NT		NT		NT		NT	10.0 U		10.0 U		3.4 J		10.0 U	10.0 U	10.0 U
2/12/2013	110		10,700		1610		220	220	5 U	NT		NT		NT		NT		NT	10.0 U		10.0 U		1.5 J		1.4 J	1.7 J	10.0 U
6/4/2013	118		14,800		1680		212	209	6.2	NT		NT		NT		NT		NT	4.0 U		4.0 U		2.8 J		2.1 J	2.0 J	4.0 U
8/27/2013	119		14,200		1700		224	219	0.5 J	NT		NT		NT		NT		NT	4.0 U		4.0 U		2.3 J		2.0 J	1.6 J	4.0 U
12/2/2013	111				1580		217	221	0.1 J	NT		NT		NT		NT		NT	4.0 U		4.0 U		3.6 J		2.6 J	2.9 J	4.0 U
3/17/2014	119		10,400		1640		287	282	0.3 J	NT		NT		NT		NT		NT	4.0 U		4.0 U		4.0 U		4.0 U	4.0 U	4.0 U
6/2/2014	116		12,300		1680		253	250	1 U	NT		NT		NT		NT		NT	4.0 U		4.0 U		2.6 J		2.0 J	2.1 J	4.0 U
9/29/2014	118		7,310		1650		240	241	0.6 J	NT		NT		NT		NT		NT	4.0 U		4.0 U		4.0 U		4.0 U	4.0 U	1.2 J
11/17/2014	115		8,620		1680		265	267	0.2 J	NT		NT		NT		NT		NT	4.0 U		4.0 U		4.0 U		4.0 U	4.0 U	1.0 J
2/23/2015	120		10,100		1580		311	301	0.958	NT		NT		NT		NT		NT	0.13 U		0.34		2.32		1.78	1.78	0.030 J
9/14/2015	114		5,290		1570		238	268	1 U	NT		NT		NT		NT		NT	4.0 U		4.0 U		2.1 J		13.6	10.1	4.0 U
12/7/2015	110		5,990		1500		321	330		NT		NT		NT		NT		NT	4.0 U		1.3 J		3.4 J		3.4 J	2.2 J	

Table 3C. Summary of Groundwater Metals: 2007 through 2015

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Date	Nickel, dissolved (µg/L)									Zinc, dissolved (µg/L)								
MCL/SMCL	100									5,000								
WA WQ Std	--									5,000								
Well ID	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank	BXS-4	BXS-4 Dup	BXS-3	BXS-3 Dup	BXS-2	BXS-2 Dup	BXS-1	BXS-1 Dup	Field Blank
2/1/2007	20.0 U	20.0 U	20.0 U		38.4		20.0 U		20.0 U	2.4 B	10.0 U	12.9		5.8 B		4.0 B		10.0 U
4/18/2007	20.0 U	20.0 U	18.2 B		33.9		10.4 B		20.0 U	10.0 U	10.0 U	8.5 B		30.2		10.0 U		10.0 U
7/18/2007	20.0 U		20.4		30.1		20.0 U	20.0 U	20.0 U	10.0 U		12.4		11.1		8.0 B	6.5 B	10.0 U
10/9/2007	20.0 U	20.0 U	20.0 U		31.4		20.0 U		20.0 U	10.0 U	12.9	15.9		22.3		7.9 B		10.0 U
1/9/2008	20.0 U		17.0 J		30.6		16.0 J	15.5 J	2.0 U	8.3 J		10.0 U		14.8		10.0 U	8.0 J	7.0 U
4/30/2008	20.0 U		20.2		31.8		11.1 J	11.8 J	2.0 U	10.0 U		10.0 U		10.0 U		10.0 U	10.0 U	7.0 U
7/30/2008	20.0 U		4.5 J		24.8	25.1	10.2 J		0.5 U	1.0 J		4.8 J		4.4 J	4.2 J	9.1 J		1.5 B
10/22/2008	20.0 U		22.8		31.7	32.4	15.5 J			10.0 U		3.9 J		6.2 J	7.1 J	12.1		
2/1/2009	20.0 U		20.6		32.1		10.7 J	10.5 J	20.0 U	1.5 J		2.1 J		6.5 J		3.6 J	3.5 J	1.6 J
5/1/2009	20.0 U		17.7 J		31.2		7.0 J	7.9 J	20.0 U	10.0 U		3.9 J		3.7 J		1.5 J	2.2 J	5.0 J
8/1/2009	104.0		48.5	26.7	134.0		109.0		20.0 U	3.8 J		2.6 J	2.4 J	10.0 U		3.4 J		2.4 J
11/1/2009	20.0 U		13.2 J		31.1		11.1 J	10.1 J	20.0 U	10.0 U		1.5 J		2.8 J		1.5 J	10.0 U	10.0 U
2/10/2010	20.0 U		22.8		32.4	34.0	5.9 J		20.0 U	10.0 U		1.6 J		5.3 J	5.8 J	1.7 J		10.0 U
5/26/2010	20.0 U		19.5 J		32.6		6.5 J	6.7 J	20.0 U	10.0 U		10.0 U		3.5 J		2.1 J	2.5 J	10.0 U
8/18/2010	20.0 U		12.5 J		29.9		6.8 J	5.5 J	20.0 U	10.0 U		10.0 U		1.7 J		10.0 U	10.0 U	1.9 J
11/18/2010	20.0 U		17.5 J		33.3		5.8 J	5.2 J	20.0 U	10.0 U		2.3 J		4.8 J		10.0 U	1.9 J	10.0 U
2/9/2011	20.0 U		20.8		34.4		10.0 J	9.6 J	20.0 U	0.4 J		20.0 U		4.9 J		3.1 J	2.5 J	0.3 J
5/17/2011	20.0 U		15.3 J		38.7		8.7 J	7.0 J	20.0 U									
8/24/2011	20.0 U		16.2 J		32.2		8.5 J	9.2 J	20.0 U	10.0 U		4.2 J		4.7 J		1.7 J	3.1 J	10.0 U
11/3/2011	20.0 U		11.2 J		30.5		10.6 J	10.1 J	20.0 U	10.0 U		3.0 J		4.0 J		1.0 J	1.3 J	10.0 U
2/14/2012	20.0 U		22.7		29.6		9.4 J	9.3 J	20.0 U	0.7 J		6.8 J		5.5 J		3.0 J	3.2 J	0.7 J
5/2/2012	20.0 U		13.0 J		33.7		9.2 J	8.9 J	20.0 U	0.4 J		10.0 U		4.3 J		2.5 J	2.3 J	10.0 U
8/21/2012	0.7 J		15.8 J		33.5		8.9 J	9.1 J	20.0 U	10.0 U		0.8 J		2.3 J		2.6 J	2.5 J	10.0 U
11/13/2012	20.0 U		13.6 J		31.7		8.8 J	9.7 J	20.0 U	10.0 U		0.8 J		3.8 J		2.7 J	2.3 J	10.0 U
2/12/2013	20.0 U		18.2 J		36.1		9.2 J	9.4 J	20.0 U	10.0 U		0.9 J		3.2 J		2.4 J	2.1 J	10.0 U
6/4/2013	0.4 J		18.4		36.9		8.5	8.4	4.0 U	4.0 U		2.7 J		3.8 J		2.4 J	2.5	4.0 U
8/27/2013	2.2 J		22.2		38.4		11.2	10.8	4.0 U	4.0 U		2.9 J		3.6 J		2.7 J	2.5 J	4.0 U
12/2/2013	5.4		25.1		38.2		12.8	13.5	4.0 U	4.0 U		1.9 J		3.7 J		3.1 J	3.1 J	4.0 U
3/17/2014	4.0 U		11.2		31.0		7.4	7.6	4.0 U	4.0 U		0.8 J		4.4		2.8 J	2.8 J	4.0 U
6/2/2014	2.2 J		21.2		38.5		10.9	10.4	4.0 U	4.0 U		1.3 J		3.4 J		2.2 J	2.2 J	4.0 U
9/29/2014	4.0 U		16.1		34.3		8.8	9.0	0.4 J	0.5 J		1.7 J		5.6		3.2 J	2.4 J	4.0 U
11/17/2014	1.1 J		19.7		35.8		10.0	10.1	4.0 U	5.0 U		2.3 J		4.4 J		2.1 J	2.6 J	5.0 U
2/23/2015	0.4 U		18.9		34.1		9.3	9.3	0.1 J	0.4 J		2.1		6.5		2.9	2.9	0.5 U
9/14/2015	4.0 U		18.0		30.5		7.7	8.3	0.4 J	4.0 U		2.0 J		3.1 J		362.0	268.0	4.0 U
12/7/2015	4.0 U		20.6		29.3		6.6	6.9		3.2 J		0.5 J		4.4		13.7 J	6.7 J	

Notes

µg/L = microgram per liter.

B = detected in laboratory method blank.

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

J* = result is an estimated concentration because of lab imprecision.

MCL = Federal maximum contaminant levels for drinking water.

NT = not tested.

SMCL = Federal secondary maximum contaminant levels for drinking water.

R = rejected value.

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).

Table 4. Parameters Statistically Higher than Background: 1989 through 2015

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Analyte Group	Parameter[1]	Monitoring Period	Unit	Mean Value Downgradient[2,3]			Mean Value Upgradient[2]
				BXS-1	BXS-2	BXS-3	BXS-4
Conventionals	Ammonia as Nitrogen	2001	mg/L			0.10	0.50
Conventionals	Ammonia as Nitrogen	2007	mg/L			0.84	0.50
Conventionals	Ammonia as Nitrogen	2009	mg/L			1.08	0.54
Conventionals	Ammonia as Nitrogen	2010	mg/L			1.11	0.53
Conventionals	Ammonia as Nitrogen	2013	mg/L			0.82	0.53
Conventionals	Ammonia as Nitrogen	2014	mg/L			1.11	0.55
Conventionals	Ammonia as Nitrogen	2015	mg/L			1.03	0.53
Conventionals	Carbon, Total Organic	1992	mg/L	3.6	5.0	18.7	1.5
Conventionals	Carbon, Total Organic	1993	mg/L		7.3	20.0	2.0
Conventionals	Carbon, Total Organic	1994	mg/L		8.6	21.9	2.3
Conventionals	Carbon, Total Organic	1995	mg/L		10.7	30.6	3.4
Conventionals	Carbon, Total Organic	1996	mg/L	4.9	12.7	38.5	2.3
Conventionals	Carbon, Total Organic	1997	mg/L		15.0		3.8
Conventionals	Carbon, Total Organic	1998	mg/L			32.1	10.8
Conventionals	Carbon, Total Organic	1999	mg/L		15.8	31.8	6.6
Conventionals	Carbon, Total Organic	2000	mg/L	8.1	15.2		1.0
Conventionals	Carbon, Total Organic	2001	mg/L	7.5	14.6	25.2	3.1
Conventionals	Carbon, Total Organic	2002	mg/L	6.4	13.8	22.2	2.0
Conventionals	Carbon, Total Organic	2003	mg/L		14.0	21.5	0.7
Conventionals	Carbon, Total Organic	2004	mg/L	5.1	14.7	23.1	0.9
Conventionals	Carbon, Total Organic	2005	mg/L	5.7	15.8	25.1	1.1
Conventionals	Carbon, Total Organic	2006	mg/L	5.1	14.5	28.4	1.0
Conventionals	Carbon, Total Organic	2007	mg/L	5.2	15.8	27.9	1.0
Conventionals	Carbon, Total Organic	2008	mg/L	6.7	16.2	25.9	0.9
Conventionals	Carbon, Total Organic	2009	mg/L	5.1	16.5	24.1	0.9
Conventionals	Carbon, Total Organic	2010	mg/L	4.8	17.0	23.8	1.3
Conventionals	Carbon, Total Organic	2011	mg/L	3.4	15.6	17.6	0.9
Conventionals	Carbon, Total Organic	2012	mg/L	2.8	15.0	19.7	0.9
Conventionals	Carbon, Total Organic	2013	mg/L	2.5	15	18	0.83
Conventionals	Carbon, Total Organic	2014	mg/L	2.3	13.9	19.4	0.9
Conventionals	Carbon, Total Organic	2015	mg/L	2.6	13	19	0.88
Conventionals	Chemical Oxygen Demand	1990	mg/L	27.9	41.2	97.8	2.2
Conventionals	Chemical Oxygen Demand	1993	mg/L			106.0	30.5
Conventionals	Chemical Oxygen Demand	1994	mg/L		30.0	83.0	22.0
Conventionals	Chemical Oxygen Demand	1995	mg/L			90.0	32.0
Conventionals	Chemical Oxygen Demand	1996	mg/L		41.0	98.0	16.0
Conventionals	Chemical Oxygen Demand	1997	mg/L		43.0	87.0	19.0
Conventionals	Chemical Oxygen Demand	1998	mg/L		51.0	98.0	20.1
Conventionals	Chemical Oxygen Demand	1999	mg/L			92.0	40.5
Conventionals	Chemical Oxygen Demand	2000	mg/L		43.5	71.3	13.6
Conventionals	Chemical Oxygen Demand	2001	mg/L	22.3	42.5	69.5	17.3
Conventionals	Chemical Oxygen Demand	2002	mg/L	19.0	38.0	60.0	18.0
Conventionals	Chemical Oxygen Demand	2003	mg/L		37.0	55.8	2.9
Conventionals	Chemical Oxygen Demand	2004	mg/L		38.0	58.8	2.9
Conventionals	Chemical Oxygen Demand	2005	mg/L		42.8	69.5	8.4

Table 4. Parameters Statistically Higher than Background: 1989 through 2015

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Analyte Group	Parameter[1]	Monitoring Period	Unit	Mean Value Downgradient[2,3]			Mean Value Upgradient[2]
				BXS-1	BXS-2	BXS-3	BXS-4
Conventionals	Chemical Oxygen Demand	2006	mg/L	12.5	36.0	72.0	2.9
Conventionals	Chemical Oxygen Demand	2007	mg/L	9.9	34.8	73.3	3.4
Conventionals	Chemical Oxygen Demand	2008	mg/L	16.3	38.3	69.3	4.4
Conventionals	Chemical Oxygen Demand	2009	mg/L	13.7	41.3	77.7	7.5
Conventionals	Chemical Oxygen Demand	2010	mg/L	9.8	39.8	70.9	3.5
Conventionals	Chemical Oxygen Demand	2011	mg/L	8.0	42.3	74.7	4.6
Conventionals	Chemical Oxygen Demand	2012	mg/L		41.5	67.8	3.7
Conventionals	Chemical Oxygen Demand	2013	mg/L	6.6	40	63	4.5
Conventionals	Chemical Oxygen Demand	2014	mg/L	6.4	38	69	ND
Conventionals	Chemical Oxygen Demand	2015	mg/L	7.0	37	72	ND
Conventionals	Chloride	1989	mg/L	45.0	61.0	17.0	6.6
Conventionals	Chloride	1990	mg/L	22.5	14.5	6.8	2.2
Conventionals	Chloride	1992	mg/L	16.7	6.7	7.7	2.2
Conventionals	Chloride	1993	mg/L	12.1	6.6	12.8	2.3
Conventionals	Chloride	1994	mg/L	13.0	7.4	7.4	2.1
Conventionals	Chloride	1995	mg/L	14.0	10.0	9.6	1.9
Conventionals	Chloride	1996	mg/L	14.6	17.3	9.1	2.0
Conventionals	Chloride	1997	mg/L	12.6	14.8	35.0	2.0
Conventionals	Chloride	1998	mg/L	11.6	11.0	6.3	2.1
Conventionals	Chloride	1999	mg/L	10.0		6.1	2.2
Conventionals	Chloride	2000	mg/L	7.8	8.3	5.0	2.1
Conventionals	Chloride	2001	mg/L	5.9	7.4	4.7	2.1
Conventionals	Chloride	2002	mg/L	5.3	6.5	3.8	2.0
Conventionals	Chloride	2003	mg/L	4.6	5.5		2.0
Conventionals	Chloride	2004	mg/L		4.3	2.3	1.8
Conventionals	Chloride	2005	mg/L	4.5	4.4	3.7	1.8
Conventionals	Chloride	2006	mg/L	4.0	3.5	2.8	1.7
Conventionals	Chloride	2007	mg/L	5.5	4.4	2.7	1.7
Conventionals	Chloride	2008	mg/L	5.1	4.5	3.0	1.9
Conventionals	Chloride	2009	mg/L	6.8	4.8	3.6	1.9
Conventionals	Chloride	2010	mg/L	5.6	3.7	3.0	1.8
Conventionals	Chloride	2011	mg/L	6.2	3.2		1.8
Conventionals	Chloride	2012	mg/L		3.0		1.7
Conventionals	Chloride	2013	mg/L	4.2	3.0	1.9	1.7
Conventionals	Chloride	2014	mg/L	5.2	2.8	1.9	1.8
Conventionals	Chloride	2015	mg/L	4.9	2.5		1.8
Conventionals	Coliform, total	2010	mg/L		2.0		0.6
Conventionals	Coliform, total	2015	mg/L	2.4			ND
Conventionals	Conductivity	1989	µS/cm	351	607	514	180
Conventionals	Conductivity	1990	µS/cm	366	624	500	214
Conventionals	Conductivity	1992	µS/cm	292	586	533	189
Conventionals	Conductivity	1993	µS/cm		487	526	173
Conventionals	Conductivity	1994	µS/cm	214	479	602	169
Conventionals	Conductivity	1995	µS/cm	333	623		149
Conventionals	Conductivity	1996	µS/cm	290	602	787	161

Table 4. Parameters Statistically Higher than Background: 1989 through 2015

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Analyte Group	Parameter[1]	Monitoring Period	Unit	Mean Value Downgradient[2,3]			Mean Value Upgradient[2]
				BXS-1	BXS-2	BXS-3	BXS-4
Conventionals	Conductivity	1997	µS/cm	326		765	169
Conventionals	Conductivity	1998	µS/cm	393	678	738	177
Conventionals	Conductivity	1999	µS/cm	406	786	748	177
Conventionals	Conductivity	2000	µS/cm	417	762	651	166
Conventionals	Conductivity	2001	µS/cm	493	878	886	193
Conventionals	Conductivity	2002	µS/cm	470	849	825	187
Conventionals	Conductivity	2004	µS/cm		821	853	198
Conventionals	Conductivity	2005	µS/cm	393	788	750	192
Conventionals	Conductivity	2006	µS/cm	414	773	785	191
Conventionals	Conductivity	2007	µS/cm	397	799	804	191
Conventionals	Conductivity	2008	µS/cm	465	758	771	189
Conventionals	Conductivity	2009	µS/cm	340	793	730	185
Conventionals	Conductivity	2010	µS/cm	304	825	707	196
Conventionals	Conductivity	2011	µS/cm	334	839	464	193
Conventionals	Conductivity	2012	µS/cm	330	891	444	187
Conventionals	Conductivity	2013	µS/cm	290	879	643	191
Conventionals	Conductivity	2014	µS/cm	292	824	1500	186
Conventionals	Conductivity	2015	µS/cm	292	822	395	202
Conventionals	Nitrate + Nitrite as Nitrogen	1990	mg/L	0.72			0.10
Conventionals	Nitrate + Nitrite as Nitrogen	1993	mg/L	0.79			0.18
Conventionals	Nitrate + Nitrite as Nitrogen	1994	mg/L	0.50			ND
Conventionals	Nitrate + Nitrite as Nitrogen	1996	mg/L	1.65			ND
Conventionals	Nitrate + Nitrite as Nitrogen	1997	mg/L	0.75			ND
Conventionals	Nitrate + Nitrite as Nitrogen	1999	mg/L	0.43			ND
Conventionals	Nitrate + Nitrite as Nitrogen	2000	mg/L	0.33			0.10
Conventionals	Nitrate + Nitrite as Nitrogen	2002	mg/L	0.50			0.20
Conventionals	Nitrate + Nitrite as Nitrogen	2004	mg/L	0.85			0.06
Conventionals	Nitrate + Nitrite as Nitrogen	2005	mg/L	0.75			0.06
Conventionals	Nitrate + Nitrite as Nitrogen	2006	mg/L	0.71			0.04
Conventionals	Nitrate + Nitrite as Nitrogen	2007	mg/L	0.69			0.14
Conventionals	Nitrate + Nitrite as Nitrogen	2008	mg/L	0.83			0.04
Conventionals	Nitrate + Nitrite as Nitrogen	2009	mg/L	0.31		0.15	0.02
Conventionals	Nitrate + Nitrite as Nitrogen	2010	mg/L	0.09		0.16	0.03
Conventionals	Nitrate + Nitrite as Nitrogen	2011	mg/L	47.60			0.02
Conventionals	Nitrate + Nitrite as Nitrogen	2012	mg/L	0.05		0.09	0.02
Conventionals	Nitrate + Nitrite as Nitrogen	2013	mg/L	0.08		0.10	0.03
Conventionals	Nitrate + Nitrite as Nitrogen	2014	mg/L	0.09		0.08	0.05
Conventionals	pH	1992	--	6.1	6.3	6.4	7.9
Conventionals	pH	2000	--	6.1	6.4	6.5	7.9
Conventionals	pH	2001	--	6.1	6.4	6.7	7.9
Conventionals	Solids, Total Dissolved	1990	mg/L		397	436	228
Conventionals	Solids, Total Dissolved	1992	mg/L		352	351	147
Conventionals	Solids, Total Dissolved	1993	mg/L		330		141
Conventionals	Solids, Total Dissolved	1994	mg/L	161	330	418	134
Conventionals	Solids, Total Dissolved	1995	mg/L	188	361	492	141

Table 4. Parameters Statistically Higher than Background: 1989 through 2015

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Analyte Group	Parameter[1]	Monitoring Period	Unit	Mean Value Downgradient[2,3]			Mean Value Upgradient[2]
				BXS-1	BXS-2	BXS-3	BXS-4
Conventionals	Solids, Total Dissolved	1996	mg/L	224	423	604	153
Conventionals	Solids, Total Dissolved	1997	mg/L	236	456	613	150
Conventionals	Solids, Total Dissolved	1998	mg/L	273	473	562	137
Conventionals	Solids, Total Dissolved	1999	mg/L	256	524	517	156
Conventionals	Solids, Total Dissolved	2000	mg/L	297	544	527	140
Conventionals	Solids, Total Dissolved	2001	mg/L	261	299	346	135
Conventionals	Solids, Total Dissolved	2002	mg/L	298	466	518	145
Conventionals	Solids, Total Dissolved	2003	mg/L	291	525	572	132
Conventionals	Solids, Total Dissolved	2004	mg/L	228	439	493	127
Conventionals	Solids, Total Dissolved	2005	mg/L	255	516	449	135
Conventionals	Solids, Total Dissolved	2006	mg/L	259	507	526	145
Conventionals	Solids, Total Dissolved	2007	mg/L	254	471	476	152
Conventionals	Solids, Total Dissolved	2008	mg/L	298	481	489	142
Conventionals	Solids, Total Dissolved	2009	mg/L	215	500	438	127
Conventionals	Solids, Total Dissolved	2010	mg/L	189	513	368	145
Conventionals	Solids, Total Dissolved	2011	mg/L	206	538	375	134
Conventionals	Solids, Total Dissolved	2012	mg/L	205	543	347	128
Conventionals	Solids, Total Dissolved	2013	mg/L	191	549	333	103
Conventionals	Solids, Total Dissolved	2014	mg/L	173	509	322	134
Conventionals	Solids, Total Dissolved	2015	mg/L	153	462	297	119
Conventionals	Sulfate	1989	mg/L	5.9			2.3
Conventionals	Sulfate	1990	mg/L	6.6			1.9
Conventionals	Sulfate	1992	mg/L	9.1			2.0
Conventionals	Sulfate	1993	mg/L	10.0			2.0
Conventionals	Sulfate	1994	mg/L	11.8			1.9
Conventionals	Sulfate	1995	mg/L	12.0			1.8
Conventionals	Sulfate	1996	mg/L	10.7			1.7
Conventionals	Sulfate	1997	mg/L	11.8			1.6
Conventionals	Sulfate	1998	mg/L	9.5			1.3
Conventionals	Sulfate	1999	mg/L	7.8			1.4
Conventionals	Sulfate	2001	mg/L	7.5			1.4
Conventionals	Sulfate	2002	mg/L	7.3			1.4
Conventionals	Sulfate	2005	mg/L	10.1			1.3
Conventionals	Sulfate	2006	mg/L	11.3			1.4
Conventionals	Sulfate	2007	mg/L	12.4			1.4
Conventionals	Sulfate	2008	mg/L	9.1			1.1
Conventionals	Sulfate	2009	mg/L	10.5			1.9
Conventionals	Sulfate	2010	mg/L	15.3			1.4
Conventionals	Sulfate	2011	mg/L	15.8			1.1
Conventionals	Sulfate	2012	mg/L	15.3			0.8
Conventionals	Sulfate	2013	mg/L	13			0.82
Conventionals	Sulfate	2014	mg/L	10			1.10
Conventionals	Sulfate	2015	mg/L	9			1.17
Conventionals	Tannin and Lignin	1990	mg/L			3.1	1.4
Conventionals	Tannin and Lignin	1993	mg/L		0.5		0.3

Table 4. Parameters Statistically Higher than Background: 1989 through 2015

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Analyte Group	Parameter[1]	Monitoring Period	Unit	Mean Value Downgradient[2,3]			Mean Value Upgradient[2]
				BXS-1	BXS-2	BXS-3	BXS-4
Conventionals	Tannin and Lignin	1994	mg/L		0.5	1.0	0.2
Conventionals	Tannin and Lignin	1995	mg/L			3.1	0.6
Conventionals	Tannin and Lignin	1996	mg/L		0.7	5.6	0.3
Conventionals	Tannin and Lignin	1998	mg/L			8.1	0.7
Conventionals	Tannin and Lignin	1999	mg/L			12.2	0.5
Conventionals	Tannin and Lignin	2000	mg/L		9.1	9.2	0.4
Conventionals	Tannin and Lignin	2002	mg/L		1.6	11.1	0.4
Conventionals	Tannin and Lignin	2003	mg/L			6.3	0.4
Conventionals	Tannin and Lignin	2004	mg/L		1.4		0.5
Conventionals	Tannin and Lignin	2005	mg/L			8.1	0.4
Conventionals	Tannin and Lignin	2006	mg/L			11.5	0.4
Conventionals	Tannin and Lignin	2007	mg/L		1.2	8.5	0.3
Conventionals	Tannin and Lignin	2008	mg/L		1.2	11.1	0.3
Conventionals	Tannin and Lignin	2009	mg/L		1.1	9.4	0.3
Conventionals	Tannin and Lignin	2010	mg/L		1.4	14.9	0.3
Conventionals	Tannin and Lignin	2011	mg/L		1.2	15.0	0.3
Conventionals	Tannin and Lignin	2012	mg/L		1.7	26.5	0.4
Conventionals	Tannin and Lignin	2013	mg/L		1.3	10	0.26
Conventionals	Tannin and Lignin	2014	mg/L		1.3	23	0.28
Conventionals	Tannin and Lignin	2015	mg/L		1.3	12	0.29
Metals	Arsenic	1996	µg/L			9.0	4.0
Metals	Arsenic	1997	µg/L			15.0	5.0
Metals	Arsenic	1998	µg/L			20.0	4.6
Metals	Arsenic	1999	µg/L			34.0	5.8
Metals	Arsenic	2002	µg/L			10.4	3.8
Metals	Arsenic	2007	µg/L			110	5.9
Metals	Arsenic	2008	µg/L			79.3	5.9
Metals	Arsenic	2009	µg/L			75.0	6.9
Metals	Arsenic	2010	µg/L			151.8	5.9
Metals	Arsenic	2011	µg/L			142.3	6.1
Metals	Arsenic	2012	µg/L			149.0	5.5
Metals	Arsenic	2013	µg/L			140	6.4
Metals	Arsenic	2014	µg/L			174	5.9
Metals	Arsenic	2015	µg/L			174	6.0
Metals	Barium	1993	µg/L			38.0	28.0
Metals	Barium	1994	µg/L		38.0	51.0	25.0
Metals	Barium	1995	µg/L		45.0	58.0	27.0
Metals	Barium	1996	µg/L		48.0	74.0	26.0
Metals	Barium	1997	µg/L		50.0	58.0	21.0
Metals	Barium	1998	µg/L		51.0	65.0	26.0
Metals	Barium	1999	µg/L		51.0	58.0	27.0
Metals	Barium	2000	µg/L			87.8	26.5
Metals	Barium	2001	µg/L	28.3	51.0	60.0	27.3
Metals	Barium	2002	µg/L		50.0	78.0	28.0
Metals	Barium	2003	µg/L		46.5	54.7	29.2

Table 4. Parameters Statistically Higher than Background: 1989 through 2015

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Analyte Group	Parameter[1]	Monitoring Period	Unit	Mean Value Downgradient[2,3]			Mean Value Upgradient[2]
				BXS-1	BXS-2	BXS-3	BXS-4
Metals	Barium	2004	µg/L		48.0	70.9	23.1
Metals	Barium	2005	µg/L		44.3	87.8	29.1
Metals	Barium	2006	µg/L		45.9	95.4	31.2
Metals	Barium	2007	µg/L		46.3	84.6	29.2
Metals	Barium	2008	µg/L		43.9	92.7	27.7
Metals	Barium	2009	µg/L		45.1	91.7	77.9
Metals	Barium	2011	µg/L		49.6	126.5	25.8
Metals	Barium	2012	µg/L		51.5	125.8	27.9
Metals	Barium	2013	µg/L		52	104	26
Metals	Barium	2014	µg/L		51	133	28
Metals	Barium	2015	µg/L		47	143	28
Metals	Cadmium	2002	µg/L		1.1	1.1	ND
Metals	Copper	1993	µg/L			8	5
Metals	Copper	2015	µg/L		2.5		2
Metals	Iron	1990	µg/L		140	1,950	48
Metals	Iron	1994	µg/L		748	1,950	45
Metals	Iron	1995	µg/L		1,120	341	50
Metals	Iron	1996	µg/L		1,520	9,490	46
Metals	Iron	1997	µg/L		1,220	17,800	50
Metals	Iron	1998	µg/L		1,130	20,700	56
Metals	Iron	1999	µg/L		950	34,500	30
Metals	Iron	2000	µg/L		665	37,740	47.5
Metals	Iron	2001	µg/L		715	6,538	42.5
Metals	Iron	2002	µg/L		729	10,474	42
Metals	Iron	2003	µg/L		814		42.45
Metals	Iron	2004	µg/L		784		38.18
Metals	Iron	2005	µg/L		758	10,013	42.6
Metals	Iron	2006	µg/L		813	47,648	39.7
Metals	Iron	2007	µg/L		743	87,825	39.0
Metals	Iron	2008	µg/L		596	72,025	48.2
Metals	Iron	2009	µg/L		709	67,678	60.3
Metals	Iron	2010	µg/L		455	104,675	31.5
Metals	Iron	2011	µg/L		434	106,500	44.9
Metals	Iron	2012	µg/L		404	98,250	54.7
Metals	Iron	2013	µg/L		421	100,275	60
Metals	Iron	2014	µg/L		419	119,000	66
Metals	Iron	2015	µg/L		379	120,500	63
Metals	Lead	1993	µg/L			2	1
Metals	Manganese	1989	µg/L	210	580	1,100	120
Metals	Manganese	1990	µg/L		650	1,820	99
Metals	Manganese	1993	µg/L		570		110
Metals	Manganese	1994	µg/L		670	1,110	120
Metals	Manganese	1995	µg/L		834	3,780	122
Metals	Manganese	1996	µg/L		1,120	10,800	121
Metals	Manganese	1997	µg/L		1,510	13,000	90

Table 4. Parameters Statistically Higher than Background: 1989 through 2015

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Analyte Group	Parameter[1]	Monitoring Period	Unit	Mean Value Downgradient[2,3]			Mean Value Upgradient[2]
				BXS-1	BXS-2	BXS-3	BXS-4
Metals	Manganese	1998	µg/L	175	1,650	13,800	126
Metals	Manganese	1999	µg/L	200	1,420	14,800	116
Metals	Manganese	2000	µg/L	331	1,450	15,025	124
Metals	Manganese	2001	µg/L	426	1,513	15,350	119
Metals	Manganese	2002	µg/L	430	1,502	15,763	119
Metals	Manganese	2003	µg/L		1,523	15,750	113
Metals	Manganese	2004	µg/L		1,420	16,625	103
Metals	Manganese	2005	µg/L		1,305	13,503	112
Metals	Manganese	2006	µg/L		1,330	15,275	113
Metals	Manganese	2007	µg/L		1,323	13,925	114
Metals	Manganese	2008	µg/L	317	1,225	14,750	114
Metals	Manganese	2009	µg/L		1,570	11,093	1,140
Metals	Manganese	2010	µg/L			9,533	113
Metals	Manganese	2011	µg/L	144	1,375	12,403	107
Metals	Manganese	2012	µg/L	237	1,535	11,300	116
Metals	Manganese	2013	µg/L	218	1,643	13,233	115
Metals	Manganese	2014	µg/L	261	1,663	9,658	117
Metals	Manganese	2015	µg/L	284	1,583	7,500	115
Metals	Nickel	1993	µg/L		18.0		1.0
Metals	Nickel	1994	µg/L		18.0		ND
Metals	Nickel	1995	µg/L		21.0	30.0	ND
Metals	Nickel	1996	µg/L			25.0	ND
Metals	Nickel	1997	µg/L		34.0	20.0	ND
Metals	Nickel	1998	µg/L		43.0	29.0	ND
Metals	Nickel	1999	µg/L		36.0	22.0	ND
Metals	Nickel	2000	µg/L		37.0		ND
Metals	Nickel	2001	µg/L	20.3	37.5	17.5	10.0
Metals	Nickel	2002	µg/L	21.3	38.5	24.0	5.5
Metals	Nickel	2003	µg/L		37.0		10.0
Metals	Nickel	2004	µg/L		40.8		10.0
Metals	Nickel	2005	µg/L		36.2		10.0
Metals	Nickel	2006	µg/L		34.4		10.0
Metals	Nickel	2007	µg/L		33.4		10.0
Metals	Nickel	2008	µg/L		29.7	16.1	10.0
Metals	Nickel	2009	µg/L		57.1		33.5
Metals	Nickel	2011	µg/L		30.5		12.5
Metals	Nickel	2012	µg/L		32.1	16.3	7.7
Metals	Nickel	2013	µg/L	10	37	21	7
Metals	Nickel	2014	µg/L	9	35	17	3
Metals	Nickel	2015	µg/L	8	32	19	1
Metals	Zinc	2002	µg/L	8.0	6.8		ND
Metals	Zinc	2005	µg/L	10.0			5.0
Metals	Zinc	2007	µg/L	6.2	17.3	12.4	4.4
Metals	Zinc	2008	µg/L		7.6		4.8
Metals	Zinc	2014	µg/L		4.5	6.1	3.4

Table 4. Parameters Statistically Higher than Background: 1989 through 2015

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

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

Notes:

μg/L = microgram per liter.

μS/cm = microSiemen per centimeter.

mg/L = milligram per liter.

ND = not detected.

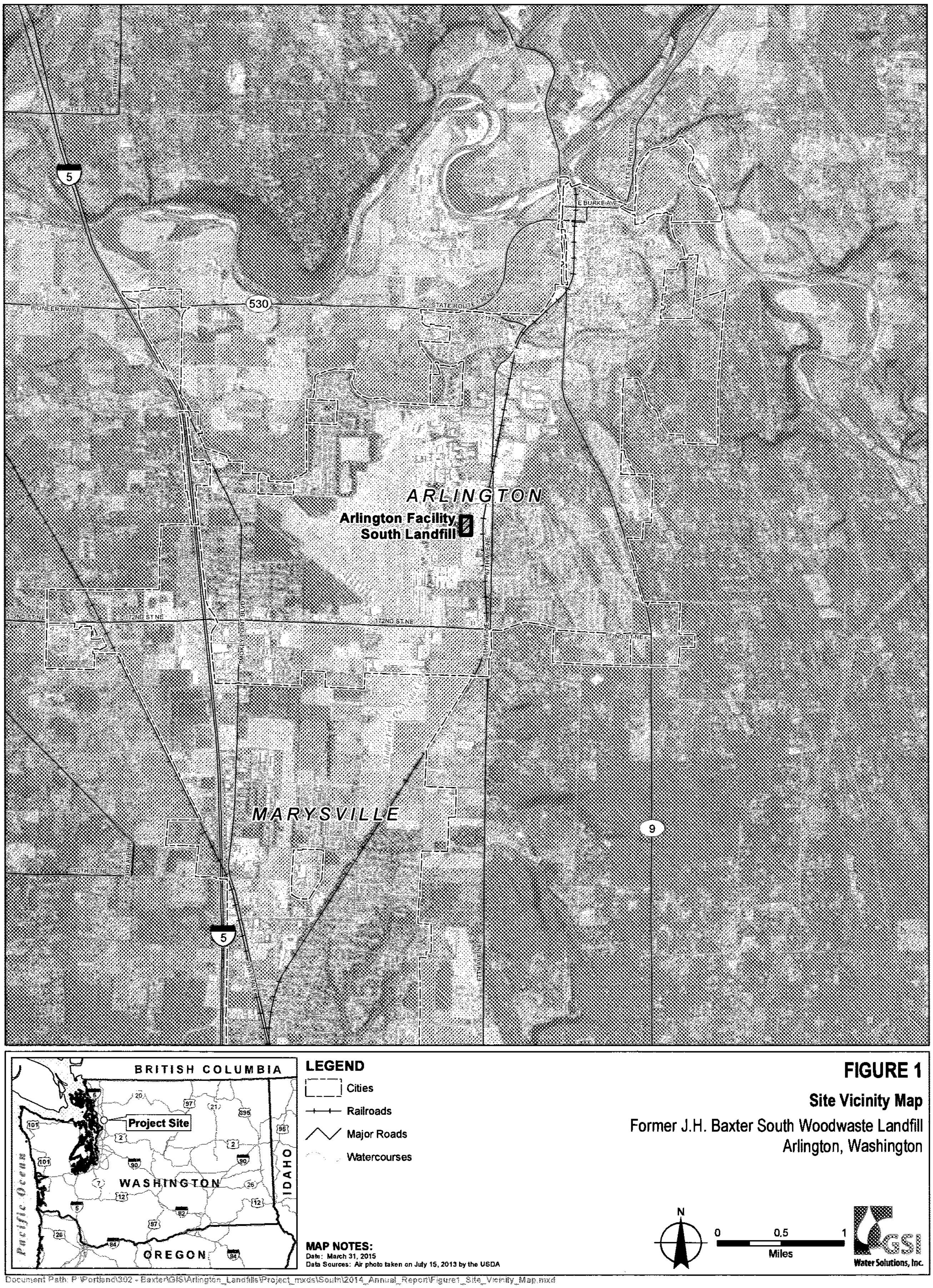
[1] Parameters listed only when at least one downgradient well has a higher mean value than the upgradient well.

[2] Mean values are yearly averages.

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

Figures

Figures



LEGEND

▭ Cities

┼┼ Railroads

╱╲ Major Roads

Watercourses

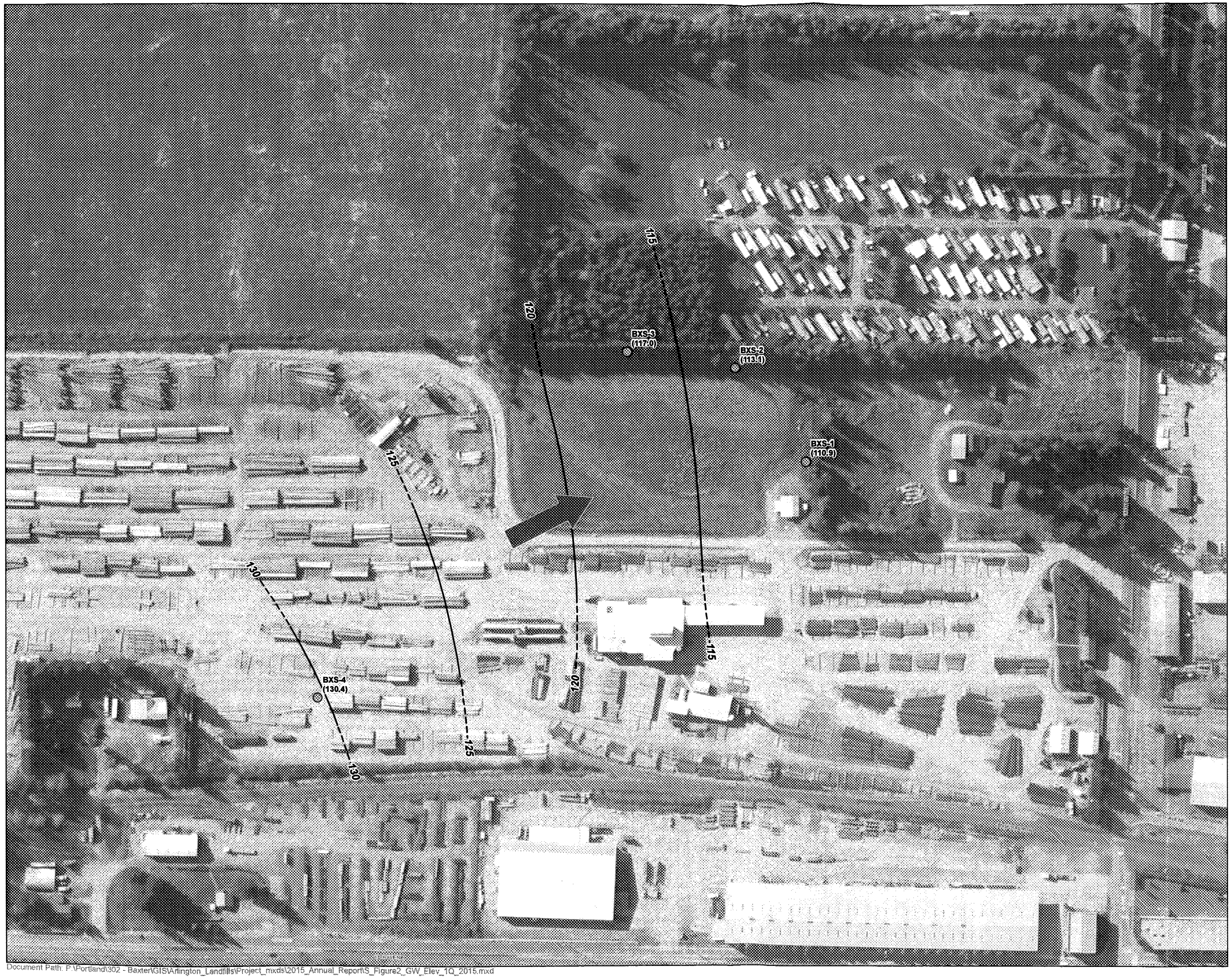
MAP NOTES:
Date: March 31, 2015
Data Sources: Air photo taken on July 15, 2013 by the USDA

FIGURE 1

Site Vicinity Map

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

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



Document Path: P:\Portland\302 - Baxter\GIS\Arlington_Landfills\Project_mxds\2015_Annual_Report\S_Figure2_GW_Elev_1Q_2015.mxd

FIGURE 2

Groundwater Elevation Contour Map: First Quarter 2015

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

LEGEND

～	Groundwater Elevation Contours (dashed where inferred)
◎	Monitoring Well (February 2015 Groundwater Elevation)
➡	Direction of Groundwater Flow

NOTES:

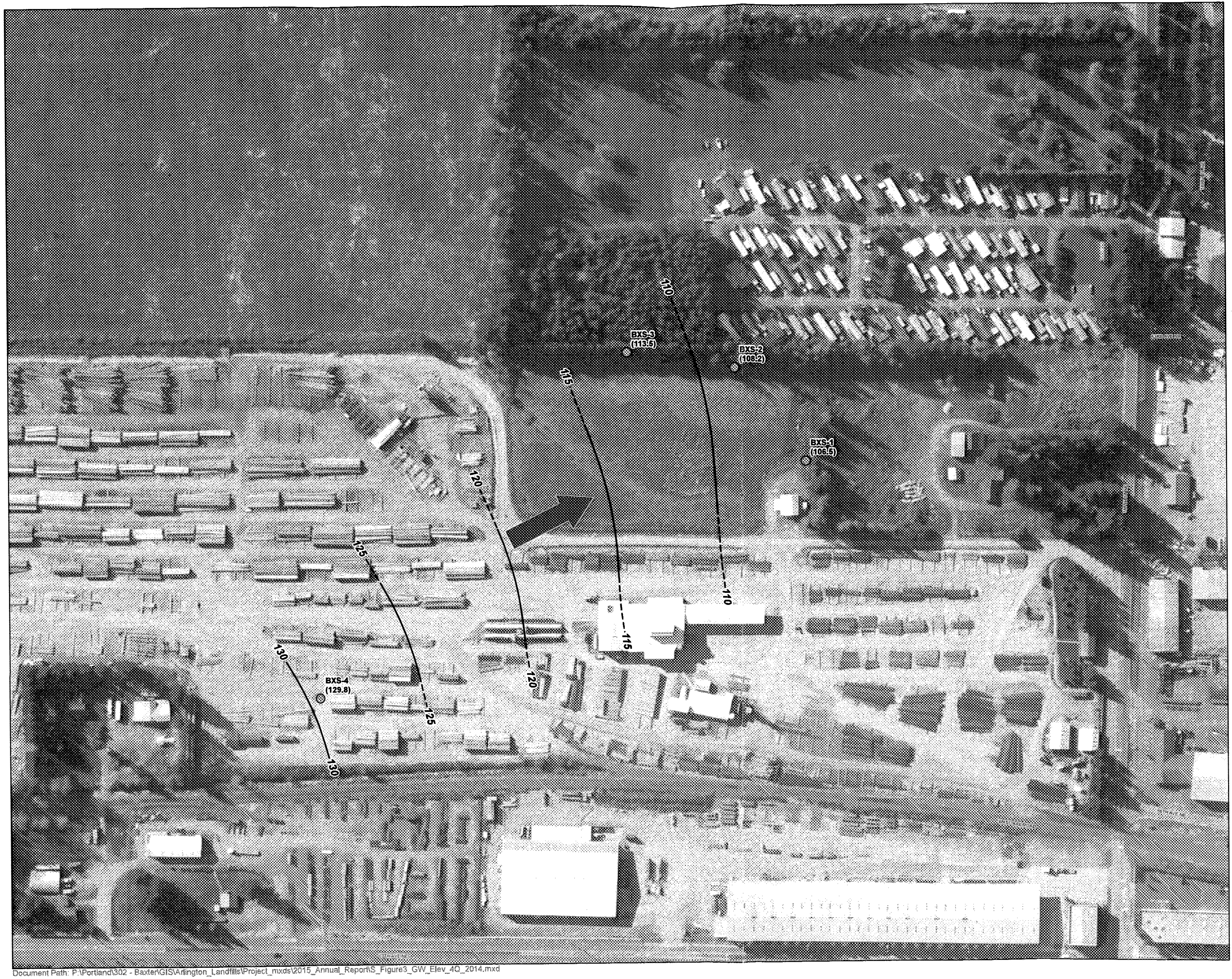
1. All elevations exist in NAVD88.

N

0 100 200 300
Feet

MAP NOTES:
Date: February 11, 2016
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\2015_Annual_Report\S_Figure3_GW_Elev_4Q_2014.mxd

FIGURE 3

Groundwater Elevation Contour Map: Fourth Quarter 2015

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

LEGEND

〜 Groundwater Elevation Contours (dashed where inferred)

◎ Monitoring Well (December 2015 Groundwater Elevation)

➡ Direction of Groundwater Flow

NOTES:

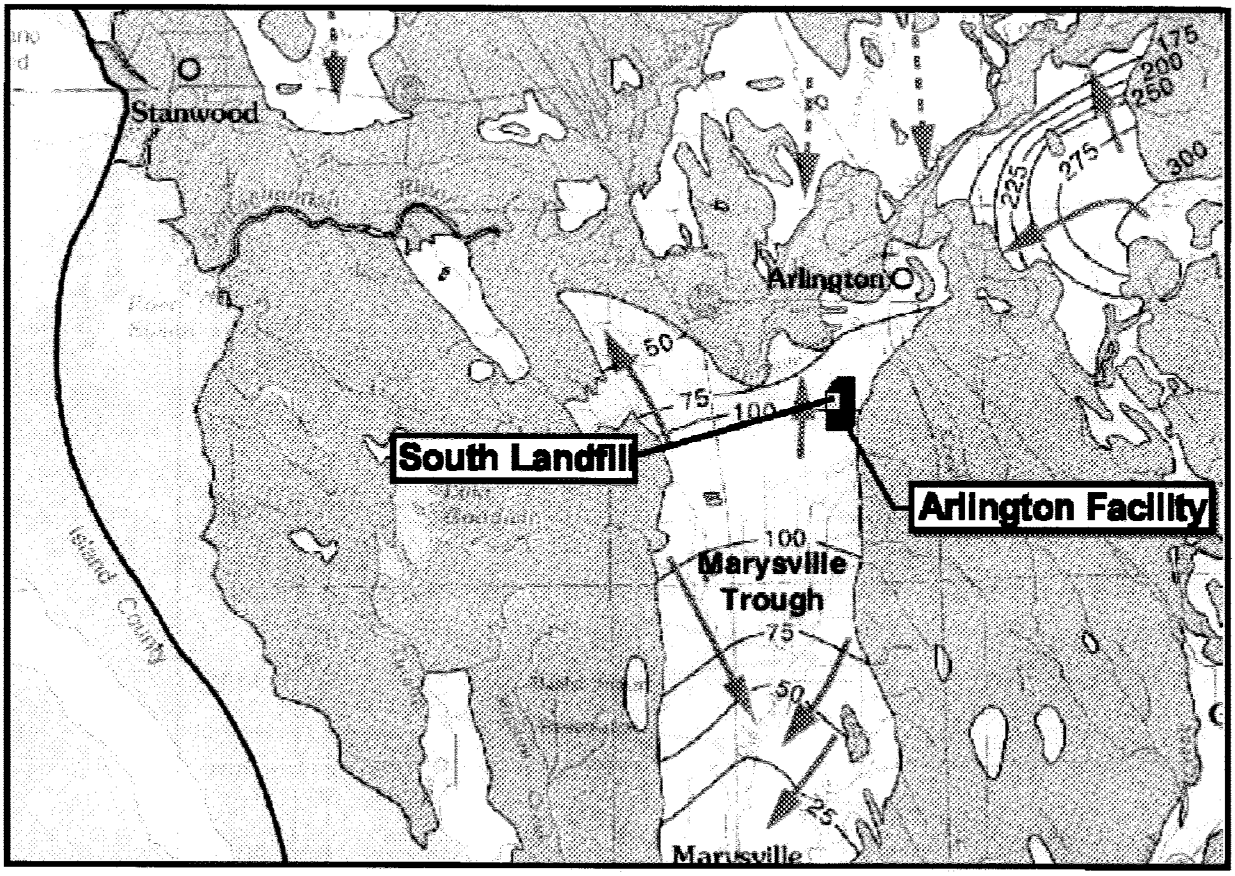
1. All elevations exist in NAVD88.

N

0 100 200 300
Feet

MAP NOTES:
Date: February 11, 2016
Data Sources: AMEC, ESRI, Air photo taken on July 15, 2013 by the USDA

GSI Water Solutions, Inc.



Note:
Map created by base map by B.E. Thomas, J.M. Wilkinson, and S.S. Embrey, entitled "Plate 6. Areal Recharge From Precipitation and Potentiometric Surfaces of Prinicpal Auqifers, Western Snohomish County, Washington," dated 1997

0 4 8 Miles

LEGEND

50	Groundwater Elevation
⌒	Groundwater Elevation Contour
←	Inferred Groundwater Flow Direction

N

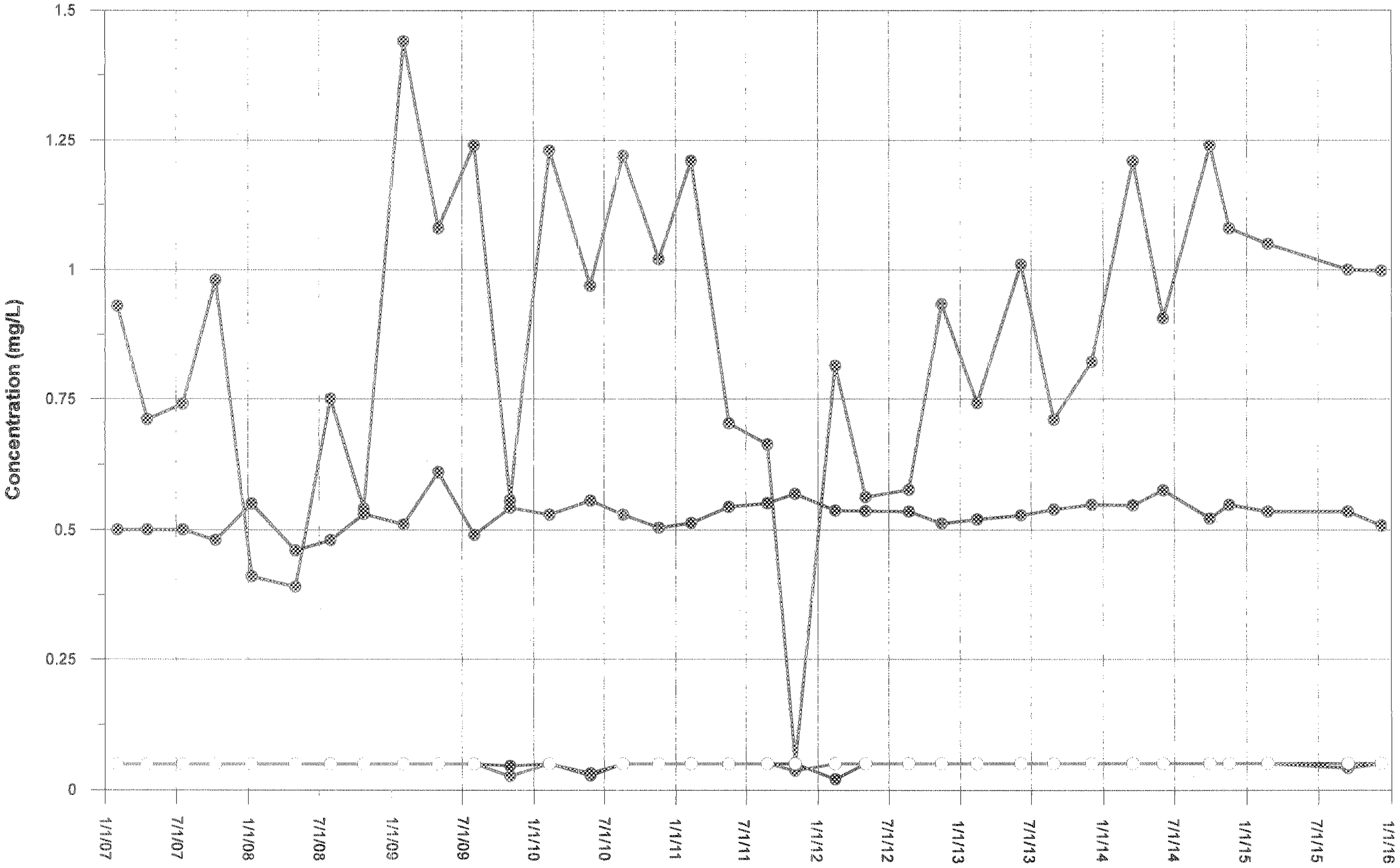
FIGURE 4

Regional Groundwater Flow

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

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

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



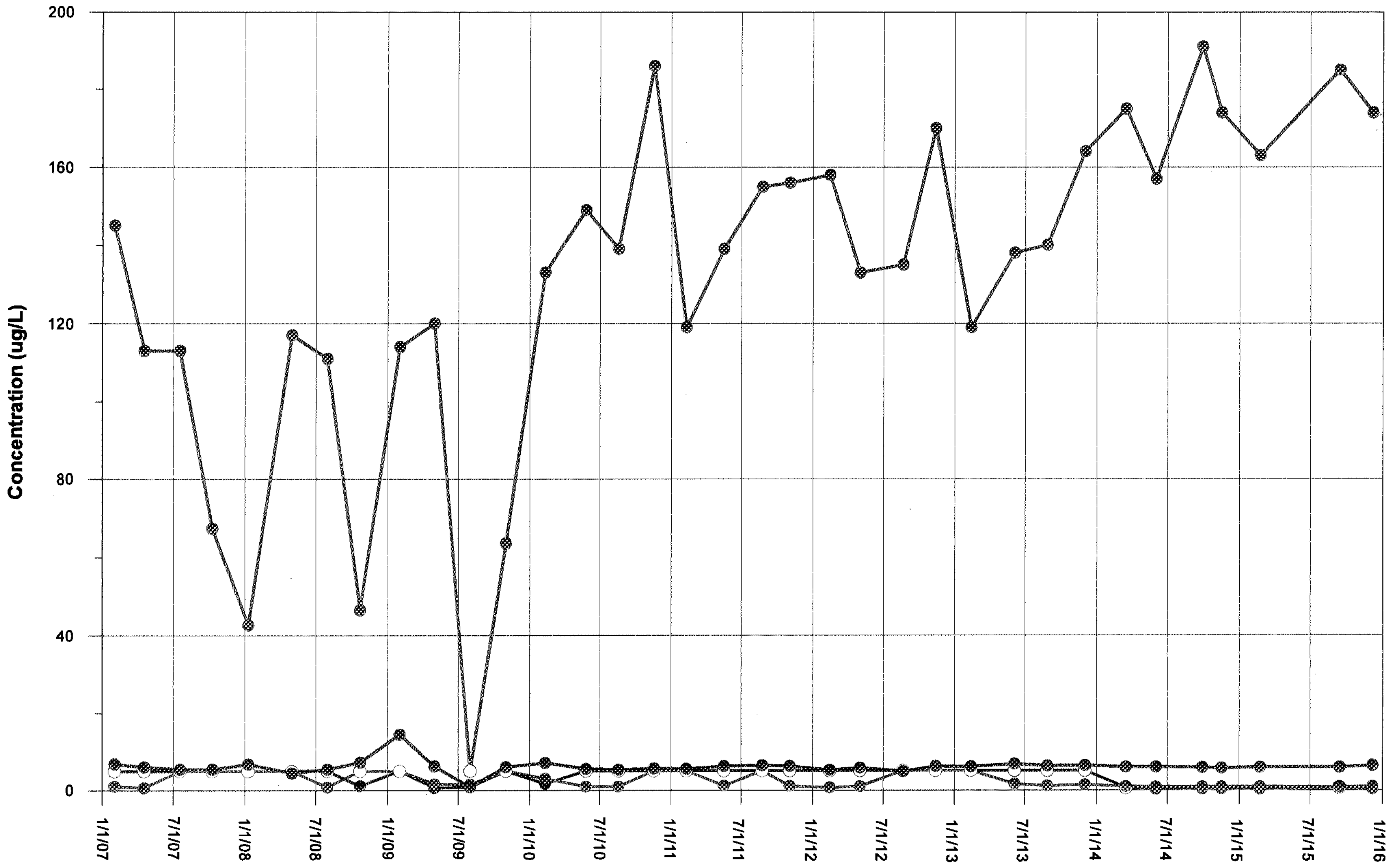
Notes:
mg/L = milligram per liter

FIGURE 5

Ammonia Concentration Trends

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

GSI Water Solutions, Inc.



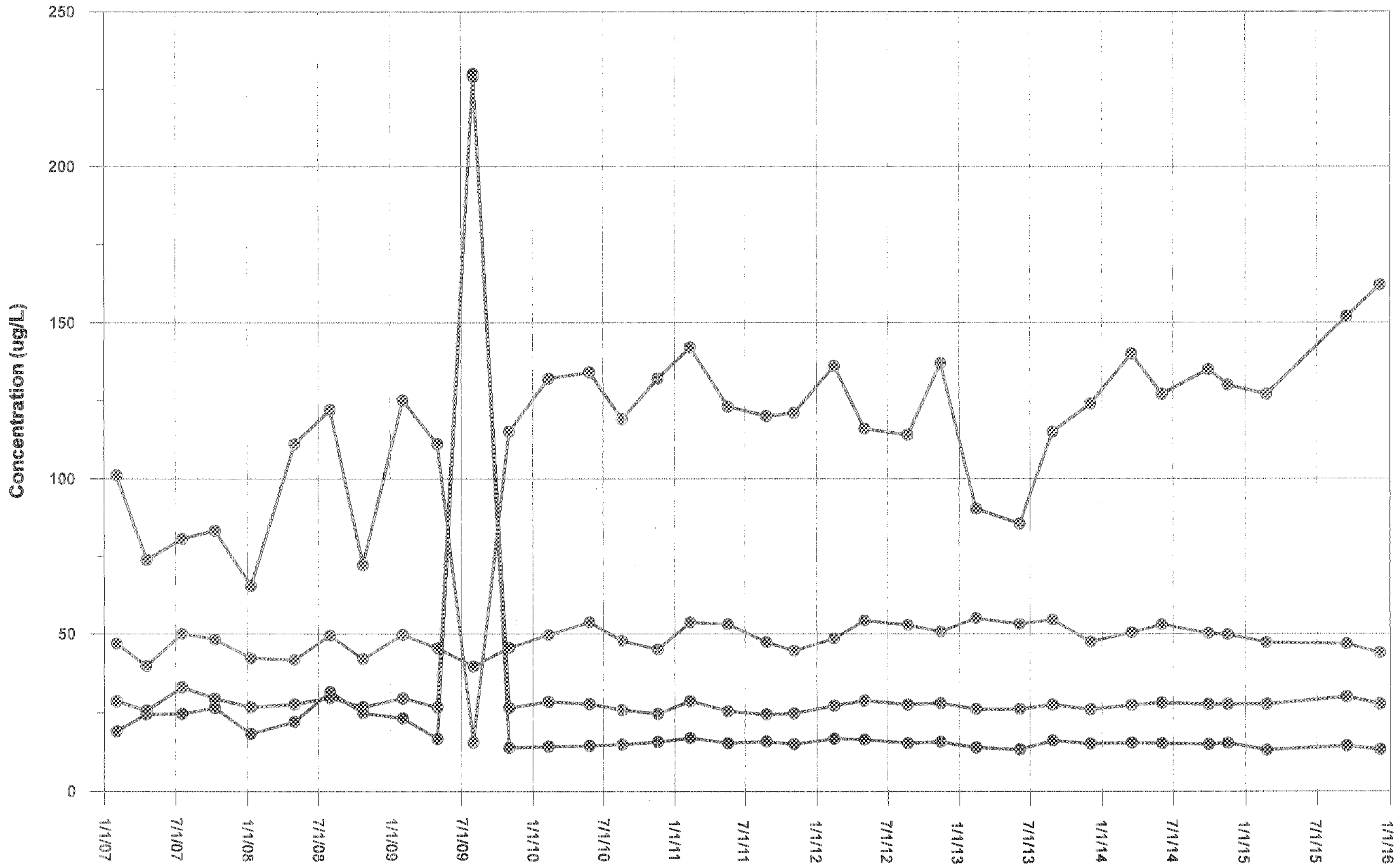
Legend:

● BXS-1 Detected Value
○ BXS-1 Non-Detected Value
● BXS-2 Detected Value
○ BXS-2 Non-Detected Value
● BXS-3 Detected Value
○ BXS-3 Non-Detected Value
● BXS-4 Detected Value
○ BXS-4 Non-Detected Value

FIGURE 6
Arsenic Concentration Trends
Former J.H. Baxter South Woodwaste Landfill
Arlington, Washington

GSI Water Solutions, Inc.

Notes:
ug/L = microgram per liter



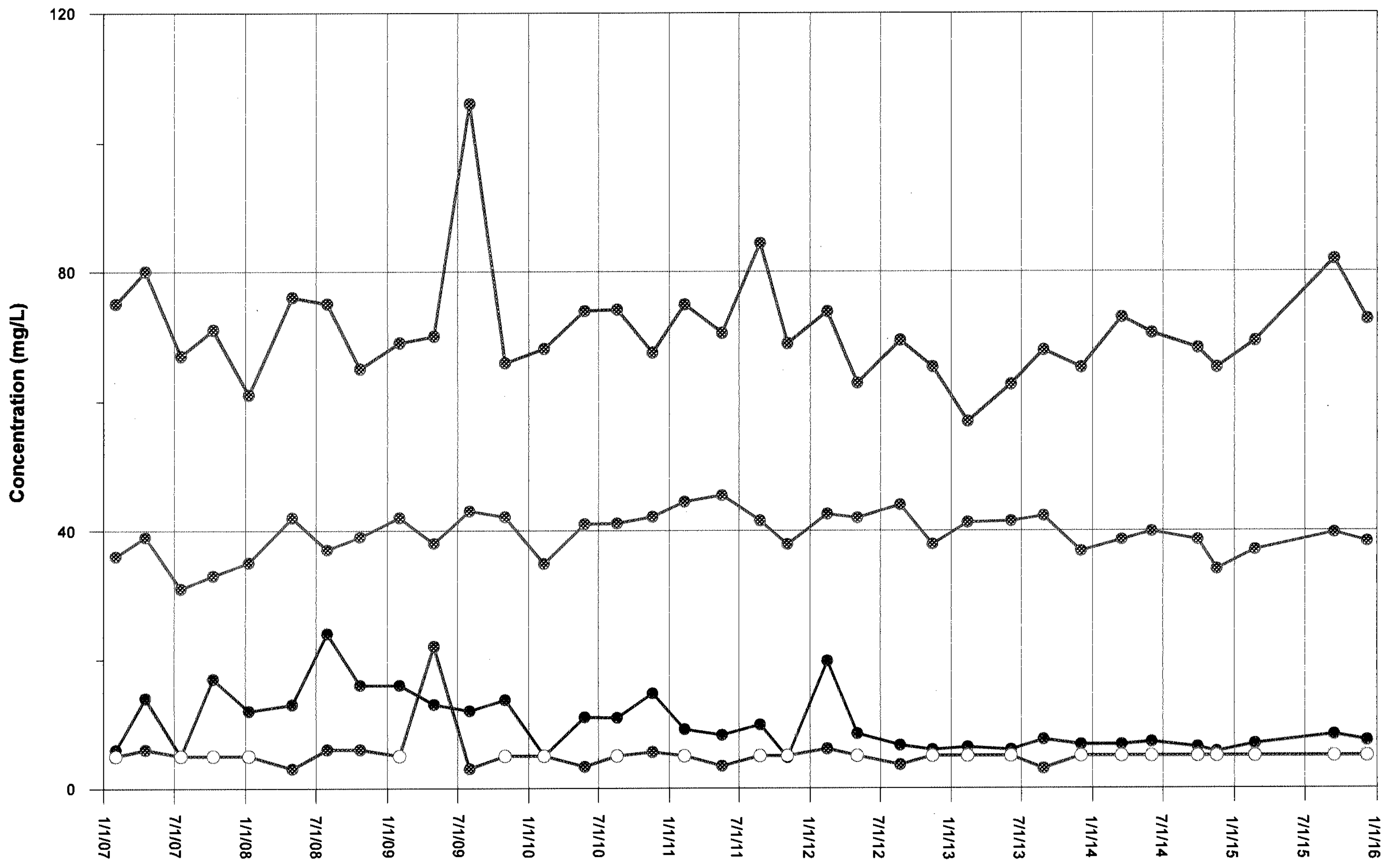
Legend:

- ● BXS-1 Detected Value
- ○ BXS-1 Non-Detected Value
- ● BXS-2 Detected Value
- ○ BXS-2 Non-Detected Value
- ● BXS-3 Detected Value
- ○ BXS-3 Non-Detected Value
- ● BXS-4 Detected Value
- ○ BXS-4 Non-Detected Value

Notes:
ug/L = microgram per liter

FIGURE 7
Barium Concentration Trends
Former J.H. Baxter South Woodwaste Landfill
Arlington, Washington

GSI Water Solutions, Inc.



Legend:

- ● BXS-1 Detected Value
- ○ BXS-1 Non-Detected Value
- ● BXS-2 Detected Value
- ○ BXS-2 Non-Detected Value
- ● BXS-3 Detected Value
- ○ BXS-3 Non-Detected Value
- ● BXS-4 Detected Value
- ○ BXS-4 Non-Detected Value

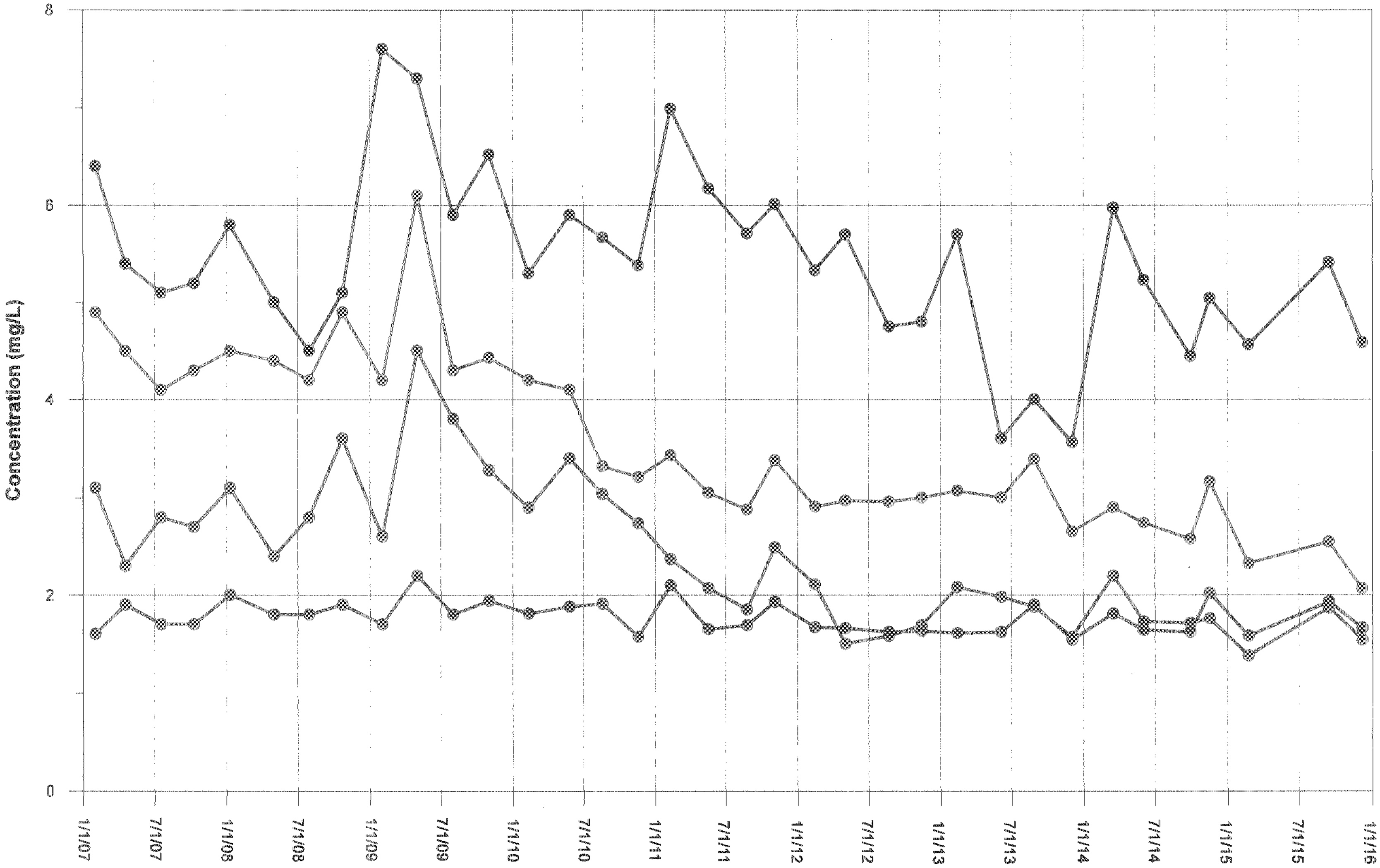
FIGURE 8

Chemical Oxygen Demand Concentration Trends

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

Notes:
mg/L = milligram per liter

GSI Water Solutions, Inc.



Legend:

- ● BXS-1 Detected Value
- ○ BXS-1 Non-Detected Value
- ● BXS-2 Detected Value
- ○ BXS-2 Non-Detected Value
- ● BXS-3 Detected Value
- ○ BXS-3 Non-Detected Value
- ● BXS-4 Detected Value
- ○ BXS-4 Non-Detected Value

FIGURE 9

Chloride Concentration Trends

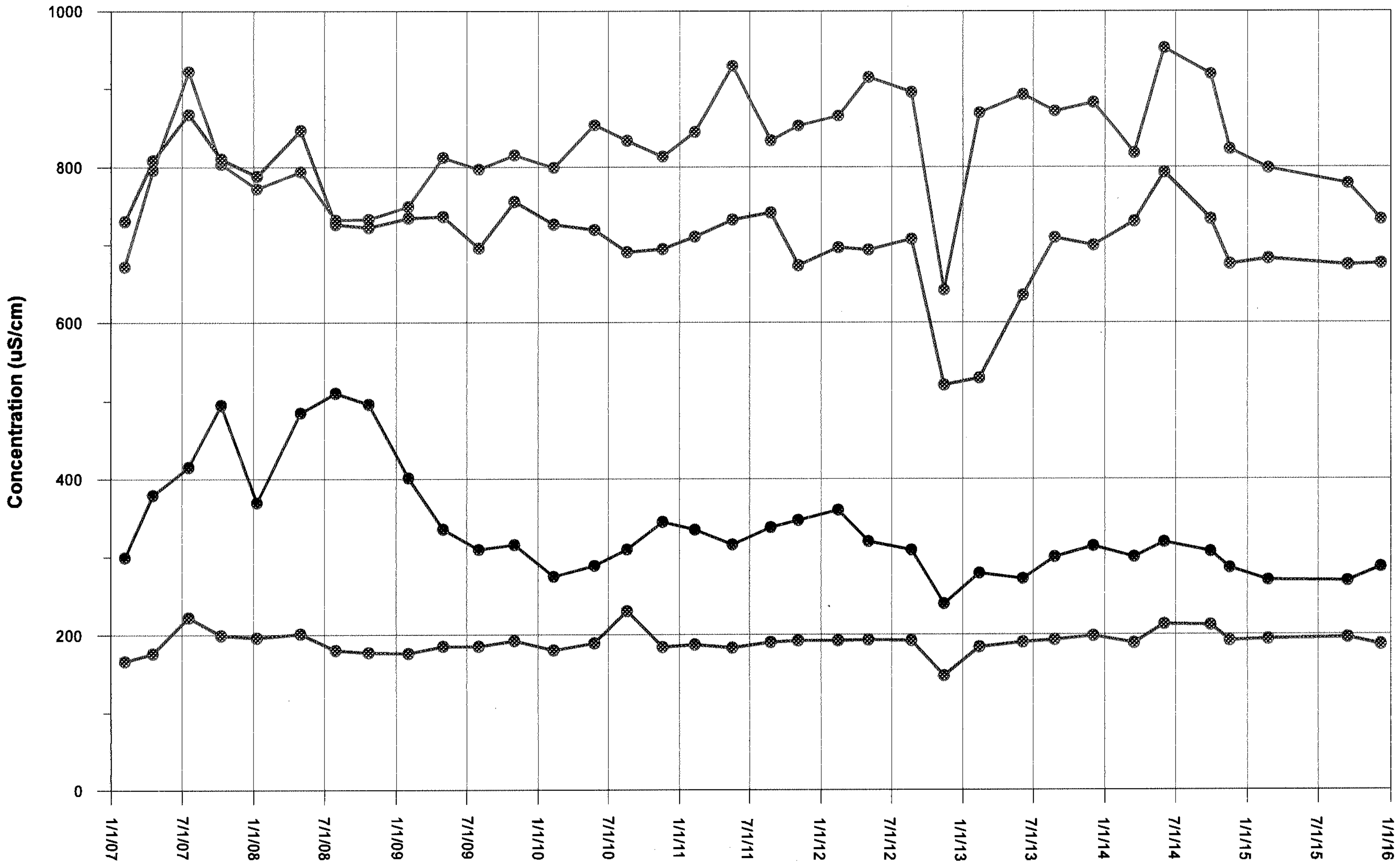
Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Notes:

mg/L = milligram per liter

GSI Water Solutions, Inc.



Legend:

- ● BXS-1 Detected Value
- ○ BXS-1 Non-Detected Value
- ● BXS-2 Detected Value
- ○ BXS-2 Non-Detected Value
- ● BXS-3 Detected Value
- ○ BXS-3 Non-Detected Value
- ● BXS-4 Detected Value
- ○ BXS-4 Non-Detected Value

Notes:

uS/cm = microSiemen per centimeter

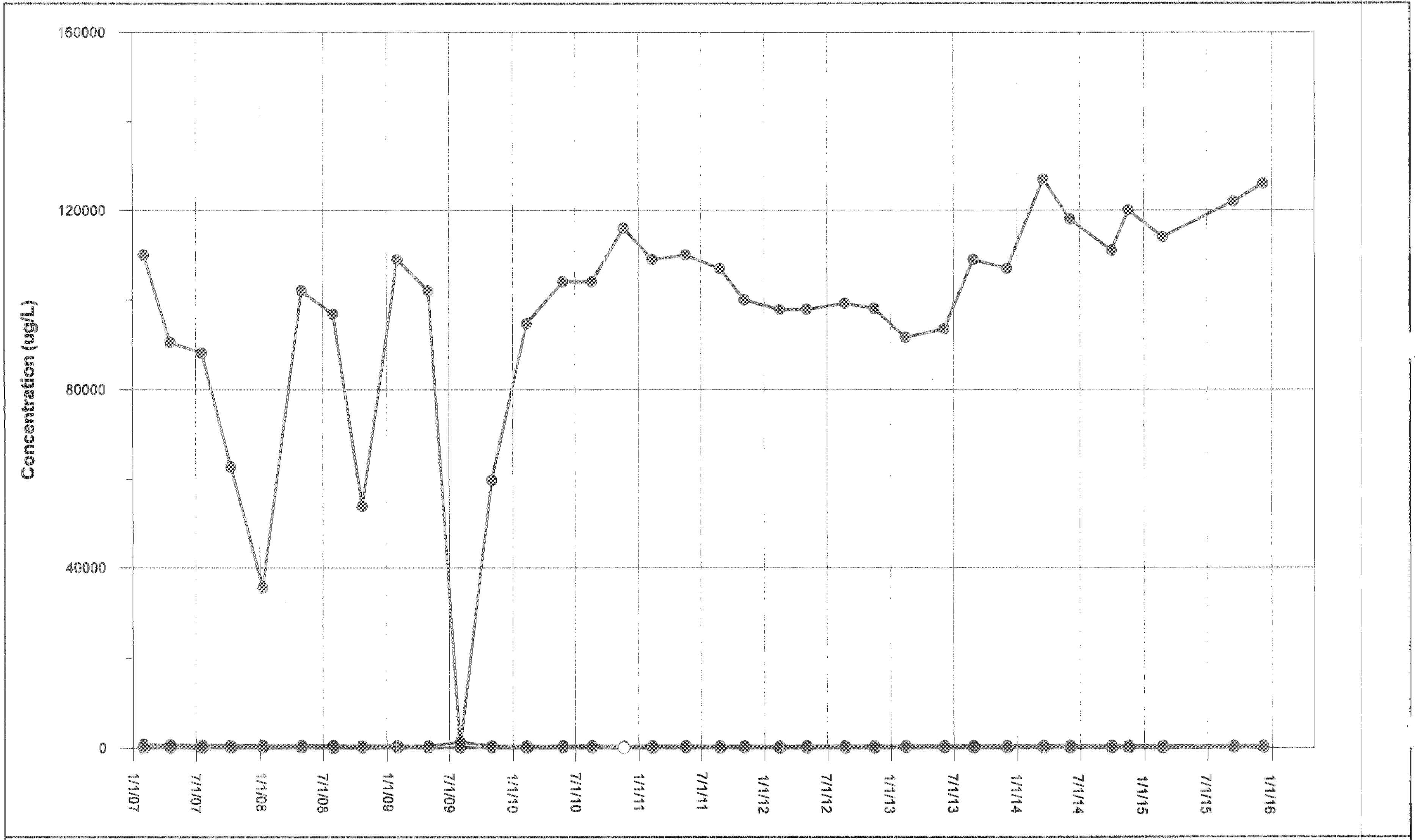
FIGURE 10

Field Conductivity Concentration Trends

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

GSI Water Solutions, Inc.



Legend:

- ● BXS-1 Detected Value
- ○ BXS-1 Non-Detected Value
- ● BXS-2 Detected Value
- BXS-2 Non-Detected Value
- ● BXS-3 Detected Value
- ○ BXS-3 Non-Detected Value
- ● BXS-4 Detected Value
- ○ BXS-4 Non-Detected Value

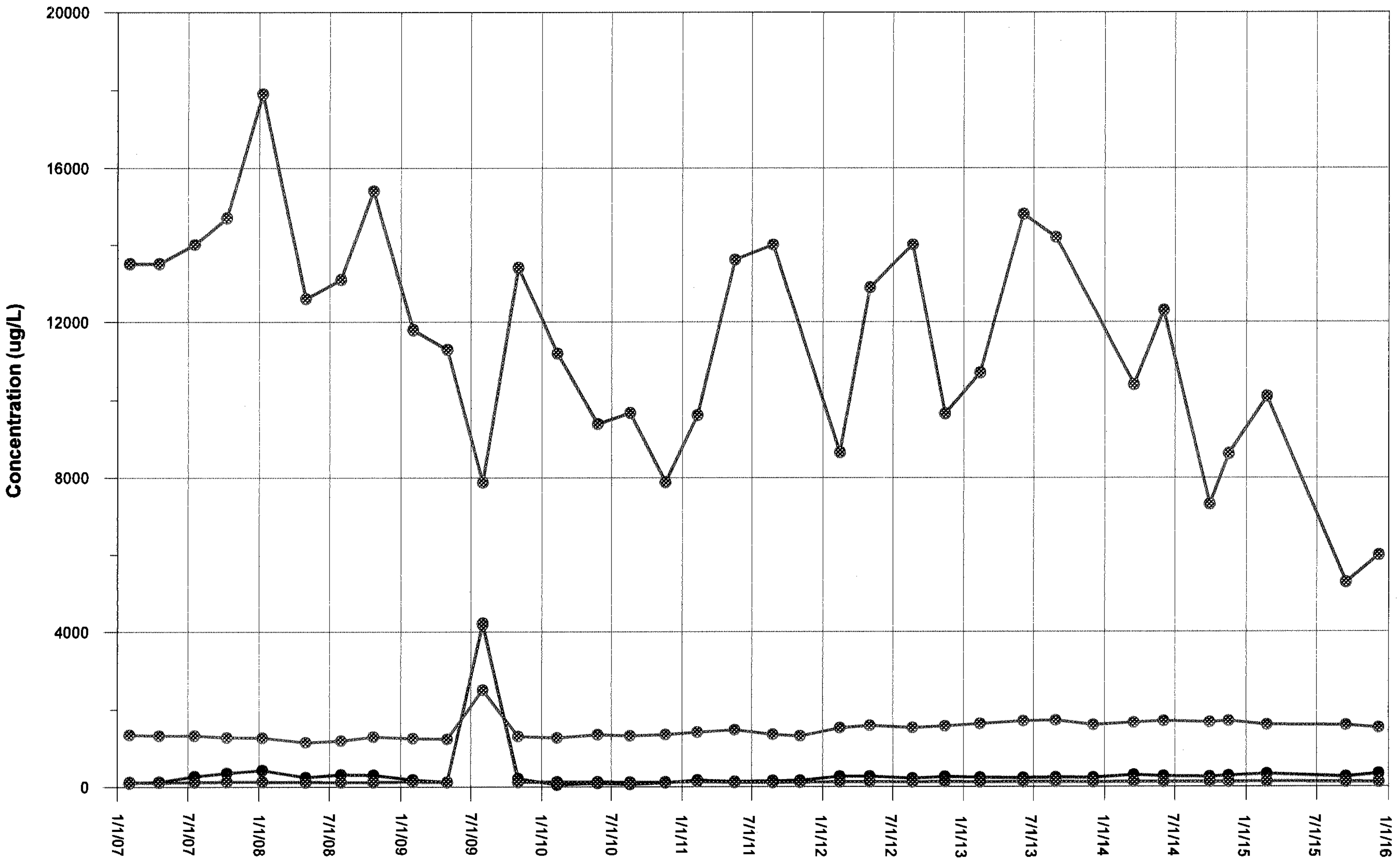
Notes:
ug/L = microgram per liter

FIGURE 11

Iron Concentration Trends

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

GSI Water Solutions, Inc.



Legend:

- ● BXS-1 Detected Value
- ○ BXS-1 Non-Detected Value
- ● BXS-2 Detected Value
- ○ BXS-2 Non-Detected Value
- ● BXS-3 Detected Value
- ○ BXS-3 Non-Detected Value
- ● BXS-4 Detected Value
- ○ BXS-4 Non-Detected Value

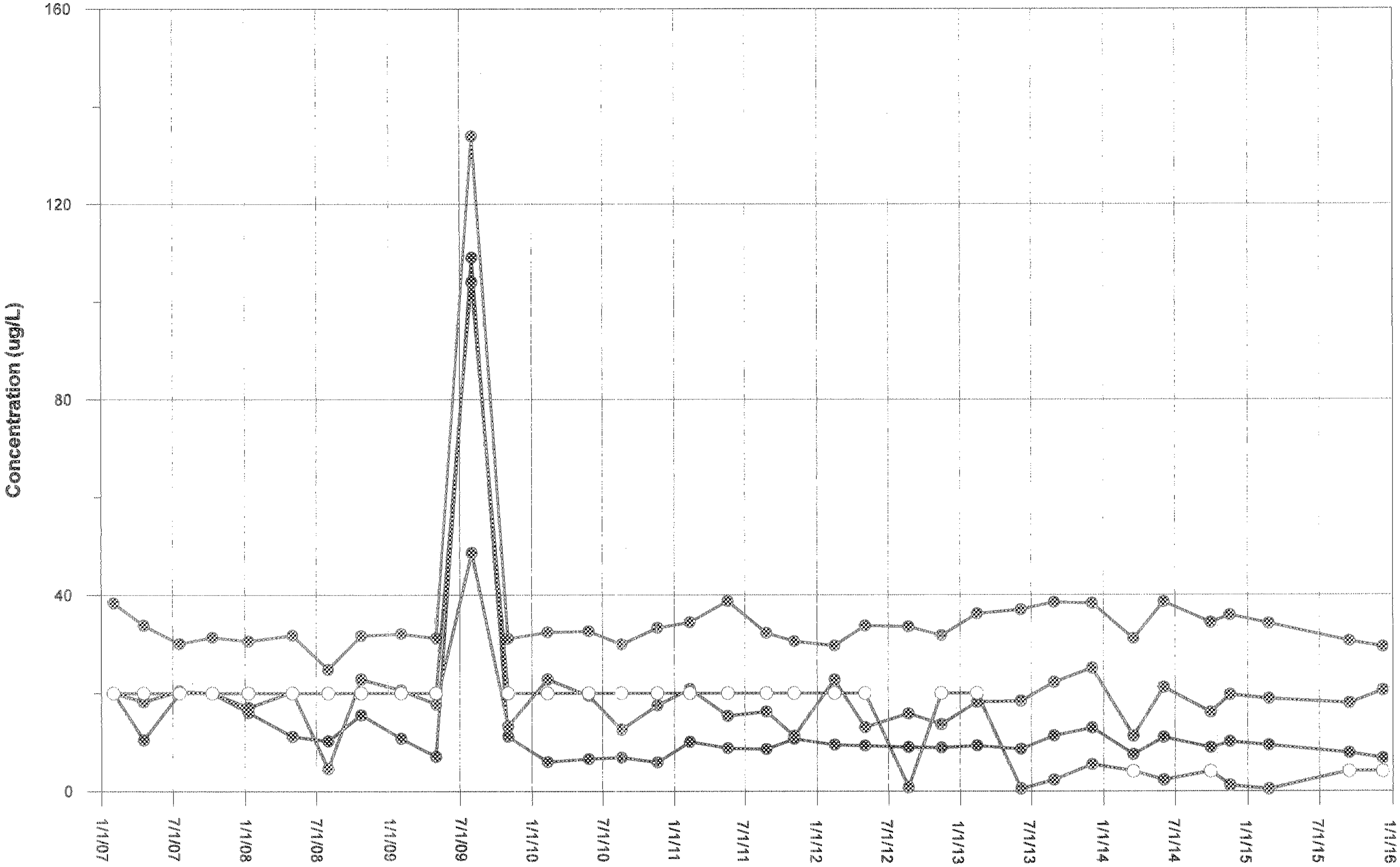
Notes:
ug/L = microgram per liter

FIGURE 12

Manganese Concentration Trends

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

GSI Water Solutions, Inc.



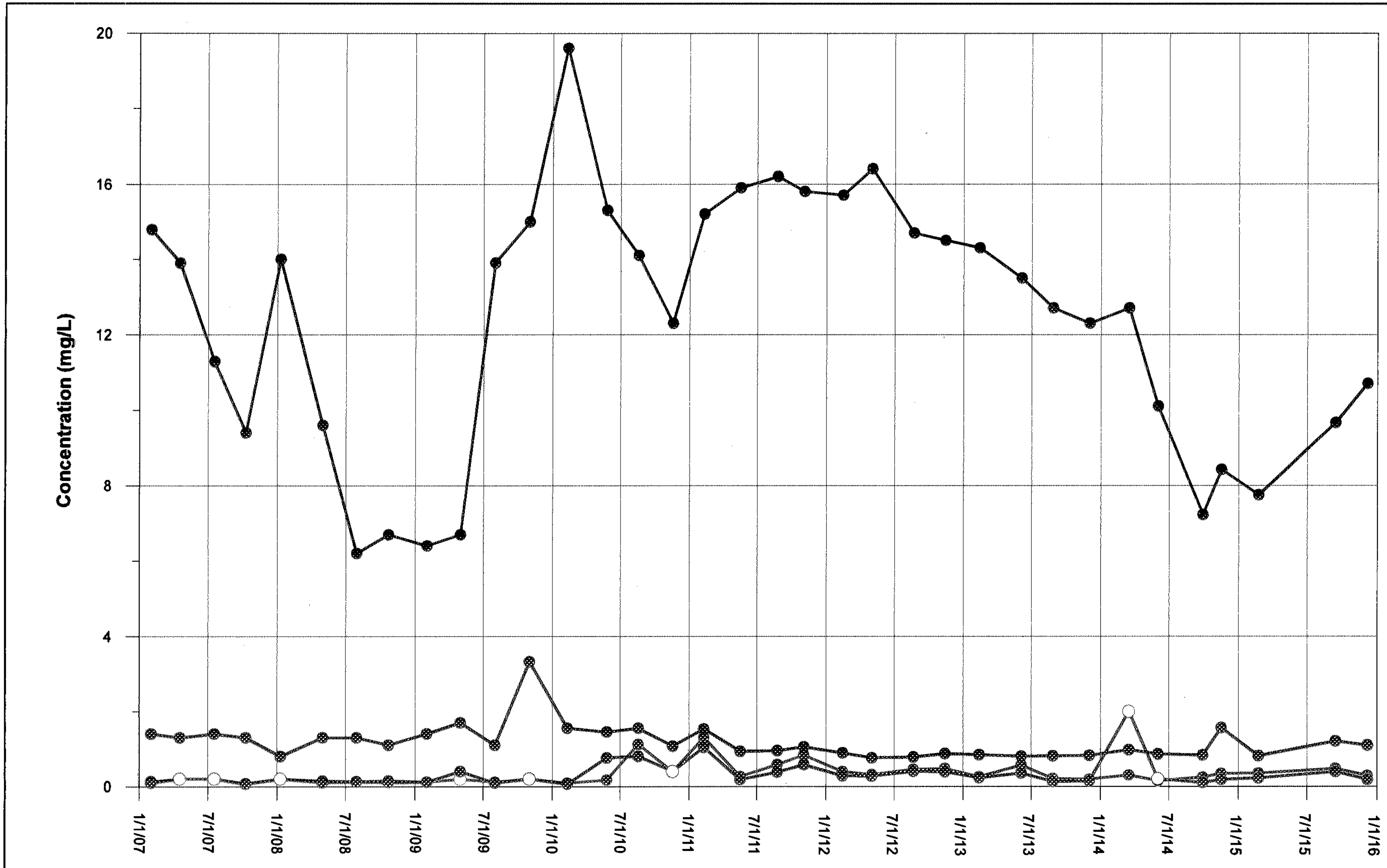
Legend:

- ● BXS-1 Detected Value
- BXS-1 Non-Detected Value
- ● BXS-2 Detected Value
- BXS-2 Non-Detected Value
- ● BXS-3 Detected Value
- ○ BXS-3 Non-Detected Value
- ● BXS-4 Detected Value
- ○ BXS-4 Non-Detected Value

Notes:
ug/L = microgram per liter

FIGURE 13
Nickel Concentration Trends
Former J.H. Baxter South Woodwaste Landfill
Arlington, Washington

GSI Water Solutions, Inc.



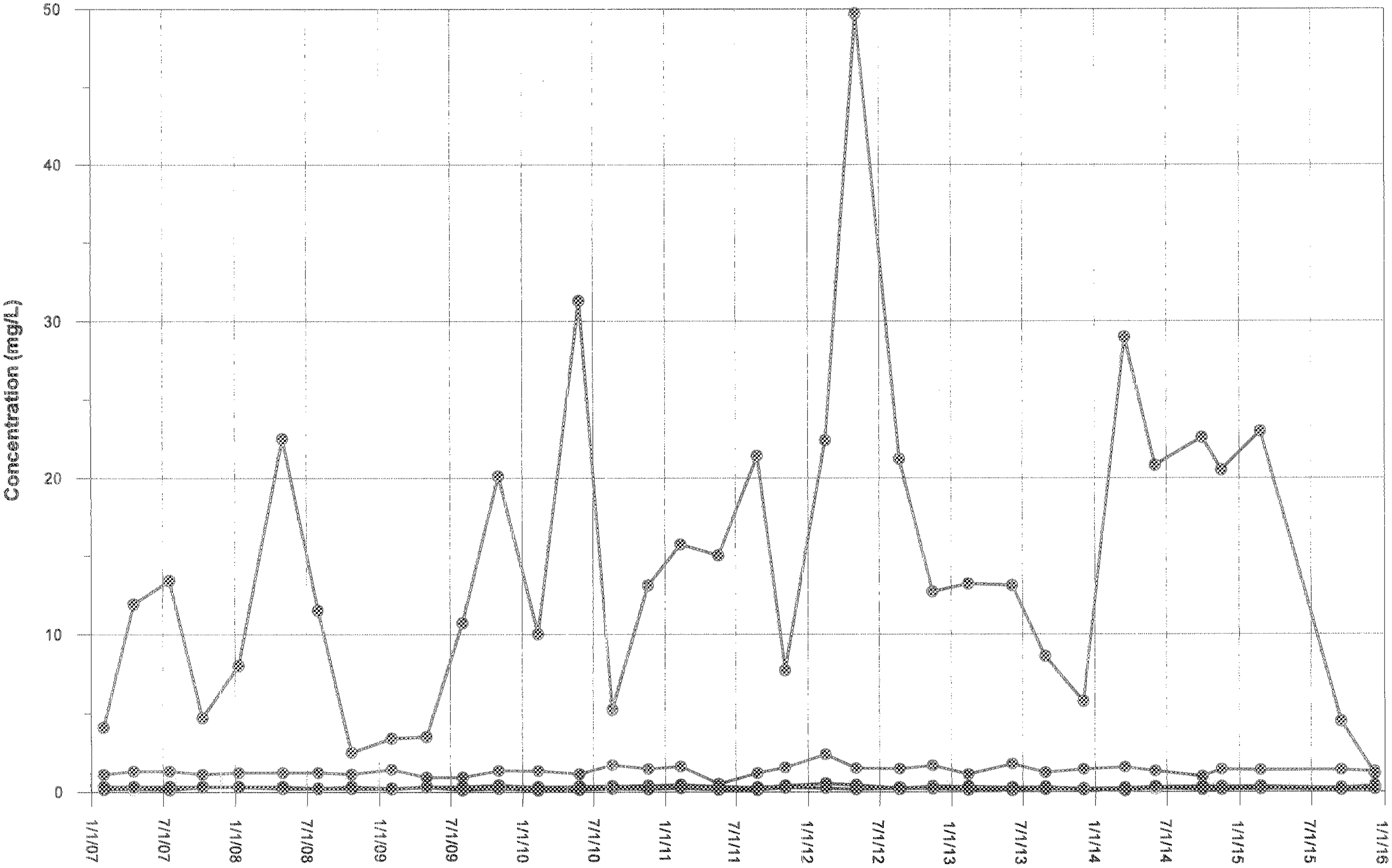
Legend:

- ● BXS-1 Detected Value
- ○ BXS-1 Non-Detected Value
- ● BXS-2 Detected Value
- ○ BXS-2 Non-Detected Value
- ● BXS-3 Detected Value
- ○ BXS-3 Non-Detected Value
- ● BXS-4 Detected Value
- ○ BXS-4 Non-Detected Value

Notes:
mg/L = milligram per liter

FIGURE 14
Sulfate Concentration Trends
Former J.H. Baxter South Woodwaste Landfill
Arlington, Washington

GSI Water Solutions, Inc.



Legend:

- ● BXS-1 Detected Value
- ○ BXS-1 Non-Detected Value
- ● BXS-2 Detected Value
- ○ BXS-2 Non-Detected Value
- ● BXS-3 Detected Value
- ○ BXS-3 Non-Detected Value
- ● BXS-4 Detected Value
- ○ BXS-4 Non-Detected Value

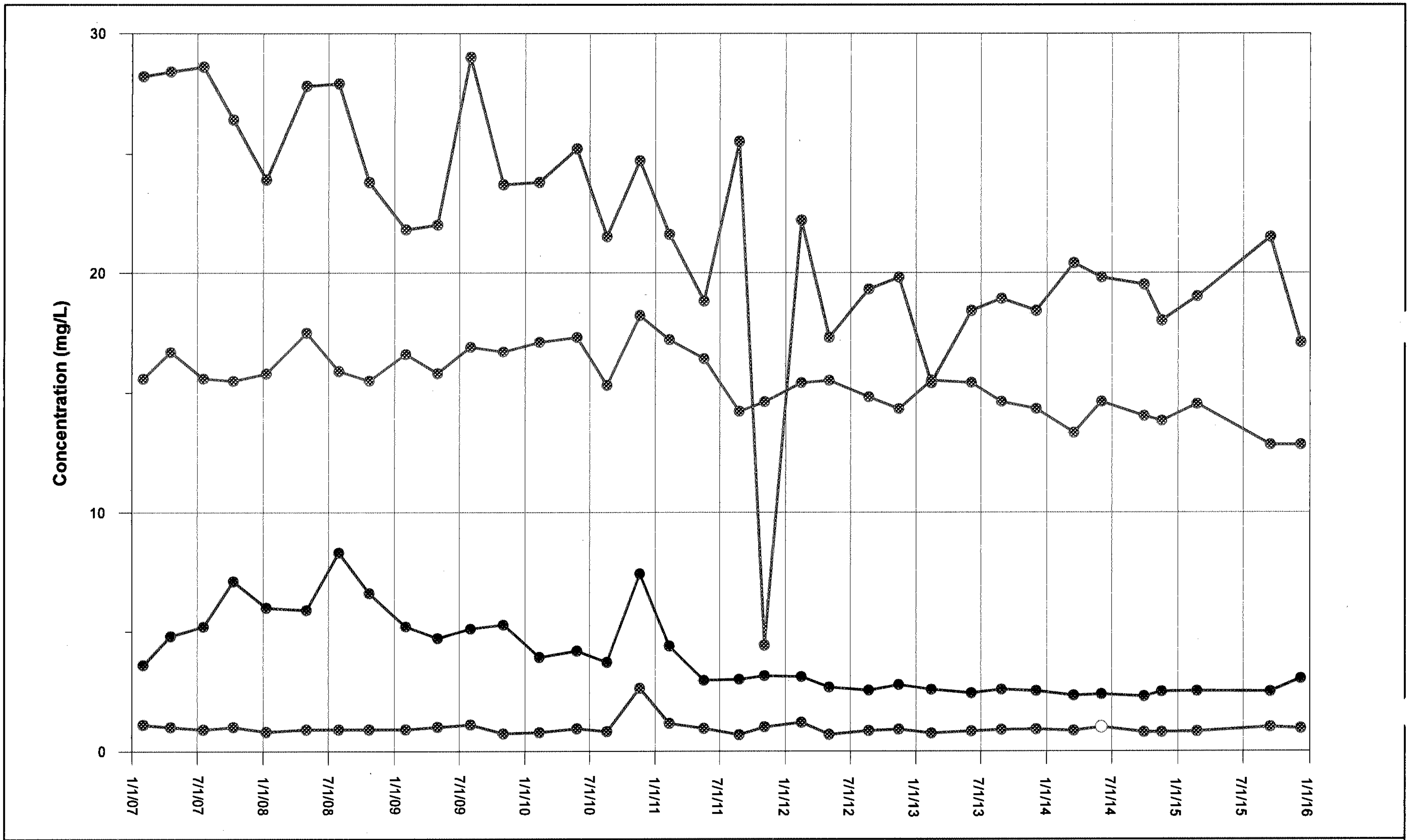
FIGURE 15

Tannin and Lignin Concentration Trends

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

Notes:
mg/L = milligram per liter

GSI Water Solutions, Inc.



Legend:

- ● BXS-1 Detected Value
- ○ BXS-1 Non-Detected Value
- ● BXS-2 Detected Value
- ○ BXS-2 Non-Detected Value
- ● BXS-3 Detected Value
- ○ BXS-3 Non-Detected Value
- ● BXS-4 Detected Value
- ○ BXS-4 Non-Detected Value

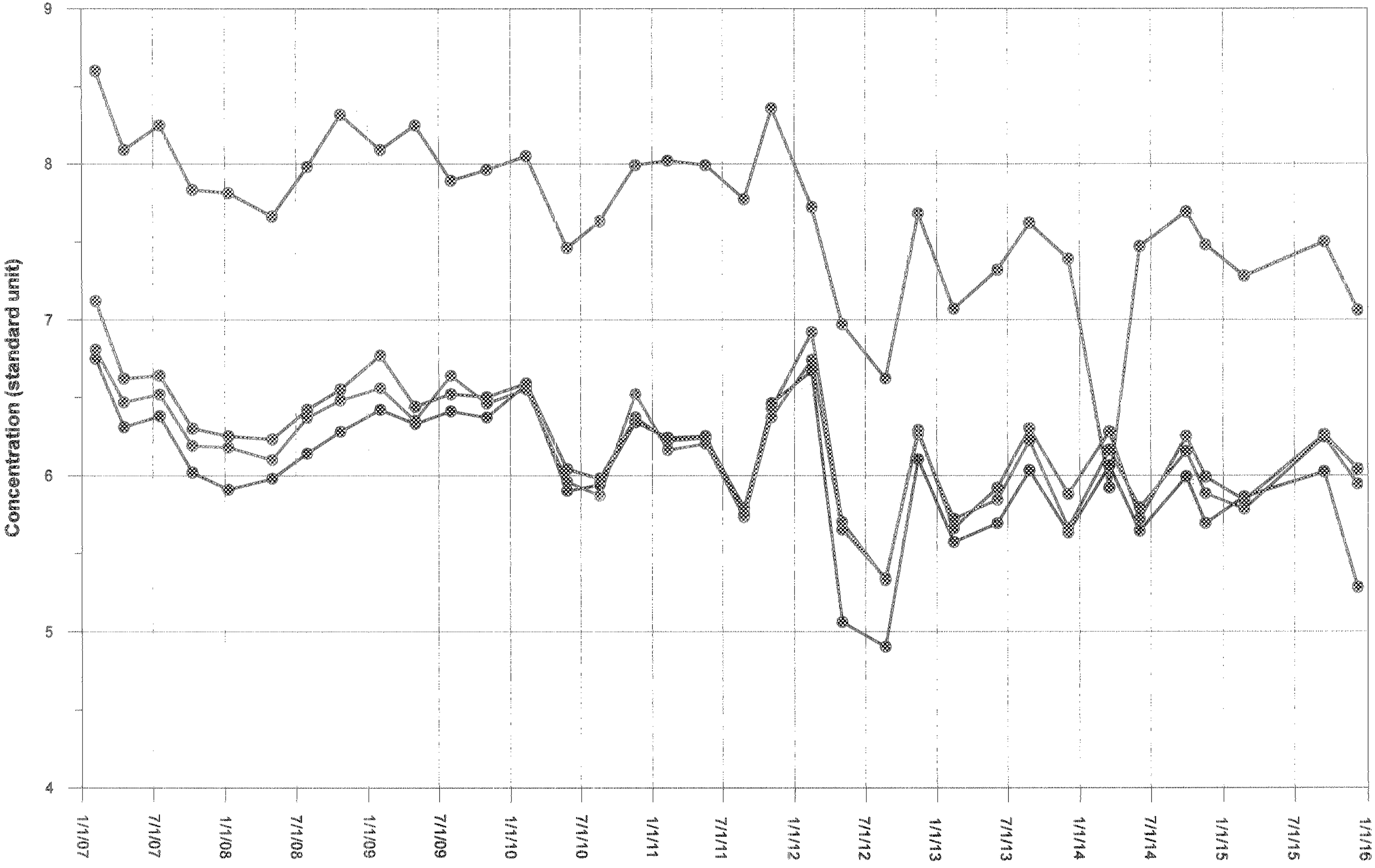
Notes:
mg/L = milligram per liter

FIGURE 16

Total Organic Carbon Concentration Trends

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

GSI Water Solutions, Inc.



Legend:

- ● BXS-1 Detected Value
- ○ BXS-1 Non-Detected Value
- ● BXS-2 Detected Value
- ○ BXS-2 Non-Detected Value
- ● BXS-3 Detected Value
- ○ BXS-3 Non-Detected Value
- ● BXS-4 Detected Value
- ○ BXS-4 Non-Detected Value

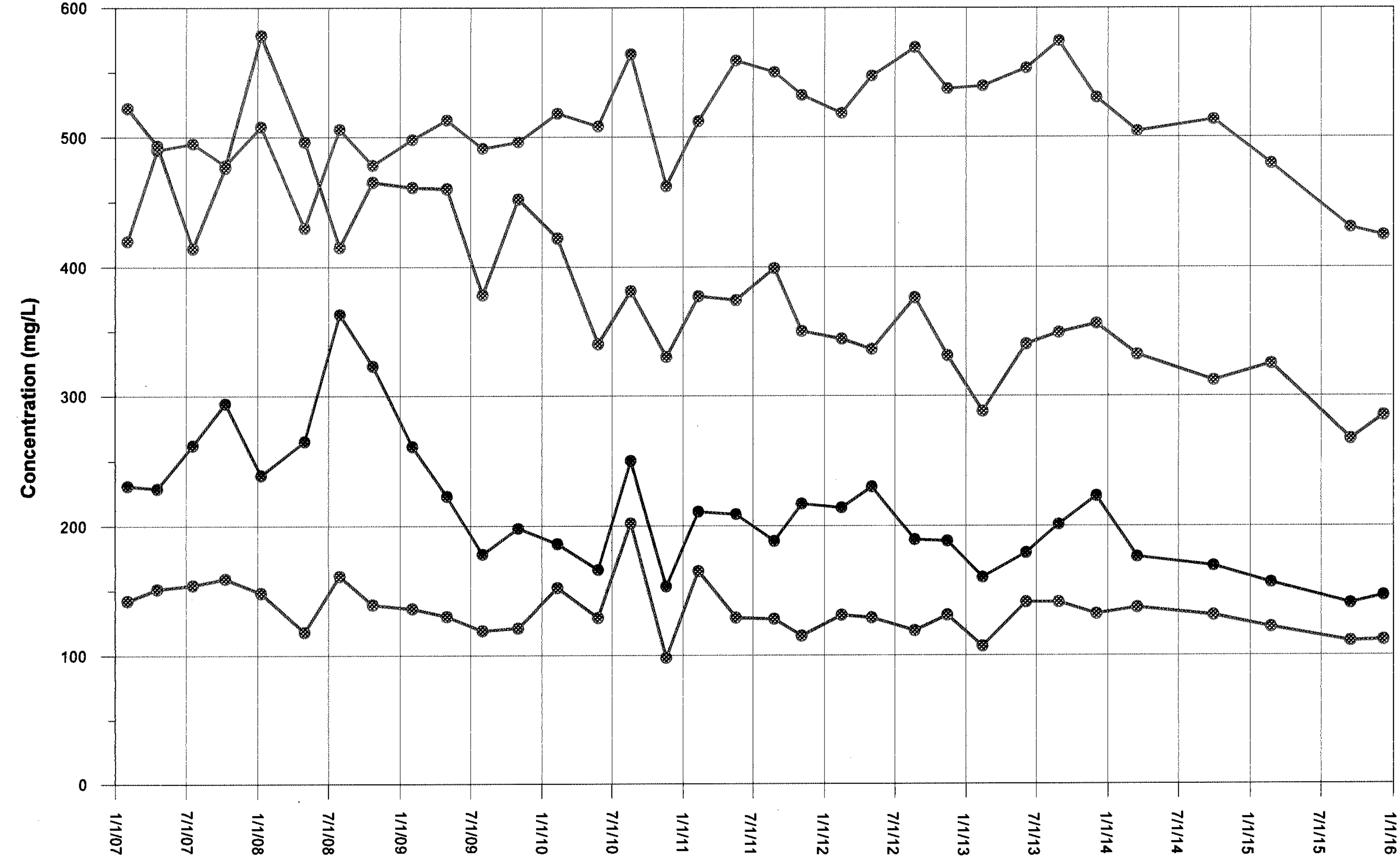
FIGURE 17

Field pH Concentration Trends

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

GSI Water Solutions, Inc.



Legend:

- ● BXS-1 Detected Value
- ○ BXS-1 Non-Detected Value
- ● BXS-2 Detected Value
- ○ BXS-2 Non-Detected Value
- ● BXS-3 Detected Value
- ○ BXS-3 Non-Detected Value
- ● BXS-4 Detected Value
- ○ BXS-4 Non-Detected Value

Notes:
mg/L = milligram per liter

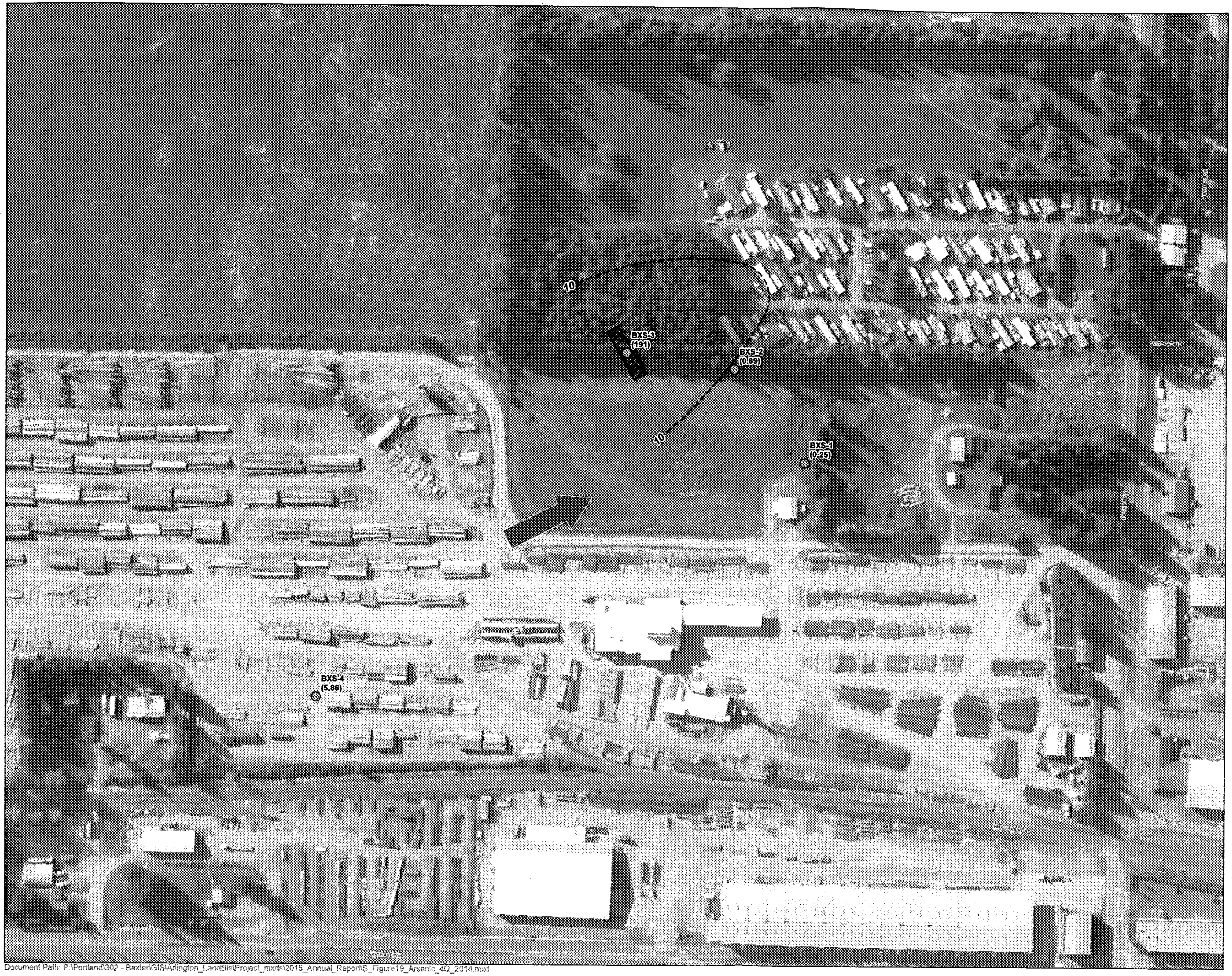
FIGURE 18
Total Dissolved Solids Concentration Trends
Former J.H. Baxter South Woodwaste Landfill
Arlington, Washington

GSI Water Solutions, Inc.

FIGURE 19

Arsenic Isopleth Map: Fourth Quarter 2014

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



LEGEND

- ⊗ Monitoring Well (September 2014 Arsenic Concentration)
- ➔ Direction of Groundwater Flow
- ▨ Modeled Source Area

NOTES:

1. All elevations exist in NAVD88.
2. Arsenic contouring estimated using Quick Domenico approximately.
3. Concentrations in ug/L.
4. Data from highest arsenic detection (fourth quarter 2014) depicted.

MAP NOTES:
Date: March 29, 2016
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\2015_Annual_Report\S_Figure19_Arsenic_4Q_2014.mxd

Appendix A

Appendix A

Groundwater Monitoring Wells

Case	Well Number	Water Level	Bottom	Date	Time	Pump
2"	BXN-1	46.99	58.18'	2-23-15	1443	
2"	BXN-2	43.26	57.24'	2-23-15	1515	
2"	BXN-3	N.D.A.	58.66'			
2"	BXN-4	41.41	51.74'	2-23-15	1544	
	BXN-5	NA	Dup BXN-1			
	BXN-6	NA	Blank	2-23-15	1700	
2"	**BXS-1***	31.72	49.00'	2-23-15	1409	X
2"	**BXS-2***	29.76	52.00'	2-23-15	1458	X
2"	BXS-3	25.04	42.50'	2-23-15	1539	X
2"	BXS-4	13.0	47.50'	2-23-15	1618	X
	BXS-5	NA	Dup BXS-1	2-23-15	1320	
	BXS-6	NA	Blank			
4"	MW-1	23.3	43.00'	2-23-15	1610	
4"	**MW-2***	36.6	47.50'	2-22-15	1524	X
4"	**MW-3***	34.2	49.50'	2-22-15	1230	X
2"	MW-4	10.61	40.00'	2-23-15	1615	
2"	HCMW-5	NA	35.00'			X
2"	HCMW-6	NA	51.50'			X
2"	**HCMW-7**	36.95	54.00'	2-23-15	0948	
2"	MW-10	26.01	43.00'	2-23-15	1628	
2"	MW-11	N.A.	38.00'			
4"	MW-12	NAPL	38.00'			
4"	MW-13	NAPL	37.00'			
2"	MW-14	17.2	38.00'	2-23-15	1618	
2"	**MW-15***	32.2	50.00'	2-23-15	1245	X
2"	**MW-16***	33.8	50.00	2-22-15	1638	X
2"	**MW-17***	35.2	55.00'	2-23-15	0938	X
2"	**MW-18***	35.3	55.00'	2-23-15	0746	X
2"	MW-19	NAPL	37.10'			
2"	MW-20	NAPL	34.70'			

JH Baxter & Co.

Groundwater Sampling Field Form

Stella-Jones Corporation

Arlington, WA 98223

(360) 435-2146 FAX (360) 435-3035

Well No. BXS-1

Location: Arlington

Date 2-23-15

Location: Landfill - South

Field Personnel/Company W.Krause/C.Baxter

Sample Time (2400 hours)

Instrument Calibration Date

Well Condition Poor [✓ Satisfactory] New (If poor, explain)

Field Conditions/Weather

Equipment Decontamination **Liquinox and D.I. Water Rinse.**

Casing Diameter:
(Circle One)
[✓ 2"] 4"
6" Other_____

Casing Volume (gallons/ft) for: 2"=0.163; 4"=0.653; 6"=1.47
Multiply Water Column Height by appropriate number above to get proper purge volume.

Depth of Well (feet): 49.0'

Depth to Water (feet): 31.72

Water Column (feet):

Casing Volume (gallons):

Calculated Purge Volume (gallons): 8.4

tual Purge Volume (gallons):

Sheen / LNAPL / DNAPL present:

Other remarks:

Time 2400 hrs	Cumulative Volume (gal)	Temp. (°C)	pH	ORP Redox.	Conductivity ms/cm 25°C	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Odor/Color/ Remarks
1409	0	12.72	5.71	361	0.223	0.0	8.86	Purge Start
1420	2.8	12.62	5.74	334	.268	0	2.52	
1429	5.6	12.59	5.75	320	.270	0	1.97	
1438	8.4	12.80	5.86	299	.269	0	1.58	
1440	Sample							

ing Equipment: Portable [✓ (Dedicated Bladder Pump)] Disposable Baler Sampling Equipment: Horiba U-52

Remarks:

Revised 02/23/12

JH Baxter & Co.

Groundwater Sampling Field Form

Stella-Jones Corporation

Arlington, WA 98223

(360) 435-2146 FAX (360) 435-3035

Well No. BXS-2	Location Arlington	Date 2-23-15
Location: Landfill - South	Field Personnel/Company W.Krause/C.Baxter	
Sample Time (2400 hours)	Instrument Calibration Date	

Well Condition Poor [✓ Satisfactory] New (If poor, explain)

Field Conditions/Weather

Equipment Decontamination **Liquinox and D.I. Water Rinse.**

Casing Diameter:
(Circle One)
[✓ 2"] 4"
6" Other_____

Casing Volume (gallons/ft) for: 2"=0.163; 4"=0.653; 6"=1.47
Multiply Water Column Height by appropriate number above to get proper purge volume.

Depth of Well (feet): 52.0'

Depth to Water (feet): 29.76

Water Column (feet):

Casing Volume (gallons):

Calculated Purge Volume (gallons): 10.9

Actual Purge Volume (gallons):

Sheen / LNAPL / DNAPL present:

Other remarks:

Time 2400 hrs	Cumulative Volume (gal)	Temp. (°C)	pH	ORP Redox.	Conductivity ms/cm 25°C	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Odor/Color/ Remarks
1458	0	1218	5.94	158	.727	0.0	6.16	Purge Start
1506	3.6	11.80	5.82	136	.787	0.5	2.01	
1514	7.2	11.72	5.79	128	.794	4.9	1.42	
1521	10.9	11.77	5.78	125	.798	7.0	1.25	
1523		Sample						

ging Equipment: **Portable** **(Dedicated Bladder Pump)** **Disposable Baler** Sampling Equipment: **Horiba U-52**

emarks:

Revised 02/23/12

JH Baxter & Co.

JBaxter WOOD PRESERVING

Groundwater Sampling Field Form

Stella-Jones Corporation
Arlington, WA 98223
(360) 435-2146 FAX (360) 435-3035

Well No. BXS-3	Location Arlington	Date 2-23-15
Location: Landfill - South	Field Personnel/Company W.Krause/C.Baxter	
Sample Time (2400 hours)	Instrument Calibration Date	

Well Condition Poor [✓ Satisfactory] New (If poor, explain)

Field Conditions/Weather

Equipment Decontamination Liquinox and D.I. Water Rinse.

Casing Diameter:
(Circle One)
[✓ 2"] 4" Other____

Casing Volume (gallons/ft) for: 2"=0.163; 4"=0.653; 6"=1.47
Multiply Water Column Height by appropriate number above to get proper purge volume.

Depth of Well (feet): 42.5'
Depth to Water (feet): 25.04
Water Column (feet):
Casing Volume (gallons):
Calculated Purge Volume (gallons): 8.5
Actual Purge Volume (gallons):

Sheen / LNAPL / DNAPL present:
Other remarks:

Time 2400 hrs	Cumulative Volume (gal)	Temp. (°C)	pH	ORP Redox.	Conductivity ms/cm 25°C	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Odor/Color/ Remarks
1539	0	12.36	5.91	-44	.677	2.1	4.21	Purge Start
1545	2.8	12.39	5.86	-58	.679	1.5	1.92	
1553	5.6	12.41	5.85	-66	.682	2.4	1.54	
1600	8.5	12.41	5.84	-71	.682	2.2	1.28	
			Sample					
1600								

ging Equipment: Portable (Dedicated Bladder Pump) Disposable Baler Sampling Equipment: Horiba U-52

Remarks:

Revised 02/23/12

JH Baxter & Co.
Groundwater Sampling Field Form
Stella-Jones Corporation
Arlington, WA 98223

(360) 435-2146 FAX (360) 435-3035

Well No. BXS-4	Location Arlington	Date 2-23-15
Sample No. Landfill - South	Field Personnel/Company W.Krause/C.Baxter	
Sample Time (2400 hours)	Instrument Calibration Date	

Well Condition Poor [✓ Satisfactory] New (If poor, explain)

Field Conditions/Weather

Equipment Decontamination **Liquinox and D.I. Water Rinse.**

Casing Diameter: (Circle One) [✓ 2"] 4" 6" Other_____

Casing Volume (gallons/ft) for: 2"=0.163; 4"=0.653; 6"=1.47
Multiply Water Column Height by appropriate number above to get proper purge volume.

Depth of Well (feet): 47.5'
Depth to Water (feet): 13.0
Water Column (feet):
Casing Volume (gallons):
Calculated Purge Volume (gallons): 16.8
Actual Purge Volume (gallons):

Sheen / LNAPL / DNAPL present:
Other remarks:

Time 2400 hrs	Cumulative Volume (gal)	Temp. (°C)	pH	ORP Redox.	Conductivity ms/cm 25°C	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Odor/Color/ Remarks
1618	0	10.36	6.77	-86	.193	35	.879	Purge Start
1632	5.6	10.25	7.29	-95	194	53	.129	
1646	11.2	10.21	7.28	-101	.195	3.0	194	
1702	16.8	10.19	7.28	-102	.194	3.1	1.02	
1704		Sample						

-ging Equipment: **Portable** **(Dedicated Bladder Pump)** **Disposable Baler** Sampling Equipment: **Horiba U-52**

Remarks:

Revised 02/23/12

Groundwater Monitoring Wells

Case	Well Number	Water Level	Bottom	Date	Time	Pump
2"	BXN-1	49.90	58.18'	14-Sep	1426	
2"	BXN-2	45.75	57.24'	14-Sep	1457	
2"	BXN-3		58.66'			
2"	BXN-4	44.99	51.47	14-Sep	1543	
	BXN-5		Dup BXN-1			
	BXN-6		Blank	14-Sep	1600	
2"	**BXS-1***	36.60	49.00'	14-Sep	1509	X
2"	**BXS-2***	34.70	52.00'	14-Sep	1620	X
2"	BXS-3	33.40	42.50'	14-Sep	1657	X
2"	BXS-4	16.40	47.50'	14-Sep	1735	X
	BXS-5		Dup BXS-1			
	BXS-6		Blank			
4"	MW-1	28.15	43.00'	14-Sep	1850	
4"	**MW-2***	42.00	47.50'	13-Sep	1504	X
4"	**MW-3***	39.53	49.50'	13-Sep	1332	X
2"	MW-4	13.25	40.00'	14-Sep	1650	
2"	HCMW-5	28.88	35.00'	14-Sep	1759	X
2"	HCMW-6	40.05	51.50'	14-Sep	1628	X
2"	**HCMW-7**	41.70	54.00'	14-Sep	930	
2"	MW-10	33.00	43.00'	14-Sep	1825	
2"	MW-11		38.00'			
4"	MW-12	NAPL	38.00'			
4"	MW-13	NAPL	37.00'			
2"	MW-14	25.42	38.00'	14-Sep	1723	
2"	**MW-15***	37.50	50.00'	14-Sep	1023	X
2"	**MW-16***	38.56	50.00	14-Sep	1101	X
2"	**MW-17***	39.90	55.00'	13-Sep	1659	X
2"	**MW-18***	39.70	55.00'	14-Sep	800	X
2"	MW-19	NAPL	37.10'			
2"	MW-20	NAPL	34.70'			

JHBaxter WOOD PRESERVING

JH Baxter & Co.

Groundwater Sampling Field Form

Stella-Jones Corporation

Arlington, WA 98223

(360) 435-2146 FAX (360) 435-3035

Well No. BXS-1	Location **Arlington**	Date 9-14-15
Location: Landfill - South	Field Personnel/Company **W.Krause/C.Baxter**	
Sample Time (2400 hours)	Instrument Calibration Date	

Well Condition Poor Satisfactory New (If poor, explain)

Field Conditions/Weather

Equipment Decontamination **Liquinox and D.I. Water Rinse.**

Casing Diameter:
(Circle One)
[✓ 2"] 4"
6 Other_____

Casing Volume (gallons/ft) for [✓ 2"]=0.163; 4"=0.653; 6"=1.47
Multiply Water Column Height by appropriate number above to get proper purge volume.

Depth of Well (feet): 49.0'
Depth to Water (feet): 36.6
Water Column (feet): 12.4
Casing Volume (gallons): 2.0
Calculated Purge Volume (gallons): 6.0
Actual Purge Volume (gallons): 6.3

Sheen / LNAPL / DNAPL present:
Other remarks:

Time 2400 hrs	Cumulative Volume (gal)	Temp. (°C)	pH	ORP Redox.	Conductivity ms/cm 25°C	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Odor/Color/ Remarks
1509	0	1410	6.05	404	.015	65.4	556	Purge Start
1512		12.98	5.97	384	.260	0.0	2.05	
1515		12.83	5.93	364	.260	0.0	1.68	
15.18	4 gal	12.90	6.00	327	.263	0.0	1.48	
1521		12.88	6.02	318	.264	0.0	1.38	
1524	5	12.99	6.03	209	.264	5.0	1.26	
1527	6	13.28	6.02	119	.263	0.0	1.23	
1530	6.3							

36.6

Purging Equipment: **Portable** **(Dedicated Bladder Pump)** **Disposable Baler** Sampling Equipment: **Horiba U-52**

Remarks:

Revised 02/23/12

JH Baxter & Co.

JH Baxter WOOD PRESERVING

Groundwater Sampling Field Form

Stella-Jones Corporation

Arlington, WA 98223

(360) 435-2146 FAX (360) 435-3035

Well No. BXS-2 | Location Arlington | Date 9-14-15

Location: Landfill - South | Field Personnel/Company W.Krause/C.Baxter

Sample Time (2400 hours) | Instrument Calibration Date

Well Condition Poor [✓ Satisfactory] New (If poor, explain) ______

Field Conditions/Weather ______

Equipment Decontamination Liquinox and D.I. Water Rinse.

Casing Diameter:
(Circle One)
[✓ 2"] 4"
6" Other____

Casing Volume (gallons/ft) for: 2"=0.163; 4"=0.653; 6"=1.47
Multiply Water Column Height by appropriate number above to get proper purge volume.

Depth of Well (feet): 52.0'

Depth to Water (feet): 34.7

Water Column (feet): 17.3

Casing Volume (gallons): 2.8

Calculated Purge Volume (gallons): 8.4

Actual Purge Volume (gallons): ______

Sheen / LNAPL / DNAPL present: ______

Other remarks: ______

Time 2400 hrs	Cumulative Volume (gal)	Temp. (°C)	pH	ORP Redox.	Conductivity ms/cm 25°C	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Odor/Color/ Remarks
1620	0	12.93	6.93	256	.739	0.0	5.67	Purge Start
1624	2.75	11.99	6.25	190	.773	0.0	9.85	
1627	4 gal	11.95	6.25	125	.776	0.0	1.76	
1630	5 gal	11.93	6.24	197	.777	0.0	1.80	
1633	"	11.90	6.24	192	.778	0.0	1.32	
1635	Sample							

rging Equipment: Portable [✓ Dedicated Bladder Pump] Disposable Baler Sampling Equipment: Horiba U-52

Remarks: ______

Revised 02/23/12

JH Baxter & Co.

JH Baxter WOOD PRESERVING

Groundwater Sampling Field Form

Stella-Jones Corporation

Arlington, WA 98223

(360) 435-2146 FAX (360) 435-3035

Well No. BXS-3

Location Arlington

Date 9-14-15

Location: Landfill - South

Field Personnel/Company W.Krause/C.Baxter

Sample Time (2400 hours)

Instrument Calibration Date

Well Condition Poor Satisfactory New (If poor, explain)

Field Conditions/Weather

Equipment Decontamination **Liquinox and D.I. Water Rinse.**

Casing Diameter:
(Circle One)
[✓ 2"] 4"
6" Other_____

Casing Volume (gallons/ft) for: 2"=0.163; 4"=0.653; 6"=1.47
Multiply Water Column Height by appropriate number above to get proper purge volume.

Depth of Well (feet): 42.5'

Depth to Water (feet): ~~[illegible]~~ 33.4

Water Column (feet): ~~[illegible]~~ 9.1

Casing Volume (gallons): 1.48

Calculated Purge Volume (gallons): 4.4

Actual Purge Volume (gallons): 5.0

Sheen / LNAPL / DNAPL present:

Other remarks:

Time 2400 hrs	Cumulative Volume (gal)	Temp. (°C)	pH	ORP Redox.	Conductivity ms/cm 25°C	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Odor/Color/ Remarks
1657	0	12.25	6.27	-85	.622	0.0	3.15	Purge Start
1700		12.23	6.26	-102	.668	0.8	1.55	
1703		12.25	6.26	-105	.670	0.8	1.44	
1707		12.24	6.26	107	674	0.0	1.33	
1710		Sample						

Purging Equipment: **Portable** **[✓ (Dedicated Bladder Pump)]** **Disposable Baler** Sampling Equipment: **Horiba U-52**

Remarks:

Revised 02/23/12

JH Baxter & Co.

Groundwater Sampling Field Form

Baxter WOOD PRESERVING

Stella-Jones Corporation

Arlington, WA 98223

(360) 435-2146 FAX (360) 435-3035

Well No. BXS-4	Location Arlington	Date 9-14-15
Sample No. Landfill - South	Field Personnel/Company W.Krause/C.Baxter	
Sample Time (2400 hours)	Instrument Calibration Date	

Well Condition Poor [✓ Satisfactory] New (If poor, explain)

Field Conditions/Weather

Equipment Decontamination **Liquinox and D.I. Water Rinse.**

Casing Diameter:
(Circle One)
[✓ 2"] 4"
6" Other_____

Casing Volume (gallons/ft) for: 2"=0.163; 4"=0.653; 6"=1.47
Multiply Water Column Height by appropriate number above to get proper purge volume.

Depth of Well (feet): 47.5'
Depth to Water (feet): 16.4
Water Column (feet):
Casing Volume (gallons): 5.06
Calculated Purge Volume (gallons): 15.2
Actual Purge Volume (gallons): 6.5

Sheen / LNAPL / DNAPL present:
Other remarks:

Time 2400 hrs	Cumulative Volume (gal)	Temp. (°C)	pH	ORP Redox.	Conductivity ms/cm 25°C	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Odor/Color/ Remarks
1735	0	12.72	6.50	14	.197	0.0	5.47	Purge Start
1738		11.12	6.95	-98	.195	0.0	2.18	
1741	2gal	1103	718	-119	.195	0.0	1.62	
1744	3	10.97	7.30	-128	.195	0.0	1.42	
1747		10.93	7.39	-133	.195	0.0	1.29	
1750	5	1086	746	134	.196	0.0	1.17	
1753		1082	749	-135	.196	0.0	1.11	
1756	6.5	1080	7.50	-136	.196	0.0	1.09	
1758		Sample						

rging Equipment: Portable [✓ Dedicated Bladder Pump] Disposable Baler Sampling Equipment: Horiba U-52

Remarks:

Revised 02/23/12

Groundwater Monitoring Wells

Case	Well Number	Water Level	Bottom	Date	Time	Pump
2"	BXN-1	49.63	58.18'	12-7-15	1210	
2"	BXN-2	45.93	57.24'	12-7-15	1235	
2"	BXN-3		58.66'			
2"	BXN-4	44.89	51.74'	12-7-15	1310	
	BXN-5		Dup BXN-1			
	BXN-6		Blank	12-7-15	1335	
2"	**BXS-1***	36.2	49.00'	12-7-15	1142	X
2"	**BXS-2***	34.7	52.00'	12-7-15	1230	X
2"	BXS-3	28.53	42.50'	12-7-15	1321	X
2"	BXS-4	13.66	47.50'	12-7-15	1405	X
	BXS-5		Dup BXS-1			
	BXS-6		Blank			
4"	MW-1 X	23.0	43.00'	12-7-15	1444	
4"	**MW-2***	41.8	47.50'	12-6-15	1328	X
4"	**MW-3***	38.9	49.50'	12-6-15	1201	X
2"	MW-4 X	10.01	40.00'	12-7-15	1447	
2"	HCMW-5		35.00'			X
2"	HCMW-6		51.50'			X
2"	**HCMW-7**	41.09	54.00'	12-7-15	0840	
2"	MW-10		43.00'			
2"	MW-11		38.00'			
4"	MW-12	NAPL	38.00'			
4"	MW-13	NAPL	37.00'			
2"	MW-14	21.67	38.00'	12-7-15	1451	
2"	**MW-15***	36.85	50.00'	12-6-15	1502	X
2"	**MW-16***	38.2	50.00	12-6-15	1533	X
2"	**MW-17***	39.8	55.00'	12-6-15	1430	X
2"	**MW-18***	39.47	55.00'	12-7-15	0806	X
2"	MW-19	NAPL	37.10'			
2"	MW-20	NAPL	34.70'			

JH Baxter & Co.

Baxter WOOD PRESERVING

Groundwater Sampling Field Form

Stella-Jones Corporation
Arlington, WA 98223
(360) 435-2146 FAX (360) 435-3035

Well No. BXS-1
Location Arlington
Date 12/7/15
Location: Landfill - South
Field Personnel/Company W.Krause/C.Baxter
Sample Time (2400 hours)
Instrument Calibration Date
Well Condition Poor [✓ Satisfactory] New (If poor, explain)
Field Conditions/Weather
Equipment Decontamination **Liquinox and D.I. Water Rinse.**

Casing Diameter:
(Circle One)
[✓ 2"] 4"
6" Other_____

Casing Volume (gallons/ft) for: 2"=0.163; 4"=0.653; 6"=1.47
Multiply Water Column Height by appropriate number above to get proper purge volume.

Depth of Well (feet): 49.0'
Depth to Water (feet): 36.2
Water Column (feet):
Casing Volume (gallons):
Calculated Purge Volume (gallons):
Actual Purge Volume (gallons): 3.75

Sheen / LNAPL / DNAPL present:
Other remarks:

Time 2400 hrs	Cumulative Volume (gal)	Temp. (°C)	pH	ORP Redox.	Conductivity ms/cm 25°C	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Odor/Color/ Remarks
11.43	0	11.94	5.76	389	.273	6.9	2.40	Purge Start
11.46		12.32	5.74	383	.281	5.3	1.76	
11.49		12.42	5.76	378	.286	0.0	1.45	
11.52		12.49	5.75	375	.285	0.0	1.26	
11.55		12.40	5.75	377	.286	0.0	1.18	
11.56	Sample							

urging Equipment: Portable [✓ (Dedicated Bladder Pump)] Disposable Baler Sampling Equipment: Horiba U-52

Remarks:

Revised 02/23/12

JH Baxter & Co.

Groundwater Sampling Field Form

Stella-Jones Corporation

Arlington, WA 98223

(360) 435-2146 FAX (360) 435-3035

Well No. BXS-2	Location Arlington	Date 12-7-15
Location: Landfill - South	Field Personnel/Company W.Krause/C.Baxter	
Sample Time (2400 hours)	Instrument Calibration Date	

Well Condition Poor [✓ Satisfactory] New (If poor, explain)

Field Conditions/Weather Rain

Equipment Decontamination **Liquinox and D.I. Water Rinse.**

Casing Diameter: (Circle One) [✓ 2"] 4" 6" Other_____

Casing Volume (gallons/ft) for: 2"=0.163; 4"=0.653; 6"=1.47
Multiply Water Column Height by appropriate number above to get proper purge volume.

Depth of Well (feet): 52.0'

Depth to Water (feet): 34.70

Water Column (feet):

Casing Volume (gallons):

Calculated Purge Volume (gallons):

Actual Purge Volume (gallons): 4.0

Sheen / LNAPL / DNAPL present:

Other remarks:

Time 2400 hrs	Cumulative Volume (gal)	Temp. (°C)	pH	ORP Redox.	Conductivity ms/cm 25°C	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Odor/Color/ Remarks
	0							Purge Start
1230		11.74	5.94	196	.720	0.3	1.71	
1233		11.76	5.93	174	.730	0.0	1.32	
1236		11.70	5.94	164	.731	0.0	1.17	
1239		11.70	5.94	161	.732	0.0	1.11	
1243		11.71	5.94	159	.732	0.0	1.07	
1243	Sample							

Purging Equipment: **Portable** **(Dedicated Bladder Pump)** **Disposable Baler** Sampling Equipment: **Horiba U-52**

Remarks:

Revised 02/23/12

JH Baxter & Co.

Groundwater Sampling Field Form

Stella-Jones Corporation

Arlington, WA 98223

(360) 435-2146 FAX (360) 435-3035

Well No. BXS-3	Location Arlington	Date 12-7-15
Location: Landfill - South	Field Personnel/Company W.Krause/C.Baxter	
Sample Time (2400 hours)	Instrument Calibration Date	

Well Condition Poor [✓ Satisfactory] New (If poor, explain)

Field Conditions/Weather

Equipment Decontamination **Liquinox and D.I. Water Rinse.**

Casing Diameter: (Circle One) [✓ 2"] 4" 6" Other____

Casing Volume (gallons/ft) for: 2"=0.163; 4"=0.653; 6"=1.47
Multiply Water Column Height by appropriate number above to get proper purge volume.

Depth of Well (feet): 42.5'
Depth to Water (feet): 28.53
Water Column (feet):
Casing Volume (gallons):
Calculated Purge Volume (gallons):
Actual Purge Volume (gallons):

Sheen / LNAPL / DNAPL present:
Other remarks:

Time 2400 hrs	Cumulative Volume (gal)	Temp. (°C)	pH	ORP Redox.	Conductivity ms/cm 25°C	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Odor/Color/ Remarks
	0	11.85						Purge Start
1321		11.85	6.02	-32	.699	0.7	1.56	
1324		11.97	6.03	-93	.663	3.4	1.27	
1326		11.98	6.01	-106	.677	1.9	1.14	
1329		11.99	6.04	-115	.676	4.2	1.09	
1332		11.96	6.04	-112	[illegible]	[illegible]	1.04	
1333		Sample						

Purging Equipment: Portable (Dedicated Bladder Pump) Disposable Baler Sampling Equipment: Horiba U-52

Remarks:

Revised 02/23/12

JH Baxter & Co.

Groundwater Sampling Field Form

Stella-Jones Corporation
Arlington, WA 98223
(360) 435-2146 FAX (360) 435-3035

Well No. BXS-4	Location Arlington	Date 12-7-15
Sample No. Landfill - South	Field Personnel/Company W.Krause/C.Baxter	
Sample Time (2400 hours)	Instrument Calibration Date	

Well Condition Poor ; Satisfactory New (If poor, explain)

Field Conditions/Weather

Equipment Decontamination **Liquinox and D.I. Water Rinse.**

Casing Diameter:
(Circle One)
(2") 4"
6" Other_____

Casing Volume (gallons/ft) for: 2"=0.163; 4"=0.653; 6"=1.47
Multiply Water Column Height by appropriate number above to get proper purge volume.

Depth of Well (feet): 47.5'
Depth to Water (feet): 13.66
Water Column (feet):
Casing Volume (gallons):
Calculated Purge Volume (gallons):
Actual Purge Volume (gallons):

Sheen / LNAPL / DNAPL present:
Other remarks:

Time 2400 hrs	Cumulative Volume (gal)	Temp. (°C)	pH	ORP Redox.	Conductivity ms/cm 25°C	Turbidity (NTU)	Dissolved Oxygen (mg/L)	Odor/Color/ Remarks
	0							Purge Start
1405		10.94	6.42	-22	.187	4.6	3.19	
1408		10.84	6.88	-129	.187	0.0	1.53	
1411		10.80	7.01	-141	.186	0.0	1.35	
1415		10.79	7.06	-143	.187	0.0	1.[illegible]	
1416	Sample							

Purging Equipment: **Portable** **(Dedicated Bladder Pump)** **Disposable Baler** Sampling Equipment: **Horiba U-52**

Remarks:

Revised 02/23/12

Appendix B

Appendix B

(provided on CD only)

Appendix C

Appendix C

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

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

Student T-Test Formula:

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

Critical Statistic: $t_c = 2.447$

BXS-4 (Upgradient Well)				
Date	**Ammonia Concentration^1**	**Number of Samples (n)**	**Average Concentration (m_0)**	**Sample Variance (s^1)**
3/17/2014	0.547	--	--	--
6/2/2014	0.576	--	--	--
9/29/2014	0.522	--	--	--
11/17/2014	0.55	4	0.55	0.00049
2/23/2015	0.54	4	0.55	0.00053
9/14/2015	0.54	4	0.54	0.00011
12/7/2015	0.51	4	0.53	0.00028

BXS-3 (Downgradient Well)						
Date	**Ammonia Concentration^1**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student T-Test Statistic (t)^2**
3/17/2014	1.21	--	--	--	--	--
6/2/2014	0.906	--	--	--	--	--
9/29/2014	1.24	--	--	--	--	--
11/17/2014	1.08	4	1.11	0.023	0.15	**7.30**
2/23/2015	1.05	4	1.07	0.019	0.14	**7.55**
9/14/2015	1.00	4	1.09	0.011	0.10	**10.51**
12/7/2015	1.00	4	1.03	0.002	0.04	**21.90**

BXS-2 (Downgradient Well)						
Date	**Ammonia Concentration^1**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student T-Test Statistic (t)^2**
3/17/2014	0.05	--	--	--	--	--
6/2/2014	0.05	--	--	--	--	--
9/29/2014	0.05	--	--	--	--	--
11/17/2014	0.05	4	0.05	0.000	0.00	-45.16
2/23/2015	0.05	4	0.05	0.000	0.00	-44.89
9/14/2015	0.05	4	0.05	0.000	0.00	-43.96
12/7/2015	0.05	4	0.05	0.000	0.00	-43.64

12.8

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

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

BXS-1 (Downgradient Well)						
Date	Ammonia Concentration[1]	Number of Samples (n)	Average Concentration ($\bar{x}$)	Sample Variance (s^2)	Sample Standard Deviation (s)	Student T-Test Statistic (t)[2]
3/17/2014	0.05	--	--	--	--	--
6/2/2014	0.05	--	--	--	--	--
9/29/2014	0.05	--	--	--	--	--
11/17/2014	0.05	4	0.05	0.000	0.00	-45.16
2/23/2015	0.05	4	0.05	0.000	0.00	-44.89
9/14/2015	0.041	4	0.05	0.000	0.00	-43.27
12/7/2015	0.05	4	0.05	0.000	0.00	-42.96

Notes

$\bar{x}$ = average concentration for downgradient well.

m_0 = 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 T-Test statistic.

-- = analysis not applicable.

* = statistic with no/zero difference.

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

[2] Statistic in **bold** or *gray* is a statistically valid detection (according to the Student T-Test).

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

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Student T-Test Formula:

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

Critical Statistic: $t_c = 2.447$

BXS-4 (Upgradient Well)				
Date	**Chloride Concentration^1**	**Number of Samples (n)**	**Average Concentration (m_0)**	**Sample Variance (s^1)**
3/17/2014	1.81	--	--	--
6/2/2014	1.64	--	--	--
9/29/2014	1.62	--	--	--
11/17/2014	2.02	4	1.77	0.03449
2/23/2015	1.58	4	1.72	0.04197
9/14/2015	1.93	4	1.79	0.04849
12/7/2015	1.66	4	1.80	0.04442

BXS-3 (Downgradient Well)						
Date	**Chloride Concentration^1**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student T-Test Statistic (t)^2**
3/17/2014	2.20	--	--	--	--	--
6/2/2014	1.73	--	--	--	--	--
9/29/2014	1.71	--	--	--	--	--
11/17/2014	1.76	4	1.85	0.055	0.23	0.52
2/23/2015	1.38	4	1.65	0.032	0.18	-0.54
9/14/2015	1.87	4	1.68	0.044	0.21	-0.77
12/7/2015	1.54	4	1.64	0.048	0.22	-1.11

BXS-2 (Downgradient Well)						
Date	**Chloride Concentration^1**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student T-Test Statistic (t)^2**
3/17/2014	2.90	--	--	--	--	--
6/2/2014	2.74	--	--	--	--	--
9/29/2014	2.57	--	--	--	--	--
11/17/2014	3.16	4	2.84	0.063	0.25	**6.86**
2/23/2015	2.32	4	2.70	0.125	0.35	**4.92**
9/14/2015	2.54	4	2.65	0.129	0.36	**4.25**
12/7/2015	2.06	4	2.52	0.221	0.47	**2.86**

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

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

BXS-1 (Downgradient Well)						
Date	Chloride Concentration[1]	Number of Samples (n)	Average Concentration (x̄)	Sample Variance (s^2)	Sample Standard Deviation (s)	Student T-Test Statistic (t)[2]
3/17/2014	5.97	--	--	--	--	--
6/2/2014	5.23	--	--	--	--	--
9/29/2014	4.44	--	--	--	--	--
11/17/2014	5.04	4	5.17	0.398	0.63	**10.33**
2/23/2015	4.56	4	4.82	0.143	0.38	**14.74**
9/14/2015	5.41	4	4.86	0.200	0.45	**12.69**
12/7/2015	4.58	4	4.90	0.166	0.41	**13.85**

Notes

x̄ = average concentration for downgradient well.

m_0 = 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 T-Test statistic.

-- = analysis not applicable.

* = statistic with no/zero difference.

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

[2] Statistic in **bold** or *gray* is a statistically valid detection (according to the Student T-Test).

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

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

Student T-Test Formula: $$\frac{\bar{x} - m_0}{\sqrt{[(s^1/n) + (s^2/n)]}}$$ Critical Statistic: $t_c = 2.447$

BXS-4 (Upgradient Well)				
Date	**TOC Concentration^1**	**Number of Samples (n)**	**Average Concentration (m_0)**	**Sample Variance (s^1)**
3/17/2014	0.84	--	--	--
6/2/2014	0.50	--	--	--
9/29/2014	0.78	--	--	--
11/17/2014	0.78	4	0.73	0.02330
2/23/2015	0.81	4	0.72	0.02123
9/14/2015	1.00	4	0.84	0.01123
12/7/2015	0.94	4	0.88	0.01096

BXS-3 (Downgradient Well)						
Date	**TOC Concentration^1**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student T-Test Statistic $(t)^2$**
3/17/2014	20.40	--	--	--	--	--
6/2/2014	19.80	--	--	--	--	--
9/29/2014	19.50	--	--	--	--	--
11/17/2014	18.00	4	19.43	1.043	1.02	**36.23**
2/23/2015	19.00	4	19.08	0.623	0.79	**45.69**
9/14/2015	21.50	4	19.50	2.167	1.47	**25.22**
12/7/2015	17.10	4	18.90	3.607	1.90	**18.91**

BXS-2 (Downgradient Well)						
Date	**TOC Concentration^1**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student T-Test Statistic $(t)^2$**
3/17/2014	13.30	--	--	--	--	--
6/2/2014	14.60	--	--	--	--	--
9/29/2014	14.00	--	--	--	--	--
11/17/2014	13.80	4	13.93	0.289	0.54	**47.23**
2/23/2015	14.50	4	14.23	0.149	0.39	**65.05**
9/14/2015	12.80	4	13.78	0.509	0.71	**35.45**
12/7/2015	12.80	4	13.48	0.689	0.83	**29.84**

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

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

BXS-1 (Downgradient Well)						
Date	**TOC Concentration[1]**	**Number of Samples (n)**	**Average Concentration (x̄)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student T-Test Statistic (t)[2]**
3/17/2014	2.29	--	--	--	--	--
6/2/2014	2.34	--	--	--	--	--
9/29/2014	2.25	--	--	--	--	--
11/17/2014	2.45	4	2.33	0.007	0.09	**18.32**
2/23/2015	2.47	4	2.38	0.010	0.10	**18.06**
9/14/2015	2.45	4	2.41	0.011	0.10	**16.93**
12/7/2015	3.00	4	2.59	0.074	0.27	**10.97**

Notes

x̄ = average concentration for downgradient well.

m_0 = 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 T-Test statistic.

-- = analysis not applicable.

* = statistic with no/zero difference.

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

[2] Statistic in **bold** or *gray* is a statistically valid detection (according to the Student T-Test).

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

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

Student T-Test Formula: $$\frac{\bar{x} - m_0}{\sqrt{[\,(s^1/n) + (s^2/n)\,]}}$$ Critical Statistic: $t_c = 2.447$

BXS-4 (Upgradient Well)

Date	COD Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
3/17/2014	2.5	--	--	--
6/2/2014	2.5	--	--	--
9/29/2014	2.5	--	--	--
11/17/2014	2.5	4	2.50	0.00000
2/23/2015	2.5	4	2.50	0.00000
9/14/2015	2.5	4	2.50	0.00000
12/7/2015	2.5	4	2.50	0.00000

BXS-3 (Downgradient Well)

Date	COD Concentration[1]	Number of Samples (n)	Average Concentration ($\bar{x}$)	Sample Variance (s^2)	Sample Standard Deviation (s)	Student T-Test Statistic (t)[2]
3/17/2014	72.9	--	--	--	--	--
6/2/2014	70.5	--	--	--	--	--
9/29/2014	68.2	--	--	--	--	--
11/17/2014	65.2	4	69.20	10.793	3.29	**40.60**
2/23/2015	69.3	4	68.30	5.153	2.27	**57.97**
9/14/2015	81.9	4	71.15	54.363	7.37	**18.62**
12/7/2015	72.6	4	72.25	50.550	7.11	**19.62**

BXS-2 (Downgradient Well)

Date	COD Concentration[1]	Number of Samples (n)	Average Concentration ($\bar{x}$)	Sample Variance (s^2)	Sample Standard Deviation (s)	Student T-Test Statistic (t)[2]
3/17/2014	38.5	--	--	--	--	--
6/2/2014	39.8	--	--	--	--	--
9/29/2014	38.5	--	--	--	--	--
11/17/2014	33.9	4	37.68	6.709	2.59	**27.16**
2/23/2015	36.9	4	37.28	6.469	2.54	**27.34**
9/14/2015	39.6	4	37.23	6.143	2.48	**28.02**
12/7/2015	38.2	4	37.15	5.910	2.43	**28.51**

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

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

BXS-1 (Downgradient Well)						
Date	COD Concentration[1]	Number of Samples (n)	Average Concentration ($\bar{x}$)	Sample Variance (s^2)	Sample Standard Deviation (s)	Student T-Test Statistic (t)[2]
3/17/2014	6.7	--	--	--	--	--
6/2/2014	7.1	--	--	--	--	--
9/29/2014	6.3	--	--	--	--	--
11/17/2014	5.6	4	6.43	0.409	0.64	**12.27**
2/23/2015	6.8	4	6.45	0.430	0.66	**12.05**
9/14/2015	8.2	4	6.73	1.209	1.10	**7.68**
12/7/2015	7.3	4	6.98	1.176	1.08	**8.25**

Notes

$\bar{x}$ = average concentration for downgradient well.

m_0 = 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 T-Test statistic.

-- = analysis not applicable.

* = statistic with no/zero difference.

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

[2] Statistic in **bold** or *gray* is a statistically valid detection (according to the Student T-Test).

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

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

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

Critical Statistic: $t_c = 2.447$

BXS-4 (Upgradient Well)				
Date	**Conductivity Concentration[1]**	**Number of Samples (n)**	**Average Concentration (m_0)**	**Sample Variance (s^1)**
3/17/2014	170	--	--	--
6/2/2014	192	--	--	--
9/29/2014	192	--	--	--
11/17/2014	190	4	186.00	114.67
2/23/2015	209	4	195.75	78.92
9/14/2015	204	4	198.75	84.92
12/7/2015	204	4	201.75	66.92

BXS-3 (Downgradient Well)						
Date	**Conductivity Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student T-Test Statistic (t)[2]**
3/17/2014	408	--	--	--	--	--
6/2/2014	4,790	--	--	--	--	--
9/29/2014	396	--	--	--	--	--
11/17/2014	406	4	1,500.00	4,810,738.67	2,193.34	1.20
2/23/2015	430	4	1,505.50	4,794,843.67	2,189.71	1.20
9/14/2015	348	4	395.00	1,185.33	34.43	**10.89**
12/7/2015	396	4	395.00	1,185.33	34.43	**10.72**

BXS-2 (Downgradient Well)						
Date	**Conductivity Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student T-Test Statistic (t)[2]**
3/17/2014	774	--	--	--	--	--
6/2/2014	861	--	--	--	--	--
9/29/2014	840	--	--	--	--	--
11/17/2014	819	4	823.50	1,383.00	37.19	**32.95**
2/23/2015	876	4	849.00	618.00	24.86	**48.27**
9/14/2015	807	4	835.50	915.00	30.25	**39.69**
12/7/2015	784	4	821.50	1,531.00	39.13	**30.55**

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

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

BXS-1 (Downgradient Well)						
Date	Conductivity Concentration^1	Number of Samples (n)	Average Concentration $(\bar{x})$	Sample Variance (s^2)	Sample Standard Deviation (s)	Student T-Test Statistic $(t)^2$
3/17/2014	314	--	--	--	--	--
6/2/2014	290	--	--	--	--	--
9/29/2014	281	--	--	--	--	--
11/17/2014	281	4	291.50	243.00	15.59	**11.16**
2/23/2015	292	4	286.00	34.00	5.83	**14.80**
9/14/2015	283	4	284.25	27.58	5.25	**14.34**
12/7/2015	312	4	292.00	200.67	14.17	**10.16**

Notes

$\bar{x}$ = average concentration for downgradient well.

m_0 = 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 T-Test statistic.

-- = analysis not applicable.

* = statistic with no/zero difference.

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

[2] Statistic in **bold** or *gray* is a statistically valid detection (according to the Student T-Test).

Table C-5. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Total Coliform

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Student T-Test Formula: $$\frac{\bar{x} - m_0}{\sqrt{[\,(s^1/n) + (s^2/n)\,]}}$$ Critical Statistic: $t_c = 2.447$

BXS-4 (Upgradient Well)

Date	Total Coliforms Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
3/17/2014	0.5	--	--	--
6/2/2014	0.5	--	--	--
9/29/2014	0.5	--	--	--
11/17/2014	0.5	4	0.50	0.00000
2/23/2015	0.5	4	0.50	0.00000
9/14/2015	0.5	4	0.50	0.00000
12/7/2015	0.5	4	0.50	0.00000

BXS-3 (Downgradient Well)

Date	Total Coliforms Concentration[1]	Number of Samples (n)	Average Concentration $(\bar{x})$	Sample Variance (s^2)	Sample Standard Deviation (s)	Student T-Test Statistic (t)[2]
3/17/2014	0.5	--	--	--	--	--
6/2/2014	0.5	--	--	--	--	--
9/29/2014	0.5	--	--	--	--	--
11/17/2014	0.5	4	0.50	0.00000	0.00	*
2/23/2015	0.5	4	0.50	0.000	0.00	*
9/14/2015	0.5	4	0.50	0.000	0.00	*
12/7/2015	0.5	4	0.50	0.000	0.00	*

BXS-2 (Downgradient Well)

Date	Total Coliforms Concentration[1]	Number of Samples (n)	Average Concentration $(\bar{x})$	Sample Variance (s^2)	Sample Standard Deviation (s)	Student T-Test Statistic (t)[2]
3/17/2014	0.5	--	--	--	--	--
6/2/2014	0.5	--	--	--	--	--
9/29/2014	0.5	--	--	--	--	--
11/17/2014	0.5	4	0.50	0.00000	0.00	*
2/23/2015	0.5	4	0.50	0.000	0.00	*
9/14/2015	0.5	4	0.50	0.000	0.00	*
12/7/2015	0.5	4	0.50	0.000	0.00	*

Table C-5. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Total Coliform

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

BXS-1 (Downgradient Well)						
Date	Total Coliforms Concentration[1]	Number of Samples (n)	Average Concentration ($\bar{x}$)	Sample Variance (s^2)	Sample Standard Deviation (s)	Student T-Test Statistic $(t)^2$
3/17/2014	0.5	--	--	--	--	--
6/2/2014	0.5	--	--	--	--	--
9/29/2014	0.5	--	--	--	--	--
11/17/2014	4.1	4	1.40	3.240	1.80	1.00
2/23/2015	0.5	4	1.40	3.240	1.80	1.00
9/14/2015	3.1	4	2.05	3.370	1.84	1.69
12/7/2015	2.0	4	2.43	2.383	1.54	**2.49**

Notes

$\bar{x}$ = average concentration for downgradient well.

m_0 = average concentration for upgradient well.

n = number of samples.

NT = not tested.

s^1 = sample variance in upgradient well.

s^2 = sample variance in downgradient well.

s = sample standard deviation.

t = Student T-Test statistic.

-- = analysis not applicable.

* = statistic with no/zero difference.

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

[2] Statistic in **bold** or *gray* is a statistically valid detection (according to the Student T-Test).

Table C-7. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Nitrate + Nitrite as Nitrogen

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

Student T-Test Formula: $$\frac{\bar{x} - m_0}{\sqrt{\left[(s^1/n) + (s^2/n) \right]}}$$

Critical Statistic: $t_c = 2.447$

BXS-4 (Upgradient Well)				
Date	Nitrate, Nitrite as N Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
3/17/2014	0.025	--	--	--
6/2/2014	0.025	--	--	--
9/29/2014	0.025	--	--	--
11/17/2014	0.025	4	0.03	0.00000
2/23/2015	0.025	4	0.03	0.00000
9/14/2015	0.025	4	0.03	0.00000
12/7/2015	0.025	4	0.03	0.00000

BXS-3 (Downgradient Well)						
Date	Nitrate, Nitrite as N Concentration[1]	Number of Samples (n)	Average Concentration ($\bar{x}$)	Sample Variance (s^2)	Sample Standard Deviation (s)	Student T-Test Statistic (t)[2]
3/17/2014	0.181	--	--	--	--	--
6/2/2014	0.025	--	--	--	--	--
9/29/2014	0.025	--	--	--	--	--
11/17/2014	0.025	4	0.06	0.006	0.08	1.00
2/23/2015	0.025	4	0.03	0.000	0.00	*
9/14/2015	0.026	4	0.03	0.000	0.00	1.00
12/7/2015	0.025	4	0.03	0.000	0.00	1.00

BXS-2 (Downgradient Well)						
Date	Nitrate, Nitrite as N Concentration[1]	Number of Samples (n)	Average Concentration ($\bar{x}$)	Sample Variance (s^2)	Sample Standard Deviation (s)	Student T-Test Statistic (t)[2]
3/17/2014	0.025	--	--	--	--	--
6/2/2014	0.025	--	--	--	--	--
9/29/2014	0.025	--	--	--	--	--
11/17/2014	0.025	4	0.03	0.000	0.00	*
2/23/2015	0.025	4	0.03	0.000	0.00	*
9/14/2015	0.025	4	0.03	0.000	0.00	*
12/7/2015	0.025	4	0.03	0.000	0.00	*

Table C-7. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Nitrate + Nitrite as Nitrogen

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

BXS-1 (Downgradient Well)						
Date	Nitrate, Nitrite as N Concentration[1]	Number of Samples (n)	Average Concentration (x̄)	Sample Variance (s^2)	Sample Standard Deviation (s)	Student T-Test Statistic (t)[2]
3/17/2014	0.133	--	--	--	--	--
6/2/2014	0.140	--	--	--	--	--
9/29/2014	0.025	--	--	--	--	--
11/17/2014	0.025	4	0.08	0.004	0.06	1.73
2/23/2015	0.070	4	0.07	0.003	0.05	1.47
9/14/2015	0.155	4	0.07	0.004	0.06	1.43
12/7/2015	0.368	4	0.15	0.023	0.15	1.70

Notes

x̄ = average concentration for downgradient well.

m_0 = average concentration for upgradient well.

n = number of samples.

NO_2 = nitrite.

NO_3 = nitrate.

s^1 = sample variance in upgradient well.

s^2 = sample variance in downgradient well.

s = sample standard deviation.

t = Student T-Test statistic.

-- = analysis not applicable.

* = statistic with no/zero difference.

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

[2] Statistic in **bold** or *gray* is a statistically valid detection (according to the Student T-Test).

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

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Student T-Test Formula: $$\frac{\bar{x} - m_0}{\sqrt{[\,(s^1/n) + (s^2/n)\,]}}$$ Critical Statistic: $t_c = 2.447$

BXS-4 (Upgradient Well)				
Date	Field pH Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
3/17/2014	5.92	--	--	--
6/2/2014	7.47	--	--	--
9/29/2014	7.69	--	--	--
11/17/2014	7.48	4	7.14	0.67180
2/23/2015	7.28	4	7.48	0.02807
9/14/2015	7.50	4	7.49	0.02809
12/7/2015	7.06	4	7.33	0.04227

BXS-3 (Downgradient Well)						
Date	Field pH Concentration[1]	Number of Samples (n)	Average Concentration $(\bar{x})$	Sample Variance (s^2)	Sample Standard Deviation (s)	Student T-Test Statistic (t)[2]
3/17/2014	6.28	--	--	--	--	--
6/2/2014	5.72	--	--	--	--	--
9/29/2014	6.25	--	--	--	--	--
11/17/2014	5.99	4	6.06	0.068	0.26	-2.51
2/23/2015	5.84	4	5.95	0.052	0.23	-3.60
9/14/2015	6.26	4	6.09	0.042	0.21	-3.32
12/7/2015	6.04	4	6.03	0.030	0.17	-3.10

BXS-2 (Downgradient Well)						
Date	Field pH Concentration[1]	Number of Samples (n)	Average Concentration $(\bar{x})$	Sample Variance (s^2)	Sample Standard Deviation (s)	Student T-Test Statistic (t)[2]
3/17/2014	6.16	--	--	--	--	--
6/2/2014	5.79	--	--	--	--	--
9/29/2014	6.15	--	--	--	--	--
11/17/2014	5.88	4	6.00	0.036	0.19	-2.72
2/23/2015	5.78	4	5.90	0.030	0.17	-3.77
9/14/2015	6.24	4	6.01	0.047	0.22	-3.48
12/7/2015	5.94	4	5.96	0.039	0.20	-3.25

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

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

BXS-1 (Downgradient Well)						
Date	**Field pH Concentration**[1]	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student T-Test Statistic (t)**[2]
3/17/2014	6.06	--	--	--	--	--
6/2/2014	5.64	--	--	--	--	--
9/29/2014	5.99	--	--	--	--	--
11/17/2014	5.69	4	5.85	0.044	0.21	-3.06
2/23/2015	5.86	4	5.80	0.026	0.16	-4.03
9/14/2015	6.02	4	5.89	0.023	0.15	-3.83
12/7/2015	5.28	4	5.71	0.101	0.32	-3.68

Notes

$\bar{x}$ = average concentration for downgradient well.

m_0 = 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 T-Test statistic.

-- = analysis not applicable.

* = statistic with no/zero difference.

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

[2] Statistic in **bold** or *gray* is a statistically valid detection (according to the Student T-Test).

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

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

Student T-Test Formula:

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

Critical Statistic: $t_c = 2.447$

BXS-4 (Upgradient Well)				
Date	**TDS Concentration**[1]	**Number of Samples (n)**	**Average Concentration (m_0)**	**Sample Variance (s^1)**
12/2/2013	132	--	--	--
3/17/2014	137	--	--	--
6/2/2014	NT	--	--	--
9/29/2014	131	--	--	--
11/17/2014	NT	--	--	--
2/23/2015	122	4	130.50	39.00
9/14/2015	111	4	125.25	128.25
12/7/2015	112	4	119.00	88.67

BXS-3 (Downgradient Well)						
Date	**TDS Concentration**[1]	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student T-Test Statistic (t)**[2]
12/2/2013	356	--	--	--	--	--
3/17/2014	332	--	--	--	--	--
6/2/2014	NT	--	--	--	--	--
9/29/2014	312	--	--	--	--	--
11/17/2014	NT	--	--	--	--	--
2/23/2015	325	4	331.25	340.92	18.46	**21.14**
9/14/2015	267	4	309	852.67	29.20	**12.31**
12/7/2015	285	4	297.25	684.25	26.16	**12.79**

BXS-2 (Downgradient Well)						
Date	**TDS Concentration**[1]	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student T-Test Statistic (t)**[2]
12/2/2013	530	--	--	--	--	--
3/17/2014	504	--	--	--	--	--
6/2/2014	NT	--	--	--	--	--
9/29/2014	513	--	--	--	--	--
11/17/2014	NT	--	--	--	--	--
2/23/2015	479	4	506.5	452.33	21.27	**34.40**
9/14/2015	430	4	481.5	1385.67	37.22	**18.88**
12/7/2015	424	4	461.50	1785.67	42.26	**15.74**

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

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

BXS-1 (Downgradient Well)						
Date	TDS Concentration[1]	Number of Samples (n)	Average Concentration (x̄)	Sample Variance (s^2)	Sample Standard Deviation (s)	Student T-Test Statistic (t)[2]
12/2/2013	223	--	--	--	--	--
3/17/2014	176	--	--	--	--	--
6/2/2014	NT	--	--	--	--	--
9/29/2014	169	--	--	--	--	--
11/17/2014	NT	--	--	--	--	--
2/23/2015	156	4	181	852.67	29.20	**3.73**
9/14/2015	140	4	160.25	250.92	15.84	**4.11**
12/7/2015	146	4	152.75	160.92	12.69	**3.89**

Notes

x̄ = average concentration for downgradient well.

m_0 = average concentration for upgradient well.

n = number of samples.

NT = not tested.

s^1 = sample variance in upgradient well.

s^2 = sample variance in downgradient well.

s = sample standard deviation.

t = Student T-Test statistic.

-- = analysis not applicable.

* = statistic with no/zero difference.

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

[2] Statistic in **bold** or *gray* is a statistically valid detection (according to the Student T-Test).

[3] The four concentrations used for the 2/23/2015 analysis include concentrations from 12/23/2013, 3/17/2014, and 9/29/201

4.

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

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

Student T-Test Formula:

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

Critical Statistic: $t_c = 2.447$

BXS-4 (Upgradient Well)				
Date	Sulfate Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
3/17/2014	0.97	--	--	--
6/2/2014	0.86	--	--	--
9/29/2014	0.83	--	--	--
11/17/2014	1.56	4	1.06	0.11697
2/23/2015	0.81	4	1.02	0.13243
9/14/2015	1.20	4	1.10	0.12620
12/7/2015	1.09	4	1.17	0.09630

BXS-3 (Downgradient Well)						
Date	Sulfate Concentration[1]	Number of Samples (n)	Average Concentration ($\bar{x}$)	Sample Variance (s^2)	Sample Standard Deviation (s)	Student T-Test Statistic (t)[2]
3/17/2014	1.00	--	--	--	--	--
6/2/2014	0.20	--	--	--	--	--
9/29/2014	0.10	--	--	--	--	--
11/17/2014	0.18	4	0.37	0.178	0.42	-2.52
2/23/2015	0.22	4	0.18	0.003	0.05	-4.86
9/14/2015	0.39	4	0.22	0.015	0.12	-4.83
12/7/2015	0.18	4	0.24	0.010	0.10	-5.18

BXS-2 (Downgradient Well)						
Date	Sulfate Concentration[1]	Number of Samples (n)	Average Concentration ($\bar{x}$)	Sample Variance (s^2)	Sample Standard Deviation (s)	Student T-Test Statistic (t)[2]
3/17/2014	0.29	--	--	--	--	--
6/2/2014	0.14	--	--	--	--	--
9/29/2014	0.23	--	--	--	--	--
11/17/2014	0.33	4	0.25	0.007	0.08	-4.59
2/23/2015	0.34	4	0.26	0.009	0.09	-4.26
9/14/2015	0.46	4	0.34	0.009	0.09	-4.28
12/7/2015	0.27	4	0.35	0.006	0.08	-4.64

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

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

BXS-1 (Downgradient Well)						
Date	**Sulfate Concentration**[1]	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student T-Test Statistic (t)**[2]
3/17/2014	12.70	--	--	--	--	--
6/2/2014	10.10	--	--	--	--	--
9/29/2014	7.22	--	--	--	--	--
11/17/2014	8.42	4	9.61	5.639	2.37	**7.13**
2/23/2015	7.74	4	8.37	1.572	1.25	**11.32**
9/14/2015	9.66	4	8.26	1.113	1.05	**12.91**
12/7/2015	10.70	4	9.13	1.727	1.31	**11.73**

Notes

$\bar{x}$ = average concentration for downgradient well.

m_0 = 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 T-Test statistic.

-- = analysis not applicable.

* = statistic with no/zero difference.

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

[2] Statistic in **bold** or *gray* is a statistically valid detection (according to the Student T-Test).

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

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

Student T-Test Formula:

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

Critical Statistic: $t_c = 2.447$

BXS-4 (Upgradient Well)				
Date	Tanin and Lignin Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
3/17/2014	0.23	--	--	--
6/2/2014	0.28	--	--	--
9/29/2014	0.30	--	--	--
11/17/2014	0.29	4	0.28	0.00097
2/23/2015	0.31	4	0.30	0.00017
9/14/2015	0.22	4	0.28	0.00167
12/7/2015	0.34	4	0.29	0.00260

BXS-3 (Downgradient Well)						
Date	Tanin and Lignin Concentration[1]	Number of Samples (n)	Average Concentration ($\bar{x}$)	Sample Variance (s^2)	Sample Standard Deviation (s)	Student T-Test Statistic (t)[2]
3/17/2014	29.00	--	--	--	--	--
6/2/2014	20.80	--	--	--	--	--
9/29/2014	22.60	--	--	--	--	--
11/17/2014	20.50	4	23.23	15.682	3.96	**11.59**
2/23/2015	23.00	4	21.73	1.583	1.26	**34.06**
9/14/2015	4.49	4	17.65	78.144	8.84	**3.93**
12/7/2015	1.13	4	12.28	122.498	11.07	2.17

BXS-2 (Downgradient Well)						
Date	Tanin and Lignin Concentration[1]	Number of Samples (n)	Average Concentration ($\bar{x}$)	Sample Variance (s^2)	Sample Standard Deviation (s)	Student T-Test Statistic (t)[2]
3/17/2014	1.52	--	--	--	--	--
6/2/2014	1.27	--	--	--	--	--
9/29/2014	0.92	--	--	--	--	--
11/17/2014	1.37	4	1.27	0.065	0.25	**7.75**
2/23/2015	1.33	4	1.22	0.042	0.21	**8.91**
9/14/2015	1.34	4	1.24	0.046	0.21	**8.88**
12/7/2015	1.23	4	1.32	0.004	0.06	**30.11**

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

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

BXS-1 (Downgradient Well)						
Date	**Tanin and Lignin Concentration**[1]	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student T-Test Statistic (t)**[2]
3/17/2014	0.03	--	--	--	--	--
6/2/2014	0.20	--	--	--	--	--
9/29/2014	0.10	--	--	--	--	--
11/17/2014	0.11	4	0.11	0.005	0.07	-4.32
2/23/2015	0.15	4	0.14	0.002	0.05	-5.63
9/14/2015	0.09	4	0.11	0.001	0.03	-8.23
12/7/2015	0.14	4	0.12	0.001	0.03	-8.07

Notes

$\bar{x}$ = average concentration for downgradient well.

m_0 = 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 T-Test statistic.

-- = analysis not applicable.

* = statistic with no/zero difference.

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

[2] Statistic in **bold** or *gray* is a statistically valid detection (according to the Student T-Test).

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

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

Student T-Test Formula:

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

Critical Statistic: $t_c = 2.447$

BXS-4 (Upgradient Well)				
Date	**Arsenic Concentration[1]**	**Number of Samples (n)**	**Average Concentration (m_0)**	**Sample Variance (s^1)**
3/17/2014	6.00	--	--	--
6/2/2014	6.00	--	--	--
9/29/2014	5.86	--	--	--
11/17/2014	5.70	4	5.89	0.02040
2/23/2015	5.90	4	5.87	0.01557
9/14/2015	5.90	4	5.84	0.00907
12/7/2015	6.32	4	5.96	0.06810

BXS-3 (Downgradient Well)						
Date	**Arsenic Concentration[1]**	**Number of Samples (n)**	**Average Concentration $(\bar{x})$**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student T-Test Statistic (t)[2]**
3/17/2014	175.00	--	--	--	--	--
6/2/2014	157.00	--	--	--	--	--
9/29/2014	191.00	--	--	--	--	--
11/17/2014	174.00	4	174.25	192.917	13.89	**24.24**
2/23/2015	163.00	4	171.25	222.917	14.93	**22.15**
9/14/2015	185.00	4	178.25	152.917	12.37	**27.88**
12/7/2015	174.00	4	174.00	80.667	8.98	**37.42**

BXS-2 (Downgradient Well)						
Date	**Arsenic Concentration[1]**	**Number of Samples (n)**	**Average Concentration $(\bar{x})$**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student T-Test Statistic (t)[2]**
3/17/2014	0.78	--	--	--	--	--
6/2/2014	0.70	--	--	--	--	--
9/29/2014	0.69	--	--	--	--	--
11/17/2014	0.70	4	0.72	0.002	0.04	-69.50
2/23/2015	0.70	4	0.70	0.000	0.01	-72.32
9/14/2015	0.60	4	0.67	0.002	0.05	-68.51
12/7/2015	0.76	4	0.69	0.004	0.07	-66.87

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

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

BXS-1 (Downgradient Well)						
Date	Arsenic Concentration[1]	Number of Samples (n)	Average Concentration ($\bar{x}$)	Sample Variance (s^2)	Sample Standard Deviation (s)	Student T-Test Statistic (t)[2]
3/17/2014	0.50	--	--	--	--	--
6/2/2014	0.20	--	--	--	--	--
9/29/2014	0.25	--	--	--	--	--
11/17/2014	0.30	4	0.31	0.017	0.13	-57.46
2/23/2015	0.20	4	0.24	0.002	0.05	-74.72
9/14/2015	0.50	4	0.31	0.017	0.13	-56.94
12/7/2015	0.26	4	0.32	0.017	0.13	-58.41

Notes

$\bar{x}$ = average concentration for downgradient well.

m_0 = 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 T-Test statistic.

-- = analysis not applicable.

* = statistic with no/zero difference.

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

[2] Statistic in **bold** or *gray* is a statistically valid detection (according to the Student T-Test).

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

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Student T-Test Formula: $$\frac{\bar{x} - m_0}{\surd [(s^1/n) + (s^2/n)]}$$

Critical Statistic: $t_c = 2.447$

BXS-4 (Upgradient Well)				
Date	**Barium Concentration[1]**	**Number of Samples (n)**	**Average Concentration (m_0)**	**Sample Variance (s^1)**
3/17/2014	27.4	--	--	--
6/2/2014	28.1	--	--	--
9/29/2014	27.6	--	--	--
11/17/2014	27.7	4	27.70	0.08667
2/23/2015	27.7	4	27.78	0.04917
9/14/2015	30.0	4	28.25	1.36333
12/7/2015	27.7	4	28.28	1.32250

BXS-3 (Downgradient Well)						
Date	**Barium Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student T-Test Statistic (t)[2]**
3/17/2014	140.0	--	--	--	--	--
6/2/2014	127.0	--	--	--	--	--
9/29/2014	135.0	--	--	--	--	--
11/17/2014	130.0	4	133.00	32.667	5.72	**36.80**
2/23/2015	127.0	4	129.75	14.250	3.77	**53.86**
9/14/2015	152.0	4	136.00	124.667	11.17	**19.29**
12/7/2015	162.0	4	142.75	288.917	17.00	**13.47**

BXS-2 (Downgradient Well)						
Date	**Barium Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student T-Test Statistic (t)[2]**
3/17/2014	50.3	--	--	--	--	--
6/2/2014	52.8	--	--	--	--	--
9/29/2014	50.0	--	--	--	--	--
11/17/2014	49.6	4	50.68	2.089	1.45	**31.15**
2/23/2015	47.0	4	49.85	5.637	2.37	**18.45**
9/14/2015	46.6	4	48.30	3.053	1.75	**22.63**
12/7/2015	43.7	4	46.73	5.836	2.42	**15.16**

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

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

BXS-1 (Downgradient Well)						
Date	Barium Concentration[1]	Number of Samples (n)	Average Concentration (x̄)	Sample Variance (s^2)	Sample Standard Deviation (s)	Student T-Test Statistic (t)[2]
3/17/2014	15.4	--	--	--	--	--
6/2/2014	15.2	--	--	--	--	--
9/29/2014	14.9	--	--	--	--	--
11/17/2014	15.3	4	15.20	0.047	0.22	-68.47
2/23/2015	13.1	4	14.63	1.063	1.03	-24.53
9/14/2015	14.4	4	14.43	0.916	0.96	-27.62
12/7/2015	13.2	4	14.00	1.100	1.05	-26.21

Notes

x̄ = average concentration for downgradient well.

m_0 = 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 T-Test statistic.

-- = analysis not applicable.

* = statistic with no/zero difference.

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

[2] Statistic in **bold** or *gray* is a statistically valid detection (according to the Student T-Test).

Table C-14. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Copper

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Student T-Test Formula: $$\frac{\bar{x} - m_0}{\sqrt{[\ (s^1/n) + (s^2/n)\ ]}}$$ Critical Statistic: $t_c = 2.447$

BXS-4 (Upgradient Well)				
Date	Copper Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
3/17/2014	2.0	--	--	--
6/2/2014	2.0	--	--	--
9/29/2014	2.0	--	--	--
11/17/2014	2.0	4	2.00	0.00000
2/23/2015	0.1	4	1.53	0.87423
9/14/2015	2.0	4	1.53	0.87423
12/7/2015	2.0	4	1.53	0.87423

BXS-3 (Downgradient Well)						
Date	Copper Concentration[1]	Number of Samples (n)	Average Concentration $(\bar{x})$	Sample Variance (s^2)	Sample Standard Deviation (s)	Student T-Test Statistic (t)[2]
3/17/2014	2.0	--	--	--	--	--
6/2/2014	2.0	--	--	--	--	--
9/29/2014	2.0	--	--	--	--	--
11/17/2014	2.0	4	2.00	0.000	0.00	*
2/23/2015	0.3	4	1.59	0.689	0.83	0.13
9/14/2015	2.0	4	1.59	0.689	0.83	0.13
12/7/2015	1.3	4	1.41	0.618	0.79	-0.31

BXS-2 (Downgradient Well)						
Date	Copper Concentration[1]	Number of Samples (n)	Average Concentration $(\bar{x})$	Sample Variance (s^2)	Sample Standard Deviation (s)	Student T-Test Statistic (t)[2]
3/17/2014	2.0	--	--	--	--	--
6/2/2014	2.6	--	--	--	--	--
9/29/2014	2.0	--	--	--	--	--
11/17/2014	2.0	4	2.15	0.090	0.30	1.00
2/23/2015	2.3	4	2.23	0.084	0.29	**4.82**
9/14/2015	2.1	4	2.11	0.023	0.15	**7.59**
12/7/2015	3.4	4	2.46	0.415	0.64	**2.86**

Table C-14. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Copper

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

BXS-1 (Downgradient Well)						
Date	Copper Concentration[1]	Number of Samples (n)	Average Concentration ($\bar{x}$)	Sample Variance (s^2)	Sample Standard Deviation (s)	Student T-Test Statistic (t)[2]
3/17/2014	2.0	--	--	--	--	--
6/2/2014	2.0	--	--	--	--	--
9/29/2014	2.0	--	--	--	--	--
11/17/2014	2.0	4	2.00	0.000	0.00	*
2/23/2015	1.8	4	1.95	0.012	0.11	**7.50**
9/14/2015	13.6	4	4.85	34.077	5.84	1.13
12/7/2015	3.4	4	5.20	31.912	5.65	1.30

Notes

$\bar{x}$ = average concentration for downgradient well.

m_0 = 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 T-Test statistic.

-- = analysis not applicable.

* = statistic with no/zero difference.

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

[2] Statistic in **bold** or *gray* is a statistically valid detection (according to the Student T-Test).

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

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

Student T-Test Formula: $$\frac{\bar{x} - m_0}{\sqrt{[(s^1/n) + (s^2/n)]}}$$ Critical Statistic: $t_c = 2.447$

BXS-4 (Upgradient Well)				
Date	Iron Concentration[1]	Number of Samples (n)	Average Concentration (m_0)	Sample Variance (s^1)
3/17/2014	69.3	--	--	--
6/2/2014	52.4	--	--	--
9/29/2014	72.7	--	--	--
11/17/2014	70.0	4	66.10	85.56667
2/23/2015	73.2	4	67.08	97.68917
9/14/2015	53.5	4	67.35	87.23000
12/7/2015	56.0	4	63.18	97.38917

BXS-3 (Downgradient Well)						
Date	Iron Concentration[1]	Number of Samples (n)	Average Concentration ($\bar{x}$)	Sample Variance (s^2)	Sample Standard Deviation (s)	Student T-Test Statistic (t)[2]
3/17/2014	127,000	--	--	--	--	--
6/2/2014	118,000	--	--	--	--	--
9/29/2014	111,000	--	--	--	--	--
11/17/2014	120,000	4	119,000.00	43,333,333.33	6,582.81	**36.13**
2/23/2015	114,000	4	115,750.00	16,250,000.00	4,031.13	**57.39**
9/14/2015	122,000	4	116,750.00	26,250,000.00	5,123.48	**45.55**
12/7/2015	126,000	4	120,500.00	25,000,000.00	5,000.00	**48.17**

BXS-2 (Downgradient Well)						
Date	Iron Concentration[1]	Number of Samples (n)	Average Concentration ($\bar{x}$)	Sample Variance (s^2)	Sample Standard Deviation (s)	Student T-Test Statistic (t)[2]
3/17/2014	424	--	--	--	--	--
6/2/2014	421	--	--	--	--	--
9/29/2014	409	--	--	--	--	--
11/17/2014	421	4	418.75	44.250	6.65	**61.90**
2/23/2015	375	4	406.50	473.000	21.75	**28.72**
9/14/2015	358	4	390.75	856.250	29.26	**21.08**
12/7/2015	361	4	378.75	848.250	29.12	**20.65**

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

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

BXS-1 (Downgradient Well)						
Date	**Iron Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student T-Test Statistic (t)[2]**
3/17/2014	10.0	--	--	--	--	--
6/2/2014	10.0	--	--	--	--	--
9/29/2014	10.0	--	--	--	--	--
11/17/2014	10.0	4	10.00	0.000	0.00	-12.13
2/23/2015	10.0	4	10.00	0.000	0.00	-12.34
9/14/2015	6.4	4	9.10	3.240	1.80	-12.36
12/7/2015	9.0	4	8.85	2.890	1.70	-11.55

Notes

$\bar{x}$ = average concentration for downgradient well.

m_0 = 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 T-Test statistic.

-- = analysis not applicable.

* = statistic with no/zero difference.

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

[2] Statistic in **bold** or *gray* is a statistically valid detection (according to the Student T-Test).

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

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

Student T-Test Formula:

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

Critical Statistic: $t_c = 2.447$

BXS-4 (Upgradient Well)				
Date	**Manganese Concentration^1**	**Number of Samples (n)**	**Average Concentration (m_0)**	**Sample Variance (s^1)**
3/17/2014	119	--	--	--
6/2/2014	116	--	--	--
9/29/2014	118	--	--	--
11/17/2014	115	4	117.00	3.33333
2/23/2015	120	4	117.25	4.91667
9/14/2015	114	4	116.75	7.58333
12/7/2015	110	4	114.75	16.91667

BXS-3 (Downgradient Well)						
Date	**Manganese Concentration^1**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student T-Test Statistic $(t)^2$**
3/17/2014	10,400	--	--	--	--	--
6/2/2014	12,300	--	--	--	--	--
9/29/2014	7,310	--	--	--	--	--
11/17/2014	8,620	4	9,657.50	4,707,091.67	2,169.58	**8.79**
2/23/2015	10,100	4	9,582.50	4,581,091.67	2,140.35	**8.84**
9/14/2015	5,290	4	7,830.00	4,166,333.33	2,041.16	**7.56**
12/7/2015	5,990	4	7,500.00	5,059,533.33	2,249.34	**6.57**

BXS-2 (Downgradient Well)						
Date	**Manganese Concentration^1**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student T-Test Statistic $(t)^2$**
3/17/2014	1,640	--	--	--	--	--
6/2/2014	1,680	--	--	--	--	--
9/29/2014	1,650	--	--	--	--	--
11/17/2014	1,680	4	1,662.50	425.00	20.62	**149.35**
2/23/2015	1,580	4	1,647.50	2,225.00	47.17	**64.83**
9/14/2015	1,570	4	1,620.00	2,866.67	53.54	**56.12**
12/7/2015	1,500	4	1,582.50	5,491.67	74.11	**39.60**

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

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

BXS-1 (Downgradient Well)						
Date	Manganese Concentration[1]	Number of Samples (n)	Average Concentration ($\bar{x}$)	Sample Variance (s^2)	Sample Standard Deviation (s)	Student T-Test Statistic (t)[2]
3/17/2014	287	--	--	--	--	--
6/2/2014	253	--	--	--	--	--
9/29/2014	240	--	--	--	--	--
11/17/2014	265	4	261.25	398.917	19.97	**14.38**
2/23/2015	311	4	267.25	954.917	30.90	**9.69**
9/14/2015	238	4	263.50	1,153.667	33.97	**8.63**
12/7/2015	321	4	283.75	1,524.917	39.05	**8.65**

Notes

$\bar{x}$ = average concentration for downgradient well.

m_0 = 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 T-Test statistic.

-- = analysis not applicable.

* = statistic with no/zero difference.

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

[2] Statistic in **bold** or *gray* is a statistically valid detection (according to the Student T-Test).

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

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

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

Critical Statistic: $t_c = 2.447$

BXS-4 (Upgradient Well)				
Date	**Nickel Concentration[1]**	**Number of Samples (n)**	**Average Concentration (m_0)**	**Sample Variance (s^1)**
3/17/2014	2.0	--	--	--
6/2/2014	2.2	--	--	--
9/29/2014	2.0	--	--	--
11/17/2014	1.1	4	1.83	0.24250
2/23/2015	0.4	4	1.42	0.72357
9/14/2015	2.0	4	1.37	0.62890
12/7/2015	2.0	4	1.37	0.62890

BXS-3 (Downgradient Well)						
Date	**Nickel Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student T-Test Statistic (t)[2]**
3/17/2014	11.2	--	--	--	--	--
6/2/2014	21.2	--	--	--	--	--
9/29/2014	16.1	--	--	--	--	--
11/17/2014	19.7	4	17.05	19.790	4.45	**6.80**
2/23/2015	18.9	4	18.98	4.583	2.14	**15.99**
9/14/2015	18.0	4	18.18	2.396	1.55	**20.70**
12/7/2015	20.6	4	19.30	1.233	1.11	**29.53**

BXS-2 (Downgradient Well)						
Date	**Nickel Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student T-Test Statistic (t)[2]**
3/17/2014	31.0	--	--	--	--	--
6/2/2014	38.5	--	--	--	--	--
9/29/2014	34.3	--	--	--	--	--
11/17/2014	35.8	4	34.90	9.780	3.13	**20.89**
2/23/2015	34.1	4	35.68	4.123	2.03	**32.80**
9/14/2015	30.5	4	33.68	5.056	2.25	**28.07**
12/7/2015	29.3	4	32.43	9.222	3.04	**20.19**

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

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

BXS-1 (Downgradient Well)						
Date	**Nickel Concentration**[1]	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student T-Test Statistic (t)**[2]
3/17/2014	7.4	--	--	--	--	--
6/2/2014	10.9	--	--	--	--	--
9/29/2014	8.8	--	--	--	--	--
11/17/2014	10.0	4	9.28	2.302	1.52	**9.34**
2/23/2015	9.3	4	9.75	0.836	0.91	**16.04**
9/14/2015	7.7	4	8.95	0.932	0.97	**13.99**
12/7/2015	6.6	4	8.40	2.355	1.53	**8.72**

Notes

$\bar{x}$ = average concentration for downgradient well.

m_0 = 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 T-Test statistic.

-- = analysis not applicable.

* = statistic with no/zero difference.

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

[2] Statistic in **bold** or *gray* is a statistically valid detection (according to the Student T-Test).

Table C-18. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Zinc

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

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

Critical Statistic: $t_c = 2.447$

BXS-4 (Upgradient Well)				
Date	**Zinc Concentration[1]**	**Number of Samples (n)**	**Average Concentration (m_0)**	**Sample Variance (s^1)**
3/17/2014	2.0	--	--	--
6/2/2014	2.0	--	--	--
9/29/2014	0.5	--	--	--
11/17/2014	2.5	4	1.75	0.75000
2/23/2015	0.4	4	1.35	1.12333
9/14/2015	2.0	4	1.35	1.12333
12/7/2015	3.2	4	2.03	1.41583

BXS-3 (Downgradient Well)						
Date	**Zinc Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student T-Test Statistic (t)[2]**
3/17/2014	0.8	--	--	--	--	--
6/2/2014	1.3	--	--	--	--	--
9/29/2014	1.7	--	--	--	--	--
11/17/2014	2.3	4	1.53	0.403	0.63	-0.42
2/23/2015	2.1	4	1.85	0.197	0.44	1.03
9/14/2015	2.0	4	2.03	0.063	0.25	1.50
12/7/2015	0.5	4	1.73	0.682	0.83	-0.50

BXS-2 (Downgradient Well)						
Date	**Zinc Concentration[1]**	**Number of Samples (n)**	**Average Concentration ($\bar{x}$)**	**Sample Variance (s^2)**	**Sample Standard Deviation (s)**	**Student T-Test Statistic (t)[2]**
3/17/2014	4.4	--	--	--	--	--
6/2/2014	3.4	--	--	--	--	--
9/29/2014	5.6	--	--	--	--	--
11/17/2014	4.4	4	4.45	0.810	0.90	**4.32**
2/23/2015	6.5	4	4.98	1.843	1.36	**4.50**
9/14/2015	3.1	4	4.90	2.180	1.48	**4.15**
12/7/2015	4.4	4	4.60	1.980	1.41	**3.12**

Table C-18. Statistical Analysis of Groundwater Quality Results for Downgradient Wells: Zinc

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

BXS-1 (Downgradient Well)						
Date	Zinc Concentration[1]	Number of Samples (n)	Average Concentration ($\bar{x}$)	Sample Variance (s^2)	Sample Standard Deviation (s)	Student T-Test Statistic (t)[2]
3/17/2014	2.8	--	--	--	--	--
6/2/2014	2.2	--	--	--	--	--
9/29/2014	3.2	--	--	--	--	--
11/17/2014	2.1	4	2.58	0.269	0.52	1.63
2/23/2015	2.9	4	2.60	0.287	0.54	**2.46**
9/14/2015	362.0	4	92.55	32,268.350	179.63	1.02
12/7/2015	13.7	4	95.18	31,670.463	177.96	1.05

Notes

$\bar{x}$ = average concentration for downgradient well.

m_0 = 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 T-Test statistic.

-- = analysis not applicable.

* = statistic with no/zero difference.

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

[2] Statistic in **bold** or *gray* is a statistically valid detection (according to the Student T-Test).

Appendix D

ATTACHMENT B

South Woodwaste Landfill

Arsenic Transport Model and Calculations

Naturally occurring arsenic can become mobilized in landfill groundwater interactions due enhanced microbial activity around disposed organic material. The wood shaving/bark woodwaste provides organic content which fuels microbial induced anaerobic groundwater conditions. The observation of low pH, negative oxidation reduction potential (ORP), low dissolved oxygen content, and diminishing concentrations of sulfate across the Site indicate the occurrence of these reduced conditions (USGS, 2006). Consequently, arsenic bearing minerals such as orpiment (arsenic sulfide) or arsenic rich pyrite (iron sulfides) can become unstable, allowing the dissolution or desorption of previously immobile arsenic (EPA, 2007). High concentrations of dissolved iron and manganese in the downgradient well (BXS-3) suggest that the process of mineral desorption may be occurring within the Site.

As the reduced site groundwater blends with the more aerobic and oxidizing background aquifer, it can be expected that downgradient groundwater rapidly returns to aerobic conditions. A multitude of complexing and precipitation processes occur in oxic groundwater conditions that 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 B-1). The water quality data found (Table B-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 B-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. As show in the figure, a positive oxidation potential and increasing pH correspond to greater propensity for arsenic precipitation and sorption.

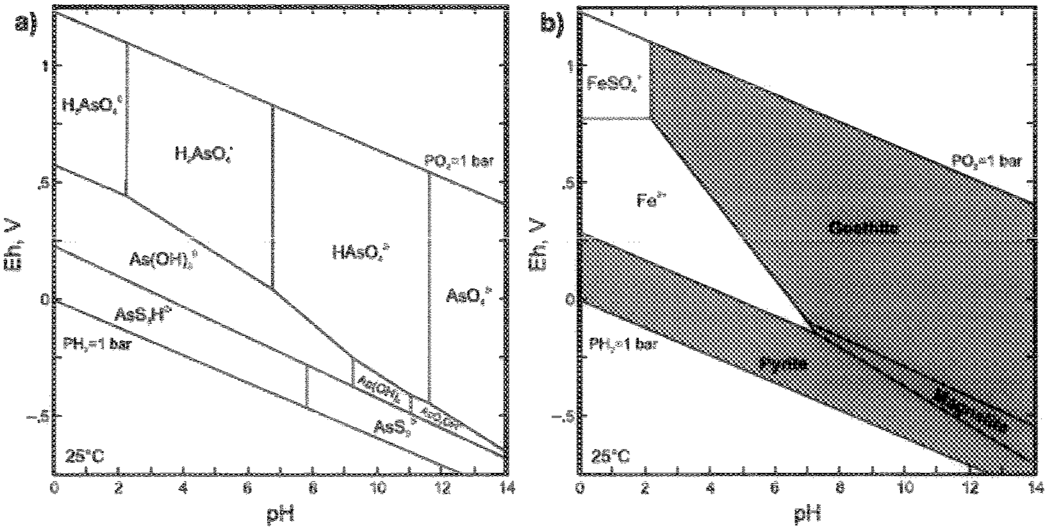


Figure B-2. Eh-pH diagrams for arsenic and iron at 25°C for coupled iron- and sulfate-reducing systems. These paired diagrams show the relative distribution of potentially adsorbing arsenic species (left) relative to representative types of Fe-bearing sorbents (right) that are predicted to occur as a 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 conservative assumptions in our calculation and this model include:

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

The sensitive parameters involved in the Domenico advection-dispersion model are conductivity and dispersivity. Generally dispersivity values were scaled to the nearest downgradient monitoring well or receptor point, however, very large dispersion values are generally considered less conservative. The results of a water well survey, conducted on March 10, 2016 using the Washington Department of Ecology's Well Log Database, indicated the nearest downgradient water well is approximately 6,000 feet northwest of the landfill (Figure B-1). Consequently the upper range of the United States Environmental Protection Agency (US EPA) recommended longitudinal dispersivity of 323 feet was selected (EPA 1996; SWRCB 1999). Associated transverse and vertical dispersivity values were calculated using this method.

Three Domenico models were created to account for variation in site hydraulic conductivity using the lowest, mean, and highest conductivity values for the site determined for 2015 (Baxter, 2016). Iterations of the Domenico model are provided in Tables B-2, B-3, and B-4. The models were set to a 10 year run period, at which point the concentrations of the models have reached the furthest downgradient extent (given a constant source). The modeled source area ✓ was set to a width of 100 feet about BXS-3; other downgradient wells BXS-2 and BXS-1 have not exhibited elevated levels of arsenic nor as significant concentrations of dissolved metals. Comparing observed concentrations in BXS-2 to the modeled values, it can be seen that the model provides a more conservative estimate of the plume dimensions.

The largest areal extent with arsenic concentrations meeting or exceeding the maximum contaminant level (MCL) of 10 µg/L are plotted in Figure B-3. Arsenic concentrations exceeding the MCL were not found to persist greater than 325 feet downgradient of BXS-1 using the Domenico model.

References

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

J.H. Baxter 2016. 2015 Groundwater Monitoring Report, South Woodwaste Landfill, Arlington, Washington. March.

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.

FIGURES B-1 and B-3

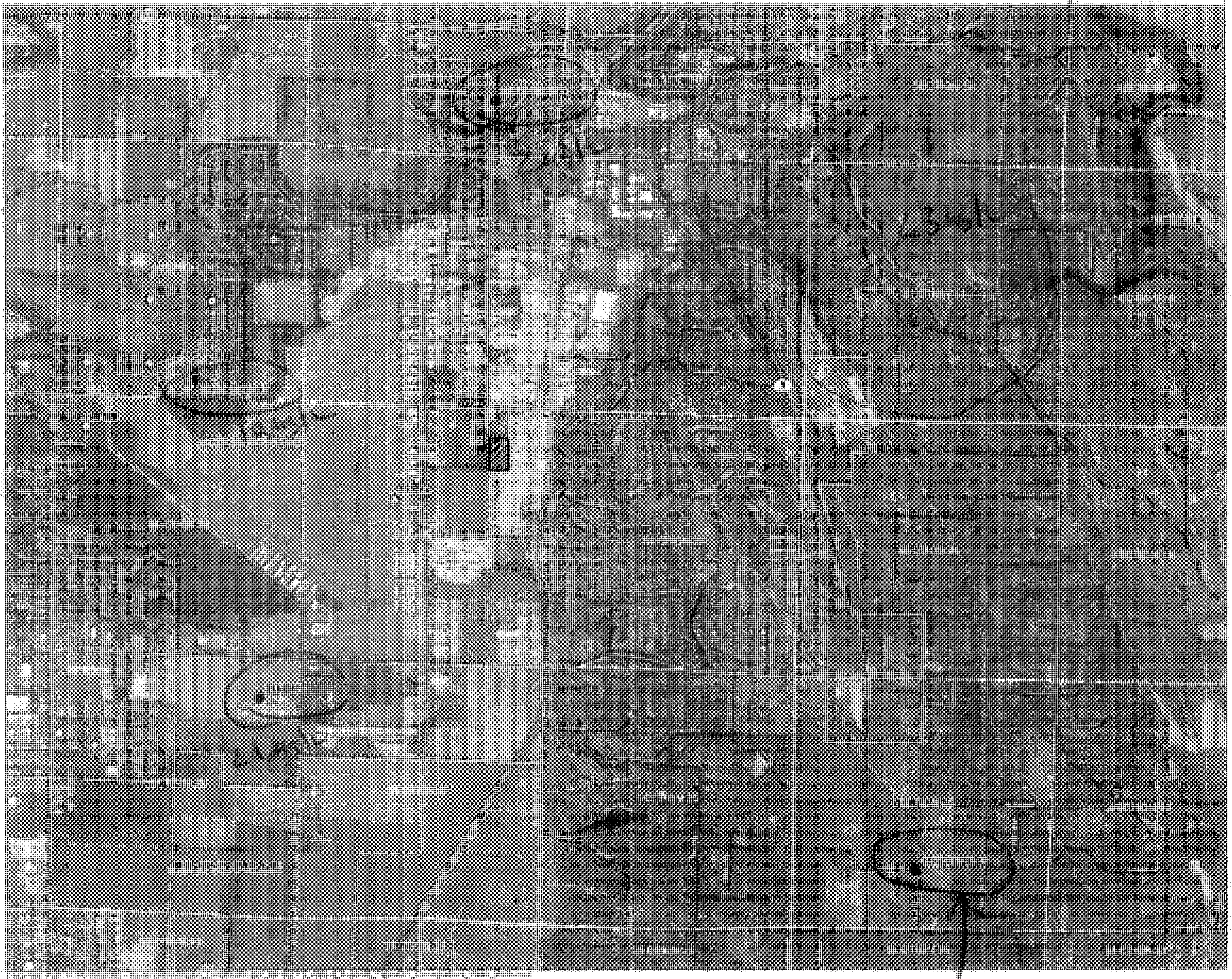


FIGURE B-1

Location of Potable Water Wells Downgradient of South Landfill

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

LEGEND

- ▨ Approximate Boundary of South Landfill
- ○ Downgradient Potable Water Wells
- ⊗ Background USGS Wells
- ⬚ Cities
- ╱╲ Roads
- ∼ Watercourses
- ▩ Waterbodies

NOTE:
USGS = United States Geological Survey

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

GSI Water Solutions, Inc.

4ug/L

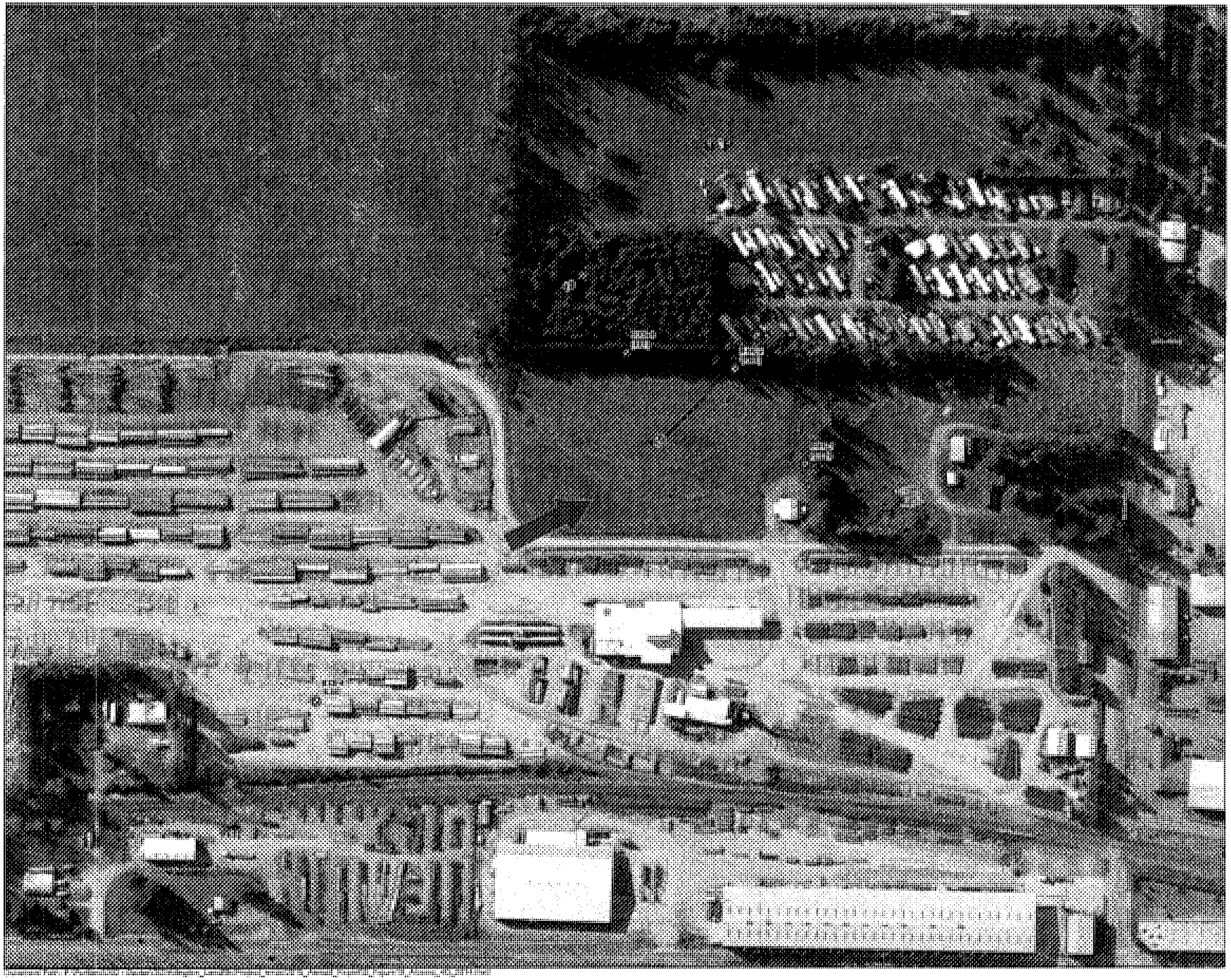


FIGURE B-3

Arsenic Isopleth Map: Fourth Quarter 2014

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

LEGEND

◎ Monitoring Well (September 2014 Arsenic Concentration)

→ Direction of Groundwater Flow

▨ Modeled Source Area

NOTES:

1. All elevations exist in NAVD88.
2. Arsenic contouring estimated using Quick Domenico approximately.
3. Concentrations in ug/L.
4. Data from highest arsenic detection (fourth quarter 2014) depicted.

N

0 100 200 300
Feet

MAP NOTES:
Date: March 29, 2016
Data Sources: AMEC, ESRI, Air photo taken on July 15, 2013 by the USOA

GSI Water Solutions, Inc.

TABLES B-1 to B-4

Table B-1. Background Groundwater Conditions

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

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

Notes:

- AMSL = above mean sea level (NGVD29)

Table B-2

85 ft/dm

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

Project: Arsenic Conservative Solute Transport
Date: 3/15/2016 Prepared by: SK
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)
0.191	3.23E+02	4.20E+01	1.94E+00	0.00E+00	100	10	3650

Hydraulic Cond (ft/day)	Hydraulic Gradient (ft/ft)	Porosity (dec. frac.)	Soil Bulk Density (g/cm³)	KOC	Frac. Org. Carb.	Retard-ation (R)	V (=K*i/n*R) (ft/day)
8.50E+01	0.02	0.3	1.7	1	1.00E-03	1.005666667	5.634736493

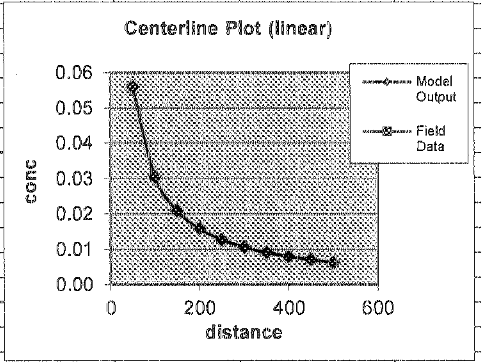
NEW QUICK_DOMENICO.XLS

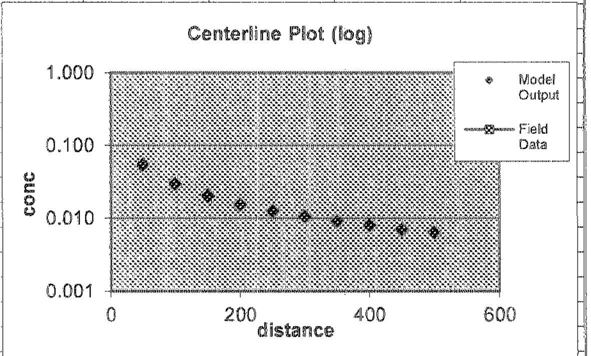
SPREADSHEET APPLICATION OF
"AN ANALYTICAL MODEL FOR
MULTIDIMENSIONAL TRANSPORT OF A
DECAYING CONTAMINANT SPECIES"
P.A. Domenico (1987)
Modified to Include Retardation

Point Concentration

x(ft)	y(ft)	z(ft)
1000	0	0

	x(ft)	y(ft)	z(ft)
Conc. At	1000	0	0
at	3650	days =	0.003 mg/l


Centerline Plot (linear)


Centerline Plot (log)

AREAL CALCULATION MODEL DOMAIN
Length (ft) 500
Width (ft) 150

	50	100	150	200	250	300	350	400	450	500
150	0.006	0.009	0.009	0.009	0.008	0.007	0.006	0.006	0.005	0.005
75	0.033	0.023	0.017	0.014	0.011	0.010	0.009	0.008	0.007	0.006
0	0.056	0.031	0.021	0.016	0.013	0.011	0.009	0.008	0.007	0.007
-75	0.033	0.023	0.017	0.014	0.011	0.010	0.009	0.008	0.007	0.006
-150	0.006	0.009	0.009	0.009	0.008	0.007	0.006	0.006	0.005	0.005

Field Data:	**Centerline C Concentration**									
	Distance from Source									

Table B-3

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

Project:	Arsenic Conservative Solute Transport		
Date:	3/15/2016	Prepared by:	SK
		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)
0.191	3.23E+02	4.20E+01	1.94E+00	0.00E+00	100	10	3650

Hydraulic Cond (ft/day)	Hydraulic Gradient (ft/ft)	Porosity (dec. frac.)	Soil Bulk Density (g/cm^3)	KOC	Frac. Org. Carb.	Retardation (R)	V (=K*i/n*R) (ft/day)
1.28E+02	0.02	0.3	1.7	1	1.00E-03	1.005666667	8.485250249

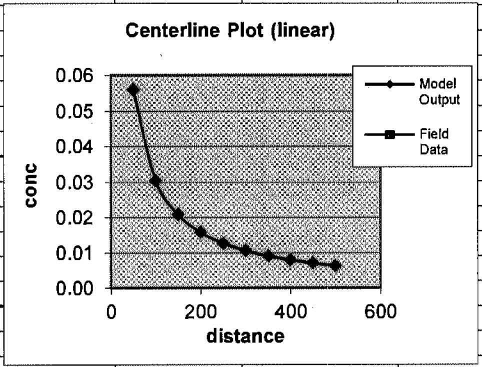
NEW QUICK_DOMENICO.XLS

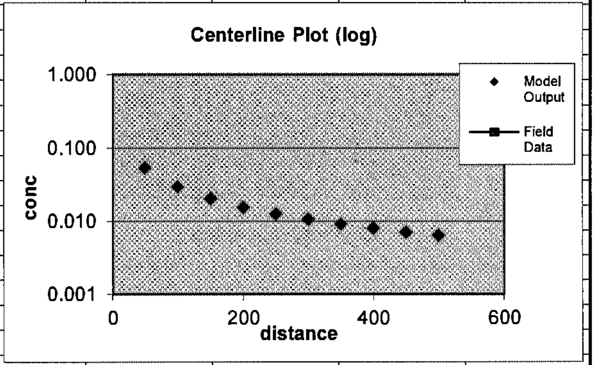
SPREADSHEET APPLICATION OF
"AN ANALYTICAL MODEL FOR
MULTIDIMENSIONAL TRANSPORT OF A
DECAYING CONTAMINANT SPECIES"
P.A. Domenico (1987)
Modified to Include Retardation

Point Concentration

x(ft)	y(ft)	z(ft)
1000	0	0

	x(ft)	y(ft)	z(ft)
Conc. At	1000	0	0
at	3650	days =	0.003 mg/l





AREAL MODEL	CALCULATION DOMAIN	
Length (ft)		500
Width (ft)		150

	50	100	150	200	250	300	350	400	450	500
150	0.006	0.009	0.009	0.009	0.008	0.007	0.006	0.006	0.005	0.005
75	0.033	0.023	0.017	0.014	0.011	0.010	0.009	0.008	0.007	0.006
0	0.056	0.031	0.021	0.016	0.013	0.011	0.009	0.008	0.007	0.007
-75	0.033	0.023	0.017	0.014	0.011	0.010	0.009	0.008	0.007	0.006
-150	0.006	0.009	0.009	0.009	0.008	0.007	0.006	0.006	0.005	0.005

Field Data:	Centerline C Concentration								
	Distance from Source								

Table B-4

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

Project: Arsenic Conservative Solute Transport
Date: 3/15/2016 Prepared by: SK
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)
0.191	3.23E+02	4.20E+01	1.94E+00	0.00E+00	100	10	3650

Hydraulic Cond (ft/day)	Hydraulic Gradient (ft/ft)	Porosity (dec. frac.)	Soil Bulk Density (g/cm³)	KOC	Frac. Org. Carb.	Retard-ation (R)	V (=K*i/n*R) (ft/day)
1.70E+02	0.02	0.3	1.7	1	1.00E-03	1.005666667	11.26947299

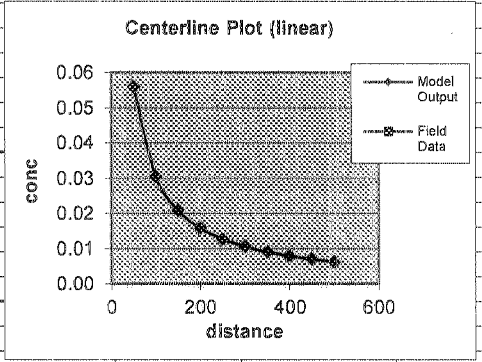
NEW QUICK_DOMENICO.XLS

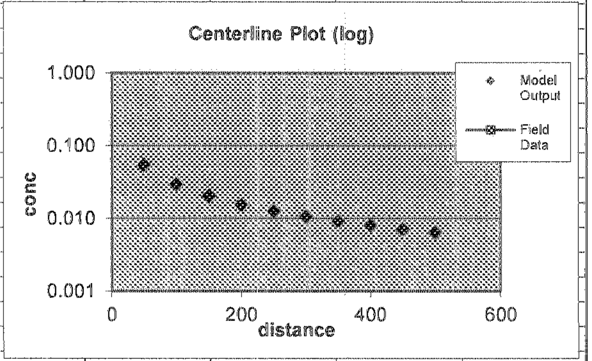
SPREADSHEET APPLICATION OF
"AN ANALYTICAL MODEL FOR
MULTIDIMENSIONAL TRANSPORT OF A
DECAYING CONTAMINANT SPECIES"
P.A. Domenico (1987)
Modified to Include Retardation

Point Concentration

x(ft)	y(ft)	z(ft)
1000	0	0

	x(ft)	y(ft)	z(ft)
Conc. At	1000	0	0
at	3650	days =	0.003 mg/l


Centerline Plot (linear)


Centerline Plot (log)

AREAL MODEL **CALCULATION DOMAIN**

Length (ft) 500
Width (ft) 150

	50	100	150	200	250	300	350	400	450	500
150	0.006	0.009	0.009	0.009	0.008	0.007	0.006	0.006	0.005	0.005
75	0.033	0.023	0.017	0.014	0.011	0.010	0.009	0.008	0.007	0.006
0	0.056	0.031	0.021	0.016	0.013	0.011	0.009	0.008	0.007	0.007
-75	0.033	0.023	0.017	0.014	0.011	0.010	0.009	0.008	0.007	0.006
-150	0.006	0.009	0.009	0.009	0.008	0.007	0.006	0.006	0.005	0.005

Field Data: **Centerline C Concentration**
Distance from Source

Appendix D

Arsenic Transport Model and Calculations

Naturally occurring arsenic can become mobilized in landfill groundwater interactions due enhanced microbial activity around disposed organic material. The wood shaving/bark woodwaste provides organic content which fuels microbial induced anaerobic groundwater conditions. The observation of low pH, negative oxidation reduction potential (ORP), low dissolved oxygen content, and diminishing concentrations of sulfate across the Site indicate the occurrence of these reduced conditions (USGS, 2006). Consequently, arsenic bearing minerals such as orpiment (arsenic sulfide) or arsenic rich pyrite (iron sulfides) can become unstable, allowing the dissolution or desorption of previously immobile arsenic (EPA, 2007). High concentrations of dissolved iron and manganese in the downgradient well (BXS-3) suggest that the process of mineral desorption may be occurring within the Site.

As the reduced site groundwater blends with the more aerobic and oxidizing background aquifer, it can be expected that downgradient groundwater rapidly returns to aerobic conditions. A multitude of complexing and precipitation processes occur in oxic groundwater conditions that 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. As show in the figure, a positive oxidation potential and increasing pH correspond to greater propensity for arsenic precipitation and sorption.

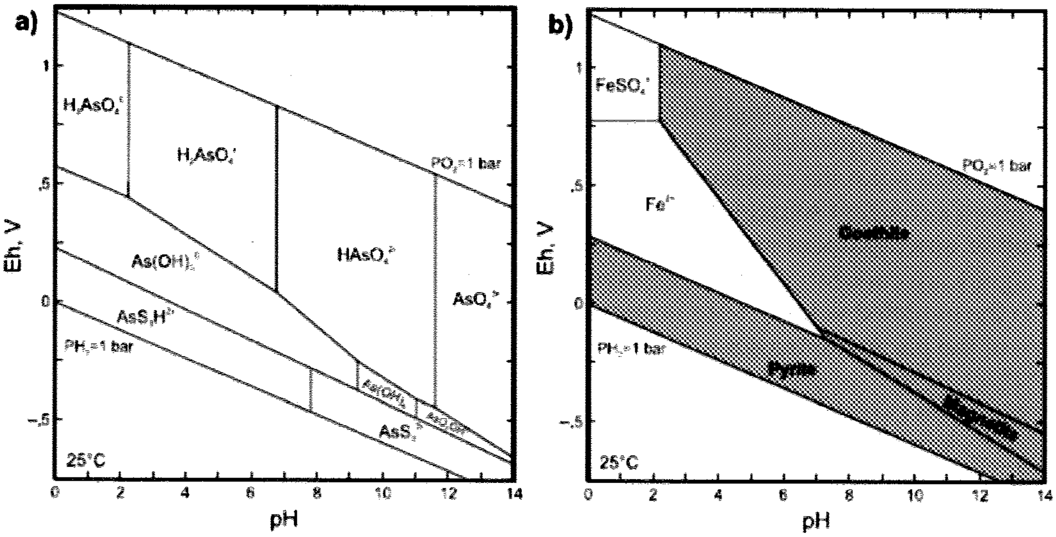


Figure D-2. Eh-pH diagrams for arsenic and iron at 25°C for coupled iron- and sulfate-reducing systems. These paired diagrams show the relative distribution of potentially adsorbing arsenic species (left) relative to representative types of Fe-bearing sorbents (right) that are predicted to occur as a 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 conservative assumptions in our calculation and this model include:

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

The sensitive parameters involved in the Domenico advection-dispersion model are conductivity and dispersivity. Generally dispersivity values were scaled to the nearest downgradient monitoring well or receptor point, however, very large dispersion values are generally considered less conservative. The results of a water well survey, conducted on March 10, 2016 using the Washington Department of Ecology's Well Log Database, indicated the nearest downgradient water well is approximately 6,000 feet northwest of the landfill (Figure D-1). Consequently the upper range of the United States Environmental Protection Agency (US EPA) recommended longitudinal dispersivity of 323 feet was selected (EPA 1996; SWRCB 1999). Associated transverse and vertical dispersivity values were calculated using this method.

Three Domenico models were created to account for variation in site hydraulic conductivity using the lowest, mean, and highest conductivity values presented in Table 2. Iterations of the Domenico model are provided in Tables D-2, D-3, and D-4. The models were set to a 10 year run period, at which point the concentrations of the models have reached the furthest downgradient extent (given a constant source). The modeled source area was set to a width of 100 feet about BXS-3; other downgradient wells BXS-2 and BXS-1 have not exhibited elevated levels of arsenic nor as significant concentrations of dissolved metals. Comparing observed concentrations in BXS-2 to the modeled values, it can be seen that the model provides a more conservative estimate of the plume dimensions.

The largest areal extent with arsenic concentrations meeting or exceeding the maximum contaminant level (MCL) of 10 µg/L are plotted in Figure 19. Arsenic concentrations exceeding the MCL were not found to persist greater than 325 feet downgradient of BXS-1 using the Domenico model.

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.

Document Path: P:\Portland\552 - Baxter\GIS\Arlington_Landfill\Project_mxds\2016_Annual_Report\5_FigureD-1_Downgradient_Water_Wells.mxd

FIGURE D-1

Location of Potable Water Wellls Downgradient of South Landfill

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

LEGEND

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

NOTE:
USGS = United States Geological Survey

N

0 1,000 2,000 3,000
Feet

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

GSI Water Solutions, Inc.

TABLES D-1 TO D-4

Table D-1. Background Groundwater Conditions

Former J.H. Baxter South Woodwaste Landfill

Arlington, Washington

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

Notes:

- AMSL = above mean sea level (NGVD29)

Table D-2

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

Project: Arsenic Conservative Solute Transport

Date: 3/15/2016 Prepared by: SK

Contaminant: **Arsenic**

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

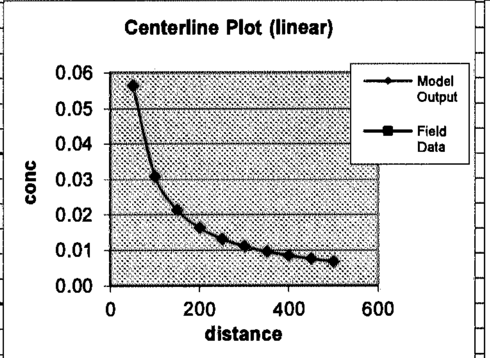
SOURCE CONC (MG/L)	Ax (ft)	Ay (ft)	Az (ft) >=.001	LAMBDA day-1	SOURCE WIDTH (ft)	SOURCE THICKNESS (ft)	Time (days) (days)
0.191	3.23E+02	4.20E+01	1.94E+00	0.00E+00	100	10	3650

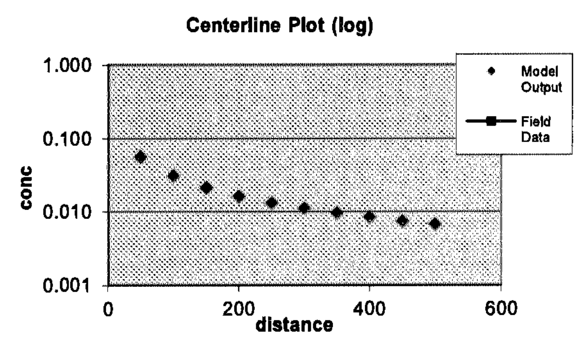
Hydraulic Cond (ft/day)	Hydraulic Gradient (ft/ft)	Porosity (dec. frac.)	Soil Bulk Density (g/cm^3)	KOC	Frac. Org. Carb.	Retard- ation (R)	V (=K*i/n*R) (ft/day)
8.50E+01	0.02	0.3	1.7	1	1.00E-03	1.005666667	5.634736493

Point Concentration

x(ft)	y(ft)	z(ft)
1000	0	0

	x(ft)	y(ft)	z(ft)
Conc. At	1000	0	0
at	3650	days =	0.003 mg/l





AREAL MODEL **CALCULATION DOMAIN**

Length (ft) 500

Width (ft) 150

	50	100	150	200	250	300	350	400	450	500
150	0.006	0.009	0.009	0.009	0.008	0.007	0.006	0.006	0.005	0.005
75	0.033	0.023	0.017	0.014	0.011	0.010	0.009	0.008	0.007	0.006
0	0.056	0.031	0.021	0.016	0.013	0.011	0.009	0.008	0.007	0.007
-75	0.033	0.023	0.017	0.014	0.011	0.010	0.009	0.008	0.007	0.006
-150	0.006	0.009	0.009	0.009	0.008	0.007	0.006	0.006	0.005	0.005

Field Data: **Centerline C Concentration**

Distance from Source

Table D-4

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

Project: Arsenic Conservative Solute Transport
Date: 3/15/2016 Prepared by: SK
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)
0.191	3.23E+02	4.20E+01	1.94E+00	0.00E+00	100	10	3650

Hydraulic Cond (ft/day)	Hydraulic Gradient (ft/ft)	Porosity (dec. frac.)	Soil Bulk Density (g/cm³)	KOC	Frac. Org. Carb.	Retard-ation (R)	V (=K*i/n*R) (ft/day)
1.70E+02	0.02	0.3	1.7	1	1.00E-03	1.005666667	11.26947299

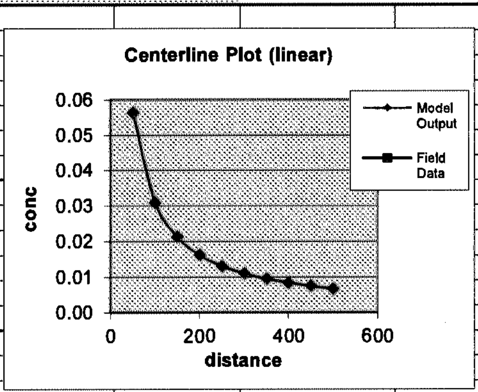
NEW QUICK_DOMENICO.XLS

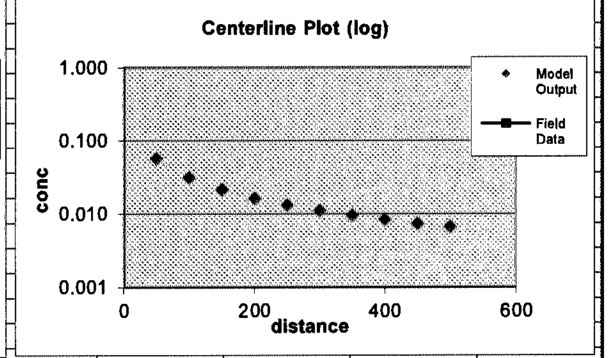
SPREADSHEET APPLICATION OF
"AN ANALYTICAL MODEL FOR
MULTIDIMENSIONAL TRANSPORT OF A
DECAYING CONTAMINANT SPECIES"
P.A. Domenico (1987)
Modified to Include Retardation

Point Concentration

x(ft)	y(ft)	z(ft)
1000	0	0

	x(ft)	y(ft)	z(ft)
Conc. At	1000	0	0
at	3650	days =	0.003 mg/l





AREAL MODEL **CALCULATION DOMAIN**
Length (ft) 500
Width (ft) 150

	50	100	150	200	250	300	350	400	450	500
150	0.006	0.009	0.009	0.009	0.008	0.007	0.006	0.006	0.005	0.005
75	0.033	0.023	0.017	0.014	0.011	0.010	0.009	0.008	0.007	0.006
0	0.056	0.031	0.021	0.016	0.013	0.011	0.009	0.008	0.007	0.007
-75	0.033	0.023	0.017	0.014	0.011	0.010	0.009	0.008	0.007	0.006
-150	0.006	0.009	0.009	0.009	0.008	0.007	0.006	0.006	0.005	0.005

Field Data: **Centerline C Concentration**
Distance from Source