Data Validation Package

May 2016
Groundwater Sampling at the Bluewater, New Mexico, Disposal Site

September 2016

U.S. DEPARTMENT OF ENERGY | Legacy Management

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Sampling Event Summary

Site: Bluewater, New Mexico, Disposal Site

Sampling Period: May 10–11, 2016

Groundwater samples were collected from monitoring wells at the Bluewater, New Mexico, Disposal Site to monitor groundwater contaminants as specified in the 1997 *Long-Term Surveillance Plan for the DOE Bluewater (UMTRCA Title II) Disposal Site Near Grants, New Mexico* (LTSP). Sampling and analyses were conducted as specified in the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites* (LMS/PRO/S04351, continually updated). A duplicate sample was collected from location 16(SG).

Alluvium wells are completed in the alluvial sediments in the former channel of the Rio San Jose, which was covered by basalt lava flows known as the El Malpais, and are identified by the suffix (M). Bedrock wells are completed in the San Andres Limestone/Glorieta Sandstone hydrologic unit (San Andres aquifer) and are identified by the suffix (SG). Wells HMC-951 and OBS-3 are also completed in the San Andres aquifer.

The LTSP requires monitoring for molybdenum, selenium, uranium, and polychlorinated biphenyls (PCBs); PCB monitoring occurs only during November sampling events. This event included sampling for an expanded list of analytes to characterize the site aquifers and to support a regional groundwater investigation being conducted by the New Mexico Environment Department.

Alluvium Monitoring Wells

Alluvium wells 21(M) and 22(M) were installed downgradient of point-of-compliance (POC) well T(M) in summer 2011; well 21(M) is located near the site boundary where alluvial groundwater leaves the site. These wells were installed in response to the exceedance of the alternate concentration limit (ACL) for uranium in well T(M) during previous sampling events.

Alluvium wells 20(M) and 23(M) were installed in summer 2012 to further characterize the alluvial aquifer. Well 20(M) is located near the west site boundary where alluvial groundwater enters the site. Well 23(M) is downgradient of well 21(M) and is located near the site entrance. Well T(M) was also scheduled for sampling but continues to be dry; the most recent sample was collected in May 2012 and had a uranium concentration of 0.55 milligram per liter (mg/L).

Analytical results for the required constituents for the alluvium wells are provided in Table 1. No ACLs were exceeded. However, the uranium concentration was 0.13 mg/L in well 21(M), and was 0.11 mg/L in point-of-exposure (POE) well X(M); these results exceed the Uranium Mill Tailings Radiation Control Act (UMTRCA) maximum concentration limit (MCL) of 0.044 mg/L (40 CFR 192, Table 1) and the New Mexico drinking water standard of 0.03 mg/L. The selenium concentration at well 21(M) is equal to the MCL of 0.010 mg/L. These results indicate alluvial groundwater with elevated uranium is leaving the site. DOE is evaluating this occurrence in consultation with the U.S. Nuclear Regulatory Commission.

Table 1. May 2016 Groundwater Monitoring Analytical Results for the Alluvium Wells

Well	Category	Molybdenum (mg/L) ACL= 0.10 mg/L	Selenium (mg/L) ACL=0.05 mg/L	Uranium (mg/L) ACL=0.44 mg/L
20(M)	Upgradient	0.0020	0.0040	0.010
21(M)	Downgradient	0.0009	0.010	0.13
22(M)	Downgradient	0.0019	0.0033	0.36
23(M)	Downgradient	0.0044	0.0029	0.020
E(M)	Background	0.00054	ND	0.00003
F(M)	POC	0.0010	0.00092	0.0072
T(M)	POC	Not Sampled	Not Sampled	Not Sampled
X(M)	POE	0.00078	0.0067	0.11
Y2(M)	PCBs	0.0015	0.0012	0.0046

Key: ACL = alternate concentration limit; mg/L = milligrams per liter; ND = not detected;
PCBs = polychlorinated biphenyls; POC = point-of-compliance; POE = point-of-exposure

Bedrock Monitoring Wells

Bedrock wells 11(SG), 13(SG), 14(SG), 15(SG), 16(SG), and 18(SG) were installed in summer 2012 to gain a better understanding of the hydrogeological characteristics of the San Andres aquifer at the site, and because a nearby offsite private well (HMC-951) completed in the same aquifer indicated elevated uranium concentrations. There were no bedrock wells in the south portion of the site prior to this well construction project. Wells 11(SG) and 14(SG) are considered to be crossgradient of the disposal cells, and all of the other new wells are downgradient of the cells. Well 16(SG) was installed between POC wells OBS-3 and S(SG) because of the poor condition of those wells (their well screens are highly corroded). The results from wells OBS-3 and S(SG) are not considered representative of the aquifer but continue to be sampled in accordance with the LTSP.

Bedrock wells I(SG) and L(SG) were completed with open-hole construction through the entire thickness of the San Andres Limestone and Glorieta Sandstone formations. All of the new San Andres aquifer wells onsite, except well 16(SG), are screened in the upper 50 feet of the San Andres Limestone, as are most San Andres aquifer wells in the region, because this is the most productive zone of the aquifer. Well 16(SG) is screened in the Glorieta Sandstone because the San Andres Limestone is dry at that location. In response to questions by New Mexico Environment Department about the possibility of stratification of contamination within the aquifer, downhole conductivity was measured in wells I(SG) and L(SG) in spring 2013. No change in conductivity with depth was observed in background well L(SG). However, two zones of different conductivities were noted in POE well I(SG). During this sampling event, a low-flow sample was collected from well I(SG) at a depth of 265 feet in the zone of highest conductivity. Offsite private well HMC-951, located near the site entrance and used only for monitoring purposes, was sampled by DOE for the sixth time during this event. A blockage near the bottom of the well casing prevented installation of a low-flow sampling pump in the open hole portion of the well. Consequently, a sample was collected using a submersible pump inside the well casing after three columns of water were purged from the well.

Analytical results for the required constituents in bedrock wells are provided in Table 2. No ACLs were exceeded. However, the uranium concentrations in downgradient wells 13(SG) and 18(SG), located along the site boundary, continue to exceed the UMTRCA MCL and the New Mexico drinking water standard. The uranium concentration at the sampled depth in POE well I(SG) also exceeded these standards. The uranium concentration in HMC-951 was equal to the New Mexico drinking water standard. These results indicate San Andres aquifer groundwater with elevated uranium is leaving the site. DOE is evaluating this occurrence in consultation with the U.S. Nuclear Regulatory Commission.

Table 2. May 2016 Groundwater Monitoring Analytical Results for the Bedrock Wells

Well	Category	Selenium (mg/L) ACL = 0.05 mg/L	Uranium (mg/L) ACL=2.15 mg/L
11(SG)	Downgradient	ND	0.010
13(SG)	Downgradient	0.0068	0.10
14(SG)	Upgradient	ND	0.060
15(SG)	Downgradient	ND	0.070
16(SG)	Downgradient	0.010	1.3
18(SG)	Downgradient	0.0057	0.22
HMC-951	Offsite	0.0057	0.020
I(SG) 265 feet	POE	0.0083	0.32
L(SG)	Background	ND	0.0035
OBS-3	POC	0.0019	0.18
S(SG)	POC	0.010	0.59

Key: ACL = alternate concentration limit; mg/L = milligrams per liter; ND = not detected; POC = point-of-compliance; POE = point-of-exposure

Richard K. Johnson, Site Lead
Navarro Research and Engineering, Inc.

9/13/16
Date

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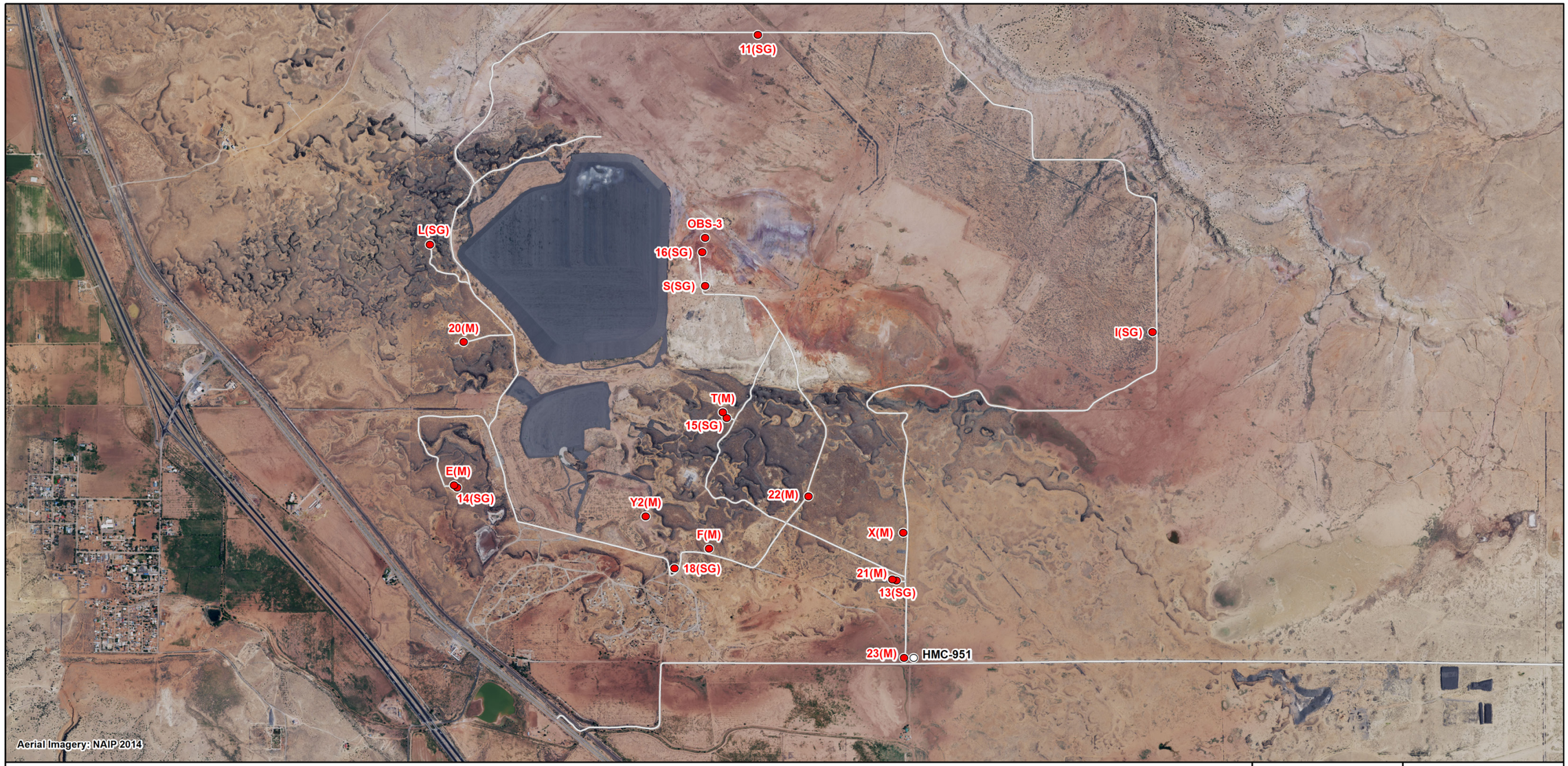

LEGEND

- DOE WELL TO BE SAMPLED
- PRIVATE WELL TO BE SAMPLED

N

SCALE N FEET

0 2,000 4,000

U.S. DEPARTMENT OF ENERGY OFFICE OF LEGACY MANAGEMENT	Work Performed by Navarro Research & Engineering, Inc. Under DOE Contract Number DE-LM0000421
Planned Sample Locations Bluewater, NM, Disposal Site May 2016	
DATE PREPARED: March 17, 2016	FILE NAME: S1400900-11x17

Bluewater, New Mexico, Disposal Site, Sample Location Map

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Data Assessment Summary

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Water Sampling Field Activities Verification Checklist

Project	Bluewater, New Mexico	**Date(s) of Water Sampling**	May 10–11, 2016
Date(s) of Verification	July 20, 2016	**Name of Verifier**	Stephen Donivan

	Response (Yes, No, NA)	Comments
1. Is the SAP the primary document directing field procedures?	Yes	
List any Program Directives or other documents, SOPs, instructions.		Program Directive BLU-2014-01. Work Order letter dated March 31, 2016.
2. Were the sampling locations specified in the planning documents sampled?	No	Location T(M) was dry and not sampled.
3. Were field equipment calibrations conducted as specified in the above-named documents?	Yes	Calibrations were performed May 6, 2016.
4. Was an operational check of the field equipment conducted daily?	Yes	
Did the operational checks meet criteria?	Yes	
5. Were the number and types (alkalinity, temperature, specific conductance, pH, turbidity, DO, ORP) of field measurements taken as specified?	Yes	
6. Were wells categorized correctly?	Yes	
7. Were the following conditions met when purging a Category I well:		
Was one pump/tubing volume purged prior to sampling?	Yes	
Did the water level stabilize prior to sampling?	Yes	
Did pH, specific conductance, and turbidity measurements meet criteria prior to sampling?	Yes	
Was the flow rate less than 500 mL/min?	Yes	

Water Sampling Field Activities Verification Checklist (continued)

	Response (Yes, No, NA)	Comments
8. Were the following conditions met when purging a Category II well:		
Was the flow rate less than 500 mL/min?	Yes	
Was one pump/tubing volume removed prior to sampling?	Yes	
9. Were duplicates taken at a frequency of one per 20 samples?	Yes	A duplicate sample was collected from location 16(SG).
10. Were equipment blanks taken at a frequency of one per 20 samples that were collected with non-dedicated equipment?	NA	An equipment blank was not required.
11. Were trip blanks prepared and included with each shipment of VOC samples?	NA	
12. Were the true identities of the QC samples documented?	Yes	
13. Were samples collected in the containers specified?	Yes	
14. Were samples filtered and preserved as specified?	Yes	
15. Were the number and types of samples collected as specified?	Yes	
16. Were chain of custody records completed and was sample custody maintained?	Yes	
17. Was all pertinent information documented on the field data sheets?	Yes	
18. Was the presence or absence of ice in the cooler documented at every sample location?	Yes	
19. Were water levels measured at the locations specified in the planning documents?	Yes	

Laboratory Performance Assessment

General Information

Task ID:	BLU01.1-16050001
Sample Event:	May 10–11, 2016
Site(s):	Bluewater, New Mexico
Laboratory:	ALS Laboratory Group, Fort Collins, Colorado
Work Order No.:	1605289
Analysis:	Metals and Wet Chemistry
Validator:	Stephen Donivan
Review Date:	July 19, 2016

This validation was performed according to the *Environmental Procedures Catalog*, (LMS/POL/S04325, continually updated) "Standard Practice for Validation of Environmental Data." The procedure was applied at Level 3, Data Validation. See attached Data Validation Worksheets for supporting documentation on the data review and validation. All analyses were successfully completed. The samples were prepared and analyzed using accepted procedures based on methods specified by line item code, which are listed in Table 3.

Table 3. Analytes and Methods

Analyte	Line Item Code	Prep Method	Analytical Method
Alkalinity, Bicarbonate	WCH-A-003	EPA 310.1/ SM 2320B	EPA 310.1/ SM 2320B
Alkalinity, Carbonate	WCH-A-003	EPA 310.1/ SM 2320B	EPA 310.1/ SM 2320B
Arsenic, Molybdenum, Selenium, Uranium	LMM-02	SW-846 3005A	SW-846 6020
Calcium, Magnesium, Potassium, Silica, Sodium	LMM-01	SW-846 3005A	SW-846 6010B
Chloride, Sulfate	MIS-A-045	SW-846 9056	SW-846 9056
Nitrate + Nitrite as N	WCH-A-022	EPA 353.2	EPA 353.2
Total Dissolved Solids (TDS)	WCH-A-033	MCAWW 160.1	MCAWW 160.1

Data Qualifier Summary

None of the data from this event required qualification.

Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado, received 20 water samples on May 13, 2016, accompanied by a Chain of Custody form. Copies of the air bills were included in the receiving documentation. The Chain of Custody form was checked to confirm that all of the samples were listed with sample collection dates and times, and that signatures and dates were present indicating sample relinquishment and receipt. The Chain of Custody form was complete with no errors or omissions.

Preservation and Holding Times

The sample shipment was received intact with the temperature inside the iced coolers between 0.6 °C and 1.2 °C, which complies with requirements. All samples were received in the correct container types and had been preserved correctly for the requested analyses, with the following exceptions. The laboratory noticed that two bottles for location S(SG) had pH values that contradicted the bottles' labels, which indicated that the labels had been switched. The laboratory corrected the error and proceeded with sample analysis. All samples were analyzed within the applicable holding times.

Detection and Quantitation Limits

The method detection limit (MDL) was reported for all analytes as required. The MDL, as defined in 40 CFR 136, is the minimum concentration of an analyte that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero. The practical quantitation limit (PQL) for these analytes is the lowest concentration that can be reliably measured, and is defined as 5 times the MDL. The arsenic and selenium laboratory MDLs are greater than the MDLs specified in the applicable line item codes but were accepted for this Task. Limited sample volume was available for the bicarbonate and carbonate analyses. The MDLs were elevated accordingly. The reported MDLs for all analytes demonstrate compliance with contractual requirements.

Laboratory Instrument Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for all analytes. Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run and of producing a linear curve. Compliance requirements for continuing calibration checks are established to ensure that the instrument continues to be capable of producing acceptable qualitative and quantitative data. All laboratory instrument calibrations were performed correctly in accordance with the cited methods. All calibration and laboratory spike standards were prepared from independent sources.

Method EPA 160.1
There are no initial or continuing calibration requirements associated with the total dissolved solids method.

Method EPA 310.1/ SM 2320B
There are no initial or continuing calibration requirements associated with the alkalinity methods.

Method EPA 353.2
Calibrations for nitrate + nitrite as N were performed using seven calibration standards on May 25, 2016. The calibration curve correlation coefficient values were greater than 0.995 and the absolute values of the intercepts were less than 3 times the MDL. Initial and continuing calibration verification checks were made at the required frequency. All calibration check results were within the acceptance criteria.

Method SW-846 6010B
Calibrations for calcium, magnesium, potassium, silica, and sodium were performed on May 23, 2016, using three calibration standards. The correlation coefficient values were greater than 0.995. The absolute values of the intercepts were less than 3 times the MDL. Initial and continuing calibration verification checks were made at the required frequency. All calibration checks met the acceptance criteria. Reporting limit verification checks were made at the required frequency to verify the linearity of the calibration curve near the PQL and all results were within the acceptance range.

Method SW-846 6020A
Calibrations were performed for arsenic, molybdenum, selenium, and uranium on May 23, 2016, using three calibration standards. The calibration curve correlation coefficient values were greater than 0.995. The absolute values of the calibration curve intercepts were less than 3 times the MDL. Initial and continuing calibration verification checks were made at the required frequency. All calibration checks associated with reported results met the acceptance criteria. Reporting limit verification checks were made at the required frequency to verify the linearity of the calibration curve near the PQL and all results were within the acceptance range with the following exceptions. A check recovery for molybdenum was below 70 percent; results less than 5 times the PQL are qualified with a "J" flag (estimated). A selenium check recovery was above 130 percent; results less than 5 times the PQL and above the MDL are qualified with a "J" flag (estimated). Mass calibration and resolution verifications were performed at the beginning of each analytical run in accordance with the analytical procedure. Internal standard recoveries associated with requested analytes were stable and within acceptable ranges.

Method SW-846 9056
Calibrations for chloride and sulfate were performed using seven calibration standards on May 6, 2016. The calibration curve correlation coefficient values were greater than 0.995 and the absolute values of the intercepts were less than 3 times the MDL. Initial and continuing calibration verification checks were made at the required frequency. All calibration checks met the acceptance criteria.

Method and Calibration Blanks

Method blanks are analyzed to assess any contamination that may have occurred during sample preparation. Calibration blanks are analyzed to assess instrument contamination prior to and during sample analysis.

Metals and Wet Chemistry
All method blank and calibration blank results were below the PQL with the exception of some calibration blanks for sulfate, which were slightly above the reporting limit. The samples associated with these blanks had sulfate concentrations greater than 5 times the blank, so no further qualification is necessary. In cases where a blank concentration exceeds the MDL, the associated sample results are qualified with a "U" flag (not detected) when the sample result is greater than the MDL but less than 5 times the blank concentration.

Inductively Coupled Plasma Interference Check Sample Analysis

Interference check samples were analyzed at the required frequency to verify the instrumental interelement and background correction factors. All check sample results met the acceptance criteria.

Matrix Spike Analysis

Matrix spike and matrix spike duplicate (MS/MSD) samples are used to measure method performance in the sample matrix. The MS/MSD data are not evaluated when the concentration of the unspiked sample is greater than 4 times the spike. The spike recoveries met the acceptance criteria for all analytes evaluated.

Laboratory Replicate Analysis

Laboratory replicate analyses are used to determine laboratory precision for each sample matrix. The relative percent difference for results that are greater than 5 times the PQL should be less than 20 percent (or less than the laboratory-derived control limits for organics). For results that are less than 5 times the PQL, the range should be no greater than the PQL. All replicate results met these criteria, demonstrating acceptable precision.

Laboratory Control Sample

Laboratory control samples were analyzed at the correct frequency to provide information on the accuracy of the analytical method and the overall laboratory performance, including sample preparation. All control sample results were acceptable.

Metals Serial Dilution

Serial dilutions were prepared and analyzed for the metals analyses to monitor chemical or physical interferences in the sample matrix. Serial dilution data are evaluated when the concentration of the undiluted sample is greater than 50 times the MDL. All evaluated serial dilution data were acceptable.

Completeness

Results were reported in the correct units for all analytes requested using contract-required laboratory qualifiers.

Chromatography Peak Integration

The integration of analyte peaks was reviewed for all PCB and ion chromatography data. All peak integrations were satisfactory.

Anion/Cation Balance

Environmental water should be electrically neutral. Expressed in milliequivalents per liter (meq/L), the sum of the anions should equal the sum of the cations. The anion/cation balance is

calculated as the difference between the anions and cations, divided by the sum of the anions and cations. The anion/cation balance can be used to identify potential errors in the analytical results. Typically, a charge balance of less than 10 percent is considered acceptable. When a charge balance is greater than 10 percent, the associated data are closely examined for error. If no errors are found, the results are considered to be acceptable. Table 4 shows the total anion and cation results from this event and the charge balance. (The alkalinity results measured by the laboratory were used in the calculation.)

Table 4. Comparison of Major Anions and Cations in Groundwater Samples

Location	Cations (meq/L)	Anions (meq/L)	Charge Balance, %
11(SG)	28.31	24.92	6.37
13(SG)	18.08	16.55	4.42
14(SG)	22.75	20.66	4.83
15(SG)	21.12	21.16	0.10
16(SG)	47.57	47.30	0.29
18(SG)	19.49	19.80	-0.80
20(M)	15.25	14.46	2.67
21(M)	20.62	19.43	2.99
22(M)	13.43	10.94	10.23
23(M)	8.10	8.16	0.33
2811	47.57	40.06	8.57
E(M)	15.90	15.63	0.86
F(M)	5.93	5.62	2.63
HMC951	14.70	13.37	4.75
I(SG)	35.15	36.24	1.52
L(SG)	29.90	30.18	0.47
OBS3	34.27	34.47	0.28
S(SG)	47.85	47.08	0.81
X(M)	19.21	18.81	1.05
Y2(M)	6.57	6.25	2.43

Location 22(M) had a charge balance slightly greater than 10 percent. There were no analytical errors identified during the review of the laboratory data for this location.

Electronic Data Deliverable (EDD) File

The EDD file arrived on June, 28, 2016. The EDD was examined to verify that the file was complete and in compliance with requirements. The contents of the file were compared to the requested analyses to ensure all and only the requested data are delivered. The contents of the EDD were manually examined to verify that the sample results accurately reflect the data contained in the sample data package.

General Data Validation Report

Task Code: BLU01.1-16050001 **Lab Code:** PAR **Validator:** Stephen Donivan **Validation Date:** 06-28-2016

Project: Bluewater Groundwater Monitoring **# Samples:** 21

Analysis Type: [X] General Chemistry [X] Metals [ ] Organics [ ] Radiochemistry

Chain of Custody

Present: OK Signed: OK Dated: OK

Sample

Integrity: OK Preservation OK Temperature: OK

Check	Summary
Holding Times:	All analyses were completed within the applicable holding times.
Detection Limits:	There were 20 detection limits above the contract required limits.
Field Duplicates:	There was 1 duplicate evaluated.

Metals Data Validation Worksheet

19-Jul-2016

Project: Bluewater Groundwater Monitoring **Task Code:** BLU01.1-16050001 **Lab Code:** PAR

Analyte	Method	Analysis Date	QC Type	Spike Recovery	Spike Dup Recovery	Lower Limit	Upper Limit	RPD	RPD Limit	ICSAB	Serial Dilution	CRI	Comments
Arsenic	SW-846 6020	05-23-2016	LCS	105.00		80	120		20				
Arsenic	SW-846 6020	05-23-2016	MB							95		80	MB < PQL
Arsenic	SW-846 6020	05-23-2016	MS	103.00		75	125		20				
Arsenic	SW-846 6020	05-23-2016	MSD		99.00	75	125	4	20				
Arsenic	SW-846 6020	05-23-2016	R						20				
Calcium	SW-846 6010	05-23-2016	LCS	103.00		80	120		20				
Calcium	SW-846 6010	05-23-2016	MB							105	1	112	MB < PQL
Calcium	SW-846 6010	05-23-2016	MS	103.00		80	120		20				
Calcium	SW-846 6010	05-23-2016	MSD		102.00	80	120	1	20				
Calcium	SW-846 6010	05-23-2016	R					1	20				
Magnesium	SW-846 6010	05-23-2016	LCS	101.00		80	120		20				

QC Types: LCS: Laboratory Control Sample MB: Method Blank MS: Matrix Spike MSD: Matrix Spike Duplicate R: Replicate

QC Checks: CRI: Quantitation limit check ICSAB: ICP interference check RPD: Relative Percent Difference

Metals Data Validation Worksheet

19-Jul-2016

Project: Bluewater Groundwater Monitoring **Task Code:** BLU01.1-16050001 **Lab Code:** PAR

Analyte	Method	Analysis Date	QC Type	Spike Recovery	Spike Dup Recovery	Lower Limit	Upper Limit	RPD	RPD Limit	ICSAB	Serial Dilution	CRI	Comments
Magnesium	SW-846 6010	05-23-2016	MB							106	2	107	MB < PQL
Magnesium	SW-846 6010	05-23-2016	MS	102.00		80	120		20				
Magnesium	SW-846 6010	05-23-2016	MSD		102.00	80	120	0	20				
Magnesium	SW-846 6010	05-23-2016	R					1	20				
Molybdenum	SW-846 6020	05-23-2016	LCS	102.00		80	120		20				
Molybdenum	SW-846 6020	05-23-2016	MB							102		89	MB < PQL
Molybdenum	SW-846 6020	05-23-2016	MS	103.00		75	125		20				
Molybdenum	SW-846 6020	05-23-2016	MSD		100.00	75	125	3	20				
Molybdenum	SW-846 6020	05-23-2016	R						20				
Potassium	SW-846 6010	05-23-2016	LCS	101.00		80	120		20				
Potassium	SW-846 6010	05-23-2016	MB									92	MB < PQL
Potassium	SW-846 6010	05-23-2016	MS	112.00		80	120		20				

QC Types: LCS: Laboratory Control Sample MB: Method Blank MS: Matrix Spike MSD: Matrix Spike Duplicate R: Replicate

QC Checks: CRI: Quantitation limit check ICSAB: ICP interference check RPD: Relative Percent Difference

Metals Data Validation Worksheet

19-Jul-2016

Project: Bluewater Groundwater Monitoring **Task Code:** BLU01.1-16050001 **Lab Code:** PAR

Analyte	Method	Analysis Date	QC Type	Spike Recovery	Spike Dup Recovery	Lower Limit	Upper Limit	RPD	RPD Limit	ICSAB	Serial Dilution	CRI	Comments
Potassium	SW-846 6010	05-23-2016	MSD		113.00	80	120	1	20				
Potassium	SW-846 6010	05-23-2016	R						20				
Selenium	SW-846 6020	05-23-2016	LCS	108.00		80	120		20				
Selenium	SW-846 6020	05-23-2016	MB							102		109	MB < PQL
Selenium	SW-846 6020	05-23-2016	MS	111.00		75	125		20				
Selenium	SW-846 6020	05-23-2016	MSD		106.00	75	125	5	20				
Selenium	SW-846 6020	05-23-2016	R						20				
Silicon	SW-846 6010	05-23-2016	LCS	105.00		80	120		20				
Silicon	SW-846 6010	05-23-2016	MB							98	1	122	MB < PQL
Silicon	SW-846 6010	05-23-2016	MS	108.00		80	120		20				
Silicon	SW-846 6010	05-23-2016	MSD		109.00	80	120	0	20				
Silicon	SW-846 6010	05-23-2016	R					1	20				

QC Types: LCS: Laboratory Control Sample MB: Method Blank MS: Matrix Spike MSD: Matrix Spike Duplicate R: Replicate

QC Checks: CRI: Quantitation limit check ICSAB: ICP interference check RPD: Relative Percent Difference

Metals Data Validation Worksheet

19-Jul-2016

Project: Bluewater Groundwater Monitoring **Task Code:** BLU01.1-16050001 **Lab Code:** PAR

Analyte	Method	Analysis Date	QC Type	Spike Recovery	Spike Dup Recovery	Lower Limit	Upper Limit	RPD	RPD Limit	ICSAB	Serial Dilution	CRI	Comments
Sodium	SW-846 6010	05-23-2016	LCS	102.00		80	120		20				
Sodium	SW-846 6010	05-23-2016	MB								6	97	MB < PQL
Sodium	SW-846 6010	05-23-2016	MS	109.00		80	120		20				
Sodium	SW-846 6010	05-23-2016	MSD		110.00	80	120	0	20				
Sodium	SW-846 6010	05-23-2016	R					1	20				
Uranium	SW-846 6020	05-23-2016	LCS	105.00		80	120		20				
Uranium	SW-846 6020	05-23-2016	MB							99	3	80	MB < PQL
Uranium	SW-846 6020	05-23-2016	MS	111.00		75	125		20				
Uranium	SW-846 6020	05-23-2016	MSD		110.00	75	125	1	20				
Uranium	SW-846 6020	05-23-2016	R					5	20				

QC Types: LCS: Laboratory Control Sample MB: Method Blank MS: Matrix Spike MSD: Matrix Spike Duplicate R: Replicate

QC Checks: CRI: Quantitation limit check ICSAB: ICP interference check RPD: Relative Percent Difference

Wet Chemistry Data Validation Worksheet

19-Jul-2016

Project: Bluewater Groundwater Monitoring **Task Code:** BLU01.1-16050001 **Lab Code:** PAR

Analyte	Method	Analysis Date	QC Type	Spike Recovery	Spike Dup Recovery	Lower Limit	Upper Limit	RPD	RPD Limit	Comments
ALK	EPA 310.1	05-16-2016	LCS	102.00		85	115		15	
ALK	EPA 310.1	05-16-2016	LCSD	100.00	100.00	85	115	3	15	
Alkalinity, Bicarbonate (HCO3) as CaCO3	EPA 310.1	05-16-2016	MB							MB < MDL
Alkalinity, Bicarbonate (HCO3) as CaCO3	EPA 310.1	05-16-2016	R					2	15	
Alkalinity, Bicarbonate (HCO3) as CaCO3	EPA 310.1	05-16-2016	R					0	15	
Alkalinity, Carbonate (CO3) as CaCO3	EPA 310.1	05-16-2016	MB							MB < MDL
Alkalinity, Carbonate (CO3) as CaCO3	EPA 310.1	05-16-2016	R						15	
Alkalinity, Carbonate (CO3) as CaCO3	EPA 310.1	05-16-2016	R						15	
Chloride	SW-846 9056	05-18-2016	MB							MB < MDL
Chloride	SW-846 9056	05-18-2016	MS	109.00		85	115		15	
Chloride	SW-846 9056	05-18-2016	MSD		107.00	85	115	2	15	
Chloride	SW-846 9056	05-19-2016	LCS	105.00		90	110		15	
Chloride	SW-846 9056	05-19-2016	LCS	106.00		90	110		15	
Chloride	SW-846 9056	05-19-2016	MB							MB < MDL
Chloride	SW-846 9056	05-19-2016	MS	104.00		85	115		15	
Chloride	SW-846 9056	05-19-2016	MSD		106.00	85	115	2	15	
Nitrate + Nitrite as Nitrogen	EPA 353.2	05-25-2016	LCS	99.69		90	110		20	
Nitrate + Nitrite as Nitrogen	EPA 353.2	05-25-2016	MB							MB < MDL
Nitrate + Nitrite as Nitrogen	EPA 353.2	05-25-2016	MS	81.00		75	125		20	
Nitrate + Nitrite as Nitrogen	EPA 353.2	05-25-2016	MSD		98.00	75	125	19	20	

QC Types: LCS: Laboratory Control Sample MB: Method Blank MS: Matrix Spike MSD: Matrix Spike Duplicate R: Replicate

QC Checks: RPD: Relative Percent Difference

Wet Chemistry Data Validation Worksheet

19-Jul-2016

Project: Bluewater Groundwater Monitoring **Task Code:** BLU01.1-16050001 **Lab Code:** PAR

Analyte	Method	Analysis Date	QC Type	Spike Recovery	Spike Dup Recovery	Lower Limit	Upper Limit	RPD	RPD Limit	Comments
Sulfate	SW-846 9056	05-18-2016	MB							MB < MDL
Sulfate	SW-846 9056	05-18-2016	MS	109.00		85	115		15	
Sulfate	SW-846 9056	05-18-2016	MSD		106.00	85	115	1	15	
Sulfate	SW-846 9056	05-19-2016	LCS	108.00		90	110		15	
Sulfate	SW-846 9056	05-19-2016	LCS	106.00		90	110		15	
Sulfate	SW-846 9056	05-19-2016	MB							MB < MDL
Sulfate	SW-846 9056	05-19-2016	MS	104.00		85	115		15	
Sulfate	SW-846 9056	05-19-2016	MSD		106.00	85	115	2	15	
Total Dissolved Solids	EPA160.1	05-17-2016	LCS	100.00		85	115		5	
Total Dissolved Solids	EPA160.1	05-17-2016	LCSD	103.00	103.00	85	115	3	5	
Total Dissolved Solids	EPA160.1	05-17-2016	MB							MB < MDL
Total Dissolved Solids	EPA160.1	05-17-2016	R					2	5	
Total Dissolved Solids	EPA160.1	05-17-2016	R					0	5	

QC Types: LCS: Laboratory Control Sample MB: Method Blank MS: Matrix Spike MSD: Matrix Spike Duplicate R: Replicate

QC Checks: RPD: Relative Percent Difference

Sampling Quality Control Assessment

The following information summarizes and assesses quality control for this sampling event.

Sampling Protocol

Sample results for all wells were qualified with an "F" flag, indicating the wells were purged and sampled using the low-flow method and Category I criteria, with the following exceptions:

- As per Program Directive BLU-2014-01, wells HMC-951, OBS-3, and S(SG) were not sampled using low-flow criteria. These wells were sampled using high-volume and high-flow submersible pumps.
- Wells 23(M) and E(M) were purged and sampled using Category II or III criteria. For these wells, the water level drawdown during the purge did not meet the Category I criterion because these wells produced water at a rate less than the minimum low-flow purging rate and were classified as Category II or III. The sample results for these wells were qualified with a "Q" flag (qualitative), indicating the samples were not collected under the optimal conditions of the Category I stability criteria.

Equipment Blank Assessment

No equipment blanks were taken. All samples were collected using dedicated equipment that did not require equipment blanks.

Field Duplicate Analysis

Field duplicate samples are collected and analyzed as an indication of overall precision of the measurement process. The precision observed includes both field and laboratory precision and has more variability than laboratory duplicates, which measure only laboratory performance. A duplicate sample was collected from location 16(SG). The relative percent difference for duplicate results that are greater than 5 times the PQL should be less than 20 percent. For results that are less than 5 times the PQL, the range should be no greater than the PQL. The duplicate results met the criteria, demonstrating acceptable overall precision.

Validation Report: Field Duplicates

28-Jun-2016

Project: Bluewater Groundwater Monitoring **Task Code:** BLU01.1-16050001 Lab Code: PAR

	Duplicate: BLU01.1-16050001-021				Sample: BLU01.1-16050001-005 16(SG)						
Analyte	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**Result**	**Qualifiers**	**Uncert.**	**Dilution**	**RPD**	**RER**	**Units**
Alkalinity, Bicarbonate (HCO3) as CaCO3	420.00			1	420.00			1	0		mg/L
Alkalinity, Carbonate (CO3) as CaCO3	20.00	U		1	20.00	U		1			mg/L
Arsenic	6.7e-04	J		10	1.2e-03	U		100			mg/L
Calcium	330.00			1	330.00			1	0		mg/L
Chloride	460.00			40	460.00			40	0		mg/L
Magnesium	160.00			1	160.00			1	0		mg/L
Molybdenum	2.7e-03			10	3.2e-03	U		100			mg/L
Nitrate + Nitrite as Nitrogen	4.00			10	4.10			10	2.5		mg/L
Potassium	21.00			1	21.00			1	0		mg/L
Selenium	0.01			10	0.01			100			mg/L
Silica	20.00			10	20.00			10	0		mg/L
Sodium	400.00			10	400.00			10	0		mg/L
Sulfate	1300.00			40	1300.00			40	0		mg/L
Uranium	1.40			100	1.30			100	7.4		mg/L

QC Checks: RPD: Relative Percent Difference RER: Relative Error Ratio

Certification

All laboratory analytical quality control criteria were met except as qualified in this report. The data qualifiers listed on the database reports are defined on the last page of each report. All data in this package are considered validated and available for use.

Laboratory Coordinator: Stephen Donivan — Stephen Donivan — 9-13-2016 — Date

Data Validation Lead: Stephen Donivan — Stephen Donivan — 9-13-2016 — Date

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Attachment 1

Assessment of Anomalous Data

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Potential Outliers Report

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Potential Outliers Report

Potential outliers are results that lie outside the historical range, possibly due to transcription errors, data calculation errors, or measurement system problems. However, outliers can also represent true values outside the historical range. Potential outliers are identified by generating the Data Validation Outliers Report from data in the environmental database. The new data are compared to historical values and data that fall outside the historical data range are listed on the report along with the historical minimum and maximum values. The potential outliers are further reviewed and may be subject to statistical evaluation using the ProUCL application developed by the EPA. The review also includes an evaluation of any notable trends in the data that may indicate the outliers represent true extreme values.

There were 9 results that were outside the historical range and identified as statistical outliers using ProUCL, as shown in the Data Validation Outliers Report. Most of the outliers are low concentration potassium results that are trending upward. There were no analytical errors associated with these data and the data from this event are acceptable as qualified.

Data Validation Outliers Report - No Field Parameters **Report Date: 07/19/2016**

Comparison to Historical Data Since: 7/19/2005 12:00:00 AM Fraction: Any

Task: BLU01.1-16050001

Analyte	Location	Analysis Location	Units	Fraction	Result	Type	HistMIN	HistMAX	HistSetSize	Outlier?
Potassium	11(SG)	LB	mg/L	T	17.00	> HistMAX	10	12	9	Yes
Calcium	11(SG)	LB	mg/L	T	190.00	> HistMAX	161	187	9	No
Arsenic	11(SG)	LB	mg/L	T	1.6e-03	< HistMIN	0.0017	0.0242	9	No
Selenium	11(SG)	LB	mg/L	T	6.6e-04	< HistMIN	0.0015	0.0075	9	No
Potassium	13(SG)	LB	mg/L	T	7.70	> HistMAX	5.55	6.4	8	Yes
Calcium	13(SG)	LB	mg/L	T	180.00	> HistMAX	149	177	8	No
Magnesium	14(SG)	LB	mg/L	T	57.00	> HistMAX	40.8	56	9	No
Potassium	14(SG)	LB	mg/L	T	7.90	> HistMAX	4.49	5.7	9	Yes
Sulfate	14(SG)	LB	mg/L	N	510.00	> HistMAX	229	500	9	No
Magnesium	15(SG)	LB	mg/L	T	39.00	> HistMAX	27.9	38.2	9	No
Potassium	15(SG)	LB	mg/L	T	9.40	> HistMAX	5.34	6.8	9	Yes
Sulfate	15(SG)	LB	mg/L	N	460.00	> HistMAX	265	456	9	No
Potassium	16(SG)	LB	mg/L	T	21.00	> HistMAX	11.4	14	8	Yes
Molybdenum	16(SG)	LB	mg/L	T	3.2e-03	> HistMAX	0.0021	0.00288	8	No
Selenium	16(SG)	LB	mg/L	T	0.01	< HistMIN	0.014	0.02	8	No
Potassium	18(SG)	LB	mg/L	T	9.40	> HistMAX	6.54	8.09	8	Yes
Total Dissolved Solids	20(M)	LB	mg/L	N	900.00	< HistMIN	951	990	8	Yes
Potassium	20(M)	LB	mg/L	T	5.40	> HistMAX	4.17	5	8	No

Data Validation Outliers Report - No Field Parameters **Report Date: 07/19/2016**

Comparison to Historical Data Since: 7/19/2005 12:00:00 AM Fraction: Any

Task: BLU01.1-16050001

Analyte	Location	Analysis Location	Units	Fraction	Result	Type	HistMIN	HistMAX	HistSetSize	Outlier?
Uranium	20(M)	LB	mg/L	T	0.01	< HistMIN	0.011	0.0197	8	No
Nitrate + Nitrite as Nitrogen	21(M)	LB	mg/L	N	14.00	> HistMAX	7.9	13	14	No
Potassium	21(M)	LB	mg/L	T	8.30	> HistMAX	5.13	7.9	14	No
Total Dissolved Solids	23(M)	LB	mg/L	N	500.00	< HistMIN	510	799	7	No
Potassium	23(M)	LB	mg/L	T	3.60	< HistMIN	3.7	6.76	7	No
Molybdenum	23(M)	LB	mg/L	T	4.4e-03	< HistMIN	0.0055	0.00842	7	No
Sulfate	23(M)	LB	mg/L	N	160.00	< HistMIN	190	325	7	No
Chloride	23(M)	LB	mg/L	N	54.00	< HistMIN	78	94.2	7	Yes
Sulfate	E(M)	LB	mg/L	N	710.00	< HistMIN	747	960	13	No
Chloride	E(M)	LB	mg/L	N	26.00	< HistMIN	30	42	13	No
Total Dissolved Solids	HMC-951	LB	mg/L	N	790.00	< HistMIN	896	950	7	No
Potassium	HMC-951	LB	mg/L	T	6.10	> HistMAX	4.67	5.6	7	No
Uranium	HMC-951	LB	mg/L	T	0.02	< HistMIN	0.03	0.0332	7	No
Selenium	HMC-951	LB	mg/L	T	5.7e-03	< HistMIN	0.00592	0.0078	7	No
Sulfate	HMC-951	LB	mg/L	N	330.00	< HistMIN	356	430	7	Yes
Chloride	HMC-951	LB	mg/L	N	55.00	< HistMIN	58.5	82	7	No
Potassium	I(SG)	LB	mg/L	T	19.00	> HistMAX	4.5	14	18	No
Total Dissolved Solids	L(SG)	LB	mg/L	N	1800.00	> HistMAX	769	1770	16	No

Data Validation Outliers Report - No Field Parameters **Report Date: 07/19/2016**

Comparison to Historical Data Since: 7/19/2005 12:00:00 AM Fraction: Any

Task: BLU01.1-16050001

Analyte	Location	Analysis Location	Units	Fraction	Result	Type	HistMIN	HistMAX	HistSetSize	Outlier?
Potassium	S(SG)	LB	mg/L	T	22.00	> HistMAX	1.4	21	14	No
Nitrate + Nitrite as Nitrogen	X(M)	LB	mg/L	N	8.10	< HistMIN	8.71	11.1	7	No
Potassium	X(M)	LB	mg/L	T	7.50	> HistMAX	5.23	5.9	7	No

FRACTION: D = Dissolved N = NA T = Total

Attachment 2

Data Presentation

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Groundwater Quality Data

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Groundwater Quality Data by Location For Site BLU01, Bluewater Disposal Site

Location: 11(SG)

Report Date: 07/21/2016

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
Alkalinity, Bicarbonate (HCO_3) as $CaCO_3$	mg/L	05/10/2016	F	N	480.00		20.00		F	Y
Alkalinity, Carbonate (CO_3) as $CaCO_3$	mg/L	05/10/2016	F	N	20.00		20.00	U	F	Y
Arsenic	mg/L	05/10/2016	F	T	1.6e-03		0.00012		F	Y
Calcium	mg/L	05/10/2016	F	T	190.00		0.012		F	Y
Chloride	mg/L	05/10/2016	F	N	200.00		1.5		F	Y
Magnesium	mg/L	05/10/2016	F	T	65.00		0.013		F	Y
Molybdenum	mg/L	05/10/2016	F	T	9.4e-04		0.00032	J	F	Y
Nitrate + Nitrite as Nitrogen	mg/L	05/10/2016	F	N	0.003		0.003	U	F	Y
Potassium	mg/L	05/10/2016	F	T	17.00		0.11		F	Y
Selenium	mg/L	05/10/2016	F	T	0.00066		0.00066	U	F	Y
Silica	mg/L	05/10/2016	F	T	18.00		0.0095		F	Y
Silicon	mg/L	05/10/2016	F	T	8.30		0.0044		F	Y
Sodium	mg/L	05/10/2016	F	T	300.00		0.066		F	Y
Sulfate	mg/L	05/10/2016	F	N	700.00		7.5		F	Y
Total Dissolved Solids	mg/L	05/10/2016	F	N	1800.00		40.00		F	Y
Uranium	mg/L	05/10/2016	F	T	0.01		0.000012		F	Y

Groundwater Quality Data by Location For Site BLU01, Bluewater Disposal Site

Location: 13(SG)

Report Date: 07/21/2016

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
Alkalinity, Bicarbonate (HCO_3) as $CaCO_3$	mg/L	05/11/2016	F	N	300.00		20.00		F	Y
Alkalinity, Carbonate (CO_3) as $CaCO_3$	mg/L	05/11/2016	F	N	20.00		20.00	U	F	Y
Arsenic	mg/L	05/11/2016	F	T	4.6e-03		0.00012		F	Y
Calcium	mg/L	05/11/2016	F	T	180.00		0.012		F	Y
Chloride	mg/L	05/11/2016	F	N	90.00		0.6		F	Y
Magnesium	mg/L	05/11/2016	F	T	50.00		0.013		F	Y
Molybdenum	mg/L	05/11/2016	F	T	1.4e-03		0.00032	J	F	Y
Nitrate + Nitrite as Nitrogen	mg/L	05/11/2016	F	N	4.30		0.03		F	Y
Potassium	mg/L	05/11/2016	F	T	7.70		0.11		F	Y
Selenium	mg/L	05/11/2016	F	T	6.8e-03		0.00066		F	Y
Silica	mg/L	05/11/2016	F	T	17.00		0.0095		F	Y
Silicon	mg/L	05/11/2016	F	T	7.80		0.0044		F	Y
Sodium	mg/L	05/11/2016	F	T	110.00		0.0066		F	Y
Sulfate	mg/L	05/11/2016	F	N	420.00		3		F	Y
Total Dissolved Solids	mg/L	05/11/2016	F	N	1000.00		40.00		F	Y
Uranium	mg/L	05/11/2016	F	T	0.10		0.000012		F	Y

Groundwater Quality Data by Location For Site BLU01, Bluewater Disposal Site

Location: 14(SG)

Report Date: 07/21/2016

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
Alkalinity, Bicarbonate (HCO_3) as $CaCO_3$	mg/L	05/11/2016	F	N	430.00		20.00		F	Y
Alkalinity, Carbonate (CO_3) as $CaCO_3$	mg/L	05/11/2016	F	N	20.00		20.00	U	F	Y
Arsenic	mg/L	05/11/2016	F	T	5.2e-03		0.00012		F	Y
Calcium	mg/L	05/11/2016	F	T	140.00		0.012		F	Y
Chloride	mg/L	05/11/2016	F	N	150.00		1.2		F	Y
Magnesium	mg/L	05/11/2016	F	T	57.00		0.013		F	Y
Molybdenum	mg/L	05/11/2016	F	T	2.0e-03		0.00032		F	Y
Nitrate + Nitrite as Nitrogen	mg/L	05/11/2016	F	N	0.003		0.003	U	F	Y
Potassium	mg/L	05/11/2016	F	T	7.90		0.11		F	Y
Selenium	mg/L	05/11/2016	F	T	0.00066		0.00066	U	F	Y
Silica	mg/L	05/11/2016	F	T	27.00		0.0095		F	Y
Silicon	mg/L	05/11/2016	F	T	13.00		0.0044		F	Y
Sodium	mg/L	05/11/2016	F	T	250.00		0.066		F	Y
Sulfate	mg/L	05/11/2016	F	N	510.00		6		F	Y
Total Dissolved Solids	mg/L	05/11/2016	F	N	1400.00		40.00		F	Y
Uranium	mg/L	05/11/2016	F	T	0.06		0.000012		F	Y

Groundwater Quality Data by Location For Site BLU01, Bluewater Disposal Site

Location: 15(SG)

Report Date: 07/21/2016

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
Alkalinity, Bicarbonate (HCO_3) as $CaCO_3$	mg/L	05/11/2016	F	N	380.00		20.00		F	Y
Alkalinity, Carbonate (CO_3) as $CaCO_3$	mg/L	05/11/2016	F	N	20.00		20.00	U	F	Y
Arsenic	mg/L	05/11/2016	F	T	3.8e-03		0.00012		F	Y
Calcium	mg/L	05/11/2016	F	T	110.00		0.012		F	Y
Chloride	mg/L	05/11/2016	F	N	170.00		1.2		F	Y
Magnesium	mg/L	05/11/2016	F	T	39.00		0.013		F	Y
Molybdenum	mg/L	05/11/2016	F	T	4.8e-03		0.00032		F	Y
Nitrate + Nitrite as Nitrogen	mg/L	05/11/2016	F	N	0.003		0.003	U	F	Y
Potassium	mg/L	05/11/2016	F	T	9.40		0.11		F	Y
Selenium	mg/L	05/11/2016	F	T	0.00066		0.00066	U	F	Y
Silica	mg/L	05/11/2016	F	T	21.00		0.0095		F	Y
Silicon	mg/L	05/11/2016	F	T	9.80		0.0044		F	Y
Sodium	mg/L	05/11/2016	F	T	280.00		0.066		F	Y
Sulfate	mg/L	05/11/2016	F	N	460.00		6		F	Y
Total Dissolved Solids	mg/L	05/11/2016	F	N	1200.00		40.00		F	Y
Uranium	mg/L	05/11/2016	F	T	0.07		0.000012		F	Y

Groundwater Quality Data by Location For Site BLU01, Bluewater Disposal Site

Location: 16(SG)

Report Date: 07/21/2016

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
Alkalinity, Bicarbonate (HCO_3) as $CaCO_3$	mg/L	05/11/2016	F	N	420.00		20.00		F	Y
Alkalinity, Carbonate (CO_3) as $CaCO_3$	mg/L	05/11/2016	F	N	20.00		20.00	U	F	Y
Arsenic	mg/L	05/11/2016	F	T	0.0012		0.0012	U	F	Y
Calcium	mg/L	05/11/2016	F	T	330.00		0.012		F	Y
Chloride	mg/L	05/11/2016	F	N	460.00		2.4		F	Y
Magnesium	mg/L	05/11/2016	F	T	160.00		0.013		F	Y
Molybdenum	mg/L	05/11/2016	F	T	0.0032		0.0032	U	F	Y
Nitrate + Nitrite as Nitrogen	mg/L	05/11/2016	F	N	4.10		0.03		F	Y
Potassium	mg/L	05/11/2016	F	T	21.00		0.11		F	Y
Selenium	mg/L	05/11/2016	F	T	0.01		0.0066		F	Y
Silica	mg/L	05/11/2016	F	T	20.00		0.0095		F	Y
Silicon	mg/L	05/11/2016	F	T	9.40		0.0044		F	Y
Sodium	mg/L	05/11/2016	F	T	400.00		0.066		F	Y
Sulfate	mg/L	05/11/2016	F	N	1300.00		12		F	Y
Total Dissolved Solids	mg/L	05/11/2016	F	N	2900.00		80.00		F	Y
Uranium	mg/L	05/11/2016	F	T	1.30		0.00012		F	Y

Groundwater Quality Data by Location For Site BLU01, Bluewater Disposal Site

Location: 18(SG)

Report Date: 07/21/2016

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
Alkalinity, Bicarbonate (HCO_3) as $CaCO_3$	mg/L	05/11/2016	F	N	340.00		20.00		F	Y
Alkalinity, Carbonate (CO_3) as $CaCO_3$	mg/L	05/11/2016	F	N	20.00		20.00	U	F	Y
Arsenic	mg/L	05/11/2016	F	T	1.7e-03		0.00012		F	Y
Calcium	mg/L	05/11/2016	F	T	180.00		0.012		F	Y
Chloride	mg/L	05/11/2016	F	N	110.00		1.2		F	Y
Magnesium	mg/L	05/11/2016	F	T	56.00		0.013		F	Y
Molybdenum	mg/L	05/11/2016	F	T	1.6e-03		0.00032	J	F	Y
Nitrate + Nitrite as Nitrogen	mg/L	05/11/2016	F	N	3.10		0.03		F	Y
Potassium	mg/L	05/11/2016	F	T	9.40		0.11		F	Y
Selenium	mg/L	05/11/2016	F	T	5.7e-03		0.00066		F	Y
Silica	mg/L	05/11/2016	F	T	17.00		0.0095		F	Y
Silicon	mg/L	05/11/2016	F	T	7.80		0.0044		F	Y
Sodium	mg/L	05/11/2016	F	T	130.00		0.0066		F	Y
Sulfate	mg/L	05/11/2016	F	N	500.00		6		F	Y
Total Dissolved Solids	mg/L	05/11/2016	F	N	1200.00		40.00		F	Y
Uranium	mg/L	05/11/2016	F	T	0.22		0.000012		F	Y

Groundwater Quality Data by Location For Site BLU01, Bluewater Disposal Site

Location: 20(M)

Report Date: 07/21/2016

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
Alkalinity, Bicarbonate (HCO_3) as $CaCO_3$	mg/L	05/10/2016	F	N	250.00		20.00		F	Y
Alkalinity, Carbonate (CO_3) as $CaCO_3$	mg/L	05/10/2016	F	N	20.00		20.00	U	F	Y
Arsenic	mg/L	05/10/2016	F	T	0.01		0.00012		F	Y
Calcium	mg/L	05/10/2016	F	T	160.00		0.012		F	Y
Chloride	mg/L	05/10/2016	F	N	59.00		0.75		F	Y
Magnesium	mg/L	05/10/2016	F	T	38.00		0.013		F	Y
Molybdenum	mg/L	05/10/2016	F	T	2.0e-03		0.00032		F	Y
Nitrate + Nitrite as Nitrogen	mg/L	05/10/2016	F	N	3.30		0.03		F	Y
Potassium	mg/L	05/10/2016	F	T	5.40		0.11		F	Y
Selenium	mg/L	05/10/2016	F	T	4.0e-03		0.00066		F	Y
Silica	mg/L	05/10/2016	F	T	26.00		0.0095		F	Y
Silicon	mg/L	05/10/2016	F	T	12.00		0.0044		F	Y
Sodium	mg/L	05/10/2016	F	T	92.00		0.0066		F	Y
Sulfate	mg/L	05/10/2016	F	N	400.00		3.8		F	Y
Total Dissolved Solids	mg/L	05/10/2016	F	N	900.00		40.00		F	Y
Uranium	mg/L	05/10/2016	F	T	0.01		0.000012		F	Y

Groundwater Quality Data by Location For Site BLU01, Bluewater Disposal Site

Location: 21(M)

Report Date: 07/21/2016

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
Alkalinity, Bicarbonate (HCO_3) as $CaCO_3$	mg/L	05/11/2016	F	N	280.00		20.00		F	Y
Alkalinity, Carbonate (CO_3) as $CaCO_3$	mg/L	05/11/2016	F	N	20.00		20.00	U	F	Y
Arsenic	mg/L	05/11/2016	F	T	2.8e-03		0.00012		F	Y
Calcium	mg/L	05/11/2016	F	T	160.00		0.012		F	Y
Chloride	mg/L	05/11/2016	F	N	140.00		1.2		F	Y
Magnesium	mg/L	05/11/2016	F	T	40.00		0.013		F	Y
Molybdenum	mg/L	05/11/2016	F	T	9.0e-04		0.00032	J	F	Y
Nitrate + Nitrite as Nitrogen	mg/L	05/11/2016	F	N	14.00		0.06		F	Y
Potassium	mg/L	05/11/2016	F	T	8.30		0.11		F	Y
Selenium	mg/L	05/11/2016	F	T	0.01		0.00066		F	Y
Silica	mg/L	05/11/2016	F	T	25.00		0.0095		F	Y
Silicon	mg/L	05/11/2016	F	T	12.00		0.0044		F	Y
Sodium	mg/L	05/11/2016	F	T	210.00		0.066		F	Y
Sulfate	mg/L	05/11/2016	F	N	500.00		6		F	Y
Total Dissolved Solids	mg/L	05/11/2016	F	N	1300.00		40.00		F	Y
Uranium	mg/L	05/11/2016	F	T	0.13		0.000012		F	Y

Groundwater Quality Data by Location For Site BLU01, Bluewater Disposal Site

Location: 22(M)

Report Date: 07/21/2016

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
Alkalinity, Bicarbonate (HCO_3) as $CaCO_3$	mg/L	05/11/2016	F	N	330.00		20.00		F	Y
Alkalinity, Carbonate (CO_3) as $CaCO_3$	mg/L	05/11/2016	F	N	20.00		20.00	U	F	Y
Arsenic	mg/L	05/11/2016	F	T	3.7e-03		0.00012		F	Y
Calcium	mg/L	05/11/2016	F	T	87.00		0.012		F	Y
Chloride	mg/L	05/11/2016	F	N	28.00		0.75		F	Y
Magnesium	mg/L	05/11/2016	F	T	24.00		0.013		F	Y
Molybdenum	mg/L	05/11/2016	F	T	1.9e-03		0.00032	J	F	Y
Nitrate + Nitrite as Nitrogen	mg/L	05/11/2016	F	N	31.00		0.15		F	Y
Potassium	mg/L	05/11/2016	F	T	6.00		0.11		F	Y
Selenium	mg/L	05/11/2016	F	T	3.3e-03		0.00066		F	Y
Silica	mg/L	05/11/2016	F	T	32.00		0.0095		F	Y
Silicon	mg/L	05/11/2016	F	T	15.00		0.0044		F	Y
Sodium	mg/L	05/11/2016	F	T	160.00		0.066		F	Y
Sulfate	mg/L	05/11/2016	F	N	200.00		3.8		F	Y
Total Dissolved Solids	mg/L	05/11/2016	F	N	990.00		20.00		F	Y
Uranium	mg/L	05/11/2016	F	T	0.36		0.000012		F	Y

Groundwater Quality Data by Location For Site BLU01, Bluewater Disposal Site

Location: 23(M)

Report Date: 07/21/2016

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
Alkalinity, Bicarbonate (HCO_3) as $CaCO_3$	mg/L	05/10/2016	F	N	160.00		20.00		FQ	Y
Alkalinity, Carbonate (CO_3) as $CaCO_3$	mg/L	05/10/2016	F	N	20.00		20.00	U	FQ	Y
Arsenic	mg/L	05/10/2016	F	D	2.7e-04		0.00012	J	FQ	Y
Calcium	mg/L	05/10/2016	F	D	83.00		0.012		FQ	Y
Chloride	mg/L	05/10/2016	F	N	54.00		0.6		FQ	Y
Magnesium	mg/L	05/10/2016	F	D	19.00		0.013		FQ	Y
Molybdenum	mg/L	05/10/2016	F	D	4.4e-03		0.00032		FQ	Y
Nitrate + Nitrite as Nitrogen	mg/L	05/10/2016	F	N	2.60		0.03		FQ	Y
Potassium	mg/L	05/10/2016	F	D	3.60		0.11		FQ	Y
Selenium	mg/L	05/10/2016	F	D	2.9e-03		0.00066		FQ	Y
Silica	mg/L	05/10/2016	F	D	13.00		0.0095		FQ	Y
Silicon	mg/L	05/10/2016	F	D	6.30		0.0044		FQ	Y
Sodium	mg/L	05/10/2016	F	D	53.00		0.0066		FQ	Y
Sulfate	mg/L	05/10/2016	F	N	160.00		3		FQ	Y
Total Dissolved Solids	mg/L	05/10/2016	F	N	500.00		20.00		FQ	Y
Uranium	mg/L	05/10/2016	F	D	0.02		0.000012		FQ	Y

Groundwater Quality Data by Location For Site BLU01, Bluewater Disposal Site

Location: E(M)

Report Date: 07/21/2016

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
Alkalinity, Bicarbonate (HCO_3) as $CaCO_3$	mg/L	05/11/2016	F	N	53.00		20.00		FQ	Y
Alkalinity, Carbonate (CO_3) as $CaCO_3$	mg/L	05/11/2016	F	N	20.00		20.00	U	FQ	Y
Arsenic	mg/L	05/11/2016	F	D	0.00012		0.00012	U	FQ	Y
Calcium	mg/L	05/11/2016	F	D	190.00		0.012		FQ	Y
Chloride	mg/L	05/11/2016	F	N	26.00		0.75		FQ	Y
Magnesium	mg/L	05/11/2016	F	D	49.00		0.013		FQ	Y
Molybdenum	mg/L	05/11/2016	F	D	5.4e-04		0.00032	J	FQ	Y
Nitrate + Nitrite as Nitrogen	mg/L	05/11/2016	F	N	0.01		0.003		FQ	Y
Potassium	mg/L	05/11/2016	F	D	4.70		0.11		FQ	Y
Selenium	mg/L	05/11/2016	F	D	0.00066		0.00066	U	FQ	Y
Silica	mg/L	05/11/2016	F	D	1.10		0.0095		FQ	Y
Silicon	mg/L	05/11/2016	F	D	0.51		0.0044		FQ	Y
Sodium	mg/L	05/11/2016	F	D	52.00		0.0066		FQ	Y
Sulfate	mg/L	05/11/2016	F	N	710.00		3.8		FQ	Y
Total Dissolved Solids	mg/L	05/11/2016	F	N	1100.00		40.00		FQ	Y
Uranium	mg/L	05/11/2016	F	D	3.0e-05		0.000012	J	FQ	Y

Groundwater Quality Data by Location For Site BLU01, Bluewater Disposal Site

Location: F(M)

Report Date: 07/21/2016

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
Alkalinity, Bicarbonate (HCO_3) as $CaCO_3$	mg/L	05/11/2016	F	N	170.00		20.00		F	Y
Alkalinity, Carbonate (CO_3) as $CaCO_3$	mg/L	05/11/2016	F	N	20.00		20.00	U	F	Y
Arsenic	mg/L	05/11/2016	F	T	1.1e-03		0.00012		F	Y
Calcium	mg/L	05/11/2016	F	T	70.00		0.012		F	Y
Chloride	mg/L	05/11/2016	F	N	12.00		0.48		F	Y
Magnesium	mg/L	05/11/2016	F	T	18.00		0.013		F	Y
Molybdenum	mg/L	05/11/2016	F	T	1.0e-03		0.00032	J	F	Y
Nitrate + Nitrite as Nitrogen	mg/L	05/11/2016	F	N	0.71		0.003		F	Y
Potassium	mg/L	05/11/2016	F	T	3.20		0.11		F	Y
Selenium	mg/L	05/11/2016	F	T	9.2e-04		0.00066	J	F	Y
Silica	mg/L	05/11/2016	F	T	31.00		0.0095		F	Y
Silicon	mg/L	05/11/2016	F	T	14.00		0.0044		F	Y
Sodium	mg/L	05/11/2016	F	T	20.00		0.0066		F	Y
Sulfate	mg/L	05/11/2016	F	N	100.00		2.4		F	Y
Total Dissolved Solids	mg/L	05/11/2016	F	N	370.00		20.00		F	Y
Uranium	mg/L	05/11/2016	F	T	7.2e-03		0.000012		F	Y

Groundwater Quality Data by Location For Site BLU01, Bluewater Disposal Site

Location: HMC-951

Report Date: 07/21/2016

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
Alkalinity, Bicarbonate (HCO_3) as $CaCO_3$	mg/L	05/10/2016	F	N	250.00		20.00			Y
Alkalinity, Carbonate (CO_3) as $CaCO_3$	mg/L	05/10/2016	F	N	20.00		20.00	U		Y
Arsenic	mg/L	05/10/2016	F	T	2.5e-03		0.00012			Y
Calcium	mg/L	05/10/2016	F	T	150.00		0.012			Y
Chloride	mg/L	05/10/2016	F	N	55.00		0.75			Y
Magnesium	mg/L	05/10/2016	F	T	44.00		0.013			Y
Molybdenum	mg/L	05/10/2016	F	T	1.1e-03		0.00032	J		Y
Nitrate + Nitrite as Nitrogen	mg/L	05/10/2016	F	N	4.30		0.03			Y
Potassium	mg/L	05/10/2016	F	T	6.10		0.11			Y
Selenium	mg/L	05/10/2016	F	T	5.7e-03		0.00066			Y
Silica	mg/L	05/10/2016	F	T	17.00		0.0095			Y
Silicon	mg/L	05/10/2016	F	T	7.90		0.0044			Y
Sodium	mg/L	05/10/2016	F	T	79.00		0.0066			Y
Sulfate	mg/L	05/10/2016	F	N	330.00		3.8			Y
Total Dissolved Solids	mg/L	05/10/2016	F	N	790.00		20.00			Y
Uranium	mg/L	05/10/2016	F	T	0.02		0.000012			Y

Groundwater Quality Data by Location For Site BLU01, Bluewater Disposal Site

Location: I(SG)

Report Date: 07/21/2016

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
Alkalinity, Bicarbonate (HCO_3) as $CaCO_3$	mg/L	05/10/2016	F	N	420.00		20.00		F	Y
Alkalinity, Carbonate (CO_3) as $CaCO_3$	mg/L	05/10/2016	F	N	20.00		20.00	U	F	Y
Arsenic	mg/L	05/10/2016	F	T	2.1e-04		0.00012	J	F	Y
Calcium	mg/L	05/10/2016	F	T	270.00		0.012		F	Y
Chloride	mg/L	05/10/2016	F	N	300.00		1.5		F	Y
Magnesium	mg/L	05/10/2016	F	T	99.00		0.013		F	Y
Molybdenum	mg/L	05/10/2016	F	T	1.1e-03		0.00032	J	F	Y
Nitrate + Nitrite as Nitrogen	mg/L	05/10/2016	F	N	1.30		0.015		F	Y
Potassium	mg/L	05/10/2016	F	T	19.00		0.11		F	Y
Selenium	mg/L	05/10/2016	F	T	8.3e-03		0.00066		F	Y
Silica	mg/L	05/10/2016	F	T	15.00		0.0095		F	Y
Silicon	mg/L	05/10/2016	F	T	7.10		0.0044		F	Y
Sodium	mg/L	05/10/2016	F	T	300.00		0.066		F	Y
Sulfate	mg/L	05/10/2016	F	N	980.00		7.5		F	Y
Total Dissolved Solids	mg/L	05/10/2016	F	N	2100.00		80.00		F	Y
Uranium	mg/L	05/10/2016	F	T	0.32		0.000012		F	Y

Groundwater Quality Data by Location For Site BLU01, Bluewater Disposal Site

Location: L(SG)

Report Date: 07/21/2016

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
Alkalinity, Bicarbonate (HCO_3) as $CaCO_3$	mg/L	05/10/2016	F	N	570.00		20.00		F	Y
Alkalinity, Carbonate (CO_3) as $CaCO_3$	mg/L	05/10/2016	F	N	20.00		20.00	U	F	Y
Arsenic	mg/L	05/10/2016	F	T	0.00012		0.00012	U	F	Y
Calcium	mg/L	05/10/2016	F	T	150.00		0.012		F	Y
Chloride	mg/L	05/10/2016	F	N	220.00		1.5		F	Y
Magnesium	mg/L	05/10/2016	F	T	78.00		0.013		F	Y
Molybdenum	mg/L	05/10/2016	F	T	4.4e-04		0.00032	J	F	Y
Nitrate + Nitrite as Nitrogen	mg/L	05/10/2016	F	N	0.003		0.003	U	F	Y
Potassium	mg/L	05/10/2016	F	T	13.00		0.11		F	Y
Selenium	mg/L	05/10/2016	F	T	0.00066		0.00066	U	F	Y
Silica	mg/L	05/10/2016	F	T	11.00		0.0095		F	Y
Silicon	mg/L	05/10/2016	F	T	5.10		0.0044		F	Y
Sodium	mg/L	05/10/2016	F	T	360.00		0.066		F	Y
Sulfate	mg/L	05/10/2016	F	N	660.00		7.5		F	Y
Total Dissolved Solids	mg/L	05/10/2016	F	N	1800.00		40.00		F	Y
Uranium	mg/L	05/10/2016	F	T	3.5e-03		0.000012		F	Y

Groundwater Quality Data by Location For Site BLU01, Bluewater Disposal Site

Location: OBS-3

Report Date: 07/21/2016

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
Alkalinity, Bicarbonate (HCO_3) as $CaCO_3$	mg/L	05/11/2016	F	N	100.00		20.00			Y
Alkalinity, Carbonate (CO_3) as $CaCO_3$	mg/L	05/11/2016	F	N	20.00		20.00	U		Y
Arsenic	mg/L	05/11/2016	F	D	0.00012		0.00012	U		Y
Calcium	mg/L	05/11/2016	F	D	130.00		0.012			Y
Chloride	mg/L	05/11/2016	F	N	660.00		6			Y
Magnesium	mg/L	05/11/2016	F	D	120.00		0.013			Y
Molybdenum	mg/L	05/11/2016	F	D	0.00032		0.00032	U		Y
Nitrate + Nitrite as Nitrogen	mg/L	05/11/2016	F	N	0.35		0.003			Y
Potassium	mg/L	05/11/2016	F	D	20.00		0.11			Y
Selenium	mg/L	05/11/2016	F	D	1.9e-03		0.00066			Y
Silica	mg/L	05/11/2016	F	D	2.30		0.0095			Y
Silicon	mg/L	05/11/2016	F	D	1.10		0.0044			Y
Sodium	mg/L	05/11/2016	F	D	400.00		0.066			Y
Sulfate	mg/L	05/11/2016	F	N	710.00		30			Y
Total Dissolved Solids	mg/L	05/11/2016	F	N	2100.00		80.00			Y
Uranium	mg/L	05/11/2016	F	D	0.18		0.000012			Y

Groundwater Quality Data by Location For Site BLU01, Bluewater Disposal Site

Location: S(SG)

Report Date: 07/21/2016

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
Alkalinity, Bicarbonate (HCO_3) as $CaCO_3$	mg/L	05/10/2016	F	N	400.00		20.00			Y
Alkalinity, Carbonate (CO_3) as $CaCO_3$	mg/L	05/10/2016	F	N	20.00		20.00	U		Y
Arsenic	mg/L	05/10/2016	F	T	0.00012		0.00012	U		Y
Calcium	mg/L	05/10/2016	F	T	310.00		0.012			Y
Chloride	mg/L	05/10/2016	F	N	480.00		2.4			Y
Magnesium	mg/L	05/10/2016	F	T	170.00		0.013			Y
Molybdenum	mg/L	05/10/2016	F	T	1.3e-03		0.00032	J		Y
Nitrate + Nitrite as Nitrogen	mg/L	05/10/2016	F	N	2.40		0.03			Y
Potassium	mg/L	05/10/2016	F	T	22.00		0.11			Y
Selenium	mg/L	05/10/2016	F	T	0.01		0.00066			Y
Silica	mg/L	05/10/2016	F	T	18.00		0.0095			Y
Silicon	mg/L	05/10/2016	F	T	8.30		0.0044			Y
Sodium	mg/L	05/10/2016	F	T	410.00		0.066			Y
Sulfate	mg/L	05/10/2016	F	N	1300.00		12			Y
Total Dissolved Solids	mg/L	05/10/2016	F	N	2900.00		80.00			Y
Uranium	mg/L	05/10/2016	F	T	0.59		0.000012			Y

Groundwater Quality Data by Location For Site BLU01, Bluewater Disposal Site

Location: X(M)

Report Date: 07/21/2016

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
Alkalinity, Bicarbonate (HCO_3) as $CaCO_3$	mg/L	05/11/2016	F	N	200.00		20.00		F	Y
Alkalinity, Carbonate (CO_3) as $CaCO_3$	mg/L	05/11/2016	F	N	20.00		20.00	U	F	Y
Arsenic	mg/L	05/11/2016	F	T	1.1e-03		0.00012		F	Y
Calcium	mg/L	05/11/2016	F	T	150.00		0.012		F	Y
Chloride	mg/L	05/11/2016	F	N	170.00		1.2		F	Y
Magnesium	mg/L	05/11/2016	F	T	45.00		0.013		F	Y
Molybdenum	mg/L	05/11/2016	F	T	7.8e-04		0.00032	J	F	Y
Nitrate + Nitrite as Nitrogen	mg/L	05/11/2016	F	N	8.10		0.03		F	Y
Potassium	mg/L	05/11/2016	F	T	7.50		0.11		F	Y
Selenium	mg/L	05/11/2016	F	T	6.7e-03		0.00066		F	Y
Silica	mg/L	05/11/2016	F	T	21.00		0.0095		F	Y
Silicon	mg/L	05/11/2016	F	T	10.00		0.0044		F	Y
Sodium	mg/L	05/11/2016	F	T	180.00		0.066		F	Y
Sulfate	mg/L	05/11/2016	F	N	500.00		6		F	Y
Total Dissolved Solids	mg/L	05/11/2016	F	N	1300.00		40.00		F	Y
Uranium	mg/L	05/11/2016	F	T	0.11		0.000012		F	Y

Groundwater Quality Data by Location For Site BLU01, Bluewater Disposal Site

Location: Y2(M)

Report Date: 07/21/2016

Parameter	Units	Sample Date	Sample Type	Fraction	Result	Uncertainty	MDC/MDL	Lab	Data	QA
Alkalinity, Bicarbonate (HCO_3) as $CaCO_3$	mg/L	05/11/2016	F	N	210.00		20.00		F	Y
Alkalinity, Carbonate (CO_3) as $CaCO_3$	mg/L	05/11/2016	F	N	20.00		20.00	U	F	Y
Arsenic	mg/L	05/11/2016	F	T	1.3e-03		0.00012		F	Y
Calcium	mg/L	05/11/2016	F	T	59.00		0.012		F	Y
Chloride	mg/L	05/11/2016	F	N	16.00		0.6		F	Y
Magnesium	mg/L	05/11/2016	F	T	16.00		0.013		F	Y
Molybdenum	mg/L	05/11/2016	F	T	1.5e-03		0.00032	J	F	Y
Nitrate + Nitrite as Nitrogen	mg/L	05/11/2016	F	N	1.50		0.015		F	Y
Potassium	mg/L	05/11/2016	F	T	3.40		0.11		F	Y
Selenium	mg/L	05/11/2016	F	T	1.2e-03		0.00066		F	Y
Silica	mg/L	05/11/2016	F	T	28.00		0.0095		F	Y
Silicon	mg/L	05/11/2016	F	T	13.00		0.0044		F	Y
Sodium	mg/L	05/11/2016	F	T	51.00		0.0066		F	Y
Sulfate	mg/L	05/11/2016	F	N	100.00		3		F	Y
Total Dissolved Solids	mg/L	05/11/2016	F	N	420.00		20.00		F	Y
Uranium	mg/L	05/11/2016	F	T	4.6e-03		0.000012		F	Y

SAMPLE TYPE: D = Duplicate E = Equipment Blank F = Field Sample FB = Field Blank TB = Trip Blank

FRACTION: D = Dissolved N = NA T = Total

MDC / MDL: MDC = Radiochemical minimum detectable concentration MDL = Non-radiochemical minimum detection limit

LAB QUALIFIERS (details can be found in laboratory report):

* = One or more quality control criteria failed (e.g., laboratory control sample, surrogate spike, or calibration verification recovery).
B = Blank contamination. The reported result is associated with a contaminated blank.
D = Result is from the analysis of a diluted sample.
H = Holding time was exceeded.
J = The reported result is an estimated value (e.g., matrix interference was observed or the analyte was detected at a concentration outside the quantitation range).
U = Analytical result is below the MDC or MDL.
Z = Laboratory defined qualifier, see case narrative.

DATA QUALIFIERS:

F = Low flow sampling method used.
L = Less than 3 bore volumes purged prior to sampling.
U = Parameter analyzed for, but not detected.
G = Possible grout contamination, pH > 9
Q = Qualitative result due to sampling technique.
X = Location is undefined.
J = Estimated value
R = Rejected, unusable result

QA QUALIFIER: Yes = Validated, acceptable as qualified.

Static Water Level Data

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Static Water Levels For Site BLU01, Bluewater Disposal Site

Measurement Date Between : 05/10/2016 and 05/11/2016

Report Date: 07/21/2016

Location Code	Measurement Date	Top of Casing Elevation	Water Elevation	Water Level Depth	Units	Dry (y/n)
11(SG)	05/10/2016	6639.19	6429.94	209.25	ft	
13(SG)	05/11/2016	6593.57	6424.08	169.49	ft	
14(SG)	05/11/2016	6617.2	6424.96	192.24	ft	
15(SG)	05/11/2016	6612.53	6424.28	188.25	ft	
16(SG)	05/11/2016	6618.25	6429.77	188.48	ft	
18(SG)	05/11/2016	6601.32	6424.32	177	ft	
20(M)	05/10/2016	6613.38	6505.41	107.97	ft	
21(M)	05/11/2016	6593.8	6466.44	127.36	ft	
22(M)	05/11/2016	6606.48	6468.73	137.75	ft	
23(M)	05/10/2016	6579.22	6468.91	110.31	ft	
E(M)	05/11/2016	6616.32	6534.52	81.8	ft	
F(M)	05/11/2016	6603.59	6490.06	113.53	ft	
HMC-951	05/10/2016	6576.79	6424.09	152.7	ft	
I(SG)	05/10/2016	6625.93	6424.13	201.8	ft	
L(SG)	05/10/2016	6606.09	6439.09	167	ft	
OBS-3	05/11/2016	6617.22	NA	NA	ft	
S(SG)	05/10/2016	6625.25	6429.85	195.4	ft	
T(M)	05/11/2016	6612.65			ft	y
X(M)	05/11/2016	6598.91	6466.96	131.95	ft	
Y2(M)	05/11/2016	6614.13	6496.64	117.49	ft	

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Time-Concentration Graphs

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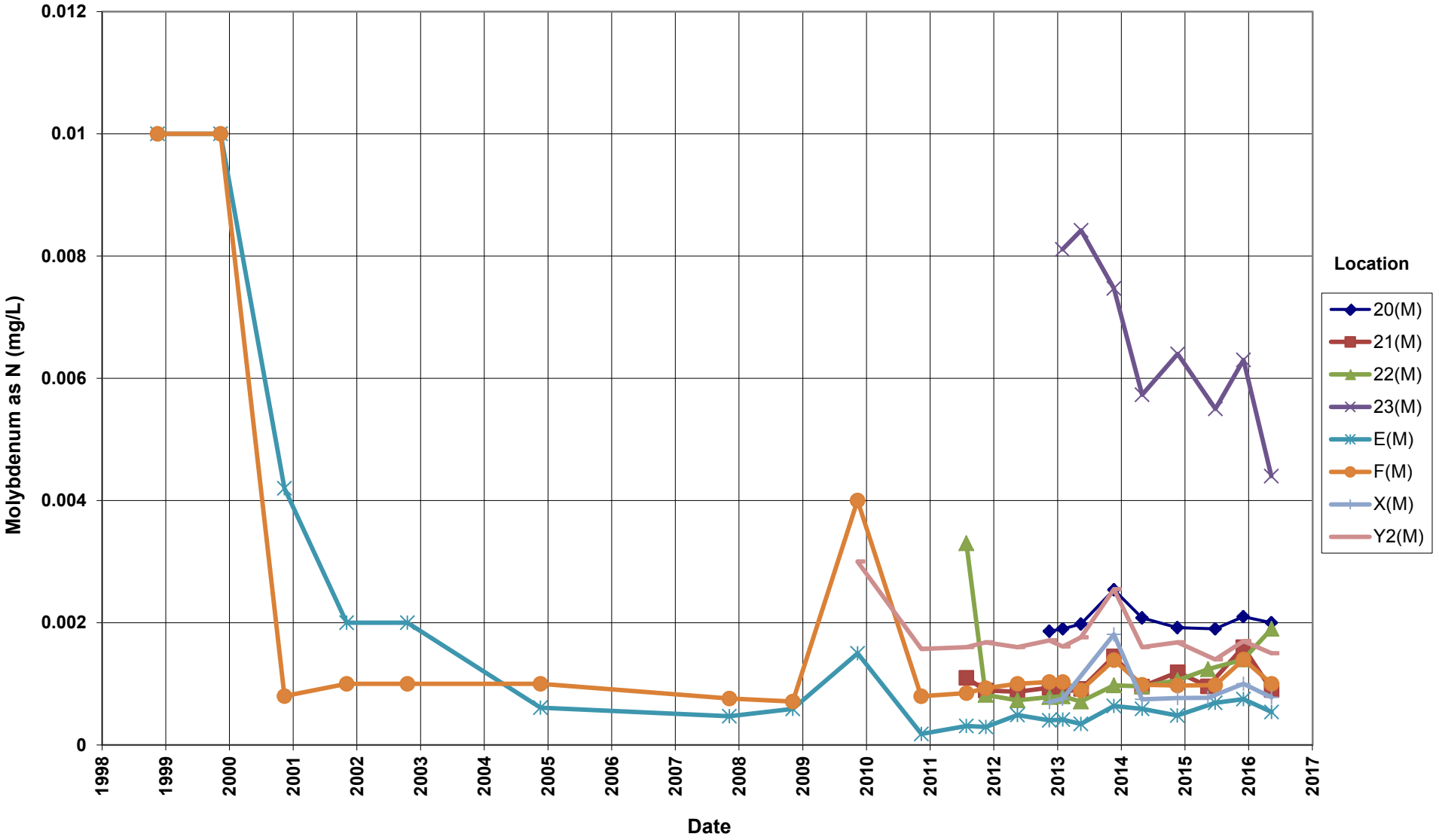
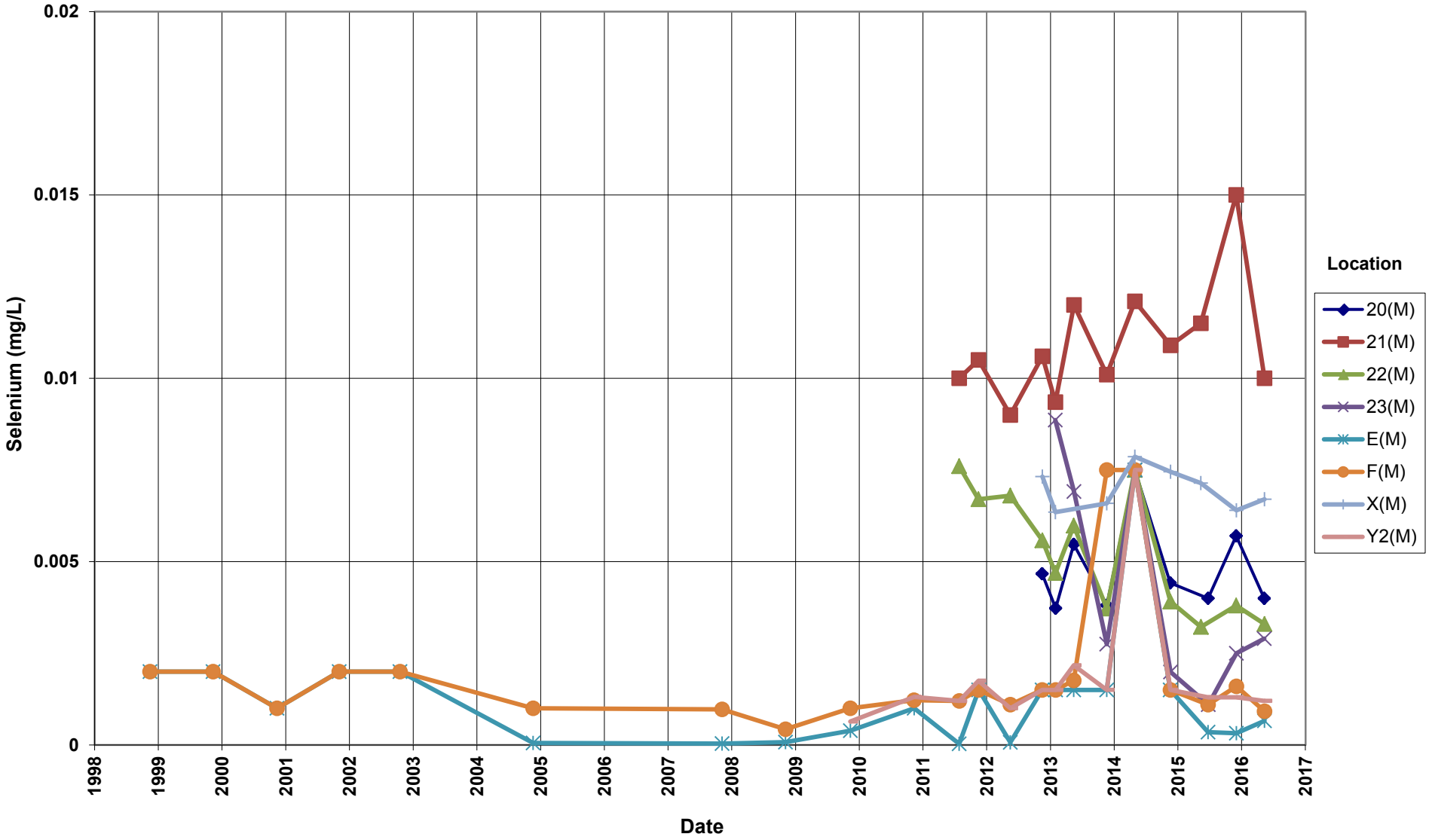
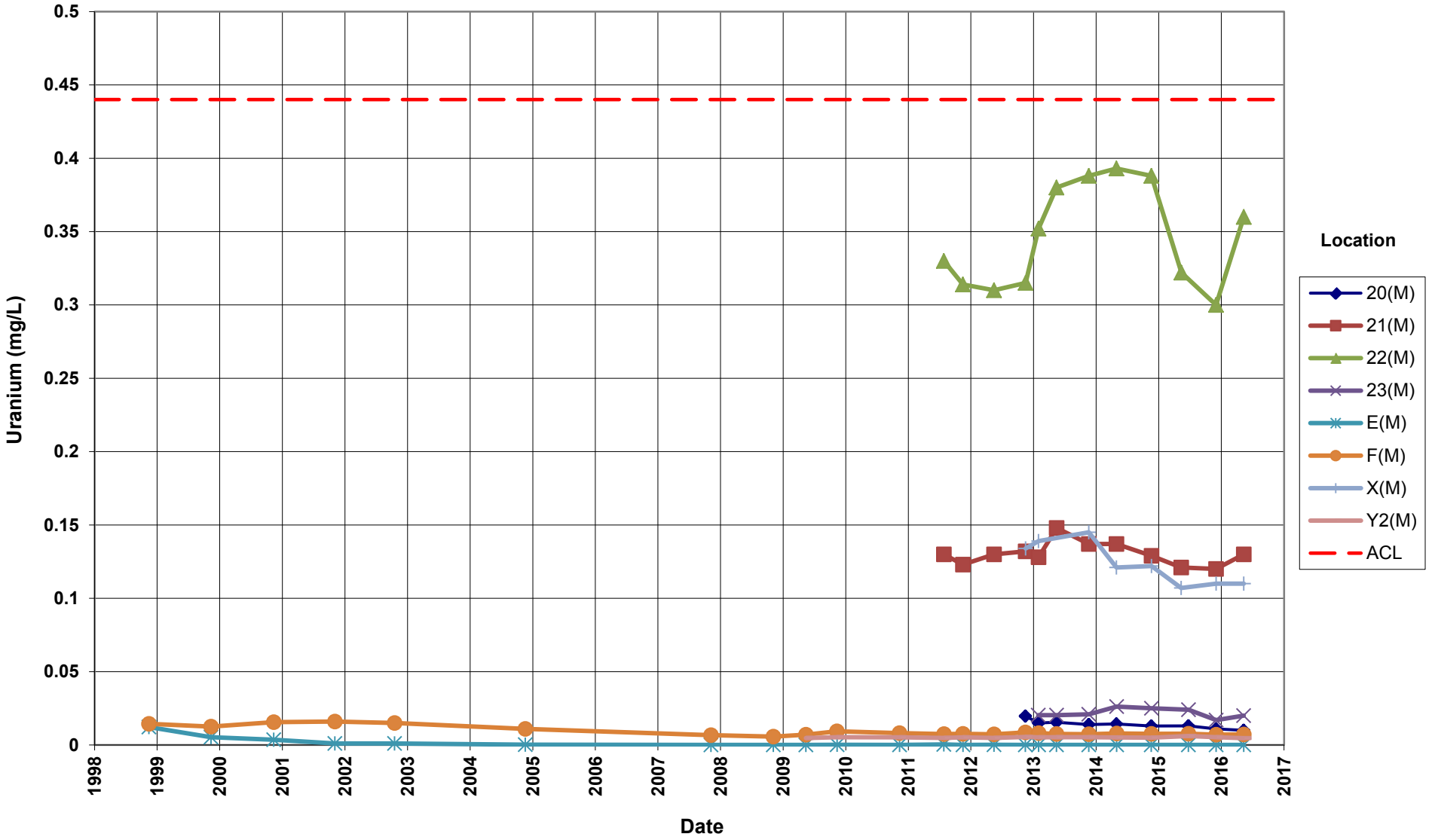
Bluewater Disposal Site
Alluvium Wells
Molybdenum Concentration
Alternate Concentration Limit (ACL) = 0.10 mg/L



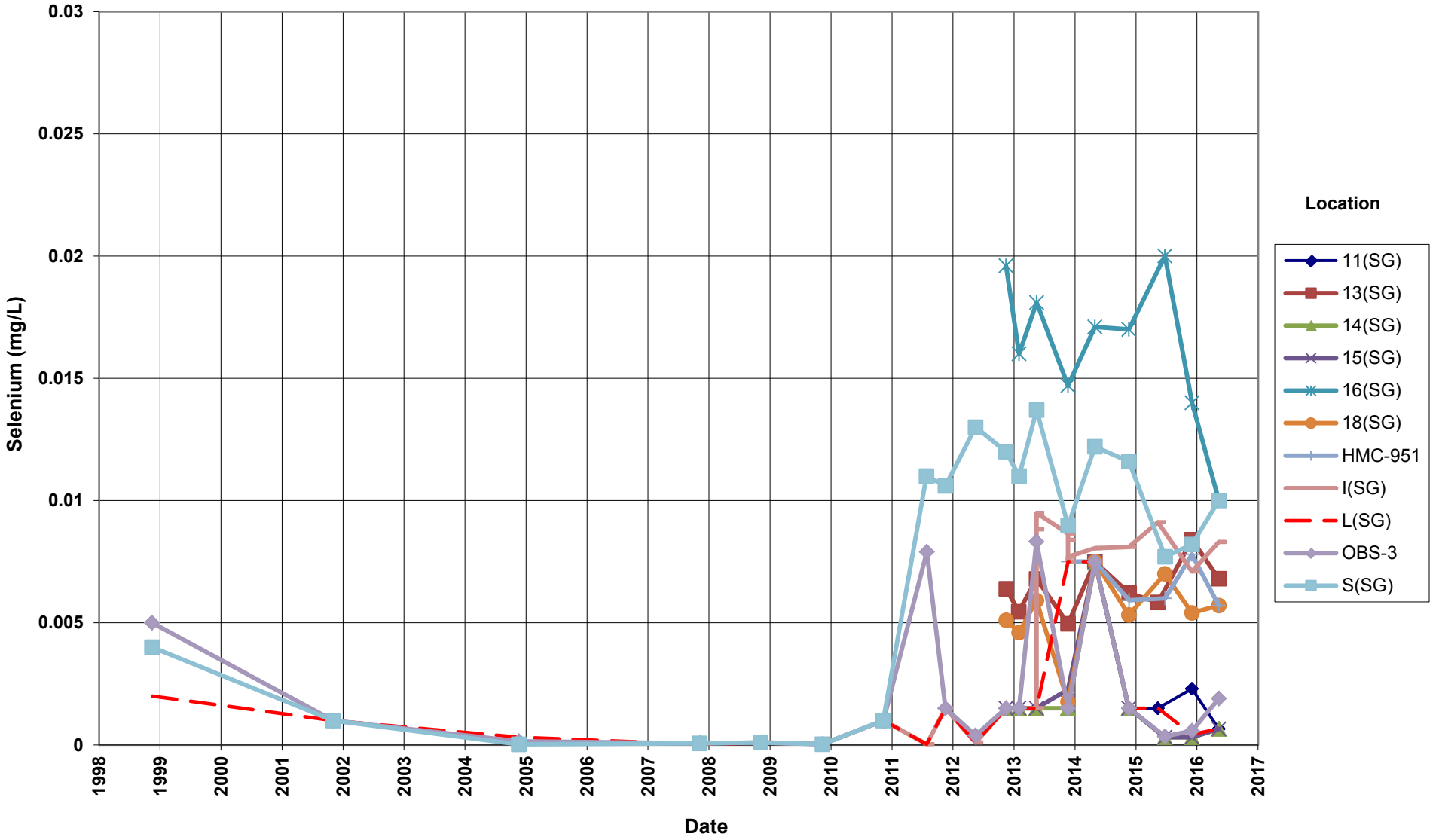
Bluewater Disposal Site
Alluvium Wells
Selenium Concentration
Alternate Concentration Limit (ACL) = 0.05 mg/L



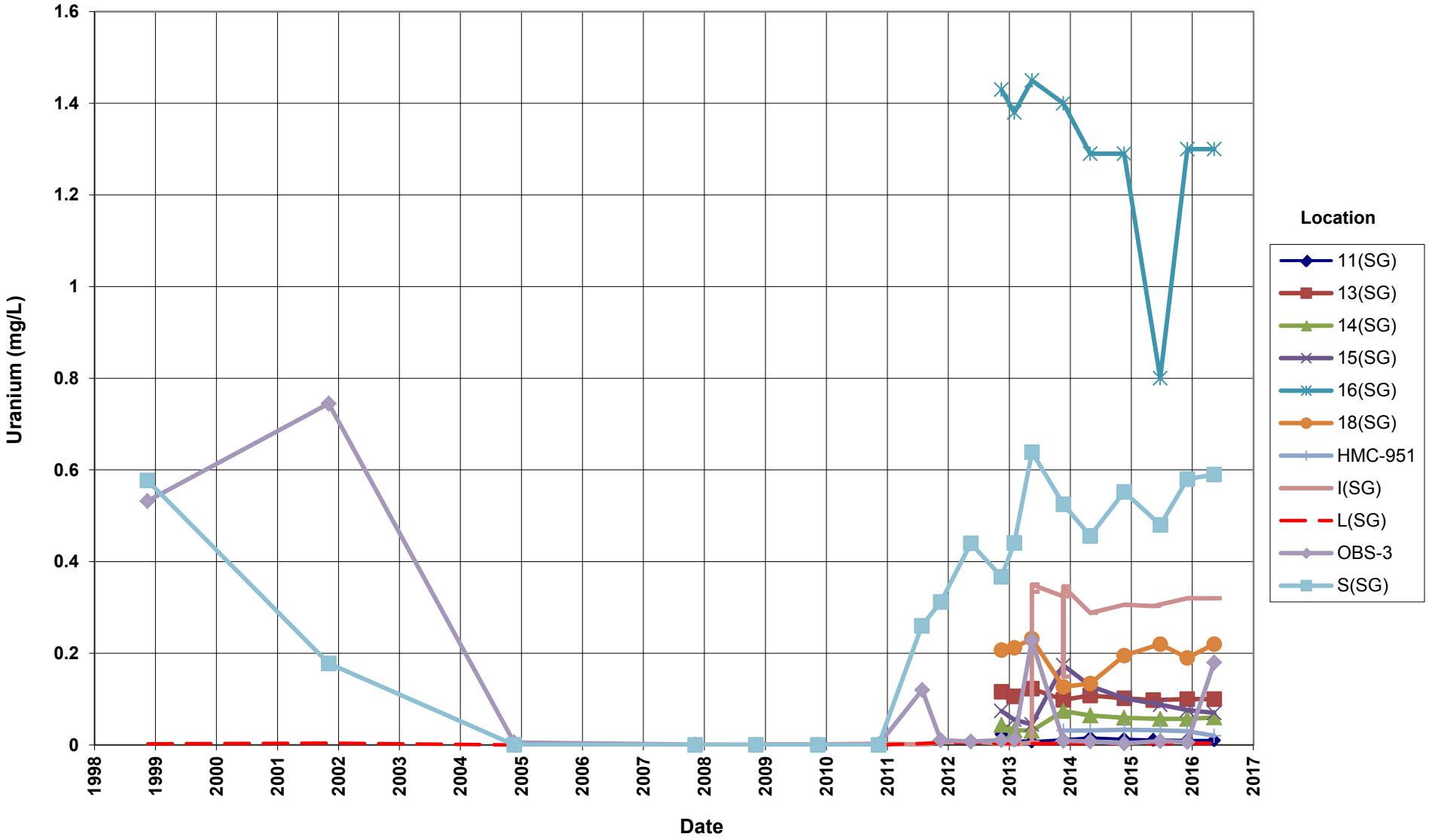
Bluewater Disposal Site
Alluvium Wells
Uranium Concentration
Alternate Concentration Limit (ACL) = 0.44 mg/L



Bluewater Disposal Site
Bedrock Wells
Selenium Concentration
Alternate Concentration Limit (ACL) = 0.05 mg/L



Bluewater Disposal Site
Bedrock Wells
Uranium Concentration
Alternate Concentration Limit (ACL) = 2.15 mg/L



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Attachment 3

Sampling and Analysis Work Order

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March 31, 2016

Task Assignment 103
Control Number 16-0456

U.S. Department of Energy
Office of Legacy Management
ATTN: Deborah Barr
Site Manager
2597 Legacy Way
Grand Junction, CO 81503

SUBJECT: Contract No. DE-LM0000421, Navarro Research & Engineering, Inc. (Navarro)
Task Assignment 103 LTS&M-UMTRCA TI & TII Sites, D&D Sites, Other Sites, and Other
May 2016 Environmental Sampling at the Bluewater, New Mexico, Disposal Site

REFERENCE: Task Assignment 103, 1-103-1-03-203, Bluewater, New Mexico, Disposal Site

Dear Ms. Barr:

The purpose of this letter is to inform you of the upcoming sampling event at the Bluewater, New Mexico, Disposal Site. Enclosed are the map and tables specifying sample locations and analytes for monitoring at the Bluewater site. Water quality data will be collected from this site as part of the routine environmental sampling currently scheduled to begin the week of May 5, 2016.

The following lists show the monitoring and private wells (with zone of completion) scheduled to be sampled during this event.

MONITORING WELLS

E(M) Al	T(M) Al	S(SG) Sg	11(SG) Sg	14(SG) Sg	16(SG) Sg	20(M) Al	22(M) Al
Y2(M) Al	X(M) Al	OBS-3 Sg	13(SG) Sg	15(SG) Sg	18(SG) Sg	21(M) Al	23(M) Al
F(M) Al	L(SG) Sg	I(SG) Sg					

PRIVATE WELL

HMC-951

*NOTE: Al = alluvium; Sg = San Andres-Glorieta

All samples will be collected as directed in the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites*. Access agreements are being reviewed and are expected to be complete by the beginning of fieldwork.

Please contact me at (970) 248-6022 if you have any questions.

Sincerely,

Richard K. Johnson
Site Lead

RKJ/lcg/bkb

Enclosures (3)

cc: (electronic)
Christina Pennal, DOE
Jeff Carman, Navarro
Beverly Cook, Navarro
Steve Donivan, Navarro
Lauren Goodknight, Navarro
Richard Johnson, Navarro
Sam Marutzky, Navarro
Diana Osborne, Navarro
EDD Delivery
rc-grand.junction
File: BLU 400.02

Sampling Frequencies for Locations at Bluewater, New Mexico

Location ID	Quarterly	Semiannually	Annually	Triennially	Not Sampled	Notes
Monitoring Wells						
E(M)		X				PCBs in November only
Y2(M)		X				PCBs in November only
F(M)		X				PCBs in November only
T(M)		X				PCBs in November only
X(M)		X				
L(SG)		X				
S(SG)		X				
OBS-3		X				
I(SG)		X				
11(SG)		X				
13(SG)		X				
14(SG)		X				
15(SG)		X				
16(SG)		X				
18(SG)		X				
20(M)		X				
21(M)		X				
22(M)		X				
23(M)		X				
Private Wells						
HMC-951		X				

Sampling conducted in May and November.

Constituent Sampling Breakdown

Site	Bluewater				
Analyte	Groundwater	Surface Water	Required Detection Limit (mg/L)	Analytical Method	Line Item Code
Approx. No. Samples/yr	40	0			
Field Measurements					
Alkalinity	X				
Dissolved Oxygen	X				
Redox Potential	X				
pH	X				
Specific Conductance	X				
Turbidity	X				
Temperature	X				
Laboratory Measurements					
Aluminum					
Ammonia as N (NH3-N)					
Arsenic	X		0.0001	SW-846 6020	LMM-02
Bicarbonate	X		10	SM2320 B	WCH-A-003
Calcium	X		5	SW-846 6010	LMM-01
Carbonate	X		10	SM2320 B	WCH-A-004
Chloride	X		0.5	SW-846 9056	WCH-A-039
Lead					
Magnesium	X		5	SW-846 6010	LMM-01
Manganese					
Molybdenum	X		0.003	SW-846 6020	LMM-02
Nickel					
Nickel-63					
Nitrate + Nitrite as N (NO_3+NO_2)-N	X		0.05	EPA 353.1	WCH-A-022
Oxygen-18					
PCBs	E(M), Y2(M), F(M), T(M), and X(M) only (November only)		0.0005	SW-846 8082	PEP-A-006
Potassium	X		1	SW-846 6010	LMM-01
Radium-226					
Radium-228					
Selenium	X		0.0001	SW-846 6020	LMM-02
Silica	X		0.1	SW-846 6010	LMM-01
Sodium	X		1	SW-846 6010	LMM-01
Strontium					

Sulfate	X		0.5	SW-846 9056	MIS-A-044
Sulfide					
Total Dissolved Solids	X		10	SM2540 C	WCH-A-033
Tritium					
Uranium	X		0.0001	SW-846 6020	LMM-02
Vanadium					
Zinc					
Total No. of Analytes	16	0			

Note: All analyte samples are considered unfiltered unless stated otherwise. All private well samples are to be unfiltered. The total number of analytes does not include field parameters.

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Attachment 4

Trip Report

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memo

Navarro Research and Engineering

To: Dick Johnson, Navarro

From: Jennifer Graham, Navarro

CC: Deborah Barr, DOE
Steve Donivan, Navarro
Dick Johnson, Navarro
EDD Delivery

Date: 5/26/2016

Re: Sampling Trip Report

Site: Bluewater Disposal Site, New

Dates of Sampling Event: May 10-11, 2016

Team Members: Jennifer Graham and Eric Szabelski, Navarro

Number of Locations Sampled: Samples were collected at 19 of the 20 locations identified on the sampling notification letter dated March 31, 2016.

Locations Not Sampled/Reason: Monitoring well T(M) was dry.

Location Specific Information:

Location IDs	Comments
OBS-3	Sampled per Program Directive BLU-2014-01. Began purging well at 8:37, well subsequently went dry at 8:57. The well went dry after approximately 100 gallons of water was purged from it. Sampling team allowed well to recover and returned at 10:01 to collect field readings and samples. Alkalinity was field filtered.
T(M)	Location was dry.
14(SG) and 16(SG)	As part of the UMTRCA IDW plan, purge water was disbursed at these locations over a minimum of 500 square feet and 100 square feet respectively.

Quality Control Sample Cross Reference: The following are the false identifications assigned to the quality control samples.

False ID	Sample ID	True ID	Sample Type	Associated Matrix
2810	BLU01.1-16050001-021	16(SG)	Duplicate	Groundwater

Task Code Assigned: Samples were assigned to BLU1.1-16050001. Field data sheets can be found in \\crow\SMS\BLU01.1-16050001\FieldData.

Sample Shipment: Samples were shipped overnight via FedEx from Bowling's Shipping Center, Grants, New Mexico, to ALS Laboratories on May 12, 2016.

Water Level Measurements: Water levels were measured at all sampled wells prior to sampling. An initial water level measurement was not captured in EDGE at OBS-3.

Well Inspection Summary: No issues were identified.

Sampling Method: Samples were collected according to the *Sampling and Analysis Plan (SAP) for the U. S. Department of Energy Office of Legacy Management Sites* (LMS/PRO/S04351, continually updated) and Program Directive BLU-2014-01. EDGE 6.4 was used to collect data for this sampling event.

Field Variance: None.

Equipment: All equipment functioned properly.

Stakeholder/Regulatory/DOE: Adrian Venable, Homestake Mining Company, met us on May 10, 2016, to allow access to HMC-951. In addition to routine samples, 8 liters of water were collected from the Homestake well for analysis by Homestake Mining Company. All purge water was disbursed off Homestake Mining Company property.

Institutional Controls:

Fences, Gates, and Locks: No issues were observed. Gates that were open on arrival were left open. Gates that were closed were reclosed after entry.
Signs: No issues were observed.
Trespassing/Site Disturbances: No issues were observed.
Disposal Cell/Drainage Structure Integrity: No issues were observed.

Safety Issues: None.

Access Issues: Homestake Mining Company was contacted prior to access of HMC-951.

General Information: Nothing to note.

Immediate Actions Taken: At location I(SG), the length of the drop tubing was verified after sampling. The drop tubing measured 29.4 ft. from the bottom of the pump to the sampling inlet. The total measured sampling depth was measured in June 2015 at 265.0 ft., which verified that the sampling depth has not changed.

Future Actions Required or Suggested: None suggested.