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Data Validation Package for the Bluewater, New Mexico, Disposal Site, January 2013

The U.S. Department of Energy (DOE) has prepared a Data Validation Package containing the water sampling data generated from the January 2013 sampling event at the Bluewater, New Mexico, Disposal Site. **At your request, you are receiving a hard copy of the report.**

The report is also available for your review on the Internet at the DOE Office of Legacy Management (LM) website – http://energy.gov/lm. From the LM website home page, select the LM SITES MAP. Then select Bluewater Site from the LM SITES list in the right column. The report will be available on the Bluewater, New Mexico, Disposal Site page of the LM website under Site Documents and Links.

U.S. DEPARTMENT OF ENERGY | Legacy Management

LMS/BLU/S00113

AD-8902

Data Validation Package

January 2013
Groundwater Sampling at the Bluewater, New Mexico, Disposal Site

April 2013

U.S. DEPARTMENT OF ENERGY
Legacy Management

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Sampling Event Summary

Site: Bluewater, New Mexico, Disposal Site

Sampling Period: January 28–30, 2013

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 analysis were conducted as specified in the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites* (LMS/PLN/S04351, continually updated). One duplicate sample was collected from monitoring well L(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 and are identified by the suffix (SG). Well OBS-3 is also completed in the San Andres/Glorieta 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 support a regional groundwater investigation being conducted by the New Mexico Environment Department.

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 apparently 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 apparently enters the site. Well 23(M) is downgradient of well 21(M) and is located near the site entrance. This well was dry during the November 2012 sampling event, but had sufficient water to sample during this event.

Private well HMC-951 was scheduled for sampling during this event; however, a pump could not be installed because of an obstruction in the well.

Analytical results for the required constituents for the alluvium wells are provided in Table 1. The uranium concentration was 0.139 milligrams per liter (mg/L) in POE well X(M), and was 0.128 mg/L in well 21(M); both concentrations exceed the Uranium Mill Tailings Radiation Control Act (UMTRCA) maximum concentration limit (MCL) of 0.044 mg/L (40 CFR 192, Table 1). Therefore, contaminated alluvial groundwater is leaving the site; this occurrence is being evaluated by DOE in consultation with the U.S. Nuclear Regulatory Commission. The extent of contamination in the alluvial aquifer is not known at this time.

However, the uranium concentration in well 23(M), located about 1,600 feet downgradient of well 21(M), was 0.0203 mg/L.

Table 1. January 2013 Groundwater Monitoring Analytical Results for the Alluvium Wells

Location	Category	Molybdenum ACL=0.10 (mg/L)	Selenium (mg/L) ACL=0.05 mg/L (mg/L)	Uranium ACL=0.44 (mg/L)
20(M)	Upgradient	0.0019	0.0037	0.015
21(M)	Downgradient	0.0009	0.0094	0.128
22(M)	Downgradient	0.0008	0.0047	0.352
23(M)	Downgradient	0.0081	0.0089	0.0203
E(M)	Background	0.0004	ND	ND
F(M)	POC	0.001	ND	0.0081
X(M)	POE	0.0008	0.0064	0.139
Y2(M)	PCBs	0.0016	ND	0.0052

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

Bedrock wells 11(SG), 13(SG), 14(SG), 15(SG), 16(SG), and 18(SG) were installed in summer 2012 in support of New Mexico Environment Department's regional groundwater investigation, to gain a better understanding of the hydrogeological characteristics of the San Andres/Glorieta aquifer at the site, and because a nearby off-site private well completed in the same aquifer (HMC-951) 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). All of the new wells were sampled for the second time during this event.

Analytical results for the required constituents for the bedrock wells are provided in Table 2. The selenium and uranium concentrations did not exceed ACLs in the POC wells, and no constituents exceeded their respective UMTRCA MCLs at POE well I(SG). However, the uranium concentrations in downgradient wells 13(SG) and 18(SG), located along the site boundary, substantially exceed the UMTRCA MCL. Therefore, contaminated San Andres/Glorieta aquifer groundwater is leaving the site; this occurrence will be evaluated by DOE in consultation with the U.S. Nuclear Regulatory Commission.

Table 2. January 2013 Groundwater Monitoring Analytical Results for the Bedrock Wells

Location	Category	Selenium ACL=0.05 (mg/L)	Uranium ACL=2.15 (mg/L)
11(SG)	Downgradient	ND	0.011
13(SG)	Downgradient	0.0055	0.106
14(SG)	Upgradient	ND	0.0324
15(SG)	Downgradient	ND	0.0553
16(SG)	Downgradient	0.016	1.38
18(SG)	Downgradient	0.0046	0.212
I(SG)	POE	ND	0.0020
L(SG)	Background	ND	0.0034
OBS-3	POC	ND	0.0116
S(SG)	POC	0.011	0.441

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

Richard K. Johnson
Site Lead, S.M. Stoller Corporation

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Date

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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**	January 28–30, 2013
Date(s) of Verification	March 11, 2013	**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-2013-01, Work Order letter dated January 17, 2013.
2. Were the sampling locations specified in the planning documents sampled?	No	Monitoring well T(M) had too little water to sample with either a pump or a bailer. Domestic well HMC-951 could not be sampled because of an obstruction in the well. Well 23(M) was not in the notification letter. The site lead requested the water level to be checked and—if not dry—for samples to be collected. There was sufficient water for sample collection.
3. Were calibrations conducted as specified in the above-named documents?	Yes	
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 stabilize 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 well L(SG).
10. Were equipment blanks taken at a frequency of one per 20 samples that were collected with non-dedicated equipment?	Yes	One equipment blank was collected.
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

Report Number (RIN):	13015067
Sample Event:	January 28–30, 2013
Site(s):	Bluewater, New Mexico
Laboratory:	GEL Laboratories, Charleston, South Carolina
Work Order No.:	319442
Analysis:	Metals and Wet Chemistry
Validator:	Stephen Donivan
Review Date:	March 8, 2013

This validation was performed according to the *Environmental Procedures Catalog*, (LMS/PRO/S04325, continually updated) "Standard Practice for Validation of Laboratory 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-004	EPA 310.1/ SM 2320B	EPA 310.1/ SM 2320B
Chloride, Sulfate	MIS-A-045	EPA 300.0	EPA 300.0
Calcium, Magnesium, Potassium, Sodium	LMM-01	SW-846 3005A	SW-846 6010B
Arsenic, Molybdenum, Selenium, Uranium	LMM-02	SW-846 3005A	SW-846 6020A
Nitrate + Nitrite as N	WCH-A-022	EPA 353.2	EPA 353.2
Total Dissolved Solids	WCH-A-033	SM 2540C	SM 2540C

Data Qualifier Summary

None of the analytical results required qualification.

Sample Shipping/Receiving

GEL Laboratories in Charleston, South Carolina, received 20 water samples between January 28 and February 1, 2013, accompanied by Chain of Custody forms. The air bill numbers were listed in the receiving documentation. The Chain of Custody forms were 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 forms were complete with no errors or omissions.

Preservation and Holding Times

The sample shipment was received intact with the temperature inside the iced coolers at 2 °C, which complies with requirements. All samples were received in the correct container types and had been preserved correctly for the requested analyses. 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.

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 300.0
Calibrations for chloride and sulfate were performed using seven calibration standards on January 22, 2013. 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 with all calibration checks meeting the acceptance criteria.

Methods EPA 310.1/ SM 2320B, SM 2540C
There are no initial or continuing calibration requirements associated with the alkalinity or total dissolved solids methods.

Method EPA 353.2
Calibrations for nitrate + nitrite as N were performed using five calibration standards on February 7, 2013. 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 with all calibration check results within the acceptance criteria.

Method SW-846 6010B
Calibrations for calcium, magnesium, potassium, and sodium were performed on February 5, 2013, 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 with all calibration checks meeting 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 February 20, 2013, using four 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 with all calibration checks meeting 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. 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 and Calibration Blanks

Method blanks are analyzed to assess any contamination that may have occurred during sample preparation. Methods without sample preparation do not require the analysis of a method blank. Calibration blanks are analyzed to assess instrument contamination prior to and during sample analysis. All method blank and calibration blank results were below the PQL for all analytes.

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 (RPD) for replicate 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 replicate results met these criteria, demonstrating acceptable laboratory 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 chromatography data. All peak integrations were satisfactory.

Anion/Cation Balance

The anion/cation balance is used to determine if major ion concentrations have been quantified correctly. The total anions should balance with (be equal to) the total cations when expressed in milliequivalents per liter (meq/L). Table 4 shows the total anion and cation results in groundwater samples from this event and the charge balance, which is a RPD calculation. Typically, a charge balance difference of 10 percent is considered acceptable.

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

Location	Cations (meq/L)	Anions (meq/L)	Charge Balance (%)
11(SG)	24.3	23.6	1.6
13(SG)	15.7	17.3	5.0
14(SG)	21.5	22.0	1.1
15(SG)	19.2	1.97	1.2
16(SG)	44.0	46.7	3.0
18(SG)	19.2	18.9	0.8
20(M)	14.7	15.1	1.3
21(M)	20.8	20.2	1.3
22(M)	14.4	14.4	0.2
23(M)	11.7	12.4	2.9
E(M)	17.0	16.6	1.3
F(M)	6.1	6.0	0.7
I(SG)	11.4	12.3	4.0
L(SG)	29.1	28.7	0.6
OBS-3	36.7	35.1	2.1

Table 4 (continued). Comparison of Major Anions and Cations in Groundwater Sample

Location	Cations (meq/L)	Anions (meq/L)	Charge Balance (%)
S(SG)	48.6	46.4	2.4
X(M)	20.3	21.2	2.1
Y2(M)	7.0	6.7	2.6

The charge balance values met the acceptance criteria, indicating acceptable analytical performance.

Electronic Data Deliverable (EDD) File

The EDD file arrived on December, 17, 2012. The Sample Management System EDD validation module was used to verify that the EDD file was complete and in compliance with requirements. The module compares the contents of the file 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.

SAMPLE MANAGEMENT SYSTEM

General Data Validation Report

RIN: 13015067 Lab Code: GEN Validator: Stephen Donivan Validation Date: 03/07/2013

Project: Bluewater Analysis Type: ☑ Metals ☑ General Chem ☐ Rad ☐ Organics

# of Samples: 20 Matrix: Water Requested Analysis Completed: Yes

Chain of Custody

Present: OK Signed: OK Dated: OK

Sample

Integrity: OK Preservation: OK Temperature: OK

Select Quality Parameters

☑ Holding Times	All analyses were completed within the applicable holding times.
☑ Detection Limits	There are 0 detection limit failures.
☑ Field/Trip Blanks	There were 2 trip/equipment blanks evaluated.
☑ Field Duplicates	There were 2 duplicates evaluated.

SAMPLE MANAGEMENT SYSTEM

Metals Data Validation Worksheet

RIN: 13015067 **Lab Code:** GEN **Date Due:** 03/01/2013

Matrix: Water **Site Code:** BLU01 **Date Completed:** 03/04/2013

Analyte	Method Type	Date Analyzed	CALIBRATION				Method Blank	LCS %R	MS %R	MSD %R	Dup. RPD	ICSAB %R	Serial Dil. %R	CRI %R
			Int.	R^2	CCV	CCB								
Arsenic	ICP/MS	02/21/2013			OK	OK	OK	103.0	106.0			107.0		92.0
Calcium	ICP/ES	02/05/2013	0.0000	1.0000	OK	OK	OK	104.0			10.0	97.0	2.7	101.0
Magnesium	ICP/ES	02/05/2013	0.0000	1.0000	OK	OK	OK	106.0			10.0	96.0	6.5	100.0
Molybdenum	ICP/MS	02/21/2013			OK	OK	OK	103.0	106.0		0.0	108.0		98.0
Potassium	ICP/ES	02/05/2013	0.0000	1.0000	OK	OK	OK	105.0	109.0		11.0	110.0	6.0	116.0
Selenium	ICP/MS	02/21/2013			OK	OK	OK	102.0	96.8		5.0	106.0		103.0
Sodium	ICP/ES	02/05/2013	0.0000	1.0000	OK	OK	OK	106.0			9.0	104.0	6.0	112.0
Uranium	ICP/MS	02/21/2013			OK	OK	OK	102.0	118.0		2.0	107.0	1.3	99.0

SAMPLE MANAGEMENT SYSTEM

Wet Chemistry Data Validation Worksheet

RIN: 13015067 **Lab Code:** GEN **Date Due:** 03/01/2013

Matrix: Water **Site Code:** BLU01 **Date Completed:** 03/04/2013

Analyte	Date Analyzed	CALIBRATION				Method Blank	LCS %R	MS %R	MSD %R	DUP RPD	Serial Dil. %R
		Int.	R^2	CCV	CCB						
ALKALINITY, Total as CaCO3	02/07/2013					OK	104.00				
ALKALINITY, Total as CaCO3	02/11/2013					OK	101.00	105.0			
ALKALINITY, Total as CaCO3	02/11/2013						105.00				
Bicarbonate alkalinity (CaCO3	02/07/2013									1.00	
Bicarbonate alkalinity (CaCO3	02/11/2013									0	
Chloride	02/19/2013	0.000	0.9996	OK	OK	OK	95.60				
NO2+NO3 as N	02/07/2013	0.000	1.0000	OK	OK	OK	94.10	96.0		2.00	
NO2+NO3 as N	02/07/2013							94.0			
Sulfate	02/19/2013	0.000	0.9999	OK	OK	OK	98.80				
Total Dissolved Solids	02/01/2013						101.00			1.00	
Total Dissolved Solids	02/01/2013									21.00	

Sampling Quality Control Assessment

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

Sampling Protocol

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

- As per Program Directive BLU-2013-01, wells S(SG) and OBS-3 were *not* sampled using low-flow criteria. These wells were sampled using dedicated high-volume and high-flow submersible pumps with no field parameter stability requirements.
- Well E(M) was classified as Category II. The sample results were qualified with a "Q" flag, indicating the data are qualitative because of the sampling technique.
- Well 23(M) was sampled with a bailer.

Equipment Blank Assessment

Equipment blanks are prepared and analyzed to document contamination attributable to the sample collection process. One equipment blank was submitted with these samples. Calcium, chloride, potassium, sodium, sulfate, and uranium were detected in this blank. The concentration of these analytes in the associated samples were greater than 5 times the blank concentration, requiring no qualification.

Field Duplicate Assessment

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 L(SG). The RPD 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.

SAMPLE MANAGEMENT SYSTEM

Validation Report: Equipment/Trip Blanks

RIN: 13015067 Lab Code: GEN Project: Bluewater Validation Date: 03/07/2013

Blank Data

Blank Type	Lab Sample ID	Lab Method	Analyte Name	Result	Qualifier	MDL	Units
Equipment Blank	319442039	EPA 3005/6010B	Calcium	388		50.0	ug/L

Sample ID	Sample Ticket	Location	Result	Dilution Factor	Lab Qualifier	Validation Qualifier
319442033	LCR 573	OBS-3	112000	1.00		
319442035	LCR 576	S(SG)	310000	1.00		

Blank Data

Blank Type	Lab Sample ID	Lab Method	Analyte Name	Result	Qualifier	MDL	Units
Equipment Blank	319442039	EPA 3005/6010B	Potassium	87.1	B	50.0	ug/L

Sample ID	Sample Ticket	Location	Result	Dilution Factor	Lab Qualifier	Validation Qualifier
319442033	LCR 573	OBS-3	13100	1.00		
319442035	LCR 576	S(SG)	13500	1.00		

Blank Data

Blank Type	Lab Sample ID	Lab Method	Analyte Name	Result	Qualifier	MDL	Units
Equipment Blank	319442039	EPA 3005/6010B	Sodium	347		100	ug/L

Sample ID	Sample Ticket	Location	Result	Dilution Factor	Lab Qualifier	Validation Qualifier
319442033	LCR 573	OBS-3	436000	1.00		
319442035	LCR 576	S(SG)	427000	1.00		

Blank Data

Blank Type	Lab Sample ID	Lab Method	Analyte Name	Result	Qualifier	MDL	Units
Equipment Blank	319442039	EPA 3005/6020	Uranium	2		0.067	ug/L

Sample ID	Sample Ticket	Location	Result	Dilution Factor	Lab Qualifier	Validation Qualifier
319442033	LCR 573	OBS-3	11.6	1.00		
319442035	LCR 576	S(SG)	441	1.00		

Blank Data

Blank Type	Lab Sample ID	Lab Method	Analyte Name	Result	Qualifier	MDL	Units
Equipment Blank	319442040	EPA 300.0	Chloride	2.46		0.067	mg/L

Sample ID	Sample Ticket	Location	Result	Dilution Factor	Lab Qualifier	Validation Qualifier
319442034	LCR 573	OBS-3	577	100.00		

SAMPLE MANAGEMENT SYSTEM

Validation Report: Equipment/Trip Blanks

RIN: 13015067 Lab Code: GEN Project: Bluewater Validation Date: 03/07/2013

Blank Data

Blank Type	Lab Sample ID	Lab Method	Analyte Name	Result	Qualifier	MDL	Units
Equipment Blank	319442040		Chloride				

Sample ID	Sample Ticket	Location	Result	Dilution Factor	Lab Qualifier	Validation Qualifier
319442036	LCR 576	S(SG)	467	100.00		

Blank Data

Blank Type	Lab Sample ID	Lab Method	Analyte Name	Result	Qualifier	MDL	Units
Equipment Blank	319442040	EPA 300.0	Sulfate	5.69		0.133	mg/L

Sample ID	Sample Ticket	Location	Result	Dilution Factor	Lab Qualifier	Validation Qualifier
319442034	LCR 573	OBS-3	865	100.00		
319442036	LCR 576	S(SG)	1200	100.00		

Blank Data

Blank Type	Lab Sample ID	Lab Method	Analyte Name	Result	Qualifier	MDL	Units
Equipment Blank	319442040	SM 2320B	Bicarbonate alkalinity (CaCO3)	1.57		0.725	mg/L

Sample ID	Sample Ticket	Location	Result	Dilution Factor	Lab Qualifier	Validation Qualifier
319442034	LCR 573	OBS-3	41.8	1.00		
319442036	LCR 576	S(SG)	400	1.00		

Blank Data

Blank Type	Lab Sample ID	Lab Method	Analyte Name	Result	Qualifier	MDL	Units
Equipment Blank	319442040	SM 2540C	Total Dissolved Solids	22.9		3.40	mg/L

Sample ID	Sample Ticket	Location	Result	Dilution Factor	Lab Qualifier	Validation Qualifier
319442034	LCR 573	OBS-3	2350	1.00		
319442036	LCR 576	S(SG)	3030	1.00		

SAMPLE MANAGEMENT SYSTEM

Validation Report: Field Duplicates

RIN: 13015067 Lab Code: GEN Project: Bluewater Validation Date: 03/07/2013

Duplicate: 2074 Sample: L(SG)

Analyte	Sample Result	Sample Flag	Sample Error	Sample Dilution	Duplicate Result	Duplicate Flag	Duplicate Error	Duplicate Dilution	RPD	RER	Units
Arsenic	1.70	U		1.00	1.70	U		1.00			ug/L
Bicarbonate alkalinity (CaCO3)	565			1.00	573			1.00	1.41		mg/L
Calcium	139000			1.00	141000			1.00	1.43		ug/L
Carbonate alkalinity (CaCO3)	0.725	U		1.00	0.725	U		1.00			mg/L
Chloride	190			100.00	190			100.00	0		mg/L
Magnesium	76600			1.00	76900			1.00	0.39		ug/L
Molybdenum	0.458	B		1.00	0.484	B		1.00			ug/L
NO2+NO3 as N	0.017	U		1.00	0.017	U		1.00			mg/L
Potassium	7870			1.00	7770			1.00	1.28		ug/L
Selenium	1.50	U		1.00	1.50	U		1.00			ug/L
Sodium	360000			1.00	361000			1.00	0.28		ug/L
Sulfate	581			100.00	585			100.00	0.69		mg/L
Total Dissolved Solids	1750			1.00	1750			1.00	0		mg/L
Uranium	3.41			1.00	3.34			1.00	2.07		ug/L

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 4-1-2013
Stephen Donivan

Data Validation Lead: Stephen Donivan 4-1-2013
Stephen Donivan

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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 measurements that are extremely large or small relative to the rest of the data and, therefore, are suspected of misrepresenting the population from which they were collected. Potential outliers may result from transcription errors, data-coding errors, or measurement system problems. However, outliers may also represent true extreme values of a distribution and indicate more variability in the population than was expected.

Statistical outlier tests give probabilistic evidence that an extreme value does not "fit" with the distribution of the remainder of the data and is therefore a statistical outlier. These tests should only be used to identify data points that require further investigation. The tests alone cannot determine whether a statistical outlier should be discarded or corrected within a data set.

There are three steps involved in identifying extreme values or outliers:

1. Identify extreme values that may be potential outliers by generating the Outliers Report using the Sample Management System from data in the environmental database. The application compares the new data set (in standard environmental database units) with historical data and lists the new data that fall outside the historical data range. A determination is also made if the data are normally distributed using the Shapiro-Wilk Test.
2. Apply the appropriate statistical test. Dixon's Extreme Value test is used to test for statistical outliers when the sample size is less than or equal to 25. This test considers both extreme values that are much smaller than the rest of the data (case 1) and extreme values that are much larger than the rest of the data (case 2). This test is valid only if the data without the suspected outlier are normally distributed. Rosner's Test is a parametric test that is used to detect outliers for sample sizes of 25 or more. This test also assumes that the data without the suspected outliers are normally distributed.
3. Scientifically review statistical outliers and decide on their disposition.

There were no potential outliers identified, and the data for this event are acceptable as qualified.

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Data Validation Outliers Report - No Field Parameters
Comparison: All historical Data Beginning 01/01/2003
Laboratory: GEL Laboratories
RIN: 13015067
Report Date: 03/11/2013

					Current			Historical Maximum			Historical Minimum			Number of		Statistical
						Qualifiers			Qualifiers			Qualifiers		Data Points		
Site Code	Location Code	Sample ID	Sample Date	Analyte	Result	Lab	Data	Result	Lab	Data	Result	Lab	Data	N	N Below Detect	Outlier
BLU01	21(M)	N001	01/29/2013	Arsenic	0.00321	B	F	0.00293	B	F	0.0017	U	F	5	1	No
BLU01	21(M)	N001	01/29/2013	Calcium	146		F	170		F	151		F	5	0	No
BLU01	21(M)	N001	01/29/2013	Magnesium	39.4		F	42.9		F	40.8		F	5	0	No
BLU01	21(M)	N001	01/29/2013	Molybdenum	0.000865		F	0.0011		F	0.00087	B	F	5	0	No
BLU01	21(M)	N001	01/29/2013	Nitrate + Nitrite as Nitrogen	9.46		F	8.68		F	7.9		F	5	0	No
BLU01	21(M)	N001	01/29/2013	Potassium	5.52		F	7.9		F	5.53	E	JF	5	0	No
BLU01	L(SG)	N002	01/30/2013	Sodium	361		F	345		F	240		F	6	0	No
BLU01	L(SG)	N001	01/30/2013	Sodium	360		F	345		F	240		F	6	0	No
BLU01	OBS-3	0001	01/30/2013	Chloride	577			1100		F	590			7	0	No
BLU01	S(SG)	0001	01/30/2013	Chloride	467			2570		F	493			6	0	No
BLU01	S(SG)	0001	01/30/2013	Molybdenum	0.00127			0.00126			0.000167	U	F	6	2	No
BLU01	S(SG)	0001	01/30/2013	Uranium	0.441			0.44		FQ	0.000016	B	UF	9	3	No

STATISTICAL TESTS:
The distribution of the data is tested for normality or lognormality using the Shapiro-Wilk Test
Outliers are identified using Dixon's Test when there are 25 or fewer data points.
Outliers are identified using Rosner's Test when there are 26 or more data points.
See Data Quality Assessment: Statistical Methods for Practitioners, EPA QC/G-9S, February 2006.

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Attachment 2
Data Presentation

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Groundwater Quality Data

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Groundwater Quality Data by Location (USEE100) FOR SITE BLU01, Bluewater Disposal Site

REPORT DATE: 03/11/2013

Location: 11(SG) WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	01/30/2013	N001	265 - 295	493		F	#	0.725	
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	01/30/2013	N001	265 - 295	0.725	U	F	#	0.725	
Arsenic	mg/L	01/30/2013	N001	265 - 295	0.0163		F	#	0.0017	
Calcium	mg/L	01/30/2013	N001	265 - 295	161		F	#	0.05	
Chloride	mg/L	01/30/2013	N001	265 - 295	187		F	#	1.34	
Dissolved Oxygen	mg/L	01/30/2013	N001	265 - 295	0.92		F	#		
Magnesium	mg/L	01/30/2013	N001	265 - 295	61.9		F	#	0.11	
Molybdenum	mg/L	01/30/2013	N001	265 - 295	0.000292	B	F	#	0.000165	
Nitrate + Nitrite as Nitrogen	mg/L	01/30/2013	N001	265 - 295	0.017	U	F	#	0.017	
Oxidation Reduction Potential	mV	01/30/2013	N001	265 - 295	-108.5		F	#		
pH	s.u.	01/30/2013	N001	265 - 295	7.03		F	#		
Potassium	mg/L	01/30/2013	N001	265 - 295	10.4		F	#	0.05	
Selenium	mg/L	01/30/2013	N001	265 - 295	0.0015	U	F	#	0.0015	
Sodium	mg/L	01/30/2013	N001	265 - 295	251		F	#	0.1	
Specific Conductance	umhos /cm	01/30/2013	N001	265 - 295	2093		F	#		
Sulfate	mg/L	01/30/2013	N001	265 - 295	405		F	#	2.66	
Temperature	C	01/30/2013	N001	265 - 295	11.5		F	#		
Total Dissolved Solids	mg/L	01/30/2013	N001	265 - 295	1490		F	#	3.4	
Turbidity	NTU	01/30/2013	N001	265 - 295	2.25		F	#		
Uranium	mg/L	01/30/2013	N001	265 - 295	0.011		F	#	0.000067	

Groundwater Quality Data by Location (USEE100) FOR SITE BLU01, Bluewater Disposal Site

REPORT DATE: 03/11/2013

Location: 13(SG) WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	01/28/2013	N001	270 - 300	301		F	#	0.725	
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	01/28/2013	N001	270 - 300	0.725	U	F	#	0.725	
Arsenic	mg/L	01/28/2013	N001	270 - 300	0.0028	B	F	#	0.0017	
Calcium	mg/L	01/28/2013	N001	270 - 300	149		F	#	0.05	
Chloride	mg/L	01/28/2013	N001	270 - 300	84.9		F	#	0.67	
Dissolved Oxygen	mg/L	01/28/2013	N001	270 - 300	2.67		F	#		
Magnesium	mg/L	01/28/2013	N001	270 - 300	45.1		F	#	0.11	
Molybdenum	mg/L	01/28/2013	N001	270 - 300	0.00136		F	#	0.000165	
Nitrate + Nitrite as Nitrogen	mg/L	01/28/2013	N001	270 - 300	4.25		F	#	0.085	
Oxidation Reduction Potential	mV	01/28/2013	N001	270 - 300	156.2		F	#		
pH	s.u.	01/28/2013	N001	270 - 300	6.99		F	#		
Potassium	mg/L	01/28/2013	N001	270 - 300	5.55		F	#	0.05	
Selenium	mg/L	01/28/2013	N001	270 - 300	0.00545		F	#	0.0015	
Sodium	mg/L	01/28/2013	N001	270 - 300	101		F	#	0.1	
Specific Conductance	umhos /cm	01/28/2013	N001	270 - 300	1450		F	#		
Sulfate	mg/L	01/28/2013	N001	270 - 300	413		F	#	13.3	
Temperature	C	01/28/2013	N001	270 - 300	10.99		F	#		
Total Dissolved Solids	mg/L	01/28/2013	N001	270 - 300	1070		F	#	3.4	
Turbidity	NTU	01/28/2013	N001	270 - 300	0.77		F	#		
Uranium	mg/L	01/28/2013	N001	270 - 300	0.106		F	#	0.000067	

Groundwater Quality Data by Location (USEE100) FOR SITE BLU01, Bluewater Disposal Site

REPORT DATE: 03/11/2013

Location: 14(SG) WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	01/30/2013	N001	285 - 315	592		F	#	0.725	
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	01/30/2013	N001	285 - 315	0.725	U	F	#	0.725	
Arsenic	mg/L	01/30/2013	N001	285 - 315	0.0866		F	#	0.0017	
Calcium	mg/L	01/30/2013	N001	285 - 315	103		F	#	0.05	
Chloride	mg/L	01/30/2013	N001	285 - 315	165		F	#	0.67	
Dissolved Oxygen	mg/L	01/30/2013	N001	285 - 315	2.84		F	#		
Magnesium	mg/L	01/30/2013	N001	285 - 315	40.8		F	#	0.11	
Molybdenum	mg/L	01/30/2013	N001	285 - 315	0.0026		F	#	0.000165	
Nitrate + Nitrite as Nitrogen	mg/L	01/30/2013	N001	285 - 315	0.017	U	F	#	0.017	
Oxidation Reduction Potential	mV	01/30/2013	N001	285 - 315	-102.7		F	#		
pH	s.u.	01/30/2013	N001	285 - 315	7.18		F	#		
Potassium	mg/L	01/30/2013	N001	285 - 315	4.57		F	#	0.05	
Selenium	mg/L	01/30/2013	N001	285 - 315	0.0015	U	F	#	0.0015	
Sodium	mg/L	01/30/2013	N001	285 - 315	296		F	#	0.1	
Specific Conductance	umhos /cm	01/30/2013	N001	285 - 315	1810		F	#		
Sulfate	mg/L	01/30/2013	N001	285 - 315	262		F	#	1.33	
Temperature	C	01/30/2013	N001	285 - 315	10.22		F	#		
Total Dissolved Solids	mg/L	01/30/2013	N001	285 - 315	1210		F	#	3.4	
Turbidity	NTU	01/30/2013	N001	285 - 315	1.27		F	#		
Uranium	mg/L	01/30/2013	N001	285 - 315	0.0324		F	#	0.000067	

Groundwater Quality Data by Location (USEE100) FOR SITE BLU01, Bluewater Disposal Site

REPORT DATE: 03/11/2013

Location: 15(SG) WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	01/29/2013	N001	341 - 371	429		F	#	0.725	
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	01/29/2013	N001	341 - 371	0.725	U	F	#	0.725	
Arsenic	mg/L	01/29/2013	N001	341 - 371	0.0179		F	#	0.0017	
Calcium	mg/L	01/29/2013	N001	341 - 371	78.9		F	#	0.05	
Chloride	mg/L	01/29/2013	N001	341 - 371	167		F	#	0.67	
Dissolved Oxygen	mg/L	01/29/2013	N001	341 - 371	0.87		F	#		
Magnesium	mg/L	01/29/2013	N001	341 - 371	27.9		F	#	0.11	
Molybdenum	mg/L	01/29/2013	N001	341 - 371	0.00476		F	#	0.000165	
Nitrate + Nitrite as Nitrogen	mg/L	01/29/2013	N001	341 - 371	0.017	U	F	#	0.017	
Oxidation Reduction Potential	mV	01/29/2013	N001	341 - 371	-116		F	#		
pH	s.u.	01/29/2013	N001	341 - 371	7.33		F	#		
Potassium	mg/L	01/29/2013	N001	341 - 371	5.34		F	#	0.05	
Selenium	mg/L	01/29/2013	N001	341 - 371	0.0015	U	F	#	0.0015	
Sodium	mg/L	01/29/2013	N001	341 - 371	295		F	#	0.1	
Specific Conductance	umhos /cm	01/29/2013	N001	341 - 371	1695		F	#		
Sulfate	mg/L	01/29/2013	N001	341 - 371	307		F	#	1.33	
Temperature	C	01/29/2013	N001	341 - 371	11.11		F	#		
Total Dissolved Solids	mg/L	01/29/2013	N001	341 - 371	1150		F	#	3.4	
Turbidity	NTU	01/29/2013	N001	341 - 371	0.68		F	#		
Uranium	mg/L	01/29/2013	N001	341 - 371	0.0553		F	#	0.000067	

Groundwater Quality Data by Location (USEE100) FOR SITE BLU01, Bluewater Disposal Site

REPORT DATE: 03/11/2013

Location: 16(SG) WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	01/30/2013	N001	195 - 225	431		F	#	0.725	
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	01/30/2013	N001	195 - 225	0.725	U	F	#	0.725	
Arsenic	mg/L	01/30/2013	N001	195 - 225	0.0017	U	F	#	0.0017	
Calcium	mg/L	01/30/2013	N001	195 - 225	290		F	#	0.05	
Chloride	mg/L	01/30/2013	N001	195 - 225	453		F	#	6.7	
Dissolved Oxygen	mg/L	01/30/2013	N001	195 - 225	0.83		F	#		
Magnesium	mg/L	01/30/2013	N001	195 - 225	145		F	#	0.11	
Molybdenum	mg/L	01/30/2013	N001	195 - 225	0.00257		F	#	0.000165	
Nitrate + Nitrite as Nitrogen	mg/L	01/30/2013	N001	195 - 225	4.37		F	#	0.085	
Oxidation Reduction Potential	mV	01/30/2013	N001	195 - 225	23.4		F	#		
pH	s.u.	01/30/2013	N001	195 - 225	6.69		F	#		
Potassium	mg/L	01/30/2013	N001	195 - 225	11.6		F	#	0.05	
Selenium	mg/L	01/30/2013	N001	195 - 225	0.016		F	#	0.0015	
Sodium	mg/L	01/30/2013	N001	195 - 225	397		F	#	0.1	
Specific Conductance	umhos /cm	01/30/2013	N001	195 - 225	3769		F	#		
Sulfate	mg/L	01/30/2013	N001	195 - 225	1200		F	#	13.3	
Temperature	C	01/30/2013	N001	195 - 225	13.26		F	#		
Total Dissolved Solids	mg/L	01/30/2013	N001	195 - 225	3040		F	#	3.4	
Turbidity	NTU	01/30/2013	N001	195 - 225	1.04		F	#		
Uranium	mg/L	01/30/2013	N001	195 - 225	1.38		F	#	0.000067	

Groundwater Quality Data by Location (USEE100) FOR SITE BLU01, Bluewater Disposal Site

REPORT DATE: 03/11/2013

Location: 18(SG) WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	01/30/2013	N001	260 - 290	331		F	#	0.725	
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	01/30/2013	N001	260 - 290	0.725	U	F	#	0.725	
Arsenic	mg/L	01/30/2013	N001	260 - 290	0.0017	U	F	#	0.0017	
Calcium	mg/L	01/30/2013	N001	260 - 290	171		F	#	0.05	
Chloride	mg/L	01/30/2013	N001	260 - 290	100		F	#	0.67	
Dissolved Oxygen	mg/L	01/30/2013	N001	260 - 290	2.02		F	#		
Magnesium	mg/L	01/30/2013	N001	260 - 290	54.9		F	#	0.11	
Molybdenum	mg/L	01/30/2013	N001	260 - 290	0.00222		F	#	0.000165	
Nitrate + Nitrite as Nitrogen	mg/L	01/30/2013	N001	260 - 290	3.11		F	#	0.085	
Oxidation Reduction Potential	mV	01/30/2013	N001	260 - 290	15.7		F	#		
pH	s.u.	01/30/2013	N001	260 - 290	6.94		F	#		
Potassium	mg/L	01/30/2013	N001	260 - 290	7.39		F	#	0.05	
Selenium	mg/L	01/30/2013	N001	260 - 290	0.0046	B	F	#	0.0015	
Sodium	mg/L	01/30/2013	N001	260 - 290	138		F	#	0.1	
Specific Conductance	umhos /cm	01/30/2013	N001	260 - 290	1610		F	#		
Sulfate	mg/L	01/30/2013	N001	260 - 290	445		F	#	13.3	
Temperature	C	01/30/2013	N001	260 - 290	12.71		F	#		
Total Dissolved Solids	mg/L	01/30/2013	N001	260 - 290	1200		F	#	3.4	
Turbidity	NTU	01/30/2013	N001	260 - 290	1.9		F	#		
Uranium	mg/L	01/30/2013	N001	260 - 290	0.212		F	#	0.000067	

Groundwater Quality Data by Location (USEE100) FOR SITE BLU01, Bluewater Disposal Site

REPORT DATE: 03/11/2013

Location: 20(M) WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	01/30/2013	N001	110 - 125	257		F	#	0.725	
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	01/30/2013	N001	110 - 125	0.725	U	F	#	0.725	
Arsenic	mg/L	01/30/2013	N001	110 - 125	0.00962		F	#	0.0017	
Calcium	mg/L	01/30/2013	N001	110 - 125	149		F	#	0.05	
Chloride	mg/L	01/30/2013	N001	110 - 125	55.8		F	#	0.67	
Dissolved Oxygen	mg/L	01/30/2013	N001	110 - 125	7.08		F	#		
Magnesium	mg/L	01/30/2013	N001	110 - 125	38.4		F	#	0.11	
Molybdenum	mg/L	01/30/2013	N001	110 - 125	0.0019		F	#	0.000165	
Nitrate + Nitrite as Nitrogen	mg/L	01/30/2013	N001	110 - 125	3.15		F	#	0.085	
Oxidation Reduction Potential	mV	01/30/2013	N001	110 - 125	-35.3		F	#		
pH	s.u.	01/30/2013	N001	110 - 125	7.24		F	#		
Potassium	mg/L	01/30/2013	N001	110 - 125	4.54		F	#	0.05	
Selenium	mg/L	01/30/2013	N001	110 - 125	0.00373	B	F	#	0.0015	
Sodium	mg/L	01/30/2013	N001	110 - 125	91.8		F	#	0.1	
Specific Conductance	umhos /cm	01/30/2013	N001	110 - 125	1267		F	#		
Sulfate	mg/L	01/30/2013	N001	110 - 125	391		F	#	2.66	
Temperature	C	01/30/2013	N001	110 - 125	12.55		F	#		
Total Dissolved Solids	mg/L	01/30/2013	N001	110 - 125	963		F	#	3.4	
Turbidity	NTU	01/30/2013	N001	110 - 125	1.33		F	#		
Uranium	mg/L	01/30/2013	N001	110 - 125	0.015		F	#	0.000067	

Groundwater Quality Data by Location (USEE100) FOR SITE BLU01, Bluewater Disposal Site

REPORT DATE: 03/11/2013

Location: 21(M) WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	01/29/2013	N001	139.6 - 149.6	260		F	#	0.725	
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	01/29/2013	N001	139.6 - 149.6	0.725	U	F	#	0.725	
Arsenic	mg/L	01/29/2013	N001	139.6 - 149.6	0.00321	B	F	#	0.0017	
Calcium	mg/L	01/29/2013	N001	139.6 - 149.6	146		F	#	0.05	
Chloride	mg/L	01/29/2013	N001	139.6 - 149.6	152		F	#	0.67	
Dissolved Oxygen	mg/L	01/29/2013	N001	139.6 - 149.6	4.58		F	#		
Magnesium	mg/L	01/29/2013	N001	139.6 - 149.6	39.4		F	#	0.11	
Molybdenum	mg/L	01/29/2013	N001	139.6 - 149.6	0.000865		F	#	0.000165	
Nitrate + Nitrite as Nitrogen	mg/L	01/29/2013	N001	139.6 - 149.6	9.46		F	#	0.17	
Oxidation Reduction Potential	mV	01/29/2013	N001	139.6 - 149.6	87.4		F	#		
pH	s.u.	01/29/2013	N001	139.6 - 149.6	7.29		F	#		
Potassium	mg/L	01/29/2013	N001	139.6 - 149.6	5.52		F	#	0.05	
Selenium	mg/L	01/29/2013	N001	139.6 - 149.6	0.00935		F	#	0.0015	
Sodium	mg/L	01/29/2013	N001	139.6 - 149.6	203		F	#	0.1	
Specific Conductance	umhos /cm	01/29/2013	N001	139.6 - 149.6	1762		F	#		
Sulfate	mg/L	01/29/2013	N001	139.6 - 149.6	483		F	#	13.3	
Temperature	C	01/29/2013	N001	139.6 - 149.6	11.57		F	#		
Total Dissolved Solids	mg/L	01/29/2013	N001	139.6 - 149.6	1310		F	#	3.4	
Turbidity	NTU	01/29/2013	N001	139.6 - 149.6	1.76		F	#		
Uranium	mg/L	01/29/2013	N001	139.6 - 149.6	0.128		F	#	0.000067	

Groundwater Quality Data by Location (USEE100) FOR SITE BLU01, Bluewater Disposal Site

REPORT DATE: 03/11/2013

Location: 22(M) WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	01/29/2013	N001	136.83 - 146.83	323		F	#	0.725	
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	01/29/2013	N001	136.83 - 146.83	0.725	U	F	#	0.725	
Arsenic	mg/L	01/29/2013	N001	136.83 - 146.83	0.00308	B	F	#	0.0017	
Calcium	mg/L	01/29/2013	N001	136.83 - 146.83	90.1		F	#	0.05	
Chloride	mg/L	01/29/2013	N001	136.83 - 146.83	31.8		F	#	0.67	
Dissolved Oxygen	mg/L	01/29/2013	N001	136.83 - 146.83	1.56		F	#		
Magnesium	mg/L	01/29/2013	N001	136.83 - 146.83	25.9		F	#	0.11	
Molybdenum	mg/L	01/29/2013	N001	136.83 - 146.83	0.000796		F	#	0.000165	
Nitrate + Nitrite as Nitrogen	mg/L	01/29/2013	N001	136.83 - 146.83	30.7		F	#	1.7	
Oxidation Reduction Potential	mV	01/29/2013	N001	136.83 - 146.83	7.9		F	#		
pH	s.u.	01/29/2013	N001	136.83 - 146.83	7.31		F	#		
Potassium	mg/L	01/29/2013	N001	136.83 - 146.83	4.89		F	#	0.05	
Selenium	mg/L	01/29/2013	N001	136.83 - 146.83	0.00469	B	F	#	0.0015	
Sodium	mg/L	01/29/2013	N001	136.83 - 146.83	176		F	#	0.1	
Specific Conductance	umhos /cm	01/29/2013	N001	136.83 - 146.83	1276		F	#		
Sulfate	mg/L	01/29/2013	N001	136.83 - 146.83	231		F	#	1.33	
Temperature	C	01/29/2013	N001	136.83 - 146.83	12.07		F	#		
Total Dissolved Solids	mg/L	01/29/2013	N001	136.83 - 146.83	939		F	#	3.4	
Turbidity	NTU	01/29/2013	N001	136.83 - 146.83	0.84		F	#		
Uranium	mg/L	01/29/2013	N001	136.83 - 146.83	0.352		F	#	0.000067	

Groundwater Quality Data by Location (USEE100) FOR SITE BLU01, Bluewater Disposal Site

REPORT DATE: 03/11/2013

Location: 23(M) WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	01/28/2013	0001	89 - 109	133			#	0.725	
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	01/28/2013	0001	89 - 109	0.725	U		#	0.725	
Arsenic	mg/L	01/28/2013	0001	89 - 109	0.0017	U		#	0.0017	
Calcium	mg/L	01/28/2013	0001	89 - 109	134			#	0.05	
Chloride	mg/L	01/28/2013	0001	89 - 109	94.2			#	0.67	
Dissolved Oxygen	mg/L	01/28/2013	N001	89 - 109	4.82			#		
Magnesium	mg/L	01/28/2013	0001	89 - 109	29.9			#	0.11	
Molybdenum	mg/L	01/28/2013	0001	89 - 109	0.00811			#	0.000165	
Nitrate + Nitrite as Nitrogen	mg/L	01/28/2013	0001	89 - 109	3.98			#	0.085	
Oxidation Reduction Potential	mV	01/28/2013	N001	89 - 109	170			#		
pH	s.u.	01/28/2013	N001	89 - 109	7.29			#		
Potassium	mg/L	01/28/2013	0001	89 - 109	6.56			#	0.05	
Selenium	mg/L	01/28/2013	0001	89 - 109	0.00886			#	0.0015	
Sodium	mg/L	01/28/2013	0001	89 - 109	53.9			#	0.1	
Specific Conductance	umhos /cm	01/28/2013	N001	89 - 109	1113			#		
Sulfate	mg/L	01/28/2013	0001	89 - 109	325			#	1.33	
Temperature	C	01/28/2013	N001	89 - 109	11.54			#		
Total Dissolved Solids	mg/L	01/28/2013	0001	89 - 109	799			#	3.4	
Turbidity	NTU	01/28/2013	N001	89 - 109	157			#		
Uranium	mg/L	01/28/2013	0001	89 - 109	0.0203			#	0.000067	

Groundwater Quality Data by Location (USEE100) FOR SITE BLU01, Bluewater Disposal Site

REPORT DATE: 03/11/2013

Location: E(M) WELL State Plane coordinates established with GPS Mapping Grade, Local coordinates source AutoCAD drawing

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	01/30/2013	N001	68.6 - 89.8	2.61		FQ	#	0.725	
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	01/30/2013	N001	68.6 - 89.8	0.725	U	FQ	#	0.725	
Arsenic	mg/L	01/30/2013	N001	68.6 - 89.8	0.0017	U	FQ	#	0.0017	
Calcium	mg/L	01/30/2013	N001	68.6 - 89.8	202		FQ	#	0.05	
Chloride	mg/L	01/30/2013	N001	68.6 - 89.8	32.2		FQ	#	0.67	
Dissolved Oxygen	mg/L	01/30/2013	N001	68.6 - 89.8	0.45		FQ	#		
Magnesium	mg/L	01/30/2013	N001	68.6 - 89.8	53.2		FQ	#	0.11	
Molybdenum	mg/L	01/30/2013	N001	68.6 - 89.8	0.000416	B	FQ	#	0.000165	
Nitrate + Nitrite as Nitrogen	mg/L	01/30/2013	N001	68.6 - 89.8	0.017	U	FQ	#	0.017	
Oxidation Reduction Potential	mV	01/30/2013	N001	68.6 - 89.8	-313.6		FQ	#		
pH	s.u.	01/30/2013	N001	68.6 - 89.8	8.31		FQ	#		
Potassium	mg/L	01/30/2013	N001	68.6 - 89.8	4.11		FQ	#	0.05	
Selenium	mg/L	01/30/2013	N001	68.6 - 89.8	0.0015	U	FQ	#	0.0015	
Sodium	mg/L	01/30/2013	N001	68.6 - 89.8	57.1		FQ	#	0.1	
Specific Conductance	umhos /cm	01/30/2013	N001	68.6 - 89.8	1411		FQ	#		
Sulfate	mg/L	01/30/2013	N001	68.6 - 89.8	751		FQ	#	13.3	
Temperature	C	01/30/2013	N001	68.6 - 89.8	13.38		FQ	#		
Total Dissolved Solids	mg/L	01/30/2013	N001	68.6 - 89.8	1200		FQ	#	3.4	
Turbidity	NTU	01/30/2013	N001	68.6 - 89.8	9.2		FQ	#		
Uranium	mg/L	01/30/2013	N001	68.6 - 89.8	0.000067	U	FQ	#	0.000067	

Groundwater Quality Data by Location (USEE100) FOR SITE BLU01, Bluewater Disposal Site

REPORT DATE: 03/11/2013

Location: F(M) WELL State Plane coordinates established with GPS Mapping Grade, Local coordinates source AutoCAD drawing

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	01/30/2013	N001	94.2 - 114.87	180		F	#	0.725	
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	01/30/2013	N001	94.2 - 114.87	0.725	U	F	#	0.725	
Arsenic	mg/L	01/30/2013	N001	94.2 - 114.87	0.0017	U	F	#	0.0017	
Calcium	mg/L	01/30/2013	N001	94.2 - 114.87	70.4		F	#	0.05	
Chloride	mg/L	01/30/2013	N001	94.2 - 114.87	11.1		F	#	0.67	
Dissolved Oxygen	mg/L	01/30/2013	N001	94.2 - 114.87	2.65		F	#		
Magnesium	mg/L	01/30/2013	N001	94.2 - 114.87	19.2		F	#	0.11	
Molybdenum	mg/L	01/30/2013	N001	94.2 - 114.87	0.00103		F	#	0.000165	
Nitrate + Nitrite as Nitrogen	mg/L	01/30/2013	N001	94.2 - 114.87	0.654		F	#	0.017	
Oxidation Reduction Potential	mV	01/30/2013	N001	94.2 - 114.87	6.4		F	#		
pH	s.u.	01/30/2013	N001	94.2 - 114.87	7.7		F	#		
Potassium	mg/L	01/30/2013	N001	94.2 - 114.87	3.38		F	#	0.05	
Selenium	mg/L	01/30/2013	N001	94.2 - 114.87	0.0015	U	F	#	0.0015	
Sodium	mg/L	01/30/2013	N001	94.2 - 114.87	21.3		F	#	0.1	
Specific Conductance	umhos /cm	01/30/2013	N001	94.2 - 114.87	536		F	#		
Sulfate	mg/L	01/30/2013	N001	94.2 - 114.87	99.1		F	#	1.33	
Temperature	C	01/30/2013	N001	94.2 - 114.87	11.73		F	#		
Total Dissolved Solids	mg/L	01/30/2013	N001	94.2 - 114.87	364		F	#	3.4	
Turbidity	NTU	01/30/2013	N001	94.2 - 114.87	2.26		F	#		
Uranium	mg/L	01/30/2013	N001	94.2 - 114.87	0.00808		F	#	0.000335	

Groundwater Quality Data by Location (USEE100) FOR SITE BLU01, Bluewater Disposal Site

REPORT DATE: 03/11/2013

Location: I(SG) WELL State Plane coordinates established with GPS Mapping Grade, Local coordinates source AutoCAD drawing

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	01/29/2013	N001	-	134		F	#	0.725	
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	01/29/2013	N001	-	1.05		F	#	0.725	
Arsenic	mg/L	01/29/2013	N001	-	0.0017	U	F	#	0.0017	
Calcium	mg/L	01/29/2013	N001	-	18.9		F	#	0.05	
Chloride	mg/L	01/29/2013	N001	-	195		F	#	0.67	
Dissolved Oxygen	mg/L	01/29/2013	N001	-	0.45		F	#		
Magnesium	mg/L	01/29/2013	N001	-	20.6		F	#	0.11	
Molybdenum	mg/L	01/29/2013	N001	-	0.00058		F	#	0.000165	
Nitrate + Nitrite as Nitrogen	mg/L	01/29/2013	N001	-	0.017	U	F	#	0.017	
Oxidation Reduction Potential	mV	01/29/2013	N001	-	-241.4		F	#		
pH	s.u.	01/29/2013	N001	-	8.31		F	#		
Potassium	mg/L	01/29/2013	N001	-	6.29		F	#	0.05	
Selenium	mg/L	01/29/2013	N001	-	0.0015	U	F	#	0.0015	
Sodium	mg/L	01/29/2013	N001	-	197		F	#	0.1	
Specific Conductance	umhos /cm	01/29/2013	N001	-	1176		F	#		
Sulfate	mg/L	01/29/2013	N001	-	199		F	#	1.33	
Temperature	C	01/29/2013	N001	-	11.5		F	#		
Total Dissolved Solids	mg/L	01/29/2013	N001	-	734		F	#	3.4	
Turbidity	NTU	01/29/2013	N001	-	7.71		F	#		
Uranium	mg/L	01/29/2013	N001	-	0.00202		F	#	0.000067	

Groundwater Quality Data by Location (USEE100) FOR SITE BLU01, Bluewater Disposal Site
REPORT DATE: 03/11/2013
Location: L(SG) WELL State Plane coordinates established with GPS Mapping Grade, Local coordinates source AutoCAD drawing

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	01/30/2013	N001	-	565		F	#	0.725	
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	01/30/2013	N002	-	573		F	#	0.725	
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	01/30/2013	N001	-	0.725	U	F	#	0.725	
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	01/30/2013	N002	-	0.725	U	F	#	0.725	
Arsenic	mg/L	01/30/2013	N001	-	0.0017	U	F	#	0.0017	
Arsenic	mg/L	01/30/2013	N002	-	0.0017	U	F	#	0.0017	
Calcium	mg/L	01/30/2013	N001	-	139		F	#	0.05	
Calcium	mg/L	01/30/2013	N002	-	141		F	#	0.05	
Chloride	mg/L	01/30/2013	N001	-	190		F	#	6.7	
Chloride	mg/L	01/30/2013	N002	-	190		F	#	6.7	
Dissolved Oxygen	mg/L	01/30/2013	N001	-	1.21		F	#		
Magnesium	mg/L	01/30/2013	N001	-	76.6		F	#	0.11	
Magnesium	mg/L	01/30/2013	N002	-	76.9		F	#	0.11	
Molybdenum	mg/L	01/30/2013	N001	-	0.000458	B	F	#	0.000165	
Molybdenum	mg/L	01/30/2013	N002	-	0.000484	B	F	#	0.000165	
Nitrate + Nitrite as Nitrogen	mg/L	01/30/2013	N001	-	0.017	U	F	#	0.017	
Nitrate + Nitrite as Nitrogen	mg/L	01/30/2013	N002	-	0.017	U	F	#	0.017	
Oxidation Reduction Potential	mV	01/30/2013	N001	-	-96.9		F	#		

Groundwater Quality Data by Location (USEE100) FOR SITE BLU01, Bluewater Disposal Site
REPORT DATE: 03/11/2013
Location: L(SG) WELL State Plane coordinates established with GPS Mapping Grade, Local coordinates source AutoCAD drawing

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
pH	s.u.	01/30/2013	N001	-	6.78		F	#		
Potassium	mg/L	01/30/2013	N001	-	7.87		F	#	0.05	
Potassium	mg/L	01/30/2013	N002	-	7.77		F	#	0.05	
Selenium	mg/L	01/30/2013	N001	-	0.0015	U	F	#	0.0015	
Selenium	mg/L	01/30/2013	N002	-	0.0015	U	F	#	0.0015	
Sodium	mg/L	01/30/2013	N001	-	360		F	#	0.1	
Sodium	mg/L	01/30/2013	N002	-	361		F	#	0.1	
Specific Conductance	umhos /cm	01/30/2013	N001	-	2413		F	#		
Sulfate	mg/L	01/30/2013	N001	-	581		F	#	13.3	
Sulfate	mg/L	01/30/2013	N002	-	585		F	#	13.3	
Temperature	C	01/30/2013	N001	-	12.04		F	#		
Total Dissolved Solids	mg/L	01/30/2013	N001	-	1750		F	#	3.4	
Total Dissolved Solids	mg/L	01/30/2013	N002	-	1750		F	#	3.4	
Turbidity	NTU	01/30/2013	N001	-	2.22		F	#		
Uranium	mg/L	01/30/2013	N001	-	0.00341		F	#	0.000067	
Uranium	mg/L	01/30/2013	N002	-	0.00334		F	#	0.000067	

Groundwater Quality Data by Location (USEE100) FOR SITE BLU01, Bluewater Disposal Site

REPORT DATE: 03/11/2013

Location: OBS-3 WELL State Plane coordinates established with GPS Mapping Grade, Local coordinates source AutoCAD drawing

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	01/30/2013	0001	152.4 - 350	41.8			#	0.725	
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	01/30/2013	0001	152.4 - 350	0.725	U		#	0.725	
Arsenic	mg/L	01/30/2013	0001	152.4 - 350	0.0017	U		#	0.0017	
Calcium	mg/L	01/30/2013	0001	152.4 - 350	112			#	0.05	
Chloride	mg/L	01/30/2013	0001	152.4 - 350	577			#	6.7	
Dissolved Oxygen	mg/L	01/30/2013	N001	152.4 - 350	1.79			#		
Magnesium	mg/L	01/30/2013	0001	152.4 - 350	143			#	0.11	
Molybdenum	mg/L	01/30/2013	0001	152.4 - 350	0.000175	B		#	0.000165	
Nitrate + Nitrite as Nitrogen	mg/L	01/30/2013	0001	152.4 - 350	0.061			#	0.017	
Oxidation Reduction Potential	mV	01/30/2013	N001	152.4 - 350	-128.2			#		
pH	s.u.	01/30/2013	N001	152.4 - 350	7.18			#		
Potassium	mg/L	01/30/2013	0001	152.4 - 350	13.1			#	0.05	
Selenium	mg/L	01/30/2013	0001	152.4 - 350	0.0015	U		#	0.0015	
Sodium	mg/L	01/30/2013	0001	152.4 - 350	436			#	0.1	
Specific Conductance	umhos /cm	01/30/2013	N001	152.4 - 350	3260			#		
Sulfate	mg/L	01/30/2013	0001	152.4 - 350	865			#	13.3	
Temperature	C	01/30/2013	N001	152.4 - 350	13.24			#		
Total Dissolved Solids	mg/L	01/30/2013	0001	152.4 - 350	2350			#	3.4	
Turbidity	NTU	01/30/2013	N001	152.4 - 350	76			#		
Uranium	mg/L	01/30/2013	0001	152.4 - 350	0.0116			#	0.000067	

Groundwater Quality Data by Location (USEE100) FOR SITE BLU01, Bluewater Disposal Site

REPORT DATE: 03/11/2013

Location: S(SG) WELL State Plane coordinates established with GPS Mapping Grade, Local coordinates source AutoCAD drawing

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	01/30/2013	0001	159 - 280	400			#	0.725	
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	01/30/2013	0001	159 - 280	0.725	U		#	0.725	
Arsenic	mg/L	01/30/2013	0001	159 - 280	0.0017	U		#	0.0017	
Calcium	mg/L	01/30/2013	0001	159 - 280	310			#	0.05	
Chloride	mg/L	01/30/2013	0001	159 - 280	467			#	6.7	
Dissolved Oxygen	mg/L	01/30/2013	N001	159 - 280	3.96			#		
Magnesium	mg/L	01/30/2013	0001	159 - 280	173			#	0.11	
Molybdenum	mg/L	01/30/2013	0001	159 - 280	0.00127			#	0.000165	
Nitrate + Nitrite as Nitrogen	mg/L	01/30/2013	0001	159 - 280	2.91			#	0.085	
Oxidation Reduction Potential	mV	01/30/2013	N001	159 - 280	-129			#		
pH	s.u.	01/30/2013	N001	159 - 280	7.05			#		
Potassium	mg/L	01/30/2013	0001	159 - 280	13.5			#	0.05	
Selenium	mg/L	01/30/2013	0001	159 - 280	0.011			#	0.0015	
Sodium	mg/L	01/30/2013	0001	159 - 280	427			#	0.1	
Specific Conductance	umhos /cm	01/30/2013	N001	159 - 280	3780			#		
Sulfate	mg/L	01/30/2013	0001	159 - 280	1200			#	13.3	
Temperature	C	01/30/2013	N001	159 - 280	14.41			#		
Total Dissolved Solids	mg/L	01/30/2013	0001	159 - 280	3030			#	3.4	
Turbidity	NTU	01/30/2013	N001	159 - 280	12.7			#		
Uranium	mg/L	01/30/2013	0001	159 - 280	0.441			#	0.000067	

Groundwater Quality Data by Location (USEE100) FOR SITE BLU01, Bluewater Disposal Site

REPORT DATE: 03/11/2013

Location: X(M) WELL State Plane coordinates established with GPS Mapping Grade, Local coordinates source AutoCAD drawing

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	01/29/2013	N001	123 - 132	224		F	#	0.725	
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	01/29/2013	N001	123 - 132	0.725	U	F	#	0.725	
Arsenic	mg/L	01/29/2013	N001	123 - 132	0.00203	B	F	#	0.0017	
Calcium	mg/L	01/29/2013	N001	123 - 132	159		F	#	0.05	
Chloride	mg/L	01/29/2013	N001	123 - 132	199		F	#	0.67	
Dissolved Oxygen	mg/L	01/29/2013	N001	123 - 132	2.99		F	#		
Magnesium	mg/L	01/29/2013	N001	123 - 132	44.5		F	#	0.11	
Molybdenum	mg/L	01/29/2013	N001	123 - 132	0.000754		F	#	0.000165	
Nitrate + Nitrite as Nitrogen	mg/L	01/29/2013	N001	123 - 132	11.1		F	#	0.17	
Oxidation Reduction Potential	mV	01/29/2013	N001	123 - 132	85.4		F	#		
pH	s.u.	01/29/2013	N001	123 - 132	7.56		F	#		
Potassium	mg/L	01/29/2013	N001	123 - 132	5.41		F	#	0.05	
Selenium	mg/L	01/29/2013	N001	123 - 132	0.00635		F	#	0.0015	
Sodium	mg/L	01/29/2013	N001	123 - 132	197		F	#	0.1	
Specific Conductance	umhos /cm	01/29/2013	N001	123 - 132	1836		F	#		
Sulfate	mg/L	01/29/2013	N001	123 - 132	495		F	#	13.3	
Temperature	C	01/29/2013	N001	123 - 132	10.65		F	#		
Total Dissolved Solids	mg/L	01/29/2013	N001	123 - 132	1370		F	#	3.4	
Turbidity	NTU	01/29/2013	N001	123 - 132	2.11		F	#		
Uranium	mg/L	01/29/2013	N001	123 - 132	0.139		F	#	0.000067	

Groundwater Quality Data by Location (USEE100) FOR SITE BLU01, Bluewater Disposal Site

REPORT DATE: 03/11/2013

Location: Y2(M) WELL State Plane coordinates established with GPS Mapping Grade, Local coordinates source AutoCAD drawing

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Bicarbonate (as $CaCO_3$)	mg/L	01/30/2013	N001	98 - 123	208		F	#	0.725	
Alkalinity, Carbonate (as $CaCO_3$)	mg/L	01/30/2013	N001	98 - 123	0.725	U	F	#	0.725	
Arsenic	mg/L	01/30/2013	N001	98 - 123	0.0017	U	F	#	0.0017	
Calcium	mg/L	01/30/2013	N001	98 - 123	62.1		F	#	0.05	
Chloride	mg/L	01/30/2013	N001	98 - 123	14.4		F	#	0.67	
Dissolved Oxygen	mg/L	01/30/2013	N001	98 - 123	6.23		F	#		
Magnesium	mg/L	01/30/2013	N001	98 - 123	17.8		F	#	0.11	
Molybdenum	mg/L	01/30/2013	N001	98 - 123	0.00161		F	#	0.000165	
Nitrate + Nitrite as Nitrogen	mg/L	01/30/2013	N001	98 - 123	1.39		F	#	0.085	
Oxidation Reduction Potential	mV	01/30/2013	N001	98 - 123	11.1		F	#		
pH	s.u.	01/30/2013	N001	98 - 123	7.54		F	#		
Potassium	mg/L	01/30/2013	N001	98 - 123	3.24		F	#	0.05	
Selenium	mg/L	01/30/2013	N001	98 - 123	0.0015	U	F	#	0.0015	
Sodium	mg/L	01/30/2013	N001	98 - 123	55		F	#	0.1	
Specific Conductance	umhos /cm	01/30/2013	N001	98 - 123	617		F	#		
Sulfate	mg/L	01/30/2013	N001	98 - 123	97		F	#	1.33	
Temperature	C	01/30/2013	N001	98 - 123	12.35		F	#		
Total Dissolved Solids	mg/L	01/30/2013	N001	98 - 123	394		F	#	3.4	
Turbidity	NTU	01/30/2013	N001	98 - 123	0.68		F	#		
Uranium	mg/L	01/30/2013	N001	98 - 123	0.00523		F	#	0.000067	

SAMPLE ID CODES: 000X = Filtered sample (0.45 µm). N00X = Unfiltered sample. X = replicate number.

LAB QUALIFIERS:

*	Replicate analysis not within control limits.
>	Result above upper detection limit.
A	TIC is a suspected aldol-condensation product.
B	Inorganic: Result is between the IDL and CRDL. Organic: Analyte also found in method blank.
C	Pesticide result confirmed by GC-MS.
D	Analyte determined in diluted sample.
E	Inorganic: Estimate value because of interference, see case narrative. Organic: Analyte exceeded calibration range of the GC-MS.
H	Holding time expired, value suspect.
I	Increased detection limit due to required dilution.
J	Estimated
N	Inorganic or radiochemical: Spike sample recovery not within control limits. Organic: Tentatively identified compound (TIC).
P	> 25% difference in detected pesticide or Aroclor concentrations between 2 columns.
U	Analytical result below detection limit.
W	Post-digestion spike outside control limits while sample absorbance < 50% of analytical spike absorbance.
X,Y,Z	Laboratory defined qualifier, see case narrative.

DATA QUALIFIERS:

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

QA QUALIFIER:

#	Validated according to quality assurance guidelines.

Equipment Blank Data

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BLANKS REPORT

LAB: GENERAL ENGINEERING (Charleston, SC)

RIN: 13015067

Report Date: 03/11/2013

Parameter	Site Code	Location ID	Sample Date	Sample ID	Units	Result	Qualifiers Lab Data	Detection Limit	Uncertainty	Sample Type
Alkalinity, Bicarbonate (as $CaCO_3$)	BLU01	0999	01/30/2013	N001	mg/L	1.57		0.725		E
Alkalinity, Carbonate (as $CaCO_3$)	BLU01	0999	01/30/2013	N001	mg/L	0.725	U	0.725		E
Arsenic	BLU01	0999	01/30/2013	N001	mg/L	0.0017	U	0.0017		E
Calcium	BLU01	0999	01/30/2013	N001	mg/L	0.388		0.05		E
Chloride	BLU01	0999	01/30/2013	N001	mg/L	2.46		0.067		E
Magnesium	BLU01	0999	01/30/2013	N001	mg/L	0.11	U	0.11		E
Molybdenum	BLU01	0999	01/30/2013	N001	mg/L	0.000165	U	0.000165		E
Nitrate + Nitrite as Nitrogen	BLU01	0999	01/30/2013	N001	mg/L	0.017	U	0.017		E
Potassium	BLU01	0999	01/30/2013	N001	mg/L	0.0871	B	0.05		E
Selenium	BLU01	0999	01/30/2013	N001	mg/L	0.0015	U	0.0015		E
Sodium	BLU01	0999	01/30/2013	N001	mg/L	0.347		0.1		E
Sulfate	BLU01	0999	01/30/2013	N001	mg/L	5.69		0.133		E
Total Dissolved Solids	BLU01	0999	01/30/2013	N001	mg/L	22.9		3.4		E
Uranium	BLU01	0999	01/30/2013	N001	mg/L	0.002		0.000067		E

SAMPLE ID CODES: 000X = Filtered sample (0.45 µm). N00X = Unfiltered sample. X = replicate number.

LAB QUALIFIERS:

*	Replicate analysis not within control limits.
>	Result above upper detection limit.
A	TIC is a suspected aldol-condensation product.
B	Inorganic: Result is between the IDL and CRDL. Organic: Analyte also found in method blank.
C	Pesticide result confirmed by GC-MS.
D	Analyte determined in diluted sample.
E	Inorganic: Estimate value because of interference, see case narrative. Organic: Analyte exceeded calibration range of the GC-MS.
H	Holding time expired, value suspect.
I	Increased detection limit due to required dilution.
J	Estimated
N	Inorganic or radiochemical: Spike sample recovery not within control limits. Organic: Tentatively identified compound (TIC).
P	> 25% difference in detected pesticide or Aroclor concentrations between 2 columns.

U Analytical result below detection limit.
W Post-digestion spike outside control limits while sample absorbance < 50% of analytical spike absorbance.
X,Y,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 was not detected.
G Possible grout contamination, pH > 9.
Q Qualitative result due to sampling technique.
X Location is undefined.
J Estimated value.
R Unusable result.

SAMPLE TYPES:

E Equipment Blank.

Static Water Level Data

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STATIC WATER LEVELS (USEE700) FOR SITE BLU01, Bluewater Disposal Site
REPORT DATE: 03/11/2013

Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Date	Measurement Time	Depth From Top of Casing (Ft)	Water Elevation (Ft)
11(SG)		6639.19	01/30/2013	09:15:12	205.11	6434.08
13(SG)		6593.57	01/28/2013	17:35:40	166.33	6427.24
14(SG)		6617.2	01/30/2013	15:20:54	188.06	6429.14
15(SG)		6612.53	01/29/2013	17:40:44	184.63	6427.9
16(SG)		6618.25	01/30/2013	13:40:02	184.31	6433.94
18(SG)		6601.32	01/30/2013	16:55:47	173.36	6427.96
20(M)		6613.38	01/30/2013	11:20:34	105.01	6508.37
21(M)		6593.8	01/29/2013	09:05:52	128.28	6465.52
22(M)		6606.48	01/29/2013	16:20:40	136.99	6469.49
23(M)		6579.22	01/28/2013	16:25:55	110.61	6468.61
E(M)		6616.32	01/30/2013	14:25:10	81.61	6534.71
F(M)		6603.59	01/30/2013	17:50:08	113.48	6490.11
I(SG)		6625.93	01/29/2013	15:30:37	199.19	6426.74
L(SG)		6606.09	01/30/2013	10:35:09	160.39	6445.7
OBS-3		6617.22	01/30/2013	12:45:04	183.1	6434.12
S(SG)		6625.25	01/30/2013	15:45:01	191.21	6434.04
X(M)		6598.91	01/29/2013	09:40:11	131.71	6467.2
Y2(M)		6614.13	01/30/2013	17:20:03	117.39	6496.74

FLOW CODES: B BACKGROUND C CROSS GRADIENT D DOWN GRADIENT F OFF SITE
N UNKNOWN O ON SITE U UPGRADIENT

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Time-Concentration Graphs

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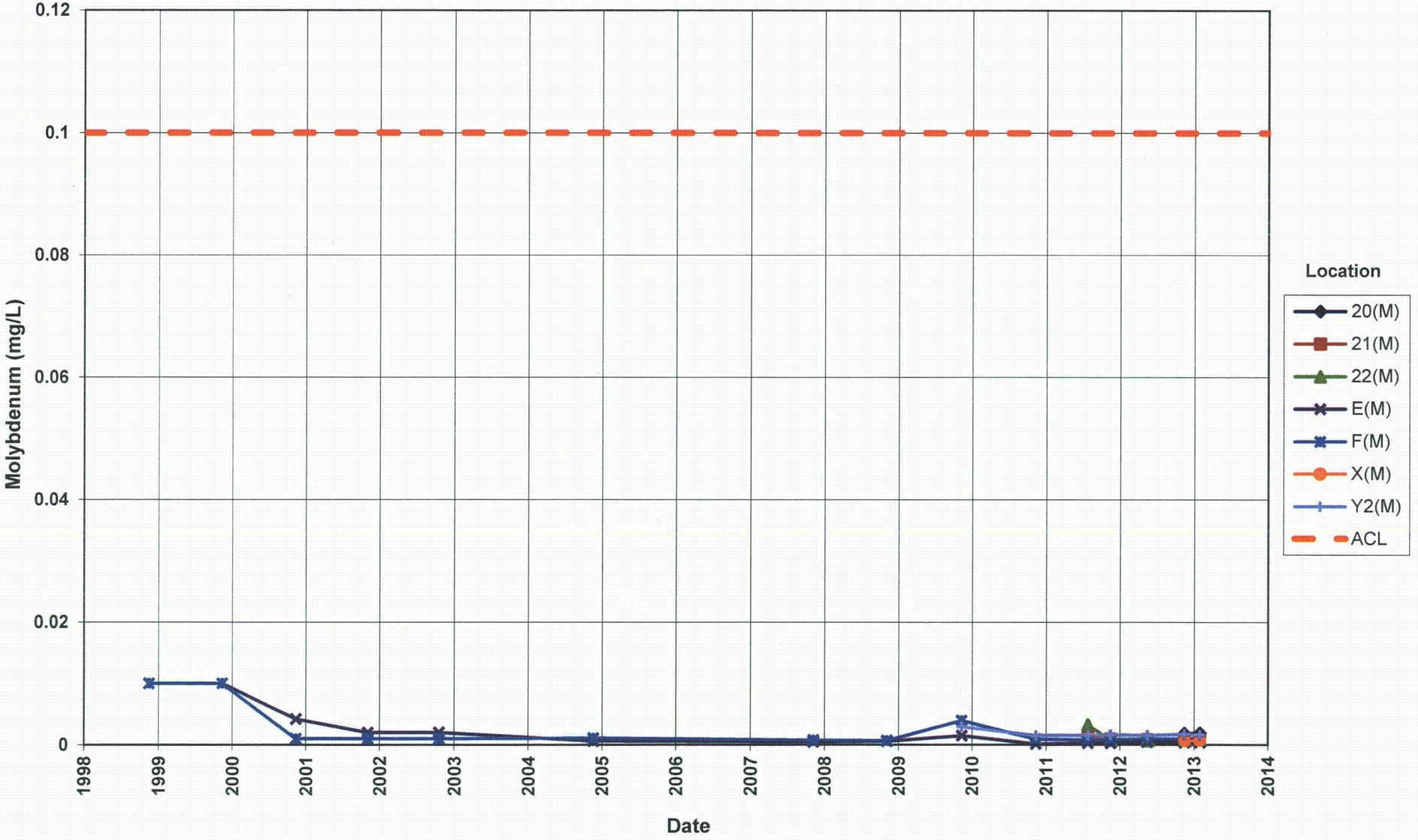
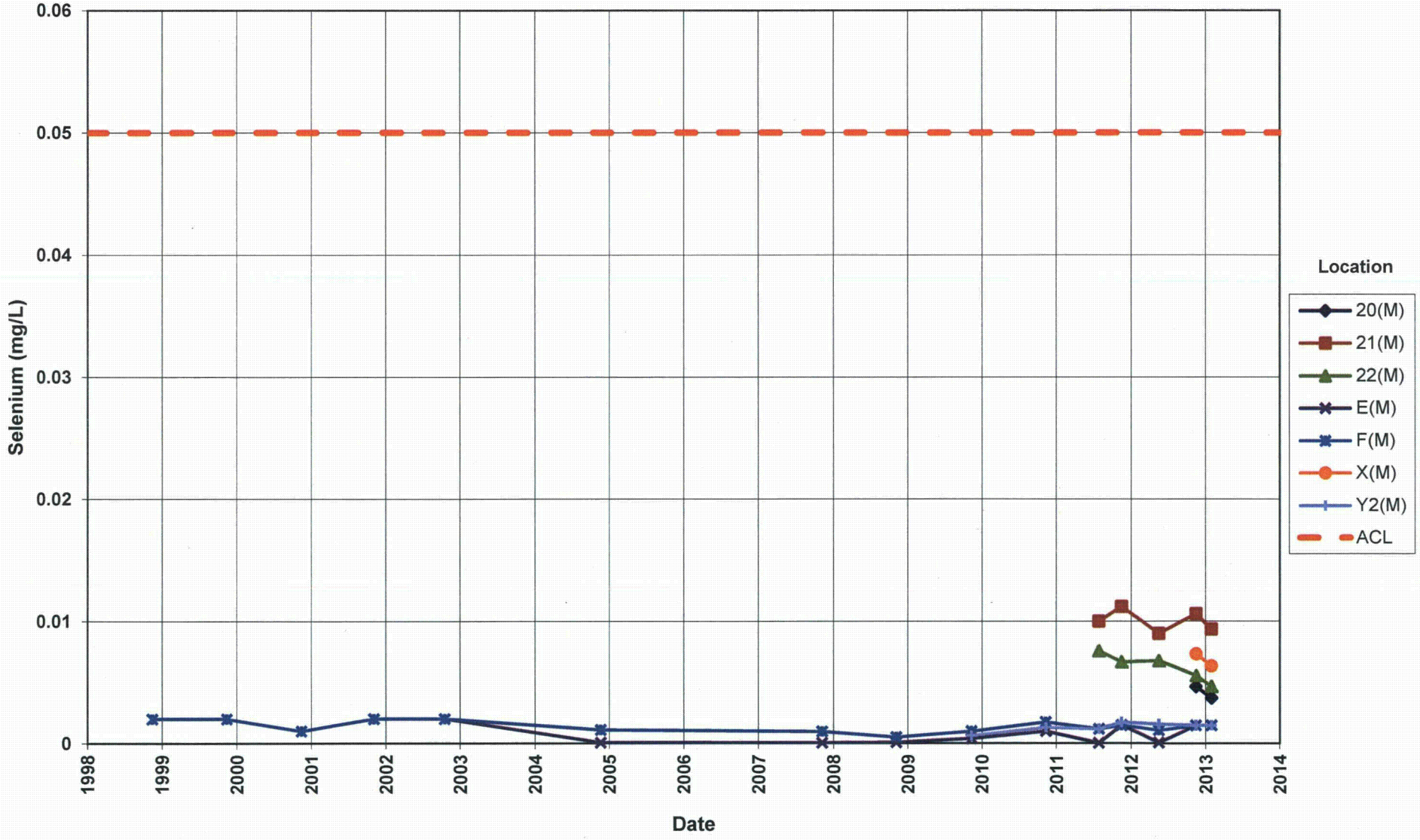
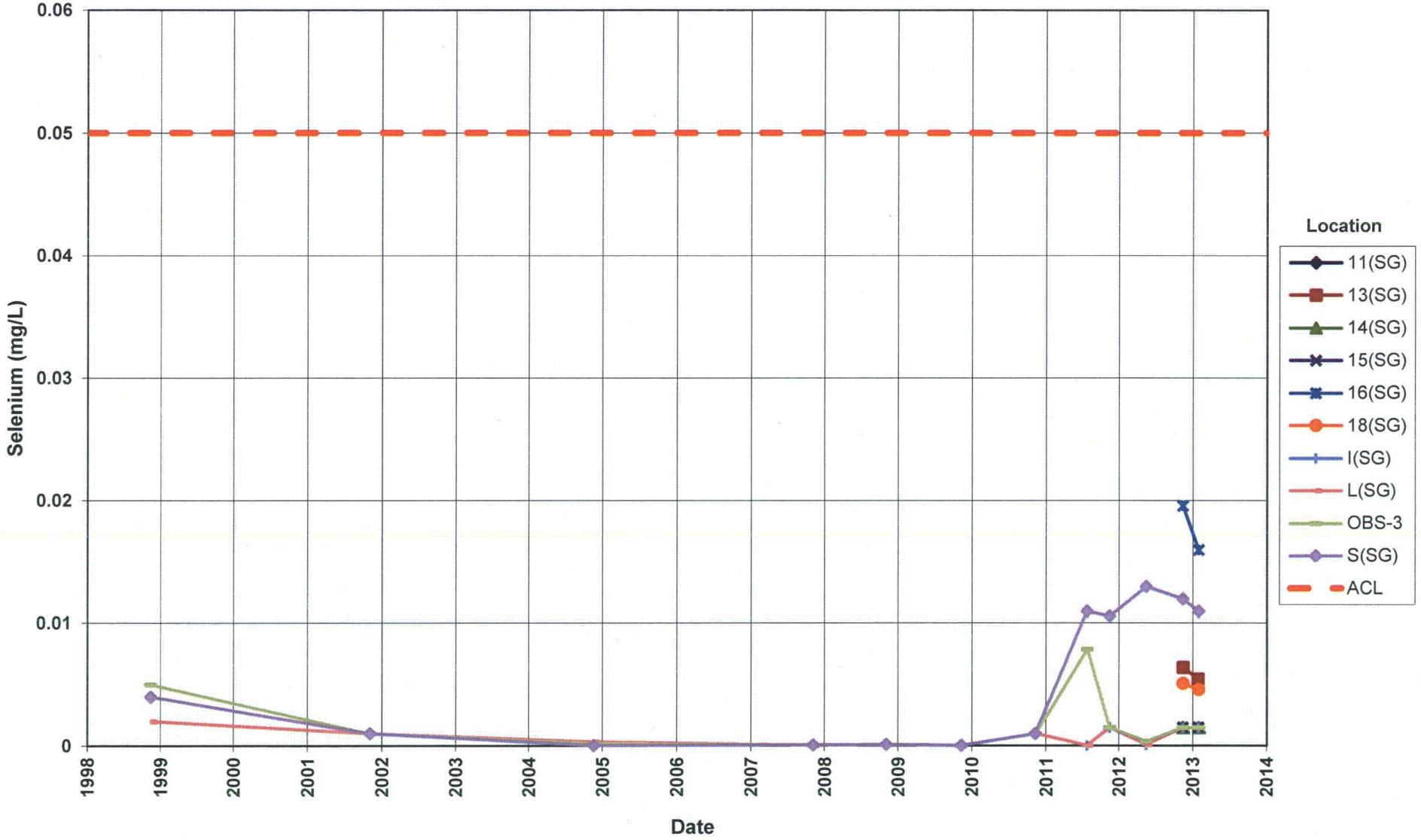
Bluewater Disposal Site
Alluvium Wells
Molybdenum Concentration
Alternate Concentration Limit (ACL) = 0.1 mg/L



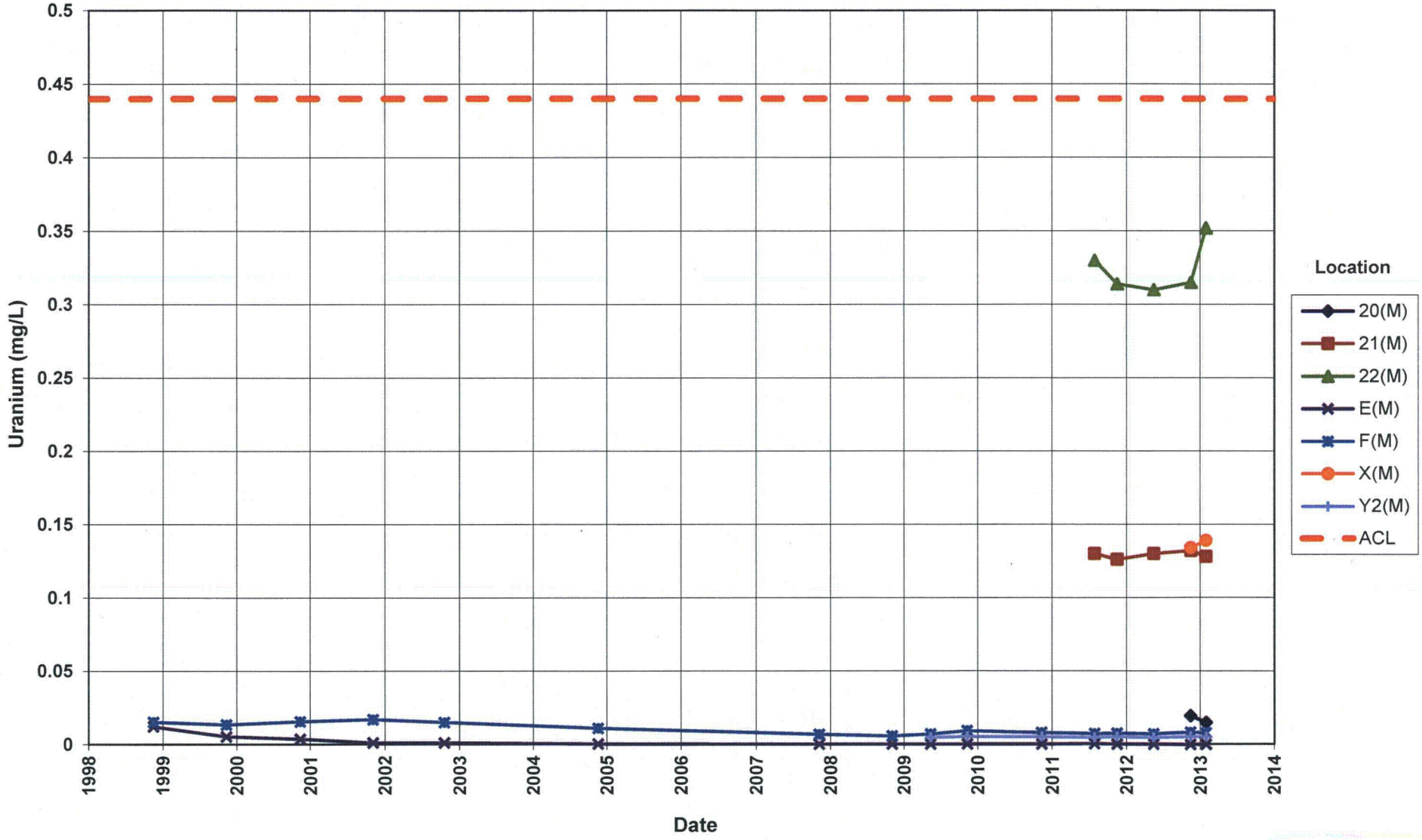
Bluewater Disposal Site
Alluvium Wells
Selenium Concentration
Alternate Concentration Limit (ACL) = 0.05 mg/L



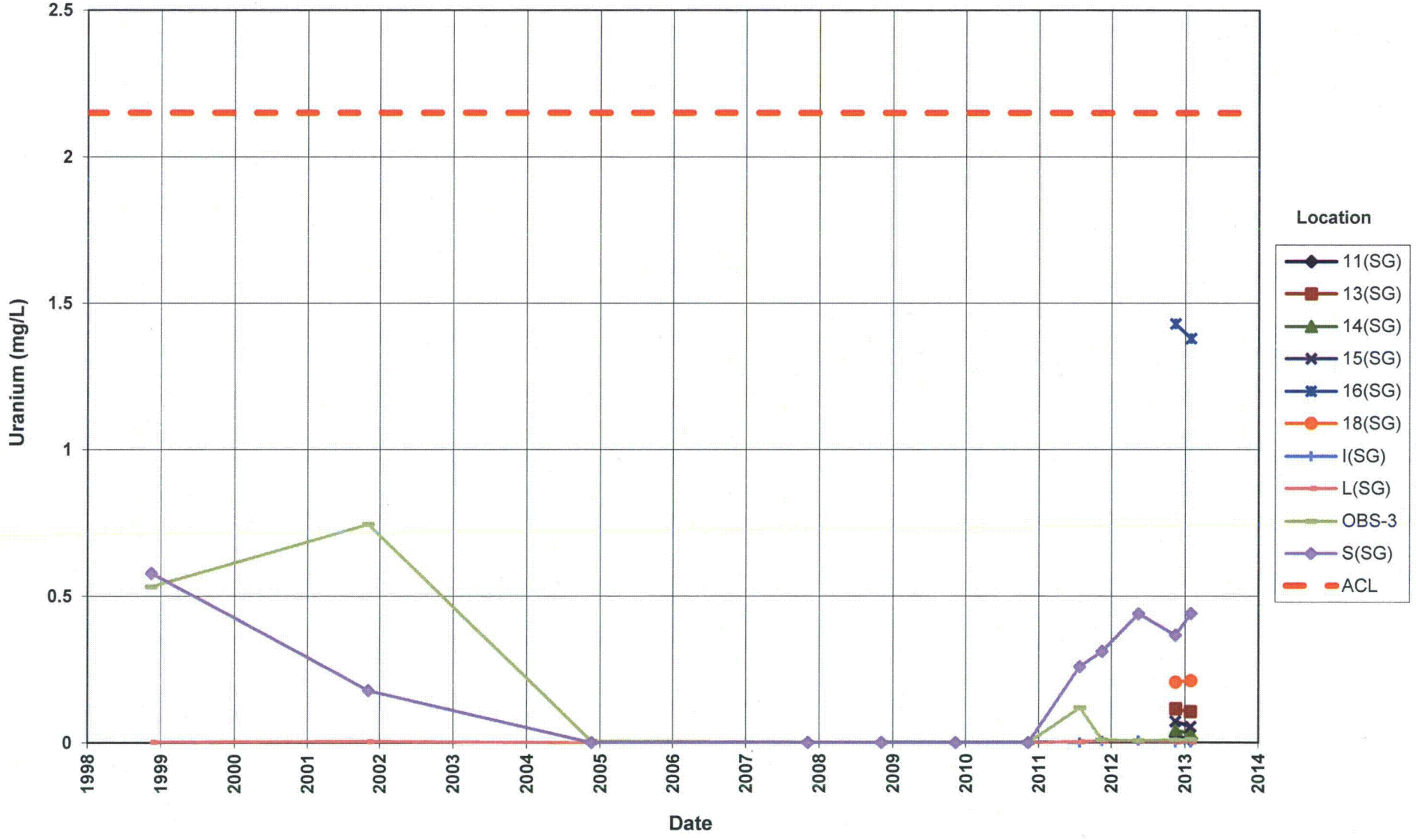
Bluewater Disposal Site
Bedrock Wells
Selenium Concentration
Alternate Concentration Limit (ACL) = 0.05 mg/L



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



Bluewater Disposal Site
Bedrock Wells
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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Stoller

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Task Order LM00-501
Control Number 13-0278

January 17, 2013

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-AM01-07LM00060, S.M. Stoller Corporation (Stoller) January 2013 Environmental Sampling at the Bluewater, New Mexico, Disposal Site

REFERENCE: Task Order LM00-501-03-203-402, Bluewater, New Mexico, Disposal Site

Dear Ms. Barr:

The purpose of this letter is to inform you of the upcoming sampling event at Bluewater, New Mexico. Enclosed are the map and tables specifying sample locations and analytes for monitoring at the Bluewater disposal site. Water quality data will be collected at this site per a DOE request and is tentatively scheduled to begin the week of January 28, 2013.

The following list shows the monitoring wells (with zone of completion) scheduled for sampling during this event.

Monitoring Wells*

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

Private Wells
HMC-951 Sg

*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.

The S.M. Stoller Corporation 2597 Legacy Way Grand Junction, CO 81503 (970) 248-6000 Fax (970) 248-6040

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

Sincerely,

Richard K. Johnson
Site Lead

RKJ/lcg/lb

Enclosures (3)

cc: (electronic)
Karl Stoeckle, DOE
Steve Donivan, Stoller
Bev Gallagher, Stoller
Lauren Goodknight, Stoller
Richard Johnson, Stoller
EDD Delivery
rc-grand.junction
File: BLU 410.02(A)

The S.M. Stoller Corporation 2597 Legacy Way Grand Junction, CO 81503 (970) 248-6000 Fax (970) 248-6040

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				
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	10	0			
Field Measurements					
Alkalinity					
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
Iron					
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 (NO3+NO2)-N	X		0.05	EPA 353.1	WCH-A-022
PCBs	E(M), Y2(M), F(M), T(M), and X(M) 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					
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
Total Organic Carbon					
Uranium	X		0.0001	SW-846 6020	LMM-02
Vanadium					
Zinc					
Total No. of Analytes	15	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.

Attachment 4
Trip Report

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Stoller
Grand Junction Office

established 1959

Memorandum

DATE: February 7, 2013

TO: Dick Johnson

FROM: Gretchen Baer

SUBJECT: Trip Report

Site: Bluewater Disposal Site

Dates of Sampling Event: January 28-31, 2013

Team Members: Gretchen Baer, Joe Treviño

Number of Locations Sampled: Samples were collected from 17 of the 19 wells identified in the sampling notification letter. In addition, 1 sample was collected from monitoring well 23(M), which was not listed in the notification letter.

Locations Not Sampled/Reason: Monitoring well T(M) had too little water to sample with either a pump or a bailer. A bladder pump was to be installed in domestic well HMC-951 during this event; however, the pump could not be installed because of an obstruction in the well. A sample could not be collected from this location.

Location Specific Information:

Location IDs	Comments
E(M)	Cat II based on WL drop at slow purge rate. Depth of well is wrong in the database (34.58'). It should be 99.7'.
23(M)	This location was not in the notification letter. The site lead requested the water level to be checked and—if not dry—for samples to be collected. Approximately 2 feet of water was found. Samples were collected with a disposable bailer.
HMC-951	Inner casing is ~11 inches in diameter. Water level was taken at a point marked on the inner casing. An obstruction prevented installation of a bladder pump.
OBS-3	Sampled according to Program Directive BLU-2013-01. Purged at ~5 gpm. Well went dry after approx 80 gal were purged. Well was allowed to recover (~10 min) then samples were collected.
S(SG)	Sampled according to Program Directive BLU-2013-01. Purged at ~6 gpm.
T(M)	Too little water to pump. Pulled the installed bladder pump to attempt bailing, but there was too little water to fill the bailer sufficiently to close the check valve. The bladder pump was re-installed.

Minimum purge volumes for low-flow wells (liters):

11(SG)	13(SG)	14(SG)	15(SG)	16(SG)	18(SG)	20(M)	21(M)	22(M)	E(M)	F(M)	I(SG)	L(SG)	T(M)	X(M)	Y2(M)
2.23	2.44	2.50	3.29	1.57	2.33	1.05	1.19	1.17	0.89	0.97	1.68	3.86	1.12	1.09	1.05

Calculated with ¼-inch inside diameter drop tubing where present, 3/16-inch tubing to pump, and 0.4-liter pumps.

Minimum purge volumes for high-flow wells:

	3 Casing Volumes
OBS-3	658 gallons
S(SG)	820 gallons

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

False ID	Ticket Number	True ID	Sample Type	Associated Matrix
2074	LCR 577	L(SG)	Duplicate	Groundwater
2444	LCT 318	Associated with OBS-3 and S(SG)	Equipment Blank	Water

Duplicates were collected by filling all bottles labeled with the location number first, then filling all bottles labeled with the false ID second.

RIN Number Assigned: Samples were assigned to RIN 13015067. Field data sheets can be found in crow\sms\13015067 in the FieldData folder.

Sample Shipment: Samples were shipped overnight via FedEx to GEL Laboratories in Charleston, SC, on January 30 and 31, 2013.

Water Level Measurements: Water levels were measured in all sampled wells.

Well Inspection Summary: No issues were identified.

Sampling Method: Samples were collected according to the *Sampling and Analysis Plan for the U. S. Department of Energy Office of Legacy Management Sites* (LMS/PLN/S04351, continually updated) and Program Directive No. BLU-2013-01.

Field Variance: None.

Equipment: All equipment functioned properly. All wells (with the exception of OBS-3 and S(SG)) were sampled using the low-flow procedure. Low-flow wells were sampled with a dedicated bladder pump or a disposable bailer. High-flow wells were sampled with a dedicated submersible pump and a non-dedicated brass fitting. An equipment blank was collected on the brass fitting.

Regulatory: Nothing to note.

Institutional Controls:

Fences, Gates, and Locks: All gates were locked and in good condition.
Signs: No issues.
Trespassing/Site Disturbances: None observed.

Site Issues:

Disposal Cell/Drainage Structure Integrity: None observed.
Vegetation/Noxious Weed Concerns: None observed.
Maintenance Requirements: None observed.
Safety Issues: None.
Access Issues:

- In January 2013 the site lead installed signs around the site as guides to the wells, which were very helpful.
- Well HMC-951: To access this well, a representative from the Homestake Mining Company of California must be contacted. The gate leading to this well and the well itself do not have 3359 locks. During this event, Alan Cox (Project Manager) opened the gate and well. His business card can be found in the field sampling notebook.

Corrective Action Required/Taken: None

cc: (electronic)
Deborah Barr, DOE
Steve Donivan, Stoller
Dick Johnson, Stoller
EDD Delivery

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