LMS/GRN/S00612

Data Validation Package

June 2012
Water Sampling at the
Green River, Utah, Disposal Site

September 2012

U.S. DEPARTMENT OF ENERGY | Legacy Management

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Sampling Event Summary

Site: Green River, Utah; Disposal Site

Sampling Period: June 20-21, 2012

The 2008 Preliminary Final *Groundwater Compliance Action Plan for the Green River, Utah, Disposal Site* requires annual groundwater monitoring at the site to observe the effectiveness of the groundwater compliance strategy.

Groundwater samples were collected from point-of-compliance (POC) wells 0171, 0173, 0176, 0179, 0181, and 0813 to monitor the performance of the disposal cell. Groundwater samples also were collected from alluvium monitoring wells 0188, 0189, 0192, 0194, and 0707 and basal sandstone monitoring wells 0182, 0184, 0185, and 0588 as a best management practice. Surface locations 0846 and 0847 were sampled to monitor for degradation of water quality in the backwater area of Browns Wash and in the Green River immediately downstream of Browns Wash. The Green River location, 0801, is upstream from the site and is sampled to obtain benchmark values. Sampling and analysis were conducted as specified in *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites* (LMS/PLN/S04351, continually updated). Water levels were measured at each sampled well and in four additional wells (0174, 0175, 0180, and 0183).

All six POC wells are completed in the middle sandstone unit of the Cedar Mountain Formation and are monitored to measure contaminant concentrations for comparison to proposed alternate concentration limits (ACLs), as provided in Table 1. Contaminant concentrations in the POC wells remain below their respective ACLs.

Table 1. Analytical Results[a] and Proposed ACL Values for the POC Wells

Well	Arsenic		Nitrate + Nitrite as Nitrogen (N)		Selenium		Sulfate		Uranium	
	ACL	Sample Result	ACL	Sample Result	ACL	Sample Result	ACL	Sample Result	ACL	Sample Result
0171	5.0	0.0015	1,000	51	5.0	0.18	None	4000	4.4	0.091
0173		0.0021		120		0.13		6600		0.016
0176		0.00034		64		0.86		3800		0.0026
0179		0.00065		20		0.30		3600		0.17
0181		0.0050		5.8		0.0076		5700		0.012
0813		0.10		ND[b]		0.00073		3800		0.017

[a] Analytical results and ACLs are in milligrams per Liter.
[b] ND = Not Detected

The alluvium monitoring wells are sampled as a best management practice. The results are not compared to ACLs because the alluvial groundwater is not classified as an aquifer. As expected, some of these wells continue to have elevated concentrations of nitrate and uranium because processing activities contaminated the alluvial groundwater. Analytical results for the alluvium monitoring wells are provided in Table 2.

Groundwater in the basal sandstone unit has not been contaminated by site-related activities, but is also monitored as a best management practice. Analytical results for the basal sandstone monitoring wells also are provided in Table 2.

Table 2. Analytical Results[a] for the Alluvium and Basal Sandstone Monitoring Wells

Well	Arsenic	Nitrate + Nitrite as N	Selenium	Sulfate	Uranium
Alluvium Monitoring Wells					
0188	0.00026	6.3	0.024	6100	0.068
0189	0.00057	34	0.065	6800	0.33
0192	0.00031	80	0.11	6300	0.54
0194	0.0027	220	0.022	24,000	4.9
0707	0.00033	2.8	0.092	7500	0.026
Basal Sandstone Monitoring Wells					
0182	0.0034	0.023	0.000065	580	0.0011
0184	0.0020	0.10	0.00032	650	0.0029
0185	0.0012	0.10	0.000032	450	0.00088
0588	0.011	0.010	0.000049	620	0.00015

[a] Analytical results are in milligrams per liter

The surface water locations are in the ephemeral Browns Wash (0847, backwater of the Green River); at the confluence of Browns Wash and the Green River (0846); and at an upgradient Green River location (0801). The uranium concentration exceeds the benchmark value in Browns Wash at the uppermost reach of backwater from the Green River (0847), and may be due to contaminated groundwater discharging to the surface in Browns Wash. The concentration is below the benchmark value at the confluence of Browns Wash and the Green River (0846), indicating no degradation of water quality resulting from contaminated groundwater discharge. Surface water sample results for contaminants of concern are provided in Table 3.

Table 3. Analytical Results[a] and Standards[b]/Benchmarks[c] for Surface Water

Location	Ammonia as N		Arsenic		Nitrate + Nitrite as N		Selenium		Uranium	
	Std[d]	Sample Result	Std	Sample Result	Std	Sample Result	Std	Sample Result	Benchmark	Sample Result
0801	0.5	ND[5]	0.150	0.0014	4	ND	0.0046	0.00074	0.0058	0.0024
0846		ND		0.0017		ND		0.00077		0.0024
0847		ND		0.0014		ND		0.00086		0.0073

[a] Sample results are milligrams per liter.
[b] Standards for arsenic, nitrate, and selenium are aquatic wildlife standards from Utah Rule R317-2, Standards of Quality for Waters of the State, Table 2.14.2.
[c] Uranium benchmark is based on historical data set (1997–present) from upstream Green River location (0801).
[d] Std = Standard. ND = Not Detected.

J. E. Price

Jeffrey Price
Site Lead, S.M. Stoller Corporation

September 6, 2012
Date

Green River, Utah, Sample Location Map

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Data Assessment Summary

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Water Sampling Field Activities Verification Checklist

Project	Green River, Utah; Disposal Site	**Date(s) of Water Sampling**	June 20-21, 2012
Date(s) of Verification	July 25, 2012	**Name of Verifier**	Gretchen Baer

	Response (Yes, No, NA)	Comments
1. Is the SAP the primary document directing field procedures?	Yes	
List other documents, SOPs, instructions.		Work Order letter dated May 16, 2012.
2. Were the sampling locations specified in the planning documents sampled?	Yes	Well 0707 was also sampled. Well 0707 was not on the routine sampling list because the well had been dry for the last several sampling events.
3. Was a pre-trip calibration conducted as specified in the above-named documents?	Yes	Pre-trip calibration was performed on June 18, 2012.
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. Was the category of the well documented?	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	
If a portable pump was used, was there a 4-hour delay between pump installation and sampling?	NA	

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 at location 0188.
10. Were equipment blanks taken at a frequency of one per 20 samples that were collected with nondedicated equipment?	Yes	
11. Were trip blanks prepared and included with each shipment of VOC samples?	NA	
12. Were QC samples assigned a fictitious site identification number?	Yes	
Was the true identity of the samples recorded on the Quality Assurance Sample Log or in the Field Data Collection System (FDCS) report?	Yes	
13. Were samples collected in the containers specified?	Yes	
14. Were samples filtered and preserved as specified?	No	One metals sample was received by lab un-acidified; lab added acid and no further qualification was required.
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. Are field data sheets signed and dated by both team members (hardcopies) or are dates present for the “Date Signed” fields (FDCS)?	Yes	
18. Was all other pertinent information documented on the field data sheets?	Yes	
19. Was the presence or absence of ice in the cooler documented at every sample location?	Yes	
20. Were water levels measured at the locations specified in the planning documents?	Yes	Water levels were measured at each sampled monitoring well and in 4 additional wells (0174, 0175, 0180, and 0183). Wells 0582 and 0817 are flowing.

Laboratory Performance Assessment

General Information

Report Number (RIN):	12064625
Sample Event:	June 20-21, 2012
Site(s):	Green River, Utah, Disposal Site
Laboratory:	ALS Laboratory Group, Fort Collins, Colorado
Work Order No.:	1206347
Analysis:	Metals and Wet Chemistry
Validator:	Gretchen Baer
Review Date:	July 24, 2012

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 4.

Table 4. Analytes and Methods

Analyte	Line Item Code	Prep Method	Analytical Method
Ammonia as N	WCH-A-005	EPA 350.1	EPA 350.1
As, Se, U	LMM-02	SW-846 3005A	SW-846 6020A
Nitrate + Nitrite as N	WCH-A-022	EPA 353.2	EPA 353.2
Sulfate	MIS-A-045	SW-846 9056	SW-846 9056

Data Qualifier Summary

Analytical results were qualified as listed in Table 5. Refer to the attached validation worksheets and the sections below for an explanation of the data qualifiers applied.

Table 5. Data Qualifiers

Sample Number	Location	Analyte	Flag	Reason
1206347-1	0171	Arsenic	J	Reporting limit verification failure
1206347-2	0173	Arsenic	J	Reporting limit verification failure
1206347-3	0176	Arsenic	J	Reporting limit verification failure
1206347-4	0179	Arsenic	J	Reporting limit verification failure
1206347-9	0188	Ammonia as N	J	Field duplicate failure
1206347-9	0188	Arsenic	J	Reporting limit verification failure
1206347-10	0189	Arsenic	J	Reporting limit verification failure
1206347-11	0192	Arsenic	J	Reporting limit verification failure
1206347-12	0194	Arsenic	J	Reporting limit verification failure
1206347-14	0707	Arsenic	J	Reporting limit verification failure
1206347-19	0188 Dup, 2357	Ammonia as N	J	Field duplicate failure

Table 5 (continued). Data Qualifiers

Sample Number	Location	Analyte	Flag	Reason
1206347-19	0188 Dup, 2357	Arsenic	J	Reporting limit verification failure
1206347-20	Equip Blank, 2358	Arsenic	J	Reporting limit verification failure
1206347-20	Equip Blank, 2358	Uranium	U	Less than 5 times the method blank

Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado, received 20 water samples on June 26, 2012, 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 cooler at 0.2 °C, which complies with requirements. All samples were received in the correct container types and had been preserved correctly for the requested analyses with one exception. The metals bottle for sample 0185 was received with a pH outside of the acceptance range. The laboratory adjusted the pH of the sample upon receipt. No data qualification or further corrective action is required. 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 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. 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 350.1, Ammonia as N
Calibrations were performed using six calibration standards on June 26, 2012. The 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 checks were made at the required frequency resulting in four calibration checks. The calibration checks met the acceptance criteria.

Method EPA 353.2, Nitrate + Nitrite as N
Calibrations were performed using seven calibration standards on June 27, 2012. The 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 checks were made at the required frequency resulting in four calibration checks. The calibration checks met the acceptance criteria.

Method SW-846 6020A, Arsenic, Selenium, and Uranium
Calibrations were performed on June 27, 2012, using four calibration standards. 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 resulting in 14 verification checks. 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, with the following exception. The arsenic check results were above the acceptance range. Affected (dilution-factor-corrected) 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 were stable and within acceptable ranges.

Method SW-846 9056, Sulfate
Calibrations were performed using five calibration standards on June 12, 2012. The 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 checks were made at the required frequency resulting in seven calibration checks. The 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. All method blank and calibration blank results were below the PQL for all analytes. 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 concentration (as was the case with the phosphorus spikes). 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.

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. No serial dilution data required evaluation.

Completeness

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

Electronic Data Deliverable (EDD) File

A revised EDD file arrived on July 9, 2012, that included corrections to some filtration status fields and a ticket number. 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: 12064625 Lab Code: PAR Validator: Gretchen Baer Validation Date: 7/24/2012

Project: Green River 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	The reported detection limits are equal to or below contract requirements.
☑ Field/Trip Blanks	There was 1 trip/equipment blank evaluated.
☑ Field Duplicates	There was 1 duplicate evaluated.

SAMPLE MANAGEMENT SYSTEM

Metals Data Validation Worksheet

RIN: 12064625 **Lab Code:** PAR **Date Due:** 7/24/2012

Matrix: Water **Site Code:** GRN **Date Completed:** 7/6/2012

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	ICV	CCV	ICB	CCB								
Arsenic	ICP/MS	06/27/2012														130.0
Arsenic	ICP/MS	06/27/2012	-0.0130	1.0000	OK	OK	OK	OK	OK	100.0	99.0	102.0	3.0	100.0		139.0
Selenium	ICP/MS	06/27/2012	-0.0360	1.0000	OK	OK	OK	OK	OK	104.0	105.0	107.0	2.0	100.0		80.0
Selenium	ICP/MS	06/27/2012														87.0
Uranium	ICP/MS	06/27/2012	0.0000	1.0000	OK	OK	OK	OK	OK	104.0	101.0	103.0	2.0	99.0		90.0
Uranium	ICP/MS	06/27/2012														95.0

SAMPLE MANAGEMENT SYSTEM

Wet Chemistry Data Validation Worksheet

RIN: 12064625 **Lab Code:** PAR **Date Due:** 7/24/2012

Matrix: Water **Site Code:** GRN **Date Completed:** 7/6/2012

Analyte	Date Analyzed	CALIBRATION						Method Blank	LCS %R	MS %R	MSD %R	DUP RPD	Serial Dil. %R
		Int.	R^2	ICV	CCV	ICB	CCB						
AMMONIA AS N	06/26/2012	-0.030	0.9999	OK	OK	OK	OK	OK	97.00	102.0	98.0	5.00	
Nitrate+Nitrite as N	06/27/2012	0.000	0.9998	OK	OK	OK	OK	OK	97.00	91.0	96.0	1.00	
SULFATE	06/12/2012	0.356	0.9999	OK		OK							
SULFATE	06/26/2012				OK		OK	OK	97.00	101.0	103.0	1.00	
SULFATE	06/26/2012									106.0			

Sampling Quality Control Assessment

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

Sampling Protocol

Sample results for all monitoring wells were qualified with an "F" flag in the database, indicating the wells were purged and sampled using the low-flow sampling method. All wells met the Category I criteria with the following exceptions: Wells 0171, 0182, 0184, 0185, 0189, 0194, and 0707 were classified as Category II or III because of water level drawdown. The sample results for these wells were qualified with a "Q" flag, indicating the data are qualitative because of the sampling technique.

Equipment Blank

An equipment blank (field ID 2358) was collected after decontamination of the non-dedicated sampling equipment used at surface water locations. Arsenic and sulfate were detected in the equipment blank. All arsenic and sulfate sample results were greater than 5 times the equipment blank, so no further qualification is required. The equipment blank results indicate adequate decontamination of the sampling equipment.

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. 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. A duplicate sample was collected from location 0188. The duplicate results met the criteria with the exception of the RPD for ammonia as N, which was above the criteria at 76 percent. There were no analytical errors identified during the review of the data. The ammonia as N results for this location are qualified with a "J" flag as estimated values.

SAMPLE MANAGEMENT SYSTEM

Validation Report: Equipment/Trip Blanks

RIN: 12064625 **Lab Code:** PAR **Project:** Green River **Validation Date:** 7/24/2012

Blank Data

Blank Type	Lab Sample ID	Lab Method	Analyte Name	Result	Qualifier	MDL	Units
Equipment Blank	1206347-20	SW6020	Arsenic	0.018	B	0.015	UG/L

Sample ID	Sample Ticket	Location	Result	Dilution Factor	Lab Qualifier	Validation Qualifier
1206347-15	KHW 711	0801	1.4	1		
1206347-17	KHW 706	0846	1.7	1		
1206347-18	KHW 707	0847	1.4	1		

Blank Data

Blank Type	Lab Sample ID	Lab Method	Analyte Name	Result	Qualifier	MDL	Units
Equipment Blank	1206347-20	SW9056	SULFATE	0.56		0.5	MG/L

Sample ID	Sample Ticket	Location	Result	Dilution Factor	Lab Qualifier	Validation Qualifier
1206347-15	KHW 711	0801	120	5		
1206347-17	KHW 706	0846	120	5		
1206347-18	KHW 707	0847	1400	50		

SAMPLE MANAGEMENT SYSTEM

Validation Report: Field Duplicates

RIN: 12064625 **Lab Code:** PAR **Project:** Green River **Validation Date:** 7/24/2012

Duplicate: 2357 **Sample:** 0188

	Sample				Duplicate						
Analyte	Result	Flag	Error	Dilution	Result	Flag	Error	Dilution	RPD	RER	Units
AMMONIA AS N	2.9			1	1.3			1	76.19		MG/L
Arsenic	0.26			1	0.29			1	10.91		UG/L
Nitrate+Nitrite as N	6.3			10	6			10	4.88		MG/L
Selenium	24			5	25			5	4.08		UG/L
SULFATE	6100			100	6100			100	0		MG/L
Uranium	68			5	72			1	5.71		UG/L

Certification

All laboratory analytical quality control criteria were met except as qualified in this report. The data qualifiers listed on the SEEPro 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: Steve Donivan — Date: 9-6-2012

Data Validation Lead: Gretchen Baer — Date: 9/6/12

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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 SEEPro database. The application compares the new data set 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.

Four laboratory results from this sampling event were identified as potential outliers. The outliers at locations 0192 and 0707 may be due to trending or low variability in the few available data points. The outlier for sulfate at surface water location 0847 may be caused by the variability in the sampling location due to changing river levels. The outlier for nitrate + nitrite as N at location 0181 may be anomalous. The data associated with this result were further reviewed. There were no errors noted but future measurements should be closely examined. The laboratory results for this RIN are acceptable as qualified.

Potential anomalies in the field parameters were also examined for patterns of repeated high or low bias, which suggest a systematic error due to instrument malfunction. No such patterns were found. The outlier at 0192 for specific conductance may be due to trending or low variability in the few available data points. All field data from this event are acceptable.

There were no anomalies identified during data validation for the previous sampling event (June 2011).

Data Validation Outliers Report - No Field Parameters
Comparison: All Historical Data
Laboratory: ALS Laboratory Group
RIN: 12064625
Report Date: 7/25/2012

					Current			Historical Maximum			Historical Minimum			Number of Data Points		Statistical Outlier
						Qualifiers			Qualifiers			Qualifiers				
Site Code	Location Code	Sample ID	Sample Date	Analyte	Result	Lab	Data	Result	Lab	Data	Result	Lab	Data	N	N Below Detect	
GRN01	0173	N001	06/20/2012	Nitrate + Nitrite as Nitrogen	120		F	350		F	170		F	20	0	No
GRN01	0181	N001	06/20/2012	Arsenic	0.005		F	0.0048		F	0.0018		F	16	0	No
GRN01	0181	N001	06/20/2012	Nitrate + Nitrite as Nitrogen	5.8		F	140		F	37		F	12	0	Yes
GRN01	0182	N001	06/21/2012	Selenium	0.000065	B	FQ	0.00015		FQ	0.000075	B	FQ	5	3	No
GRN01	0182	N001	06/21/2012	Uranium	0.0011		FQ	0.001		FQ	0.0001	U	QF	5	1	No
GRN01	0188	N002	06/21/2012	Ammonia Total as N	1.3		JF	35		F	8.2		JF	9	0	No
GRN01	0188	N001	06/21/2012	Ammonia Total as N	2.9		JF	35		F	8.2		JF	9	0	No
GRN01	0188	N001	06/21/2012	Nitrate + Nitrite as Nitrogen	6.3		F	62		JF	6.8		F	9	0	No
GRN01	0188	N002	06/21/2012	Nitrate + Nitrite as Nitrogen	6		F	62		JF	6.8		F	9	0	No
GRN01	0189	N001	06/21/2012	Ammonia Total as N	45		FQ	43		FQ	0.56		FQJ	8	0	No
GRN01	0189	N001	06/21/2012	Nitrate + Nitrite as Nitrogen	34		FQ	810		FQ	39		FQ	8	0	No
GRN01	0192	N001	06/21/2012	Ammonia Total as N	0.61		F	3.7		F	2.2		F	7	0	Yes
GRN01	0588	N001	06/21/2012	Selenium	0.000049	B	F	0.096			0.000081	B	F	28	21	No
GRN01	0707	N001	06/21/2012	Sulfate	7500		FQ	6620		F	4770		J	26	0	Yes
GRN01	0847	0001	06/21/2012	Sulfate	1400			231			54			6	0	Yes

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.

Data Validation Outliers Report - Field Parameters Only
Comparison: All Historical Data
Laboratory: Field Measurements
RIN: 12064625
Report Date: 7/25/2012

					Current			Historical Maximum			Historical Minimum			Number of Data Points		Statistical Outlier
						Qualifiers			Qualifiers			Qualifiers				
Site Code	Location Code	Sample ID	Sample Date	Analyte	Result	Lab	Data	Result	Lab	Data	Result	Lab	Data	N	N Below Detect	
GRN01	0176	N001	06/20/2012	Alkalinity, Total (as $CaCO_3$)	340		F	845		F	351		F	26	0	No
GRN01	0182	N001	06/21/2012	Alkalinity, Total (as $CaCO_3$)	450		FQ	920		FQ	489		FQ	5	0	No
GRN01	0188	N001	06/21/2012	Temperature	16		F	20		QF	16.16		F	10	0	No
GRN01	0188	N001	06/21/2012	Turbidity	0.51		F	19.2		QF	0.68		F	9	0	No
GRN01	0192	N001	06/21/2012	Specific Conductance	11880		F	10642		F	9298		F	7	0	Yes
GRN01	0707	N001	06/21/2012	Specific Conductance	11980		FQ	10472		F	1500			25	0	No
GRN01	0801	N001	06/21/2012	Turbidity	20.2			591			52.3			5	0	No
GRN01	0846	N001	06/21/2012	pH	8.51			8.48			7.92			9	0	No
GRN01	0846	N001	06/21/2012	Turbidity	24.1			1000	>		29.7			6	0	No
GRN01	0847	0001	06/21/2012	Alkalinity, Total (as $CaCO_3$)	298			196			64			8	0	No
GRN01	0847	N001	06/21/2012	Specific Conductance	3510			2380			344			10	0	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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Anomalous Data Review Checksheet

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Anomalous Data Review Checksheet

Site: Green River, Utah; Disposal Site **Sampling Data:** Water

Reviewer: Gretchen Baer (Name (print)) Signature 8/16/12 (Date)

Site Hydrologist: Dave Peterson ~~Jeff Price~~ (Name (print)) David M. Peterson (Signature) 8/27/12 (Date)

Date of Review: 7/25/12

Loc. No.	Analyte	Type of Anomaly	Disposition
0181	Nitrate + Nitrite as N	Low	Compare to future results.

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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 GRN01, Green River Disposal Site
REPORT DATE: 7/25/2012
Location: 0171 WELL POC Monitoring Well (Down Gradient)

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	06/20/2012	N001	76	-	86	360		FQ	#		
Ammonia Total as N	mg/L	06/20/2012	N001	76	-	86	0.1	U	FQ	#	0.1	
Arsenic	mg/L	06/20/2012	N001	76	-	86	0.0015		JFQ	#	0.000074	
Nitrate + Nitrite as Nitrogen	mg/L	06/20/2012	N001	76	-	86	51		FQ	#	0.5	
Oxidation Reduction Potential	mV	06/20/2012	N001	76	-	86	40		FQ	#		
pH	s.u.	06/20/2012	N001	76	-	86	6.88		FQ	#		
Selenium	mg/L	06/20/2012	N001	76	-	86	0.18		FQ	#	0.00016	
Specific Conductance	umhos /cm	06/20/2012	N001	76	-	86	7620		FQ	#		
Sulfate	mg/L	06/20/2012	N001	76	-	86	4000		FQ	#	50	
Temperature	C	06/20/2012	N001	76	-	86	18.6		FQ	#		
Turbidity	NTU	06/20/2012	N001	76	-	86	0.7		FQ	#		
Uranium	mg/L	06/20/2012	N001	76	-	86	0.091		FQ	#	0.000015	

Groundwater Quality Data by Location (USEE100) FOR SITE GRN01, Green River Disposal Site
REPORT DATE: 7/25/2012
Location: 0173 WELL POC Monitoring Well (Down Gradient)

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	06/20/2012	N001	92	-	102	540		F	#		
Ammonia Total as N	mg/L	06/20/2012	N001	92	-	102	0.1	U	F	#	0.1	
Arsenic	mg/L	06/20/2012	N001	92	-	102	0.0021		JF	#	0.000074	
Nitrate + Nitrite as Nitrogen	mg/L	06/20/2012	N001	92	-	102	120		F	#	1	
Oxidation Reduction Potential	mV	06/20/2012	N001	92	-	102	75		F	#		
pH	s.u.	06/20/2012	N001	92	-	102	6.95		F	#		
Selenium	mg/L	06/20/2012	N001	92	-	102	0.13		F	#	0.00016	
Specific Conductance	umhos /cm	06/20/2012	N001	92	-	102	13150		F	#		
Sulfate	mg/L	06/20/2012	N001	92	-	102	6600		F	#	50	
Temperature	C	06/20/2012	N001	92	-	102	19.4		F	#		
Turbidity	NTU	06/20/2012	N001	92	-	102	1.57		F	#		
Uranium	mg/L	06/20/2012	N001	92	-	102	0.016		F	#	0.000015	

Groundwater Quality Data by Location (USEE100) FOR SITE GRN01, Green River Disposal Site
REPORT DATE: 7/25/2012
Location: 0176 WELL POC Monitoring Well (Cross Gradient)

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	06/20/2012	N001	72	-	82	340		F	#		
Ammonia Total as N	mg/L	06/20/2012	N001	72	-	82	0.1	U	F	#	0.1	
Arsenic	mg/L	06/20/2012	N001	72	-	82	0.00034		JF	#	0.000015	
Nitrate + Nitrite as Nitrogen	mg/L	06/20/2012	N001	72	-	82	64		F	#	0.5	
Oxidation Reduction Potential	mV	06/20/2012	N001	72	-	82	90		F	#		
pH	s.u.	06/20/2012	N001	72	-	82	6.75		F	#		
Selenium	mg/L	06/20/2012	N001	72	-	82	0.86		F	#	0.00032	
Specific Conductance	umhos /cm	06/20/2012	N001	72	-	82	8100		F	#		
Sulfate	mg/L	06/20/2012	N001	72	-	82	3800		F	#	50	
Temperature	C	06/20/2012	N001	72	-	82	19		F	#		
Turbidity	NTU	06/20/2012	N001	72	-	82	2.53		F	#		
Uranium	mg/L	06/20/2012	N001	72	-	82	0.0026		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE GRN01, Green River Disposal Site
REPORT DATE: 7/25/2012
Location: 0179 WELL POC Monitoring Well (Up Gradient)

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	06/20/2012	N001	78	-	88	452		F	#		
Ammonia Total as N	mg/L	06/20/2012	N001	78	-	88	0.1	U	F	#	0.1	
Arsenic	mg/L	06/20/2012	N001	78	-	88	0.00065		JF	#	0.000074	
Nitrate + Nitrite as Nitrogen	mg/L	06/20/2012	N001	78	-	88	20		F	#	0.2	
Oxidation Reduction Potential	mV	06/20/2012	N001	78	-	88	115		F	#		
pH	s.u.	06/20/2012	N001	78	-	88	6.68		F	#		
Selenium	mg/L	06/20/2012	N001	78	-	88	0.3		F	#	0.00016	
Specific Conductance	umhos /cm	06/20/2012	N001	78	-	88	7510		F	#		
Sulfate	mg/L	06/20/2012	N001	78	-	88	3600		F	#	50	
Temperature	C	06/20/2012	N001	78	-	88	21.8		F	#		
Turbidity	NTU	06/20/2012	N001	78	-	88	2.22		F	#		
Uranium	mg/L	06/20/2012	N001	78	-	88	0.17		F	#	0.000015	

Groundwater Quality Data by Location (USEE100) FOR SITE GRN01, Green River Disposal Site
REPORT DATE: 7/25/2012
Location: 0181 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	06/20/2012	N001	77	-	92	484		F	#		
Ammonia Total as N	mg/L	06/20/2012	N001	77	-	92	0.1	U	F	#	0.1	
Arsenic	mg/L	06/20/2012	N001	77	-	92	0.005		F	#	0.000015	
Nitrate + Nitrite as Nitrogen	mg/L	06/20/2012	N001	77	-	92	5.8		F	#	0.05	
Oxidation Reduction Potential	mV	06/20/2012	N001	77	-	92	70		F	#		
pH	s.u.	06/20/2012	N001	77	-	92	7.17		F	#		
Selenium	mg/L	06/20/2012	N001	77	-	92	0.0076		F	#	0.000032	
Specific Conductance	umhos /cm	06/20/2012	N001	77	-	92	11175		F	#		
Sulfate	mg/L	06/20/2012	N001	77	-	92	5700		F	#	50	
Temperature	C	06/20/2012	N001	77	-	92	20		F	#		
Turbidity	NTU	06/20/2012	N001	77	-	92	3.62		F	#		
Uranium	mg/L	06/20/2012	N001	77	-	92	0.012		F	#	0.0000029	

Groundwater Quality Data by Location (USEE100) FOR SITE GRN01, Green River Disposal Site
REPORT DATE: 7/25/2012
Location: 0182 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	06/21/2012	N001	140	-	150	450		FQ	#		
Ammonia Total as N	mg/L	06/21/2012	N001	140	-	150	0.1	U	FQ	#	0.1	
Arsenic	mg/L	06/21/2012	N001	140	-	150	0.0034		FQ	#	0.000015	
Nitrate + Nitrite as Nitrogen	mg/L	06/21/2012	N001	140	-	150	0.023		FQ	#	0.01	
Oxidation Reduction Potential	mV	06/21/2012	N001	140	-	150	-65		FQ	#		
pH	s.u.	06/21/2012	N001	140	-	150	8.38		FQ	#		
Selenium	mg/L	06/21/2012	N001	140	-	150	0.000065	B	FQ	#	0.000032	
Specific Conductance	umhos /cm	06/21/2012	N001	140	-	150	2810		FQ	#		
Sulfate	mg/L	06/21/2012	N001	140	-	150	580		FQ	#	25	
Temperature	C	06/21/2012	N001	140	-	150	17.3		FQ	#		
Turbidity	NTU	06/21/2012	N001	140	-	150	7.32		FQ	#		
Uranium	mg/L	06/21/2012	N001	140	-	150	0.0011		FQ	#	0.0000029	

Groundwater Quality Data by Location (USEE100) FOR SITE GRN01, Green River Disposal Site
REPORT DATE: 7/25/2012
Location: 0184 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	06/20/2012	N001	169	-	184	456		FQ	#		
Ammonia Total as N	mg/L	06/20/2012	N001	169	-	184	0.1	U	FQ	#	0.1	
Arsenic	mg/L	06/20/2012	N001	169	-	184	0.002		FQ	#	0.000015	
Nitrate + Nitrite as Nitrogen	mg/L	06/20/2012	N001	169	-	184	0.1		FQ	#	0.01	
Oxidation Reduction Potential	mV	06/20/2012	N001	169	-	184	100		FQ	#		
pH	s.u.	06/20/2012	N001	169	-	184	8		FQ	#		
Selenium	mg/L	06/20/2012	N001	169	-	184	0.00032		FQ	#	0.000032	
Specific Conductance	umhos /cm	06/20/2012	N001	169	-	184	2820		FQ	#		
Sulfate	mg/L	06/20/2012	N001	169	-	184	650		FQ	#	25	
Temperature	C	06/20/2012	N001	169	-	184	19.1		FQ	#		
Turbidity	NTU	06/20/2012	N001	169	-	184	9.85		FQ	#		
Uranium	mg/L	06/20/2012	N001	169	-	184	0.0029		FQ	#	0.0000029	

Groundwater Quality Data by Location (USEE100) FOR SITE GRN01, Green River Disposal Site
REPORT DATE: 7/25/2012
Location: 0185 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	06/20/2012	N001	131	-	141	654		FQ	#		
Ammonia Total as N	mg/L	06/20/2012	N001	131	-	141	0.1	U	FQ	#	0.1	
Arsenic	mg/L	06/20/2012	N001	131	-	141	0.0012		FQ	#	0.000015	
Nitrate + Nitrite as Nitrogen	mg/L	06/20/2012	N001	131	-	141	0.1		FQ	#	0.01	
Oxidation Reduction Potential	mV	06/20/2012	N001	131	-	141	45		FQ	#		
pH	s.u.	06/20/2012	N001	131	-	141	8.52		FQ	#		
Selenium	mg/L	06/20/2012	N001	131	-	141	0.000032	U	FQ	#	0.000032	
Specific Conductance	umhos /cm	06/20/2012	N001	131	-	141	2600		FQ	#		
Sulfate	mg/L	06/20/2012	N001	131	-	141	450		FQ	#	25	
Temperature	C	06/20/2012	N001	131	-	141	20		FQ	#		
Turbidity	NTU	06/20/2012	N001	131	-	141	0.94		FQ	#		
Uranium	mg/L	06/20/2012	N001	131	-	141	0.00088		FQ	#	0.0000029	

Groundwater Quality Data by Location (USEE100) FOR SITE GRN01, Green River Disposal Site
REPORT DATE: 7/25/2012
Location: 0188 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	06/21/2012	N001	7.5	-	12.5	350		F	#		
Ammonia Total as N	mg/L	06/21/2012	N001	7.5	-	12.5	2.9		JF	#	0.1	
Ammonia Total as N	mg/L	06/21/2012	N002	7.5	-	12.5	1.3		JF	#	0.1	
Arsenic	mg/L	06/21/2012	N001	7.5	-	12.5	0.00026		JF	#	0.000015	
Arsenic	mg/L	06/21/2012	N002	7.5	-	12.5	0.00029		JF	#	0.000015	
Nitrate + Nitrite as Nitrogen	mg/L	06/21/2012	N001	7.5	-	12.5	6.3		F	#	0.1	
Nitrate + Nitrite as Nitrogen	mg/L	06/21/2012	N002	7.5	-	12.5	6		F	#	0.1	
Oxidation Reduction Potential	mV	06/21/2012	N001	7.5	-	12.5	10		F	#		
pH	s.u.	06/21/2012	N001	7.5	-	12.5	7.08		F	#		
Selenium	mg/L	06/21/2012	N001	7.5	-	12.5	0.024		F	#	0.00016	
Selenium	mg/L	06/21/2012	N002	7.5	-	12.5	0.025		F	#	0.00016	
Specific Conductance	umhos /cm	06/21/2012	N001	7.5	-	12.5	10750		F	#		
Sulfate	mg/L	06/21/2012	N001	7.5	-	12.5	6100		F	#	50	
Sulfate	mg/L	06/21/2012	N002	7.5	-	12.5	6100		F	#	50	
Temperature	C	06/21/2012	N001	7.5	-	12.5	16		F	#		
Turbidity	NTU	06/21/2012	N001	7.5	-	12.5	0.51		F	#		
Uranium	mg/L	06/21/2012	N001	7.5	-	12.5	0.068		F	#	0.000015	
Uranium	mg/L	06/21/2012	N002	7.5	-	12.5	0.072		F	#	0.0000029	

Groundwater Quality Data by Location (USEE100) FOR SITE GRN01, Green River Disposal Site
REPORT DATE: 7/25/2012
Location: 0189 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	06/21/2012	N001	14	-	19	408		FQ	#		
Ammonia Total as N	mg/L	06/21/2012	N001	14	-	19	45		FQ	#	2	
Arsenic	mg/L	06/21/2012	N001	14	-	19	0.00057		JFQ	#	0.000074	
Nitrate + Nitrite as Nitrogen	mg/L	06/21/2012	N001	14	-	19	34		FQ	#	0.2	
Oxidation Reduction Potential	mV	06/21/2012	N001	14	-	19	60		FQ	#		
pH	s.u.	06/21/2012	N001	14	-	19	6.97		FQ	#		
Selenium	mg/L	06/21/2012	N001	14	-	19	0.065		FQ	#	0.00016	
Specific Conductance	umhos /cm	06/21/2012	N001	14	-	19	12540		FQ	#		
Sulfate	mg/L	06/21/2012	N001	14	-	19	6800		FQ	#	50	
Temperature	C	06/21/2012	N001	14	-	19	17.3		FQ	#		
Turbidity	NTU	06/21/2012	N001	14	-	19	4.29		FQ	#		
Uranium	mg/L	06/21/2012	N001	14	-	19	0.33		FQ	#	0.000015	

Groundwater Quality Data by Location (USEE100) FOR SITE GRN01, Green River Disposal Site
REPORT DATE: 7/25/2012
Location: 0192 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	06/21/2012	N001	5.02 - 9.96	350		F	#		
Ammonia Total as N	mg/L	06/21/2012	N001	5.02 - 9.96	0.61		F	#	0.1	
Arsenic	mg/L	06/21/2012	N001	5.02 - 9.96	0.00031		JF	#	0.000015	
Nitrate + Nitrite as Nitrogen	mg/L	06/21/2012	N001	5.02 - 9.96	80		F	#	0.5	
Oxidation Reduction Potential	mV	06/21/2012	N001	5.02 - 9.96	60		F	#		
pH	s.u.	06/21/2012	N001	5.02 - 9.96	6.96		F	#		
Selenium	mg/L	06/21/2012	N001	5.02 - 9.96	0.11		F	#	0.00032	
Specific Conductance	umhos /cm	06/21/2012	N001	5.02 - 9.96	11880		F	#		
Sulfate	mg/L	06/21/2012	N001	5.02 - 9.96	6300		F	#	50	
Temperature	C	06/21/2012	N001	5.02 - 9.96	17.8		F	#		
Turbidity	NTU	06/21/2012	N001	5.02 - 9.96	1.78		F	#		
Uranium	mg/L	06/21/2012	N001	5.02 - 9.96	0.54		F	#	0.000029	

Groundwater Quality Data by Location (USEE100) FOR SITE GRN01, Green River Disposal Site
REPORT DATE: 7/25/2012
Location: 0194 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	06/21/2012	0001	12.5	-	17.5	1360		FQ	#		
Ammonia Total as N	mg/L	06/21/2012	0001	12.5	-	17.5	0.1	U	FQ	#	0.1	
Arsenic	mg/L	06/21/2012	0001	12.5	-	17.5	0.0027		JFQ	#	0.00015	
Nitrate + Nitrite as Nitrogen	mg/L	06/21/2012	0001	12.5	-	17.5	220		FQ	#	2	
Oxidation Reduction Potential	mV	06/21/2012	N001	12.5	-	17.5	170		FQ	#		
pH	s.u.	06/21/2012	N001	12.5	-	17.5	7.54		FQ	#		
Selenium	mg/L	06/21/2012	0001	12.5	-	17.5	0.022		FQ	#	0.00032	
Specific Conductance	umhos /cm	06/21/2012	N001	12.5	-	17.5	38905		FQ	#		
Sulfate	mg/L	06/21/2012	0001	12.5	-	17.5	24000		FQ	#	250	
Temperature	C	06/21/2012	N001	12.5	-	17.5	21.8		FQ	#		
Turbidity	NTU	06/21/2012	N001	12.5	-	17.5	34.6		FQ	#		
Uranium	mg/L	06/21/2012	0001	12.5	-	17.5	4.9		FQ	#	0.00029	

Groundwater Quality Data by Location (USEE100) FOR SITE GRN01, Green River Disposal Site
REPORT DATE: 7/25/2012
Location: 0588 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers Data	Qualifiers QA	Lab	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	06/21/2012	N001	123 - 143	560		F	#		
Ammonia Total as N	mg/L	06/21/2012	N001	123 - 143	0.1	U	F	#	0.1	
Arsenic	mg/L	06/21/2012	N001	123 - 143	0.011		F	#	0.000015	
Nitrate + Nitrite as Nitrogen	mg/L	06/21/2012	N001	123 - 143	0.01	U	F	#	0.01	
Oxidation Reduction Potential	mV	06/21/2012	N001	123 - 143	-240		F	#		
pH	s.u.	06/21/2012	N001	123 - 143	8.39		F	#		
Selenium	mg/L	06/21/2012	N001	123 - 143	0.000049	B	F	#	0.000032	
Specific Conductance	umhos /cm	06/21/2012	N001	123 - 143	2945		F	#		
Sulfate	mg/L	06/21/2012	N001	123 - 143	620		F	#	25	
Temperature	C	06/21/2012	N001	123 - 143	18		F	#		
Turbidity	NTU	06/21/2012	N001	123 - 143	2.57		F	#		
Uranium	mg/L	06/21/2012	N001	123 - 143	0.00015		F	#	0.0000029	

Groundwater Quality Data by Location (USEE100) FOR SITE GRN01, Green River Disposal Site
REPORT DATE: 7/25/2012
Location: 0707 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	06/21/2012	N001	9	-	15	160		FQ	#		
Ammonia Total as N	mg/L	06/21/2012	N001	9	-	15	0.1	U	FQ	#	0.1	
Arsenic	mg/L	06/21/2012	N001	9	-	15	0.00033		JFQ	#	0.000015	
Nitrate + Nitrite as Nitrogen	mg/L	06/21/2012	N001	9	-	15	2.8		FQ	#	0.02	
Oxidation Reduction Potential	mV	06/21/2012	N001	9	-	15	50		FQ	#		
pH	s.u.	06/21/2012	N001	9	-	15	7.54		FQ	#		
Selenium	mg/L	06/21/2012	N001	9	-	15	0.092		FQ	#	0.000032	
Specific Conductance	umhos /cm	06/21/2012	N001	9	-	15	11980		FQ	#		
Sulfate	mg/L	06/21/2012	N001	9	-	15	7500		FQ	#	50	
Temperature	C	06/21/2012	N001	9	-	15	17		FQ	#		
Turbidity	NTU	06/21/2012	N001	9	-	15	3.32		FQ	#		
Uranium	mg/L	06/21/2012	N001	9	-	15	0.026		FQ	#	0.0000029	

Groundwater Quality Data by Location (USEE100) FOR SITE GRN01, Green River Disposal Site
REPORT DATE: 7/25/2012
Location: 0813 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	06/20/2012	N001	77.7	-	97.7	638		F	#		
Ammonia Total as N	mg/L	06/20/2012	N001	77.7	-	97.7	0.1	U	F	#	0.1	
Arsenic	mg/L	06/20/2012	N001	77.7	-	97.7	0.1		F	#	0.000015	
Nitrate + Nitrite as Nitrogen	mg/L	06/20/2012	N001	77.7	-	97.7	0.01	U	F	#	0.01	
Oxidation Reduction Potential	mV	06/20/2012	N001	77.7	-	97.7	-35		F	#		
pH	s.u.	06/20/2012	N001	77.7	-	97.7	6.74		F	#		
Selenium	mg/L	06/20/2012	N001	77.7	-	97.7	0.00073		F	#	0.000032	
Specific Conductance	umhos /cm	06/20/2012	N001	77.7	-	97.7	7430		F	#		
Sulfate	mg/L	06/20/2012	N001	77.7	-	97.7	3800		F	#	50	
Temperature	C	06/20/2012	N001	77.7	-	97.7	18.7		F	#		
Turbidity	NTU	06/20/2012	N001	77.7	-	97.7	0.79		F	#		
Uranium	mg/L	06/20/2012	N001	77.7	-	97.7	0.017		F	#	0.0000029	

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.

Surface Water Quality Data

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Surface Water Quality Data by Location (USEE102) FOR SITE GRN01, Green River Disposal Site
REPORT DATE: 7/25/2012
Location: 0801 SURFACE LOCATION GREEN RIVER

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	06/21/2012	0001	143			#		
Ammonia Total as N	mg/L	06/21/2012	0001	0.1	U		#	0.1	
Arsenic	mg/L	06/21/2012	0001	0.0014			#	0.000015	
Nitrate + Nitrite as Nitrogen	mg/L	06/21/2012	0001	0.01	U		#	0.01	
Oxidation Reduction Potential	mV	06/21/2012	N001	65			#		
pH	s.u.	06/21/2012	N001	8.44			#		
Selenium	mg/L	06/21/2012	0001	0.00074			#	0.000032	
Specific Conductance	umhos/cm	06/21/2012	N001	620			#		
Sulfate	mg/L	06/21/2012	0001	120			#	2.5	
Temperature	C	06/21/2012	N001	25.5			#		
Turbidity	NTU	06/21/2012	N001	20.2			#		
Uranium	mg/L	06/21/2012	0001	0.0024			#	0.0000029	

Surface Water Quality Data by Location (USEE102) FOR SITE GRN01, Green River Disposal Site
REPORT DATE: 7/25/2012
Location: 0846 SURFACE LOCATION

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	06/21/2012	0001	140			#		
Ammonia Total as N	mg/L	06/21/2012	0001	0.1	U		#	0.1	
Arsenic	mg/L	06/21/2012	0001	0.0017			#	0.000015	
Nitrate + Nitrite as Nitrogen	mg/L	06/21/2012	0001	0.01	U		#	0.01	
Oxidation Reduction Potential	mV	06/21/2012	N001	25			#		
pH	s.u.	06/21/2012	N001	8.51			#		
Selenium	mg/L	06/21/2012	0001	0.00077			#	0.000032	
Specific Conductance	umhos/cm	06/21/2012	N001	630			#		
Sulfate	mg/L	06/21/2012	0001	120			#	2.5	
Temperature	C	06/21/2012	N001	25.6			#		
Turbidity	NTU	06/21/2012	N001	24.1			#		
Uranium	mg/L	06/21/2012	0001	0.0024			#	0.0000029	

Surface Water Quality Data by Location (USEE102) FOR SITE GRN01, Green River Disposal Site
REPORT DATE: 7/25/2012
Location: 0847 SURFACE LOCATION

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	06/21/2012	0001	298			#		
Ammonia Total as N	mg/L	06/21/2012	0001	0.1	U		#	0.1	
Arsenic	mg/L	06/21/2012	0001	0.0014			#	0.000015	
Nitrate + Nitrite as Nitrogen	mg/L	06/21/2012	0001	0.01	U		#	0.01	
Oxidation Reduction Potential	mV	06/21/2012	N001	90			#		
pH	s.u.	06/21/2012	N001	8.02			#		
Selenium	mg/L	06/21/2012	0001	0.00086			#	0.000032	
Specific Conductance	umhos/cm	06/21/2012	N001	3510			#		
Sulfate	mg/L	06/21/2012	0001	1400			#	25	
Temperature	C	06/21/2012	N001	28			#		
Turbidity	NTU	06/21/2012	N001	92.1			#		
Uranium	mg/L	06/21/2012	0001	0.0073			#	0.0000029	

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: PARAGON/ALS LABORATORY GROUP (Fort Collins, CO)
RIN: 12064625
Report Date: 7/25/2012

Parameter	Site Code	Location ID	Sample Date	Sample ID	Units	Result	Qualifiers Lab	Qualifiers Data	Detection Limit	Uncertainty	Sample Type
Ammonia Total as N	GRN01	0999	06/21/2012	N001	mg/L	0.1	U		0.1		E
Arsenic	GRN01	0999	06/21/2012	N001	mg/L	0.000018	B	J	0.000015		E
Nitrate + Nitrite as Nitrogen	GRN01	0999	06/21/2012	N001	mg/L	0.01	U		0.01		E
Selenium	GRN01	0999	06/21/2012	N001	mg/L	0.000032	U		0.000032		E
Sulfate	GRN01	0999	06/21/2012	N001	mg/L	0.56			0.5		E
Uranium	GRN01	0999	06/21/2012	N001	mg/L	0.000008	B	U	0.0000029		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.

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Static Water Level Data

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STATIC WATER LEVELS (USEE700) FOR SITE GRN01, Green River Disposal Site
REPORT DATE: 8/2/2012

Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Date	Measurement Time	Depth From Top of Casing (Ft)	Water Elevation (Ft)	Water Level Flag
0171	D	4140.1	06/20/2012	11:00:38	55.22	4084.88	
0173	D	4141.23	06/20/2012	12:05:30	56.23	4085.00	
0174	D	4142.12	06/20/2012	12:10:00	57.12	4085.00	
0175	D	4142.86	06/20/2012	12:16:00	57.13	4085.73	
0176	D	4143.4	06/20/2012	12:45:45	56.72	4086.68	
0179	C	4161.39	06/20/2012	15:15:37	75.61	4085.78	
0180	C	4159.11	06/21/2012	10:20:00	57.3	4101.81	
0181	D	4141.1	06/20/2012	11:35:43	55.88	4085.22	
0182	D	4101.52	06/21/2012	10:15:24	15.53	4085.99	
0183	C	4100.6	06/21/2012	11:05:00	14.46	4086.14	
0184	C	4192.98	06/20/2012	15:40:07	106.46	4086.52	
0185	U	4135.46	06/20/2012	14:45:38	50	4085.46	
0188	O	4075.11	06/21/2012	11:30:46	11.77	4063.34	
0189	O	4075.96	06/21/2012	11:40:35	19.01	4056.95	
0192	O	4065.83	06/21/2012	12:05:53	11.41	4054.42	
0194	D	4067.76	06/21/2012	14:50:00	18.31	4049.45	
0588	U	4113.92	06/21/2012	09:55:40	28.55	4085.37	
0707	U	4083.03	06/21/2012	11:00:37	14.46	4068.57	
0813	D	4136.36	06/20/2012	10:15:55	51.36	4085.00	

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

WATER LEVEL FLAGS: D Dry F Flowing B Below top of pump

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Hydrographs

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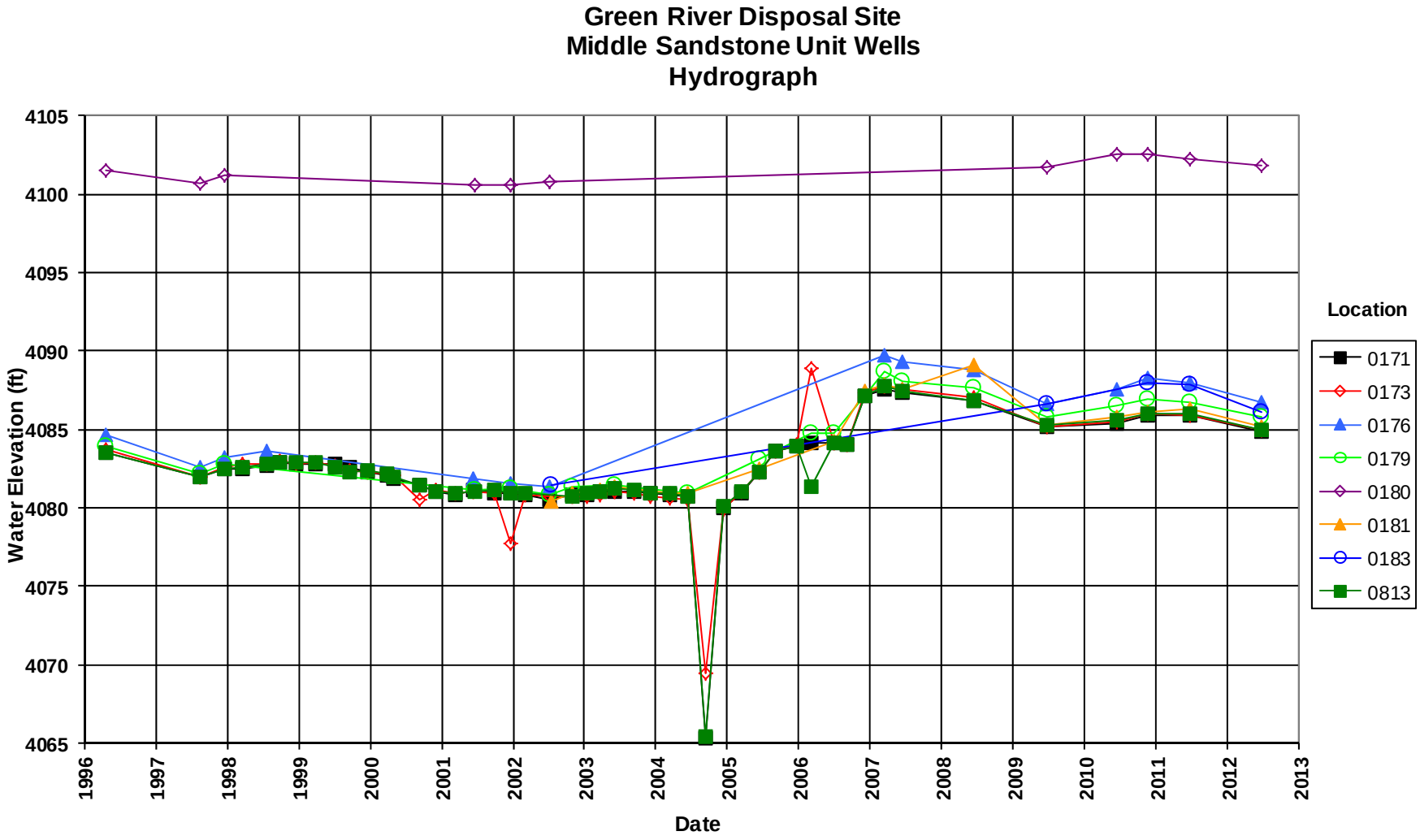
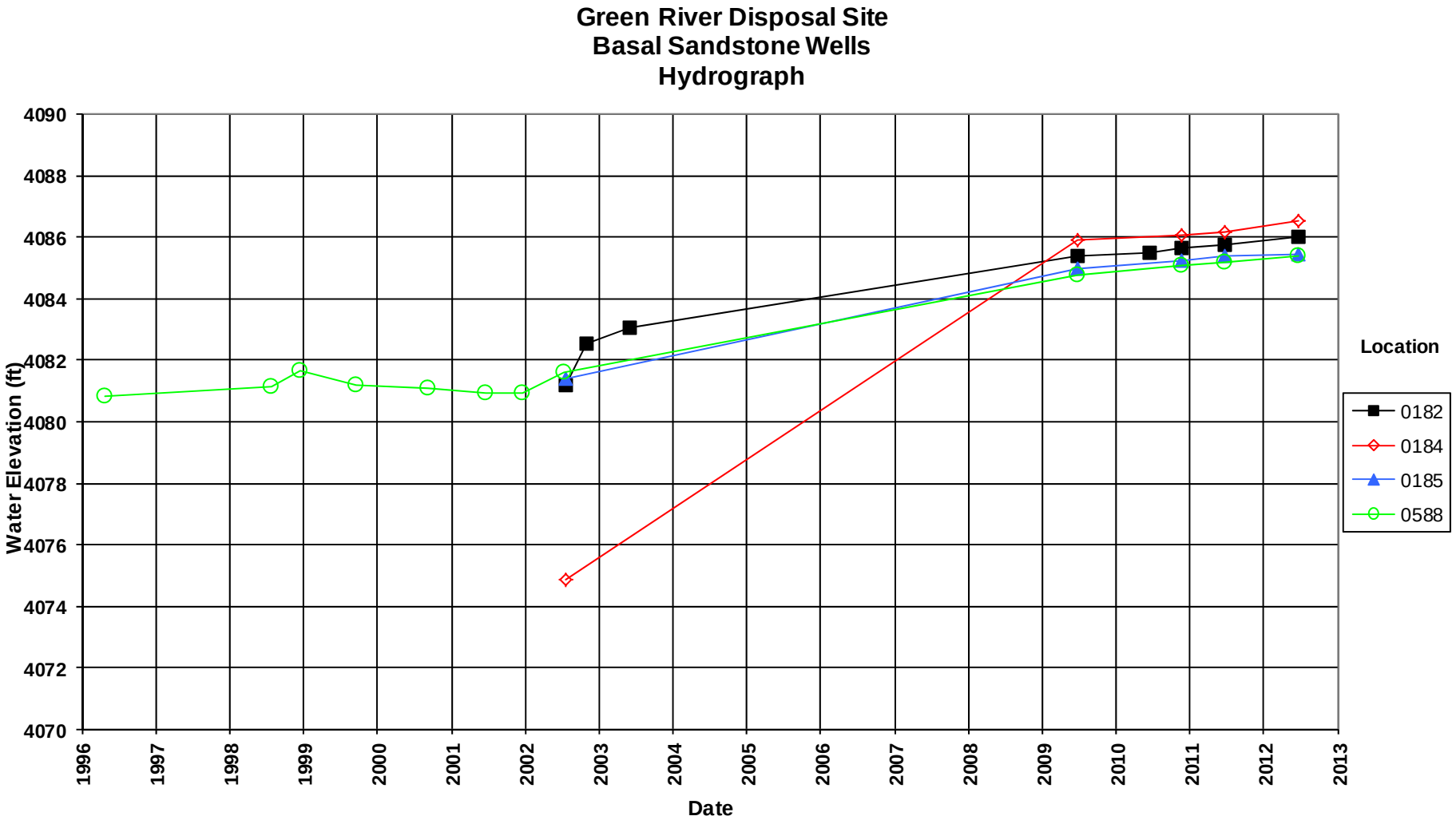
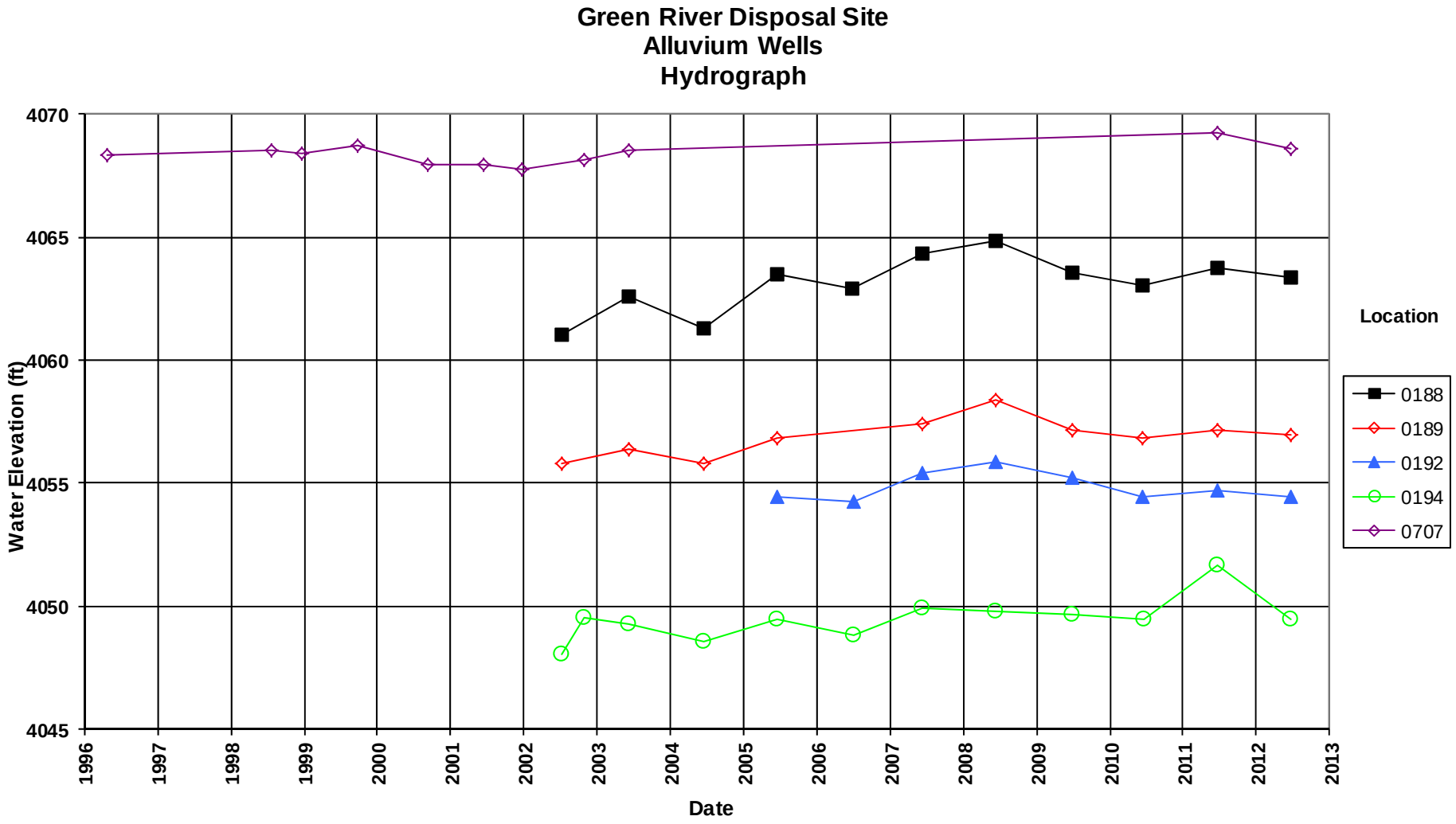

Green River Disposal Site
Middle Sandstone Unit Wells
Hydrograph
Water Elevation (ft)
4105
4100
4095
4090
4085
4080
4075
4070
4065
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Date
Location
0171
0173
0176
0179
0180
0181
0183
0813


Green River Disposal Site
Basal Sandstone Wells
Hydrograph
Water Elevation (ft)
4090
4088
4086
4084
4082
4080
4078
4076
4074
4072
4070
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Date
Location
0182
0184
0185
0588


Green River Disposal Site
Alluvium Wells
Hydrograph
Water Elevation (ft)
4070
4065
4060
4055
4050
4045
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Date
Location
0188
0189
0192
0194
0707

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Time-Concentration Graphs

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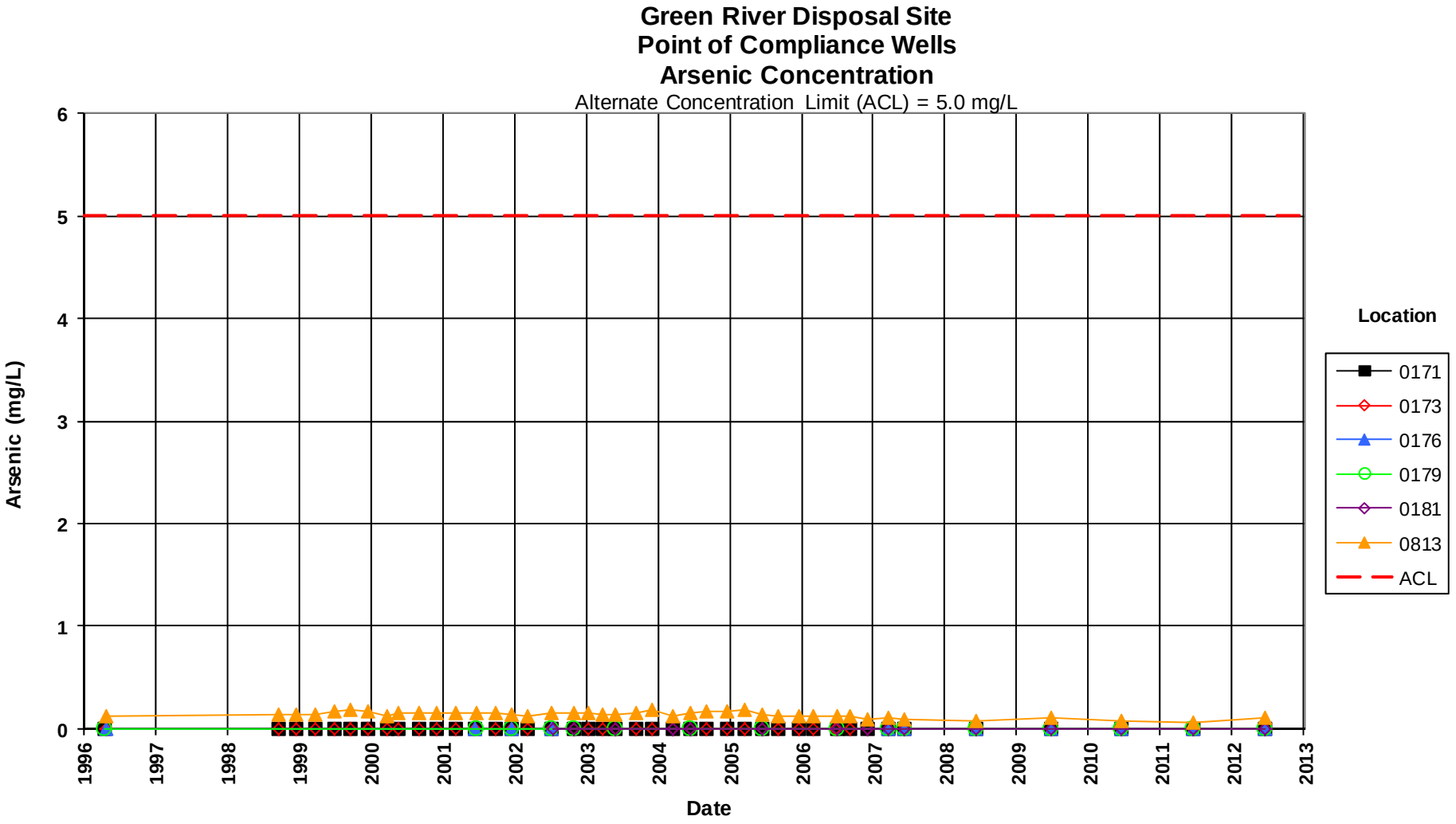
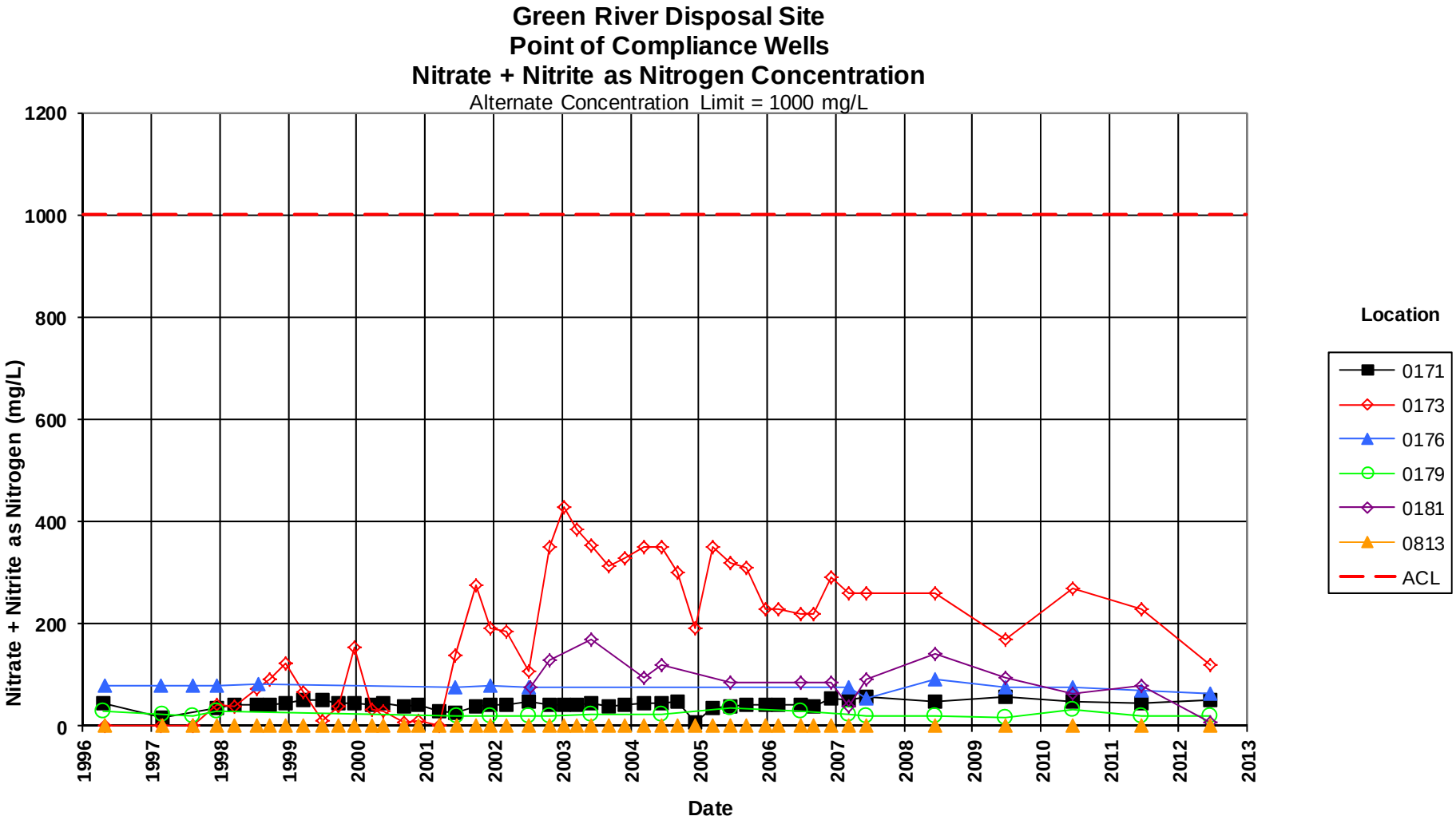
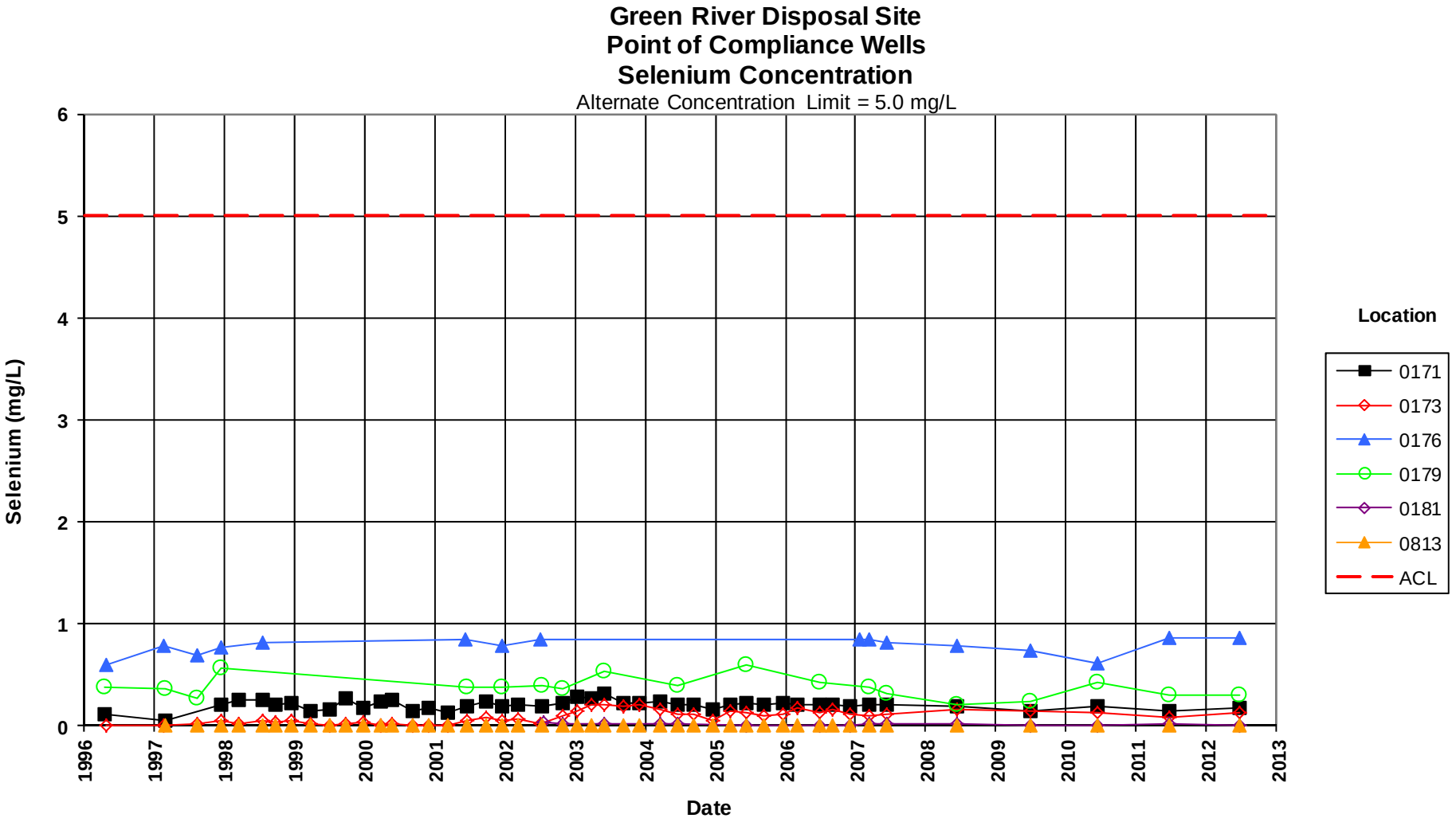
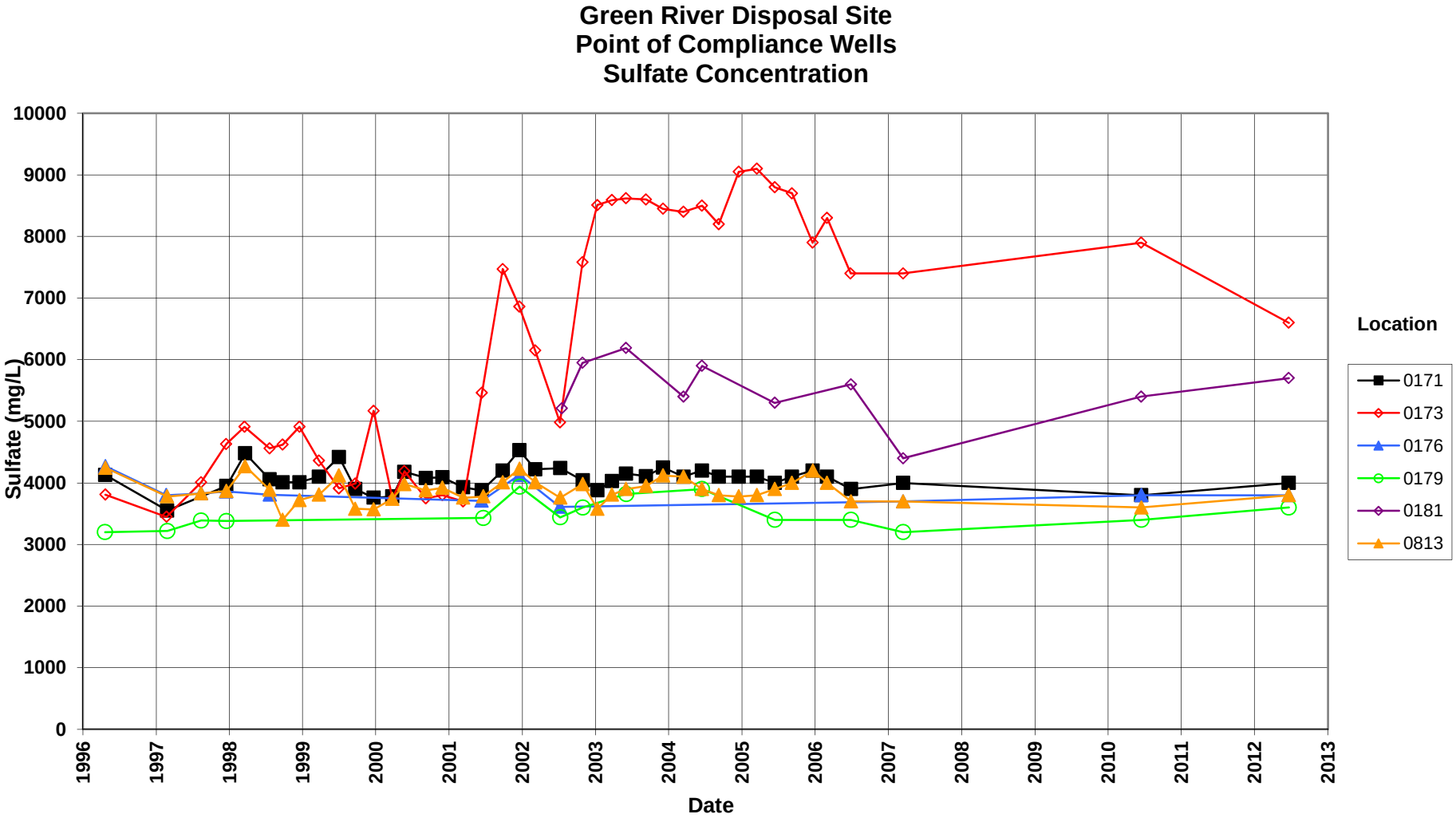

Green River Disposal Site
Point of Compliance Wells
Arsenic Concentration
Alternate Concentration Limit (ACL) = 5.0 mg/L
Arsenic (mg/L)
6
5
4
3
2
1
0
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Date
Location
0171
0173
0176
0179
0181
0813
ACL


Green River Disposal Site
Point of Compliance Wells
Nitrate + Nitrite as Nitrogen Concentration
Alternate Concentration Limit = 1000 mg/L
Nitrate + Nitrite as Nitrogen (mg/L)
1200
1000
800
600
400
200
0
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Date
Location
0171
0173
0176
0179
0181
0813
ACL


Green River Disposal Site
Point of Compliance Wells
Selenium Concentration
Alternate Concentration Limit = 5.0 mg/L
Selenium (mg/L)
6
5
4
3
2
1
0
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Date
Location
0171
0173
0176
0179
0181
0813
ACL


Green River Disposal Site
Point of Compliance Wells
Sulfate Concentration
Sulfate (mg/L)
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
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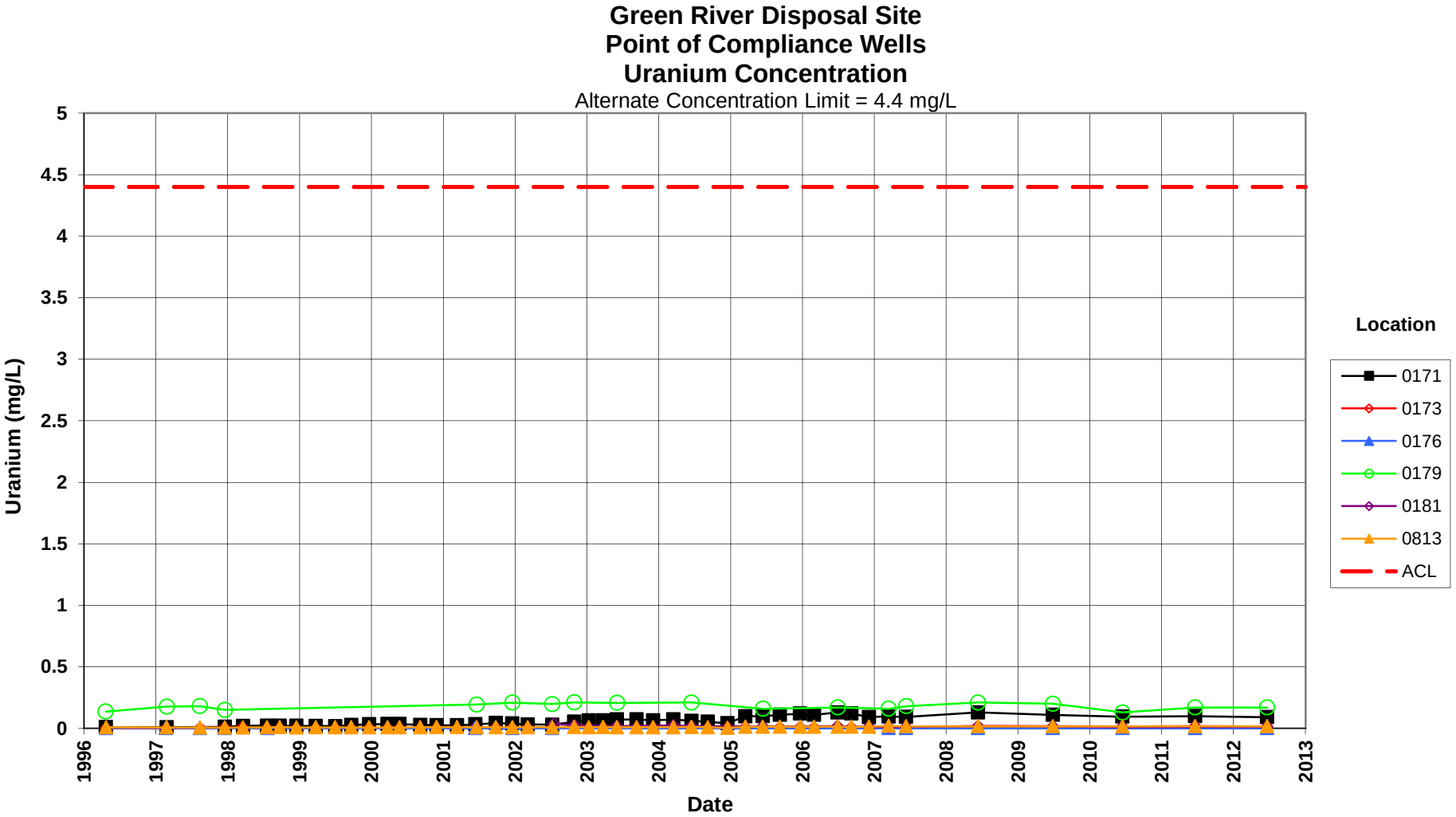
2008
2009
2010
2011
2012
2013
Date
Location
0171
0173
0176
0179
0181
0813


Green River Disposal Site
Point of Compliance Wells
Uranium Concentration
Alternate Concentration Limit = 4.4 mg/L
Uranium (mg/L)
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
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2010
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2012
2013
Date
Location
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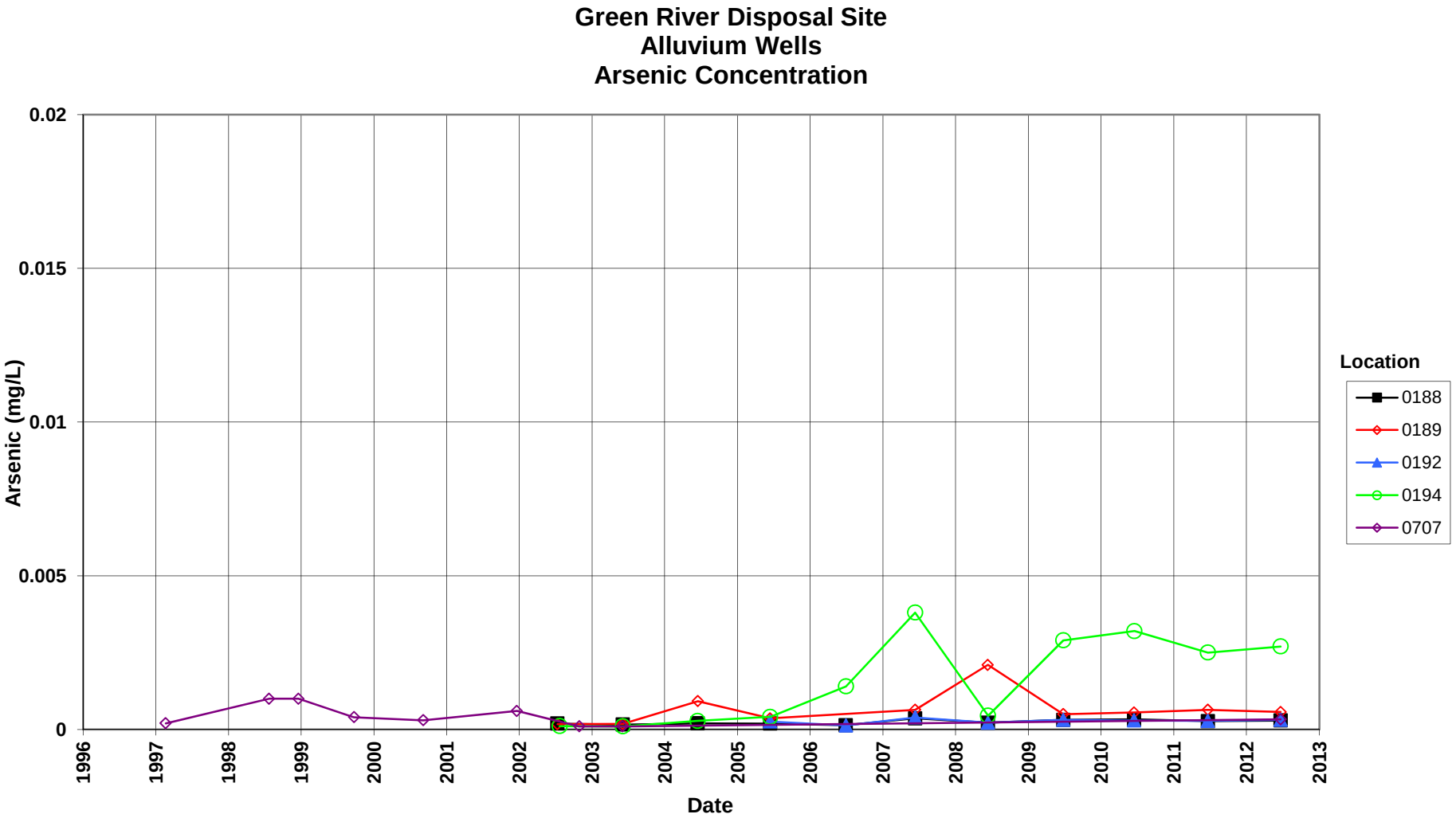
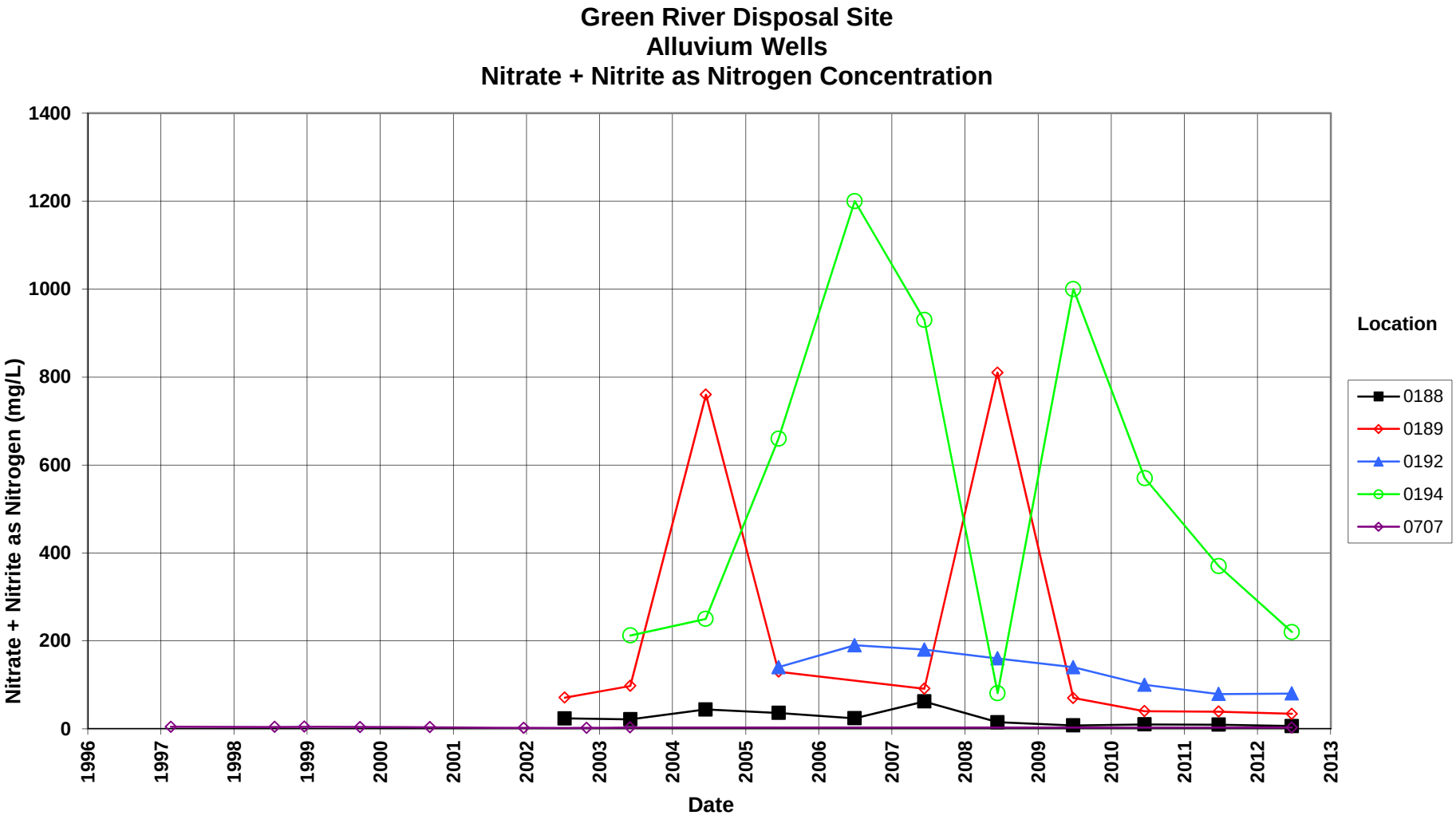
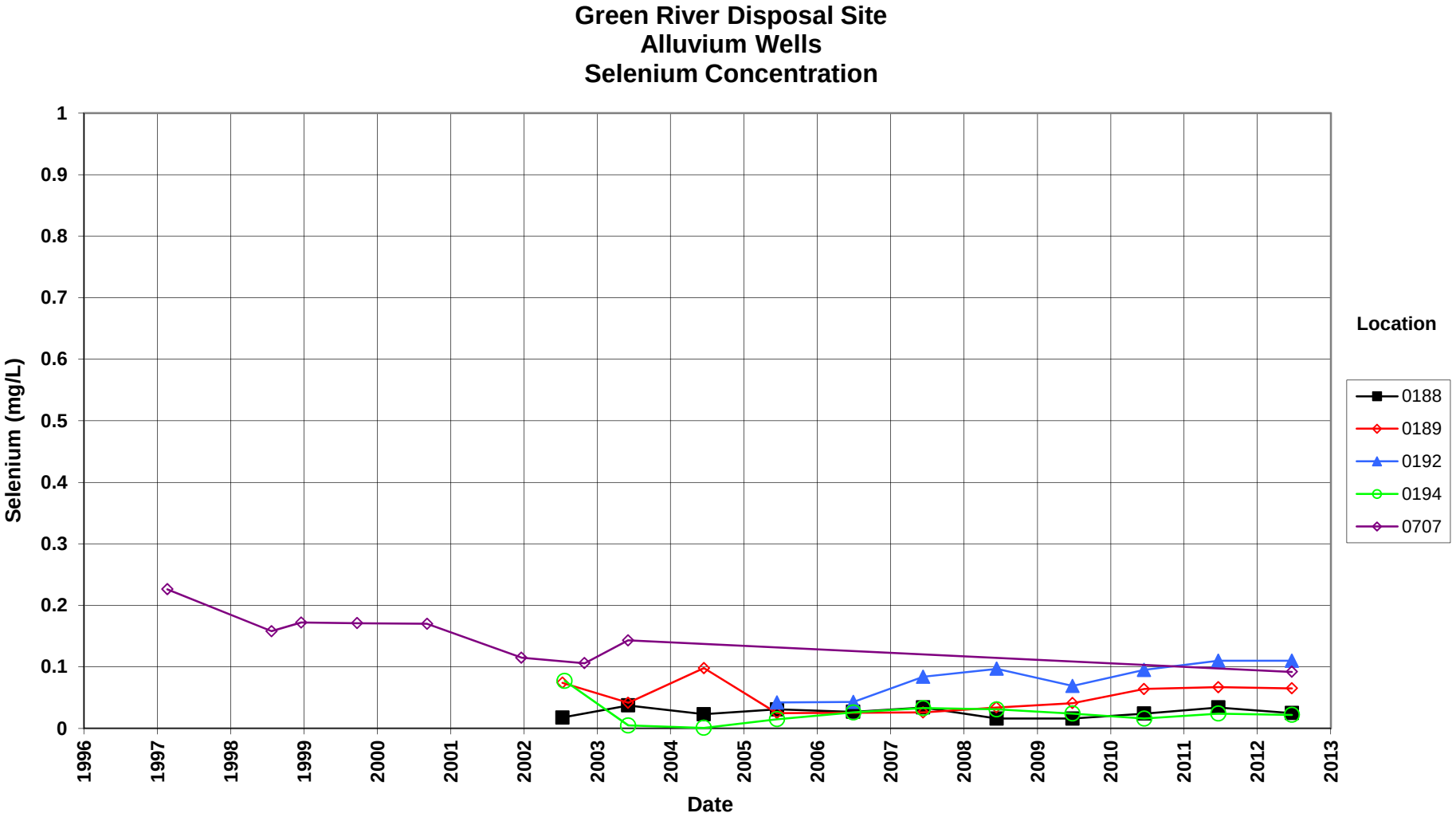
0173
0176
0179
0181
0813
ACL


Green River Disposal Site
Alluvium Wells
Arsenic Concentration
Arsenic (mg/L)
0.02
0.015
0.01
0.005
0
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Date
Location
0188
0189
0192
0194
0707


Green River Disposal Site
Alluvium Wells
Nitrate + Nitrite as Nitrogen Concentration
Nitrate + Nitrite as Nitrogen (mg/L)
1400
1200
1000
800
600
400
200
0
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Date
Location
0188
0189
0192
0194
0707


Green River Disposal Site
Alluvium Wells
Selenium Concentration
Selenium (mg/L)
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
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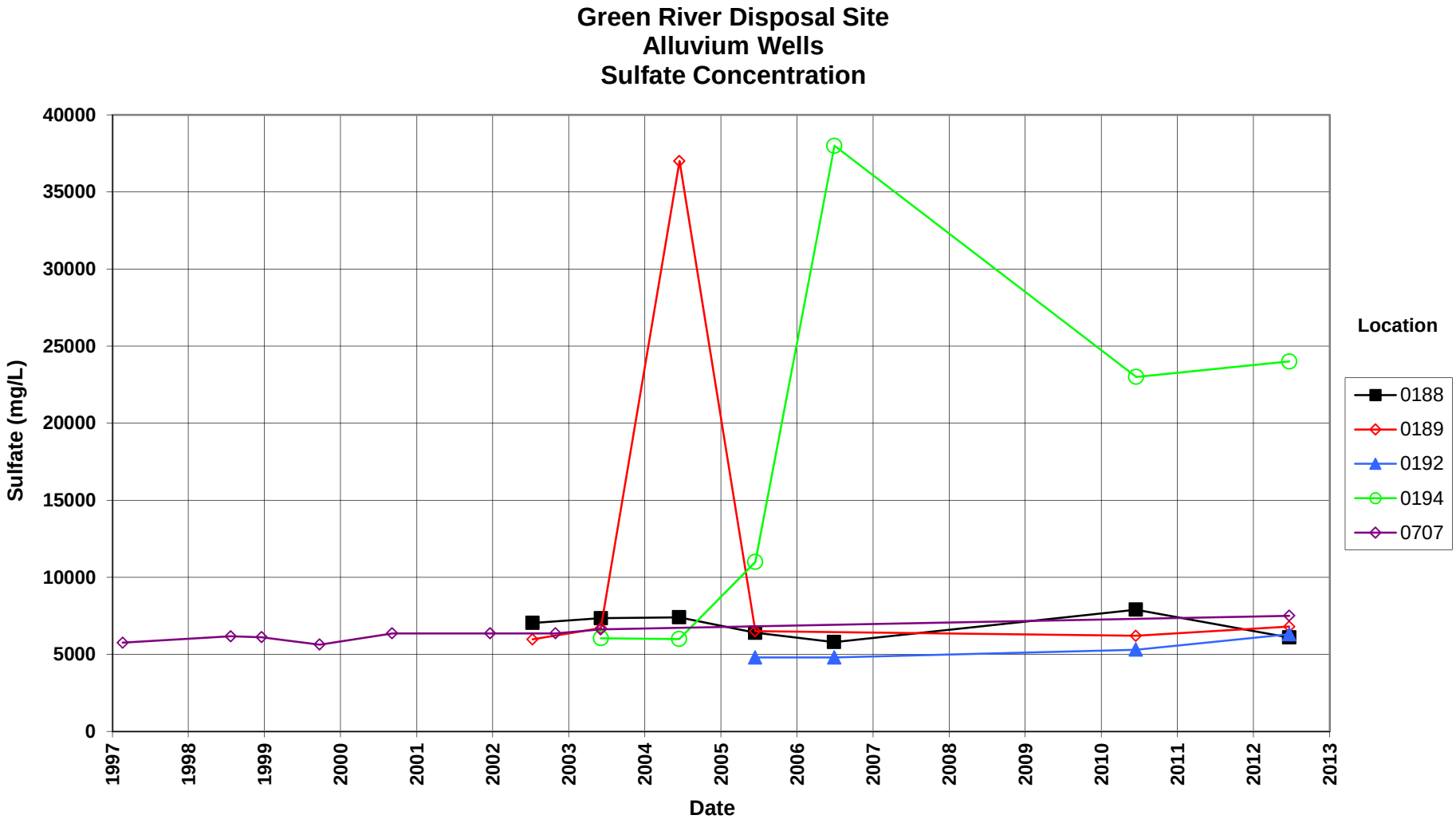
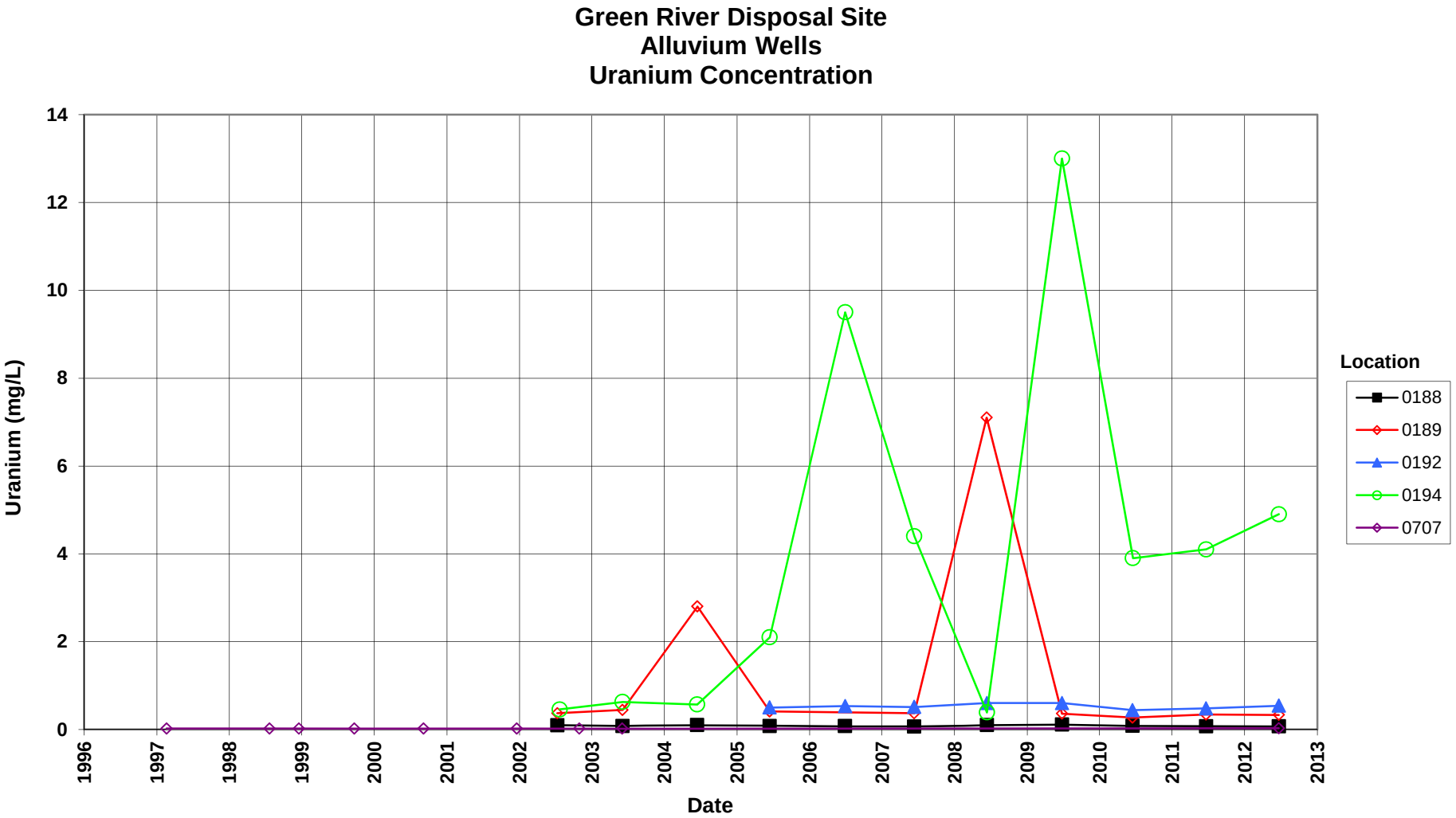
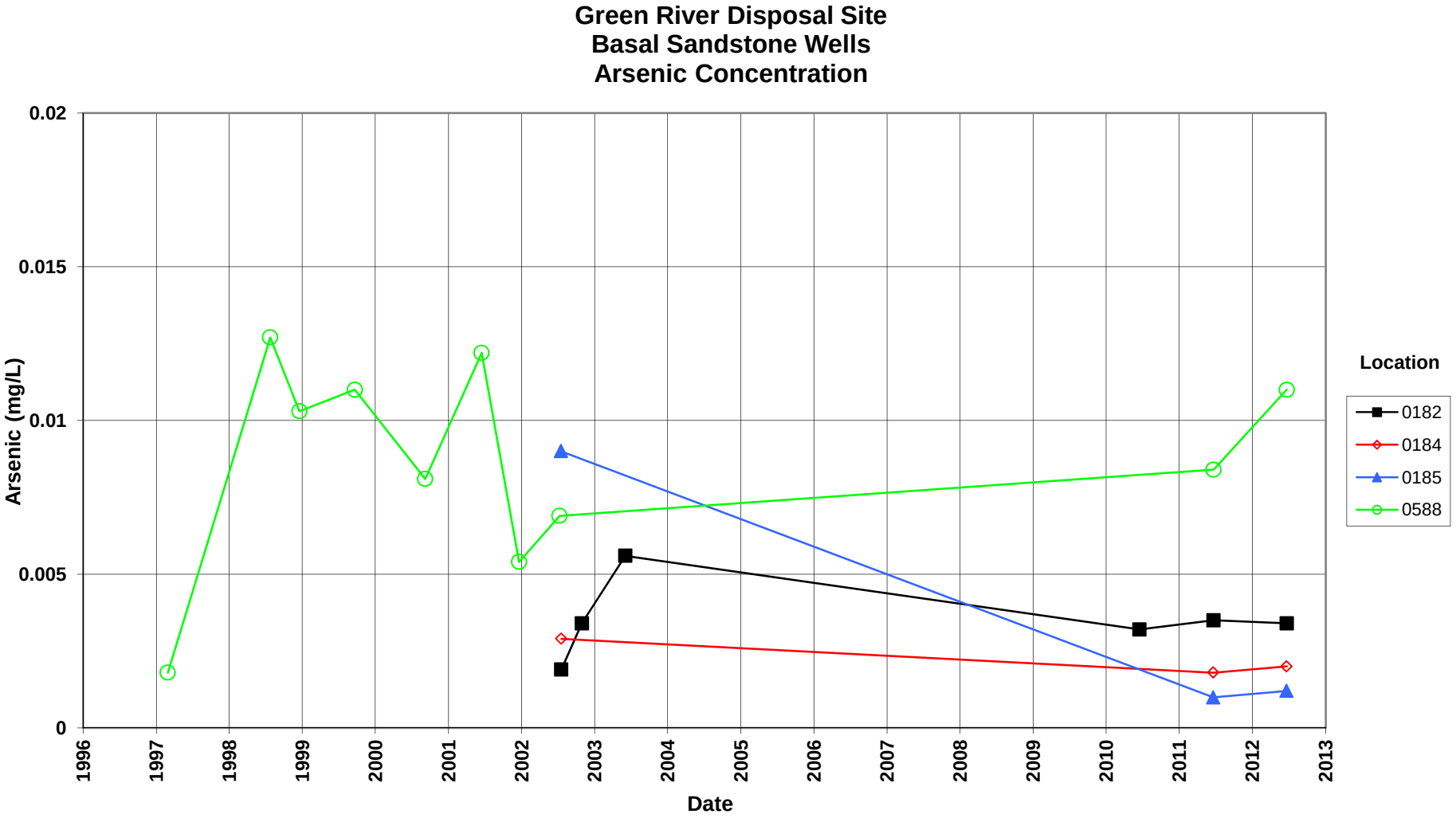
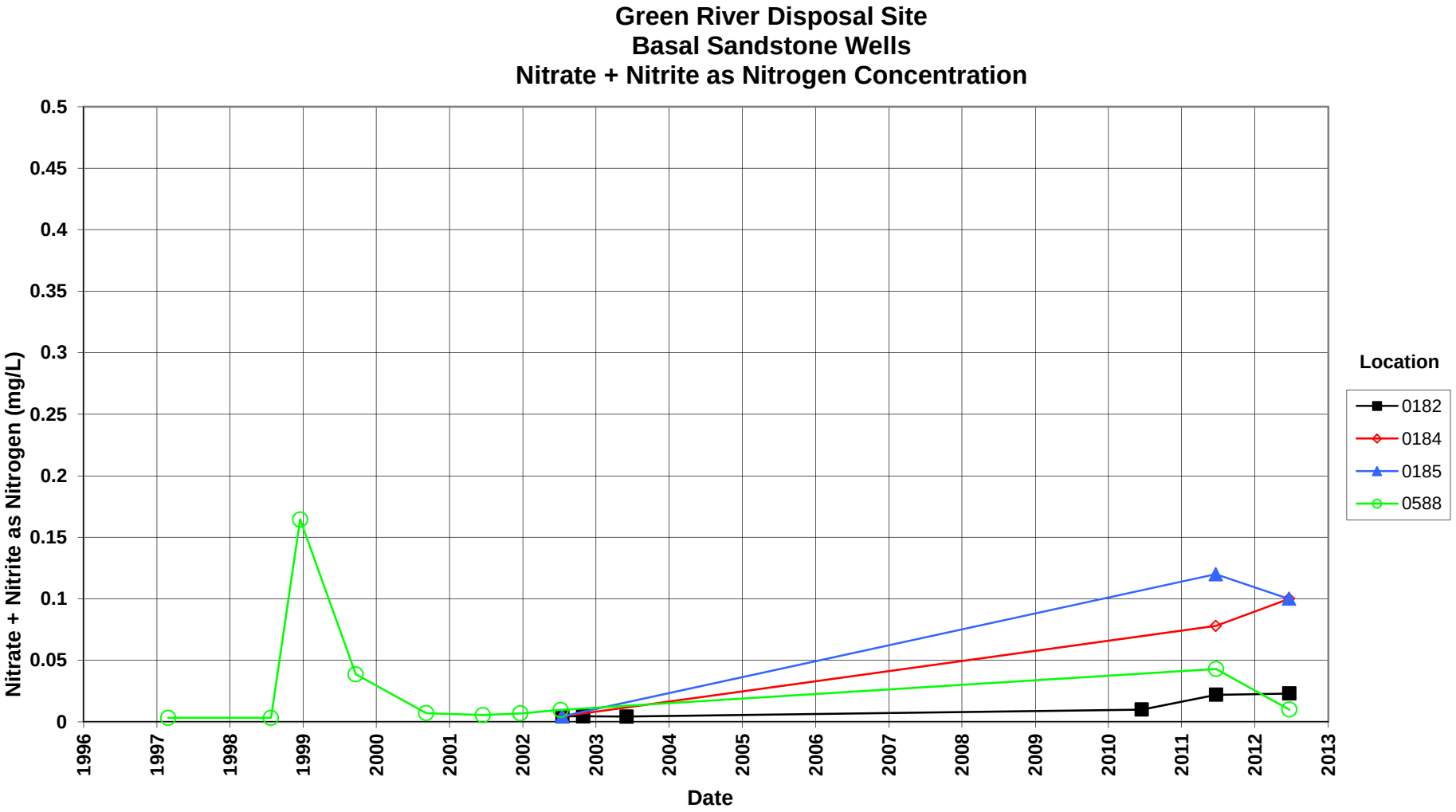
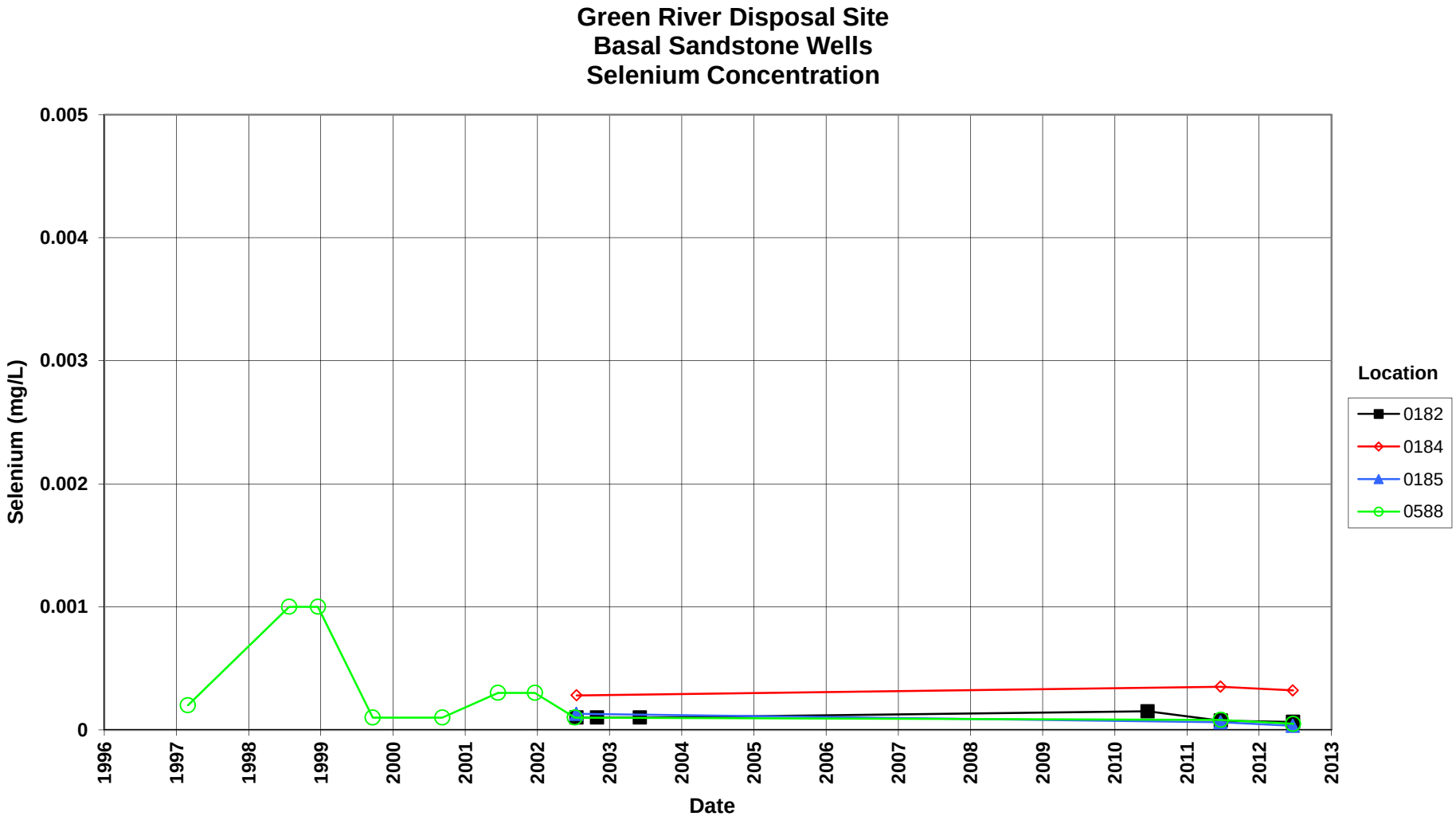
Date
Location
0188
0189
0192
0194
0707

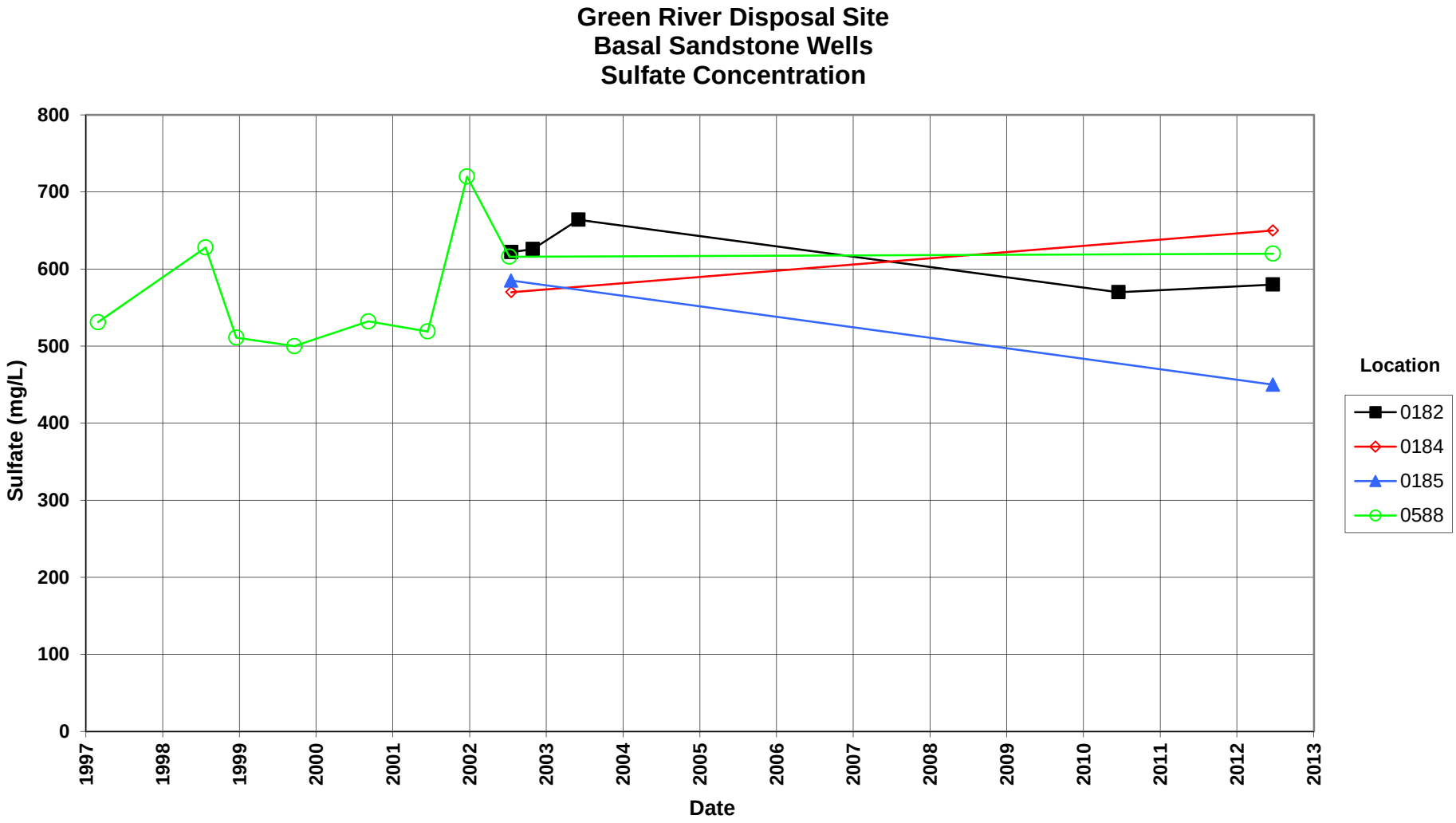

Green River Disposal Site
Alluvium Wells
Sulfate Concentration
Sulfate (mg/L)
40000
35000
30000
25000
20000
15000
10000
5000
0
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Date
Location
0188
0189
0192
0194
0707

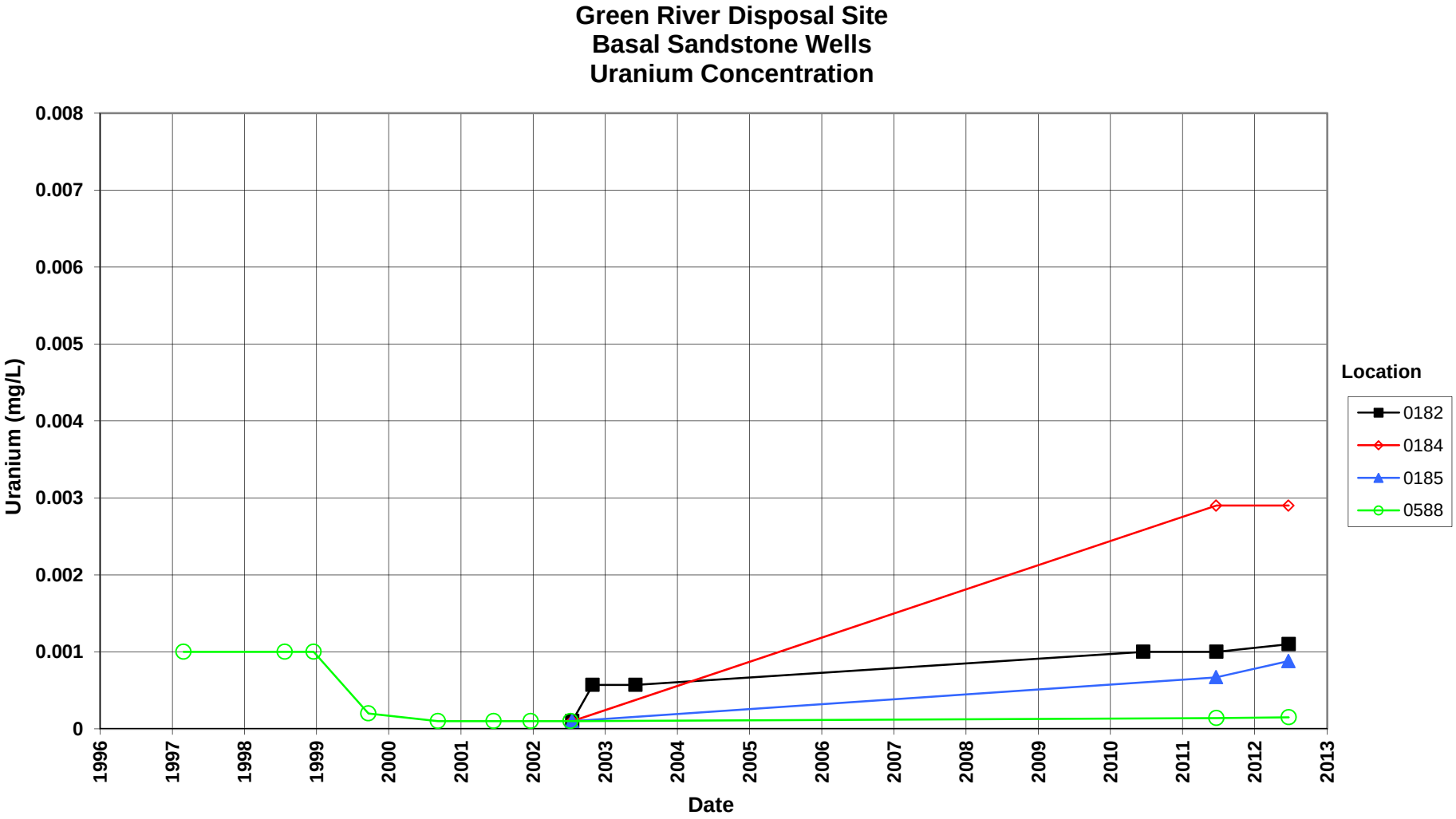

Green River Disposal Site
Alluvium Wells
Uranium Concentration
Uranium (mg/L)
14
12
10
8
6
4
2
0
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Date
Location
0188
0189
0192
0194
0707


Green River Disposal Site
Basal Sandstone Wells
Arsenic Concentration
Arsenic (mg/L)
0.02
0.015
0.01
0.005
0
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Date
Location
0182
0184
0185
0588


Green River Disposal Site
Basal Sandstone Wells
Nitrate + Nitrite as Nitrogen Concentration
Nitrate + Nitrite as Nitrogen (mg/L)
0.5
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Date
Location
0182
0184
0185
0588


Green River Disposal Site
Basal Sandstone Wells
Selenium Concentration
Selenium (mg/L)
0.005
0.004
0.003
0.002
0.001
0
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Date
Location
0182
0184
0185
0588


Green River Disposal Site
Basal Sandstone Wells
Sulfate Concentration
Sulfate (mg/L)
800
700
600
500
400
300
200
100
0
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Date
Location
0182
0184
0185
0588


Green River Disposal Site
Basal Sandstone Wells
Uranium Concentration
Uranium (mg/L)
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
Date
Location
0182
0184
0185
0588

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Attachment 3
Sampling and Analysis Work Order

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Task Order LM00-501
Control Number 12-0639

May 16, 2012

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

SUBJECT: Contract No. DE-AM01-07LM00060, S.M. Stoller Corporation (Stoller)
June 2012 Environmental Sampling at the Green River, Utah, Site

REFERENCE: Task Order LM00-501-02-107-402, Green River, Utah, Disposal Site

Dear Mr. Kautsky:

The purpose of this letter is to inform you of the upcoming sampling event at Green River, Utah. Enclosed are the map and tables specifying sample locations and analytes for monitoring at the Green River site. Water quality data will be collected from monitoring wells and surface locations at this site as part of the annual environmental sampling currently scheduled to begin the week of June 18, 2012.

The following lists show the monitoring wells (with zone of completion) and surface locations scheduled to be sampled during this event. Water levels will be obtained site wide prior to sampling.

Monitoring Wells*

0171 Cm	0176 Cm	0181 Cm	0184 Cb	0188 Al	0192 Al	0588 Cb
0173 Cm	0179 Cm	0182 Cb	0185 Cb	0189 Al	0194 Al	0813 Cm

*NOTE: Al = Alluvium; Cb = Cedar Mountain Basal Sandstone Member; Cm = Middle Sandstone Unit

Surface Locations

0801	0846	0847

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

In addition to the annual sampling task, well development work will be completed after the samples are collected. Routine well redevelopment is a necessary maintenance action to remove bacterial slime build-up. Bacterial slime will plug well screen openings and the well sand pack, which will affect water chemistry and groundwater flow through the well screen. Typical well development consists of agitating the water column to break up the slime and then removing the turbid water from the well. Equipment used for well development will be cleaned after each well to prevent contaminant cross-contamination.

Please contact me at (970) 248-6592 if you have any questions.

Sincerely,

J. E. Price

Jeffrey E. Price
Site Lead

JEP/lcg/lb

Enclosures (3)

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

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

Constituent Sampling Breakdown

Site	Green River				
Analyte	Groundwater	Surface Water	Required Detection Limit (mg/L)	Analytical Method	Line Item Code
Approx. No. Samples/yr	10	2			
Field Measurements					
Alkalinity	X	X			
Dissolved Oxygen					
Redox Potential	X	X			
pH	X	X			
Specific Conductance	X	X			
Turbidity	X	X			
Temperature	X	X			
Laboratory Measurements					
Aluminum					
Ammonia as N (NH3-N)	X	X	0.1	EPA 350.1	WCH-A-005
Arsenic	X	X	0.0001	SW-846 6020	LMM-02
Calcium					
Chloride					
Chromium					
Gross Alpha					
Gross Beta					
Iron					
Lead					
Magnesium					
Manganese					
Molybdenum					
Nickel					
Nickel-63					
Nitrate + Nitrite as N (NO3+NO2)-N	X	X	0.05	EPA 353.1	WCH-A-022
Potassium					
Radium-226					
Radium-228					
Selenium	X	X	0.0001	SW-846 6020	LMM-02
Silica					
Sodium					
Strontium					
Sulfate	X	X	0.5	SW-846 9056	MIS-A-044
Sulfide					
Total Dissolved Solids					
Total Organic Carbon					
Uranium	X	X	0.0001	SW-846 6020	LMM-02
Vanadium					
Zinc					
Total No. of Analytes	6	6			

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

Sampling Frequencies for Locations at Green River, Utah

Location ID	Quarterly	Semiannually	Annually	Biennially	Not Sampled	Notes
Monitoring Wells						
171			X			Telemetry
173			X			Telemetry
176			X			Telemetry
179			X			Telemetry
180					X	Telemetry
181			X			
182			X			Telemetry
183					X	Telemetry; WL only
184			X			Telemetry;
185			X			Telemetry
188			X			
189			X			
192			X			
194			X			
582					X	Telemetry; WL only
588			X			Telemetry
707					X	
813			X			Telemetry
817					X	Telemetry; WL only
Surface Locations						
801			X			
846			X			
847			X			

Annual sampling conducted in June

Site-wide water levels. Do water levels first prior to sampling. Record exact time that water levels are measured.

Attachment 4
Trip Report

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Memorandum

DATE: June 25, 2012

TO: Distribution

FROM: Jeff Price

SUBJECT: Trip Report

Site: Green River, Utah

Dates of Sampling Event: June 20-21, 2012

Team Members: Joe Treviño and Jeff Price.

Number of Locations Sampled: Water samples for arsenic, selenium, uranium, ammonia as N, nitrate + nitrite as N, and sulfate, were collected from 15 monitoring wells and three surface water locations.

Locations Not Sampled/Reason: Well 0707, which was not on the list to be sampled, was sampled. Well 0707 was not on the routine sampling list because the well had been dry for the last several sampling events. However, 0707 is the up-gradient alluvial well; data obtained from this sampling event will be useful for site characterization activities.

Location Specific Information: The intent of collecting surface location 0847 is to sample the upper reach of the Green River water that backs up into Browns Wash. Depending on the stage of the river, the location of surface sample 0847 will vary. Because of the low stage of the Green River, the backwater sampling location was about 350 feet up-stream from the Green River confluence. During normal river stages, the location is from 1,200 to 1,500 feet above the confluence.

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
2357	KHW 713	0188	Duplicate	Groundwater
2358	KHW 714	N/A	Equipment Blank	Surface Water

Report Identification Number (RIN) Assigned: All samples were assigned to RIN 12064625.

Sample Shipment: Samples were shipped overnight via FedEx to ALS Laboratory Group, Fort Collins, Colorado, on June 25, 2012.

Water Level Measurements: Water levels were measured at all wells.

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

Well Inspection Summary: All sampled wells were in adequate condition.

Field Variance: None.

Equipment: Wells were sampled with a peristaltic pump and dedicated tubing or a dedicated bladder pump. Surface water locations were sampled using a peristaltic pump and disposable tubing.

Regulatory: No regulatory stakeholders were present.

Institutional Controls

Fences, Gates, Locks: All fences, gates, and locks are OK.
Signs: OK
Trespassing/Site Disturbances: None.

Site Issues:

Disposal Cell/Drainage Structure Integrity: No issues observed.
Vegetation/Noxious Weed Concerns: None observed.
Maintenance Requirements: None observed.
Safety Issues: None.
Access Issues: None.

Access Issues: None.

Corrective Action Required/Taken: None.

(JP/lcg)

cc: (electronic)
Mark Kautsky, DOE
Steve Donivan, Stoller
Jeff Price, Stoller
EDD Delivery