

# Data Validation Package

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**June 2009**  
**Groundwater and Surface Water**  
**Sampling at the Green River, Utah,**  
**Disposal Site**

**October 2009**



U.S. DEPARTMENT OF  
**ENERGY**

Legacy  
Management

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# Sampling Event Summary

**Site:** Green River, Utah, Disposal Site

**Sampling Period:** June 25-26, 2009

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. Point-of-compliance (POC) wells 0171, 0173, 0176, 0179, 0181, and 0813 were sampled during this event to monitor the performance of the disposal cell. Additionally, annual sampling of alluvium monitor wells 0188, 0189, 0192, 0194 (for best management practice only) and potential point of exposure surface locations 0846 and 0847, was conducted according to a proposed compliance strategy for the combined disposal site and processing site. Sampling and analysis was conducted as specified in *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites (LMS/PLN/S04351, continually updated)*. The water level was measured at each sampled well.

Concentrations of contaminants of concern compared to alternate concentration limits (ACLs) are provided in Table 1 for the POC wells. Analytical results for the alluvium monitor wells are provided in Table 2, and surface water sample results for contaminants of concern are provided in Table 3. All concentrations are expressed in milligrams per liter (mg/L).

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

Monitor Well	Arsenic (mg/L)		Nitrate (mg/L)		Selenium (mg/L)		Uranium (mg/L)	
	ACL	Sample Result	ACL	Sample Result	ACL	Sample Result	ACL	Sample Result
0171	5.0	0.0012	1,000	56	5.0	0.15	4.4	0.11
0173	5.0	0.0015	1,000	170	5.0	0.15	4.4	0.018
0176	5.0	0.00031	1,000	74	5.0	0.74	4.4	0.0027
0179	5.0	0.00057	1,000	17	5.0	0.23	4.4	0.20
0181	5.0	0.0032	1,000	93	5.0	0.0059	4.4	0.014
0813	5.0	0.100	1,000	Not Detected	5.0	0.00075	4.4	0.017

Table 2. Analytical Results for the Alluvium Wells

Monitor Well	Arsenic (mg/L)	Nitrate (mg/L)	Selenium (mg/L)	Uranium (mg/L)
0188	0.00024	7.5	0.016	0.11
0189	0.00050	70	0.041	0.36
0192	0.00031	140	0.069	0.60
0194	0.0029	1000	0.024	13.0

Table 3. Analytical Results for the Surface Water Locations

Locations	Arsenic (mg/L)	Nitrate (mg/L)	Selenium (mg/L)	Uranium (mg/L)
0846	0.0011	0.092	0.0006	0.0015
0847	0.0020	Not Detected	0.0015	0.014

All six POC wells are completed in the middle sandstone unit of the Cedar Mountain Formation. Three wells—0171, 0173, and 0181—are located approximately 50 feet downgradient from the disposal cell. Well 0813 was constructed approximately 100 feet downgradient from well 0171, which, historically, has had the highest uranium concentrations. Well 0176 is located adjacent to the east corner of the disposal cell. Well 0179 is located on Umetco property southeast of the disposal cell.

Arsenic concentrations remain below 0.005 mg/L for wells 0171, 0173, 0176, 0179, and 0181. The arsenic concentration in well 0813 increased slightly compared to the concentration observed in 2008.

The nitrate (nitrate plus nitrite as nitrogen) concentration in wells 0171, 0173, 0179, and 0813 has not changed significantly since March 2007 with the concentration in well 0813 below the method detection limit (MDL).

The selenium concentration is trending downward in wells 0176 and 0179 and is essentially constant for the other four POC wells.

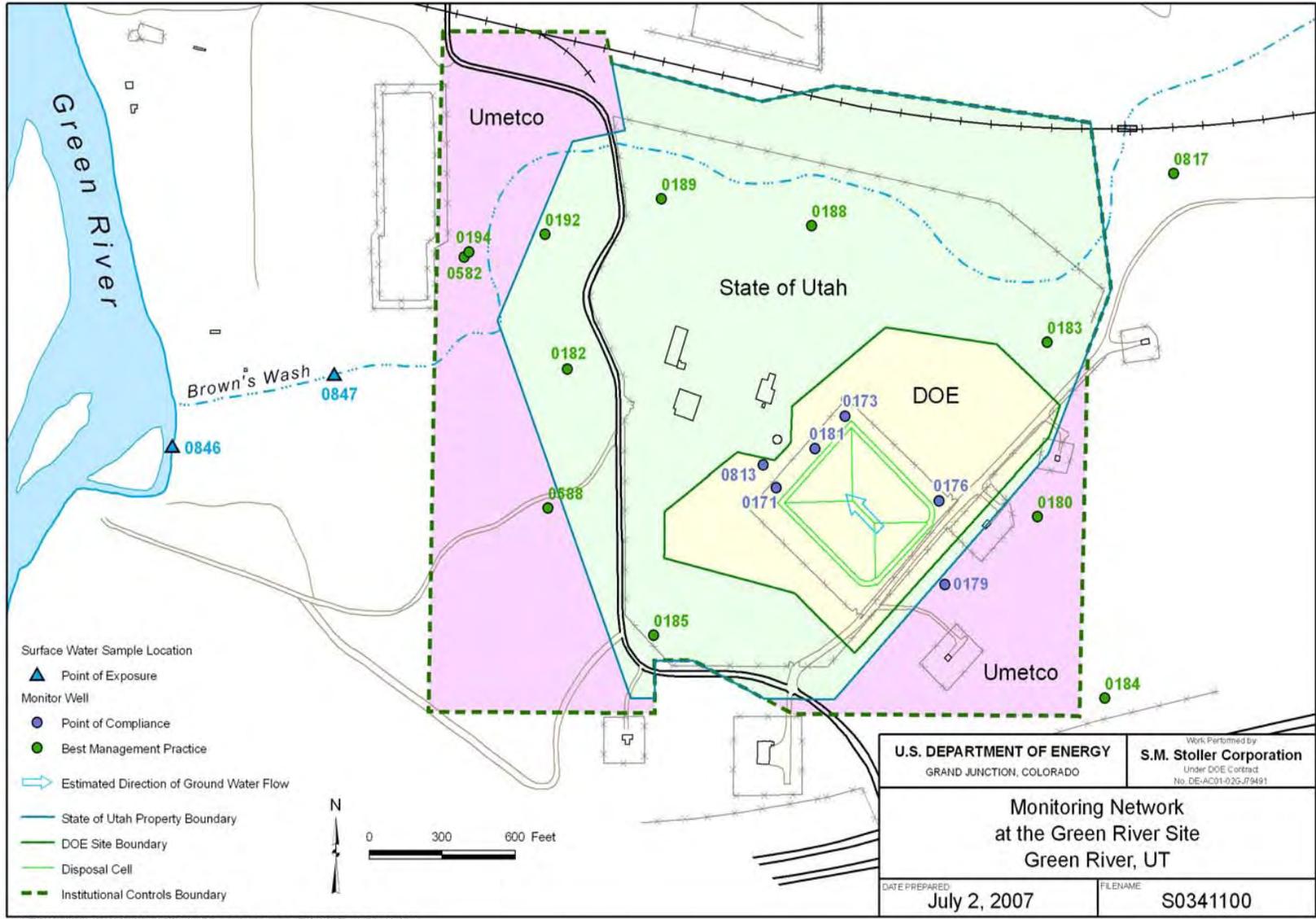
Uranium concentrations continue to remain essentially unchanged in wells 0173, 0176, 0181, and 0813. In wells 0171 and 0179, the uranium concentration decreased after trending upward since 2007.

The remaining monitor wells (0188, 0189, 0192, and 0194) are completed in the Browns Wash alluvium. These wells are monitored as a best management practice because the alluvial groundwater is not classified as an aquifer; therefore, the results are not compared to ACLs. Some of these wells continue to have elevated concentrations of nitrate and uranium as expected because processing activities contaminated the low-yield unused alluvial groundwater.

The surface water locations are in the backwater of the Green River in the ephemeral Browns Wash (0847) and at the confluence of Browns Wash and the Green River (0846). Though the contaminated Browns Wash groundwater discharges to the Green River alluvial aquifer and the Green River, contaminant concentrations remain below the applicable surface water standards.

  
Richard Johnson  
Site Lead, S.M. Stoller

10/16/09  
Date



Green River, Utah, Disposal Site, Sample Location Map

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# Data Assessment Summary

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### Water Sampling Field Activities Verification Checklist

<b>Project</b>	<u>Green River, Utah</u>	<b>Date(s) of Water Sampling</b>	<u>June 25-26, 2009</u>
<b>Date(s) of Verification</b>	<u>August 6, 2009</u>	<b>Name of Verifier</b>	<u>Steve Donovan</u>

	<b>Response (Yes, No, NA)</b>	<b>Comments</b>
1. Is the SAP the primary document directing field procedures? List other documents, SOPs, instructions.	<u>Yes</u>	<u>Work Order Letter dated May 13, 2009.</u>
2. Were the sampling locations specified in the planning documents sampled?	<u>Yes</u>	
3. Was a pre-trip calibration conducted as specified in the above-named documents?	<u>Yes</u>	<u>Pre-trip calibration was performed on June 24, 2009.</u>
4. Was an operational check of the field equipment conducted daily? Did the operational checks meet criteria?	<u>Yes</u> <u>Yes</u>	
5. Were the number and types (alkalinity, temperature, specific conductance, pH, turbidity, DO, ORP) of field measurements taken as specified?	<u>Yes</u>	
6. Was the category of the well documented?	<u>Yes</u>	
7. Were the following conditions met when purging a Category I well: Was one pump/tubing volume purged prior to sampling? Did the water level stabilize prior to sampling? Did pH, specific conductance, and turbidity measurements stabilize prior to sampling? Was the flow rate less than 500 mL/min? If a portable pump was used, was there a 4-hour delay between pump installation and sampling?	<u>Yes</u> <u>Yes</u> <u>Yes</u> <u>Yes</u> <u>NA</u>	

### 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?	NA	There were no Category II wells sampled.
Was one pump/tubing volume removed prior to sampling?	NA	
9. Were duplicates taken at a frequency of one per 20 samples?	Yes	A duplicate sample was collected from 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	Location IDs of 2416 and 2509 were used for the QC samples.
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?	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. 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?		

## Laboratory Performance Assessment

### General Information

Report Number (RIN): 09062378  
 Sample Event: June 25-26, 2009  
 Site(s): Green River, Utah Disposal Site  
 Laboratory: ALS Laboratory Group, Fort Collins, Colorado  
 Work Order No.: 0906285  
 Analysis: Metals and Inorganics  
 Validator: Steve Donovan  
 Review Date: August 6, 2009

This validation was performed according to the *Environmental Procedures Catalog* (LMS/PRO/S04325, continually updated), "Standard Practice for Validation of Laboratory Data," GT-9(P). 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, NH <sub>3</sub> -N	WCH-A-005	MCAWW 350.1	MCAWW 350.1
Arsenic, As	LMM-02	SW-846 3005A	SW-846 6020A
Nitrate + Nitrite as N, NO <sub>3</sub> +NO <sub>2</sub> -N	WCH-A-022	MCAWW 353.2	MCAWW 353.2
Selenium, Se	LMM-02	SW-846 3005A	SW-846 6020A
Uranium, U	LMM-02	SW-846 3005A	SW-846 6020A

### Data Qualifier Summary

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

*Table 5. Data Qualifier Summary*

Sample Number	Location	Analyte	Flag	Reason
All	All	Ammonia as N	J	Matrix spike failure
0906285-1	0171	Uranium	J	Serial dilution failure
0906285-11	0846	Nitrate+nitrite as N	J	Less than 5 times the equipment blank
0906285-11	0846	Selenium	J	Less than 5 times the equipment blank
0906285-12	0847	Selenium	J	Less than 5 times the equipment blank
0906285-14	Equipment Blank	Arsenic	U	Less than 5 times the method blank
0906285-14	Equipment Blank	Uranium	U	Less than 5 times the method blank

## Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado, received 14 water samples on June 30, 2009, accompanied by a Chain of Custody (COC) form. The receiving documentation included copies of the shipping labels listing the air waybill numbers. The COC form was checked to confirm that all of the samples were listed on the form with sample collection dates and times, and that signatures and dates were present indicating sample relinquishment and receipt. The COC form was complete with no errors or omissions.

## Preservation and Holding Times

The sample shipment was received cool and intact with a temperature inside the iced cooler at 7.8 °C, which does not comply with requirements. However, bottles for ammonia and nitrate analysis were sealed in a bag in direct contact with a bag of ice. Although the average cooler temperature may have been above 6.0 °C, the bottles requiring cooling were properly chilled. All samples were received in the correct container types and were analyzed within the applicable holding times.

## 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.

### *Method MCAWW 350.1, Ammonia as N*

The initial calibration was performed using six calibration standards on July 1, 2009, resulting in a calibration curve correlation coefficient value greater than 0.995 and an intercept less than 3 times the MDL. Initial and continuing calibration verification checks were made at the required frequency resulting in three verification checks that met the acceptance criteria.

### *Method MCAWW 353.2, Nitrate + Nitrite as N*

The initial calibration was performed using seven calibration standards on July 2, 2009, resulting in a calibration curve correlation coefficient value greater than 0.995 and an intercept less than 3 times the MDL. Initial and continuing calibration verification checks were made at the required frequency resulting in four verification checks that met the acceptance criteria.

### *Method SW-846 6020A, Arsenic, Selenium, and Uranium*

Calibrations were performed on July 6, 2009, for uranium and on July 7, 2009, for arsenic and selenium using seven calibration standards resulting in calibration curves with correlation coefficient values greater than 0.995. The absolute values of the calibration curve intercepts were less than 3 times the MDLs. Calibration and laboratory spike standards were prepared from independent sources. Initial and continuing calibration verification checks were made at the

required frequency resulting in 12 verification checks. All calibration checks met the acceptance criteria with the exception of one selenium calibration check. There were no samples associated with this check. A reporting limit verification check was made at the required frequency to verify the linearity of the calibration curve near the practical quantitation limit. The check results were within the acceptance criteria 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. Calibration blanks are analyzed to assess instrument contamination prior to and during sample analysis. All method, initial calibration, and continuing calibration blank results associated with the samples were below the practical quantitation limits for both 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 (ICP) Interference Check Sample (ICS) Analysis

ICP interference check samples, ICSA and ICSAB, 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 samples are analyzed as a measure of method performance in the sample matrix. Matrix spike performance is not evaluated when the concentration of the unspiked sample is greater than 4 times the spike concentration. The spike analyses resulted in acceptable recoveries for all analytes evaluated with the exception of ammonia. The ammonia results are qualified with a “J” flag as estimated values.

### Laboratory Replicate Analysis

The laboratory replicate sample results demonstrate acceptable laboratory precision. The relative percent difference values for the matrix spike duplicate samples were less than 20 percent, demonstrating acceptable precision.

### Laboratory Control Sample

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

### Metals Serial Dilution

Serial dilutions were prepared and analyzed for metals analyses to monitor chemical or physical interferences in the sample matrix. Serial dilution data were evaluated when the concentration of the undiluted sample was greater than 100 times the practical quantitation limit. The serial dilution results for uranium did not meet the acceptance criteria. The associated sample result is qualified with a “J” flag as an estimated value.

### Detection Limits/Dilutions

Samples were diluted in a consistent and acceptable manner when required. The samples were diluted prior to analysis of uranium to reduce interferences. The required detection limits were met for all analytes.

### Completeness

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

### Electronic Data Deliverable (EDD) File

The EDD file arrived on July 9, 2009. 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: 09062378 Lab Code: PAR Validator: Steve Donovan Validation Date: 8/6/2009  
Project: Green River Analysis Type:  Metals  General Chem  Rad  Organics  
# of Samples: 14 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
- Detection Limits
- Field/Trip Blanks
- Field Duplicates

All analyses were completed within the applicable holding times.

The reported detection limits are equal to or below contract requirements.

There was 1 trip/equipment blank evaluated.

There was 1 duplicate evaluated.

**SAMPLE MANAGEMENT SYSTEM**  
**Metals Data Validation Worksheet**

RIN: 09062378      Lab Code: PAR      Date Due: 7/28/2009  
 Matrix: Water      Site Code: GRN      Date Completed: 7/10/2009

Analyte	Date Analyzed	CALIBRATION						Method	LCS %R	MS %R	MSD %R	Dup. RPD	ICSAB %R	Serial Dil. %R	CRI %R
		Int.	R^2	ICV	CCV	ICB	CCB								
ARSENIC	07/07/2009	0.0000	1.0000	OK	OK	OK	OK	OK	101.0	86.0	87.0	1.0	97.0		105.0
ARSENIC	07/07/2009											0.0			
SELENIUM	07/07/2009	0.0000	1.0000	OK	OK	OK	OK	OK	95.0	-28.0	-31.0	0.0	95.0	6.0	121.0
SELENIUM	07/07/2009											2.0			
URANIUM	07/06/2009	0.0000	1.0000	OK	OK	OK	OK	OK	101.0	117.0	128.0	2.0	108.0	21.0	103.0
URANIUM	07/06/2009											4.0			

**SAMPLE MANAGEMENT SYSTEM**  
**Wet Chemistry Data Validation Worksheet**

**RIN:** 09062378      **Lab Code:** PAR      **Date Due:** 7/28/2009  
**Matrix:** Water      **Site Code:** GRN      **Date Completed:** 7/10/2009

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	07/01/2009	0.000	0.9998	OK	OK	OK	OK	100.00	65.0	66.0	2.00		
NITRATE/NITRITE AS N	07/02/2009	0.000	0.9990	OK	OK	OK	OK	104.00					

## Sampling Quality Control Assessment

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

### Sampling Protocol

Sample results for monitor wells that met the Category I or III low-flow sampling criteria 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 exception. Well 0189 was classified as Category III because of water level drawdown. The sample results for this well were qualified with a “Q” flag, indicating the data are qualitative because of the sampling technique.

### Equipment Blank Assessment

An equipment blank was collected after completion of decontamination and prior to collection of environmental samples. This blank is useful in documenting adequate decontamination of sampling equipment. Nitrate+nitrite as N and selenium were detected in the equipment blank. The associated sample results for these analytes that are greater than the MDL but less than 5 times the blank concentration are qualified with a “J” flag as estimated values.

### 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. Duplicate samples were collected from well 0188. The duplicate results met the U.S. Environmental Protection Agency recommended laboratory duplicate criteria of less than 20 percent relative difference for results that are greater than 5 times the practical quantitation limit, indicating acceptable overall precision.

**SAMPLE MANAGEMENT SYSTEM**  
**Validation Report: Field Duplicates**

Page 1 of 1

RIN: 09062378    Lab Code: PAR    Project: Green River    Validation Date: 8/6/2009

Duplicate: 2416

Sample: 0188

Analyte	Sample			Duplicate			RPD	RER	Units
	Result	Flag	Error	Result	Flag	Error			
AMMONIA AS N	9.8			9.8			0		MG/L
ARSENIC	0.24			0.31			25.45		UG/L
NITRATE/NITRITE AS N	7.5			6.8			9.79		MG/L
SELENIUM	16			16			0		UG/L
URANIUM	110			100			9.52		UG/L

**SAMPLE MANAGEMENT SYSTEM**

**Validation Report: Equipment/Trip Blanks**

RIN: 09062378    Lab Code: PAR    Project: Green River    Validation Date: 8/6/2009

**Blank Data**

Blank Type	Lab Sample ID	Lab Method	Analyte Name	Result	Qualifier	MDL	Units
Equipment Blank	0906285-14	SW6020	SELENIUM	0.32		0.018	UG/L

Sample ID	Sample Ticket	Location	Result	Dilution Factor	Lab Qualifier	Validation Qualifier
0906285-11	HHS 318	0846	0.6	1		J
0906285-12	HHS 319	0847	1.5	1		J
0906285-9	HHS 317	0194	24	2		

**Blank Data**

Blank Type	Lab Sample ID	Lab Method	Analyte Name	Result	Qualifier	MDL	Units
Equipment Blank	0906285-14	EPA353.2	NITRATE/NITRITE AS N	0.83		0.01	MG/L

Sample ID	Sample Ticket	Location	Result	Dilution Factor	Lab Qualifier	Validation Qualifier
0906285-11	HHS 318	0846	0.092	1		J
0906285-12	HHS 319	0847	0.01	1	U	
0906285-9	HHS 317	0194	1000	1000		

### 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 10-5-2009  
Steve Donivan Date

Data Validation Lead: Steve Donivan 10-5-2009  
Steve Donivan Date

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**Attachment 1**  
**Assessment of Anomalous Data**

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# Potential Outliers Report

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## Potential Outliers Report

Potential outliers are 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.

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

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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: 9/11/2009

Location: 0171 WELL POC Monitor Well (Down Gradient)

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Ammonia Total as N	mg/L	06/26/2009	N001	76	- 86	0.1	UN	FJ	#	0.1	
Arsenic	mg/L	06/26/2009	N001	76	- 86	0.0012		F	#	0.00001	
Nitrate + Nitrite as Nitrogen	mg/L	06/26/2009	N001	76	- 86	56		F	#	0.5	
Oxidation Reduction Potential	mV	06/26/2009	N001	76	- 86	129.1		F	#		
pH	s.u.	06/26/2009	N001	76	- 86	6.88		F	#		
Selenium	mg/L	06/26/2009	N001	76	- 86	0.15		F	#	0.00018	
Specific Conductance	umhos/cm	06/26/2009	N001	76	- 86	7124		F	#		
Temperature	C	06/26/2009	N001	76	- 86	18.49		F	#		
Turbidity	NTU	06/26/2009	N001	76	- 86	1.9		F	#		
Uranium	mg/L	06/26/2009	N001	76	- 86	0.11	E	FJ	#	0.000022	

**Groundwater Quality Data by Location (USEE100) FOR SITE GRN01, Green River Disposal Site**

REPORT DATE: 9/11/2009

Location: 0173 WELL POC Monitor Well (Down Gradient)

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Ammonia Total as N	mg/L	06/26/2009	N001	92	- 102	0.1	U	FJ	#	0.1	
Arsenic	mg/L	06/26/2009	N001	92	- 102	0.0015		F	#	0.0001	
Nitrate + Nitrite as Nitrogen	mg/L	06/26/2009	N001	92	- 102	170		F	#	1	
Oxidation Reduction Potential	mV	06/26/2009	N001	92	- 102	149.2		F	#		
pH	s.u.	06/26/2009	N001	92	- 102	6.9		F	#		
Selenium	mg/L	06/26/2009	N001	92	- 102	0.15		F	#	0.00018	
Specific Conductance	umhos/cm	06/26/2009	N001	92	- 102	13089		F	#		
Temperature	C	06/26/2009	N001	92	- 102	16.78		F	#		
Turbidity	NTU	06/26/2009	N001	92	- 102	0.75		F	#		
Uranium	mg/L	06/26/2009	N001	92	- 102	0.018		F	#	0.0000045	

**Groundwater Quality Data by Location (USEE100) FOR SITE GRN01, Green River Disposal Site**

REPORT DATE: 9/11/2009

Location: 0176 WELL POC Monitor Well (Cross Gradient)

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Ammonia Total as N	mg/L	06/26/2009	N001	72	- 82	0.1	U	FJ	#	0.1	
Arsenic	mg/L	06/26/2009	N001	72	- 82	0.00031		F	#	0.00001	
Nitrate + Nitrite as Nitrogen	mg/L	06/26/2009	N001	72	- 82	74		F	#	0.5	
Oxidation Reduction Potential	mV	06/26/2009	N001	72	- 82	148.7		F	#		
pH	s.u.	06/26/2009	N001	72	- 82	6.71		F	#		
Selenium	mg/L	06/26/2009	N001	72	- 82	0.74		F	#	0.00091	
Specific Conductance	umhos/cm	06/26/2009	N001	72	- 82	7636		F	#		
Temperature	C	06/26/2009	N001	72	- 82	17.45		F	#		
Turbidity	NTU	06/26/2009	N001	72	- 82	1.28		F	#		
Uranium	mg/L	06/26/2009	N001	72	- 82	0.0027		F	#	0.0000045	

**Groundwater Quality Data by Location (USEE100) FOR SITE GRN01, Green River Disposal Site**

REPORT DATE: 9/11/2009

Location: 0179 WELL POC Monitor Well (Up Gradient)

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Ammonia Total as N	mg/L	06/26/2009	N001	78	- 88	0.1	U	FJ	#	0.1	
Arsenic	mg/L	06/26/2009	N001	78	- 88	0.00057		F	#	0.00001	
Nitrate + Nitrite as Nitrogen	mg/L	06/26/2009	N001	78	- 88	17		F	#	0.1	
Oxidation Reduction Potential	mV	06/26/2009	N001	78	- 88	159.7		F	#		
pH	s.u.	06/26/2009	N001	78	- 88	6.61		F	#		
Selenium	mg/L	06/26/2009	N001	78	- 88	0.23		F	#	0.00036	
Specific Conductance	umhos/cm	06/26/2009	N001	78	- 88	7006		F	#		
Temperature	C	06/26/2009	N001	78	- 88	17		F	#		
Turbidity	NTU	06/26/2009	N001	78	- 88	1.81		F	#		
Uranium	mg/L	06/26/2009	N001	78	- 88	0.2		F	#	0.000022	

**Groundwater Quality Data by Location (USEE100) FOR SITE GRN01, Green River Disposal Site**

REPORT DATE: 9/11/2009

Location: 0181 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Ammonia Total as N	mg/L	06/26/2009	N001	77	- 92	0.1	U	FJ	#	0.1	
Arsenic	mg/L	06/26/2009	N001	77	- 92	0.0032		F	#	0.00001	
Nitrate + Nitrite as Nitrogen	mg/L	06/26/2009	N001	77	- 92	93		F	#	0.5	
Oxidation Reduction Potential	mV	06/26/2009	N001	77	- 92	137		F	#		
pH	s.u.	06/26/2009	N001	77	- 92	7.13		F	#		
Selenium	mg/L	06/26/2009	N001	77	- 92	0.0059		F	#	0.000018	
Specific Conductance	umhos/cm	06/26/2009	N001	77	- 92	10796		F	#		
Temperature	C	06/26/2009	N001	77	- 92	18.16		F	#		
Turbidity	NTU	06/26/2009	N001	77	- 92	0.66		F	#		
Uranium	mg/L	06/26/2009	N001	77	- 92	0.014		F	#	0.0000045	

**Groundwater Quality Data by Location (USEE100) FOR SITE GRN01, Green River Disposal Site**

REPORT DATE: 9/11/2009

Location: 0188 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Ammonia Total as N	mg/L	06/25/2009	N001	7.5	- 12.5	9.8		FJ	#	0.5	
Ammonia Total as N	mg/L	06/25/2009	N002	7.5	- 12.5	9.8		FJ	#	0.5	
Arsenic	mg/L	06/25/2009	N001	7.5	- 12.5	0.00024		F	#	0.00001	
Arsenic	mg/L	06/25/2009	N002	7.5	- 12.5	0.00031		F	#	0.00001	
Nitrate + Nitrite as Nitrogen	mg/L	06/25/2009	N001	7.5	- 12.5	7.5		F	#	0.5	
Nitrate + Nitrite as Nitrogen	mg/L	06/25/2009	N002	7.5	- 12.5	6.8		F	#	0.5	
Oxidation Reduction Potential	mV	06/25/2009	N001	7.5	- 12.5	71.6		F	#		
pH	s.u.	06/25/2009	N001	7.5	- 12.5	7.01		F	#		
Selenium	mg/L	06/25/2009	N001	7.5	- 12.5	0.016		F	#	0.000018	
Selenium	mg/L	06/25/2009	N002	7.5	- 12.5	0.016		F	#	0.000018	
Specific Conductance	umhos/cm	06/25/2009	N001	7.5	- 12.5	11812		F	#		
Temperature	C	06/25/2009	N001	7.5	- 12.5	17.08		F	#		
Turbidity	NTU	06/25/2009	N001	7.5	- 12.5	1.89		F	#		
Uranium	mg/L	06/25/2009	N001	7.5	- 12.5	0.11		F	#	0.000022	
Uranium	mg/L	06/25/2009	N002	7.5	- 12.5	0.1		F	#	0.000022	

**Groundwater Quality Data by Location (USEE100) FOR SITE GRN01, Green River Disposal Site**

REPORT DATE: 9/11/2009

Location: 0189 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Ammonia Total as N	mg/L	06/25/2009	N001	14	- 19	35		FQJ	#	1	
Arsenic	mg/L	06/25/2009	N001	14	- 19	0.0005		FQ	#	0.00001	
Nitrate + Nitrite as Nitrogen	mg/L	06/25/2009	N001	14	- 19	70		FQ	#	0.5	
Oxidation Reduction Potential	mV	06/25/2009	N001	14	- 19	72.8		FQ	#		
pH	s.u.	06/25/2009	N001	14	- 19	6.89		FQ	#		
Selenium	mg/L	06/25/2009	N001	14	- 19	0.041		FQ	#	0.000091	
Specific Conductance	umhos/cm	06/25/2009	N001	14	- 19	10283		FQ	#		
Temperature	C	06/25/2009	N001	14	- 19	19.25		FQ	#		
Turbidity	NTU	06/25/2009	N001	14	- 19	4.69		FQ	#		
Uranium	mg/L	06/25/2009	N001	14	- 19	0.36		FQ	#	0.000022	

**Groundwater Quality Data by Location (USEE100) FOR SITE GRN01, Green River Disposal Site**

REPORT DATE: 9/11/2009

Location: 0192 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Ammonia Total as N	mg/L	06/25/2009	N001	5.02	- 9.96	3.2		FJ	#	0.1	
Arsenic	mg/L	06/25/2009	N001	5.02	- 9.96	0.00031		F	#	0.00001	
Nitrate + Nitrite as Nitrogen	mg/L	06/25/2009	N001	5.02	- 9.96	140		F	#	1	
Oxidation Reduction Potential	mV	06/25/2009	N001	5.02	- 9.96	68.9		F	#		
pH	s.u.	06/25/2009	N001	5.02	- 9.96	6.94		F	#		
Selenium	mg/L	06/25/2009	N001	5.02	- 9.96	0.069		F	#	0.000091	
Specific Conductance	umhos/cm	06/25/2009	N001	5.02	- 9.96	9607		F	#		
Temperature	C	06/25/2009	N001	5.02	- 9.96	17.54		F	#		
Turbidity	NTU	06/25/2009	N001	5.02	- 9.96	3.78		F	#		
Uranium	mg/L	06/25/2009	N001	5.02	- 9.96	0.6		F	#	0.000045	

**Groundwater Quality Data by Location (USEE100) FOR SITE GRN01, Green River Disposal Site**

REPORT DATE: 9/11/2009

Location: 0194 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Ammonia Total as N	mg/L	06/25/2009	N001	12.5	- 17.5	9.8		FJ	#	0.5	
Arsenic	mg/L	06/25/2009	N001	12.5	- 17.5	0.0029		F	#	0.000021	
Nitrate + Nitrite as Nitrogen	mg/L	06/25/2009	N001	12.5	- 17.5	1000		F	#	10	
Oxidation Reduction Potential	mV	06/25/2009	N001	12.5	- 17.5	77.6		F	#		
pH	s.u.	06/25/2009	N001	12.5	- 17.5	7.53		F	#		
Selenium	mg/L	06/25/2009	N001	12.5	- 17.5	0.024		F	#	0.000036	
Specific Conductance	umhos/cm	06/25/2009	N001	12.5	- 17.5	69800		F	#		
Temperature	C	06/25/2009	N001	12.5	- 17.5	26.66		F	#		
Turbidity	NTU	06/25/2009	N001	12.5	- 17.5	7.56		F	#		
Uranium	mg/L	06/25/2009	N001	12.5	- 17.5	13		F	#	0.0022	

**Groundwater Quality Data by Location (USEE100) FOR SITE GRN01, Green River Disposal Site**

REPORT DATE: 9/11/2009

Location: 0813 WELL

Parameter	Units	Sample		Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID			Lab	Data	QA		
Ammonia Total as N	mg/L	06/26/2009	N001	77.7 - 97.7	0.1	U	FJ	#	0.1	
Arsenic	mg/L	06/26/2009	N001	77.7 - 97.7	0.1		F	#	0.0001	
Nitrate + Nitrite as Nitrogen	mg/L	06/26/2009	N001	77.7 - 97.7	0.01	U	F	#	0.01	
Oxidation Reduction Potential	mV	06/26/2009	N001	77.7 - 97.7	19.7		F	#		
pH	s.u.	06/26/2009	N001	77.7 - 97.7	6.64		F	#		
Selenium	mg/L	06/26/2009	N001	77.7 - 97.7	0.00075		F	#	0.000018	
Specific Conductance	umhos/cm	06/26/2009	N001	77.7 - 97.7	7277		F	#		
Temperature	C	06/26/2009	N001	77.7 - 97.7	17.56		F	#		
Turbidity	NTU	06/26/2009	N001	77.7 - 97.7	2.73		F	#		
Uranium	mg/L	06/26/2009	N001	77.7 - 97.7	0.017		F	#	0.0000045	

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.

**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: 9/11/2009

Location: 0846 SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID		Lab	Data	QA		
Ammonia Total as N	mg/L	06/25/2009	0001	0.1	U	J	#	0.1	
Arsenic	mg/L	06/25/2009	0001	0.0011			#	0.00001	
Nitrate + Nitrite as Nitrogen	mg/L	06/25/2009	0001	0.092		J	#	0.01	
Oxidation Reduction Potential	mV	06/25/2009	N001	-6.8			#		
pH	s.u.	06/25/2009	N001	7.92			#		
Selenium	mg/L	06/25/2009	0001	0.0006		J	#	0.000018	
Specific Conductance	umhos/cm	06/25/2009	N001	382			#		
Temperature	C	06/25/2009	N001	23.74			#		
Turbidity	NTU	06/25/2009	N001	1000	>		#		
Uranium	mg/L	06/25/2009	0001	0.0015			#	0.0000045	

**Surface Water Quality Data by Location (USEE102) FOR SITE GRN01, Green River Disposal Site**

REPORT DATE: 9/11/2009

Location: 0847 SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID		Lab	Data	QA		
Ammonia Total as N	mg/L	06/25/2009	0001	0.23		J	#	0.1	
Arsenic	mg/L	06/25/2009	0001	0.002			#	0.00001	
Nitrate + Nitrite as Nitrogen	mg/L	06/25/2009	0001	0.01	U		#	0.01	
Oxidation Reduction Potential	mV	06/25/2009	N001	-64.1			#		
pH	s.u.	06/25/2009	N001	6.92			#		
Selenium	mg/L	06/25/2009	0001	0.0015		J	#	0.000018	
Specific Conductance	umhos/cm	06/25/2009	N001	2380			#		
Temperature	C	06/25/2009	N001	25.33			#		
Turbidity	NTU	06/25/2009	N001	565			#		
Uranium	mg/L	06/25/2009	0001	0.014			#	0.0000045	

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.

QA QUALIFIER:

- # Validated according to quality assurance guidelines.

## **Equipment Blank Data**

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**BLANKS REPORT**

LAB: PARAGON (Fort Collins, CO)

RIN: 09062378

Report Date: 9/11/2009

Parameter	Site Code	Location ID	Sample Date	Sample ID	Units	Result	Qualifiers Lab	Data	Detection Limit	Uncertainty	Sample Type
Ammonia Total as N	GRN01	0999	06/26/2009	N001	mg/L	0.1	U	J	0.1		E
Arsenic	GRN01	0999	06/26/2009	N001	mg/L	0.00014		U	0.00001		E
Nitrate + Nitrite as Nitrogen	GRN01	0999	06/26/2009	N001	mg/L	0.83			0.01		E
Selenium	GRN01	0999	06/26/2009	N001	mg/L	0.00032			0.000018		E
Uranium	GRN01	0999	06/26/2009	N001	mg/L	0.000019	B	U	0.0000045		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: 9/11/2009**

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	06/26/2009	11:50:02	54.96	4085.14	
0173	D	4141.23	06/26/2009	10:50:44	56.05	4085.18	
0176	D	4143.4	06/26/2009	10:10:17	56.8	4086.6	
0179	C	4161.39	06/26/2009	09:35:41	75.57	4085.82	
0180	C	4159.11	06/25/2009	15:20:00	57.42	4101.69	
0181	D	4141.1	06/26/2009	11:20:04	55.79	4085.31	
0182	D	4101.52	06/25/2009	14:46:00	16.13	4085.39	
0183	C	4100.6	06/25/2009	13:25:00	13.95	4086.65	
0184	C	4192.98	06/25/2009	15:07:00	107.09	4085.89	
0185	U	4135.46	06/25/2009	15:01:00	50.5	4084.96	
0188	O	4075.11	06/25/2009	13:10:47	11.56	4063.55	
0189	O	4075.96	06/25/2009	12:45:25	18.82	4057.14	
0192	O	4065.83	06/25/2009	11:45:58	10.61	4055.22	
0194	D	4067.76	06/25/2009	14:25:40	18.09	4049.67	
0588	U	4113.92	06/25/2009	14:53:00	29.13	4084.79	
0813	D	4136.36	06/26/2009	12:30:22	51.12	4085.24	

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

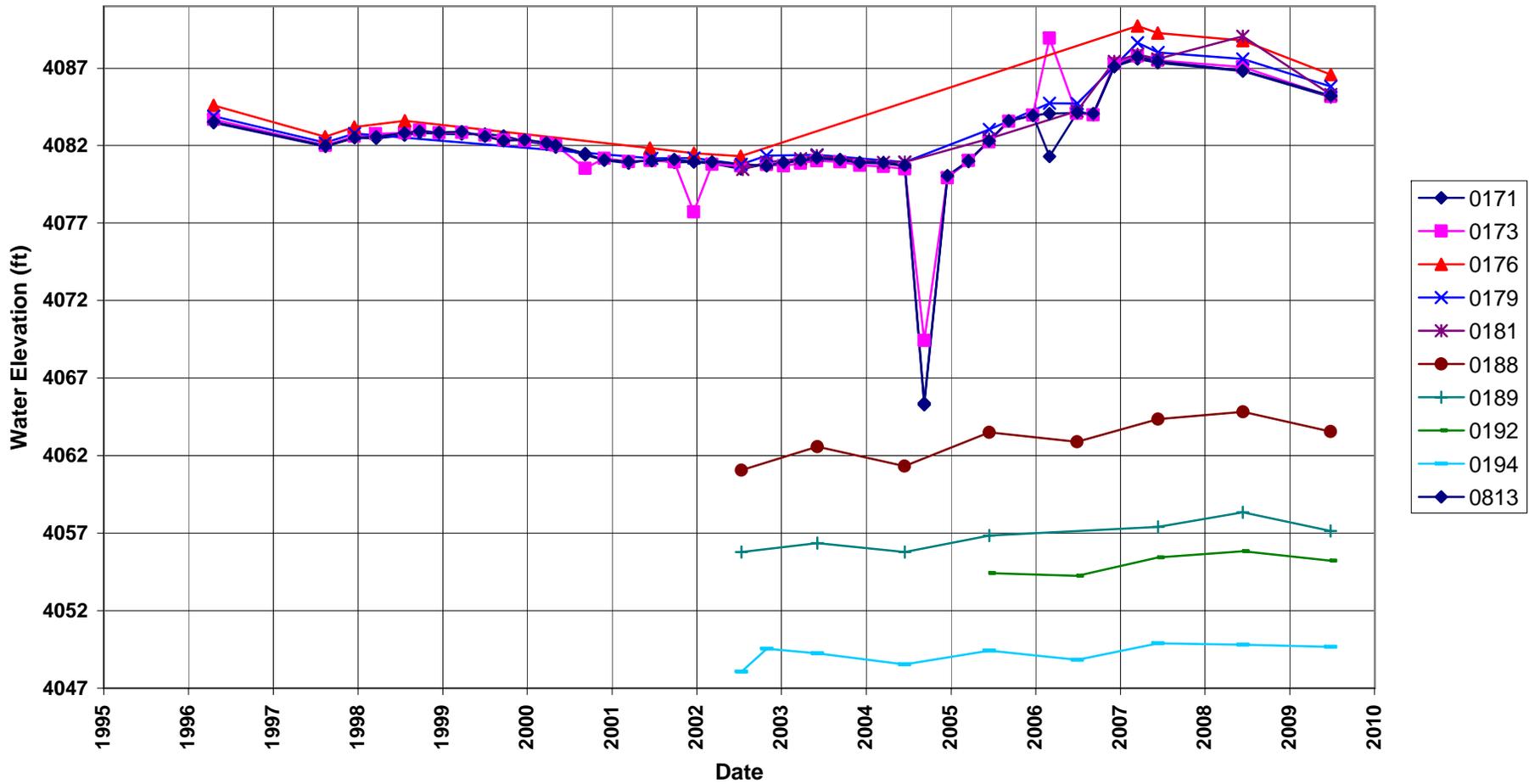
WATER LEVEL FLAGS: D Dry      F FLOWING

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# Hydrograph

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### Green River Disposal Site Hydrograph

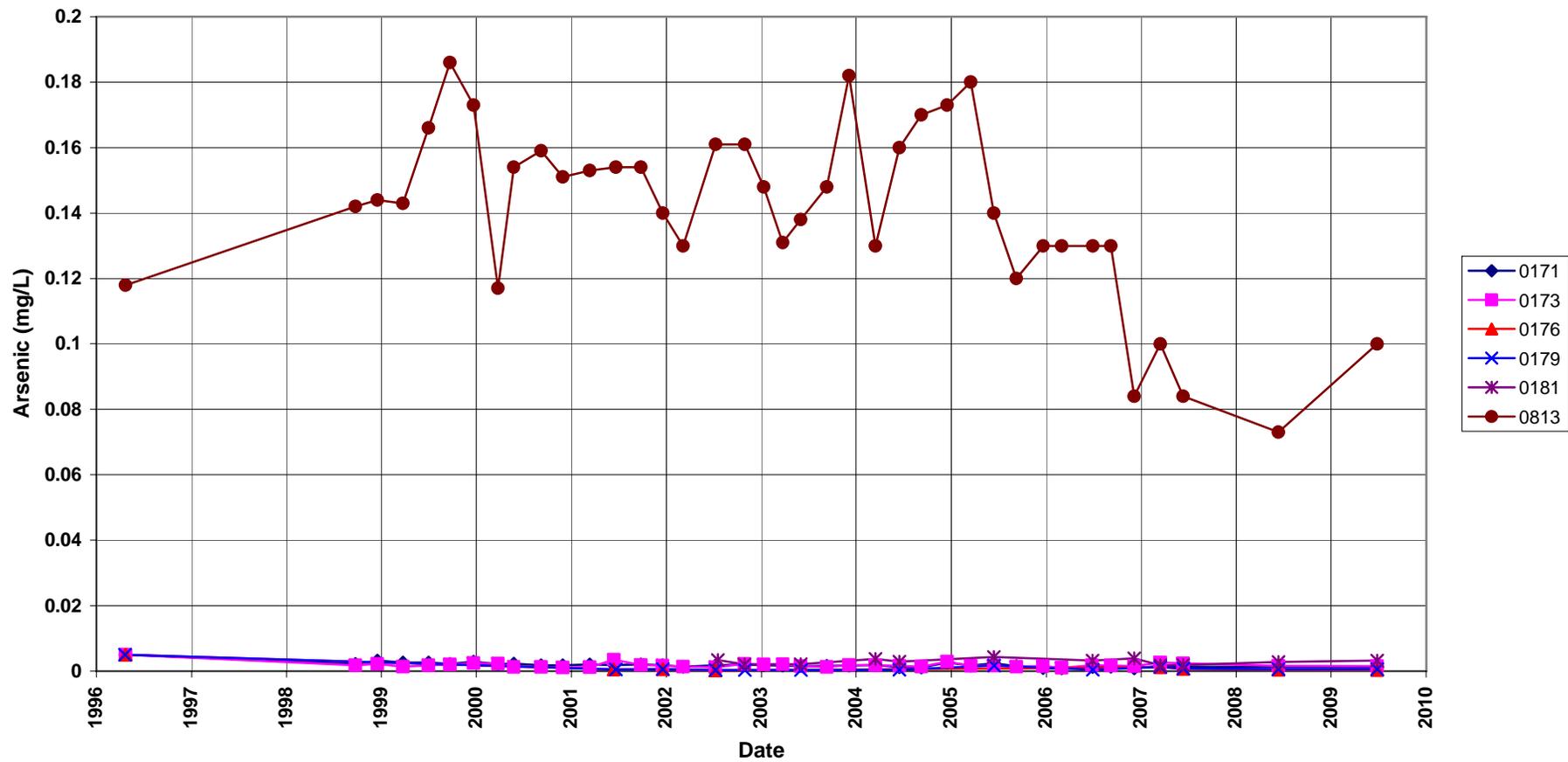


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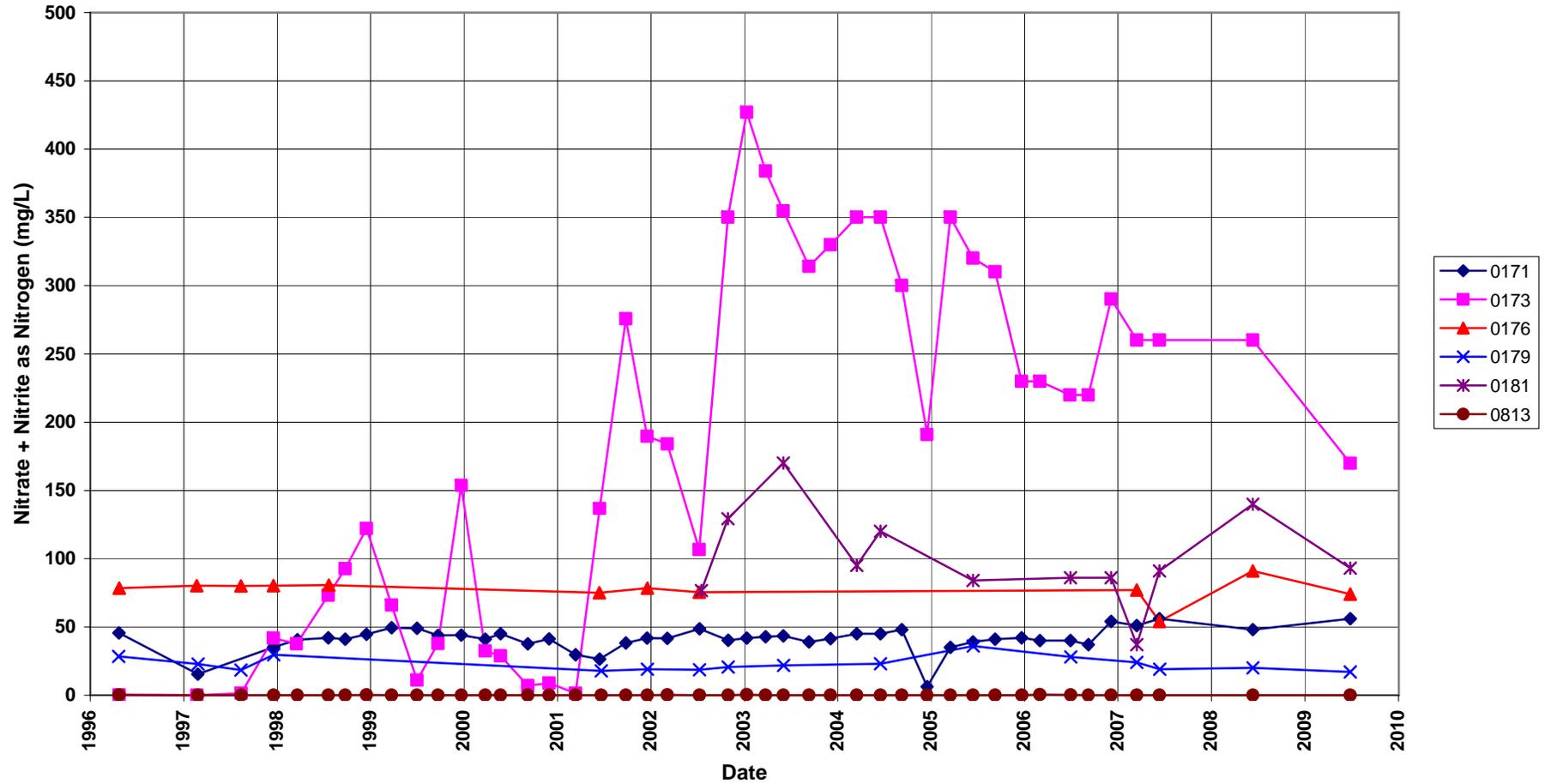
## **Time-Concentration Graphs**

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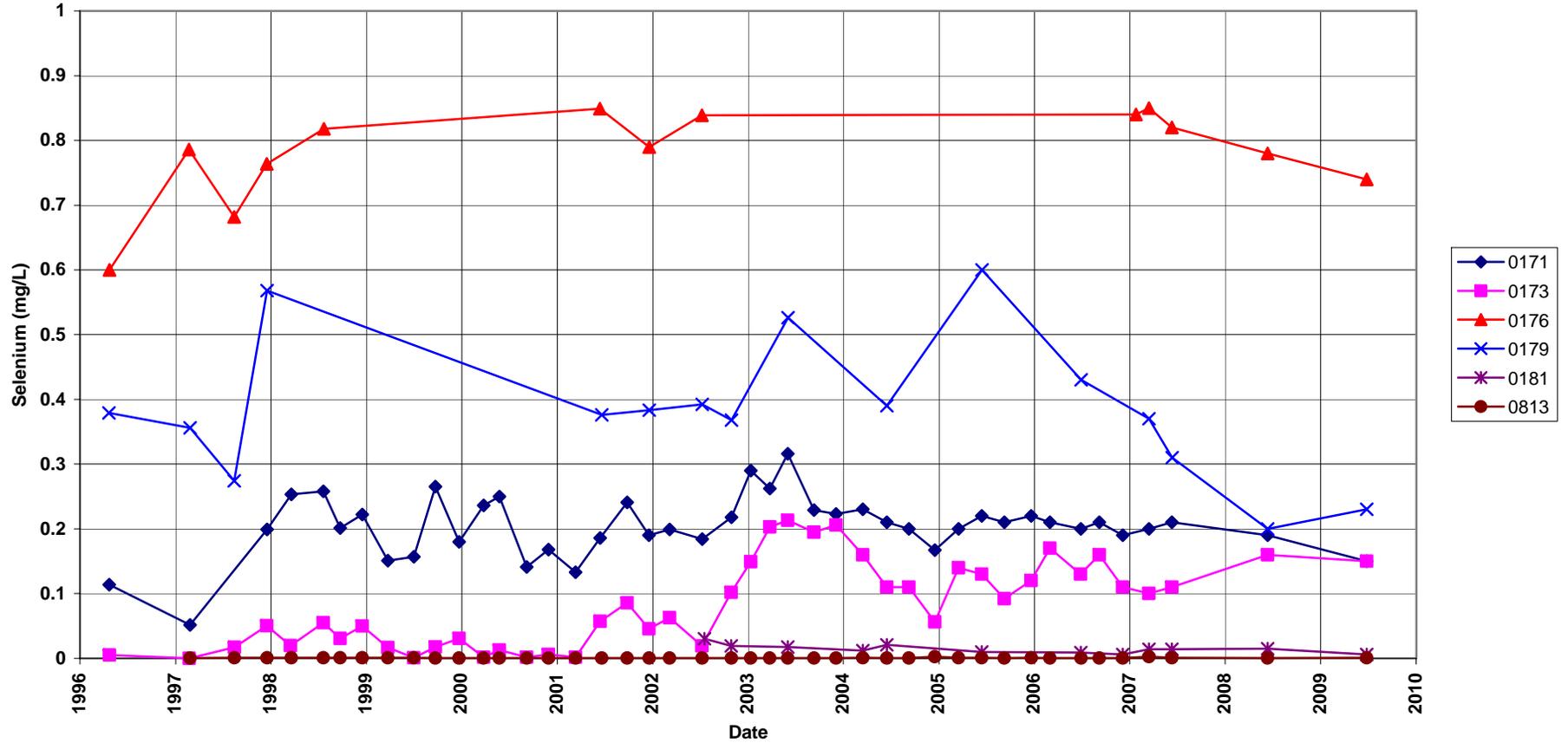
**Green River Disposal Site  
Point of Compliance Wells  
Arsenic Concentration**  
Alternate Concentration Limit = 5.0 mg/L



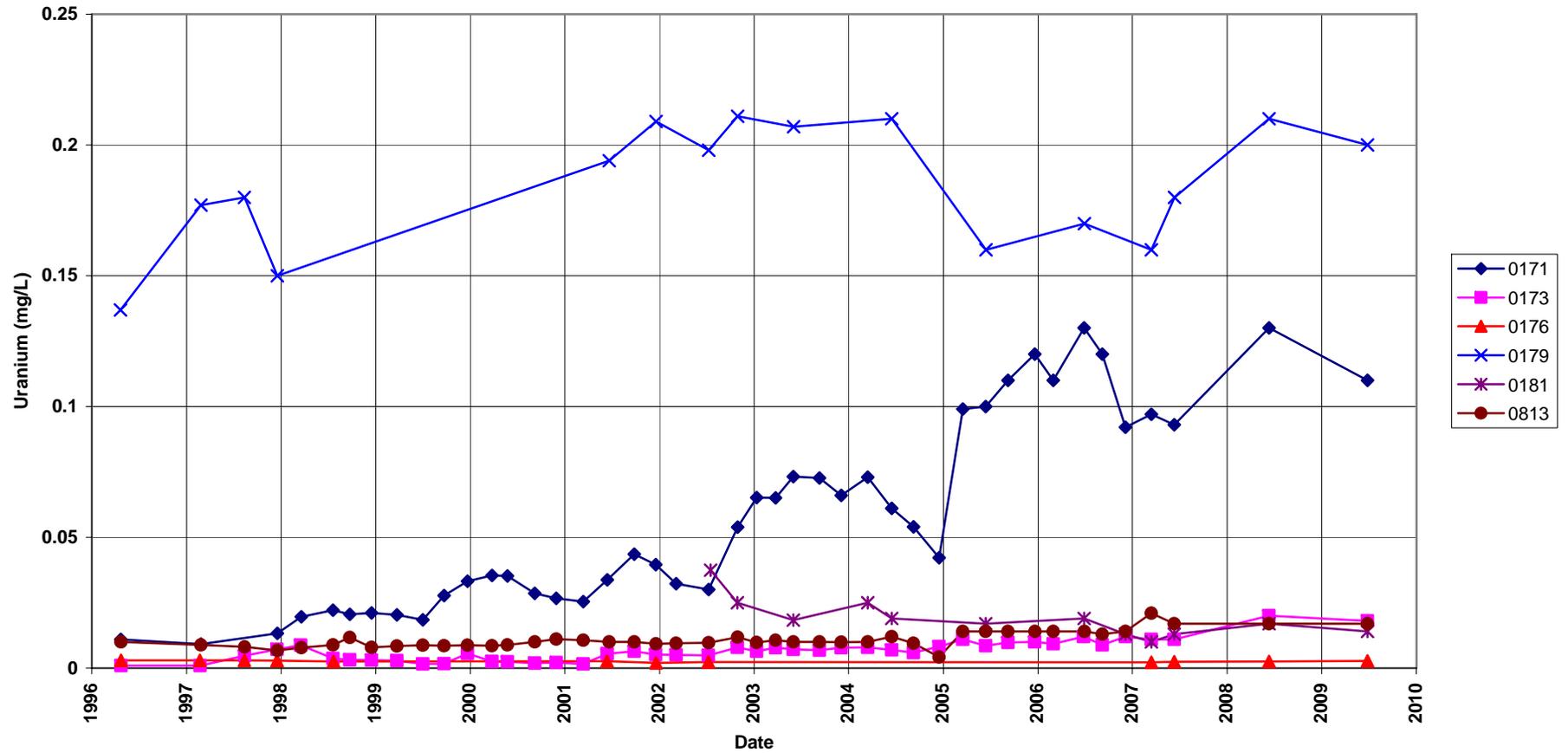
**Green River Disposal Site  
Point of Compliance Wells  
Nitrate + Nitrite as Nitrogen Concentration**  
Alternate Concentration Limit = 1,000 mg/L



**Green River Disposal Site  
Point of Compliance Wells  
Selenium Concentration**  
Alternate Concentration Limit = 1.0 mg/L



**Green River Disposal Site  
Point of Compliance Wells  
Uranium Concentration**  
Alternate Concentration Limit = 4.4 mg/L



**Attachment 3**  
**Sampling and Analysis Work Order**

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established 1959

Task Order LM00-501  
Control Number 09-0761

May 13, 2009

U.S. Department of Energy  
Office of Legacy Management  
ATTN: Richard Bush  
Site Manager  
2597 B 3/4 Road  
Grand Junction, CO 81503

SUBJECT: Contract No. DE-AM01-07LM00060, Stoller  
June 2009 Environmental Sampling at Green River, Utah

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

Dear Mr. Bush:

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 routine monitoring at the Green River, Utah, Disposal Site. Water quality data will be collected from monitor wells and surface locations at this site as part of the routine environmental sampling currently scheduled to begin the week of June 15, 2009.

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

**Monitor Wells\***

0171 Cm	0176 Cm	0181 Cm	0189 Al	0192 Al	0194 Al	0813 Cm
0173 Cm	0179 Cm	0188 Al				

\*NOTE: Al = Alluvium; Cm = Middle Sandstone Unit

**Surface Locations**

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.

Please call me at (970) 248-6022, if you have questions.

Sincerely,

Richard Johnson  
Site Lead

DJ/lcg/lb

Enclosures (3)

cc: (electronic)

Cheri Bahrke, Stoller  
Steve Donovan, Stoller  
Bev Gallagher, Stoller  
Lauren Goodknight, Stoller  
Dick Johnson, Stoller  
EDD Delivery  
rc-grand.junction

## Constituent Sampling Breakdown

Site	Green River		Required Detection Limit (mg/L)	Analytical Method	Line Item Code
Analyte	Groundwater	Surface Water			
<b>Approx. No. Samples/yr</b>	10	2			
<i>Field Measurements</i>					
Alkalinity					
Dissolved Oxygen					
Redox Potential	X	X			
pH	X	X			
Specific Conductance	X	X			
Turbidity	X				
Temperature	X	X			
<i>Laboratory Measurements</i>					
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					
Sulfide					
Total Dissolved Solids					
Total Organic Carbon					
Uranium	X	X	0.0001	SW-846 6020	LMM-02
Vanadium					
Zinc					
<b>Total No. of Analytes</b>	5	5			

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

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# **Attachment 4**

## **Trip Report**

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## Memorandum

Control Number N/A

DATE: July 23, 2009  
 TO: Dick Johnson  
 FROM: Gretchen Baer  
 SUBJECT: Trip Report

**Site:** Green River, Utah

**Dates of Sampling Event:** June 25 and 26, 2009

**Team Members:** Gretchen Baer and Sam Campbell. Dick Johnson assisted in identifying the surface locations.

**Number of Locations Sampled:** Water samples for arsenic, selenium, uranium, ammonia as N, and nitrate + nitrite as N were collected from ten monitor wells and two surface locations for a total of 12 locations.

**Locations Not Sampled/Reason:** None.

### Location Specific Information:

Location IDs	Comments
0189	Cat III based on WL drop at slow purge rate and WL within screened interval.
0192	Roots in well may interfere with WL measurements.
0194	Roots in well prevented the downhole tubing from being pushed back into the water. Well was sampled with the tubing reel. Very high sp conductivity. Purge water was brownish and had small root particles. ~400 mL collected for metals. Extra acid required to get pH <2 for preservation.
0846	D. Johnson observed sampling and collected a GPS point to correct the location. Turbidity >1000 ntu. Evidence of trespassing.
0847	D. Johnson observed sampling. Water was slowly moving upstream at sample point.

**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
2416	HHS 311	0188	Duplicate	Groundwater
2509	HHS 320	Associated with 0846, 0847, and 0194	Equipment Blank	Water

**Report Identification Number (RIN) Assigned:** All samples were assigned to RIN 09062378.

**Sample Shipment:** Samples were shipped overnight via FedEx to ALS Laboratory Group, Fort Collins, Colorado, on June 29, 2009.

**Water Level Measurements:** Water levels were measured at all sampled wells and at six additional wells (0180, 0182, 0183, 0184, 0185, and 0588).

**Well Inspection Summary:** All sampled wells were in adequate condition. Some wells should be repainted and relabeled because the paint is starting to deteriorate.

**Field Variance:** None.

**Equipment:** With one exception, wells were sampled with a peristaltic pump and dedicated tubing or a dedicated bladder pump. Well 0194 was sampled with a tubing reel. Surface water locations were sampled using a peristaltic pump and tubing reel. An equipment blank was collected after decontamination of the tubing reel used to sample the surface waters and well 0194.

**Regulatory:** N/A

#### **Institutional Controls**

**Fences, Gates, Locks:** All fences, gates, and locks are OK.

**Signs:** OK

**Trespassing/Site Disturbances:** The bank side at surface location 0846 had evidence of trespassing: litter and coals from a fire.

#### **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:** Wells 0192 and 0194 need to be re-developed because of roots. The 1/4" downhole tubing in 0194 should be replaced with 3/8" tubing. Older wells should be repainted and relabeled because the paint is starting to deteriorate.

(GRB/lcg)

cc: (electronic)  
Richard Bush, DOE  
Cheri Bahrke, Stoller  
Steve Donovan, Stoller  
EDD Delivery