

# Data Validation Package

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**July 2009**

**Groundwater and Surface Water  
Sampling at the  
Naturita, Colorado, Processing Site**

**October 2009**



**U.S. DEPARTMENT OF  
ENERGY**

Legacy  
Management

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# Sampling Event Summary

**Site:** Naturita, Colorado, Processing Site

**Sampling Period:** July 13-14, 2009

This sampling event includes sampling groundwater and surface water at the Naturita Processing Site. Sampling and analysis were conducted as specified in the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites* (LMS/PLN/S04351, continually updated) and the *Environmental Procedures Catalog* (LMS/PRO/S04325, continually updated). One duplicate sample was collected from location NAT01-1. An equipment blank was also collected during this sampling event.

The 2002 *Ground Water Compliance Action Plan for the Naturita, Colorado, UMTRA Project Site* requires annual monitoring to observe the effectiveness of the groundwater compliance strategy at the site. The sampling conducted included monitor wells NAT01-1, NAT02, NAT08, NAT26, MAU07, MAU08, 0715, and 0718 and surface locations 0531, 0533, 0538, SM2, and SM4. The water level was measured at each sampled well.

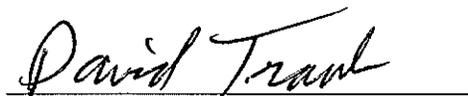
DM1 is a background groundwater location that was not sampled because the well had been damaged prior to this sampling event. The well was repaired and sampled in September 2009.

Time-concentration graphs show that uranium and vanadium concentrations in the wells sampled tend to be decreasing and remain below the proposed alternate concentration limits.

Surface location 0538 is a groundwater seep that collects in a small area near the river. The uranium concentration of 0.18 milligrams per liter (mg/L) and the vanadium concentration of 0.00029 mg/L at this location are well below the action levels of 3 mg/L and 6 mg/L, respectively. Surface water results from San Miguel River locations downstream of and adjacent to the site were compared to statistical benchmark values derived using historical data from location 0531, which is located upstream of the site on the San Miguel River. As shown in Table 1, no benchmark values were exceeded during this event, indicating that there are no measurable site impacts on river water quality.

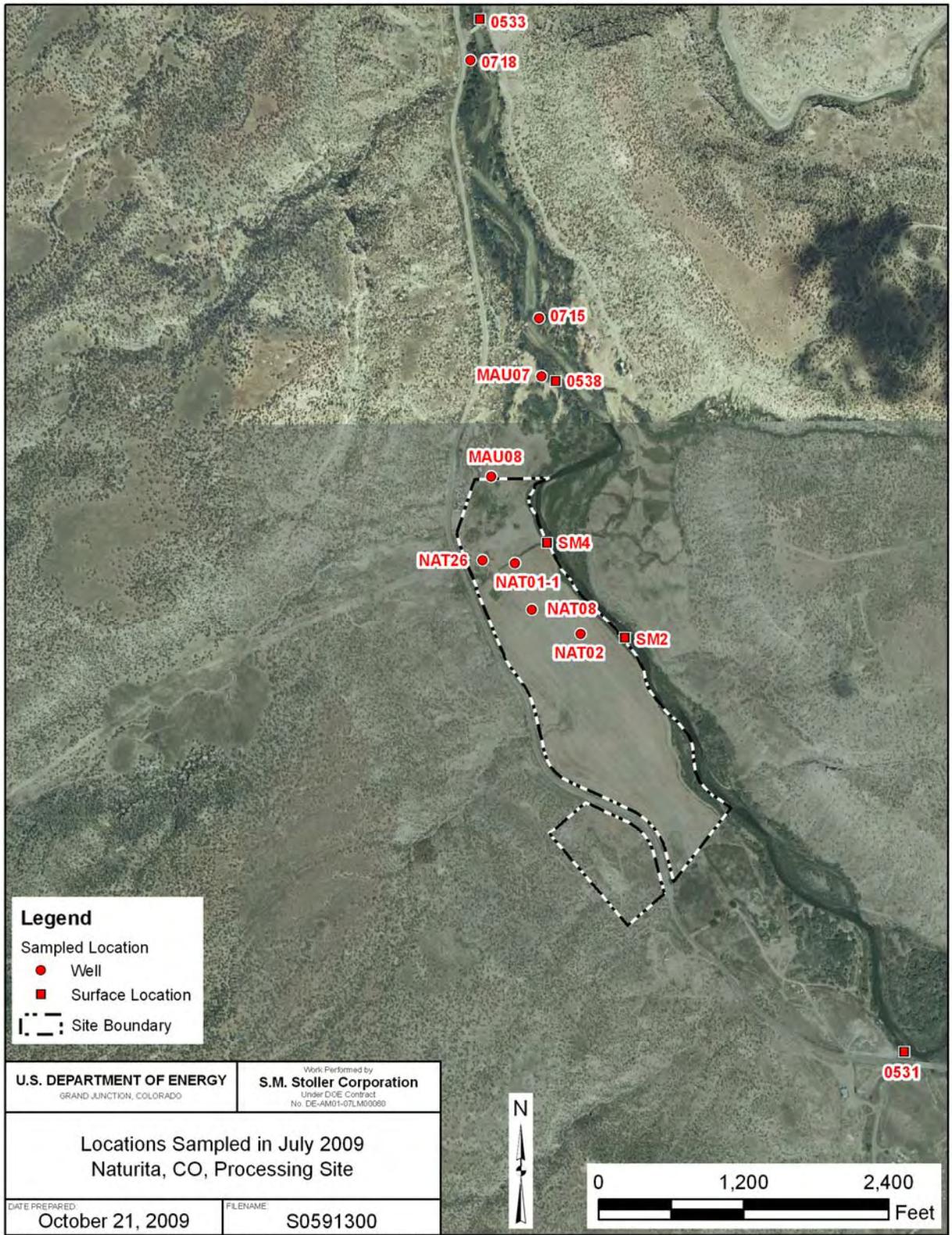
Table 1. Comparison of San Miguel River July 2009 Concentrations to Benchmarks

Analyte	Benchmark Value for 0531 (mg/L)	0531 Concentration (mg/L)	SM2 Concentration (mg/L)	SM4 Concentration (mg/L)	0533 Concentration (mg/L)
Uranium	0.0045	0.00096	0.00091	0.00092	0.0011
Vanadium	0.0050	0.00054	0.00056	0.00059	0.00054



David Traub  
Site Lead, S.M. Stoller

10-22-09  
Date



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Naturita, Colorado Processing Site Sample Location Map

# Data Assessment Summary

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### Water Sampling Field Activities Verification Checklist

<b>Project</b>	<u>Naturita, Colorado</u>	<b>Date(s) of Water Sampling</b>	<u>July 13-14, 2009</u>
<b>Date(s) of Verification</b>	<u>October 1, 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 June 9, 2009.</u>
2. Were the sampling locations specified in the planning documents sampled?	<u>No</u>	<u>Well DM1 was found damaged and not sampled.</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 July 13, 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>No</u> <u>Yes</u> <u>NA</u>	<u>Specific conductance did not meet the stability criteria at well 0715.</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.
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 NAT01-1.
10. Were equipment blanks taken at a frequency of one per 20 samples that were collected with nondedicated equipment?	Yes	One equipment blank was collected.
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 2516 and 2517 were used for 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?	Yes	

## Laboratory Performance Assessment

### General Information

Report Number (RIN): 09062420  
Sample Event: July 13–14, 2009  
Site(s): Naturita, Colorado  
Laboratory: ALS Laboratory Group, Fort Collins, Colorado  
Work Order No.: 0907147  
Analysis: Metals and Wet Chemistry  
Validator: Steve Donivan  
Review Date: September 30, 2009

This validation was performed according to the *Environmental Procedures Catalog* (LMS/PRO/S04325), “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 1.

*Table 1. Analytes and Methods*

Analyte	Line Item Code	Prep Method	Analytical Method
Total Dissolved Solids	WCH-B-033	MCAWW 160.1	MCAWW 160.1
Metals: Arsenic, Uranium, Vanadium	LMM-02	SW-846 3005A	SW-846 6020A

### Data Qualifier Summary

Analytical results were qualified as listed in Table 2. Refer to the sections below for an explanation of the data qualifiers applied.

*Table 2. Data Qualifier Summary*

Sample Number	Location	Analyte	Flag	Reason
0907147-13	Equipment Blank	Arsenic	U	Less than 5 times the method blank
0907147-13	Equipment Blank	Uranium	U	Less than 5 times the calibration blank

### Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado, received 15 water samples on July 15, 2009, accompanied by a Chain of Custody (COC) form. The COC 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 sample submittal documents including the COC form and the sample tickets had no errors or omissions with the following exceptions. The sample filtration status was not marked on the COC form and the time sampled

listed on the sample label for sample HHU 922 did not agree with the time listed on the COC form. The laboratory was provided a revised COC form with the correct information on July 17, 2009. A copy of the air waybill was included with the receiving documentation.

### Preservation and Holding Times

The sample shipment was received intact with the temperature inside the iced cooler at 3.8 °C, which complies with requirements. All samples were received in the correct container types and had been preserved correctly for the requested analyses and all samples 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 SW-846 6020*

Calibrations for uranium were performed on July 22, 2009, and for arsenic and vanadium on July 23, 2009, using eight 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 method detection limit (MDL). Calibration and laboratory spike standards were prepared from independent sources. Initial and continuing calibration verification checks were made at the required frequency resulting in four verification checks for uranium and seven for arsenic and vanadium. 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 practical quantitation limit and all results were within the acceptance range. Mass calibration and resolution verifications were performed at the beginning of each analytical run in accordance with the analytical procedure. Internal standard recoveries associated with requested analytes were stable and within acceptable ranges.

#### *Method MCAWW 160.1*

There are no calibration requirements associated with the determination of total dissolved solids.

### 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 associated with the samples were below the practical quantitation limits 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.

### 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. The spikes met the recovery and precision criteria for all analytes evaluated.

### Laboratory Replicate Analysis

Laboratory replicate sample results demonstrate acceptable laboratory precision. The relative percent difference values for the sample replicates and matrix spike replicates were less than 20 percent for results that are greater than 5 times the practical quantitation limit, indicating acceptable precision.

### Laboratory Control Sample

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

### Metals Serial Dilution

Serial dilutions were prepared and analyzed for the metals analyses to monitor chemical or physical interferences in the sample matrix. ICP-MS serial dilution data are evaluated when the concentration of the undiluted sample is greater than 100 times the practical quantitation limit. No serial dilution data required evaluation.

### Detection Limits/Dilutions

Samples were diluted in a consistent and acceptable manner when required. The samples were diluted prior to analysis of molybdenum, uranium, and vanadium 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

A revised EDD file arrived on August 3, 2009, that included a correction to a sample preparation date. 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: 09062420 Lab Code: PAR Validator: Steve Donovan Validation Date: 9/30/2009  
Project: Naturita Analysis Type:  Metals  General Chem  Rad  Organics  
# of Samples: 15 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: 09062420      Lab Code: PAR      Date Due: 8/12/2009  
 Matrix: Water      Site Code: NAT      Date Completed: 8/4/2009

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	07/23/2009	0.0000	1.0000	OK	OK	OK	OK	OK	91.0	89.0	85.0	2.0	95.0	6.0	105.0
URANIUM	07/22/2009	0.0000	1.0000	OK	OK	OK	OK	OK	101.0	439.0	371.0	2.0	109.0	1.0	107.0
VANADIUM	07/23/2009	0.0000	1.0000	OK	OK	OK	OK	OK	96.0	203.0	328.0	2.0	92.0	3.0	109.0

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

**RIN:** 09062420      **Lab Code:** PAR      **Date Due:** 8/12/2009  
**Matrix:** Water      **Site Code:** NAT      **Date Completed:** 8/4/2009

Analyte	Date Analyzed	CALIBRATION						Method Blank	LCS %R	MS %R	MSD %R	DUP RPD	Serial Dil. %R
		Int.	R^2	ICV	CCV	ICB	CCB						
TOTAL DISSOLVED SOLIDS	07/16/2009							OK	103.00			0	

## **Sampling Quality Control Assessment**

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

### Sampling Protocol

All wells were sampled with dedicated tubing using the low-flow purge procedure. Sample results for all 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 exception. The specific conductance for well 0715 did not meet the stability criteria. The sample results for this well are qualified with a “Q” flag, indicating the data are qualitative because of the sampling technique.

The surface water locations were sampled using a peristaltic pump and lanyard with tubing and a stainless steel weight.

### Equipment Blank Assessment

An equipment blank (field ID 2517) was collected after decontamination of equipment used to collect surface water samples. Arsenic and uranium was detected in the blank by the laboratory. These analytes were qualified during data validation with a “U” flag as not detected. The equipment blank results indicate adequate decontamination of the sampling equipment.

### 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 location NAT01-1 (field duplicate ID 2516). The duplicate results met the 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: 09062420    Lab Code: PAR    Project: Naturita    Validation Date: 9/30/2009

Duplicate: 2516

Sample: NAT01-1

Analyte	Sample			Duplicate			RPD	RER	Units
	Result	Flag	Error	Result	Flag	Error			
ARSENIC	6.4			6.2			3.17		UG/L
TOTAL DISSOLVED SOLIDS	1500			1500			0		MG/L
URANIUM	620			620			0		UG/L
VANADIUM	2.4			2.4			0		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 10-12-2009  
Steve Donivan Date

Data Validation Lead: Steve Donivan 10-12-2009  
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 NAT01, Naturita Processing Site**

REPORT DATE: 10/1/2009

Location: 0715 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO3)	mg/L	07/14/2009	N001	5.49	- 10.42	91		FQ	#		
Arsenic	mg/L	07/14/2009	N001	5.49	- 10.42	0.0046		FQ	#	0.0000084	
Oxidation Reduction Potential	mV	07/14/2009	N001	5.49	- 10.42	220.5		FQ	#		
pH	s.u.	07/14/2009	N001	5.49	- 10.42	7.3		FQ	#		
Specific Conductance	umhos/cm	07/14/2009	N001	5.49	- 10.42	101		FQ	#		
Temperature	C	07/14/2009	N001	5.49	- 10.42	15.32		FQ	#		
Total Dissolved Solids	mg/L	07/14/2009	N001	5.49	- 10.42	600		FQ	#	20	
Turbidity	NTU	07/14/2009	N001	5.49	- 10.42	8.21		FQ	#		
Uranium	mg/L	07/14/2009	N001	5.49	- 10.42	0.061		FQ	#	0.0000017	
Vanadium	mg/L	07/14/2009	N001	5.49	- 10.42	0.0036		FQ	#	0.00005	

**Groundwater Quality Data by Location (USEE100) FOR SITE NAT01, Naturita Processing Site**

REPORT DATE: 10/1/2009

Location: 0718 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO3)	mg/L	07/14/2009	N001	8.6	- 18.6	233		F	#		
Arsenic	mg/L	07/14/2009	N001	8.6	- 18.6	0.0031		F	#	0.0000084	
Oxidation Reduction Potential	mV	07/14/2009	N001	8.6	- 18.6	-27.7		F	#		
pH	s.u.	07/14/2009	N001	8.6	- 18.6	7.23		F	#		
Specific Conductance	umhos/cm	07/14/2009	N001	8.6	- 18.6	1614		F	#		
Temperature	C	07/14/2009	N001	8.6	- 18.6	12.78		F	#		
Total Dissolved Solids	mg/L	07/14/2009	N001	8.6	- 18.6	1300		F	#	40	
Turbidity	NTU	07/14/2009	N001	8.6	- 18.6	5.88		F	#		
Uranium	mg/L	07/14/2009	N001	8.6	- 18.6	0.067		F	#	0.0000017	
Vanadium	mg/L	07/14/2009	N001	8.6	- 18.6	0.00035		F	#	0.00005	

**Groundwater Quality Data by Location (USEE100) FOR SITE NAT01, Naturita Processing Site**

REPORT DATE: 10/1/2009

Location: MAU07 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO3)	mg/L	07/14/2009	N001	2.92	- 7.92	209		F	#		
Arsenic	mg/L	07/14/2009	N001	2.92	- 7.92	0.0051		F	#	0.0000084	
Oxidation Reduction Potential	mV	07/14/2009	N001	2.92	- 7.92	-29.8		F	#		
pH	s.u.	07/14/2009	N001	2.92	- 7.92	7.13		F	#		
Specific Conductance	umhos/cm	07/14/2009	N001	2.92	- 7.92	2110		F	#		
Temperature	C	07/14/2009	N001	2.92	- 7.92	17.38		F	#		
Total Dissolved Solids	mg/L	07/14/2009	N001	2.92	- 7.92	1800		F	#	40	
Turbidity	NTU	07/14/2009	N001	2.92	- 7.92	2.72		F	#		
Uranium	mg/L	07/14/2009	N001	2.92	- 7.92	0.51		F	#	0.000017	
Vanadium	mg/L	07/14/2009	N001	2.92	- 7.92	0.00018	B	F	#	0.00005	

**Groundwater Quality Data by Location (USEE100) FOR SITE NAT01, Naturita Processing Site**

REPORT DATE: 10/1/2009

Location: MAU08 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO3)	mg/L	07/14/2009	N001	6.17	- 11.17	297		F	#		
Arsenic	mg/L	07/14/2009	N001	6.17	- 11.17	0.00044		F	#	0.0000084	
Oxidation Reduction Potential	mV	07/14/2009	N001	6.17	- 11.17	76.2		F	#		
pH	s.u.	07/14/2009	N001	6.17	- 11.17	7.3		F	#		
Specific Conductance	umhos/cm	07/14/2009	N001	6.17	- 11.17	2844		F	#		
Temperature	C	07/14/2009	N001	6.17	- 11.17	15.6		F	#		
Total Dissolved Solids	mg/L	07/14/2009	N001	6.17	- 11.17	2300		F	#	40	
Turbidity	NTU	07/14/2009	N001	6.17	- 11.17	3.19		F	#		
Uranium	mg/L	07/14/2009	N001	6.17	- 11.17	0.74		F	#	0.000017	
Vanadium	mg/L	07/14/2009	N001	6.17	- 11.17	0.0002	B	F	#	0.00005	

**Groundwater Quality Data by Location (USEE100) FOR SITE NAT01, Naturita Processing Site**

REPORT DATE: 10/1/2009

Location: NAT01-1 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO3)	mg/L	07/13/2009	N001	17	- 17.5	242		F	#		
Arsenic	mg/L	07/13/2009	N001	17	- 17.5	0.0064		F	#	0.0000084	
Arsenic	mg/L	07/13/2009	N002	17	- 17.5	0.0062		F	#	0.0000084	
Oxidation Reduction Potential	mV	07/13/2009	N001	17	- 17.5	-23		F	#		
pH	s.u.	07/13/2009	N001	17	- 17.5	7.24		F	#		
Specific Conductance	umhos/cm	07/13/2009	N001	17	- 17.5	1859		F	#		
Temperature	C	07/13/2009	N001	17	- 17.5	15.5		F	#		
Total Dissolved Solids	mg/L	07/13/2009	N001	17	- 17.5	1500		F	#	40	
Total Dissolved Solids	mg/L	07/13/2009	N002	17	- 17.5	1500		F	#	40	
Turbidity	NTU	07/13/2009	N001	17	- 17.5	1.14		F	#		
Uranium	mg/L	07/13/2009	N001	17	- 17.5	0.62		F	#	0.000017	
Uranium	mg/L	07/13/2009	N002	17	- 17.5	0.62		F	#	0.000017	
Vanadium	mg/L	07/13/2009	N001	17	- 17.5	0.0024		F	#	0.00005	
Vanadium	mg/L	07/13/2009	N002	17	- 17.5	0.0024		F	#	0.00005	

**Groundwater Quality Data by Location (USEE100) FOR SITE NAT01, Naturita Processing Site**

REPORT DATE: 10/1/2009

Location: NAT02 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO3)	mg/L	07/13/2009	N001	6.42	- 11.42	153		F	#		
Arsenic	mg/L	07/13/2009	N001	6.42	- 11.42	0.0059		F	#	0.0000084	
Oxidation Reduction Potential	mV	07/13/2009	N001	6.42	- 11.42	46.2		F	#		
pH	s.u.	07/13/2009	N001	6.42	- 11.42	7.36		F	#		
Specific Conductance	umhos/cm	07/13/2009	N001	6.42	- 11.42	945		F	#		
Temperature	C	07/13/2009	N001	6.42	- 11.42	16.55		F	#		
Total Dissolved Solids	mg/L	07/13/2009	N001	6.42	- 11.42	710		F	#	20	
Turbidity	NTU	07/13/2009	N001	6.42	- 11.42	5.03		F	#		
Uranium	mg/L	07/13/2009	N001	6.42	- 11.42	0.16		F	#	0.0000087	
Vanadium	mg/L	07/13/2009	N001	6.42	- 11.42	0.66		F	#	0.0017	

**Groundwater Quality Data by Location (USEE100) FOR SITE NAT01, Naturita Processing Site**

REPORT DATE: 10/1/2009

Location: NAT08 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO3)	mg/L	07/13/2009	N001	6.3	- 11.3	216		F	#		
Arsenic	mg/L	07/13/2009	N001	6.3	- 11.3	0.024		F	#	0.000042	
Oxidation Reduction Potential	mV	07/13/2009	N001	6.3	- 11.3	41.7		F	#		
pH	s.u.	07/13/2009	N001	6.3	- 11.3	7.2		F	#		
Specific Conductance	umhos/cm	07/13/2009	N001	6.3	- 11.3	1636		F	#		
Temperature	C	07/13/2009	N001	6.3	- 11.3	16.59		F	#		
Total Dissolved Solids	mg/L	07/13/2009	N001	6.3	- 11.3	1300		F	#	40	
Turbidity	NTU	07/13/2009	N001	6.3	- 11.3	2.29		F	#		
Uranium	mg/L	07/13/2009	N001	6.3	- 11.3	0.39		F	#	0.000017	
Vanadium	mg/L	07/13/2009	N001	6.3	- 11.3	2.4		F	#	0.017	

**Groundwater Quality Data by Location (USEE100) FOR SITE NAT01, Naturita Processing Site**

REPORT DATE: 10/1/2009

Location: NAT26 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO3)	mg/L	07/13/2009	N001	10.67 - 15.67	312		F	#		
Arsenic	mg/L	07/13/2009	N001	10.67 - 15.67	0.00024		F	#	0.0000084	
Oxidation Reduction Potential	mV	07/13/2009	N001	10.67 - 15.67	256.5		F	#		
pH	s.u.	07/13/2009	N001	10.67 - 15.67	7.23		F	#		
Specific Conductance	umhos/cm	07/13/2009	N001	10.67 - 15.67	3534		F	#		
Temperature	C	07/13/2009	N001	10.67 - 15.67	15.22		F	#		
Total Dissolved Solids	mg/L	07/13/2009	N001	10.67 - 15.67	2800		F	#	80	
Turbidity	NTU	07/13/2009	N001	10.67 - 15.67	1.19		F	#		
Uranium	mg/L	07/13/2009	N001	10.67 - 15.67	1.4		F	#	0.000087	
Vanadium	mg/L	07/13/2009	N001	10.67 - 15.67	0.00052		F	#	0.00005	

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.

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## **Surface Water Quality Data**

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**Surface Water Quality Data by Location (USEE102) FOR SITE NAT01, Naturita Processing Site**

REPORT DATE: 10/1/2009

Location: 0531 SURFACE LOCATION SURFACE WATER LOCATION

Parameter	Units	Sample Date	Sample ID	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO3)	mg/L	07/13/2009	N001	74			#		
Arsenic	mg/L	07/13/2009	N001	0.00075			#	0.0000084	
Oxidation Reduction Potential	mV	07/13/2009	N001	211.2			#		
pH	s.u.	07/13/2009	N001	8.08			#		
Specific Conductance	umhos/cm	07/13/2009	N001	473			#		
Temperature	C	07/13/2009	N001	22.68			#		
Total Dissolved Solids	mg/L	07/13/2009	N001	280			#	20	
Turbidity	NTU	07/13/2009	N001	8.03			#		
Uranium	mg/L	07/13/2009	N001	0.00096			#	0.0000017	
Vanadium	mg/L	07/13/2009	N001	0.00054			#	0.00005	

**Surface Water Quality Data by Location (USEE102) FOR SITE NAT01, Naturita Processing Site**

REPORT DATE: 10/1/2009

Location: 0533 SURFACE LOCATION SURFACE WATER LOCATION

Parameter	Units	Sample Date	Sample ID	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO3)	mg/L	07/14/2009	N001	35			#		
Arsenic	mg/L	07/14/2009	N001	0.00068			#	0.0000084	
Oxidation Reduction Potential	mV	07/14/2009	N001	72.8			#		
pH	s.u.	07/14/2009	N001	8.36			#		
Specific Conductance	umhos/cm	07/14/2009	N001	453			#		
Temperature	C	07/14/2009	N001	18.99			#		
Total Dissolved Solids	mg/L	07/14/2009	N001	300			#	20	
Turbidity	NTU	07/14/2009	N001	5.03			#		
Uranium	mg/L	07/14/2009	N001	0.0011			#	0.0000017	
Vanadium	mg/L	07/14/2009	N001	0.00054			#	0.00005	

**Surface Water Quality Data by Location (USEE102) FOR SITE NAT01, Naturita Processing Site**

REPORT DATE: 10/1/2009

Location: 0538 SURFACE LOCATION SURFACE LOCATION, SEEP

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO3)	mg/L	07/14/2009	0001	228			#		
Arsenic	mg/L	07/14/2009	0001	0.0021			#	0.0000084	
Oxidation Reduction Potential	mV	07/14/2009	N001	-7.6			#		
pH	s.u.	07/14/2009	N001	7.18			#		
Specific Conductance	umhos/cm	07/14/2009	N001	1278			#		
Temperature	C	07/14/2009	N001	22.14			#		
Total Dissolved Solids	mg/L	07/14/2009	0001	1100			#	40	
Turbidity	NTU	07/14/2009	N001	72.1			#		
Uranium	mg/L	07/14/2009	0001	0.18			#	0.0000087	
Vanadium	mg/L	07/14/2009	0001	0.00029	B		#	0.00005	

---

**Surface Water Quality Data by Location (USEE102) FOR SITE NAT01, Naturita Processing Site**

REPORT DATE: 10/1/2009

Location: SM2 SURFACE LOCATION

Parameter	Units	Sample Date	Sample ID	Result	Qualifiers Lab Data QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO3)	mg/L	07/13/2009	N001	38	#		
Arsenic	mg/L	07/13/2009	N001	0.00073	#	0.0000084	
Oxidation Reduction Potential	mV	07/13/2009	N001	76.1	#		
pH	s.u.	07/13/2009	N001	8.51	#		
Specific Conductance	umhos/cm	07/13/2009	N001	422	#		
Temperature	C	07/13/2009	N001	23.3	#		
Total Dissolved Solids	mg/L	07/13/2009	N001	280	#	20	
Turbidity	NTU	07/13/2009	N001	6.73	#		
Uranium	mg/L	07/13/2009	N001	0.00091	#	0.0000017	
Vanadium	mg/L	07/13/2009	N001	0.00056	#	0.00005	

**Surface Water Quality Data by Location (USEE102) FOR SITE NAT01, Naturita Processing Site**

REPORT DATE: 10/1/2009

Location: SM4 SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID		Lab	Data	QA		
Alkalinity, Total (As CaCO3)	mg/L	07/13/2009	N001	34			#		
Arsenic	mg/L	07/13/2009	N001	0.00074			#	0.0000084	
Oxidation Reduction Potential	mV	07/13/2009	N001	99.8			#		
pH	s.u.	07/13/2009	N001	8.53			#		
Specific Conductance	umhos/cm	07/13/2009	N001	410			#		
Temperature	C	07/13/2009	N001	23.83			#		
Total Dissolved Solids	mg/L	07/13/2009	N001	280			#	20	
Turbidity	NTU	07/13/2009	N001	6.74			#		
Uranium	mg/L	07/13/2009	N001	0.00092			#	0.0000017	
Vanadium	mg/L	07/13/2009	N001	0.00059			#	0.00005	

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. J Estimated value.  
Q Qualitative result due to sampling technique. R Unusable result.  
X Location is undefined.

QA QUALIFIER:

# Validated according to quality assurance guidelines.

## **Equipment Blank Data**

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**BLANKS REPORT**

LAB: PARAGON (Fort Collins, CO)

RIN: 09062420

Report Date: 10/1/2009

Parameter	Site Code	Location ID	Sample Date	Sample ID	Units	Result	Qualifiers Lab	Data	Detection Limit	Uncertainty	Sample Type
Arsenic	NAT01	0999	07/14/2009	N001	mg/L	0.000083	B	U	0.0000084		E
Total Dissolved Solids	NAT01	0999	07/14/2009	N001	mg/L	20	U		20		E
Uranium	NAT01	0999	07/14/2009	N001	mg/L	0.000028	B	U	0.0000017		E
Vanadium	NAT01	0999	07/14/2009	N001	mg/L	0.00005	U		0.00005		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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Location Code	Top of Casing Elevation (Ft)	Measurement Date	Measurement Time	Depth From Top of Casing (Ft)	Water Elevation (Ft)	Water Level Flag
0715		07/14/2009	08:25:09	4.57	NA	E
0718		07/14/2009	09:05:42	11.14	NA	
MAU07	5280.88	07/14/2009	10:40:11	7.33	5273.55	
MAU08	5291.19	07/14/2009	10:20:04	10.98	5280.21	
NAT01-1	5295.46	07/13/2009	16:36:12	11.31	5284.15	
NAT02	5294.09	07/13/2009	17:45:54	7.06	5287.03	
NAT08	5292.73	07/13/2009	17:15:42	7.39	5285.34	
NAT26	5300.21	07/13/2009	15:45:09	16.61	5283.6	

FLOW CODES: E Top of casing elevation data not available

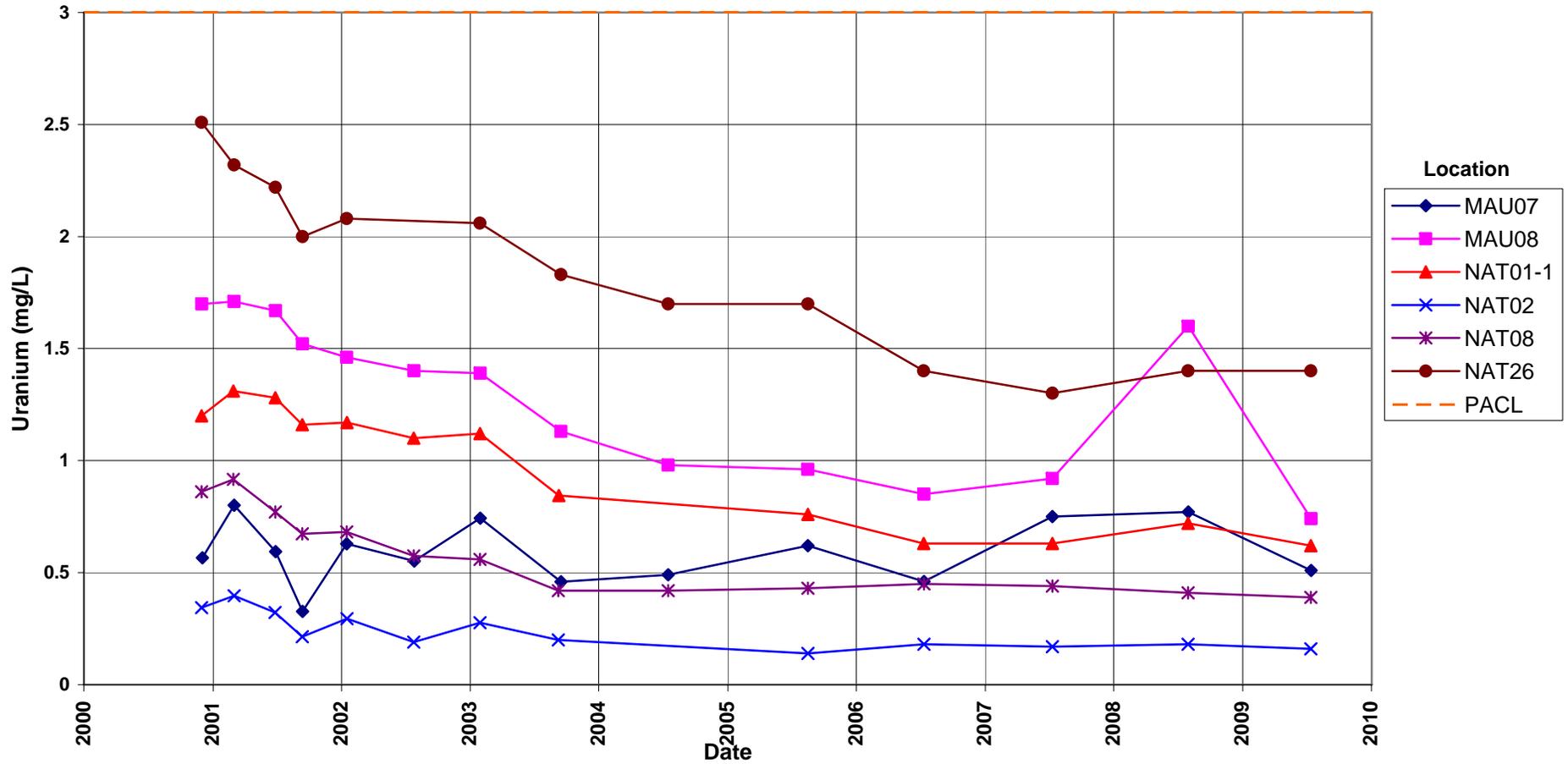
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## **Time-Concentration Graphs**

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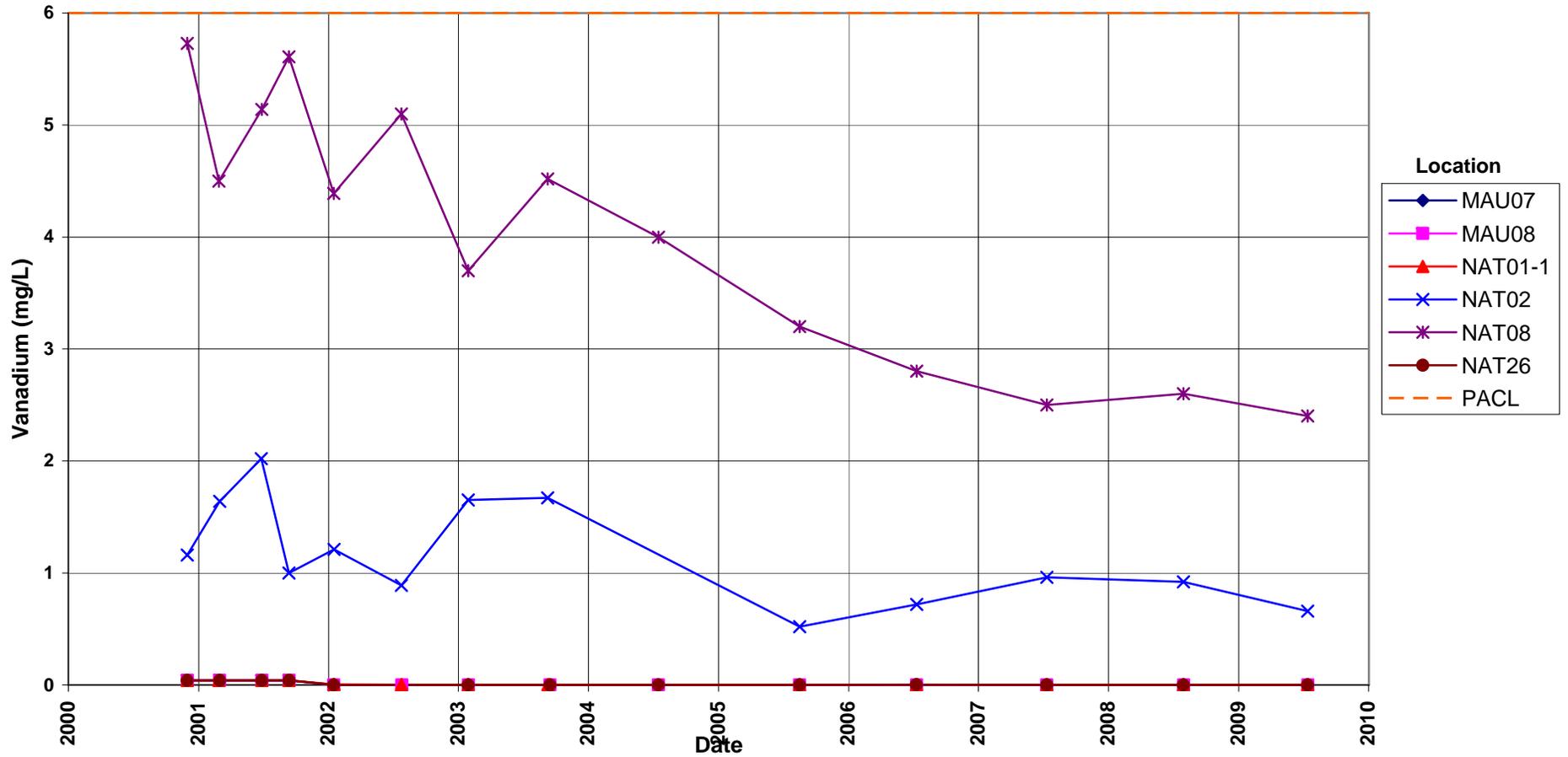
# Naturita Processing Site Groundwater Locations Uranium Concentration

Proposed Alternate Concentration Limit (PACL) = 3.0 mg/L



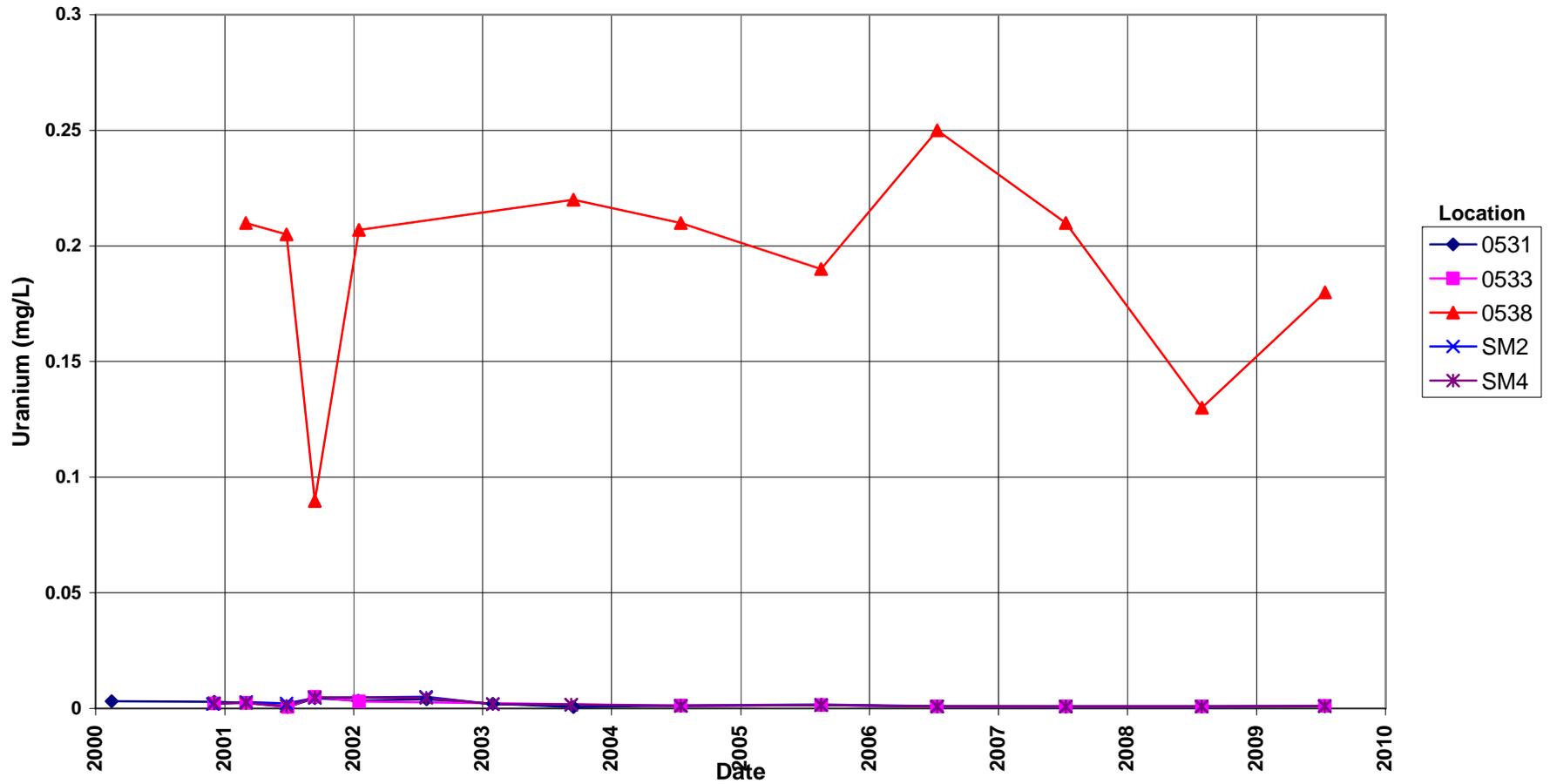
# Naturita Processing Site Groundwater Locations Vanadium Concentration

Proposed Alternate Concentration Limit (PACL) = 6.0 mg/L



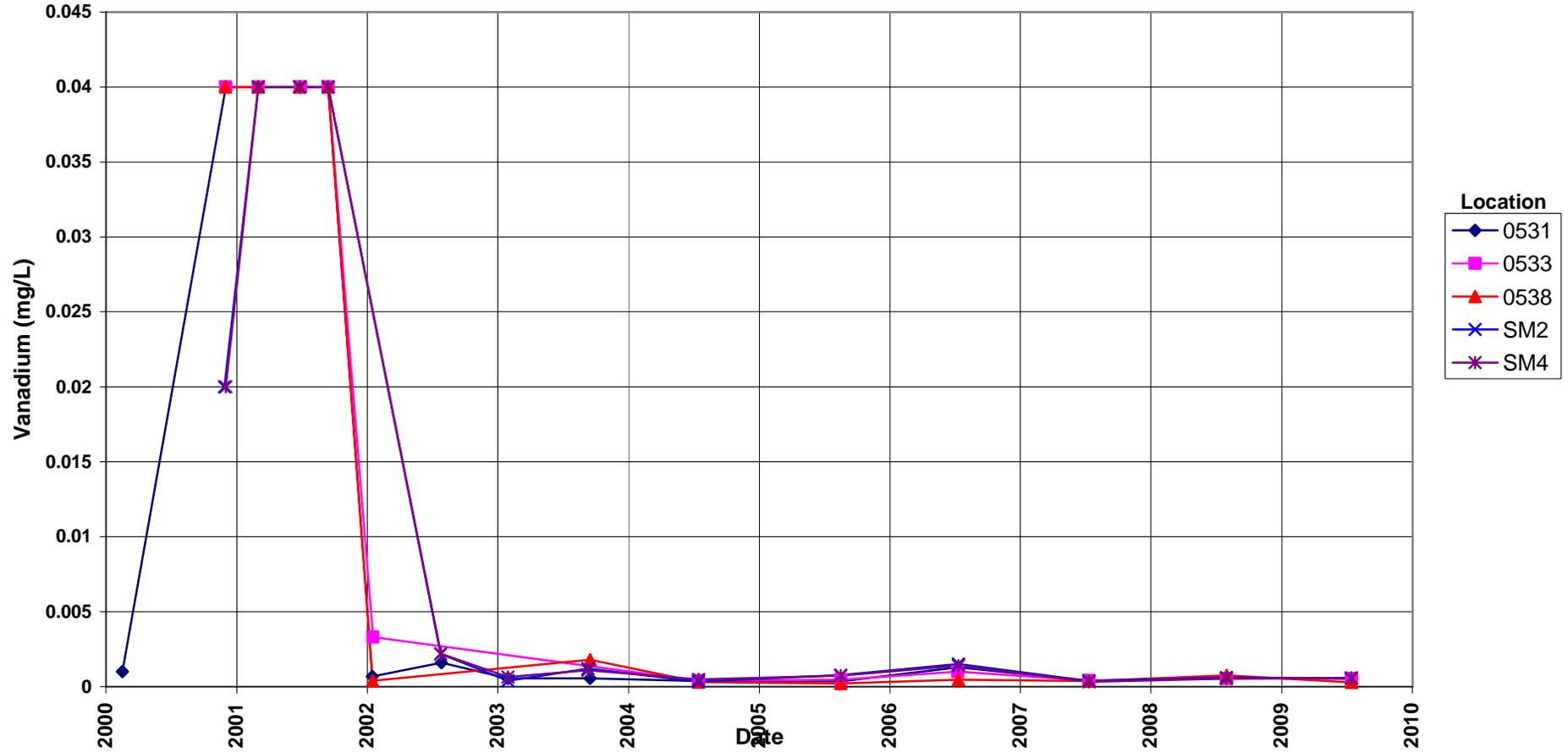
# Naturita Processing Site Surface Water Locations Uranium Concentration

Proposed Alternate Concentration Limit (PACL) = 3.0 mg/L



# Naturita Processing Site Surface Water Locations Vanadium Concentration

Proposed Alternate Concentration Limit (PACL) = 6.0 mg/L



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

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established 1959

Task Order LM00-501  
Control Number 09-0810

June 9, 2009

U.S. Department of Energy  
Office of Legacy Management  
ATTN: Mark Kautsky  
Site Manager  
2597 B ¾ Road  
Grand Junction, CO 81503

SUBJECT: Contract No. DE-AM01-07LM00060, Stoller  
July 2009 Environmental Sampling at Naturita, Colorado

REFERENCE: Task Order LM00-501-02-115-402, Naturita, CO, Processing Site

Dear Mr. Kautsky:

The purpose of this letter is to inform you of the upcoming sampling event at Naturita, Colorado. Enclosed are the map and tables specifying sample locations and analytes for monitoring at the Naturita Processing site. Water quality data will be collected at this site as part of the routine environmental sampling currently scheduled to begin the week of July 6, 2009.

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

**Monitor Wells\***

NAT01-1 AI	NAT 02 AI	NAT08 AI	NAT26 AI	718 Nr
MAU07 AI	MAU08 AI	DM1 AI	715 AI	

\*NOTE: AI = Alluvium; Nr = No Recovery of Data for Classifying

**Surface Locations (filtered)**

0531	0533	0538	SM2	SM4
------	------	------	-----	-----

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) 248-6557 if you have any questions.

Sincerely,

David Traub  
Site Lead

DT/lcg/lb

Enclosures (3)

cc: (electronic)

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

## Constituent Sampling Breakdown

Site	Naturita				
Analyte	Groundwater	Surface Water	Required Detection Limit (mg/L)	Analytical Method	Line Item Code
<b>Approx. No. Samples/yr</b>	12	5			
<b>Field Measurements</b>					
Alkalinity	X	X			
Dissolved Oxygen					
Redox Potential	X	X			
pH	X	X			
Specific Conductance	X	X			
Turbidity	X				
Temperature	X	X			
<b>Laboratory Measurements</b>					
Aluminum					
Ammonia as N (NH3-N)					
Antimony					
Arsenic	BR and CM wells only		0.0001	SW-846 6020	LMM-02
Cadmium					
Calcium					
Chloride					
Chromium					
Iron					
Lead					
Magnesium					
Manganese					
Molybdenum	BR and CM wells only		0.003	SW-846 6020	LMM-02
Nitrate + Nitrite as N (NO3+NO2)-N					
Potassium					
Selenium					
Silica					
Sodium					
Strontium					
Sulfate					
Tin					
Total Dissolved Solids	X	X	10	SM2540 C	WCH-A-033
Uranium	X	X	0.0001	SW-846 6020	LMM-02
Vanadium	X	X	0.0003	SW-846 6020	LMM-02
Zinc					
<b>Total No. of Analytes</b>	5	3			

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: August 24, 2009

TO: Dave Traub

FROM: Kent Moe

SUBJECT: Trip Report

**Site:** Naturita, CO

**Dates of Sampling Event:** July 13-14, 2009.

**Team Members:** Kent Moe and Joe Trevino

**Number of Locations Sampled:** 8 Processing Site monitor wells, 5 surface water locations, 1 duplicate, and 1 equipment blank for uranium, vanadium, and TDS.

**Locations Not Sampled/Reason:** Well DM1 was hit by what appears to be a dozer. Well cover was bent and PVC casing was broken off about 1 ft below ground.

**Location Specific Information:**

Date	Sample Location	Ticket Number	Sample Time	Notes	Water Levels
7/13/09	0531	HHU 927	1510	Surface Water	NA
7/13/09	NAT 26	HHU 923	1545	CAT I	16.61
7/13/09	NAT01-1	HHU 920	16.36	CAT I	11.31
7/13/09	2516	HHU 932	1700	Duplicate of NAT01-1	NA
7/13/09	NAT08	HHU 922	1715	CAT I	7.39
7/13/09	NAT02	HHU 921	1745	CAT I	7.06
7/13/09	SM2	HHU 930	1820	Surface Water	NA
7/13/09	SM4	HHU 931	1845	Surface Water	NA
7/14/09	0715	HHU 937	0825	CAT I	4.57
7/14/09	0718	HHU 938	0905	CAT I	11.14
7/14/09	0533	HHU 928	0935	Surface Water	NA
7/14/09	2517	HHU 933	0945	Equipment Blank	NA
7/14/09	MAU08	HHU 925	1020	CAT I	10.98
7/14/09	MAU07	HHU 924	1040	CAT I	7.33
7/14/09	0538	HHU 929	1120	Surface Water	NA

All samples were shipped via Fed-Ex to ALS Laboratory Group on July 14, 2009.

**Field Variance:** None.

**Quality Control Sample Cross Reference:** Following are the false identifications assigned to the quality control samples:

False ID	True ID	Sample Type	Ticket Number
2516	NAT01-1	Duplicate	HHU 932
2517	NA	Equipment Blank	HHU 933

**Requisition Numbers Assigned:** All samples were assigned to requisition identification number (RIN) 09062420.

**Water Level Measurements:** Water levels were measured at all sampled monitor wells. See table above.

**Well Inspection Summary:** Wells are in good condition. Well DM1 has been damaged as stated above.

**Equipment:** All wells are equipped with dedicated tubing and all were sampled with a peristaltic pump. The surface water locations were sampled using a peristaltic pump and lanyard with tubing and a stainless steel weight.

**Notes:** The Field Data Collection System was used for this sampling event and all field data was entered into a laptop computer.

**Regulatory:** N/A

#### **Institutional Controls**

**Fences, Gates, Locks:** OK

**Signs:** Not applicable.

**Trespassing/Site Disturbances:** None observed.

**Site Issues:** None observed.

**Disposal Cell/Drainage Structure Integrity:** Not applicable.

**Vegetation/Noxious Weed Concerns:** Not applicable.

**Maintenance Requirements:** None.

**Safety Issues:** None.

**Access Issues:** N/A

**Corrective Action Required/Taken:** Repair or abandonment of well DM1.

KM/lcg

cc: (electronic) Mark Kautsky, DOE  
Cheri Bahrke, Stoller  
Steve Donovan, Stoller  
EDD Delivery