

Data Validation Package

July 2013

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

October 2013

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Sampling Event Summary

Site: Naturita, Colorado, Processing Site

Sampling Period: July 24, 2013

This event includes sampling groundwater and surface water at the Naturita Processing Site. Sampling and analyses were conducted as specified in the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites* (LMS/PRO/S04351, continually updated). Duplicate samples were collected from location 0718.

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 monitoring wells DM1, MAU07, MAU08, NAT01-1, NAT02, NAT08, NAT26, 0715, and 0718, and surface locations 0531, 0533, SM2, and SM4. Well location NAT26 was not sampled due to insufficient water. The water level was measured at each sampled well.

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

Surface water results from San Miguel River locations adjacent to and downstream of 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. For example, the 2013 uranium benchmark was calculated as described in *Data Quality Assessment: Statistical Methods for Practitioners, EPA QC/G-9S* using 49 previous values dating to 1986. The average uranium concentration was 0.0018 mg/L with a standard deviation of 0.0019 mg/L. The benchmark value is equal to the one-sided upper tolerance limit (K factor = 2.126). As shown in Table 1, no benchmark values were exceeded during this sampling event. The current adjacent and downgradient sampling results are under the benchmark, which indicates they are within the range of statistical variation of background and further indicate the site is having no measureable impact on river water quality.

Table 1. Comparison of San Miguel River July 2013 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	0.0058	0.0036	0.0040	0.0037	0.0037
Vanadium	0.00500	0.0015	0.0015	0.0015	0.0019

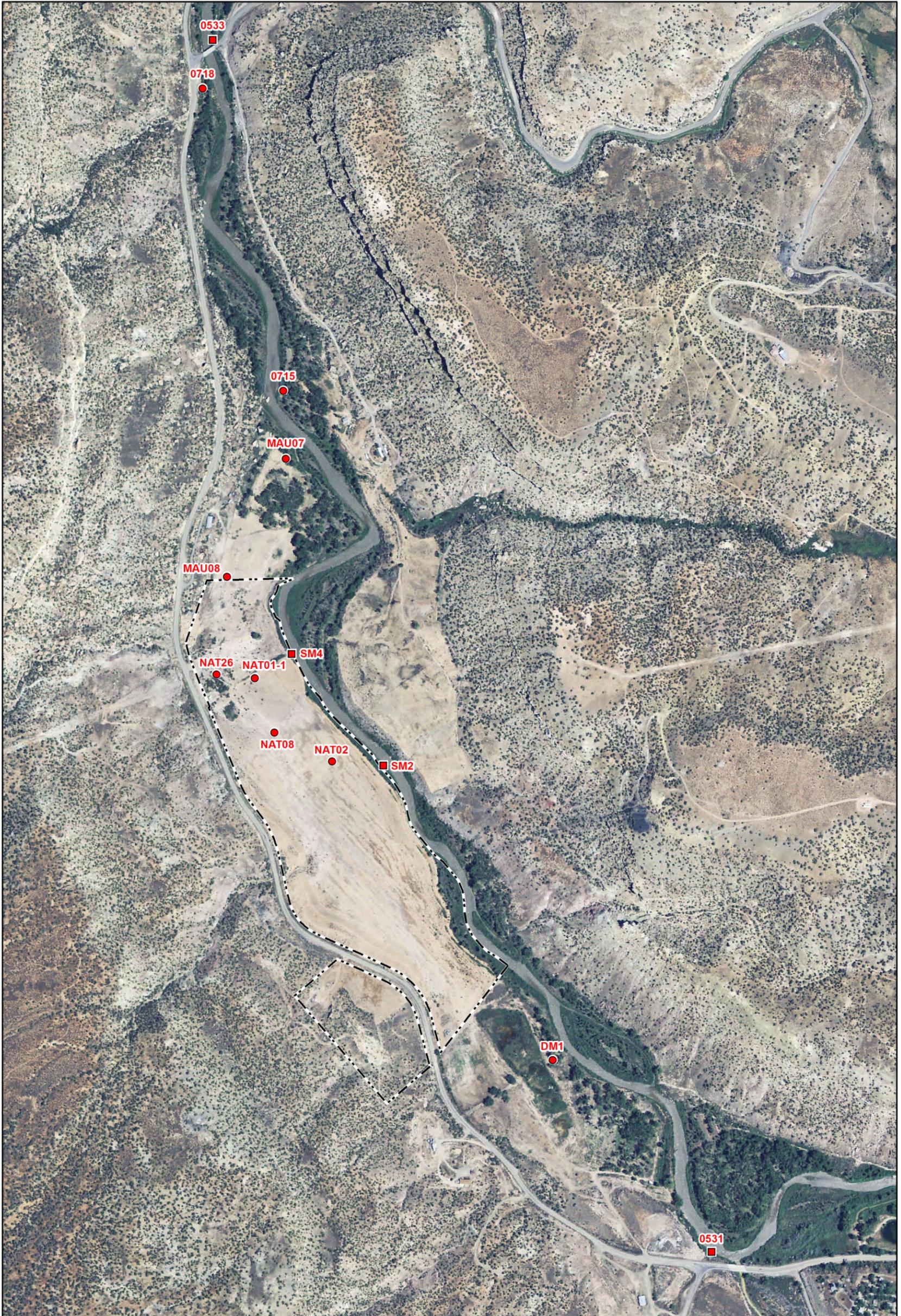
mg/L. = milligrams per liter



David Traub
Site Lead, S.M. Stoller Corporation

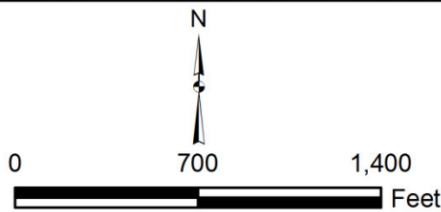
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LEGEND

- WELL TO BE SAMPLED
- SURFACE LOCATION TO BE SAMPLED
- - - SITE BOUNDARY



U.S. DEPARTMENT OF ENERGY
GRAND JUNCTION, COLORADO

Work Performed by
S.M. Stoller Corporation
Under DOE Contract
No. DE-AM01-07LM00090

Planned Sampling Map
Naturita, CO, Processing Site
July 2013

DATE PREPARED: June 19, 2013

FILENAME: S1036300

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Naturita, Colorado, Sample Location Map

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Data Assessment Summary

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Water Sampling Field Activities Verification Checklist

Project	<u>Naturita, Colorado</u>	Date(s) of Water Sampling	<u>July 24, 2013</u>
Date(s) of Verification	<u>September 18, 2013</u>	Name of Verifier	<u>Stephen Donovan</u>

	Response (Yes, No, NA)	Comments
1. Is the SAP the primary document directing field procedures? List any Program Directives or other documents, SOPs, instructions.	<u>Yes</u>	<u>Work Order letter dated June 28, 2013.</u>
2. Were the sampling locations specified in the planning documents sampled?	<u>No</u>	<u>Well location NAT26 was not sampled due to insufficient water.</u>
3. Were calibrations conducted as specified in the above-named documents?	<u>Yes</u>	<u>Calibration was performed on July 23, 2013.</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. Were wells categorized correctly?	<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 meet criteria prior to sampling? Was the flow rate less than 500 mL/min?	<u>Yes</u> <u>Yes</u> <u>Yes</u> <u>Yes</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? Was one pump/tubing volume removed prior to sampling?	NA	All wells were Category II.
9. Were duplicates taken at a frequency of one per 20 samples?	Yes	A duplicate sample was collected from location 0718.
10. Were equipment blanks taken at a frequency of one per 20 samples that were collected with non-dedicated equipment?	NA	An equipment blank was not required.
11. Were trip blanks prepared and included with each shipment of VOC samples?	NA	
12. Were the true identities of the QC samples documented?	Yes	Location ID 2510 was used for the duplicate sample.
13. Were samples collected in the containers specified?	Yes	
14. Were samples filtered and preserved as specified?	Yes	
15. Were the number and types of samples collected as specified?	Yes	
16. Were chain of custody records completed and was sample custody maintained?	Yes	
17. Was all pertinent information documented on the field data sheets?	Yes	
18. Was the presence or absence of ice in the cooler documented at every sample location?	Yes	
19. Were water levels measured at the locations specified in the planning documents?	Yes	

Laboratory Performance Assessment

General Information

Report Number (RIN): 13075483
Sample Event: July 24, 2013
Site(s): Naturita, CO, Processing Site
Laboratory: ALS Laboratory Group, Fort Collins, Colorado
Work Order No.: 1307478
Analysis: Metals and Wet Chemistry
Validator: Stephen Donovan
Review Date: September 18, 2013

This validation was performed according to the *Environmental Procedures Catalog*, (LMS/POL/S04325, continually updated) "Standard Practice for Validation of Environmental Data." The procedure was applied at Level 3, Data Validation. See attached Data Validation Worksheets for supporting documentation on the data review and validation. All analyses were successfully completed. The samples were prepared and analyzed using accepted procedures based on methods specified by line item code, which are listed in Table 2.

Table 2. Analytes and Methods

Analyte	Line Item Code	Prep Method	Analytical Method
Total Dissolved Solids (TDS)	WCH-A-033	EPA 160.1	EPA 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 3. Refer to the attached validation worksheets and the sections below for an explanation of the data qualifiers applied.

Table 3. Data Qualifiers

Sample Number	Location	Analyte	Flag	Reason
1307478-1	0531	Arsenic	J	Serial dilution result

Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado, received 13 water samples on July 26, 2013, accompanied by a Chain of Custody form. The Chain of Custody form was checked to confirm that all of the samples were listed with sample collection dates and times, and that signatures and dates were present indicating sample relinquishment and receipt. The Chain of Custody form was complete with no errors or omissions. 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 4.4 °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.

Detection and Quantitation Limits

The method detection limit (MDL) was reported for all metal, organic, and wet chemical analytes as required. The MDL, as defined in 40 CFR 136, is the minimum concentration of an analyte that can be measured and reported with 99 percent confidence that the analyte concentration is greater than zero. The practical quantitation limit (PQL) for these analytes is the lowest concentration that can be reliably measured, and is defined as 5 times the MDL. The required detection limits were met for all analytes.

Laboratory Instrument Calibration

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

Method EPA 160.1

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

Method SW-846 6020

Calibrations were performed on July 31, 2013, using four calibration standards. The calibration curve correlation coefficient values were greater than 0.995 and the absolute values of the intercepts were less than 3 times the MDL. Initial and continuing calibration verification checks were made at the required frequency with all calibration checks meeting the acceptance criteria. Reporting limit verification checks were made at the required frequency to verify the linearity of the calibration curve near the PQL and all results were within the acceptance range. Mass calibration and resolution verifications were performed at the beginning of each analytical run in accordance with the analytical procedure. Internal standard recoveries associated with requested analytes were stable and within acceptable ranges.

Method and Calibration Blanks

Method blanks are analyzed to assess any contamination that may have occurred during sample preparation. 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 PQL for all analytes. In cases where a blank concentration exceeds or equals the MDL, the associated sample results are qualified with a “U” flag (not detected) when

the dilution-factor-corrected 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 spikes met the recovery and precision criteria for all analytes evaluated.

Laboratory Replicate Analysis

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

Laboratory Control Sample

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

Metals Serial Dilution

Serial dilutions were prepared and analyzed for the metals analyses to monitor chemical or physical interferences in the sample matrix. Method 6020 serial dilution data are evaluated when the concentration of the undiluted sample is greater than 50 times the MDL. All evaluated serial dilution data were acceptable with the following exception. The arsenic result for the serial dilution prepared from sample 0531 did not meet the acceptance criteria. The associated sample arsenic result is qualified with a “J” flag as an estimated value.

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 was received on July 31, 2013. 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: 13075483 Lab Code: PAR Validator: Stephen Donovan Validation Date: 09/18/2013
Project: Naturita Analysis Type: Metals General Chem Rad Organics
of Samples: 13 Matrix: WATER Requested Analysis Completed: Yes

Chain of Custody

Present: OK Signed: OK Dated: OK

Sample

Integrity: OK Preservation: OK Temperature: OK

Select Quality Parameters

Holding Times

All analyses were completed within the applicable holding times.

Detection Limits

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

Field/Trip Blanks

Field Duplicates

There was 1 duplicate evaluated.

SAMPLE MANAGEMENT SYSTEM

Metals Data Validation Worksheet

RIN: 13075483 Lab Code: PAR Date Due: 08/23/2013
 Matrix: Water Site Code: NAT01 Date Completed: 08/02/2013

Analyte	Method Type	Date Analyzed	CALIBRATION				Method Blank	LCS %R	MS %R	MSD %R	Dup. RPD	ICSAB %R	Serial Dil. %R	CRI %R
			Int.	R^2	CCV	CCB								
Arsenic	ICP/MS	07/31/2013	0.0000	1.0000	OK	OK	OK	99.0	104.0	105.0	1.0	102.0	14.0	92.0
Uranium	ICP/MS	07/31/2013	0.0000	1.0000	OK	OK	OK	100.0	104.0	103.0	1.0	102.0	1.0	120.0
Vanadium	ICP/MS	07/31/2013	0.0000	1.0000	OK	OK	OK	99.0	101.0	100.0	1.0	99.0	0.0	87.0

SAMPLE MANAGEMENT SYSTEM
Wet Chemistry Data Validation Worksheet

RIN: 13075483 **Lab Code:** PAR **Date Due:** 08/23/2013
Matrix: Water **Site Code:** NAT01 **Date Completed:** 08/02/2013

Analyte	Date Analyzed	CALIBRATION				Method Blank	LCS %R	MS %R	MSD %R	DUP RPD	Serial Dil. %R
		Int.	R ²	CCV	CCB						
TOTAL DISSOLVED SOLIDS	07/30/2013					OK	96.00			2.00	

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, meeting the Category I criteria and results from these wells were qualified with a “F” flag in the database, indicating the wells were purged and sampled using the low-flow sampling method.

Surface water locations were sampled using container immersion.

Equipment Blank Assessment

An equipment blank was not required because dedicated equipment was used for all sample collection.

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. The relative percent difference for duplicate results that are greater than 5 times the PQL should be less than 20 percent. For results that are less than 5 times the PQL, the range should be no greater than the PQL. A duplicate sample (field ID 2510) was collected from location 0718. The duplicate results met the criteria, demonstrating acceptable overall precision.

SAMPLE MANAGEMENT SYSTEM
Validation Report: Field Duplicates

RIN: 13075483 Lab Code: PAR Project: Naturita Validation Date: 09/18/2013

Duplicate: 2510

Sample: 0718

Analyte	Sample				Duplicate				RPD	RER	Units
	Result	Flag	Error	Dilution	Result	Flag	Error	Dilution			
Arsenic	3.4			1	3.3			1	2.99		UG/L
TOTAL DISSOLVED SOLIDS	1300			1	1300			1	0		MG/L
Uranium	41			1	42			1	2.41		UG/L
Vanadium	0.16	B		1	0.14	B		1	13.33		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:

Stephen Donovan
Stephen Donovan

10-10-2013
Date

Data Validation Lead:

Stephen Donovan
Stephen Donovan

10-10-2013
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 environmental database. The application compares the new data set (in standard environmental database units) with historical data and lists the new data that fall outside the historical data range. A determination is also made if the data are normally distributed using the Shapiro-Wilk Test.
2. Apply the appropriate statistical test. Dixon's Extreme Value test is used to test for statistical outliers when the sample size is less than or equal to 25. This test considers both extreme values that are much smaller than the rest of the data (case 1) and extreme values that are much larger than the rest of the data (case 2). This test is valid only if the data without the suspected outlier are normally distributed. Rosner's Test is a parametric test that is used to detect outliers for sample sizes of 25 or more. This test also assumes that the data without the suspected outliers are normally distributed.
3. Scientifically review statistical outliers and decide on their disposition. The review should include an evaluation of any notable trends in the data that may indicate the outliers represent true extreme values.

Three TDS results were identified as potentially anomalous. Comparison of the TDS data with the specific conductance measured at these locations confirmed that the data are representative of the locations from which they were collected.

Data Validation Outliers Report - No Field Parameters

Comparison: All Historical Data

Laboratory: ALS Laboratory Group

RIN: 13075483

Report Date: 09/18/2013

Site Code	Location Code	Sample ID	Sample Date	Analyte	Current	Historical Maximum			Historical Minimum			Number of Data Points		Statistical Outlier		
					Result	Qualifiers		Result	Qualifiers		Result	Qualifiers			N	N Below Detect
						Lab	Data		Lab	Data		Lab	Data			
NAT01	0533	0001	07/24/2013	Total Dissolved Solids	980			730			200			31	0	Yes
NAT01	0718	N001	07/24/2013	Vanadium	0.00016	B	F	0.0025		F	0.00031			7	3	NA
NAT01	0718	N002	07/24/2013	Vanadium	0.00014	B	F	0.0025		F	0.00031			7	3	NA
NAT01	MAU08	N001	07/24/2013	Uranium	0.53		F	1.71	DI		0.61		F	21	0	No
NAT01	MAU08	N001	07/24/2013	Vanadium	0.00014	B	F	0.04	DIU		0.0002	B	F	21	11	NA
NAT01	NAT01-1	N001	07/24/2013	Total Dissolved Solids	1300		F	1870			1400		F	15	0	Yes
NAT01	NAT01-1	N001	07/24/2013	Uranium	0.46		F	1.31	DI		0.52		F	18	0	NA
NAT01	NAT02	N001	07/24/2013	Uranium	0.11		F	0.397	DI		0.13		F	16	0	No
NAT01	NAT02	N001	07/24/2013	Vanadium	0.45		F	2.02	DI		0.52		F	16	0	No
NAT01	NAT08	N001	07/24/2013	Arsenic	0.021		F	0.064			0.024		F	16	0	NA
NAT01	NAT08	N001	07/24/2013	Total Dissolved Solids	1000		F	1620			1200		F	18	0	Yes
NAT01	NAT08	N001	07/24/2013	Uranium	0.26		F	0.916	DI		0.31		F	22	0	No
NAT01	NAT08	N001	07/24/2013	Vanadium	1.8		F	5.73	DI		2.1		F	22	0	No
NAT01	SM4	0001	07/24/2013	Total Dissolved Solids	1000			987			240			14	0	No

STATISTICAL TESTS:

The distribution of the data is tested for normality or lognormality using the Shapiro-Wilk Test

Outliers are identified using Dixon's Test when there are 25 or fewer data points.

Outliers are identified using Rosner's Test when there are 26 or more data points.

See Data Quality Assessment: Statistical Methods for Practitioners, EPA QC/G-9S, February 2006.

NA: Data are not normally or lognormally distributed.

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: 09/18/2013

Location: 0715 WELL

Parameter	Units	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	07/24/2013	N001	5.49	-	10.42	120		F	#		
Arsenic	mg/L	07/24/2013	N001	5.49	-	10.42	0.0045		F	#	0.000015	
Oxidation Reduction Potential	mV	07/24/2013	N001	5.49	-	10.42	-34.4		F	#		
pH	s.u.	07/24/2013	N001	5.49	-	10.42	7.17		F	#		
Specific Conductance	umhos/cm	07/24/2013	N001	5.49	-	10.42	1089		F	#		
Temperature	C	07/24/2013	N001	5.49	-	10.42	16.85		F	#		
Total Dissolved Solids	mg/L	07/24/2013	N001	5.49	-	10.42	800		F	#	20	
Turbidity	NTU	07/24/2013	N001	5.49	-	10.42	0.99		F	#		
Uranium	mg/L	07/24/2013	N001	5.49	-	10.42	0.066		F	#	0.0000029	
Vanadium	mg/L	07/24/2013	N001	5.49	-	10.42	0.0024		F	#	0.000015	

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

REPORT DATE: 09/18/2013

Location: 0718 WELL

Parameter	Units	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	07/24/2013	N001	8.6	-	18.6	262		F	#		
Arsenic	mg/L	07/24/2013	N001	8.6	-	18.6	0.0034		F	#	0.000015	
Arsenic	mg/L	07/24/2013	N002	8.6	-	18.6	0.0033		F	#	0.000015	
Oxidation Reduction Potential	mV	07/24/2013	N001	8.6	-	18.6	-31.1		F	#		
pH	s.u.	07/24/2013	N001	8.6	-	18.6	7		F	#		
Specific Conductance	umhos/cm	07/24/2013	N001	8.6	-	18.6	1654		F	#		
Temperature	C	07/24/2013	N001	8.6	-	18.6	13.78		F	#		
Total Dissolved Solids	mg/L	07/24/2013	N001	8.6	-	18.6	1300		F	#	40	
Total Dissolved Solids	mg/L	07/24/2013	N002	8.6	-	18.6	1300		F	#	40	
Turbidity	NTU	07/24/2013	N001	8.6	-	18.6	7.67		F	#		
Uranium	mg/L	07/24/2013	N001	8.6	-	18.6	0.041		F	#	0.0000029	
Uranium	mg/L	07/24/2013	N002	8.6	-	18.6	0.042		F	#	0.0000029	
Vanadium	mg/L	07/24/2013	N001	8.6	-	18.6	0.00016	B	F	#	0.000015	
Vanadium	mg/L	07/24/2013	N002	8.6	-	18.6	0.00014	B	F	#	0.000015	

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

REPORT DATE: 09/18/2013

Location: DM1 WELL

Parameter	Units	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	07/24/2013	N001	2.67	-	7.67	178		F	#		
Arsenic	mg/L	07/24/2013	N001	2.67	-	7.67	0.0012		F	#	0.000015	
Oxidation Reduction Potential	mV	07/24/2013	N001	2.67	-	7.67	2.3		F	#		
pH	s.u.	07/24/2013	N001	2.67	-	7.67	6.97		F	#		
Specific Conductance	umhos/cm	07/24/2013	N001	2.67	-	7.67	951		F	#		
Temperature	C	07/24/2013	N001	2.67	-	7.67	19.38		F	#		
Total Dissolved Solids	mg/L	07/24/2013	N001	2.67	-	7.67	700		F	#	20	
Turbidity	NTU	07/24/2013	N001	2.67	-	7.67	3.42		F	#		
Uranium	mg/L	07/24/2013	N001	2.67	-	7.67	0.0039		F	#	0.0000029	
Vanadium	mg/L	07/24/2013	N001	2.67	-	7.67	0.00014	B	F	#	0.000015	

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

REPORT DATE: 09/18/2013

Location: MAU07 WELL

Parameter	Units	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	07/24/2013	N001	2.92	-	7.92	195		F	#		
Arsenic	mg/L	07/24/2013	N001	2.92	-	7.92	0.0044		F	#	0.000015	
Oxidation Reduction Potential	mV	07/24/2013	N001	2.92	-	7.92	-36.1		F	#		
pH	s.u.	07/24/2013	N001	2.92	-	7.92	7.04		F	#		
Specific Conductance	umhos/cm	07/24/2013	N001	2.92	-	7.92	1197		F	#		
Temperature	C	07/24/2013	N001	2.92	-	7.92	15.53		F	#		
Total Dissolved Solids	mg/L	07/24/2013	N001	2.92	-	7.92	920		F	#	20	
Turbidity	NTU	07/24/2013	N001	2.92	-	7.92	3.71		F	#		
Uranium	mg/L	07/24/2013	N001	2.92	-	7.92	0.17		F	#	0.0000029	
Vanadium	mg/L	07/24/2013	N001	2.92	-	7.92	0.0003		F	#	0.000015	

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

REPORT DATE: 09/18/2013

Location: MAU08 WELL

Parameter	Units	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	07/24/2013	N001	6.17	-	11.17	294		F	#		
Arsenic	mg/L	07/24/2013	N001	6.17	-	11.17	0.00068		F	#	0.000015	
Oxidation Reduction Potential	mV	07/24/2013	N001	6.17	-	11.17	12.1		F	#		
pH	s.u.	07/24/2013	N001	6.17	-	11.17	7.01		F	#		
Specific Conductance	umhos/cm	07/24/2013	N001	6.17	-	11.17	2595		F	#		
Temperature	C	07/24/2013	N001	6.17	-	11.17	16.17		F	#		
Total Dissolved Solids	mg/L	07/24/2013	N001	6.17	-	11.17	1900		F	#	40	
Turbidity	NTU	07/24/2013	N001	6.17	-	11.17	2.34		F	#		
Uranium	mg/L	07/24/2013	N001	6.17	-	11.17	0.53		F	#	0.00029	
Vanadium	mg/L	07/24/2013	N001	6.17	-	11.17	0.00014	B	F	#	0.000015	

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

REPORT DATE: 09/18/2013

Location: NAT01-1 WELL

Parameter	Units	Sample		Depth Range			Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data		
Alkalinity, Total (as CaCO ₃)	mg/L	07/24/2013	N001	17	-	17.5	316		F	#	
Arsenic	mg/L	07/24/2013	N001	17	-	17.5	0.0088		F	#	0.000074
Oxidation Reduction Potential	mV	07/24/2013	N001	17	-	17.5	-34.4		F	#	
pH	s.u.	07/24/2013	N001	17	-	17.5	7.09		F	#	
Specific Conductance	umhos/cm	07/24/2013	N001	17	-	17.5	1720		F	#	
Temperature	C	07/24/2013	N001	17	-	17.5	14.85		F	#	
Total Dissolved Solids	mg/L	07/24/2013	N001	17	-	17.5	1300		F	#	40
Turbidity	NTU	07/24/2013	N001	17	-	17.5	3.45		F	#	
Uranium	mg/L	07/24/2013	N001	17	-	17.5	0.46		F	#	0.00029
Vanadium	mg/L	07/24/2013	N001	17	-	17.5	0.002		F	#	0.000076

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

REPORT DATE: 09/18/2013

Location: NAT02 WELL

Parameter	Units	Sample		Depth Range			Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data QA		
Alkalinity, Total (as CaCO ₃)	mg/L	07/24/2013	N001	6.42	-	11.42	195	F	#		
Arsenic	mg/L	07/24/2013	N001	6.42	-	11.42	0.006	F	#	0.00015	
Oxidation Reduction Potential	mV	07/24/2013	N001	6.42	-	11.42	-30.5	F	#		
pH	s.u.	07/24/2013	N001	6.42	-	11.42	7.18	F	#		
Specific Conductance	umhos/cm	07/24/2013	N001	6.42	-	11.42	918	F	#		
Temperature	C	07/24/2013	N001	6.42	-	11.42	16.15	F	#		
Total Dissolved Solids	mg/L	07/24/2013	N001	6.42	-	11.42	650	F	#	20	
Turbidity	NTU	07/24/2013	N001	6.42	-	11.42	7.52	F	#		
Uranium	mg/L	07/24/2013	N001	6.42	-	11.42	0.11	F	#	0.000029	
Vanadium	mg/L	07/24/2013	N001	6.42	-	11.42	0.45	F	#	0.00015	

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

REPORT DATE: 09/18/2013

Location: NAT08 WELL

Parameter	Units	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	07/24/2013	N001	6.3	-	11.3	273		F	#		
Arsenic	mg/L	07/24/2013	N001	6.3	-	11.3	0.021		F	#	0.00074	
Oxidation Reduction Potential	mV	07/24/2013	N001	6.3	-	11.3	-55		F	#		
pH	s.u.	07/24/2013	N001	6.3	-	11.3	7.05		F	#		
Specific Conductance	umhos /cm	07/24/2013	N001	6.3	-	11.3	1406		F	#		
Temperature	C	07/24/2013	N001	6.3	-	11.3	15.55		F	#		
Total Dissolved Solids	mg/L	07/24/2013	N001	6.3	-	11.3	1000		F	#	40	
Turbidity	NTU	07/24/2013	N001	6.3	-	11.3	2.13		F	#		
Uranium	mg/L	07/24/2013	N001	6.3	-	11.3	0.26		F	#	0.00015	
Vanadium	mg/L	07/24/2013	N001	6.3	-	11.3	1.8		F	#	0.00076	

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: 09/18/2013

Location: 0531 SURFACE LOCATION SURFACE WATER LOCATION

Parameter	Units	Sample		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID		Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	07/24/2013	N001	214			#		
Arsenic	mg/L	07/24/2013	0001	0.0017	E	J	#	0.000015	
Oxidation Reduction Potential	mV	07/24/2013	N001	144.9			#		
pH	s.u.	07/24/2013	N001	8.38			#		
Specific Conductance	umhos/cm	07/24/2013	N001	1305			#		
Temperature	C	07/24/2013	N001	20.76			#		
Total Dissolved Solids	mg/L	07/24/2013	0001	1000			#	20	
Turbidity	NTU	07/24/2013	N001	43.12			#		
Uranium	mg/L	07/24/2013	0001	0.0036			#	0.0000029	
Vanadium	mg/L	07/24/2013	0001	0.0015			#	0.000015	

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

REPORT DATE: 09/18/2013

Location: 0533 SURFACE LOCATION SURFACE WATER LOCATION

Parameter	Units	Sample		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID		Lab	Data QA		
Alkalinity, Total (as CaCO ₃)	mg/L	07/24/2013	N001	135		#		
Arsenic	mg/L	07/24/2013	0001	0.0017		#	0.000015	
Oxidation Reduction Potential	mV	07/24/2013	N001	-10.3		#		
pH	s.u.	07/24/2013	N001	8.32		#		
Specific Conductance	umhos/cm	07/24/2013	N001	1284		#		
Temperature	C	07/24/2013	N001	20.11		#		
Total Dissolved Solids	mg/L	07/24/2013	0001	980		#	20	
Turbidity	NTU	07/24/2013	N001	32.4		#		
Uranium	mg/L	07/24/2013	0001	0.0037		#	0.0000029	
Vanadium	mg/L	07/24/2013	0001	0.0019		#	0.000015	

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

REPORT DATE: 09/18/2013

Location: SM2 SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID		Lab	Data QA		
Alkalinity, Total (as CaCO ₃)	mg/L	07/24/2013	N001	209		#		
Arsenic	mg/L	07/24/2013	0001	0.0018		#	0.000015	
Oxidation Reduction Potential	mV	07/24/2013	N001	62.3		#		
pH	s.u.	07/24/2013	N001	8.43		#		
Specific Conductance	umhos/cm	07/24/2013	N001	1289		#		
Temperature	C	07/24/2013	N001	19.77		#		
Total Dissolved Solids	mg/L	07/24/2013	0001	1000		#	20	
Turbidity	NTU	07/24/2013	N001	45.2		#		
Uranium	mg/L	07/24/2013	0001	0.004		#	0.0000029	
Vanadium	mg/L	07/24/2013	0001	0.0015		#	0.000015	

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

REPORT DATE: 09/18/2013

Location: SM4 SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID		Lab	Data		
Alkalinity, Total (as CaCO ₃)	mg/L	07/24/2013	N001	199		#		
Arsenic	mg/L	07/24/2013	0001	0.0018		#	0.000015	
Oxidation Reduction Potential	mV	07/24/2013	N001	4.6		#		
pH	s.u.	07/24/2013	N001	8.38		#		
Specific Conductance	umhos/cm	07/24/2013	N001	1307		#		
Temperature	C	07/24/2013	N001	20.27		#		
Total Dissolved Solids	mg/L	07/24/2013	0001	1000		#	20	
Turbidity	NTU	07/24/2013	N001	46.5		#		
Uranium	mg/L	07/24/2013	0001	0.0037		#	0.0000029	
Vanadium	mg/L	07/24/2013	0001	0.0015		#	0.000015	

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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Static Water Level Data

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STATIC WATER LEVELS (USEE700) FOR SITE NAT01, Naturita Processing Site
REPORT DATE: 09/18/2013

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
0715		NA	07/24/2013	09:35:03	6.44	NA	E
0718		NA	07/24/2013	10:10:22	11.99	NA	E
DM1		5310.81	07/24/2013	13:45:37	8.68	5302.13	
MAU07		5280.88	07/24/2013	10:50:04	7.65	5273.23	
MAU08		5291.19	07/24/2013	11:20:19	12.46	5278.73	
NAT01-1		5295.46	07/24/2013	12:00:35	12.5	5282.96	
NAT02		5294.09	07/24/2013	14:35:16	8.03	5286.06	
NAT08		5292.73	07/24/2013	14:15:50	8.41	5284.32	

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

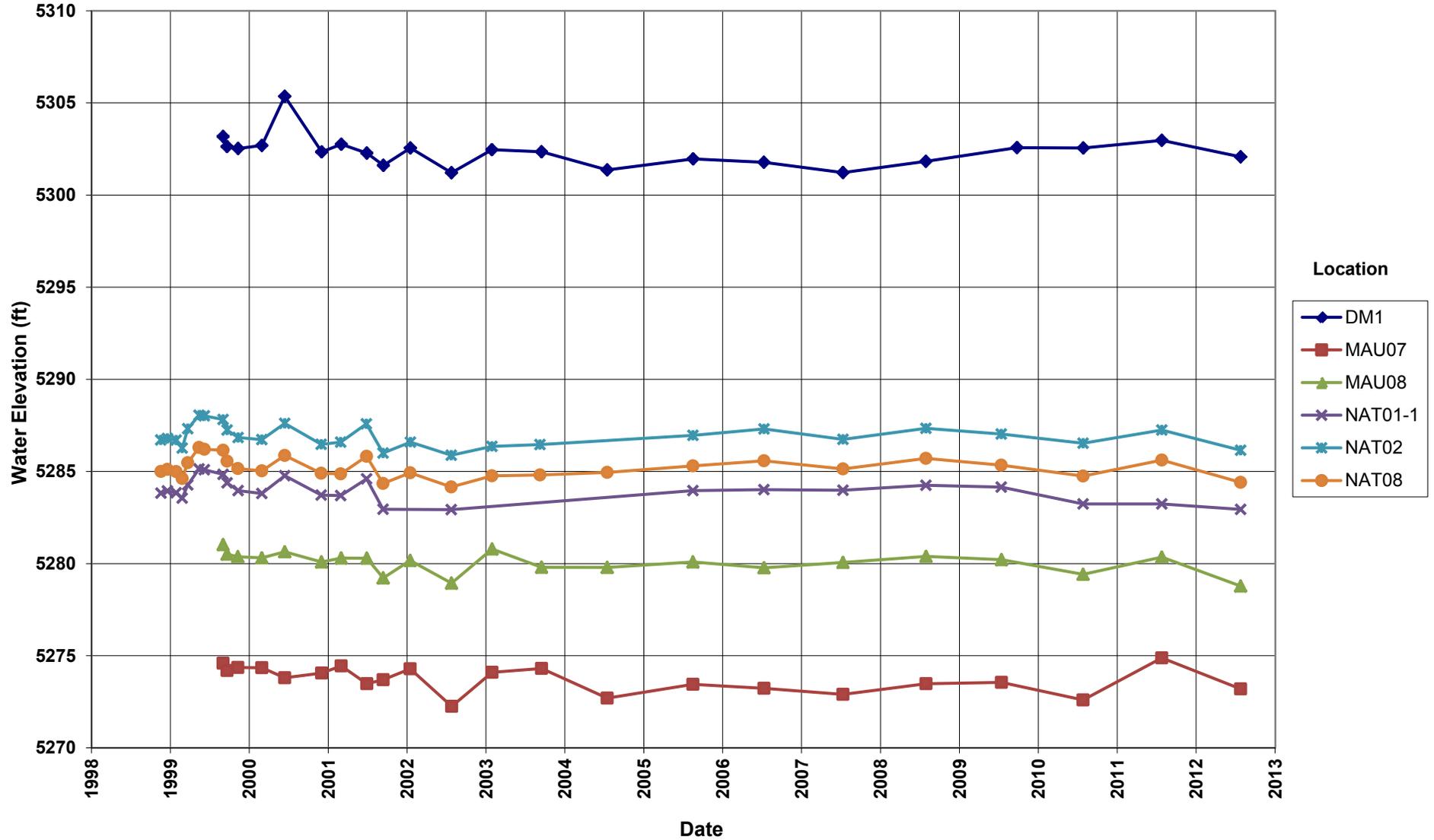
WATER LEVEL FLAGS: E TOP OF CASING ELEVATION DATA NOT AVAILABLE

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Hydrograph

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Naturita Processing Site Hydrograph

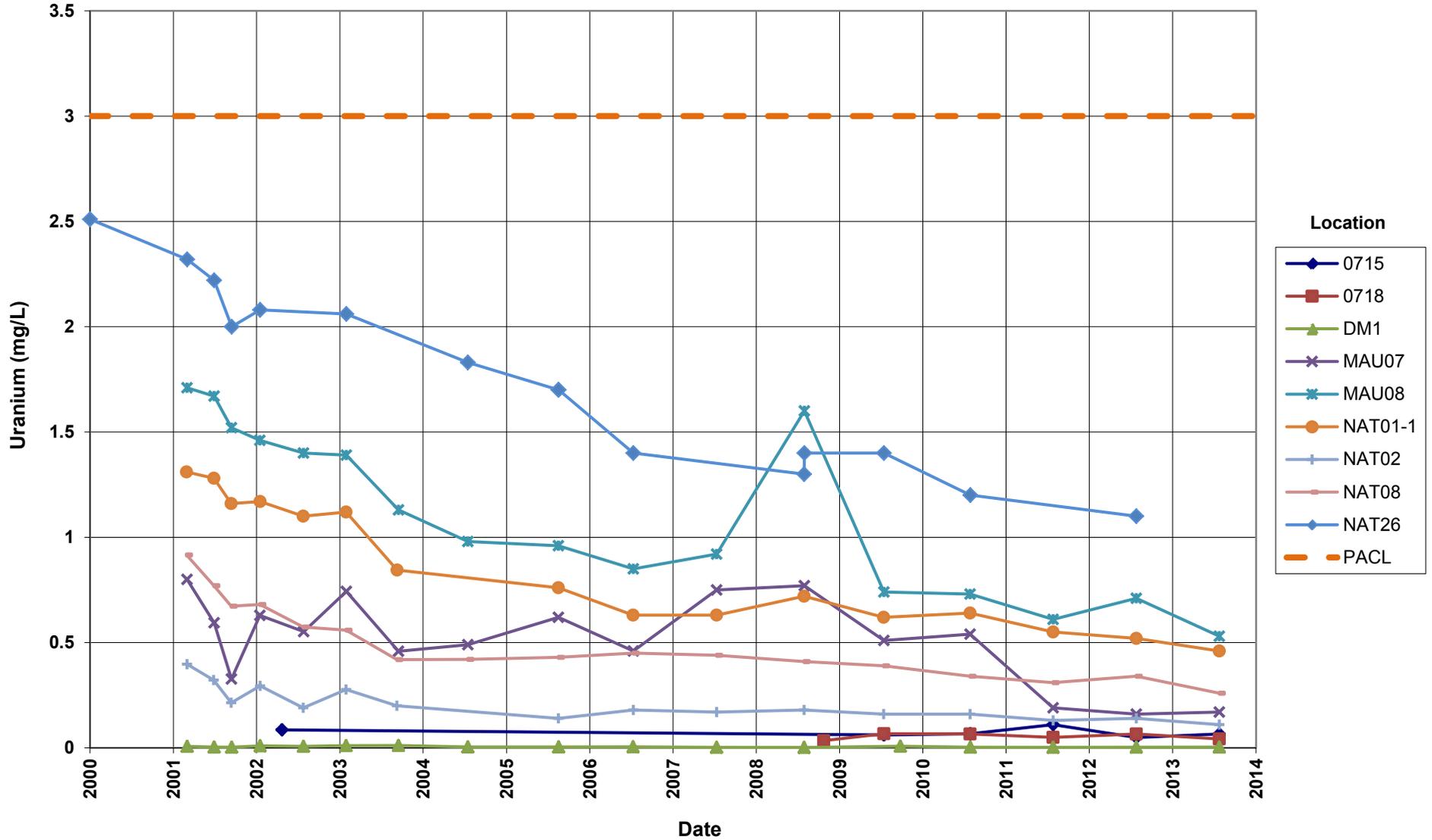


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Time-Concentration Graphs

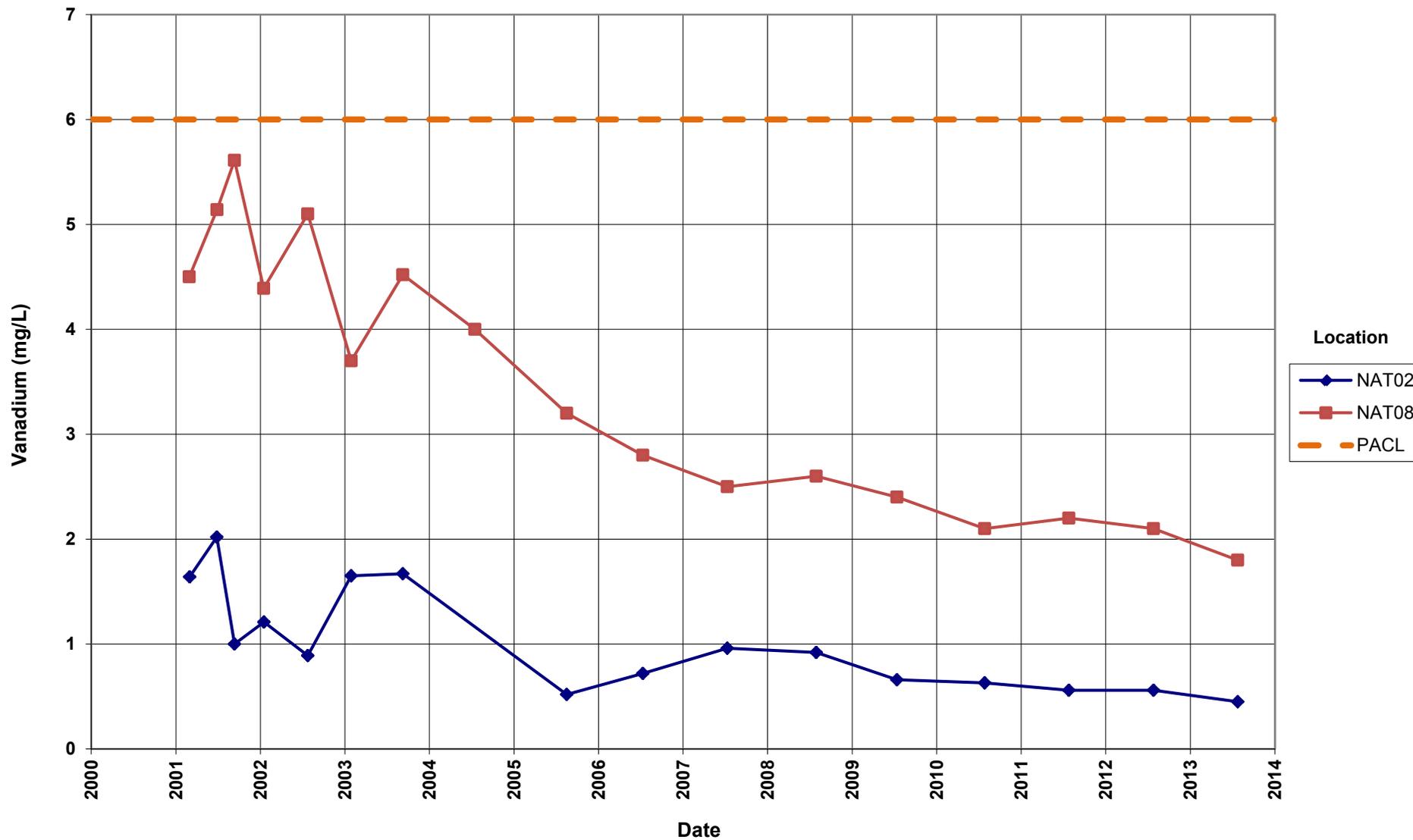
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**Naturita Processing Site
Uranium Concentration**
Proposed Alternate Concentration Limit (PACL) = 3.0 mg/L



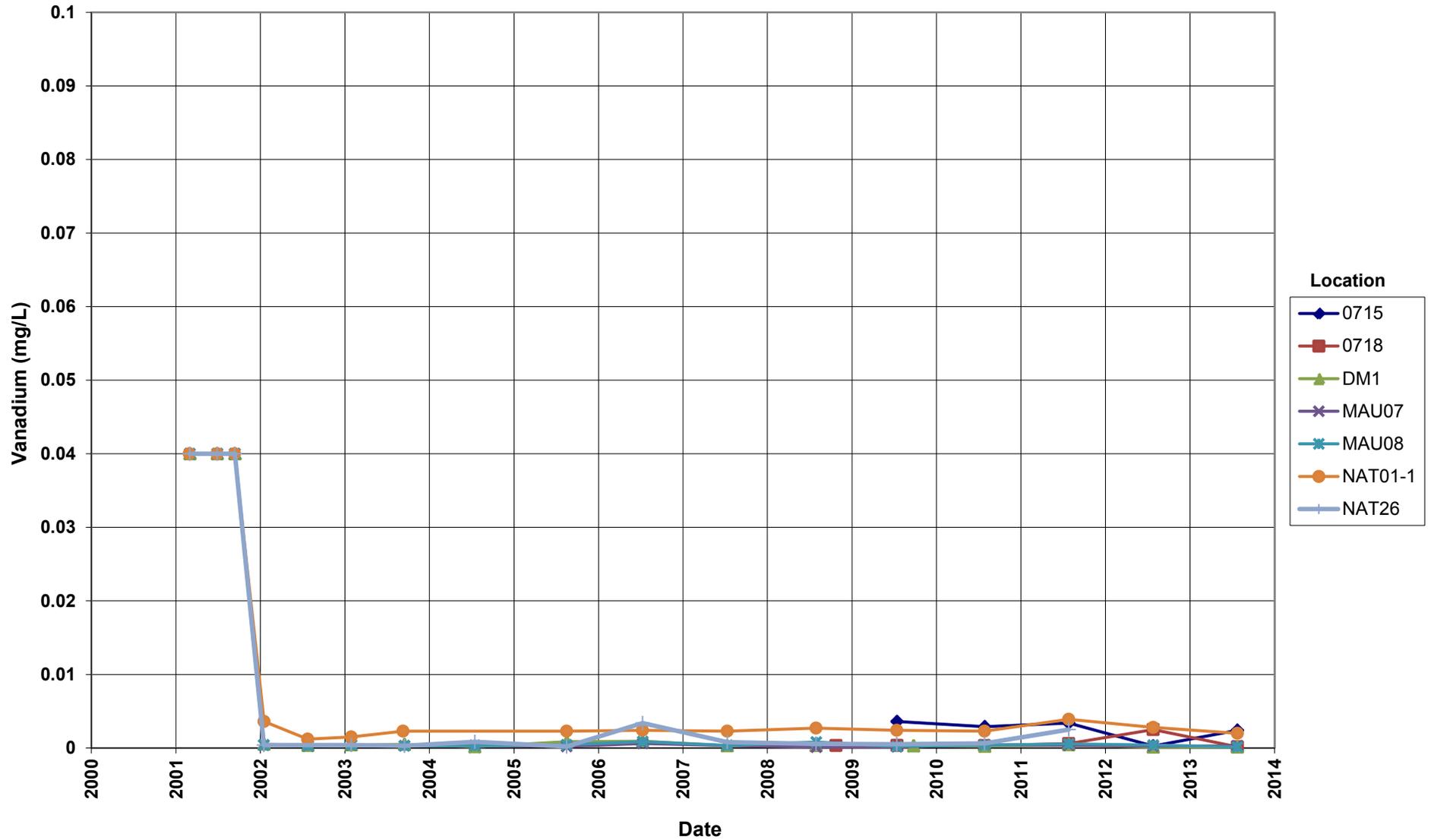
Naturita Processing Site Vanadium Concentration

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



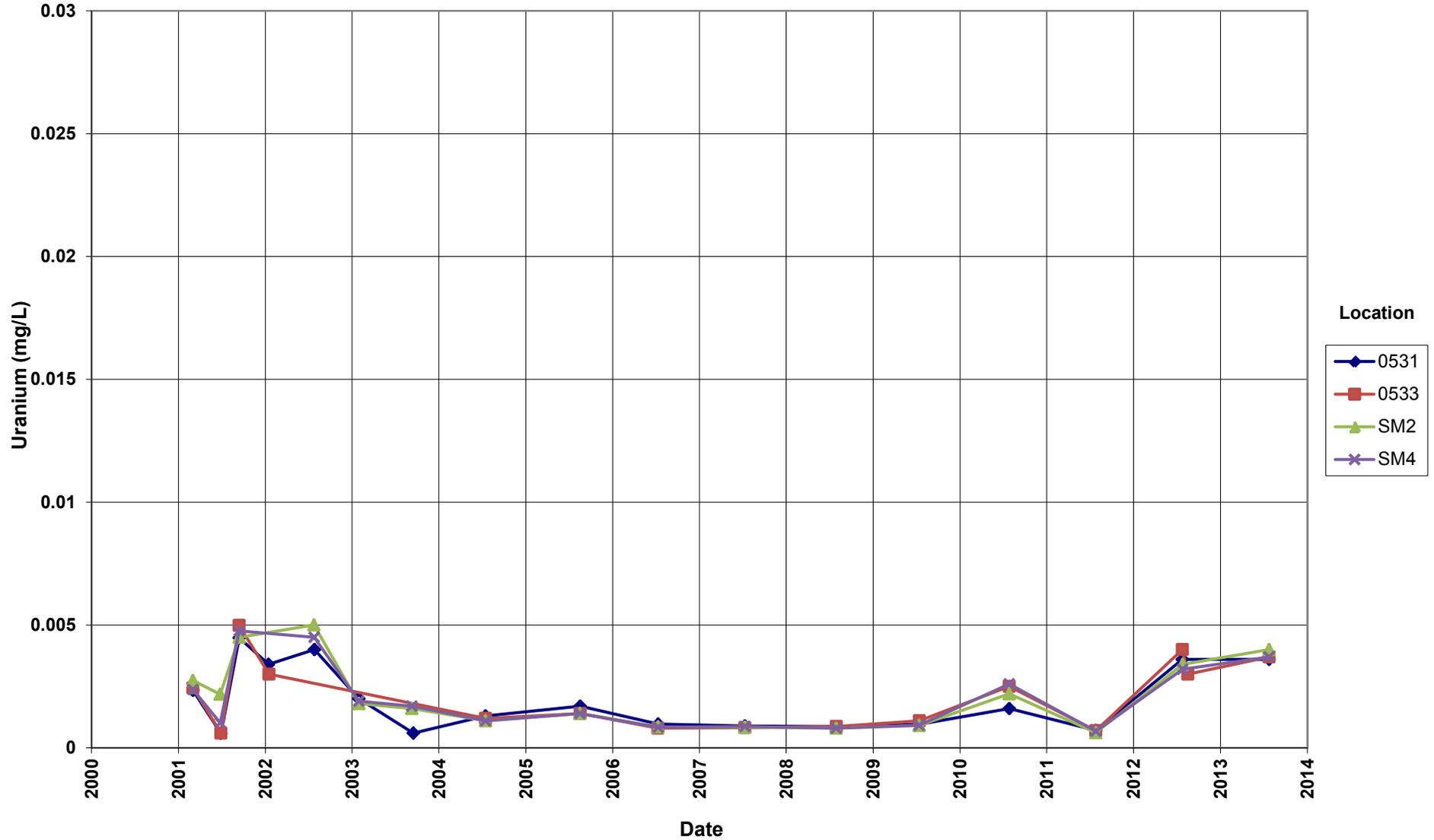
Naturita Processing Site Vanadium Concentration

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



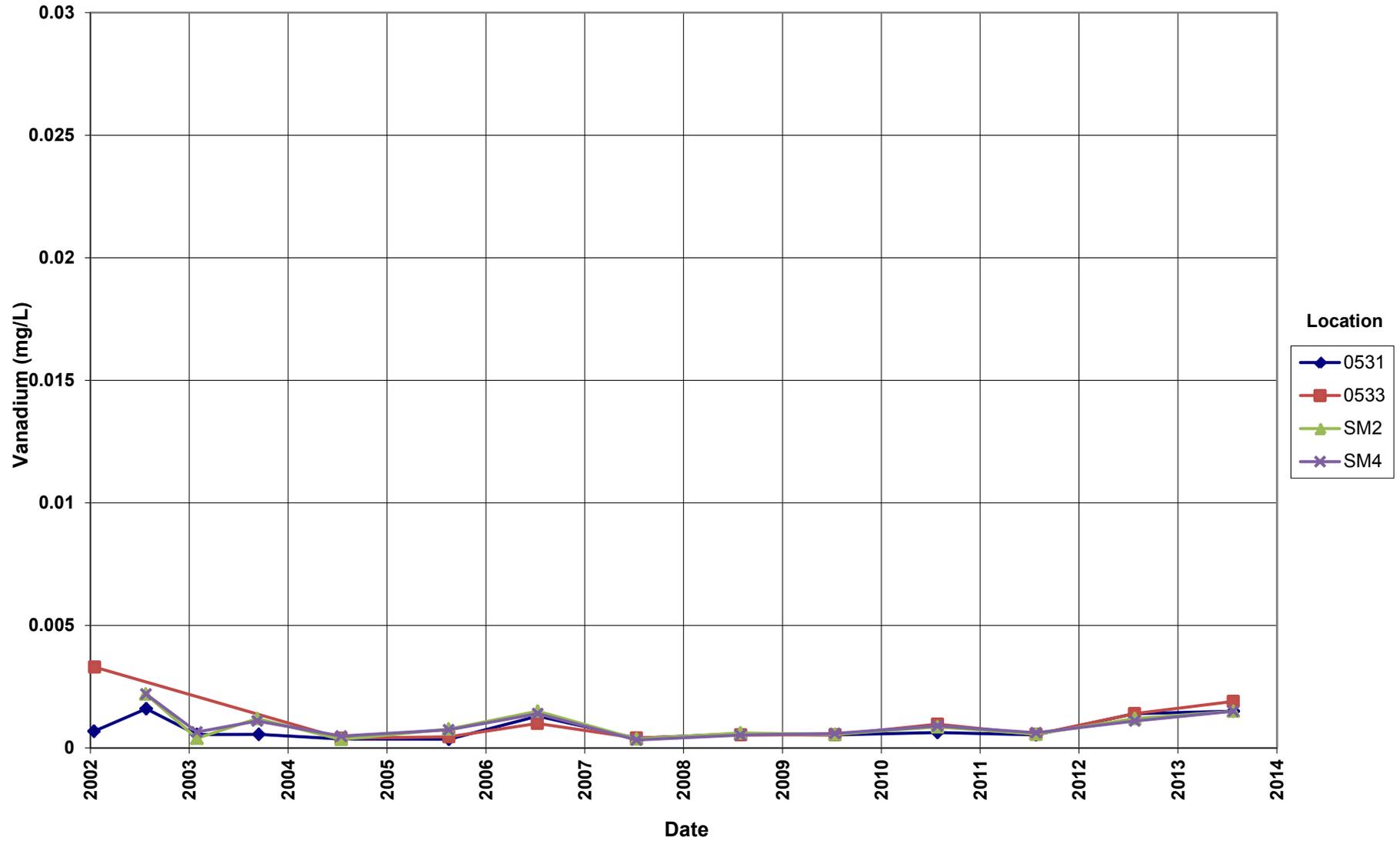
Naturita Processing Site--Surface Water Locations Uranium Concentration

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



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Attachment 3
Sampling and Analysis Work Order

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established 1959

Task Order LM-501
Control Number 13-0667

June 28, 2013

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

SUBJECT: Contract No. DE-AM01-07LM00060, S.M. Stoller Corporation (Stoller)
July 2013 Environmental Sampling at Naturita, Colorado, Processing Site

REFERENCE: Task Order LM00-501-02-115-402, Naturita, Colorado, 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 maps and tables specifying sample locations and analytes for monitoring at the Naturita site. Water quality data will be collected from monitoring wells and surface locations at this site as part of the routine environmental sampling currently scheduled to begin the week of July 22, 2013.

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

Monitoring Wells*

Processing Site

NAT01-1 AI	NAT 02 AI	NAT08 AI	NAT26 AI	0718 AI
MAU07 AI	MAU08 AI	DM1 AI	0715 AI	

*NOTE: AI = Alluvium

Surface Locations (filtered)

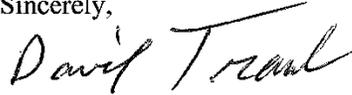
0531	0533	SM2	SM4
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All samples will be collected as directed in the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites*. Access agreements are being reviewed and are expected to be complete by the beginning of fieldwork.

Mark Kautsky
Control Number 13-0667
Page 2

Please contact me at (970) 248-6557 if you have any questions.

Sincerely,



David Traub
Site Lead

DT/lcg/lb

Enclosures (3)

cc: (electronic)

Christina Pennal, DOE
Steve Donovan, Stoller
Bev Gallagher, Stoller
Lauren Goodknight, Stoller
David Traub, Stoller
EDD Delivery
rc-grand.junction
File: NAP410.02 (A)
NAD410.02 (A)

Sampling Frequencies for Locations at Naturita, Colorado

Location ID	Quarterly	Semiannually	Annually	Biennially	Not Sampled	Notes
Monitoring Wells						
NAT01						
715			X			
718			X			
NAT01-1			X			
NAT02			X			
NAT08			X			
NAT26			X			
MAU07			X			
MAU08			X			
DM1			X			
Surface Locations						
531			X			
533			X			
SM2			X			
SM4			X			

Annual sampling conducted in July

Constituent Sampling Breakdown

Site	Naturita				
Analyte	Groundwater	Surface Water	Required Detection Limit (mg/L)	Analytical Method	Line Item Code
Approx. No. Samples/yr	14	5			
Field Measurements					
Alkalinity	X	X			
Dissolved Oxygen					
Redox Potential	X	X			
pH	X	X			
Specific Conductance	X	X			
Turbidity	X				
Temperature	X	X			
Laboratory Measurements					
Aluminum					
Ammonia as N (NH ₃ -N)					
Arsenic	X	X	0.0001	SW-846 6020	LMM-02
Calcium					
Chloride					
Chromium					
Gross Alpha					
Gross Beta					
Iron					
Lead					
Magnesium					
Manganese					
Molybdenum	BR and CM wells only		0.003	SW-846 6020	LMM-02
Nickel					
Nickel-63					
Nitrate + Nitrite as N (NO ₃ +NO ₂)-N					
Potassium					
Radium-226					
Radium-228					
Selenium					
Silica					
Sodium					
Strontium					
Sulfate					
Sulfide					
Total Dissolved Solids	X	X	10	SM2540 C	WCH-A-033
Total Organic Carbon					
Uranium	X	X	0.0001	SW-846 6020	LMM-02
Vanadium	X	X	0.0003	SW-846 6020	LMM-02
Zinc					
Total No. of Analytes	5	4			

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

Attachment 4 Trip Report

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Memorandum

Control Number N/A

DATE: July 29, 2013
 TO: David Traub
 FROM: Dan Sellers
 SUBJECT: Trip Report

Site: Naturita, CO. Processing

Dates of Sampling Event: July 24, 2013.

Team Members: Joe Treviño and Dan Sellers

Number of Locations Sampled: 8 monitoring wells and 4 surface water locations at the processing site were sampled for As, U, V, and TDS.

Locations Not Sampled/Reason: Well location NAT01-NAT26 was not sampled due to insufficient water (<0.3 ft.). Not enough water could be pumped through the dedicated tubing to collect parameters or samples.

Location Specific Information: None

Field Variance: Water level in NAT01-01 was measured from one of the two ¾" PVC well casings (one marked as "2"); the other casing (marked as "1") was purged and sampled. Water levels from both casings were identical (12.5 ft.) prior to purging. Water level in "2" did fluctuate while purge continued and stabilized at 12.58'. This well is considered CAT I and was sampled after three readings and parameters were stable.

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

False ID	True ID	Sample Type	Ticket Number	Matrix
2510	NAT01-0718	Duplicate	LIQ 786	Groundwater

Requisition Number Assigned: All samples were assigned to requisition identification number (RIN) 13075483. All samples were shipped from Grand Junction via Fed-Ex to ALS Laboratory Group on July 25, 2013.

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

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

Equipment: All wells are equipped with dedicated tubing and all were sampled with a peristaltic pump. The surface water locations were sampled by container immersion and filtered.

Regulatory: N/A

Institutional Controls

Fences, Gates, Locks: No gate currently exists at the intersection of the highway and where the access road leads to well location the DM1.

A fence has been built across the processing site that prevents vehicle access to well NAT01-MAU07. The well was accessed by hiking to it.

The lock at the main gate to the processing site is very difficult to open and close. Oil (WD-40) was sprayed on it and is now working correctly.

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.

Access Issues: None. The gate was open on the road required to access well NAT01- 0715. Access to the property was successful and an effort was made to contact the owner at the trailer house but no one was home.

Corrective Action Required/Taken: None.

(DLS/lcg)

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