

# Data Validation Package

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**July 2014**

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

**August 2014**



**U.S. DEPARTMENT OF  
ENERGY**

Legacy  
Management

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# Sampling Event Summary

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

**Sampling Period:** July 23, 2014

This 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/PRO/S04351, continually updated)*. Duplicate samples were collected from locations 0531 and DM1.

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 0715 was not sampled due to access issues. 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 downstream of and adjacent to the site were compared to statistical background threshold values 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, which indicates that the site is having no measurable impact on river water quality.

Table 1. Comparison of San Miguel River July 2014 Concentrations to Background Threshold Values

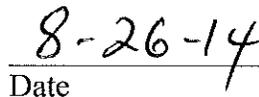
Analyte	BTV <sup>a</sup> for 0531 (mg/L)	0531 Concentration (mg/L)	SM2 Concentration (mg/L)	SM4 Concentration (mg/L)	0533 Concentration (mg/L)
Uranium	0.0052	0.0026	0.0028	0.0027	0.0028
Vanadium	0.0027	0.0012	0.0012	0.0013	0.0013

mg/L = milligrams per liter

<sup>a</sup> BTV = background threshold values based on historical data set from upstream location 0531

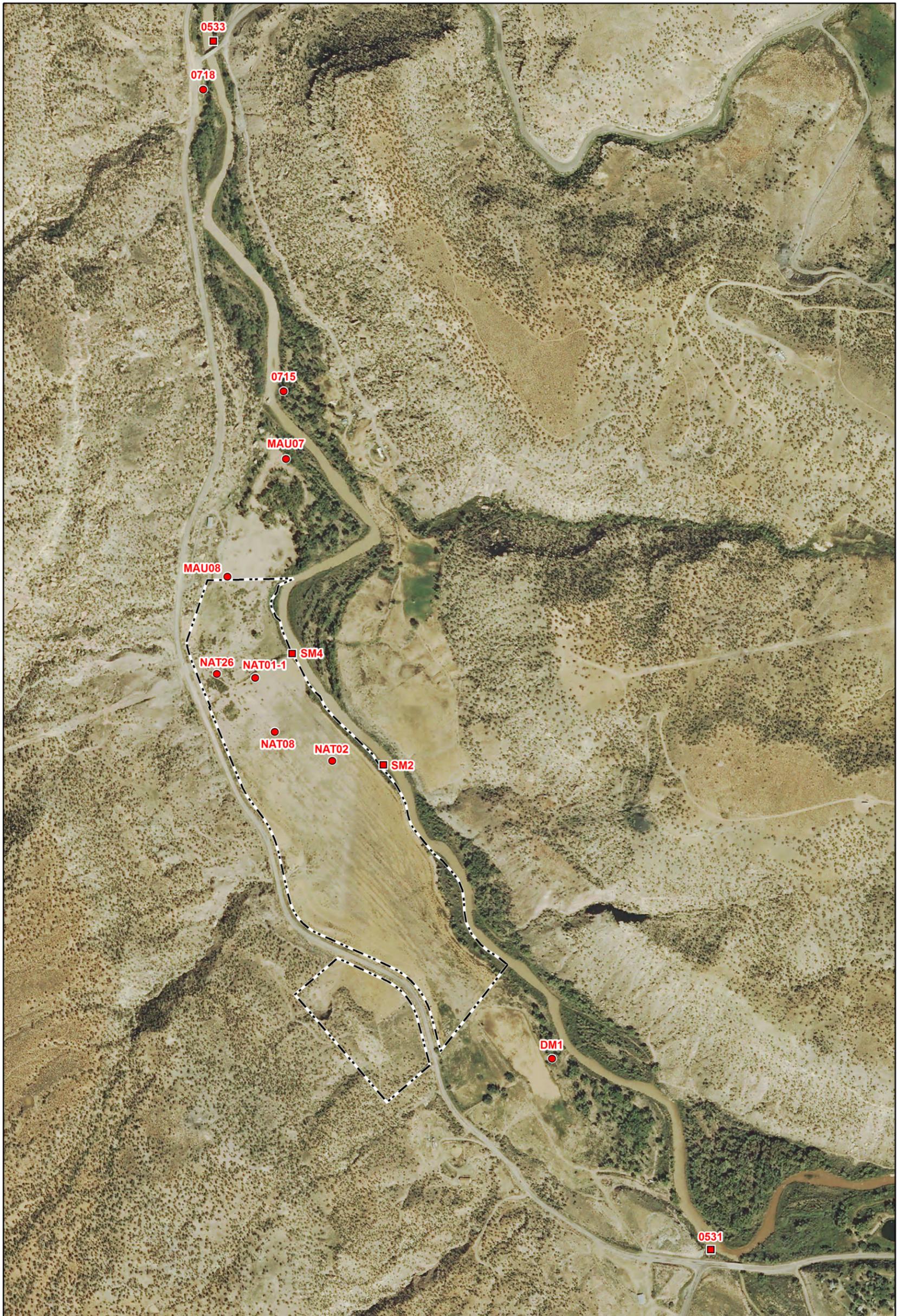


David Traub, Site Lead  
The S.M. Stoller Corporation,  
a wholly owned subsidiary of  
Huntington Ingalls Industries



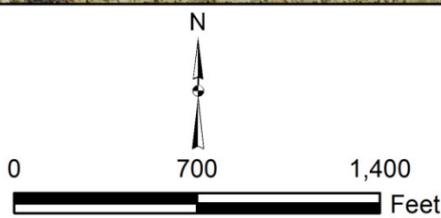
Date

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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-AM01-07LM00060

**Planned Sampling Map**  
Naturita, CO, Processing Site  
July 2014

DATE PREPARED: June 12, 2014

FILENAME: S1193900

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*Naturita, Colorado, Processing 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>Naturita, Colorado</u>	<b>Date(s) of Water Sampling</b>	<u>July 23, 2014</u>
<b>Date(s) of Verification</b>	<u>August 12, 2014</u>	<b>Name of Verifier</b>	<u>Alison Kuhlman</u>

	<b>Response (Yes, No, NA)</b>	<b>Comments</b>
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 19, 2014.</u>
2. Were the sampling locations specified in the planning documents sampled?	<u>No</u>	<u>Well location 0715 was not sampled due to access issues.</u>
3. Were calibrations conducted as specified in the above-named documents?	<u>Yes</u>	<u>Calibration was performed on July 21, 2014.</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 I.
9. Were duplicates taken at a frequency of one per 20 samples?	Yes	Duplicate samples were collected from locations 0531 and DM1.
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 2655 (0531) and 2510 (DM1) were used for the duplicate samples.
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): 14076345  
 Sample Event: July 23, 2014  
 Site(s): Naturita, CO, Processing Site  
 Laboratory: ALS Laboratory Group, Fort Collins, Colorado  
 Work Order No.: 1407538  
 Analysis: Metals and Wet Chemistry  
 Validator: Alison Kuhlman  
 Review Date: August 11, 2014

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	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
1407538-4	2510	Arsenic	J	Field duplicate RPD exceeds acceptance limit
1407538-6	DM1	Arsenic	J	Field duplicate RPD exceeds acceptance limit
1407538-10	NAT02	Uranium	J	MS recoveries outside acceptance criteria
1407538-10	NAT02	Vanadium	J	MS recoveries outside acceptance criteria
1407538-12	NAT26	Vanadium	U	Less than 5 times the method blank
1407538-4	2510	Vanadium	U	Less than 5 times the method blank
1407538-6	DM1	Vanadium	U	Less than 5 times the method blank
1407538-7	MAU07	Vanadium	U	Less than 5 times the method blank

### Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado, received 14 water samples on July 25, 2014, 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 shipments were received intact at a temperature inside the iced cooler at 0.8 °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.

### 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 28, 2014, 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 samples are used to measure method performance in the sample matrix. The spikes met the recovery and precision criteria for all analytes evaluated with the following exceptions. The matrix spike and matrix spike duplicate samples exceeded the acceptance limit for uranium, and the matrix spike duplicate sample exceeded the acceptance limit for vanadium. The associated sample results are qualified with “J” flags as estimated values.

## 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.

## 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 August 1, 2014. 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: 14076345    Lab Code: PAR    Validator: Alison Kuhlman    Validation Date: 8/12/2014

Project: Naturita Monitoring    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 were 2 duplicates evaluated.

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

RIN: 14076345      Lab Code: PAR      Date Due: 8/22/2014  
 Matrix: Water      Site Code: NAT01      Date Completed: 8/4/2014

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	07/30/2014					OK	101.00			0	

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

RIN: 14076345      Lab Code: PAR      Date Due: 8/22/2014  
 Matrix: Water      Site Code: NAT01      Date Completed: 8/4/2014

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	07/28/2014	0.0000	1.0000	OK	OK	OK	106.0	108.0	114.0	19.0	102.0		111.0
Uranium	ICP/MS	07/28/2014	0.0000	1.0000	OK	OK	OK	100.0	135.0	157.0	1.0	105.0	1.0	100.0
Vanadium	ICP/MS	07/28/2014	0.0020	1.0000	OK	.017	0.15	105.0	113.0	135.0	1.0	100.0	1.0	120.0

## **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, meeting the Category I criteria. 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 either container immersion or the peristaltic pump and dedicated tubing that was discarded after use.

### 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. Duplicate samples were collected from locations DM1 (field duplicate ID 2510) and location 0531 (field duplicate ID 2655). The duplicate results met the criteria, with one exception. The relative percent difference for arsenic at location DM1 was greater than 20 percent, therefore the sample result and the duplicate result are both qualified with “J” flags as estimated values.

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

Page 1 of 1

RIN: 14076345    Lab Code: PAR    Project: Naturita Monitoring    Validation Date: 8/12/2014

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**Duplicate: 2510**                      **Sample: DM1**

Analyte	Sample				Duplicate				RPD	RER	Units
	Result	Flag	Error	Dilution	Result	Flag	Error	Dilution			
Arsenic	2.5			1	1.8			1	32.56		UG/L
TOTAL DISSOLVED SOLIDS	350			1	350			1	0		MG/L
Uranium	2.6			1	2.6			1	0		UG/L
Vanadium	0.5			1	0.42			1	17.39		UG/L

**Duplicate: 2655**                      **Sample: 0531**

Analyte	Sample				Duplicate				RPD	RER	Units
	Result	Flag	Error	Dilution	Result	Flag	Error	Dilution			
Arsenic	1.6			1	1.8			1	11.76		UG/L
TOTAL DISSOLVED SOLIDS	530			1	530			1	0		MG/L
Uranium	2.6			1	2.6			1	0		UG/L
Vanadium	1.2			1	1.2			1	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: Stephen Donovan 8-26-2014  
Stephen Donovan Date

Data Validation Lead: Alison Kuhlman 8-26-2014  
Alison Kuhlman Date

**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.

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

**Data Validation Outliers Report - No Field Parameters**

**Comparison: All Historical Data**

Laboratory: ALS Laboratory Group

RIN: 14076345

Report Date: 8/12/2014

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	Result	Lab	Data			
NAT01	0718	N001	07/23/2014	Total Dissolved Solids	2000			1500		F	640		F	9	0	No
NAT01	0718	N001	07/23/2014	Uranium	0.0950			0.0670		F	0.0330			9	0	No
NAT01	DM1	N001	07/23/2014	Arsenic	0.00250			0.00200	B	F	0.0006	U	F	15	1	NA
NAT01	MAU08	N001	07/23/2014	Total Dissolved Solids	1400			4300		FQ	1700		F	18	0	No
NAT01	MAU08	N001	07/23/2014	Uranium	0.490			1.71	DI		0.530		F	22	0	No
NAT01	NAT01-1	N001	07/23/2014	Total Dissolved Solids	1200			1870			1300		F	16	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: 8/12/2014

Location: 0718 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	07/23/2014	N001	8.6 - 18.6	470			0		
Arsenic	mg/L	07/23/2014	N001	8.6 - 18.6	0.0034			0	0.000015	
Oxidation Reduction Potential	mV	07/23/2014	N001	8.6 - 18.6	-35.7			0		
pH	s.u.	07/23/2014	N001	8.6 - 18.6	6.94			0		
Specific Conductance	umhos/cm	07/23/2014	N001	8.6 - 18.6	2205			0		
Temperature	C	07/23/2014	N001	8.6 - 18.6	16.63			0		
Total Dissolved Solids	mg/L	07/23/2014	N001	8.6 - 18.6	2000			0	40	
Turbidity	NTU	07/23/2014	N001	8.6 - 18.6	8.05			0		
Uranium	mg/L	07/23/2014	N001	8.6 - 18.6	0.095			0	0.0000029	
Vanadium	mg/L	07/23/2014	N001	8.6 - 18.6	0.0012			0	0.000015	

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

REPORT DATE: 8/12/2014

Location: DM1 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	07/23/2014	N001	2.67 - 7.67	134			0		
Arsenic	mg/L	07/23/2014	N001	2.67 - 7.67	0.0025			0	0.000015	
Arsenic	mg/L	07/23/2014	N002	2.67 - 7.67	0.0018			0	0.000015	
Oxidation Reduction Potential	mV	07/23/2014	N001	2.67 - 7.67	-39.5			0		
pH	s.u.	07/23/2014	N001	2.67 - 7.67	6.89			0		
Specific Conductance	umho s/cm	07/23/2014	N001	2.67 - 7.67	513			0		
Temperature	C	07/23/2014	N001	2.67 - 7.67	22.83			0		
Total Dissolved Solids	mg/L	07/23/2014	N001	2.67 - 7.67	350			0	20	
Total Dissolved Solids	mg/L	07/23/2014	N002	2.67 - 7.67	350			0	20	
Turbidity	NTU	07/23/2014	N001	2.67 - 7.67	4.03			0		
Uranium	mg/L	07/23/2014	N001	2.67 - 7.67	0.0026			0	0.0000029	
Uranium	mg/L	07/23/2014	N002	2.67 - 7.67	0.0026			0	0.0000029	
Vanadium	mg/L	07/23/2014	N001	2.67 - 7.67	0.0005			0	0.000015	
Vanadium	mg/L	07/23/2014	N002	2.67 - 7.67	0.00042			0	0.000015	

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

REPORT DATE: 8/12/2014

Location: MAU07 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	07/23/2014	N001	2.92 - 7.92	370			0		
Arsenic	mg/L	07/23/2014	N001	2.92 - 7.92	0.0097			0	0.000015	
Oxidation Reduction Potential	mV	07/23/2014	N001	2.92 - 7.92	-9.6			0		
pH	s.u.	07/23/2014	N001	2.92 - 7.92	6.84			0		
Specific Conductance	umhos /cm	07/23/2014	N001	2.92 - 7.92	1667			0		
Temperature	C	07/23/2014	N001	2.92 - 7.92	20.72			0		
Total Dissolved Solids	mg/L	07/23/2014	N001	2.92 - 7.92	1400			0	40	
Turbidity	NTU	07/23/2014	N001	2.92 - 7.92	3.45			0		
Uranium	mg/L	07/23/2014	N001	2.92 - 7.92	0.48			0	0.0000029	
Vanadium	mg/L	07/23/2014	N001	2.92 - 7.92	0.00061			0	0.000015	

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

REPORT DATE: 8/12/2014

Location: MAU08 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	07/23/2014	N001	6.17 - 11.17	392			0		
Arsenic	mg/L	07/23/2014	N001	6.17 - 11.17	0.0012			0	0.000015	
Oxidation Reduction Potential	mV	07/23/2014	N001	6.17 - 11.17	86			0		
pH	s.u.	07/23/2014	N001	6.17 - 11.17	7.05			0		
Specific Conductance	umhos/cm	07/23/2014	N001	6.17 - 11.17	1891			0		
Temperature	C	07/23/2014	N001	6.17 - 11.17	23.05			0		
Total Dissolved Solids	mg/L	07/23/2014	N001	6.17 - 11.17	1400			0	40	
Turbidity	NTU	07/23/2014	N001	6.17 - 11.17	7.45			0		
Uranium	mg/L	07/23/2014	N001	6.17 - 11.17	0.49			0	0.00029	
Vanadium	mg/L	07/23/2014	N001	6.17 - 11.17	0.0023			0	0.000015	

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

REPORT DATE: 8/12/2014

Location: NAT01-1 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	07/23/2014	N001	17 - 17.5	294			0		
Arsenic	mg/L	07/23/2014	N001	17 - 17.5	0.0083			0	0.000015	
Oxidation Reduction Potential	mV	07/23/2014	N001	17 - 17.5	-45.4			0		
pH	s.u.	07/23/2014	N001	17 - 17.5	7.08			0		
Specific Conductance	umho s/cm	07/23/2014	N001	17 - 17.5	1468			0		
Temperature	C	07/23/2014	N001	17 - 17.5	18.19			0		
Total Dissolved Solids	mg/L	07/23/2014	N001	17 - 17.5	1200			0	40	
Turbidity	NTU	07/23/2014	N001	17 - 17.5	1.66			0		
Uranium	mg/L	07/23/2014	N001	17 - 17.5	0.47			0	0.00029	
Vanadium	mg/L	07/23/2014	N001	17 - 17.5	0.0024			0	0.000015	

---

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

REPORT DATE: 8/12/2014

Location: NAT02 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	07/23/2014	N001	6.42	- 11.42	396			0		
Arsenic	mg/L	07/23/2014	N001	6.42	- 11.42	0.006			0	0.00015	
Oxidation Reduction Potential	mV	07/23/2014	N001	6.42	- 11.42	-101.4			0		
pH	s.u.	07/23/2014	N001	6.42	- 11.42	6.96			0		
Specific Conductance	umho s/cm	07/23/2014	N001	6.42	- 11.42	965			0		
Temperature	C	07/23/2014	N001	6.42	- 11.42	20.79			0		
Total Dissolved Solids	mg/L	07/23/2014	N001	6.42	- 11.42	760			0	20	
Turbidity	NTU	07/23/2014	N001	6.42	- 11.42	8.37			0		
Uranium	mg/L	07/23/2014	N001	6.42	- 11.42	0.19			0	0.000029	
Vanadium	mg/L	07/23/2014	N001	6.42	- 11.42	0.64			0	0.00015	

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

REPORT DATE: 8/12/2014

Location: NAT08 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	07/23/2014	N001	6.3 - 11.3	301			0		
Arsenic	mg/L	07/23/2014	0001	6.3 - 11.3	0.024			0	0.00074	
Oxidation Reduction Potential	mV	07/23/2014	N001	6.3 - 11.3	50.7			0		
pH	s.u.	07/23/2014	N001	6.3 - 11.3	7.02			0		
Specific Conductance	umhos/cm	07/23/2014	N001	6.3 - 11.3	1355			0		
Temperature	C	07/23/2014	N001	6.3 - 11.3	21.64			0		
Total Dissolved Solids	mg/L	07/23/2014	0001	6.3 - 11.3	1100			0	40	
Turbidity	NTU	07/23/2014	N001	6.3 - 11.3	108			0		
Uranium	mg/L	07/23/2014	0001	6.3 - 11.3	0.33			0	0.00015	
Vanadium	mg/L	07/23/2014	0001	6.3 - 11.3	2			0	0.00076	

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

REPORT DATE: 8/12/2014

Location: NAT26 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	07/23/2014	N001	10.67 - 15.67	417			0		
Arsenic	mg/L	07/23/2014	N001	10.67 - 15.67	0.00024	B		0	0.000074	
Oxidation Reduction Potential	mV	07/23/2014	N001	10.67 - 15.67	110.1			0		
pH	s.u.	07/23/2014	N001	10.67 - 15.67	7.01			0		
Specific Conductance	umho s/cm	07/23/2014	N001	10.67 - 15.67	3000			0		
Temperature	C	07/23/2014	N001	10.67 - 15.67	18.39			0		
Total Dissolved Solids	mg/L	07/23/2014	N001	10.67 - 15.67	2700			0	80	
Turbidity	NTU	07/23/2014	N001	10.67 - 15.67	3.93			0		
Uranium	mg/L	07/23/2014	N001	10.67 - 15.67	1.1			0	0.000015	
Vanadium	mg/L	07/23/2014	N001	10.67 - 15.67	0.0006	B		0	0.000076	

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: 8/12/2014

Location: 0531 SURFACE LOCATION SURFACE WATER LOCATION

Parameter	Units	Sample Date	ID	Result	Qualifiers		Lab	Detection Limit	Uncertainty
					Data	QA			
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	07/23/2014	N001	127			0		
Arsenic	mg/L	07/23/2014	0002	0.0018			0	0.000015	
Arsenic	mg/L	07/23/2014	N001	0.0016			0	0.000015	
Oxidation Reduction Potential	mV	07/23/2014	N001	88.2			0		
pH	s.u.	07/23/2014	N001	8.28			0		
Specific Conductance	umhos/cm	07/23/2014	N001	683			0		
Temperature	C	07/23/2014	N001	32.37			0		
Total Dissolved Solids	mg/L	07/23/2014	0002	530			0	20	
Total Dissolved Solids	mg/L	07/23/2014	N001	530			0	20	
Turbidity	NTU	07/23/2014	N001	38.1			0		
Uranium	mg/L	07/23/2014	0002	0.0026			0	0.0000029	
Uranium	mg/L	07/23/2014	N001	0.0026			0	0.0000029	
Vanadium	mg/L	07/23/2014	0002	0.0012			0	0.000015	
Vanadium	mg/L	07/23/2014	N001	0.0012			0	0.000015	

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

REPORT DATE: 8/12/2014

Location: 0533 SURFACE LOCATION SURFACE WATER LOCATION

Parameter	Units	Sample Date	ID	Result	Qualifiers		Lab	Detection Limit	Uncertainty
					Data	QA			
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	07/23/2014	N001	159			0		
Arsenic	mg/L	07/23/2014	0001	0.0018			0	0.000015	
Oxidation Reduction Potential	mV	07/23/2014	N001	-4.8			0		
pH	s.u.	07/23/2014	N001	8.36			0		
Specific Conductance	umhos/cm	07/23/2014	N001	735			0		
Temperature	C	07/23/2014	N001	28.67			0		
Total Dissolved Solids	mg/L	07/23/2014	0001	540			0	20	
Turbidity	NTU	07/23/2014	N001	24			0		
Uranium	mg/L	07/23/2014	0001	0.0028			0	0.0000029	
Vanadium	mg/L	07/23/2014	0001	0.0013			0	0.000015	

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

REPORT DATE: 8/12/2014

Location: SM2 SURFACE LOCATION

Parameter	Units	Sample Date	ID	Result	Qualifiers		Lab	Detection Limit	Uncertainty
					Data	QA			
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	07/23/2014	N001	127			0		
Arsenic	mg/L	07/23/2014	N001	0.0016			0	0.000015	
Oxidation Reduction Potential	mV	07/23/2014	N001	-92.1			0		
pH	s.u.	07/23/2014	N001	8.43			0		
Specific Conductance	umhos/cm	07/23/2014	N001	687			0		
Temperature	C	07/23/2014	N001	29.29			0		
Total Dissolved Solids	mg/L	07/23/2014	N001	560			0	20	
Turbidity	NTU	07/23/2014	N001	7.2			0		
Uranium	mg/L	07/23/2014	N001	0.0028			0	0.0000029	
Vanadium	mg/L	07/23/2014	N001	0.0012			0	0.000015	

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

REPORT DATE: 8/12/2014

Location: SM4 SURFACE LOCATION

Parameter	Units	Sample Date	ID	Result	Qualifiers		Lab	Detection Limit	Uncertainty
					Data	QA			
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	07/23/2014	N001	148			0		
Arsenic	mg/L	07/23/2014	N001	0.0016			0	0.000015	
Oxidation Reduction Potential	mV	07/23/2014	N001	-75.9			0		
pH	s.u.	07/23/2014	N001	8.25			0		
Specific Conductance	umhos/cm	07/23/2014	N001	692			0		
Temperature	C	07/23/2014	N001	29.35			0		
Total Dissolved Solids	mg/L	07/23/2014	N001	590			0	20	
Turbidity	NTU	07/23/2014	N001	9.54			0		
Uranium	mg/L	07/23/2014	N001	0.0027			0	0.0000029	
Vanadium	mg/L	07/23/2014	N001	0.0013			0	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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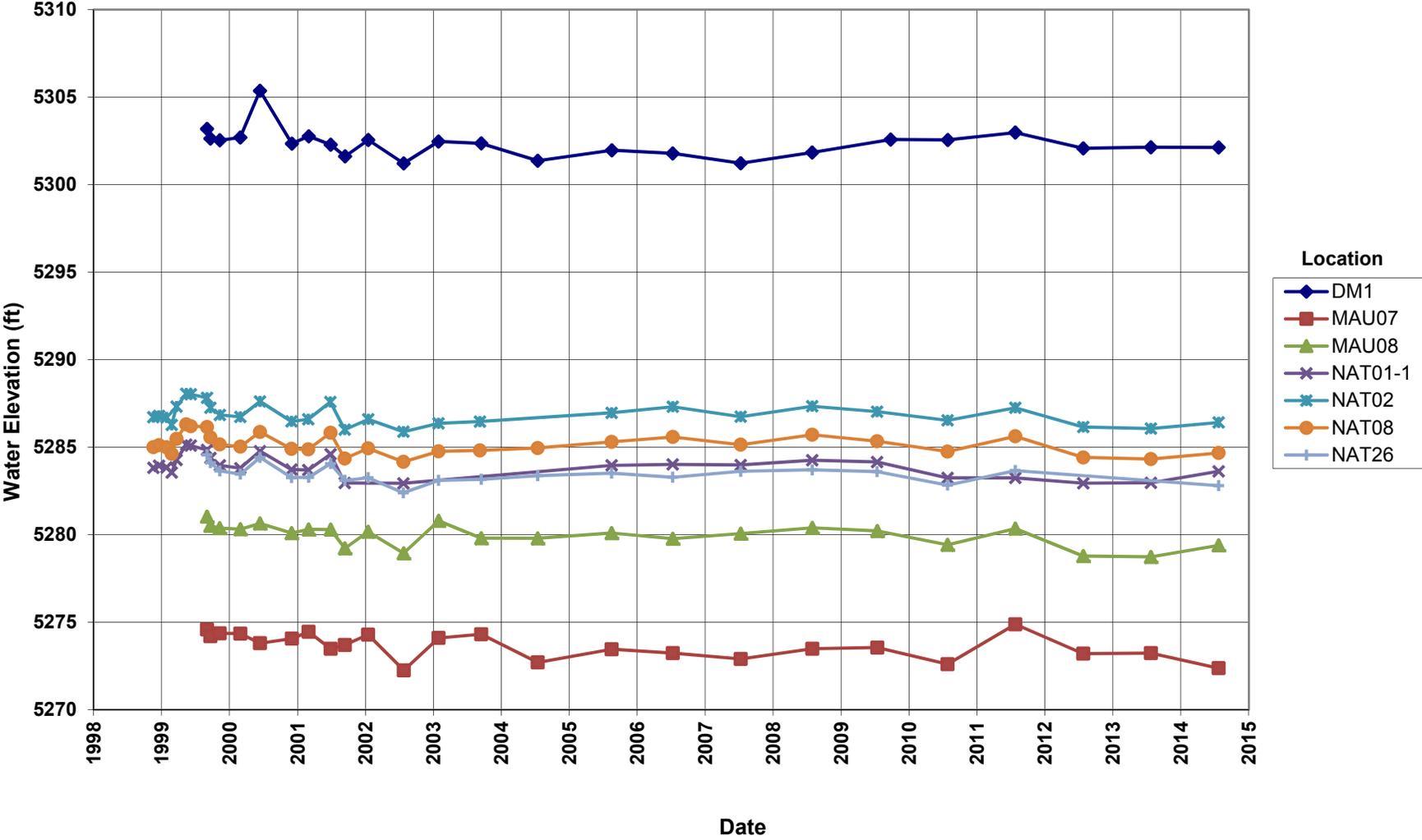


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# Hydrograph

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# Naturita Processing Site Hydrograph



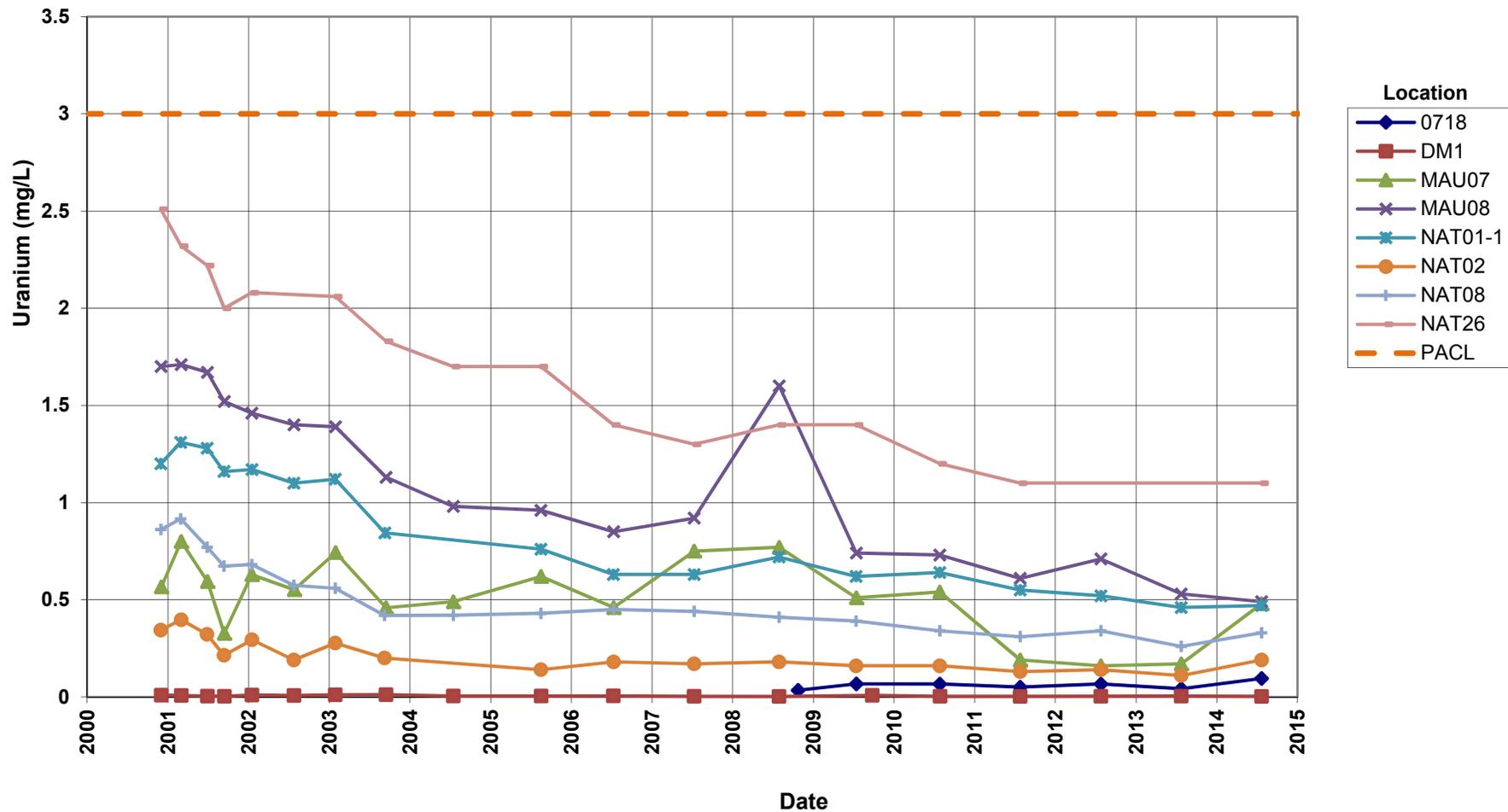
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## **Time-Concentration Graphs**

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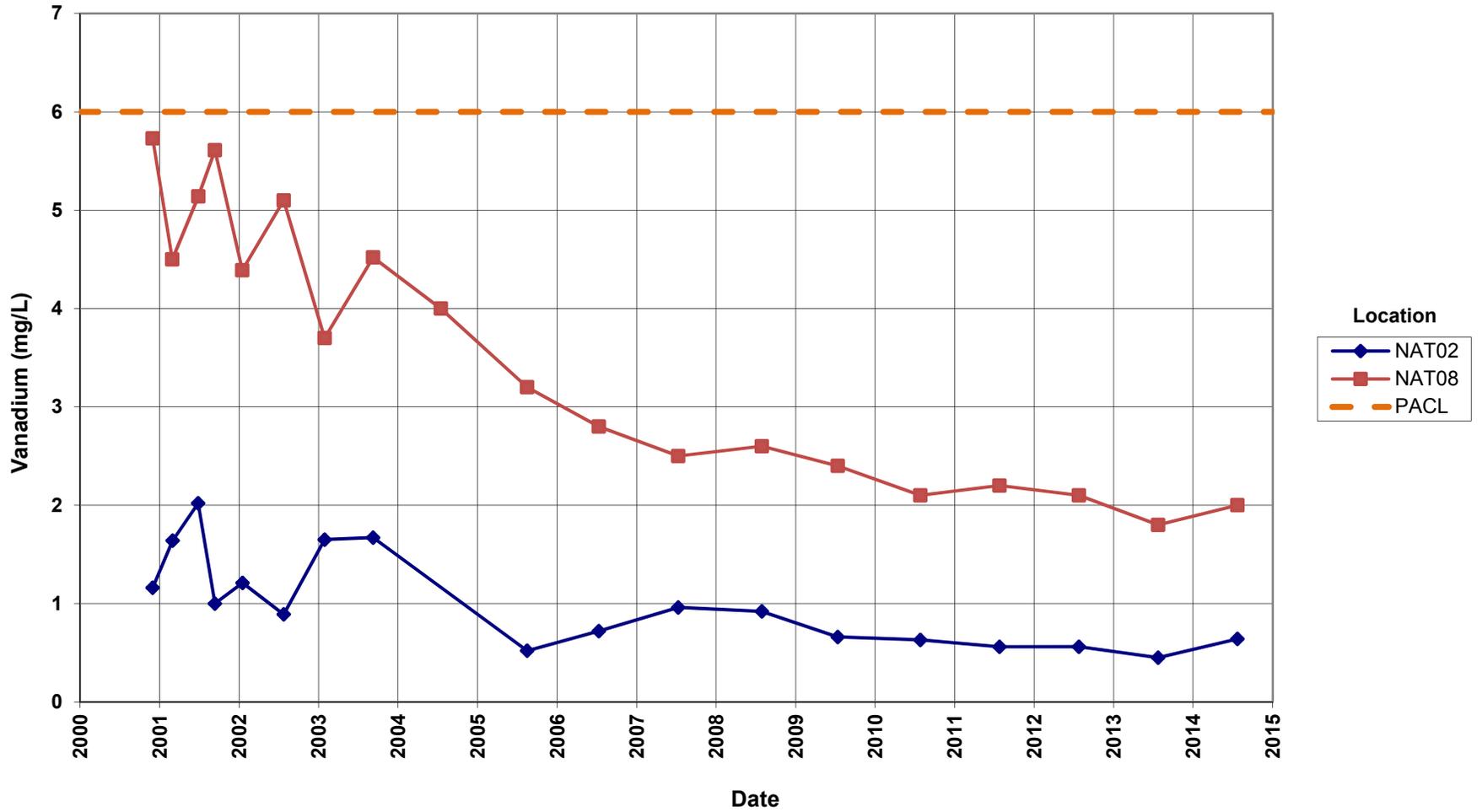
## Naturita Processing Site Uranium Concentration

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



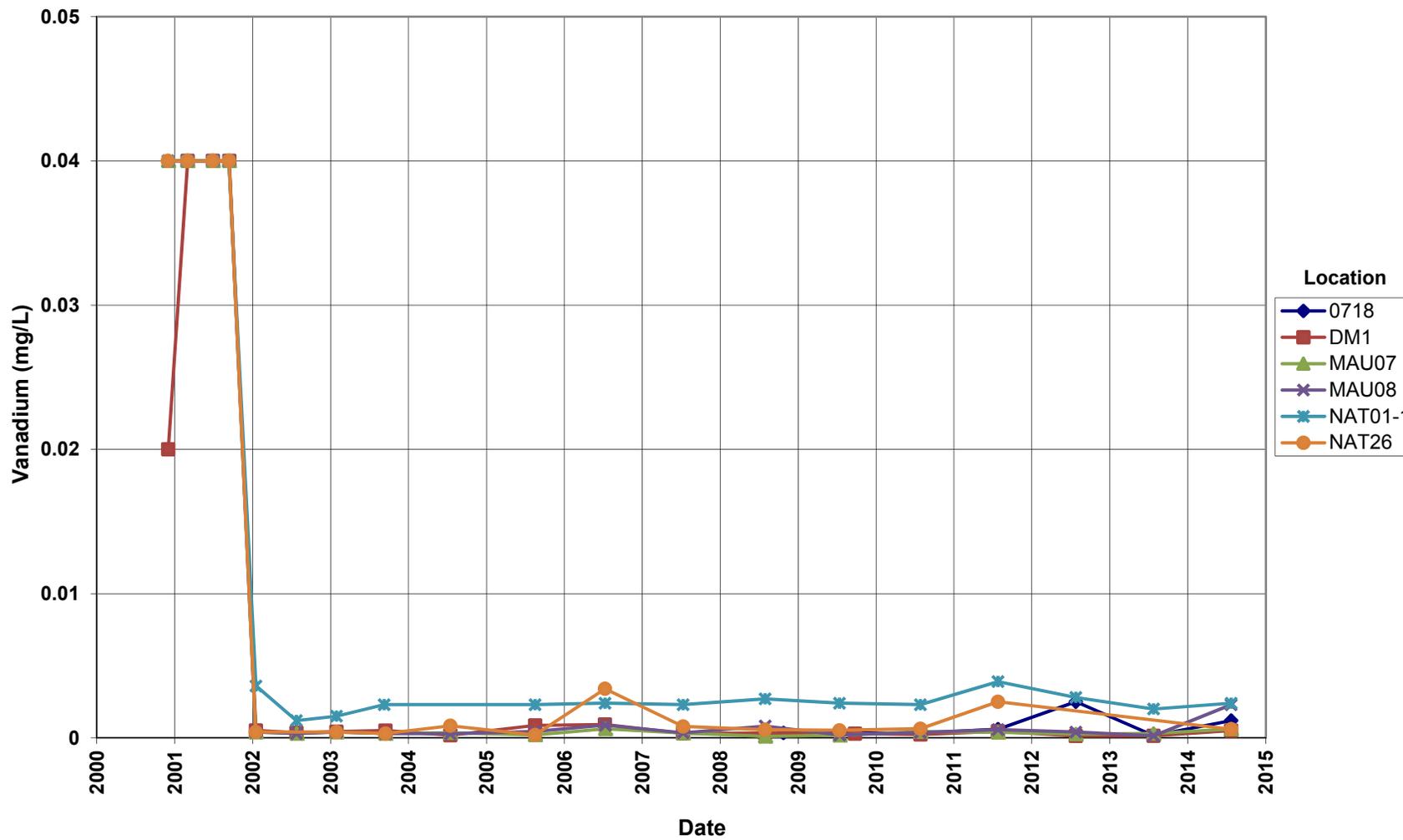
# Naturita Processing Site Vanadium Concentration

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



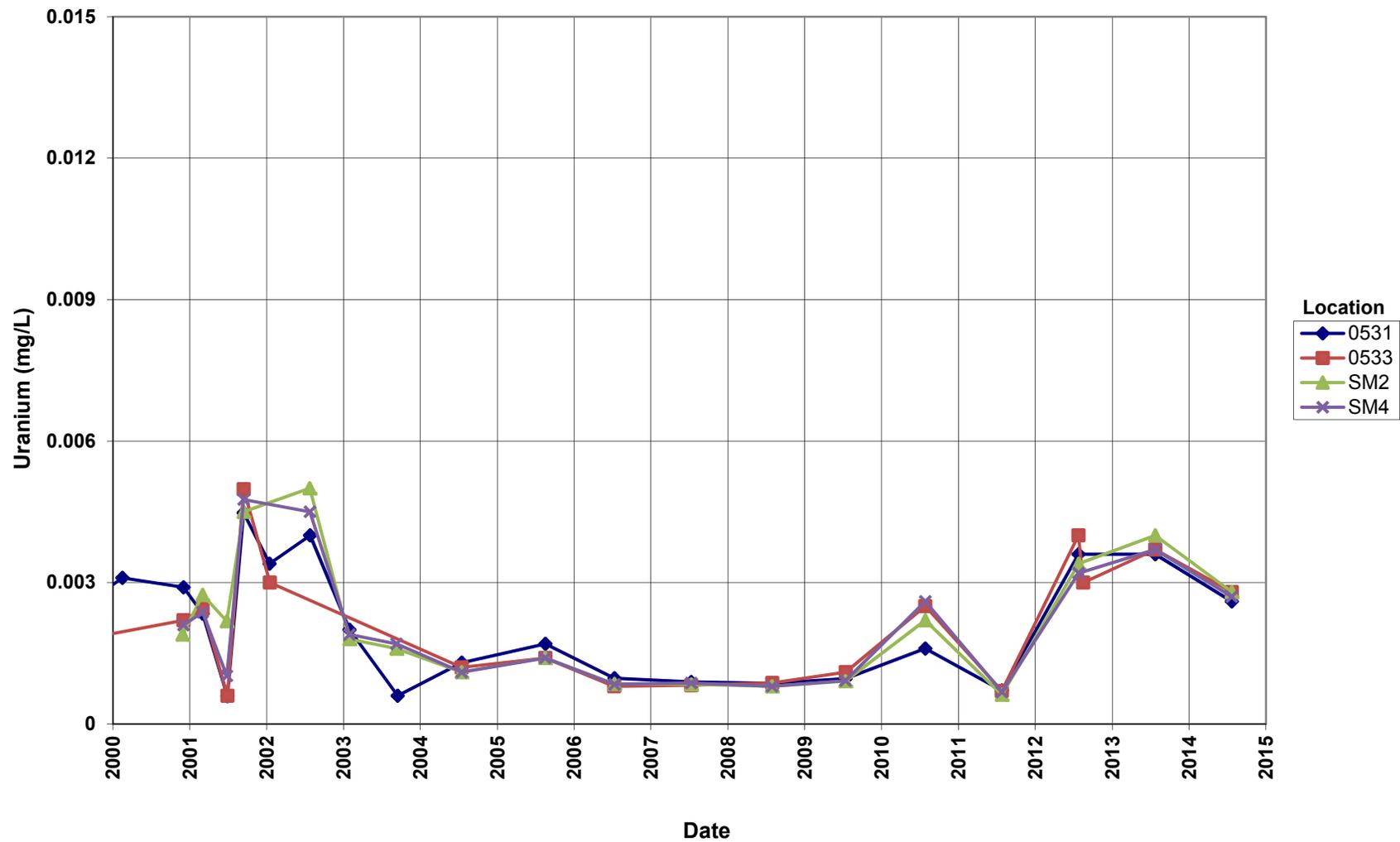
# Naturita Processing Site Vanadium Concentration

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



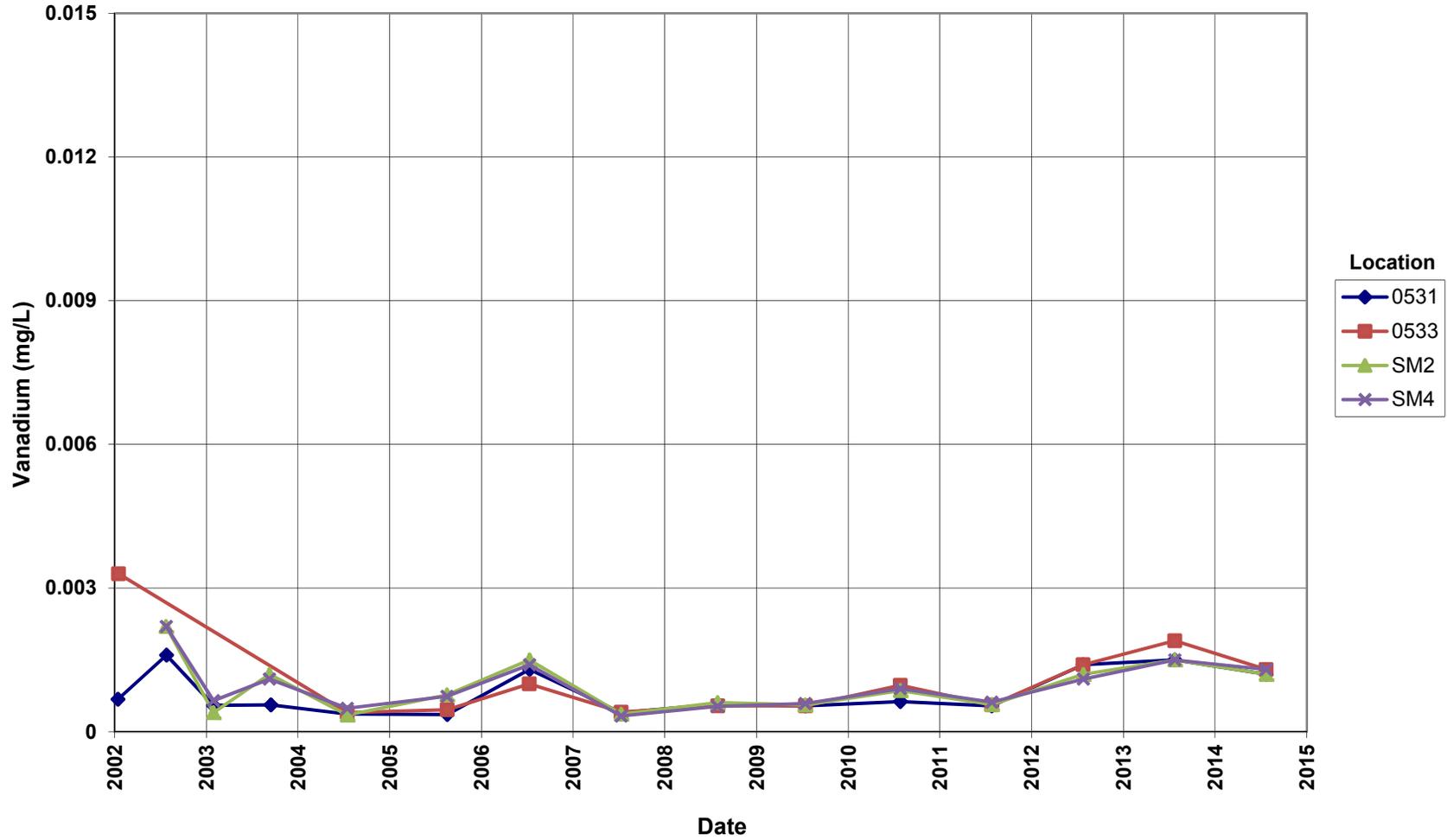
# Naturita Processing Site - Surface Water Locations Uranium Concentration

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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June 19, 2014

Task Order LM00-501  
Control Number 14-0677

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, The S.M. Stoller Corporation, a wholly owned subsidiary of Huntington Ingalls Industries (Stoller)  
July 2014 Environmental Sampling at the 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 map 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 21, 2014.

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

**MONITORING WELLS**

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

\*NOTE: AI = Alluvium

**SURFACE LOCATIONS**

0531   0533   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.

Mark Kautsky  
Control Number 14-0677  
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: NAP 410.02(A)

A SUBSIDIARY OF HUNTINGTON INGALLS INDUSTRIES

2597 Legacy Way • Grand Junction, CO 81503-1789 • Telephone (970) 248-6000 • Fax (970) 248-6040

### Sampling Frequencies for Locations at Naturita, Colorado

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

Annual sampling conducted in July

### Constituent Sampling Breakdown

Site	Naturita		Required Detection Limit (mg/L)	Analytical Method	Line Item Code
Analyte	Groundwater	Surface Water			
Approx. No. Samples/yr	14	5			
<i>Field Measurements</i>					
Alkalinity	X	X			
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 (NH <sub>3</sub> -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 <sub>3</sub> +NO <sub>2</sub> )-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					
<b>Total No. of Analytes</b>	5	4			

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

**Editors Note:** Disposal Site BR and CM wells are no longer sampled.

**Attachment 4**  
**Trip Report**

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## Memorandum

DATE: August 6, 2014  
TO: David Traub  
FROM: Rob Rice  
SUBJECT: Sampling Trip Report

**Site:** Naturita, CO, Processing Site

**Dates of Event:** July 22 and 23, 2014

**Team Members:** David Atkinson and Rob Rice

**Number of Locations Sampled:** 7 monitoring wells and 4 surface water locations were sampled, and 2 duplicate samples were collected.

**Locations Not Sampled/Reason:** Well 0715 was not developed nor sampled, as access through private land was restricted by a gate and non-DOE lock.

**Location Specific Information:** The turbidity of surface water at locations 0531 and 0533 was greater than 10 NTUs and so these samples were collected through 0.45  $\mu$ m filters.

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

False ID	Ticket Number	True ID	Sample Type	Associated Matrix
2510	MIZ105	DM1	Duplicate	Groundwater
2655	MIZ107	0531	Duplicate	Surface Water

**Report Identification Number (RIN) Assigned:** All samples were assigned to RIN 14076345.

**Sample Shipment:** Samples were shipped from Grand Junction via Fed-Ex to the ALS Laboratory Group on July 24, 2014.

**Water Level Measurements:** Water levels were measured at all wells prior to the start of sampling.

**Well Inspection Summary:** All sampled wells were in good condition. In addition, well MAU-05 was inspected for damage, having been reported previously. The well is not currently on the sampling list. Well casing was tipped over along with the concrete footing, and all contents removed. The dedicated tubing appears to have been reinserted into the well from ground level, below the casing and concrete.

**Field Variance:** Turbidity less than 10 NTUs at location NAT08 could not be reached so the sample was filtered through a 0.45 µm filter.

**Equipment:** All equipment functioned properly. Wells were sampled with a peristaltic pump and dedicated tubing. Surface water samples were collected using the peristaltic pump and dedicated tubing that was discarded after use.

**Sampling Method:** Samples were collected according to the *Sampling and Analysis Plan for the U. S. Department of Energy Office of Legacy Management Sites (LMS/PLN/S04351, continually updated)*.

**Additional Information:** Monitoring well location MAU-07 was positively identified following concerns over mislabeled well ID's and past sampling from the incorrect well. Well MAU-04 shows signs of previous mislabeling (as MAU-07), but had been corrected prior to this trip.

**Well Development Information:** All sampled wells were developed to less than 10 NTUs (unless otherwise specified) 1 day prior to sampling. The well development log is attached.

**Regulatory:** N/A

**Institutional Controls:** No issues identified.

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

**Fences, Gates, Locks:** Private gate and non-DOE lock blocking access to well 0715, located on east side of river. All appeared to be in working condition.

**Trespassing/Site Disturbances:** None.

**Site Issues:**

**Vegetation/Noxious Weed Concerns:** River access at surface collection points is difficult due to thick vegetative overgrowth.

**Maintenance Requirements:** None observed.

**Access Issues:** Access to monitoring well 0715 was blocked by a locked gate.

**Safety Issues:** None

**Corrective Action Taken:** None.

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

### Well Development Log

Site Nalvita Processing Site

Date 7/22/14

Well ID	Arrival Time	Initial Water Level (ft bte)	Number of Well Surges	Final Turbidity (NTUs)	Cumulative Volume (gallons) L	Flow Rate (gpm) <del>l/min</del>	Comments
DF18	1030	11.65	11	11.9	350	2.7	Platcan @ 12 NTUs
NAT 01	1300	11.77	11	5.61	15	0.25	
NAT 26	1245	17.34	11	0.32	72	1.2	
NAT 08	1310	8.00	11	61.5	118	0.2	Also purged 6 hrs @ 200 ml/min op.
NAT 02	1400	7.68	11	4.25	108	1.2	
MAU 08	1430	11.73	11	4.50	150	1.0	
DMI	1600	7.65	11	5.74	75	1.0	
MAU 07	1020	8.35	11	15.7	65	0.5	Platcan @ 16 NTUs

7/23

7/23/14

Conducted by DA

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