

# Data Validation Package

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September 2012  
Surface Water Sampling at the  
Durango, Colorado, Processing Site

December 2012



U.S. DEPARTMENT OF  
**ENERGY**

Legacy  
Management

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# Sampling Event Summary

**Site:** Durango, Colorado, Processing Site

**Sampling Period:** September 18, 2012

Annual surface water sampling was conducted at the Durango, Colorado, Processing sites as specified in the applicable site documents. Sampling and analysis were conducted as specified in the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites* (LMS/PLN/S04351, continually updated). A sample was not collected from the South Creek location (0588) because the creek was dry.

The 2011 *Long-Term Surveillance Plan for the Durango Disposal Site, Durango, Colorado*, requires annual monitoring to verify the performance of the disposal cell.

The 2003 *Preliminary Final Ground Water Compliance Action Plan for the Durango, Colorado, UMTRA Project Site* requires annual monitoring of groundwater and surface water from the Mill Tailings area to determine progress of the natural flushing process in meeting compliance standards. Groundwater and surface water samples are also collected at the Raffinate Pond area as a best management practice to monitor selenium and uranium concentrations.

This was a surface water only sampling event, the groundwater locations were sampled in June 2012.

Surface water contaminant concentrations were compared to the values obtained at an upgradient location on the Animas River (0652). Surface water results from Animas River locations adjacent to and downstream of the processing site were compared to statistical benchmark values derived using historical data from location 0652. As shown in Table 1, no benchmark values were exceeded at these locations, which indicates that the natural flushing strategy is not adversely affecting water quality in the Animas River.

*Table 1. Comparison of Animas River Concentrations to Benchmarks*

<b>Analyte</b>	<b>Benchmark at 0652</b>	<b>0652</b>	<b>0584</b>	<b>0586</b>	<b>0654</b>	<b>0656</b>	<b>0691</b>
Cadmium	0.0020	0.00014	0.00013	0.00013	ND	0.00011	0.00012
Molybdenum	0.010	0.0019	0.0020	0.0020	0.0020	0.0020	0.0020
Selenium	0.005	ND	ND	ND	ND	ND	ND
Uranium	0.0018	0.0016	0.0017	0.0017	0.0017	0.0017	0.0017

Concentrations are in milligrams per liter (mg/L).  
ND: Not Detected

Although not exceeding the benchmark value, historically high values for uranium concentrations were observed at all locations. The measured values for alkalinity and specific conductance were also historically high at most of these locations. The historically high values observed may be due to the low discharge rates of the Animas River at the time of sampling.



Cassie Gauthier  
Site Lead, S.M. Stoller Corporation

12/17/12

Date



<b>LEGEND</b> ■ SURFACE LOCATION TO BE SAMPLED ○ EXISTING WELL - - - SITE BOUNDARY		<b>U.S. DEPARTMENT OF ENERGY</b> <small>GRAND JUNCTION, COLORADO</small>	<small>Work Performed by</small> <b>S.M. Stoller Corporation</b> <small>Under DOE Contract No. DE-AM01-07LM00060</small>
		<b>Planned Sampling Map</b> <b>Durango, CO, Processing Sites</b> <b>June 2012</b>	
<small>DATE PREPARED:</small> August 15, 2012		<small>FILENAME:</small> S0932300	

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*Durango, 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>	Durango, Colorado, Processing Site	<b>Date(s) of Water Sampling</b>	September 18, 2012
<b>Date(s) of Verification</b>	November 27, 2012	<b>Name of Verifier</b>	Stephen Donovan

	Response (Yes, No, NA)	Comments
1. Is the SAP the primary document directing field procedures? List other documents, SOPs, instructions.	Yes	Work Order letter dated August 16, 2012.
2. Were the sampling locations specified in the planning documents sampled?	No	Location 0588 was not sampled because South Creek was dry.
3. Was a pre-trip calibration conducted as specified in the above-named documents?	Yes	Pre-trip calibration was performed on September 14, 2012.
4. Was an operational check of the field equipment conducted daily? Did the operational checks meet criteria?	Yes Yes	Two operational checks were performed on September 18, 2012.
5. Were the number and types (alkalinity, temperature, specific conductance, pH, turbidity, DO, ORP) of field measurements taken as specified?	Yes	
6. Was the category of the well documented?	NA	Only surface water locations were sampled.
7. Were the following conditions met when purging a Category I well: Was one pump/tubing volume purged prior to sampling? Did the water level stabilize prior to sampling? Did pH, specific conductance, and turbidity measurements stabilize prior to sampling? Was the flow rate less than 500 mL/min? If a portable pump was used, was there a 4-hour delay between pump installation and sampling?		

### 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?		
9. Were duplicates taken at a frequency of one per 20 samples?	Yes	A duplicate sample was collected at location DUR01-0652.
10. Were equipment blanks taken at a frequency of one per 20 samples that were collected with non-dedicated equipment?	NA	Dedicated equipment was used to collect all samples.
11. Were trip blanks prepared and included with each shipment of VOC samples?	NA	
12. Were QC samples assigned a fictitious site identification number? Was the true identity of the samples recorded on the Quality Assurance Sample Log or in the Field Data Collection System (FDSC) report?	Yes	Location ID 2400 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. Are field data sheets signed and dated by both team members (hardcopies) or are dates present for the "Date Signed" fields (FDSC)?	Yes	
18. Was all other pertinent information documented on the field data sheets?	Yes	
19. Was the presence or absence of ice in the cooler documented at every sample location?	NA	Sample chilling was not required.
20. Were water levels measured at the locations specified in the planning documents?	NA	

## Laboratory Performance Assessment

### General Information

Report Number (RIN): 12094840  
Sample Event: September 18, 2012  
Site(s): Durango, Colorado  
Laboratory: GEL Laboratories  
Work Order No.: 311529  
Analysis: Metals  
Validator: Stephen Donivan  
Review Date: November 26, 2012

This validation was performed according to the *Environmental Procedures Catalog* (LMS/PRO/S04325, continually updated), "Standard Practice for Validation of Laboratory Data." The procedure was applied at Level 3, Data Validation. See attached Data Validation Worksheets for supporting documentation of the data review and validation. All analyses were successfully completed. The samples were prepared and analyzed using accepted procedures based on methods specified by line item code, which are listed in Table 1.

Table 1. Analytes and Methods

Analyte	Line Item Code	Prep Method	Analytical Method
Metals, Cd, Mo, Se, U	LMM-02	SW-846 3005A	SW-846 6020A

### Data Qualifier Summary

None of the analytical results required qualification.

### Sample Shipping/Receiving

GEL Laboratories in Charleston, South Carolina, received seven water samples on September 20, 2012, accompanied by a Chain of Custody form. The receiving documentation included copies of the shipping labels listing of the air waybill numbers. The 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 form had no errors or omissions.

### Preservation and Holding Times

The sample shipment was received intact at ambient temperature which complies with requirements. All samples were received in the correct container types and had been preserved correctly for the requested analyses. 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 reported MDLs for all analytes demonstrate compliance with contractual requirements.

## Laboratory Instrument Calibration

Compliance requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for all analytes. Initial calibration demonstrates that the instrument is capable of acceptable performance in the beginning of the analytical run 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 SW-846 6020A*

Calibrations for cadmium, molybdenum, selenium, and uranium were performed on October 13, 2012, using two calibration standards. Initial and continuing calibration verification checks were made at the required frequency resulting in five verification checks. All calibration checks met the acceptance criteria. Reporting limit verification checks were made at the required frequency to verify the linearity of the calibration curve near the PQL and all results were within the acceptance range. 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 MDLs for all analytes.

## Inductively Coupled Plasma (ICP) Interference Check Sample (ICS) Analysis

ICP interference check samples ICSA and ICSAB were analyzed at the required frequency to verify the instrumental interelement and background correction factors. All check sample results met the acceptance criteria.

## Matrix Spike Analysis

Matrix spike and matrix spike duplicate (MS/MSD) samples are used to measure method performance in the sample matrix. The MS/MSD data are not evaluated when the concentration

of the unspiked sample is greater than 4 times the spike concentration. The spikes met the recovery and precision criteria for all analytes evaluated.

#### Laboratory Replicate Analysis

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

#### Laboratory Control Sample

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

#### Metals Serial Dilution

Serial dilutions were prepared and analyzed for the metals analyses to monitor chemical or physical interferences in the sample matrix. Serial dilution data are evaluated when the concentration of the undiluted sample is greater than 50 times the MDL. The serial dilution data met the acceptance criteria for all data evaluated.

#### Dilutions

Sample dilutions were not required.

#### 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 received arrived on October 19, 2012. 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: 12094840 Lab Code: GEN Validator: Steve Donovan Validation Date: 11/26/2012  
Project: Durango Analysis Type:  Metals  General Chem  Rad  Organics  
# of Samples: 7 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.

There are 0 detection limit failures.

There was 1 duplicate evaluated.



**SAMPLE MANAGEMENT SYSTEM**

**Metals Data Validation Worksheet**

RIN: 12094840

Lab Code: GEN

Date Due: 10/18/2012

Matrix: Water

Site Code: DUR01

Date Completed: 10/19/2012

Analyte	Method Type	Date Analyzed	CALIBRATION						Method Blank	LCS %R	MS %R	MSD %R	Dup. RPD	ICSAB %R	Serial Dil. %R	CRI %R
			Int.	R^2	ICV	CCV	ICB	CCB								
Cadmium	ICP/MS	10/13/2012			OK	OK	OK	OK	OK	105.0	107.0			102.0		108.0
Molybdenum	ICP/MS	10/13/2012			OK	OK	OK	OK	OK	102.0	105.0		6.0	102.0		121.0
Selenium	ICP/MS	10/13/2012			OK	OK	OK	OK	OK	99.4	105.0			103.0		121.0
Uranium	ICP/MS	10/13/2012			OK	OK	OK	OK	OK	113.0	114.0		3.0	107.0	1.2	114.0

## **Sampling Quality Control Assessment**

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

### Sampling Protocol

This was a surface water only sampling event. All samples were collected by container immersion.

### Equipment Blank Assessment

An equipment blank was not required.

### 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 less than 5 times the PQL, the range should be no greater than the PQL. A duplicate sample was collected from location DUR01-0652. The duplicate results met the acceptance criteria demonstrating acceptable overall precision.

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

RIN: 12094840    Lab Code: GEN    Project: Durango    Validation Date: 11/26/2012

Duplicate: 2400

Sample: 0652

Analyte	Sample				Duplicate				RPD	RER	Units
	Result	Flag	Error	Dilution	Result	Flag	Error	Dilution			
Cadmium	0.143	B		1.00	0.161	B		1.00			ug/L
Molybdenum	1.89	B		1.00	2.01	B		1.00	6.15		ug/L
Selenium	1.50	U		1.00	1.50	U		1.00			ug/L
Uranium	1.58			1.00	1.65			1.00	4.33		ug/L

## Certification

All laboratory analytical quality control criteria were met except as qualified in this report. The data qualifiers listed on the environmental 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

12/11/12  
Date

Data Validation Lead:

Stephen Donovan  
Stephen Donovan

12-11-12  
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 uranium concentrations were identified as potentially anomalous at all locations sampled. These locations also had one or more field measurement values identified as potentially anomalous. The historically high values observed are attributed to the low discharge rate for the Animas River. The average discharge rate for the month of September was 171 cubic feet per second, the lowest rate ever observed for the month of September. There were no errors identified associated with these data and the data for this RIN are acceptable as qualified.

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

**Comparison: All historical Data Beginning 1/1/2002**

Laboratory: GEL Laboratories

RIN: 12094840

Report Date: 11/27/2012

Site Code	Location Code	Sample ID	Sample Date	Analyte	Current			Historical Maximum			Historical Minimum			Number of Data Points		Statistical Outlier
					Result	Qualifiers Lab Data		Result	Qualifiers Lab Data		Result	Qualifiers Lab Data		N	N Below Detect	
DUR01	0584	N001	09/18/2012	Molybdenum	0.00202	B		0.002	U		0.00042	B	U	10	8	No
DUR01	0584	N001	09/18/2012	Uranium	0.00165			0.0005		J	0.0001	U		10	3	Yes
DUR01	0586	N001	09/18/2012	Uranium	0.00167			0.00052			0.0001	U		10	3	Yes
DUR01	0652	N001	09/18/2012	Uranium	0.00158			0.00054			0.0001	U		11	3	Yes
DUR01	0691	N001	09/18/2012	Molybdenum	0.00204	B		0.002	U		0.00026	B		10	8	No
DUR01	0691	N001	09/18/2012	Uranium	0.00171			0.0005		J	0.0001	U		10	4	Yes
DUR02	0654	N001	09/18/2012	Molybdenum	0.00204	B		0.002	U		0.00032	B	U	10	7	No
DUR02	0654	N001	09/18/2012	Uranium	0.0017			0.00063			0.0001	U		10	2	Yes
DUR02	0656	N001	09/18/2012	Cadmium	0.00011	B		0.00056	B	U	0.00013	B		10	5	No
DUR02	0656	N001	09/18/2012	Uranium	0.00165			0.0005		J	0.0001	U		10	2	Yes

**Data Validation Outliers Report - Field Parameters Only**

**Comparison: All historical Data Beginning 1/1/2002**

Laboratory: Field Measurements

RIN: 12094840

Report Date: 11/27/2012

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			
DUR01	0584	N001	09/18/2012	Oxidation Reduction Potential	230			195			-131.4			10	0	Yes
DUR01	0584	N001	09/18/2012	Specific Conductance	760			371			1			10	0	Yes
DUR01	0586	N001	09/18/2012	Alkalinity, Total (as CaCO <sub>3</sub> )	250			77			24			10	0	Yes
DUR01	0586	N001	09/18/2012	Specific Conductance	760			373			153			10	0	Yes
DUR01	0652	N001	09/18/2012	Alkalinity, Total (as CaCO <sub>3</sub> )	191			76			16			10	0	Yes
DUR01	0652	N001	09/18/2012	Specific Conductance	780			363			143			10	0	Yes
DUR01	0652	N001	09/18/2012	Turbidity	5.37			120			5.64			7	0	No
DUR01	0691	N001	09/18/2012	Alkalinity, Total (as CaCO <sub>3</sub> )	135			85			36			10	0	Yes
DUR01	0691	N001	09/18/2012	Oxidation Reduction Potential	225			190			-146.8			10	0	No
DUR01	0691	N001	09/18/2012	Specific Conductance	745			374			155			10	0	Yes
DUR02	0654	N001	09/18/2012	Alkalinity, Total (as CaCO <sub>3</sub> )	130			74			18			10	0	Yes
DUR02	0654	N001	09/18/2012	Oxidation Reduction Potential	205			175.5			-111.7			10	0	No
DUR02	0654	N001	09/18/2012	Specific Conductance	750			349			154			10	0	Yes
DUR02	0656	N001	09/18/2012	Alkalinity, Total (as CaCO <sub>3</sub> )	215			79			28			10	0	Yes
DUR02	0656	N001	09/18/2012	Oxidation Reduction Potential	230			204			-141			10	0	No
DUR02	0656	N001	09/18/2012	Specific Conductance	755			374			146			10	0	Yes

**STATISTICAL TESTS:**

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

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

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

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

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# **Attachment 2**

## **Data Presentation**

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## **Surface Water Quality Data**

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**Surface Water Quality Data by Location (USEE102) FOR SITE DUR01, Durango Mill Tailings Process Site**

REPORT DATE: 11/27/2012

Location: 0584 SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID		Lab	Data QA		
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	09/18/2012	N001	95		#		
Cadmium	mg/L	09/18/2012	N001	0.00013	B	#	0.00011	
Molybdenum	mg/L	09/18/2012	N001	0.00202	B	#	0.000165	
Oxidation Reduction Potential	mV	09/18/2012	N001	230		#		
pH	s.u.	09/18/2012	N001	8.04		#		
Selenium	mg/L	09/18/2012	N001	0.0015	U	#	0.0015	
Specific Conductance	umhos/cm	09/18/2012	N001	760		#		
Temperature	C	09/18/2012	N001	10.7		#		
Turbidity	NTU	09/18/2012	N001	7.38		#		
Uranium	mg/L	09/18/2012	N001	0.00165		#	0.000067	

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**Surface Water Quality Data by Location (USEE102) FOR SITE DUR01, Durango Mill Tailings Process Site**

REPORT DATE: 11/27/2012

Location: 0586 SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID		Lab	Data QA		
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	09/18/2012	N001	250		#		
Cadmium	mg/L	09/18/2012	N001	0.000125	B	#	0.00011	
Molybdenum	mg/L	09/18/2012	N001	0.002	B	#	0.000165	
Oxidation Reduction Potential	mV	09/18/2012	N001	200		#		
pH	s.u.	09/18/2012	N001	8.16		#		
Selenium	mg/L	09/18/2012	N001	0.0015	U	#	0.0015	
Specific Conductance	umhos/cm	09/18/2012	N001	760		#		
Temperature	C	09/18/2012	N001	11		#		
Turbidity	NTU	09/18/2012	N001	7.12		#		
Uranium	mg/L	09/18/2012	N001	0.00167		#	0.000067	

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**Surface Water Quality Data by Location (USEE102) FOR SITE DUR01, Durango Mill Tailings Process Site**

REPORT DATE: 11/27/2012

Location: 0652 SURFACE LOCATION SURFACE WATER AND SED.

Parameter	Units	Sample		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID		Lab	Data QA		
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	09/18/2012	N001	191		#		
Cadmium	mg/L	09/18/2012	N001	0.000143	B	#	0.00011	
Cadmium	mg/L	09/18/2012	N002	0.000161	B	#	0.00011	
Molybdenum	mg/L	09/18/2012	N001	0.00189	B	#	0.000165	
Molybdenum	mg/L	09/18/2012	N002	0.00201	B	#	0.000165	
Oxidation Reduction Potential	mV	09/18/2012	N001	200		#		
pH	s.u.	09/18/2012	N001	7.87		#		
Selenium	mg/L	09/18/2012	N001	0.0015	U	#	0.0015	
Selenium	mg/L	09/18/2012	N002	0.0015	U	#	0.0015	
Specific Conductance	umhos/cm	09/18/2012	N001	780		#		
Temperature	C	09/18/2012	N001	10.3		#		
Turbidity	NTU	09/18/2012	N001	5.37		#		
Uranium	mg/L	09/18/2012	N001	0.00158		#	0.000067	
Uranium	mg/L	09/18/2012	N002	0.00165		#	0.000067	

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**Surface Water Quality Data by Location (USEE102) FOR SITE DUR01, Durango Mill Tailings Process Site**

REPORT DATE: 11/27/2012

Location: 0691 SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID		Lab	Data QA		
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	09/18/2012	N001	135		#		
Cadmium	mg/L	09/18/2012	N001	0.000117	B	#	0.00011	
Molybdenum	mg/L	09/18/2012	N001	0.00204	B	#	0.000165	
Oxidation Reduction Potential	mV	09/18/2012	N001	225		#		
pH	s.u.	09/18/2012	N001	8.15		#		
Selenium	mg/L	09/18/2012	N001	0.0015	U	#	0.0015	
Specific Conductance	umhos/cm	09/18/2012	N001	745		#		
Temperature	C	09/18/2012	N001	10.7		#		
Turbidity	NTU	09/18/2012	N001	6.03		#		
Uranium	mg/L	09/18/2012	N001	0.00171		#	0.000067	

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**Surface Water Quality Data by Location (USEE102) FOR SITE DUR02, Durango Raffinate Pond Process Site**

REPORT DATE: 11/27/2012

Location: 0654 SURFACE LOCATION RESERVED FOR CDAY

Parameter	Units	Sample		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID		Lab	Data	QA		
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	09/18/2012	N001	130			#		
Cadmium	mg/L	09/18/2012	N001	0.00011	U		#	0.00011	
Molybdenum	mg/L	09/18/2012	N001	0.00204	B		#	0.000165	
Oxidation Reduction Potential	mV	09/18/2012	N001	205			#		
pH	s.u.	09/18/2012	N001	8.34			#		
Selenium	mg/L	09/18/2012	N001	0.0015	U		#	0.0015	
Specific Conductance	umhos/cm	09/18/2012	N001	750			#		
Temperature	C	09/18/2012	N001	11.4			#		
Turbidity	NTU	09/18/2012	N001	7.48			#		
Uranium	mg/L	09/18/2012	N001	0.0017			#	0.000067	

**Surface Water Quality Data by Location (USEE102) FOR SITE DUR02, Durango Raffinate Pond Process Site**

REPORT DATE: 11/27/2012

Location: 0656 SURFACE LOCATION RESERVED FOR CDAY

Parameter	Units	Sample		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID		Lab	Data QA		
Alkalinity, Total (as CaCO <sub>3</sub> )	mg/L	09/18/2012	N001	215		#		
Cadmium	mg/L	09/18/2012	N001	0.00011	B	#	0.00011	
Molybdenum	mg/L	09/18/2012	N001	0.00196	B	#	0.000165	
Oxidation Reduction Potential	mV	09/18/2012	N001	230		#		
pH	s.u.	09/18/2012	N001	8.4		#		
Selenium	mg/L	09/18/2012	N001	0.0015	U	#	0.0015	
Specific Conductance	umhos/cm	09/18/2012	N001	755		#		
Temperature	C	09/18/2012	N001	11		#		
Turbidity	NTU	09/18/2012	N001	7.58		#		
Uranium	mg/L	09/18/2012	N001	0.00165		#	0.000067	

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.

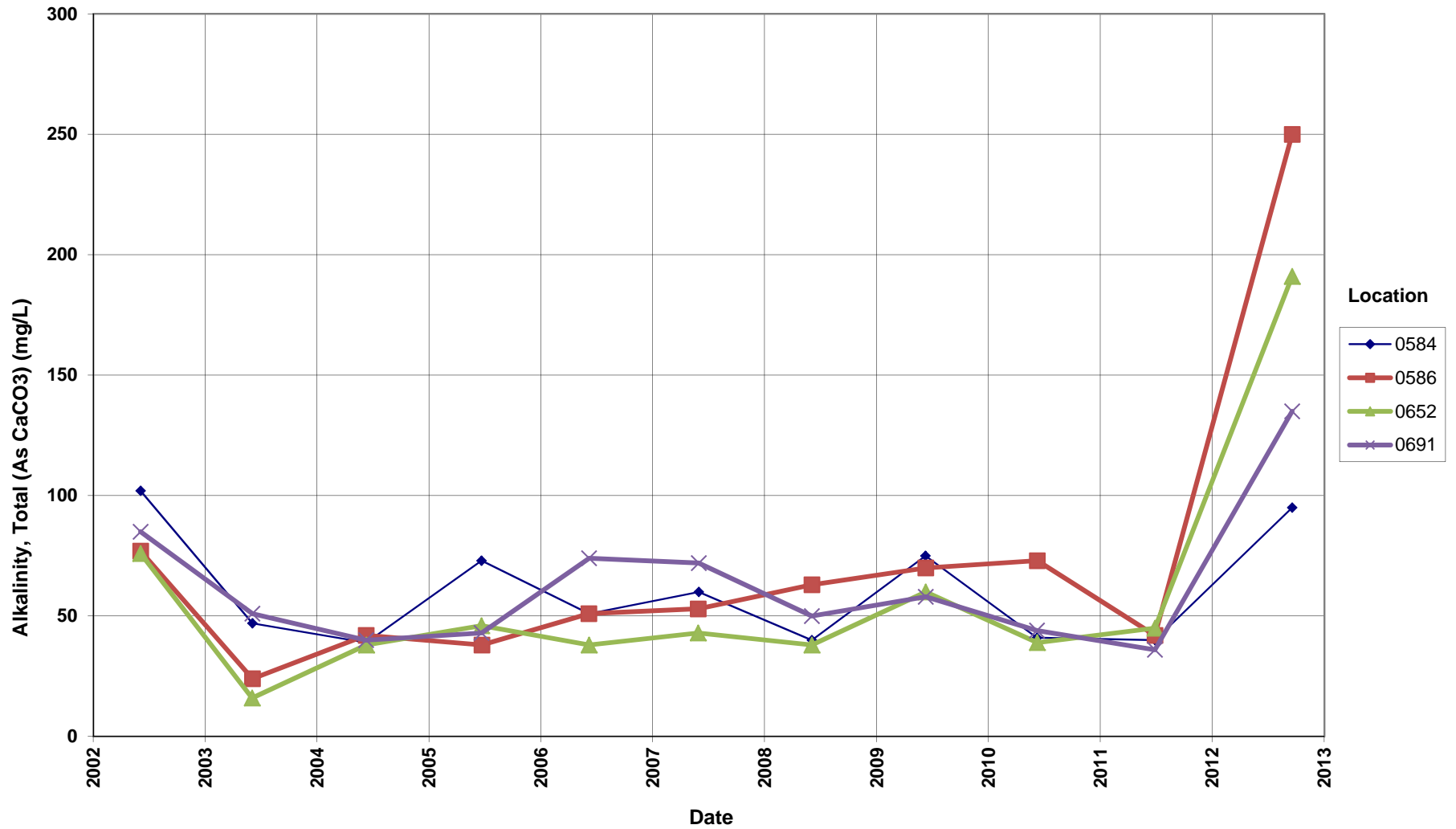
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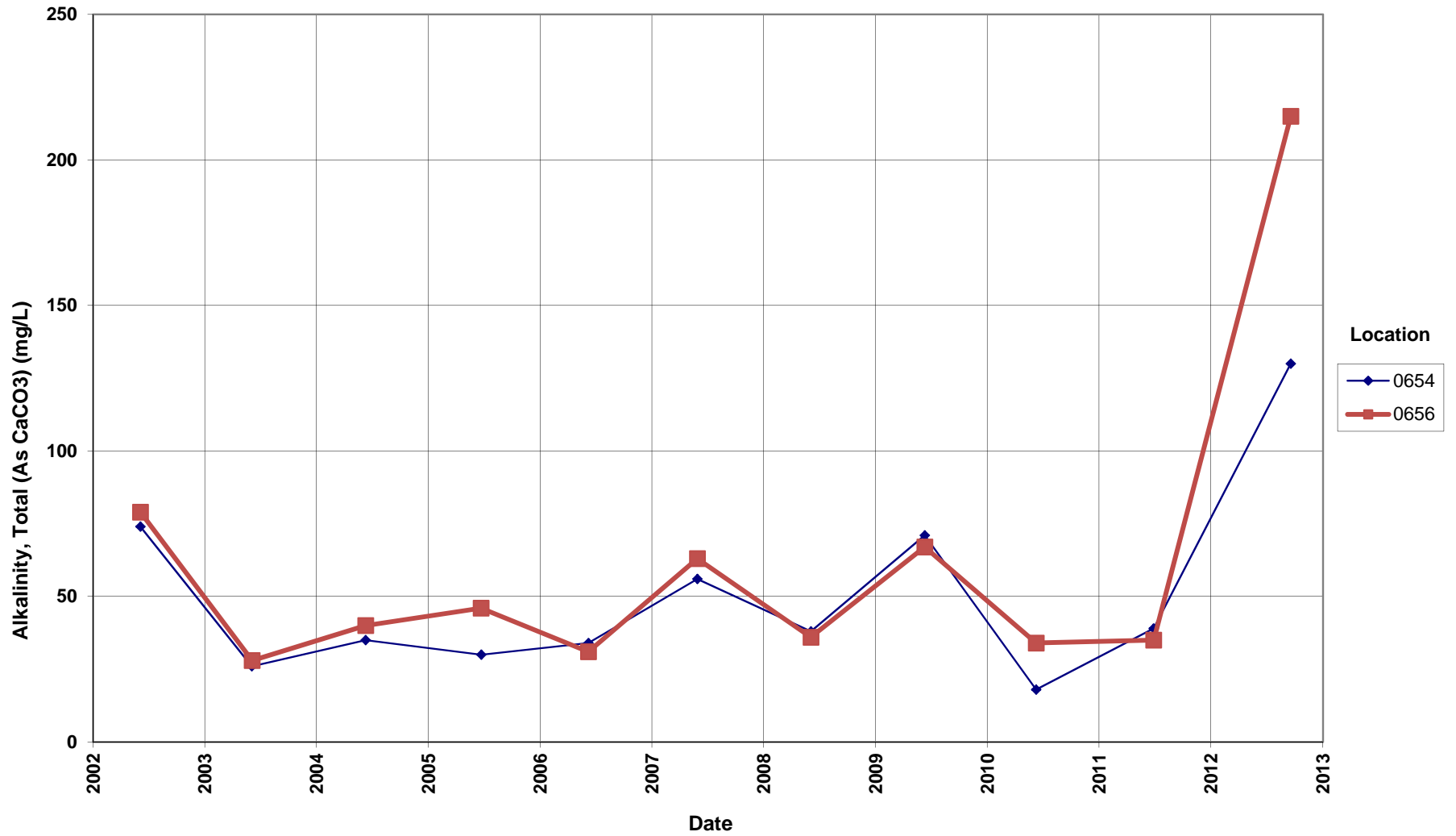
# **Time-Concentration Graphs**

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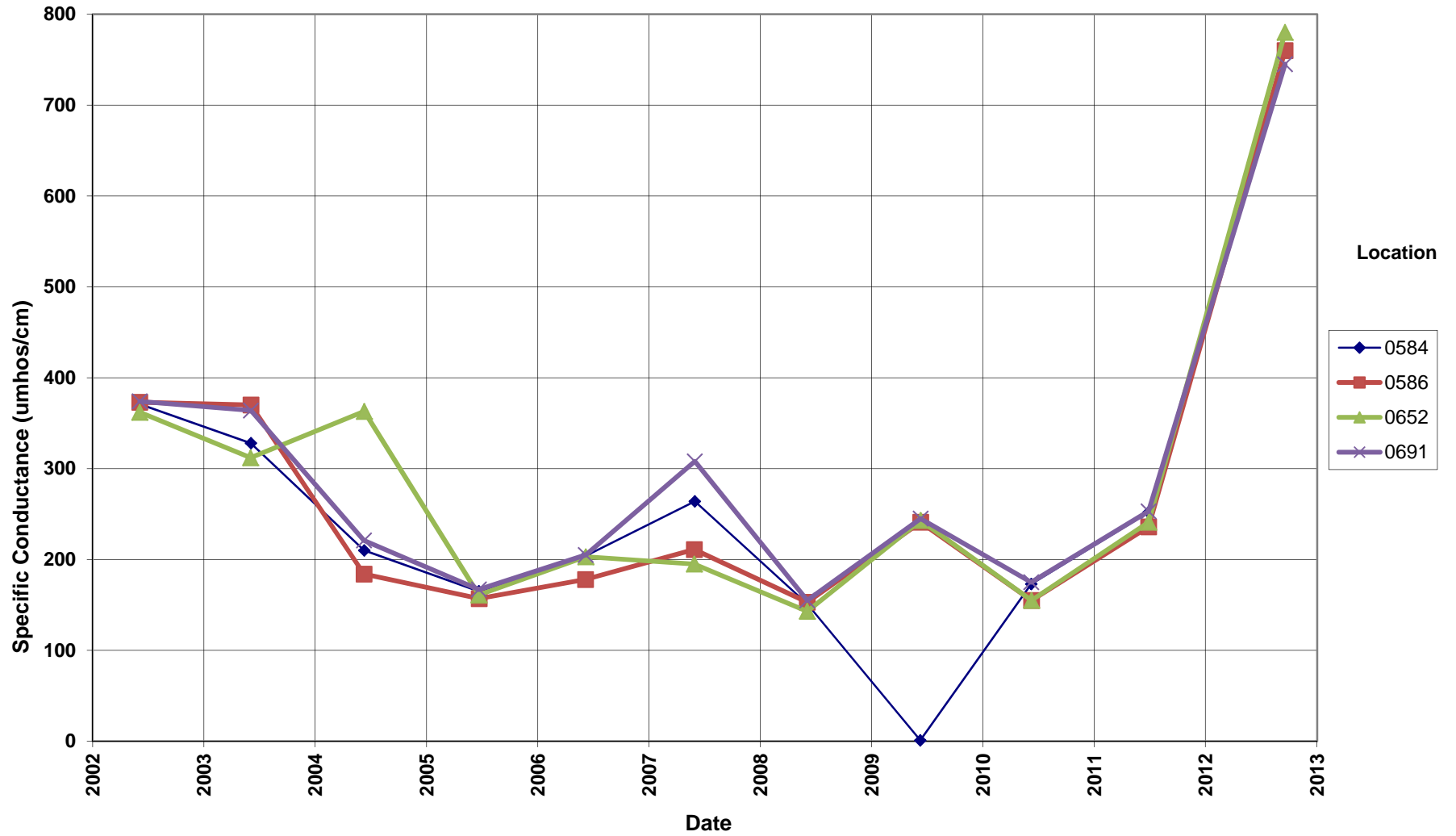
Durango Mill Tailings Process Site  
Alkalinity, Total (As CaCO<sub>3</sub>) Concentration



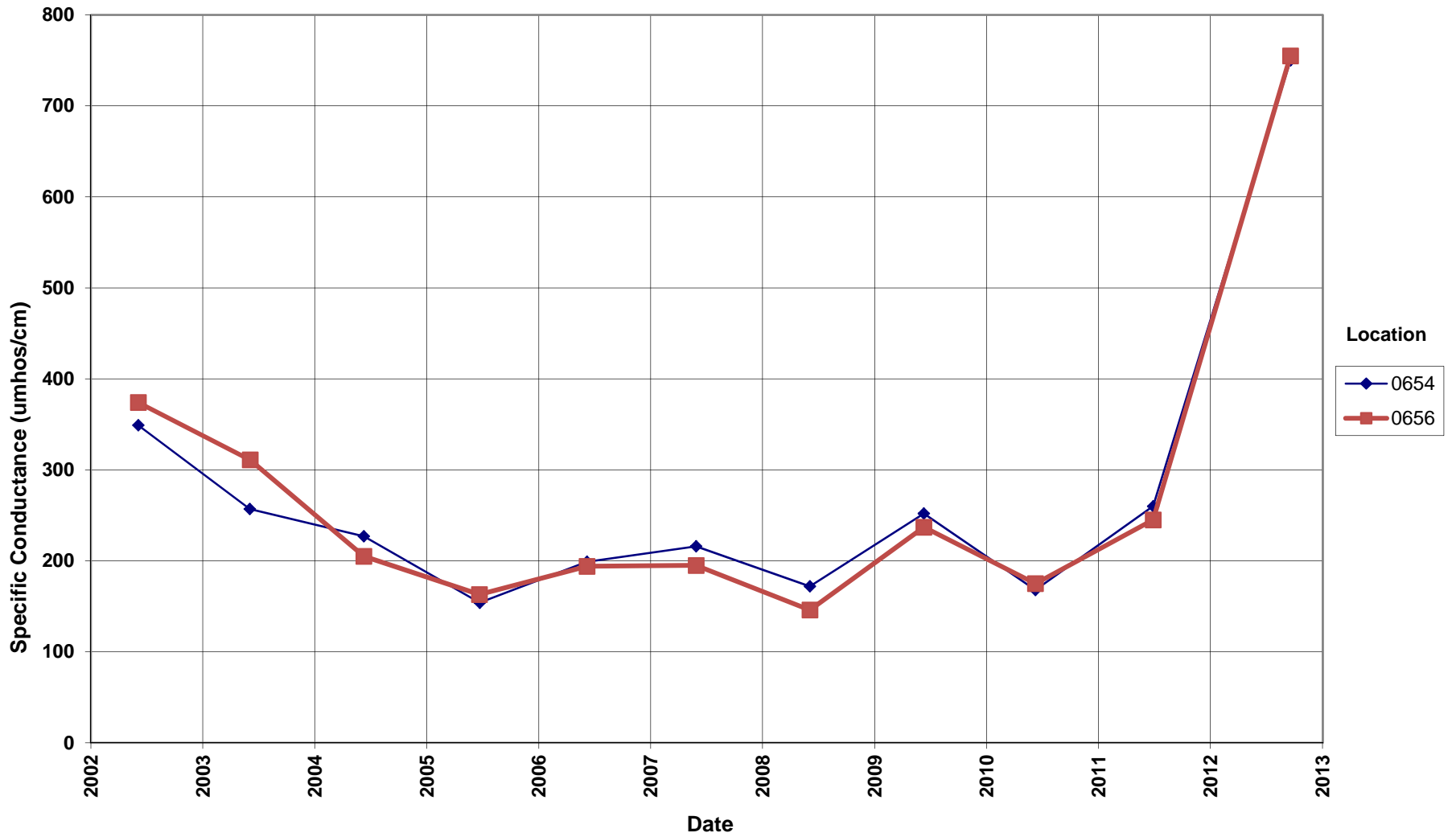
Durango Raffinate Pond Process Site  
Alkalinity, Total (As CaCO<sub>3</sub>) Concentration



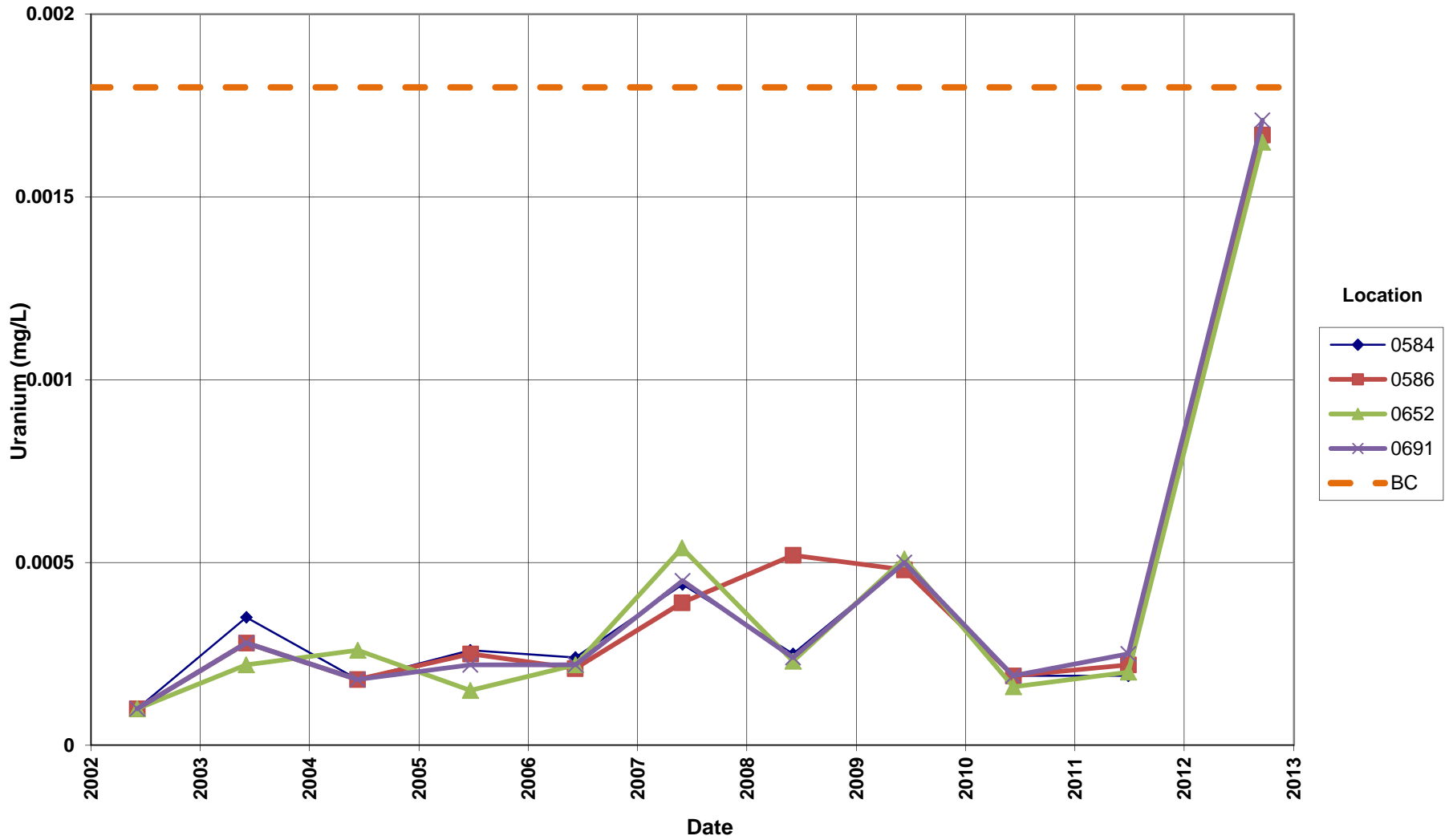
### Durango Mill Tailings Process Site Specific Conductance Concentration



### Durango Raffinate Pond Process Site Specific Conductance Concentration

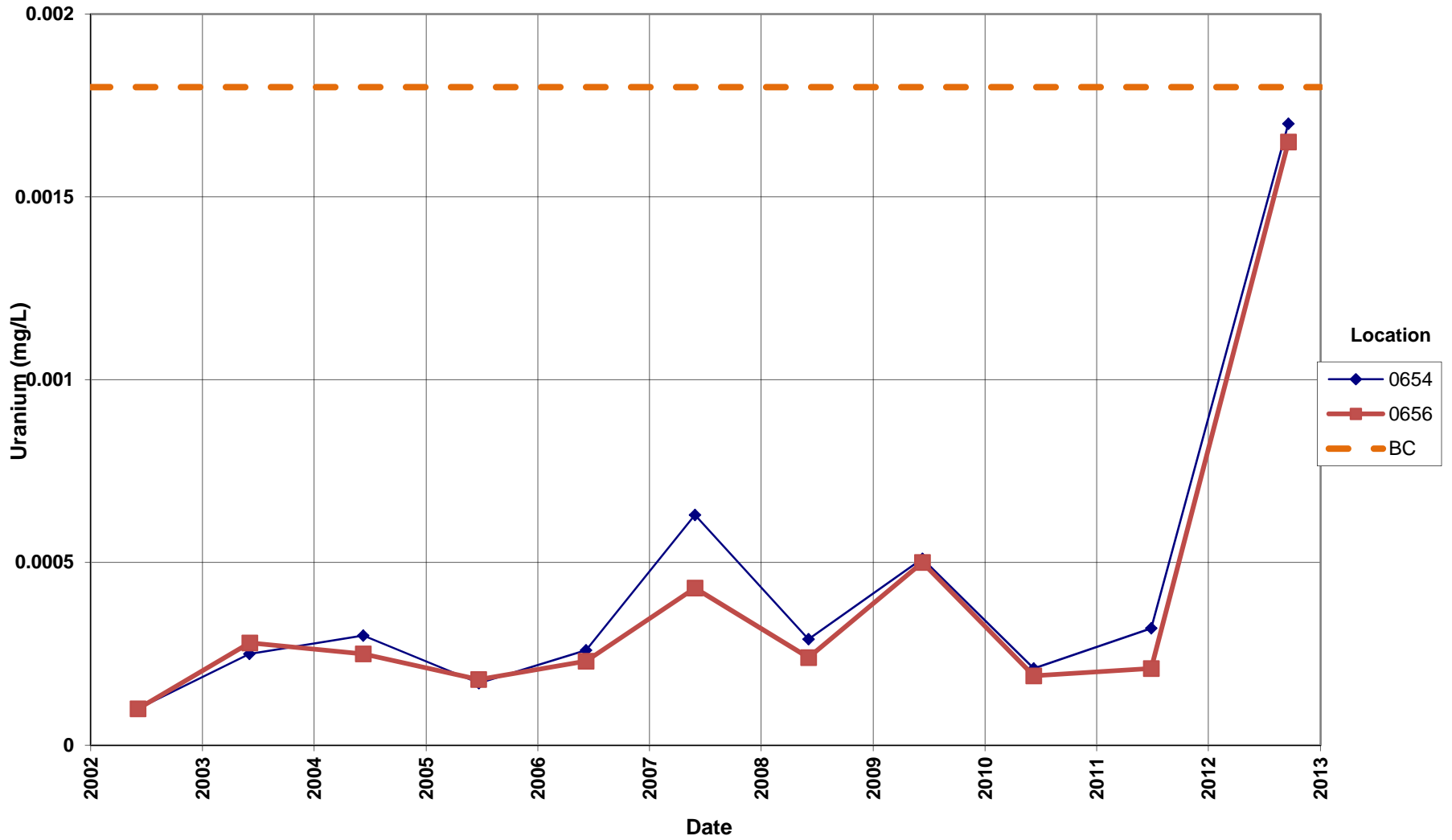


**Durango Mill Tailings Process Site  
Uranium Concentration**  
Benchmark Concentration (BC) = 0.0018 mg/L



# Durango Raffinate Pond Process Site Uranium Concentration

Benchmark Concentration = 0.0018 mg/L





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

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established 1959

Task Order LM00-501  
Control Number 12-0877

August 16, 2012

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

SUBJECT: Contract No. DE-AM01-07LM00060, S.M. Stoller Corporation (Stoller)  
September 2012 Environmental Sampling at the Durango, Colorado,  
Processing Site

REFERENCE: Task Order LM-501-02-104-402, Durango, Colorado, Processing Site

Dear Ms. Dayvault:

The purpose of this letter is to inform you of the upcoming sampling at Durango, Colorado. Enclosed are the maps and tables specifying sample locations and analytes for monitoring at the Durango processing site. Water quality data will be collected from surface locations at this site as part of the routine environmental sampling currently scheduled to begin the week of September 24, 2012. Monitoring wells were sampled in June.

The following list shows surface locations scheduled to be sampled during this event.

**Surface Locations**

DUR01

584	586	652	691
-----	-----	-----	-----

DUR02

588	654	656
-----	-----	-----

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.

Jalena Dayvault  
Control Number 12-0877  
Page 2

Please contact me at (970) 248-6652 if you have any questions or concerns.

Sincerely,



David Miller  
Site Lead

DM/lcg/lb

Enclosures (3)

cc: (electronic)

Karl Stoeckle, DOE  
Steve Donovan, Stoller  
Bev Gallagher, Stoller  
Lauren Goodknight, Stoller  
David Miller, Stoller  
EDD Delivery  
re-grand.junction  
File: DUP 410.02(A)

## Sampling Frequencies for Locations at Durango, Colorado

Location ID	Quarterly	Semiannually	Annually	Biennially	Not Sampled	Notes
<b>Surface Locations</b>						
<i>DUR01 Mill Tailings</i>						
584			X			
586			X			
652			X			RIVER
691			X			RIVER
<i>DUR02 Raffinate Pond</i>						
588			X			
654			X			RIVER
656			X			
Groundwater sampling conducted in June; surface water sampling conducted in September.						

## Constituent Sampling Breakdown

Site	Durango		Required Detection Limit (mg/L)	Analytical Method	Line Item Code
Analyte	Groundwater	Surface Water			
<b>Approx. No. Samples/yr</b>	20	7			
<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 (NH3-N)					
Cadmium	0612 & 0863 only	X	0.001	SW-846 6020	LMM-02
Calcium	DUR03 only		5	SW-846 6010	LMM-01
Chloride	DUR03 only		0.5	SW-846 9056	MIS-A-039
Chromium					
Gross Alpha					
Gross Beta					
Iron	DUR03 only		0.1	SW-846 6020	LMM-01
Lead					
Magnesium	DUR03 only		5	SW-846 6010	LMM-01
Manganese	All Mill Tailings Areas and Bodo Canyon locations		0.005	SW-846 6010	LMM-01
Molybdenum	All Mill Tailings Areas and Bodo Canyon locations	X	0.003	SW-846 6020	LMM-02
Nickel					
Nickel-63					
Nitrate + Nitrite as N (NO3+NO2)-N					
Potassium	DUR03 only		1	SW-846 6010	LMM-01
Radium-226					
Radium-228					
Selenium	X	X	0.0001	SW-846 6020	LMM-02
Silica					
Sodium	DUR03 only		1	SW-846 6010	LMM-01

## Constituent Sampling Breakdown

Site	Durango				
Analyte	Groundwater	Surface Water	Required Detection Limit (mg/L)	Analytical Method	Line Item Code
Strontium					
Sulfate	All Mill Tailings Areas and Bodo Canyon locations		0.5	SW-846 9056	MIS-A-044
Sulfide					
Total Dissolved Solids	DUR03 only		10	SM2540 C	WCH-A-033
Uranium	X	X	0.0001	SW-846 6020	LMM-02
Vanadium					
Zinc					
<b>Total No. of Analytes</b>	13	4			

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

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# **Attachment 4**

## **Trip Report**

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*Memorandum*

DATE: October 16, 2012

TO: David Miller

FROM: Jeff Price

SUBJECT: Trip Report

**Site:** Durango Disposal Cell (Treatment System) and Animas River Sampling

**Dates of Sampling Event:** September 18, 2012

**Team Members:** Kent Moe and Jeff Price

**Number of Locations Sampled:** 3 disposal site monitoring wells; 6 river samples.

**Locations Not Sampled/Reason:** Surface location 0588 was dry.

**Location Specific Information:** Durango site lead instructed samplers to limit analyte list to only Mo, Se, U, and V; and not to sample well 0623.

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

False ID	Ticket Number	True ID	Sample Type	Associated Matrix
2257	KKY 666	0618	Duplicate	Groundwater
2242	KKY 670	0618	Duplicate (ESL)	Groundwater
2400	KKY 680	0652	Duplicate	Surface Water

**RIN Number Assigned:** Samples collected for the ESL were assigned to RIN 12094838; samples sent to GEL Laboratories were assigned to RIN 12094837 and 12094840 for river samples.

**Sample Shipment:** ESL samples were delivered to the ESL by hand on September 19; GEL samples were shipped overnight via FedEx from Grand Junction on September 19.

**Water Level Measurements:** On sampled wells only.

**Well Inspection Summary:** No issues were identified

**Additional Tasks:** None.

**Field Variance:** None.

**Equipment:** All equipment functioned properly.

**Institutional Controls:**

**Fences, Gates, Locks:** All were in working condition.  
**Trespassing/Site Disturbances:** None.

**Site Issues:** None.

**Disposal Cell/Drainage Structure Integrity:** N/A  
**Vegetation/Noxious Weed Concerns:** N/A  
**Maintenance Requirements:** N/A  
**Access Issues:** N/A

**Corrective Action Taken:** N/A

cc: (electronic)  
Jalena Dayvault, DOE  
Steve Donovan, Stoller  
David Miller, Stoller  
EDD Delivery  
rc-grand.junction  
File: DUD 0045.20(A)