

# Data Validation Package

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**June 2009**  
**Groundwater and Surface Water**  
**Sampling at the**  
**Durango, Colorado, Disposal and**  
**Processing Sites**

**September 2009**



**U.S. DEPARTMENT OF**  
**ENERGY**

Legacy  
Management

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## **Attachment 1—Assessment of Anomalous Data**

Potential Outliers

## **Attachment 2—Data Presentation**

Groundwater Quality Data  
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Static Water Level Data  
Time-Concentration Graphs

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# Sampling Event Summary

**Site:** Durango, Colorado, Disposal and Processing Sites

**Sampling Period:** June 9–11, 2009

The 1996 *Long-Term Surveillance Plan (LTSP) for the Bodo Canyon Disposal Site, Durango, Colorado* requires annual monitoring to verify the performance of the disposal cell. Point-of-compliance wells 0607, 0612, 0621, and monitor wells 0605, 0608, 0618, and 0623 were sampled as specified in the plan.

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 were collected at the Raffinate Pond area as a best management practice to monitor selenium and uranium concentrations.

Sampling and analysis was 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). Water levels were measured at each sampled well.

For groundwater samples collected at the disposal site, the concentrations of the indicator parameters (molybdenum, selenium, and uranium) were below their respective U.S. Environmental Protection Agency (EPA) groundwater standard (40 CFR 192) with the following exception. The uranium concentration in well 0618 has been increasing since 2005 and is now 0.065 milligram per liter (mg/L); however, this level is below the LTSP proposed concentration limit of 0.077 mg/L.

For groundwater samples collected at the processing site, EPA groundwater standards for cadmium, molybdenum, and uranium were exceeded in samples collected from monitor wells listed in Table 1 on the following page.

Results from this sampling event are generally consistent with values previously obtained. In reviewing the time-concentration graphs included in this report, selenium concentrations at processing site wells 0617 and 0633 decreased where increases were noted in 2008.

Surface water contaminant concentrations were compared to the values obtained at upgradient locations on the Animas River (0652) and South Creek (0588). The uranium concentration (0.018 mg/L) from location 0588 is an indicator of the quality of water entering the site. 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 2, no benchmark values were exceeded during this event, which indicates that the natural flushing strategy is not adversely affecting water quality in the Animas River.

Table 1. Durango Processing Site Wells Exceeding EPA Standards in June 2009

Analyte	Standard <sup>a</sup>	Cleanup Goal <sup>c</sup>	Site Code <sup>b</sup>	Location	Concentration (mg/L)
Cadmium	0.01	Not applicable	DUR01	0612	0.042
Selenium	0.01	0.05	DUR01	0617	0.014
				0630	0.033
				0633	0.048
Selenium	0.01	0.05	DUR02	0594	0.01
				0598	0.24
				0607	0.23
				0884	0.84
Uranium	0.044	Not applicable	DUR01	0612	1.10
				0617	0.15
				0630	0.29
				0631	0.11
				0633	0.92
Uranium	0.044	Not applicable	DUR02	0634	0.11
				0594	0.063
				0598	0.110
				0884	0.13

<sup>a</sup>Standards are listed in 40 CFR 192.02 Table 1 to Subpart A; concentrations are in milligrams per liter, mg/L.

<sup>b</sup>DUR01 = Mill Tailings Area; DUR02 = Raffinate Ponds Area.

<sup>c</sup>Cleanup goal for selenium, from the *Preliminary Final Ground Water Compliance Action Plan for the Durango, Colorado, UMTRA Project Site (July 2003)*. Concentrations are in milligrams per liter, mg/L.

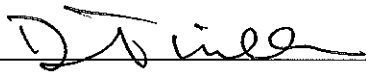
Table 2. Comparison of Animas River Concentrations to Benchmarks

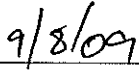
Analyte	Benchmark at 0652	0584	0691	0586	0656	0654
Cadmium	0.0020	0.00012	0.00014	0.00016	0.00013	0.00012
Molybdenum	0.010	ND	ND	ND	ND	ND
Selenium	0.0015 <sup>a</sup>	0.00028	0.00026	0.00023	0.00025	0.00024
Uranium	0.0018	0.00050	0.00050	0.00048	0.00050	0.00051

Concentrations are in milligrams per liter, mg/L.

ND = Not Detected.

<sup>a</sup>Value of the highest historical detection limit.

  
 David Miller  
 Site Lead, S.M. Stoller Corporation

  
 Date





*Durango, Colorado, Disposal Site Sample Location Map*





*Durango, Colorado, Processing Site Sample Location Map*



# **Data Assessment Summary**

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## Water Sampling Field Activities Verification Checklist

<b>Project</b>	<u>Durango, Colorado</u>	<b>Date(s) of Water Sampling</b>	<u>June 9–11, 2009</u>
<b>Date(s) of Verification</b>	<u>July 22, 2009</u>	<b>Name of Verifier</b>	<u>Steve Donovan</u>

	<b>Response (Yes, No, NA)</b>	<b>Comments</b>
1. Is the SAP the primary document directing field procedures? List other documents, SOPs, instructions.	<u>Yes</u>	<u>Work Order Letter dated May 12, 2009.</u>
2. Were the sampling locations specified in the planning documents sampled?	<u>No</u>	<u>Well 0879 could not be sampled because it was not accessible due to storm water runoff.</u>
3. Was a pre-trip calibration conducted as specified in the above-named documents?	<u>Yes</u>	
4. Was an operational check of the field equipment conducted daily? Did the operational checks meet criteria?	<u>Yes</u> <u>Yes</u>	
5. Were the number and types (alkalinity, temperature, specific conductance, pH, turbidity, DO, ORP) of field measurements taken as specified?	<u>Yes</u>	
6. Was the category of the well documented?	<u>Yes</u>	
7. Were the following conditions met when purging a Category I well: Was one pump/tubing volume purged prior to sampling?	<u>Yes</u>	
Did the water level stabilize prior to sampling?	<u>Yes</u>	
Did pH, specific conductance, and turbidity measurements stabilize prior to sampling?	<u>No</u>	<u>Turbidity criteria was not met for well DUR01 0612, sample was filtered.</u>
Was the flow rate less than 500 mL/min?	<u>Yes</u>	
If a portable pump was used, was there a 4-hour delay between pump installation and sampling?	<u>NA</u>	



## Water Sampling Field Activities Verification Checklist (continued)

	Response (Yes, No, NA)	Comments
8. Were the following conditions met when purging a Category II well:		
Was the flow rate less than 500 mL/min?	Yes	
Was one pump/tubing volume removed prior to sampling?	Yes	
9. Were duplicates taken at a frequency of one per 20 samples?	Yes	Duplicates were collected at locations 0652, 0598, and 0605.
10. Were equipment blanks taken at a frequency of one per 20 samples that were collected with nondedicated equipment?	Yes	
11. Were trip blanks prepared and included with each shipment of VOC samples?	NA	
12. Were QC samples assigned a fictitious site identification number?	Yes	
Was the true identity of the samples recorded on the Quality Assurance Sample Log or in the Field Data Collection System (FDCS) report?	Yes	
13. Were samples collected in the containers specified?	Yes	
14. Were samples filtered and preserved as specified?	Yes	
15. Were the number and types of samples collected as specified?	Yes	
16. Were chain of custody records completed and was sample custody maintained?	Yes	
17. Are field data sheets signed and dated by both team members (hardcopies) or are dates present for the "Date Signed" fields (FDCS)?	Yes	
18. Was all other pertinent information documented on the field data sheets?	Yes	
19. Was the presence or absence of ice in the cooler documented at every sample location?	Yes	
20. Were water levels measured at the locations specified in the planning documents?	Yes	

## Laboratory Performance Assessment

### General Information

Report Number (RIN): 09052334  
Sample Event: June 9–11, 2009  
Site(s): Durango, Colorado  
Laboratory: ALS Laboratory Group  
Work Order No.: 0906133  
Analysis: Metals and Wet Chemistry  
Validator: Steve Donovan  
Review Date: July 22, 2009

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 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 3.

*Table 3. Analytes and Methods*

Analyte	Line Item Code	Prep Method	Analytical Method
Chloride	MIS-A-039	SW-846 9056	SW-846 9056
Metals, Ca, Fe, K, Mg, Mn, Na	LMM-01	SW-846 3005A	SW-846 6010B
Metals, Cd, Mo, Se, U	LMM-02	SW-846 3005A	SW-846 6020A
Sulfate	MIS-A-044	SW-846 9056	SW-846 9056
Total Dissolved Solids	WCH-B-033	MCAWW 160.1	MCAWW 160.1

### Data Qualifier Summary

Analytical results were qualified as listed in Table 4. Refer to the sections below for an explanation of the data qualifiers applied.

Table 4. Data Qualifier Summary

Sample Number	Location	Analyte(s)	Flag	Reason
0906133-01	0584	Molybdenum	U	Less than 5 times the calibration blank
0906133-01	0584	Uranium	J	Uranium detected in equipment blank
0906133-02	0586	Molybdenum	U	Less than 5 times the calibration blank
0906133-02	0586	Uranium	J	Uranium detected in equipment blank
0906133-03	0588	Molybdenum	U	Less than 5 times the calibration blank
0906133-03	0588	Uranium	J	Uranium detected in equipment blank
0906133-06	0605	Selenium	U	Less than 5 times the method blank
0906133-06	0605	Molybdenum	U	Less than 5 times the calibration blank
0906133-08	0607	Molybdenum	U	Less than 5 times the calibration blank
0906133-08	0607	Selenium	U	Less than 5 times the method blank
0906133-09	0608	Molybdenum	U	Less than 5 times the calibration blank
0906133-11	0612	Iron	U	Less than 5 times the calibration blank
0906133-11	0612	Molybdenum	U	Less than 5 times the calibration blank
0906133-11	0612	Selenium	U	Less than 5 times the method blank
0906133-13	0618	Iron	U	Less than 5 times the calibration blank
0906133-13	0618	Molybdenum	U	Less than 5 times the calibration blank
0906133-14	0621	Molybdenum	U	Less than 5 times the calibration blank
0906133-14	0621	Selenium	U	Less than 5 times the method blank
0906133-14	0621	Uranium	U	Less than 5 times the calibration blank
0906133-15	0623	Molybdenum	U	Less than 5 times the calibration blank
0906133-21	0652	Molybdenum	U	Less than 5 times the calibration blank
0906133-21	0652	Uranium	J	Uranium detected in equipment blank
0906133-22	0654	Molybdenum	U	Less than 5 times the calibration blank
0906133-22	0654	Uranium	J	Uranium detected in equipment blank
0906133-23	0656	Molybdenum	U	Less than 5 times the calibration blank
0906133-23	0656	Uranium	J	Uranium detected in equipment blank
0906133-24	0691	Molybdenum	U	Less than 5 times the calibration blank
0906133-24	0691	Uranium	J	Uranium detected in equipment blank
0906133-25	0863	Molybdenum	U	Less than 5 times the calibration blank
0906133-25	0863	Selenium	U	Less than 5 times the method blank
0906133-27	0605 Duplicate	Molybdenum	U	Less than 5 times the calibration blank
0906133-27	0605 Duplicate	Selenium	U	Less than 5 times the method blank
0906133-27	0605 Duplicate	Uranium	U	Less than 5 times the calibration blank
0906133-29	Equipment Blank	Molybdenum	U	Less than 5 times the calibration blank
0906133-29	Equipment Blank	Selenium	U	Less than 5 times the method blank
0906133-30	0652 Duplicate	Molybdenum	U	Less than 5 times the calibration blank

### Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado, received 30 water samples on June 12, 2009, accompanied by a Chain of Custody (COC) form. The receiving documentation included copies of the shipping labels listing the air waybill numbers. The COC form was checked to confirm that all of the samples were listed with sample collection dates and times, and that signatures and



dates were present indicating sample relinquishment and receipt. The COC form had no errors or omissions with the following exceptions. There was no collection date/time listed for sample HHS 725. There were no analytes listed for HHS 726. The filtration status of samples HGZ 992, HGZ 981, and HGZ 995 was not completed. These issues were resolved via email during sample login.

### Preservation and Holding Times

The sample shipment was received cool and intact with temperatures inside the iced cooler at 1.6 °C, 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.

### Laboratory Instrument Calibration

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

#### *Method SW-846 6010B*

Calibrations for calcium, iron, magnesium, manganese, potassium, and sodium were performed on June 17, 2009, using single point calibrations. Calibration and laboratory spike standards were prepared from independent sources. 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 practical quantitation limit and all results were within the acceptance range.

#### *Method SW-846 6020A*

Calibrations for cadmium, molybdenum, selenium, and uranium were performed on June 18, 2009, and for selenium on June 17, 2009, using seven calibration standards. The calibration curve correlation coefficient values were greater than 0.995 and the absolute values of the intercepts were less than 3 times the method detection limits (MDLs). Calibration and laboratory spike standards were prepared from independent sources. Initial and continuing calibration verification checks were made at the required frequency resulting in eight verification checks for cadmium, molybdenum, and uranium, and nine for selenium. All calibration checks met the acceptance criteria. Reporting limit verification checks were made at the required frequency to verify the linearity of the calibration curve near the practical quantitation limit and all results were within the acceptance range. Mass calibration and resolution verifications were performed at the beginning of each analytical run in accordance with the analytical procedure. Internal standard recoveries associated with requested analytes were stable and within acceptable ranges.

#### *Method SW-846 9056*

Initial calibrations were performed for chloride and sulfate using five calibration standards on May 27, 2009. 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 resulting in ten verification checks. All calibration check results were within the acceptance criteria.

#### *Method EPA 160.1*

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

#### Method and Calibration Blanks

Method blanks are analyzed to assess any contamination that may have occurred during sample preparation. Calibration blanks are analyzed to assess instrument contamination prior to and during sample analysis. All method blank and calibration blank results associated with the samples were below the practical quantitation limits for all analytes. In cases where a blank concentration exceeds the MDL, the associated sample results are qualified with a “U” flag (not detected) when the sample result is greater than the MDL but less than 5 times the blank concentration.

For manganese, some blank results were negative and the absolute values were greater than the MDL but less than the practical quantitation limit. All associated results were greater than 5 times the MDL, so no results are qualified.

#### 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. Matrix spikes are not required for sodium, potassium, magnesium, and calcium; these results were evaluated only for acceptable precision.

#### Laboratory Replicate Analysis

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

### Laboratory Control Sample

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

### Metals Serial Dilution

Serial dilutions were prepared and analyzed for magnesium, manganese, potassium, sodium, and uranium to monitor chemical or physical interferences in the sample matrix. The serial dilution results met the acceptance criteria.

### Detection Limits/Dilutions

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

### Completeness

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

### Chromatography Peak Integration

The integration of analyte peaks was reviewed for all ion chromatography data. There were no manual integrations performed and all peak integrations were satisfactory.

### Electronic Data Deliverable (EDD) File

The original EDD file arrived on June 23, 2009. An incorrect date and time sampled was listed for the equipment blank; a revision was requested and received on June 23, 2009. The Sample Management System EDD validation module was used to verify that the EDD file was complete and in compliance with requirements. The module compares the contents of the file to the requested analyses to ensure all and only the requested data are delivered. The contents of the EDD were manually examined to verify that the sample results accurately reflect the data contained in the sample data package.



## SAMPLE MANAGEMENT SYSTEM

### General Data Validation Report

RIN: 09052334 Lab Code: PAR Validator: Steve Donovan Validation Date: 7/21/2009  
Project: Durango Analysis Type: ☒ Metals ☒ General Chem ☐ Rad ☐ Organics  
# of Samples: 30 Matrix: WATER Requested Analysis Completed: Yes

#### Chain of Custody

Present: OK Signed: OK Dated: OK

#### Sample

Integrity: OK Preservation: OK Temperature: OK

#### Select Quality Parameters

- ☒ Holding Times
- ☒ Detection Limits
- ☒ Field/Trip Blanks
- ☒ Field Duplicates

All analyses were completed within the applicable holding times.

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

There was 1 trip/equipment blank evaluated.

There were 3 duplicates evaluated.

# SAMPLE MANAGEMENT SYSTEM

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## Metals Data Validation Worksheet

RIN: 09052334

Lab Code: PAR

Date Due: 7/10/2009

Matrix: Water

Site Code: DUR

Date Completed: 6/24/2009

Analyte	Date Analyzed	CALIBRATION							Method	LCS %R	MS %R	MSD %R	Dup. RPD	ICSAB %R	Serial Dil. %R	CRI %R
		Int.	R^2	ICV	CCV	ICB	CCB	Blank								
CADMIUM	06/18/2009	0.0000	1.0000	OK	OK	OK	OK	OK	101.0					100.0		107.0
CADMIUM	06/18/2009								99.0							
CALCIUM	06/17/2009			OK	OK	OK	OK	OK	102.0	102.0	80.0	4.0		106.0	6.0	107.0
CALCIUM	06/17/2009								100.0					102.0		108.0
IRON	06/17/2009			OK	OK	OK	OK	OK	99.0	88.0	88.0	0.0		104.0	9.0	101.0
IRON	06/17/2009								98.0					101.0		102.0
MAGNESIUM	06/17/2009			OK	OK	OK	OK	OK	103.0	102.0	93.0	3.0		106.0	5.0	105.0
MAGNESIUM	06/17/2009								101.0					103.0		107.0
MANGANESE	06/17/2009			OK	OK	OK	OK	OK	100.0	101.0	99.0	2.0		97.0	4.0	102.0
MANGANESE	06/17/2009								99.0	96.0	94.0	3.0		95.0		103.0
MOLYBDENUM	06/18/2009	0.0000	1.0000	OK	OK	OK	OK	OK	99.0	103.0	102.0	1.0			10.0	108.0
MOLYBDENUM	06/18/2009								97.0	103.0	104.0	0.0		114.0		
POTASSIUM	06/17/2009			OK	OK	OK	OK	OK	96.0	110.0	111.0	1.0				85.0
POTASSIUM	06/17/2009								95.0							86.0
SELENIUM	06/17/2009	0.0000	1.0000	OK	OK	OK	OK	OK	100.0	86.0	86.0	0.0		81.0		83.0
SELENIUM	06/17/2009								100.0	79.0	80.0	1.0				
SODIUM	06/17/2009			OK	OK	OK	OK	OK	97.0	103.0	102.0	0.0			10.0	88.0
SODIUM	06/17/2009								96.0							88.0

# SAMPLE MANAGEMENT SYSTEM

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## Metals Data Validation Worksheet

RIN: 09052334

Lab Code: PAR

Date Due: 7/10/2009

Matrix: Water

Site Code: DUR

Date Completed: 6/24/2009

Analyte	Date Analyzed	CALIBRATION							Method	LCS %R	MS %R	MSD %R	Dup. RPD	ICSAB %R	Serial Dil. %R	CRI %R
		Int.	R^2	ICV	CCV	ICB	CCB	Blank								
URANIUM	06/18/2009	0.0000	1.0000	OK	OK	OK	OK	OK		97.0	108.0	105.0	1.0	108.0	4.0	103.0
URANIUM	06/18/2009									99.0	105.0	104.0	1.0		1.0	

# SAMPLE MANAGEMENT SYSTEM

## Wet Chemistry Data Validation Worksheet

RIN: 09052334

Lab Code: PARDate Due: 7/10/2009

Matrix: Water

Site Code: DURDate Completed: 6/24/2009

Analyte	Date Analyzed	CALIBRATION						Method Blank	LCS %R	MS %R	MSD %R	DUP RPD	Serial Dil. %R
		Int.	R^2	ICV	CCV	ICB	CCB						
CHLORIDE	06/16/2009	0.000	1.0000	OK	OK	OK	OK	OK	98.00				
CHLORIDE	06/19/2009									100.0	97.0	2.00	
SULFATE	06/16/2009	0.000	1.0000	OK	OK	OK	OK	OK	99.00				
SULFATE	06/19/2009									105.0	100.0	2.00	
TOTAL DISSOLVED SOLIDS	06/17/2009							OK	102.00			1.00	

## **Sampling Quality Control Assessment**

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

### **Sampling Protocol**

Sample results for all monitor wells met the Category I or II low-flow sampling criteria and were qualified with an “F” flag in the database, indicating the wells were purged and sampled using the low-flow sampling method.

All wells met the Category I criteria and were sampled with dedicated tubing using the low-flow purge procedure, with the following exceptions:

- Wells DUR01-0630, DUR01-0634, DUR02-0594, DUR02-0607, DUR03-0612, and DUR03-0623 were classified as Category II due to water level drawdown.

The sample results for these six wells were qualified with a “Q” flag, indicating the data are qualitative because of the sampling technique.

Surface water locations were sampled using a peristaltic pump. Monitor wells were sampled using either a peristaltic pump and dedicated tubing or a dedicated bladder pump.

### **Equipment Blank Assessment**

An equipment blank (field ID 2625) was collected after decontamination of the hose reel used to collect the surface water samples. Molybdenum, selenium, and uranium were detected in the blank by the laboratory; molybdenum and selenium were qualified during data validation with a “U” flag as not detected. The associated sample uranium results are qualified with a “J” flag. The equipment blank results indicate adequate decontamination of the sampling equipment.

### **Field Duplicate Assessment**

Field duplicate samples are collected and analyzed as an indication of overall precision of the measurement process. The precision observed includes both field and laboratory precision and has more variability than laboratory duplicates which measure only laboratory performance. Duplicate samples were collected from wells DUR01-0652, DUR02-0598, and DUR03-0605. The duplicate results met the EPA-recommended laboratory duplicate criteria of less than 20 percent relative difference for results that are greater than 5 times the practical quantitation limit, indicating acceptable overall precision.

# SAMPLE MANAGEMENT SYSTEM

## Validation Report: Field Duplicates

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RIN: 09052334    Lab Code: PAR    Project: Durango    Validation Date: 7/21/2009

Duplicate: 2626

Sample: 0605

Analyte	Sample			Duplicate			RPD	RER	Units
	Result	Flag	Error	Result	Flag	Error			
CALCIUM	140000			140000			0		UG/L
CHLORIDE	32			32			0		MG/L
IRON	90	B		72	B		22.22		UG/L
MAGNESIUM	120000			120000			0		UG/L
MANGANESE	34			36			5.71		UG/L
MOLYBDENUM	0.22	B		0.072	B				UG/L
POTASSIUM	8900			9000			1.12		UG/L
SELENIUM	0.056	B		0.055	B				UG/L
SODIUM	280000			280000			0		UG/L
SULFATE	730			710			2.78		MG/L
TOTAL DISSOLVED SOLIDS	1800			1800			0		MG/L
URANIUM	0.18			0.056	B		105.08		UG/L

Duplicate: 2627

Sample: 0598

Analyte	Sample			Duplicate			RPD	RER	Units
	Result	Flag	Error	Result	Flag	Error			
CADMIUM				3.6					UG/L
MOLYBDENUM				1.3					UG/L
SELENIUM	240			230			4.26		UG/L
TOTAL DISSOLVED SOLIDS				7800					MG/L
URANIUM	110			110			0		UG/L

Duplicate: 2628

Sample: 0652

Analyte	Sample			Duplicate			RPD	RER	Units
	Result	Flag	Error	Result	Flag	Error			
CADMIUM	0.11	B		0.093	B				UG/L
MOLYBDENUM	0.72	B		0.65	B		10.22		UG/L
SELENIUM	0.27			0.24			11.76		UG/L
URANIUM	0.51			0.44			14.74		UG/L



# SAMPLE MANAGEMENT SYSTEM

Page 1 of 1

## Validation Report: Equipment/Trip Blanks

RIN: 09052334 Lab Code: PAR Project: Durango Validation Date: 7/21/2009

### Blank Data

Blank Type	Lab Sample ID	Lab Method	Analyte Name	Result	Qualifier	MDL	Units
Equipment Blank	0906133-29	SW6020	URANIUM	0.22		0.0045	UG/L

Sample ID	Sample Ticket	Location	Result	Dilution Factor	Lab Qualifier	Validation Qualifier
0906133-1	HGZ 988	0584	0.5	10		J
0906133-2	HGZ 989	0586	0.48	10		J
0906133-21	HGZ 990	0652	0.51	10		J
0906133-22	HGZ 993	0654	0.51	10		J
0906133-23	HGZ 994	0656	0.5	10		J
0906133-24	HGZ 991	0691	0.5	10		J
0906133-3	HGZ 992	0588	18	10		

## Certification

All laboratory analytical quality control criteria were met except as qualified in this report. The data qualifiers listed on the SEEPro database reports are defined on the last page of each report. All data in this package are considered validated and available for use.

Laboratory Coordinator:

Steve Donovan  
Steve Donovan

9-4-2009  
Date

Data Validation Lead:

Steve Donovan  
Steve Donovan

9-4-2009  
Date

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# **Attachment 1**

## **Assessment of Anomalous Data**

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## **Potential Outliers Report**



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## Potential Outliers Report

Potential outliers are measurements that are extremely large or small relative to the rest of the data and, therefore, are suspected of misrepresenting the population from which they were collected. Potential outliers may result from transcription errors, data-coding errors, or measurement system problems. However, outliers may also represent true extreme values of a distribution and indicate more variability in the population than was expected.

Statistical outlier tests give probabilistic evidence that an extreme value does not "fit" with the distribution of the remainder of the data and is therefore a statistical outlier. These tests should only be used to identify data points that require further investigation. The tests alone cannot determine whether a statistical outlier should be discarded or corrected within a data set.

There are three steps involved in identifying extreme values or outliers:

1. Identify extreme values that may be potential outliers by generating the Outliers Report using the Sample Management System from data in the SEEPro database. The application compares the new data set with historical data and lists the new data that fall outside the historical data range. A determination is also made if the data are normally distributed using the Shapiro-Wilk Test.
2. Apply the appropriate statistical test. Dixon's Extreme Value test is used to test for statistical outliers when the sample size is less than or equal to 25. This test considers both extreme values that are much smaller than the rest of the data (case 1) and extreme values that are much larger than the rest of the data (case 2). This test is valid only if the data without the suspected outlier are normally distributed. Rosner's Test is a parametric test that is used to detect outliers for sample sizes of 25 or more. This test also assumes that the data without the suspected outliers are normally distributed.
3. Scientifically review statistical outliers and decide on their disposition.

Two results from this sampling event were identified as potential outliers. The manganese result for DUR01-0634 was below the historical minimum. There were no analytical errors identified during the review of the data. The turbidity result for DUR01-0612 was above the historical maximum. The turbidity continually increased during the purging of this well. The data for this RIN are acceptable as qualified.

# Data Validation Outliers Report - No Field Parameters

Laboratory: PARAGON (Fort Collins, CO)

RIN: 09052334

Comparison: All Historical Data

Report Date: 8/24/2009

Site Code	Location Code	Sample Date	Analyte	Current			Historical Maximum			Historical Minimum			Number of Data Points		Normally Distributed	Statistical Outlier
				Result	Qualifiers Lab	Data	Result	Qualifiers Lab	Data	Result	Qualifiers Lab	Data	N	N Below Detect		
DUR01	0612	06/10/2009	Sulfate	1500		F	3360			1540			47	0	Yes	No
DUR01	0612	06/10/2009	Uranium	1.1		F	4.67			1.3		F	50	0	No	No
DUR01	0630	06/10/2009	Selenium	0.033		FQ	0.025		F	0.0001	U	L	21	6	No	No
DUR01	0630	06/10/2009	Sulfate	1700		FQ	2550			1740		F	20	0	Yes	No
DUR01	0630	06/10/2009	Uranium	0.29		FQ	0.28		F	0.0344			21	0	Yes	No
DUR01	0634	06/09/2009	Manganese	0.015	B	FQ	1.8	I		0.0397		F	20	0	Yes (log)	Yes
DUR01	0652	06/10/2009	Cadmium	0.000093	B		0.002	S		0.00013	B		23	13	No	No
DUR01	0652	06/10/2009	Cadmium	0.00011	B		0.002	S		0.00013	B		23	13	No	No
DUR01	0863	06/09/2009	Cadmium	0.000032	U	F	0.00067	B	U	0.000066	B	FQ	12	10	Yes (log)	No
DUR02	0588	06/11/2009	Cadmium	0.000032	U		0.0013		U	0.000059	B		16	11	No	No
DUR03	0608	06/11/2009	Magnesium	100		F	250		F	102			60	0	No	No
DUR03	0618	06/11/2009	Selenium	0.0055		F	0.03	U		0.006		F	11	2	No	No
DUR03	0618	06/11/2009	Uranium	0.065		F	0.0553			0.001			12	0	Yes (log)	No

# Data Validation Outliers Report - Field Parameters Only

Laboratory: Field Measurements

RIN: 09052334

Comparison: All Historical Data

Report Date: 8/24/2009

Site Code	Location Code	Sample Date	Analyte	Result	Current Qualifiers		Result	Historical Maximum Qualifiers		Result	Historical Minimum Qualifiers		Number of Data Points		Normally Distributed	Statistical Outlier
					Lab	Data		Lab	Data		Lab	Data	N	N Below Detect		
DUR01	0584	06/09/2009	Specific Conductance	1			710			151			13	0	Yes	No
DUR01	0584	06/09/2009	Temperature	15.91			15.9			5.1			13	0	Yes	No
DUR01	0612	06/10/2009	Turbidity	336		F	27.6		F	0.4			22	1	Yes (log)	Yes
DUR01	0633	06/09/2009	Turbidity	0.53		F	101			0.59		F	18	0	No	No
DUR01	0863	06/09/2009	Oxidation Reduction Potential	-8.5		F	-34		FQ	-163.1		F	12	0	Yes	No
DUR02	0598	06/10/2009	Temperature	11.21		F	16.67		F	11.6			19	0	Yes	No

SAMPLE ID CODES: 000X = Filtered sample (0.45 µm). N00X = Unfiltered sample. X = replicate number.

## LAB QUALIFIERS:

- \* Replicate analysis not within control limits.
- > Result above upper detection limit.
- A TIC is a suspected aldol-condensation product.
- B Inorganic: Result is between the IDL and CRDL. Organic: Analyte also found in method blank.
- C Pesticide result confirmed by GC-MS.
- D Analyte determined in diluted sample.
- E Inorganic: Estimate value because of interference, see case narrative. Organic: Analyte exceeded calibration range of the GC-MS.
- H Holding time expired, value suspect.
- I Increased detection limit due to required dilution.
- J Estimated
- N Inorganic or radiochemical: Spike sample recovery not within control limits. Organic: Tentatively identified compound (TIC).
- P > 25% difference in detected pesticide or Aroclor concentrations between 2 columns.
- U Analytical result below detection limit.
- W Post-digestion spike outside control limits while sample absorbance < 50% of analytical spike absorbance.
- X,Y,Z Laboratory defined qualifier, see case narrative.

## DATA QUALIFIERS:

- F Low flow sampling method used.
- L Less than 3 bore volumes purged prior to sampling.
- U Parameter analyzed for but was not detected.
- G Possible grout contamination, pH > 9.
- Q Qualitative result due to sampling technique.
- X Location is undefined.
- J Estimated value.
- R Unusable result.

#### 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.

## **Attachment 2**

### **Data Presentation**



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## **Groundwater Quality Data**

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**Groundwater Quality Data by Location (USEE100) FOR SITE DUR01, Durango Mill Tailings Process Site**

REPORT DATE: 8/24/2009

Location: 0612 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO <sub>3</sub> )	mg/L	06/10/2009	N001	37.41	-	57.41	398		F	#		
Cadmium	mg/L	06/10/2009	0001	37.41	-	57.41	0.042		F	#	0.00063	
Manganese	mg/L	06/10/2009	0001	37.41	-	57.41	4.2		F	#	0.00023	
Molybdenum	mg/L	06/10/2009	0001	37.41	-	57.41	0.096		F	#	0.0014	
Oxidation Reduction Potential	mV	06/10/2009	N001	37.41	-	57.41	49.3		F	#		
pH	s.u.	06/10/2009	N001	37.41	-	57.41	7.03		F	#		
Selenium	mg/L	06/10/2009	0001	37.41	-	57.41	0.00089		F	#	0.000018	
Specific Conductance	umhos/cm	06/10/2009	N001	37.41	-	57.41	3416		F	#		
Sulfate	mg/L	06/10/2009	0001	37.41	-	57.41	1500		F	#	25	
Temperature	C	06/10/2009	N001	37.41	-	57.41	12.84		F	#		
Turbidity	NTU	06/10/2009	N001	37.41	-	57.41	336		F	#		
Uranium	mg/L	06/10/2009	0001	37.41	-	57.41	1.1		F	#	0.00009	

**Groundwater Quality Data by Location (USEE100) FOR SITE DUR01, Durango Mill Tailings Process Site**

REPORT DATE: 8/24/2009

Location: 0617 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO3)	mg/L	06/09/2009	N001	14	-	29	441		F	#		
Manganese	mg/L	06/09/2009	N001	14	-	29	0.44		F	#	0.00023	
Molybdenum	mg/L	06/09/2009	N001	14	-	29	0.0022		F	#	0.00014	
Oxidation Reduction Potential	mV	06/09/2009	N001	14	-	29	51.5		F	#		
pH	s.u.	06/09/2009	N001	14	-	29	6.9		F	#		
Selenium	mg/L	06/09/2009	N001	14	-	29	0.014		F	#	0.000018	
Specific Conductance	umhos/cm	06/09/2009	N001	14	-	29	3361		F	#		
Sulfate	mg/L	06/09/2009	N001	14	-	29	2000		F	#	25	
Temperature	C	06/09/2009	N001	14	-	29	11.89		F	#		
Turbidity	NTU	06/09/2009	N001	14	-	29	1.91		F	#		
Uranium	mg/L	06/09/2009	N001	14	-	29	0.15		F	#	0.000009	

**Groundwater Quality Data by Location (USEE100) FOR SITE DUR01, Durango Mill Tailings Process Site**

REPORT DATE: 8/24/2009

Location: 0630 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO <sub>3</sub> )	mg/L	06/10/2009	0001	28.3	-	38.3	331		FQ	#		
Manganese	mg/L	06/10/2009	0001	28.3	-	38.3	0.57		FQ	#	0.00023	
Molybdenum	mg/L	06/10/2009	0001	28.3	-	38.3	0.0053		FQ	#	0.00035	
Oxidation Reduction Potential	mV	06/10/2009	N001	28.3	-	38.3	18		FQ	#		
pH	s.u.	06/10/2009	N001	28.3	-	38.3	6.94		FQ	#		
Selenium	mg/L	06/10/2009	0001	28.3	-	38.3	0.033		FQ	#	0.000091	
Specific Conductance	umhos/cm	06/10/2009	N001	28.3	-	38.3	2967		FQ	#		
Sulfate	mg/L	06/10/2009	0001	28.3	-	38.3	1700		FQ	#	25	
Temperature	C	06/10/2009	N001	28.3	-	38.3	12.18		FQ	#		
Turbidity	NTU	06/10/2009	N001	28.3	-	38.3	72		FQ	#		
Uranium	mg/L	06/10/2009	0001	28.3	-	38.3	0.29		FQ	#	0.000022	



**Groundwater Quality Data by Location (USEE100) FOR SITE DUR01, Durango Mill Tailings Process Site**

REPORT DATE: 8/24/2009

Location: 0631 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO <sub>3</sub> )	mg/L	06/09/2009	N001	6	-	16	387		F	#		
Manganese	mg/L	06/09/2009	N001	6	-	16	0.25		F	#	0.00012	
Molybdenum	mg/L	06/09/2009	N001	6	-	16	0.0071		F	#	0.00014	
Oxidation Reduction Potential	mV	06/09/2009	N001	6	-	16	-115.7		F	#		
pH	s.u.	06/09/2009	N001	6	-	16	7.25		F	#		
Selenium	mg/L	06/09/2009	N001	6	-	16	0.00075		F	#	0.000018	
Specific Conductance	umhos/cm	06/09/2009	N001	6	-	16	1143		F	#		
Sulfate	mg/L	06/09/2009	N001	6	-	16	220		F	#	5	
Temperature	C	06/09/2009	N001	6	-	16	12.18		F	#		
Turbidity	NTU	06/09/2009	N001	6	-	16	2.02		F	#		
Uranium	mg/L	06/09/2009	N001	6	-	16	0.11		F	#	0.000009	

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**Groundwater Quality Data by Location (USEE100) FOR SITE DUR01, Durango Mill Tailings Process Site**

REPORT DATE: 8/24/2009

Location: 0633 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO <sub>3</sub> )	mg/L	06/09/2009	N001	4	-	14	557		F	#		
Manganese	mg/L	06/09/2009	N001	4	-	14	0.029		F	#	0.00058	
Molybdenum	mg/L	06/09/2009	N001	4	-	14	0.0019		F	#	0.00007	
Oxidation Reduction Potential	mV	06/09/2009	N001	4	-	14	10.8		F	#		
pH	s.u.	06/09/2009	N001	4	-	14	6.81		F	#		
Selenium	mg/L	06/09/2009	N001	4	-	14	0.048		F	#	0.00018	
Specific Conductance	umhos /cm	06/09/2009	N001	4	-	14	5031		F	#		
Sulfate	mg/L	06/09/2009	N001	4	-	14	3000		F	#	25	
Temperature	C	06/09/2009	N001	4	-	14	13.91		F	#		
Turbidity	NTU	06/09/2009	N001	4	-	14	0.53		F	#		
Uranium	mg/L	06/09/2009	N001	4	-	14	0.92		F	#	0.000045	

**Groundwater Quality Data by Location (USEE100) FOR SITE DUR01, Durango Mill Tailings Process Site**

REPORT DATE: 8/24/2009

Location: 0634 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO <sub>3</sub> )	mg/L	06/09/2009	N001	8	-	18	528		FQ	#		
Manganese	mg/L	06/09/2009	N001	8	-	18	0.015	B	FQ	#	0.00058	
Molybdenum	mg/L	06/09/2009	N001	8	-	18	0.0024		FQ	#	0.00007	
Oxidation Reduction Potential	mV	06/09/2009	N001	8	-	18	171.9		FQ	#		
pH	s.u.	06/09/2009	N001	8	-	18	6.92		FQ	#		
Selenium	mg/L	06/09/2009	N001	8	-	18	0.0022		FQ	#	0.000018	
Specific Conductance	umhos/cm	06/09/2009	N001	8	-	18	3963		FQ	#		
Sulfate	mg/L	06/09/2009	N001	8	-	18	2200		FQ	#	25	
Temperature	C	06/09/2009	N001	8	-	18	11.98		FQ	#		
Turbidity	NTU	06/09/2009	N001	8	-	18	6.88		FQ	#		
Uranium	mg/L	06/09/2009	N001	8	-	18	0.11		FQ	#	0.000022	

**Groundwater Quality Data by Location (USEE100) FOR SITE DUR01, Durango Mill Tailings Process Site**

REPORT DATE: 8/24/2009

Location: 0635 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO <sub>3</sub> )	mg/L	06/10/2009	N001	5.5	-	15.5	436		F	#		
Manganese	mg/L	06/10/2009	N001	5.5	-	15.5	0.11		F	#	0.00023	
Molybdenum	mg/L	06/10/2009	N001	5.5	-	15.5	0.0017		F	#	0.00007	
Oxidation Reduction Potential	mV	06/10/2009	N001	5.5	-	15.5	-29.5		F	#		
pH	s.u.	06/10/2009	N001	5.5	-	15.5	6.94		F	#		
Selenium	mg/L	06/10/2009	N001	5.5	-	15.5	0.0052		F	#	0.000018	
Specific Conductance	umhos/cm	06/10/2009	N001	5.5	-	15.5	2381		F	#		
Sulfate	mg/L	06/10/2009	N001	5.5	-	15.5	1200		F	#	10	
Temperature	C	06/10/2009	N001	5.5	-	15.5	10.42		F	#		
Turbidity	NTU	06/10/2009	N001	5.5	-	15.5	3.29		F	#		
Uranium	mg/L	06/10/2009	N001	5.5	-	15.5	0.013		F	#	0.0000045	

**Groundwater Quality Data by Location (USEE100) FOR SITE DUR01, Durango Mill Tailings Process Site**

REPORT DATE: 8/24/2009

Location: 0863 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO <sub>3</sub> )	mg/L	06/09/2009	N001	58	-	67.5	548		F	#		
Cadmium	mg/L	06/09/2009	N001	58	-	67.5	0.000032	U	F	#	0.000032	
Manganese	mg/L	06/09/2009	N001	58	-	67.5	0.11		F	#	0.00023	
Molybdenum	mg/L	06/09/2009	N001	58	-	67.5	0.0007	B	UF	#	0.00007	
Oxidation Reduction Potential	mV	06/09/2009	N001	58	-	67.5	-8.5		F	#		
pH	s.u.	06/09/2009	N001	58	-	67.5	6.97		F	#		
Selenium	mg/L	06/09/2009	N001	58	-	67.5	0.0001		UF	#	0.000018	
Specific Conductance	umhos/cm	06/09/2009	N001	58	-	67.5	2111		F	#		
Sulfate	mg/L	06/09/2009	N001	58	-	67.5	580		F	#	10	
Temperature	C	06/09/2009	N001	58	-	67.5	12.38		F	#		
Turbidity	NTU	06/09/2009	N001	58	-	67.5	9.5		F	#		
Uranium	mg/L	06/09/2009	N001	58	-	67.5	0.00016		F	#	0.0000045	

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**Groundwater Quality Data by Location (USEE100) FOR SITE DUR02, Durango Raffinate Pond Process Site**

REPORT DATE: 8/24/2009

Location: 0594 WELL Original location DH-116.

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO3)	mg/L	06/10/2009	N001	8.5	-	38.5	427		FQ	#		
Oxidation Reduction Potential	mV	06/10/2009	N001	8.5	-	38.5	12.1		FQ	#		
pH	s.u.	06/10/2009	N001	8.5	-	38.5	6.98		FQ	#		
Selenium	mg/L	06/10/2009	N001	8.5	-	38.5	0.01		FQ	#	0.000018	
Specific Conductance	umhos /cm	06/10/2009	N001	8.5	-	38.5	4156		FQ	#		
Temperature	C	06/10/2009	N001	8.5	-	38.5	13.47		FQ	#		
Turbidity	NTU	06/10/2009	N001	8.5	-	38.5	4.83		FQ	#		
Uranium	mg/L	06/10/2009	N001	8.5	-	38.5	0.063		FQ	#	0.0000045	

---

**Groundwater Quality Data by Location (USEE100) FOR SITE DUR02, Durango Raffinate Pond Process Site**

REPORT DATE: 8/24/2009

Location: 0598 WELL Original location Bureau of Rec well DH-110.

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO3)	mg/L	06/10/2009	N001	66.2	-	96.2	432		F	#		
Cadmium	mg/L	06/10/2009	N002	66.2	-	96.2	0.0036		F	#	0.000032	
Molybdenum	mg/L	06/10/2009	N002	66.2	-	96.2	0.0013		F	#	0.00007	
Oxidation Reduction Potential	mV	06/10/2009	N001	66.2	-	96.2	6.1		F	#		
pH	s.u.	06/10/2009	N001	66.2	-	96.2	7.11		F	#		
Selenium	mg/L	06/10/2009	N001	66.2	-	96.2	0.24		F	#	0.00091	
Selenium	mg/L	06/10/2009	N002	66.2	-	96.2	0.23		F	#	0.00091	
Specific Conductance	umhos/cm	06/10/2009	N001	66.2	-	96.2	7792		F	#		
Temperature	C	06/10/2009	N001	66.2	-	96.2	11.21		F	#		
Total Dissolved Solids	mg/L	06/10/2009	N002	66.2	-	96.2	7800		F	#	200	
Turbidity	NTU	06/10/2009	N001	66.2	-	96.2	4.16		F	#		
Uranium	mg/L	06/10/2009	N001	66.2	-	96.2	0.11		F	#	0.0000045	
Uranium	mg/L	06/10/2009	N002	66.2	-	96.2	0.11		F	#	0.000022	

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**Groundwater Quality Data by Location (USEE100) FOR SITE DUR02, Durango Raffinate Pond Process Site**

REPORT DATE: 8/24/2009

Location: 0607 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO3)	mg/L	06/10/2009	0001	35	-	55	312		FQ	#		
Oxidation Reduction Potential	mV	06/10/2009	N001	35	-	55	71.2		FQ	#		
pH	s.u.	06/10/2009	N001	35	-	55	7.32		FQ	#		
Selenium	mg/L	06/10/2009	0001	35	-	55	0.23		FQ	#	0.00091	
Specific Conductance	umhos /cm	06/10/2009	N001	35	-	55	1601		FQ	#		
Temperature	C	06/10/2009	N001	35	-	55	11.38		FQ	#		
Turbidity	NTU	06/10/2009	N001	35	-	55	12.9		FQ	#		
Uranium	mg/L	06/10/2009	0001	35	-	55	0.0029		FQ	#	0.0000045	

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**Groundwater Quality Data by Location (USEE100) FOR SITE DUR02, Durango Raffinate Pond Process Site**

REPORT DATE: 8/24/2009

Location: 0884 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO <sub>3</sub> )	mg/L	06/10/2009	N001	36.5	-	46.5	378		F	#		
Oxidation Reduction Potential	mV	06/10/2009	N001	36.5	-	46.5	40.6		F	#		
pH	s.u.	06/10/2009	N001	36.5	-	46.5	7.18		F	#		
Selenium	mg/L	06/10/2009	N001	36.5	-	46.5	0.84		F	#	0.0018	
Specific Conductance	umhos /cm	06/10/2009	N001	36.5	-	46.5	4006		F	#		
Temperature	C	06/10/2009	N001	36.5	-	46.5	15.19		F	#		
Total Dissolved Solids	mg/L	06/10/2009	N001	36.5	-	46.5	3900		F	#	80	
Turbidity	NTU	06/10/2009	N001	36.5	-	46.5	8.41		F	#		
Uranium	mg/L	06/10/2009	N001	36.5	-	46.5	0.13		F	#	0.000009	

**Groundwater Quality Data by Location (USEE100) FOR SITE DUR03, Durango Disposal Site**

REPORT DATE: 8/24/2009

Location: 0605 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO <sub>3</sub> )	mg/L	06/11/2009	N001	36	-	56	720		F	#		
Calcium	mg/L	06/11/2009	0002	36	-	56	140		F	#	0.0063	
Calcium	mg/L	06/11/2009	N001	36	-	56	140		F	#	0.0063	
Chloride	mg/L	06/11/2009	0002	36	-	56	32		F	#	4	
Chloride	mg/L	06/11/2009	N001	36	-	56	32		F	#	4	
Iron	mg/L	06/11/2009	0002	36	-	56	0.072	B	F	#	0.0027	
Iron	mg/L	06/11/2009	N001	36	-	56	0.09	B	F	#	0.0027	
Magnesium	mg/L	06/11/2009	0002	36	-	56	120		F	#	0.015	
Magnesium	mg/L	06/11/2009	N001	36	-	56	120		F	#	0.015	
Manganese	mg/L	06/11/2009	0002	36	-	56	0.036		F	#	0.00023	
Manganese	mg/L	06/11/2009	N001	36	-	56	0.034		F	#	0.00023	
Molybdenum	mg/L	06/11/2009	0002	36	-	56	0.000072	B	UF	#	0.00007	
Molybdenum	mg/L	06/11/2009	N001	36	-	56	0.00022	B	UF	#	0.00007	
Oxidation Reduction Potential	mV	06/11/2009	N001	36	-	56	29.6		F	#		
pH	s.u.	06/11/2009	N001	36	-	56	6.98		F	#		
Potassium	mg/L	06/11/2009	0002	36	-	56	9		F	#	0.21	
Potassium	mg/L	06/11/2009	N001	36	-	56	8.9		F	#	0.21	

**Groundwater Quality Data by Location (USEE100) FOR SITE DUR03, Durango Disposal Site**

REPORT DATE: 8/24/2009

Location: 0605 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Selenium	mg/L	06/11/2009	0002	36	-	56	0.000055	B	UF	#	0.000018	
Selenium	mg/L	06/11/2009	N001	36	-	56	0.000056	B	UF	#	0.000018	
Sodium	mg/L	06/11/2009	0002	36	-	56	280		F	#	0.0093	
Sodium	mg/L	06/11/2009	N001	36	-	56	280		F	#	0.0093	
Specific Conductance	umhos/cm	06/11/2009	N001	36	-	56	2256		F	#		
Sulfate	mg/L	06/11/2009	0002	36	-	56	710		F	#	10	
Sulfate	mg/L	06/11/2009	N001	36	-	56	730		F	#	10	
Temperature	C	06/11/2009	N001	36	-	56	11.36		F	#		
Total Dissolved Solids	mg/L	06/11/2009	0002	36	-	56	1800		F	#	40	
Total Dissolved Solids	mg/L	06/11/2009	N001	36	-	56	1800		F	#	40	
Turbidity	NTU	06/11/2009	N001	36	-	56	3.83		F	#		
Uranium	mg/L	06/11/2009	0002	36	-	56	0.000056	B	UF	#	0.0000045	
Uranium	mg/L	06/11/2009	N001	36	-	56	0.00018		F	#	0.0000045	

**Groundwater Quality Data by Location (USEE100) FOR SITE DUR03, Durango Disposal Site**

REPORT DATE: 8/24/2009

Location: 0607 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO <sub>3</sub> )	mg/L	06/11/2009	N001	36.7	-	56.7	466		F	#		
Calcium	mg/L	06/11/2009	N001	36.7	-	56.7	280		F	#	0.0063	
Chloride	mg/L	06/11/2009	N001	36.7	-	56.7	13		F	#	1	
Iron	mg/L	06/11/2009	N001	36.7	-	56.7	0.11	B	F	#	0.0027	
Magnesium	mg/L	06/11/2009	N001	36.7	-	56.7	180		F	#	0.015	
Manganese	mg/L	06/11/2009	N001	36.7	-	56.7	0.077		F	#	0.00023	
Molybdenum	mg/L	06/11/2009	N001	36.7	-	56.7	0.00021	B	UF	#	0.00007	
Oxidation Reduction Potential	mV	06/11/2009	N001	36.7	-	56.7	-122.5		F	#		
pH	s.u.	06/11/2009	N001	36.7	-	56.7	6.98		F	#		
Potassium	mg/L	06/11/2009	N001	36.7	-	56.7	8		F	#	0.21	
Selenium	mg/L	06/11/2009	N001	36.7	-	56.7	0.00005	B	UF	#	0.000018	
Sodium	mg/L	06/11/2009	N001	36.7	-	56.7	300		F	#	0.0093	
Specific Conductance	umhos /cm	06/11/2009	N001	36.7	-	56.7	3009		F	#		
Sulfate	mg/L	06/11/2009	N001	36.7	-	56.7	1600		F	#	25	
Temperature	C	06/11/2009	N001	36.7	-	56.7	11.17		F	#		
Total Dissolved Solids	mg/L	06/11/2009	N001	36.7	-	56.7	3000		F	#	40	
Turbidity	NTU	06/11/2009	N001	36.7	-	56.7	4.27		F	#		
Uranium	mg/L	06/11/2009	N001	36.7	-	56.7	0.00014		F	#	0.0000045	

**Groundwater Quality Data by Location (USEE100) FOR SITE DUR03, Durango Disposal Site**

REPORT DATE: 8/24/2009

Location: 0608 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO3)	mg/L	06/11/2009	N001	29	-	39	399		F	#		
Calcium	mg/L	06/11/2009	N001	29	-	39	170		F	#	0.0031	
Chloride	mg/L	06/11/2009	N001	29	-	39	17		F	#	4	
Iron	mg/L	06/11/2009	N001	29	-	39	0.3		F	#	0.0013	
Magnesium	mg/L	06/11/2009	N001	29	-	39	100		F	#	0.0075	
Manganese	mg/L	06/11/2009	N001	29	-	39	0.0042	B	F	#	0.00012	
Molybdenum	mg/L	06/11/2009	N001	29	-	39	0.001		UF	#	0.00007	
Oxidation Reduction Potential	mV	06/11/2009	N001	29	-	39	50.5		F	#		
pH	s.u.	06/11/2009	N001	29	-	39	7.15		F	#		
Potassium	mg/L	06/11/2009	N001	29	-	39	4.5		F	#	0.11	
Selenium	mg/L	06/11/2009	N001	29	-	39	0.0029		F	#	0.000018	
Sodium	mg/L	06/11/2009	N001	29	-	39	65		F	#	0.0047	
Specific Conductance	umhos /cm	06/11/2009	N001	29	-	39	1419		F	#		
Sulfate	mg/L	06/11/2009	N001	29	-	39	580		F	#	10	
Temperature	C	06/11/2009	N001	29	-	39	9.59		F	#		
Total Dissolved Solids	mg/L	06/11/2009	N001	29	-	39	1300		F	#	40	
Turbidity	NTU	06/11/2009	N001	29	-	39	9.65		F	#		
Uranium	mg/L	06/11/2009	N001	29	-	39	0.012		F	#	0.0000045	

**Groundwater Quality Data by Location (USEE100) FOR SITE DUR03, Durango Disposal Site**

REPORT DATE: 8/24/2009

Location: 0612 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO3)	mg/L	06/11/2009	N001	98.09 - 108.09	2172		FQ	#		
Calcium	mg/L	06/11/2009	N001	98.09 - 108.09	9.4		FQ	#	0.0063	
Chloride	mg/L	06/11/2009	N001	98.09 - 108.09	45		FQ	#	1	
Iron	mg/L	06/11/2009	N001	98.09 - 108.09	0.047	B	UFQ	#	0.0027	
Magnesium	mg/L	06/11/2009	N001	98.09 - 108.09	4.8		FQ	#	0.015	
Manganese	mg/L	06/11/2009	N001	98.09 - 108.09	0.0098	B	FQ	#	0.00023	
Molybdenum	mg/L	06/11/2009	N001	98.09 - 108.09	0.00034	B	UFQ	#	0.00007	
Oxidation Reduction Potential	mV	06/11/2009	N001	98.09 - 108.09	243.3		FQ	#		
pH	s.u.	06/11/2009	N001	98.09 - 108.09	7.72		FQ	#		
Potassium	mg/L	06/11/2009	N001	98.09 - 108.09	9.9		FQ	#	0.21	
Selenium	mg/L	06/11/2009	N001	98.09 - 108.09	0.000057	B	UFQ	#	0.000018	
Sodium	mg/L	06/11/2009	N001	98.09 - 108.09	880		FQ	#	0.047	
Specific Conductance	umhos /cm	06/11/2009	N001	98.09 - 108.09	3463		FQ	#		
Sulfate	mg/L	06/11/2009	N001	98.09 - 108.09	240		FQ	#	2.5	
Temperature	C	06/11/2009	N001	98.09 - 108.09	11.5		FQ	#		
Total Dissolved Solids	mg/L	06/11/2009	N001	98.09 - 108.09	2600		FQ	#	80	
Turbidity	NTU	06/11/2009	N001	98.09 - 108.09	7		FQ	#		
Uranium	mg/L	06/11/2009	N001	98.09 - 108.09	0.00068		FQ	#	0.0000045	

**Groundwater Quality Data by Location (USEE100) FOR SITE DUR03, Durango Disposal Site**

REPORT DATE: 8/24/2009

Location: 0618 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO3)	mg/L	06/11/2009	N001	29.77 - 49.77	415		F	#		
Calcium	mg/L	06/11/2009	N001	29.77 - 49.77	290		F	#	0.0063	
Chloride	mg/L	06/11/2009	N001	29.77 - 49.77	38		F	#	4	
Iron	mg/L	06/11/2009	N001	29.77 - 49.77	0.047	B	UF	#	0.0027	
Magnesium	mg/L	06/11/2009	N001	29.77 - 49.77	170		F	#	0.015	
Manganese	mg/L	06/11/2009	N001	29.77 - 49.77	0.00023	U	F	#	0.00023	
Molybdenum	mg/L	06/11/2009	N001	29.77 - 49.77	0.0008	B	UF	#	0.00007	
Oxidation Reduction Potential	mV	06/11/2009	N001	29.77 - 49.77	36.3		F	#		
pH	s.u.	06/11/2009	N001	29.77 - 49.77	7.06		F	#		
Potassium	mg/L	06/11/2009	N001	29.77 - 49.77	2.9		F	#	0.21	
Selenium	mg/L	06/11/2009	N001	29.77 - 49.77	0.0055		F	#	0.000018	
Sodium	mg/L	06/11/2009	N001	29.77 - 49.77	120		F	#	0.0093	
Specific Conductance	umhos /cm	06/11/2009	N001	29.77 - 49.77	2306		F	#		
Sulfate	mg/L	06/11/2009	N001	29.77 - 49.77	1200		F	#	10	
Temperature	C	06/11/2009	N001	29.77 - 49.77	9.54		F	#		
Total Dissolved Solids	mg/L	06/11/2009	N001	29.77 - 49.77	2100		F	#	40	
Turbidity	NTU	06/11/2009	N001	29.77 - 49.77	2.6		F	#		
Uranium	mg/L	06/11/2009	N001	29.77 - 49.77	0.065		F	#	0.0000045	

**Groundwater Quality Data by Location (USEE100) FOR SITE DUR03, Durango Disposal Site**

REPORT DATE: 8/24/2009

Location: 0621 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO3)	mg/L	06/11/2009	N001	78.46	-	88.46	0		F	#		
Calcium	mg/L	06/11/2009	N001	78.46	-	88.46	450		F	#	0.016	
Chloride	mg/L	06/11/2009	N001	78.46	-	88.46	11		F	#	1	
Iron	mg/L	06/11/2009	N001	78.46	-	88.46	140		F	#	0.0067	
Magnesium	mg/L	06/11/2009	N001	78.46	-	88.46	350		F	#	0.038	
Manganese	mg/L	06/11/2009	N001	78.46	-	88.46	2.9		F	#	0.00058	
Molybdenum	mg/L	06/11/2009	N001	78.46	-	88.46	0.00031	B	UF	#	0.00007	
Oxidation Reduction Potential	mV	06/11/2009	N001	78.46	-	88.46	341.5		F	#		
pH	s.u.	06/11/2009	N001	78.46	-	88.46	4.18		F	#		
Potassium	mg/L	06/11/2009	N001	78.46	-	88.46	13		F	#	0.54	
Selenium	mg/L	06/11/2009	N001	78.46	-	88.46	0.00007	B	UF	#	0.000018	
Sodium	mg/L	06/11/2009	N001	78.46	-	88.46	180		F	#	0.023	
Specific Conductance	umhos /cm	06/11/2009	N001	78.46	-	88.46	3990		F	#		
Sulfate	mg/L	06/11/2009	N001	78.46	-	88.46	3200		F	#	25	
Temperature	C	06/11/2009	N001	78.46	-	88.46	10.85		F	#		
Total Dissolved Solids	mg/L	06/11/2009	N001	78.46	-	88.46	4800		F	#	80	
Turbidity	NTU	06/11/2009	N001	78.46	-	88.46	5.47		F	#		
Uranium	mg/L	06/11/2009	N001	78.46	-	88.46	0.00007	B	UF	#	0.0000045	



**Groundwater Quality Data by Location (USEE100) FOR SITE DUR03, Durango Disposal Site**

REPORT DATE: 8/24/2009

Location: 0623 WELL

Parameter	Units	Sample Date	ID	Depth Range (Ft BLS)			Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO <sub>3</sub> )	mg/L	06/11/2009	0001	19.35	-	39.35	475		FQ	#		
Calcium	mg/L	06/11/2009	0001	19.35	-	39.35	280		FQ	#	0.0063	
Chloride	mg/L	06/11/2009	0001	19.35	-	39.35	39		FQ	#	10	
Iron	mg/L	06/11/2009	0001	19.35	-	39.35	0.16	B	FQ	#	0.0027	
Magnesium	mg/L	06/11/2009	0001	19.35	-	39.35	250		FQ	#	0.015	
Manganese	mg/L	06/11/2009	0001	19.35	-	39.35	0.3		FQ	#	0.00023	
Molybdenum	mg/L	06/11/2009	0001	19.35	-	39.35	0.0012		UFQ	#	0.00007	
Oxidation Reduction Potential	mV	06/11/2009	N001	19.35	-	39.35	77.3		FQ	#		
pH	s.u.	06/11/2009	N001	19.35	-	39.35	7.24		FQ	#		
Potassium	mg/L	06/11/2009	0001	19.35	-	39.35	3.1		FQ	#	0.21	
Selenium	mg/L	06/11/2009	0001	19.35	-	39.35	0.00033		FQ	#	0.000018	
Sodium	mg/L	06/11/2009	0001	19.35	-	39.35	160		FQ	#	0.0093	
Specific Conductance	umhos/cm	06/11/2009	N001	19.35	-	39.35	2702		FQ	#		
Sulfate	mg/L	06/11/2009	0001	19.35	-	39.35	1400		FQ	#	25	
Temperature	C	06/11/2009	N001	19.35	-	39.35	10.87		FQ	#		
Total Dissolved Solids	mg/L	06/11/2009	0001	19.35	-	39.35	2700		FQ	#	40	
Turbidity	NTU	06/11/2009	N001	19.35	-	39.35	48.7		FQ	#		
Uranium	mg/L	06/11/2009	0001	19.35	-	39.35	0.0013		FQ	#	0.0000045	

SAMPLE ID CODES: 000X = Filtered sample (0.45 µm). N00X = Unfiltered sample. X = replicate number.

LAB QUALIFIERS:

\* Replicate analysis not within control limits.  
> Result above upper detection limit.  
A TIC is a suspected aldol-condensation product.  
B Inorganic: Result is between the IDL and CRDL. Organic: Analyte also found in method blank.  
C Pesticide result confirmed by GC-MS.  
D Analyte determined in diluted sample.  
E Inorganic: Estimate value because of interference, see case narrative. Organic: Analyte exceeded calibration range of the GC-MS.  
H Holding time expired, value suspect.  
I Increased detection limit due to required dilution.  
J Estimated  
N Inorganic or radiochemical: Spike sample recovery not within control limits. Organic: Tentatively identified compound (TIC).  
P > 25% difference in detected pesticide or Aroclor concentrations between 2 columns.  
U Analytical result below detection limit.  
W Post-digestion spike outside control limits while sample absorbance < 50% of analytical spike absorbance.  
X,Y,Z Laboratory defined qualifier, see case narrative.

DATA QUALIFIERS:

F	Low flow sampling method used.	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 DUR01, Durango Mill Tailings Process Site**

REPORT DATE: 8/24/2009

Location: 0584 SURFACE LOCATION

Parameter	Units	Sample Date	ID	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO <sub>3</sub> )	mg/L	06/09/2009	N001	75			#		
Cadmium	mg/L	06/09/2009	N001	0.00012	B		#	0.000032	
Molybdenum	mg/L	06/09/2009	N001	0.00096	B	U	#	0.00007	
Oxidation Reduction Potential	mV	06/09/2009	N001	37.1			#		
pH	s.u.	06/09/2009	N001	7.47			#		
Selenium	mg/L	06/09/2009	N001	0.00028			#	0.000018	
Specific Conductance	umhos/cm	06/09/2009	N001	1			#		
Temperature	C	06/09/2009	N001	15.91			#		
Turbidity	NTU	06/09/2009	N001	4.15			#		
Uranium	mg/L	06/09/2009	N001	0.0005		J	#	0.0000045	

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

REPORT DATE: 8/24/2009

Location: 0586 SURFACE LOCATION

Parameter	Units	Sample Date	ID	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO <sub>3</sub> )	mg/L	06/10/2009	N001	70			#		
Cadmium	mg/L	06/10/2009	N001	0.00016	B		#	0.000032	
Molybdenum	mg/L	06/10/2009	N001	0.00081	B	U	#	0.00007	
Oxidation Reduction Potential	mV	06/10/2009	N001	119.4			#		
pH	s.u.	06/10/2009	N001	7.06			#		
Selenium	mg/L	06/10/2009	N001	0.00023			#	0.000018	
Specific Conductance	umhos/cm	06/10/2009	N001	241			#		
Temperature	C	06/10/2009	N001	9.27			#		
Turbidity	NTU	06/10/2009	N001	9.87			#		
Uranium	mg/L	06/10/2009	N001	0.00048		J	#	0.0000045	

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

REPORT DATE: 8/24/2009

Location: 0652 SURFACE LOCATION SURFACE WATER AND SED.

Parameter	Units	Sample Date	ID	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO <sub>3</sub> )	mg/L	06/10/2009	N001	60			#		
Cadmium	mg/L	06/10/2009	0002	0.000093	B		#	0.000032	
Cadmium	mg/L	06/10/2009	N001	0.00011	B		#	0.000032	
Molybdenum	mg/L	06/10/2009	0002	0.00065	B	U	#	0.00007	
Molybdenum	mg/L	06/10/2009	N001	0.00072	B	U	#	0.00007	
Oxidation Reduction Potential	mV	06/10/2009	N001	29.5			#		
pH	s.u.	06/10/2009	N001	7.79			#		
Selenium	mg/L	06/10/2009	0002	0.00024			#	0.000018	
Selenium	mg/L	06/10/2009	N001	0.00027			#	0.000018	
Specific Conductance	umhos/cm	06/10/2009	N001	243			#		
Temperature	C	06/10/2009	N001	10.89			#		
Turbidity	NTU	06/10/2009	N001	6.69			#		
Uranium	mg/L	06/10/2009	0002	0.00044			#	0.0000045	
Uranium	mg/L	06/10/2009	N001	0.00051		J	#	0.0000045	



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

REPORT DATE: 8/24/2009

Location: 0691 SURFACE LOCATION

Parameter	Units	Sample Date	ID	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO <sub>3</sub> )	mg/L	06/10/2009	N001	58			#		
Cadmium	mg/L	06/10/2009	N001	0.00014	B		#	0.000032	
Molybdenum	mg/L	06/10/2009	N001	0.00072	B	U	#	0.00007	
Oxidation Reduction Potential	mV	06/10/2009	N001	8.6			#		
pH	s.u.	06/10/2009	N001	7.74			#		
Selenium	mg/L	06/10/2009	N001	0.00026			#	0.000018	
Specific Conductance	umhos/cm	06/10/2009	N001	245			#		
Temperature	C	06/10/2009	N001	11.52			#		
Turbidity	NTU	06/10/2009	N001	7.18			#		
Uranium	mg/L	06/10/2009	N001	0.0005		J	#	0.0000045	

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

REPORT DATE: 8/24/2009

Location: 0588 SURFACE LOCATION

Parameter	Units	Sample Date	ID	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO3)	mg/L	06/11/2009	N001	275			#		
Cadmium	mg/L	06/11/2009	N001	0.000032	U		#	0.000032	
Molybdenum	mg/L	06/11/2009	N001	0.0012		U	#	0.00007	
Oxidation Reduction Potential	mV	06/11/2009	N001	-.1			#		
pH	s.u.	06/11/2009	N001	8.13			#		
Selenium	mg/L	06/11/2009	N001	0.00057			#	0.000018	
Specific Conductance	umhos/cm	06/11/2009	N001	1501			#		
Temperature	C	06/11/2009	N001	16.25			#		
Turbidity	NTU	06/11/2009	N001	4.53			#		
Uranium	mg/L	06/11/2009	N001	0.018		J	#	0.0000045	

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

REPORT DATE: 8/24/2009

Location: 0654 SURFACE LOCATION RESERVED FOR CDAY

Parameter	Units	Sample Date	ID	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO3)	mg/L	06/10/2009	N001	71			#		
Cadmium	mg/L	06/10/2009	N001	0.00012	B		#	0.000032	
Molybdenum	mg/L	06/10/2009	N001	0.00069	B		#	0.00007	
Oxidation Reduction Potential	mV	06/10/2009	N001	22.2			#		
pH	s.u.	06/10/2009	N001	7.62			#		
Selenium	mg/L	06/10/2009	N001	0.00024			#	0.000018	
Specific Conductance	umhos/cm	06/10/2009	N001	252			#		
Temperature	C	06/10/2009	N001	10.58			#		
Turbidity	NTU	06/10/2009	N001	7.84			#		
Uranium	mg/L	06/10/2009	N001	0.00051			#	0.0000045	

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

REPORT DATE: 8/24/2009

Location: 0656 SURFACE LOCATION RESERVED FOR CDAY

Parameter	Units	Sample Date	ID	Result	Lab	Qualifiers Data	QA	Detection Limit	Uncertainty
Alkalinity, Total (As CaCO <sub>3</sub> )	mg/L	06/10/2009	N001	67			#		
Cadmium	mg/L	06/10/2009	N001	0.00013	B		#	0.000032	
Molybdenum	mg/L	06/10/2009	N001	0.00069	B	U	#	0.00007	
Oxidation Reduction Potential	mV	06/10/2009	N001	56.3			#		
pH	s.u.	06/10/2009	N001	7.4			#		
Selenium	mg/L	06/10/2009	N001	0.00025			#	0.000018	
Specific Conductance	umhos/cm	06/10/2009	N001	237			#		
Temperature	C	06/10/2009	N001	10.46			#		
Turbidity	NTU	06/10/2009	N001	6.39			#		
Uranium	mg/L	06/10/2009	N001	0.0005		J	#	0.0000045	

SAMPLE ID CODES: 000X = Filtered sample (0.45 µm). N00X = Unfiltered sample. X = replicate number.

**LAB QUALIFIERS:**

- \* Replicate analysis not within control limits.
- > Result above upper detection limit.
- A TIC is a suspected aldol-condensation product.
- B Inorganic: Result is between the IDL and CRDL. Organic: Analyte also found in method blank.
- C Pesticide result confirmed by GC-MS.
- D Analyte determined in diluted sample.
- E Inorganic: Estimate value because of interference, see case narrative. Organic: Analyte exceeded calibration range of the GC-MS.
- H Holding time expired, value suspect.
- I Increased detection limit due to required dilution.
- J Estimated
- N Inorganic or radiochemical: Spike sample recovery not within control limits. Organic: Tentatively identified compound (TIC).
- P > 25% difference in detected pesticide or Aroclor concentrations between 2 columns.
- U Analytical result below detection limit.
- W Post-digestion spike outside control limits while sample absorbance < 50% of analytical spike absorbance.
- X,Y,Z Laboratory defined qualifier, see case narrative.

DATA QUALIFIERS:

F Low flow sampling method used.

L Less than 3 bore volumes purged prior to sampling.

U Parameter analyzed for but was not detected.

G Possible grout contamination, pH > 9.

Q Qualitative result due to sampling technique.

X Location is undefined.

J Estimated value.

R Unusable result.

QA QUALIFIER:

# Validated according to quality assurance guidelines.

## **Equipment Blank Data**

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**BLANKS REPORT**

LAB: PARAGON (Fort Collins, CO)

RIN: 09052334

Report Date: 8/24/2009

Parameter	Site Code	Location ID	Sample Date	ID	Units	Result	Qualifiers Lab Data	Detection Limit	Uncertainty	Sample Type
Cadmium	DUR01	0999	06/09/2009	N001	mg/L	0.000032	U	0.000032		E
Molybdenum	DUR01	0999	06/09/2009	N001	mg/L	0.00026	B U	0.00007		E
Selenium	DUR01	0999	06/09/2009	N001	mg/L	0.000041	B U	0.000018		E
Uranium	DUR01	0999	06/09/2009	N001	mg/L	0.00022		0.0000045		E

SAMPLE ID CODES: 000X = Filtered sample (0.45 µm). N00X = Unfiltered sample. X = replicate number.

## LAB QUALIFIERS:

\* Replicate analysis not within control limits.

&gt; 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 &gt; 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 &lt; 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 &gt; 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.

## SAMPLE TYPES:

E Equipment Blank.



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## **Static Water Level Data**

**STATIC WATER LEVELS (USEE700) FOR SITE DUR01, Durango Mill Tailings Process Site**  
**REPORT DATE: 8/24/2009**

Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Date	Time	Depth From Top of Casing (Ft)	Water Elevation (Ft)	Water Level Flag
0612	D	6500.94	06/10/2009	16:55:21	40.53	6460.41	
0617	D	6498.11	06/09/2009	15:05:13	29.02	6469.09	
0630	D	6494.44	06/10/2009	16:00:15	32.27	6462.17	
0631	D	6477.91	06/09/2009	14:10:43	8.61	6469.3	
0633	D	6481.81	06/09/2009	14:35:38	8.74	6473.07	
0634	D	6491.75	06/09/2009	12:10:05	13.22	6478.53	
0635	D	6497.68	06/10/2009	15:30:19	13.5	6484.18	
0863		6513.32	06/09/2009	16:35:05	56.69	6456.63	
0612	D	6500.94	06/10/2009	16:55:21	40.53	6460.41	
0617	D	6498.11	06/09/2009	15:05:13	29.02	6469.09	
0630	D	6494.44	06/10/2009	16:00:15	32.27	6462.17	
0631	D	6477.91	06/09/2009	14:10:43	8.61	6469.3	
0633	D	6481.81	06/09/2009	14:35:38	8.74	6473.07	
0634	D	6491.75	06/09/2009	12:10:05	13.22	6478.53	
0635	D	6497.68	06/10/2009	15:30:19	13.5	6484.18	
0863		6513.32	06/09/2009	16:35:05	56.69	6456.63	
0605	U	7189.6	06/11/2009	08:50:24	38.01	7151.59	
0607	D	7099.1	06/11/2009	13:40:19	42.69	7056.41	
0608	D	7035	06/11/2009	10:10:04	33.19	7001.81	
0608	D	7035	07/28/2009	09:00:18	35.95	6999.05	
0612	D	7109.8	06/11/2009	13:05:31	103.8	7006	
0618	D	7036.41	06/11/2009	09:55:54	35.29	7001.12	
0618	D	7036.41	07/28/2009	09:40:26	37.98	6998.43	
0621	U	7035.77	06/11/2009	10:50:43	49.55	6986.22	
0621	U	7035.77	07/28/2009	09:20:09	51.25	6984.52	
0623	U	7048.67	06/11/2009	11:15:13	33.46	7015.21	

FLOW CODES: B BACKGROUND  
N UNKNOWN

C CROSS GRADIENT  
O ON SITE

D DOWN GRADIENT  
U UPGRADIENT

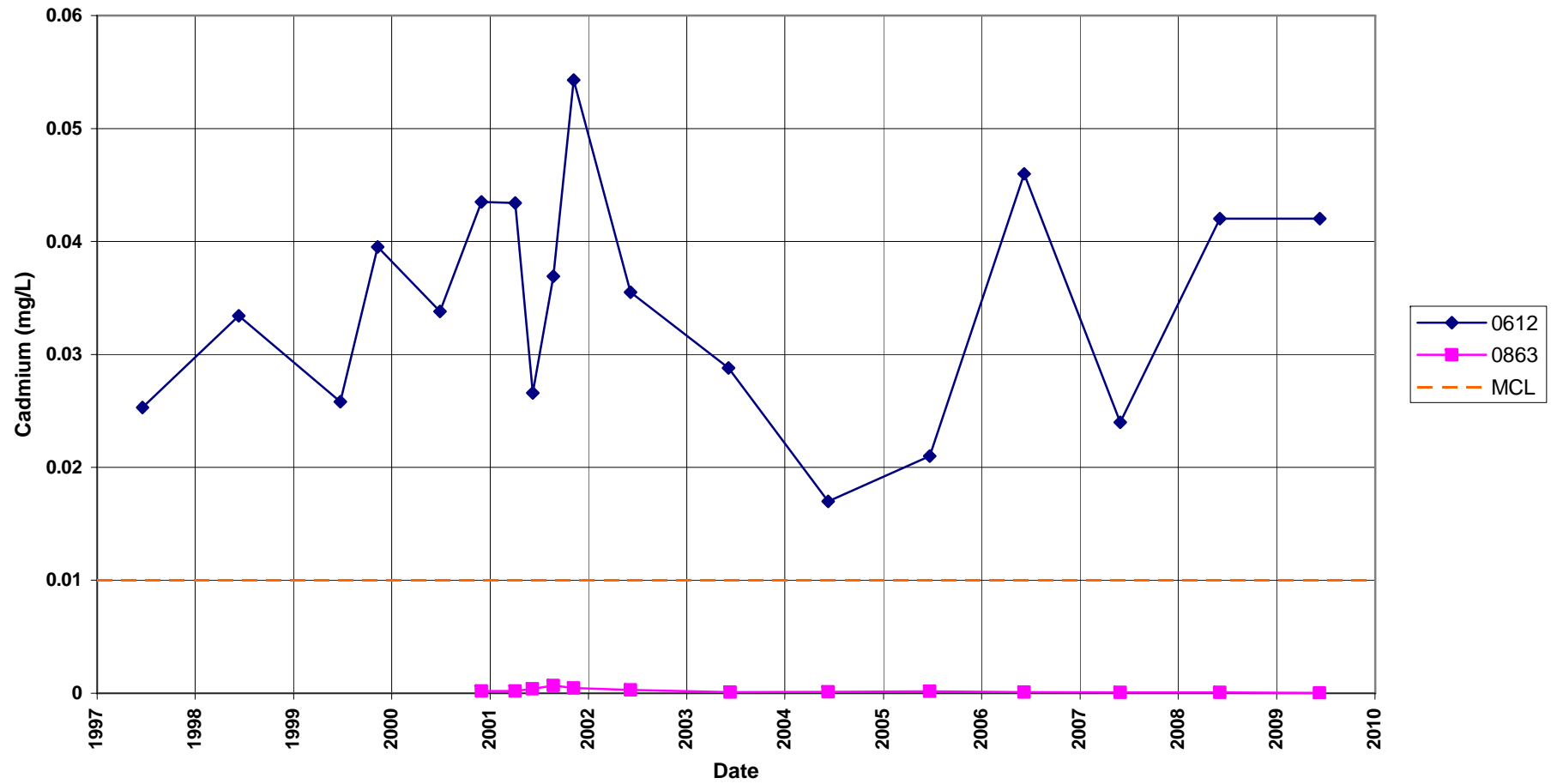
F OFF SITE

## **Time-Concentration Graphs**

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**Durango Mill Tailings Processing Site**  
**Cadmium Concentration**

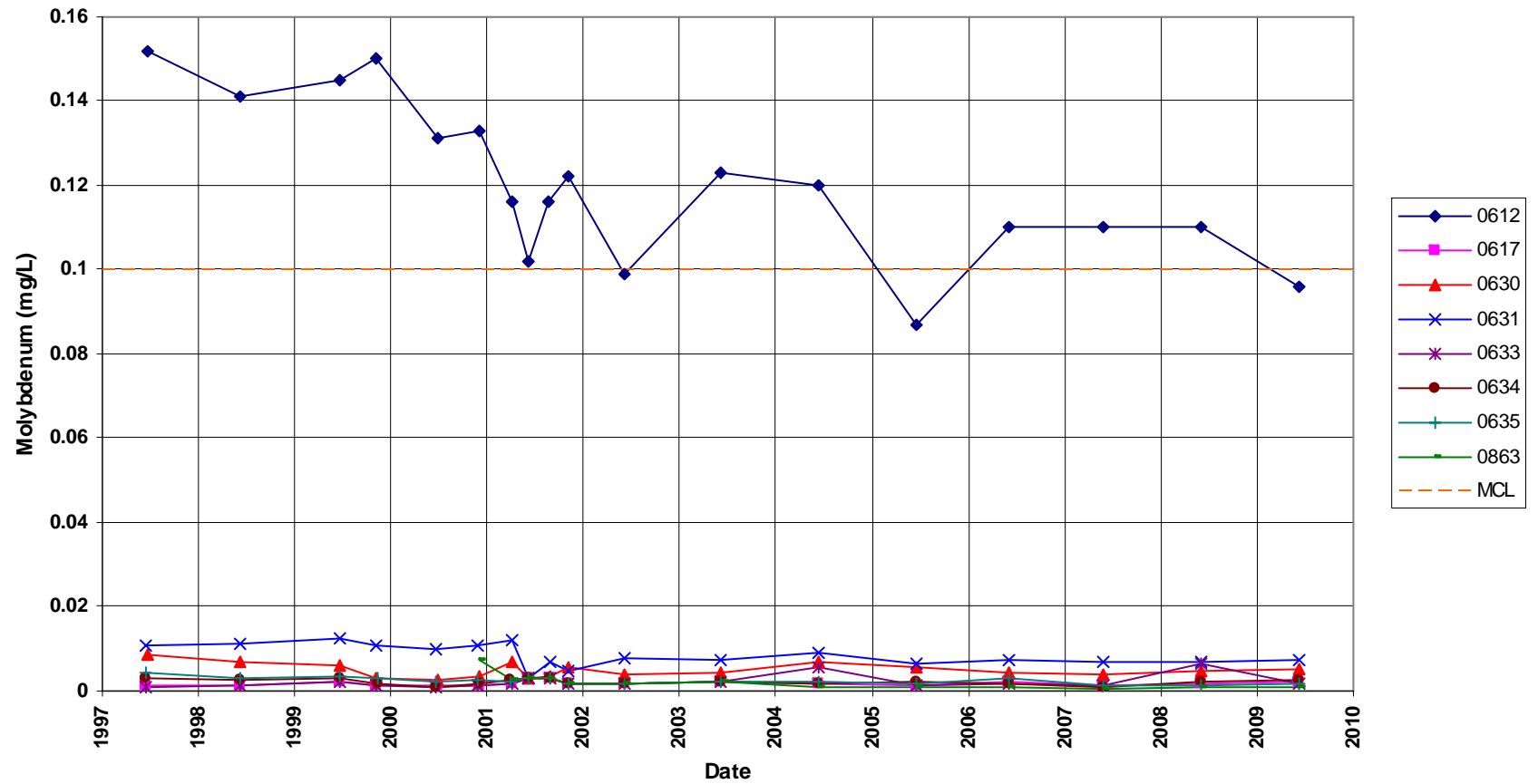
Maximum Contaminant Level = 0.01 mg/L



## Durango Mill Tailings Processing Site

### Molybdenum Concentration

Maximum Contaminant Level = 0.1 mg/L

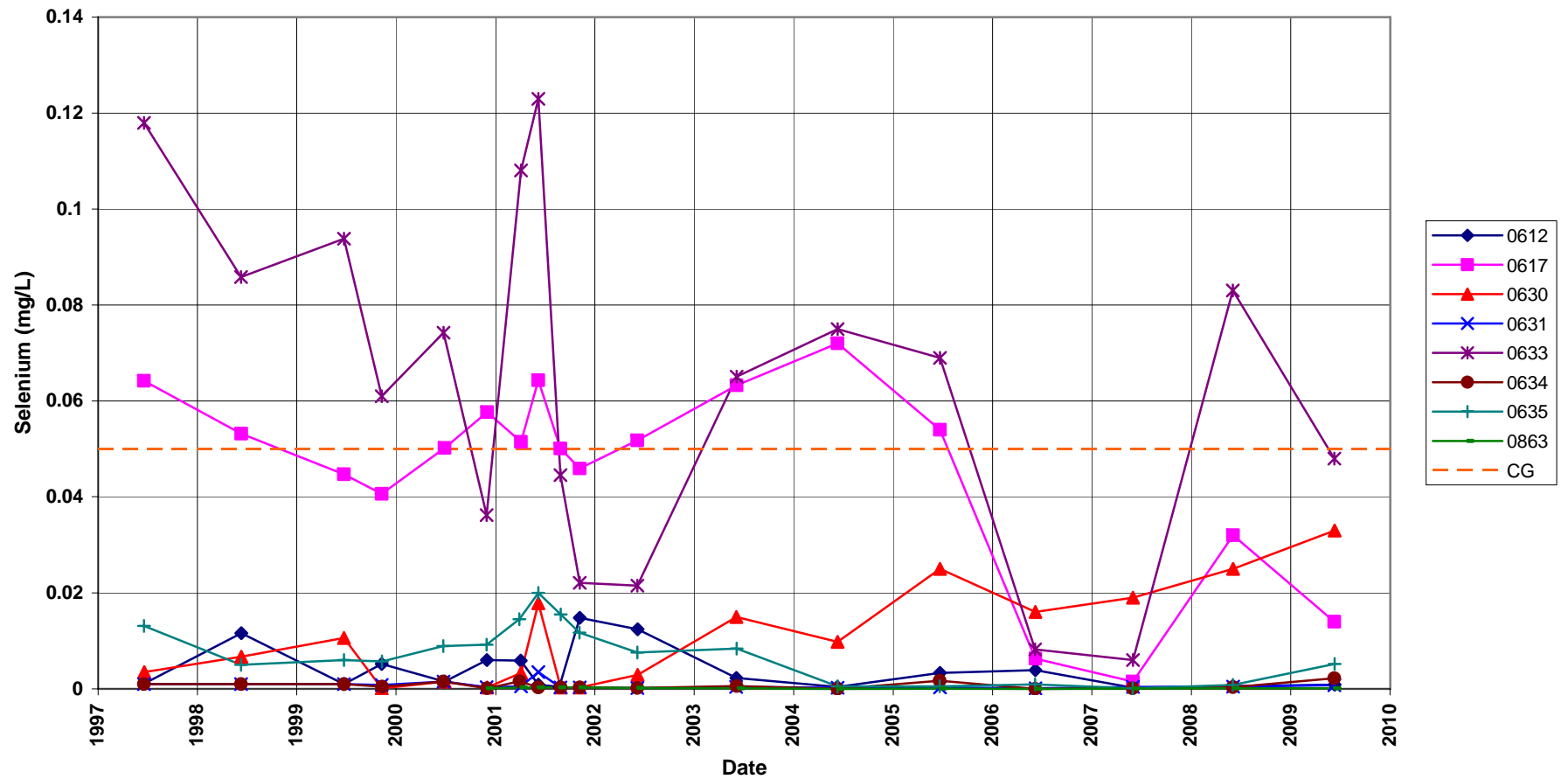


## Durango Mill Tailings Processing Site

### Selenium Concentration

Maximum Contaminant Level = 0.01 mg/L

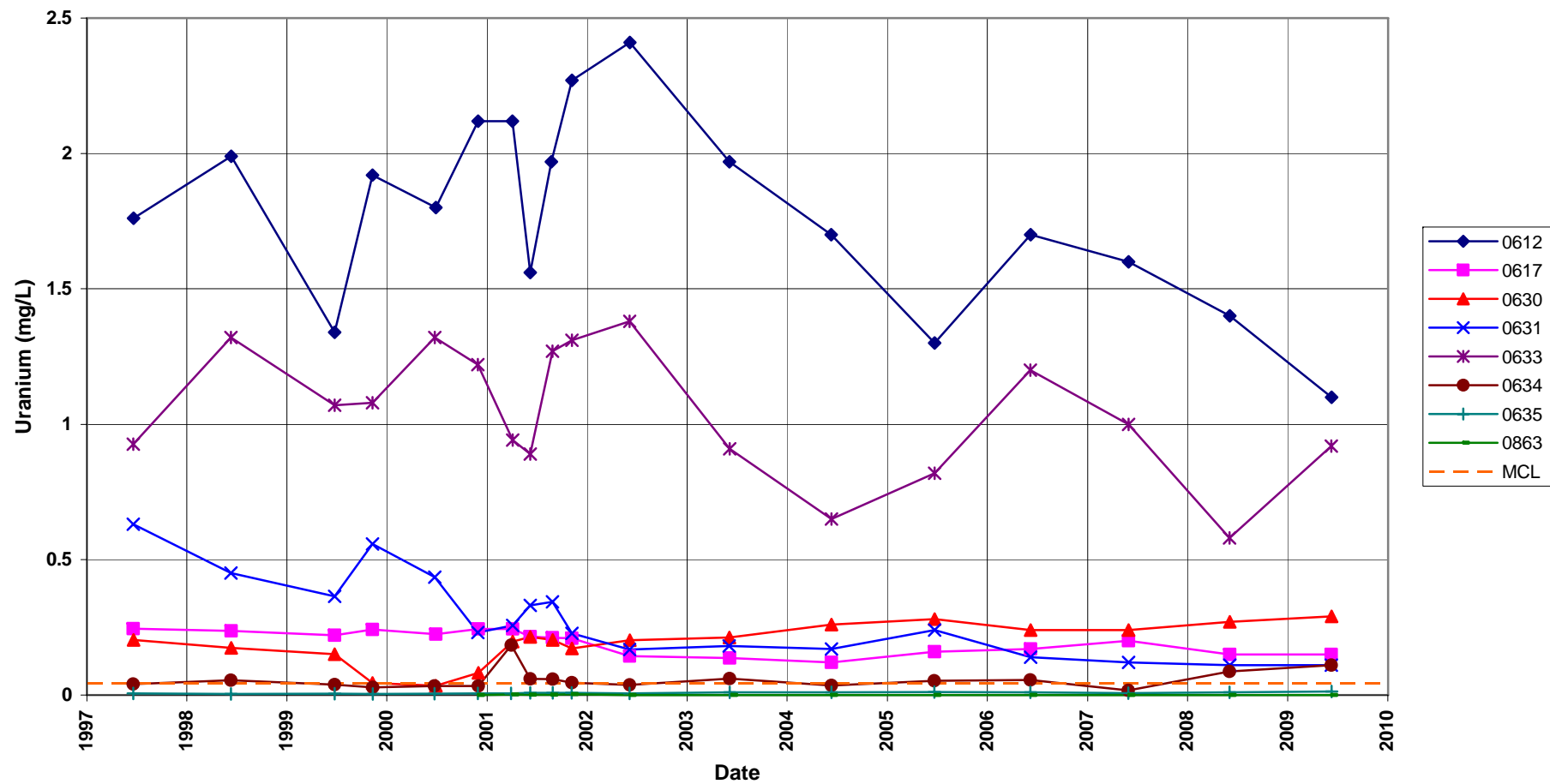
Cleanup Goal = 0.05 mg/L





# Durango Mill Tailings Processing Site Uranium Concentration

Maximum Contaminant Level = 0.044 mg/L

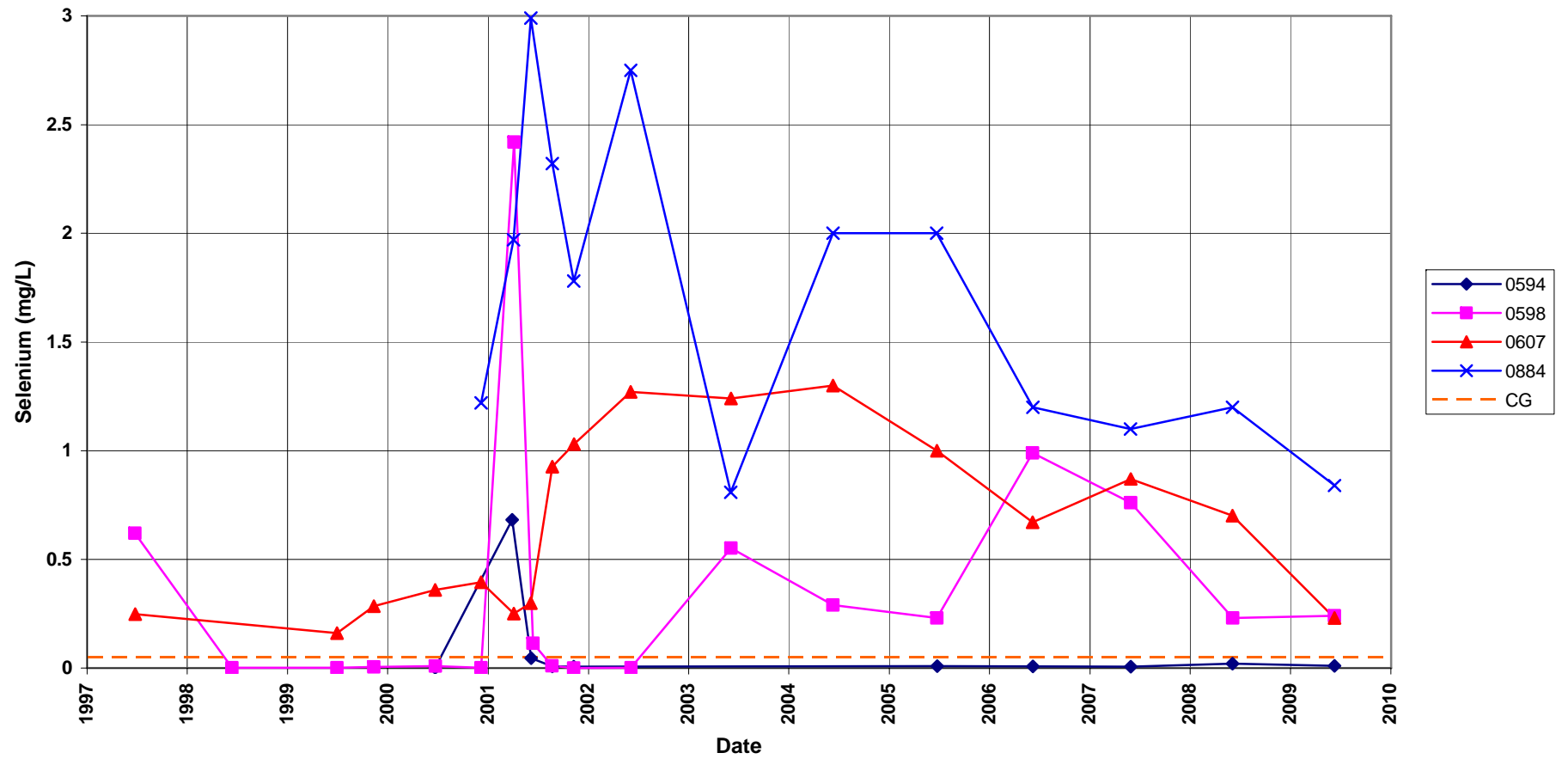


## Durango Raffinate Pond Processing Site

### Selenium Concentration

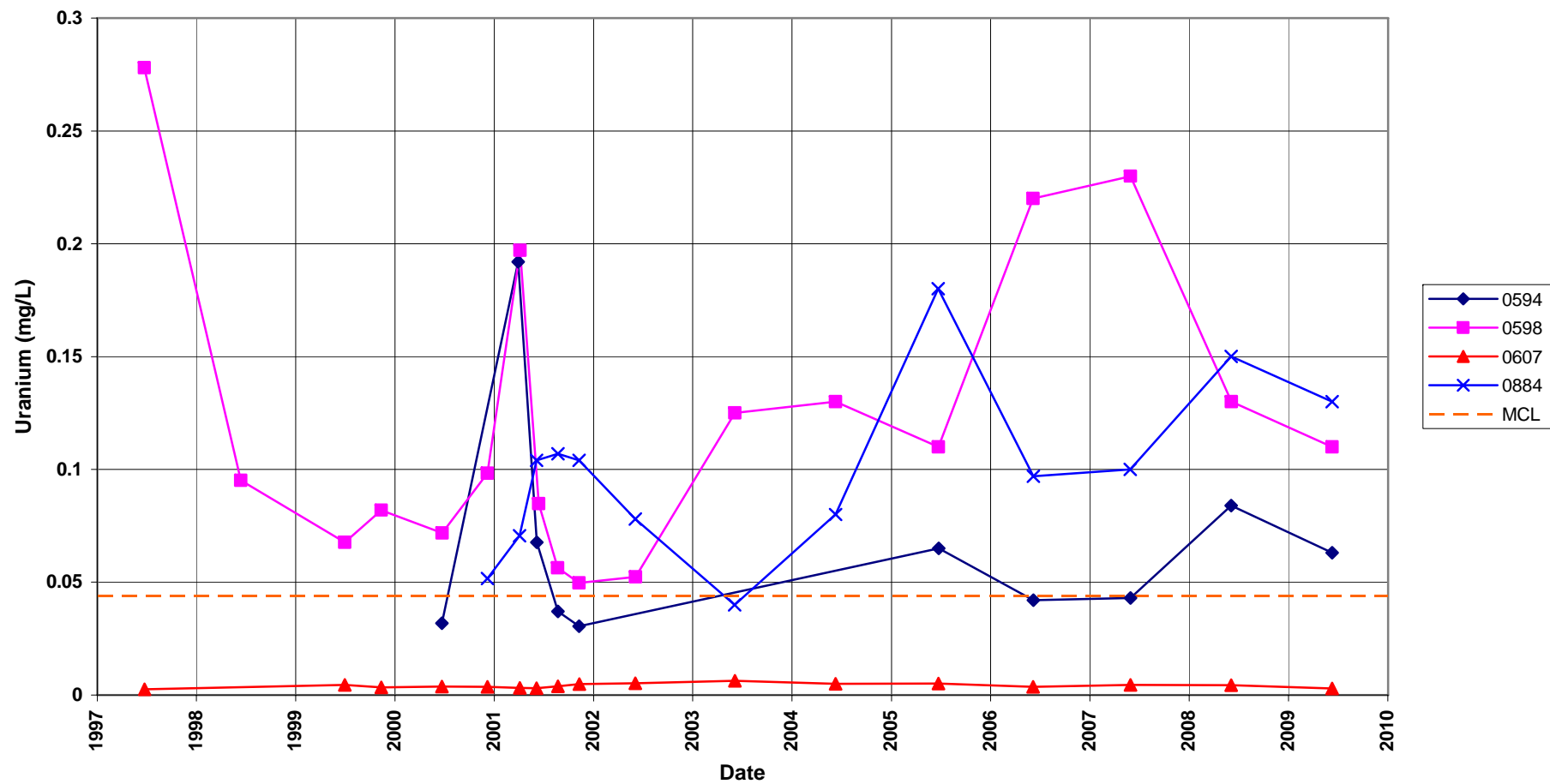
Maximum Contaminant Level = 0.01 mg/L

Cleanup Goal = 0.05 mg/L

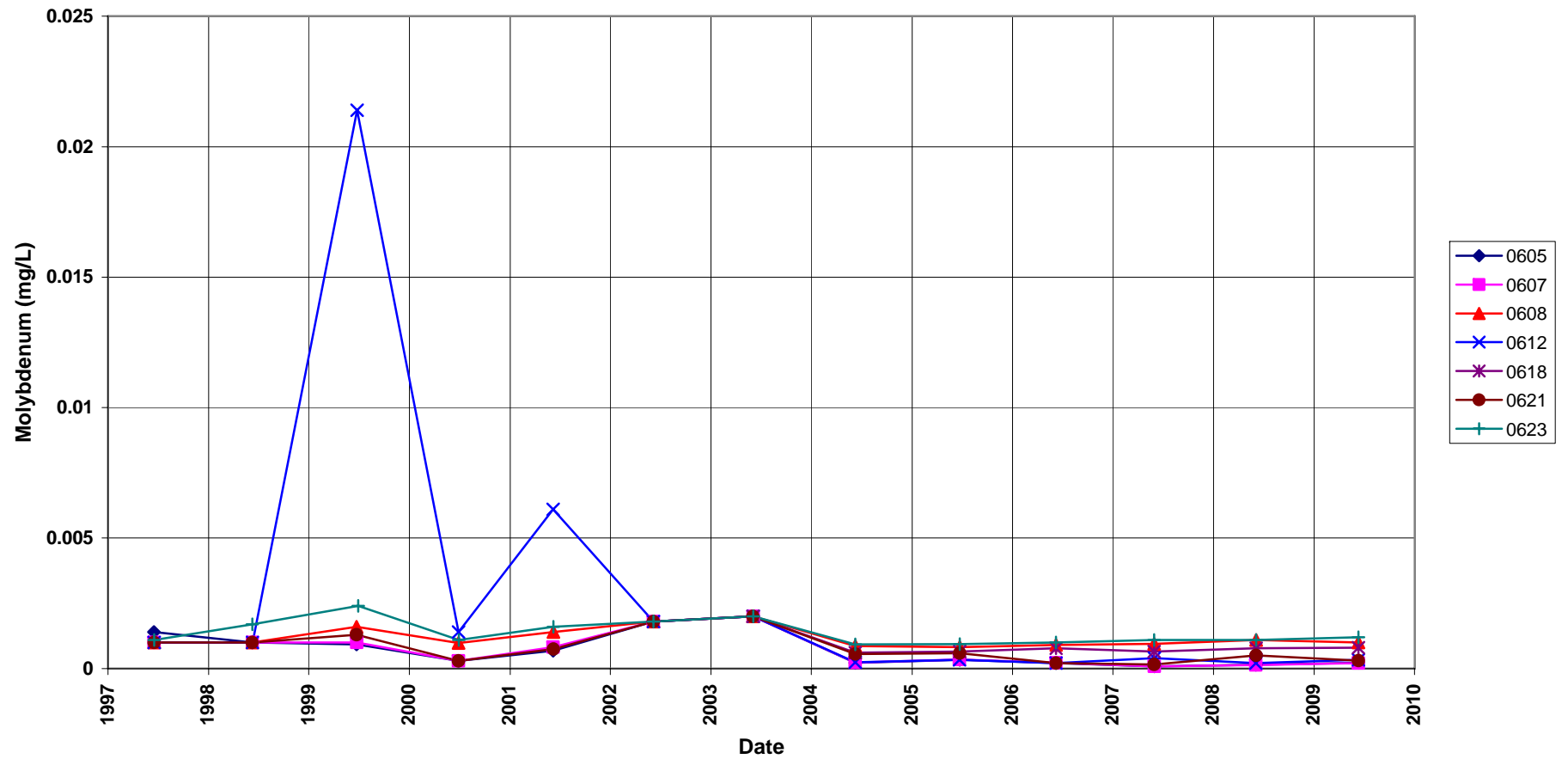


# Durango Raffinate Pond Processing Site Uranium Concentration

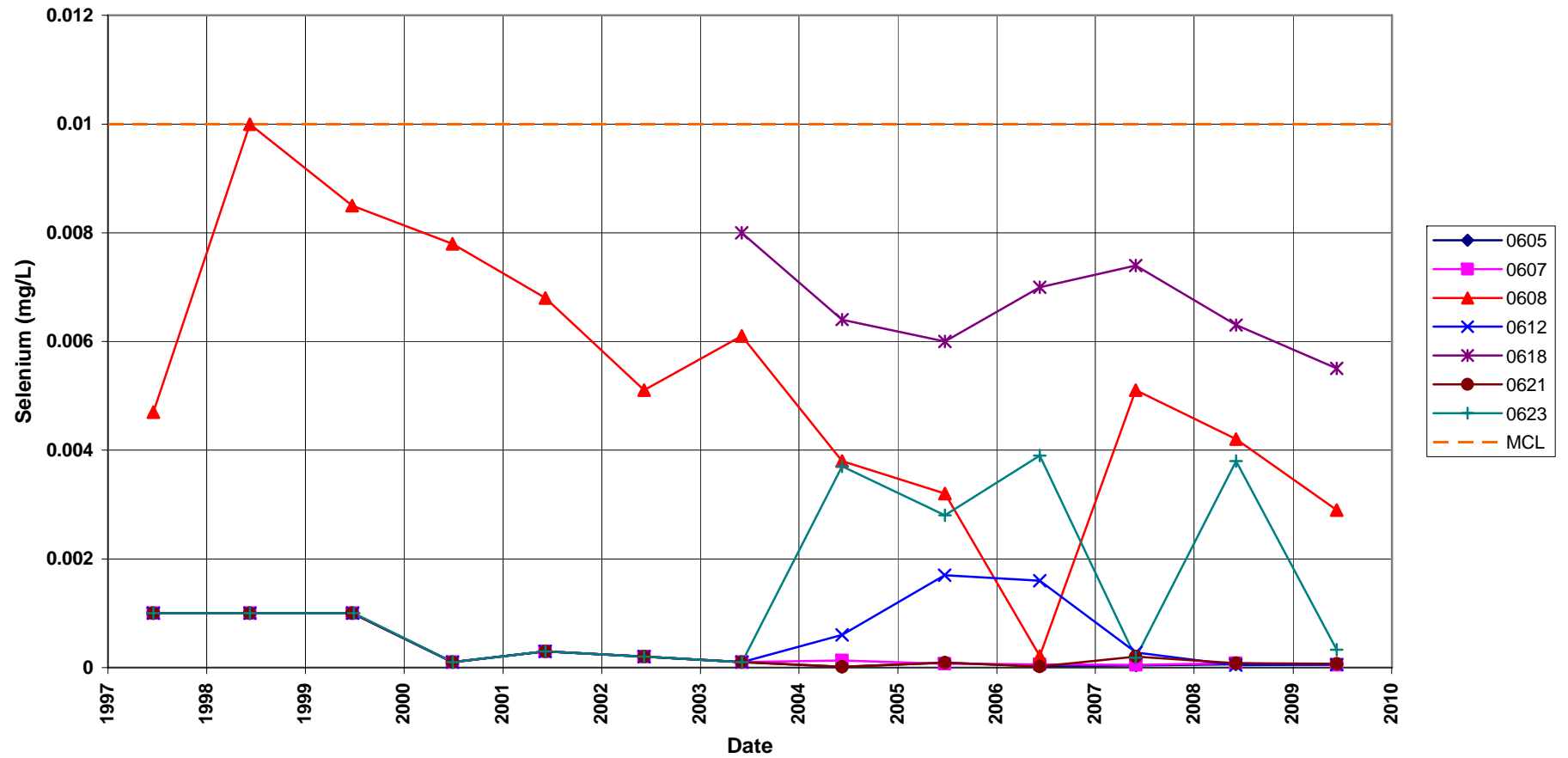
Maximum Contaminant Level = 0.044 mg/L



**Durango Disposal Site**  
**Molybdenum Concentration**  
Maximum Contaminant Level = 0.1 mg/L  
Proposed Concentration Limit = 0.22 mg/L



**Durango Disposal Site**  
**Selenium Concentration**  
Maximum Contaminant Level = 0.01 mg/L  
Proposed Concentration Limit = 0.042 mg/L

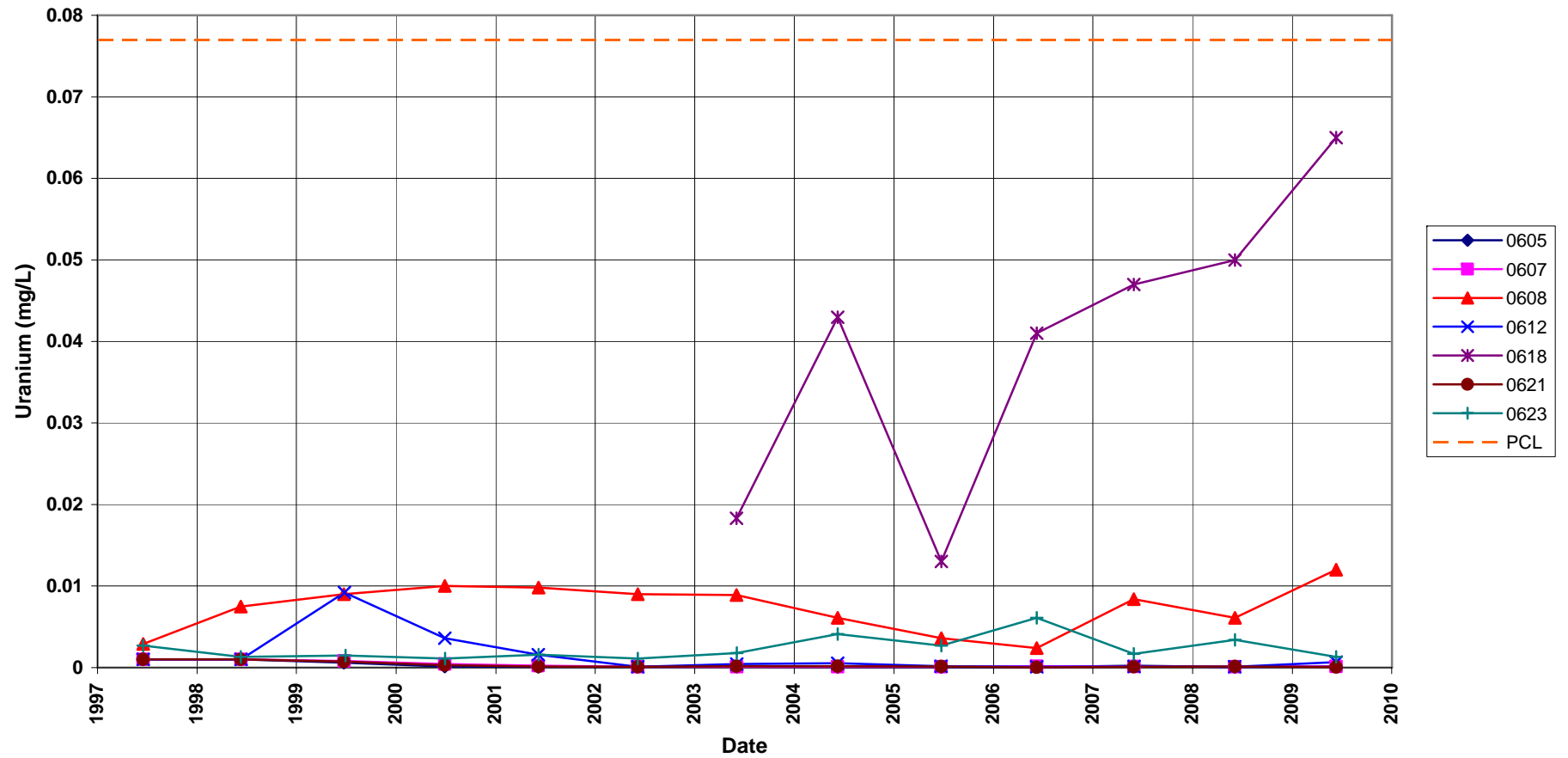


## Durango Disposal Site

### Uranium Concentration

Maximum Contaminant Level = 0.044 mg/L

Proposed Concentration Limit = 0.077 mg/L



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# **Attachment 3**

## **Sampling and Analysis Work Order**



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established 1959

Task Order LM00-501  
Control Number 09-0749

May 12, 2009

U.S. Department of Energy  
Office of Legacy Management  
ATTN: Joseph Desormeau  
Site Manager  
2597 B  $\frac{3}{4}$  Road  
Grand Junction, CO 81503

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

REFERENCE: Task Order LM-501-02-104-402, Durango, CO, Processing and Disposal Sites

Dear Mr. Desormeau:

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, Colorado, processing and disposal sites. Water quality data will be collected from monitor wells and surface water locations at these sites as part of the routine environmental sampling currently scheduled to begin the week of June 8, 2009.

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

**Monitor Wells\***

DUR01 Mill Site

612 Al/Km	630 Al/Km	631 Al/Km	633 Km	634 Km	635 Km	863 Al
617 Al						

DUR02 Raffinate Pond

594 Mf	598 Mf/Pl	607 Al	879 Mf	884 Al		
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DUR03 Bodo Canyon

605 Cf	607 Cf	608 Al	612 Km	618 Al	621 Cf	623 Al
--------	--------	--------	--------	--------	--------	--------

\*NOTE: Al = Alluvium; Cf = Cliff House Formation; Km = Mancos Shale; Mf = Menefee Formation; Pl = Point Lookout Formation

**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.

Please call me at (970) 248-6652, if you have any questions.

Sincerely,

David E. Miller  
Site Lead

DEM/lcg/lb

Enclosures (3)

cc: (electronic)

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

## Constituent Sampling Breakdown

Site	Durango		Required Detection Limit (mg/L)	Analytical Method	Line Item Code
Analyte	Groundwater	Surface Water			
Approx. No. Samples/yr	20	7			
<b>Field Measurements</b>					
Alkalinity	X	X			
Dissolved Oxygen					
Redox Potential	X	X			
pH	X	X			
Specific Conductance	X	X			
Turbidity	X				
Temperature	X	X			
<b>Laboratory Measurements</b>					
Aluminum					
Ammonia as N (NH3-N)					
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
Strontium					
Sulfate	All Mill Tailings Areas and Bodo Canyon locations		0.5	SW-846 9056	MIS-A-044
Sulfide					
Total Dissolved Solids	X		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 analyte samples are considered unfiltered unless stated otherwise. All private well samples are to be unfiltered. The total number of analytes does not include field parameters.

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## **Attachment 4**

### **Trip Report**

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*Memorandum*

Control Number N/A

DATE: June 22, 2008  
TO: David E. Miller  
FROM: Daniel Sellers  
SUBJECT: Sampling Trip Report

**Site:** Durango, Colorado, Processing and Disposal Sites

**Date of Sampling Event:** June 8-12, 2008

**Team Members:** Dan Sellers and Dave Atkinson

**Number of Locations Sampled:** 19 well locations, 7 surface water locations, 3 duplicate samples, and 1 equipment blank for a total of 30 samples.

**Locations Not Sampled/Reason:** Well 0879 (DUR02) could not be sampled because it was covered with ~ 2.0 ft of water from rain (storm water runoff).

**Location Specific Information:** All monitor wells were sampled according to the low flow purging and sampling procedure. Surface water was collected through direct emersion or tubing reel with weight. None of the surface water samples required filtration because turbidity was less than 10 NTUs.

Durango Mill Tailings site (DUR01): Monitor wells 0630 and 0634 were purged and sampled using Category II criteria; all other monitor wells were purged and sampled using Category I criteria. Monitor wells 0612 and 0630 were filtered because the measured turbidity was greater than 10 NTUs; samples from all other locations were collected without filtering.

Durango Raffinate Pond site (DUR02): Monitor wells 0594 and 0607 were purged and sampled using Category II criteria; all other monitor wells were purged and sampled using Category I criteria. Monitor well 0607 was filtered because the measured turbidity was greater than 10 NTUs; samples from all other locations were collected without filtering. Well 0594, a flush-mount well, is nearly buried.

Durango Disposal Cell site (DUR03): Monitor wells 0612 and 0623 were purged and sampled using Category II criteria; all other monitor wells were purged and sampled using Category I criteria. Monitor well 0623 was filtered because the measured turbidity was greater than 10 NTUs; samples from all other locations were collected without filtering. Monitor well 0612



had a very high alkalinity of 2172. Monitor well 0621 had a low PH (4.18); the water turned red instantly when bromocresol green-methyl red indicator was added.

**Field Variance:** None.

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

False ID	True ID	Sample Type	Associated Matrix	Ticket Number
2625	N/A	Equipment Blank for tubing used to collect all surface water samples	DI Water	HHS 725
2626	DUR03-0605	Field Duplicate	Groundwater	HGZ 987
2627	DUR02-0598	Field Duplicate	Groundwater	HGZ 995
2628	DUR01-0652	Field Duplicate	Surface water	HHS 726

**RIN Number Assigned:** All samples were assigned to RIN 09052334.

**Sample Shipment:** All samples were shipped overnight to ALS Laboratory Group from Durango, Colorado, on June 11, 2009.

**Well Inspection Summary:** Well inspections were conducted at all sampled wells. All wells were in good condition. Well DUR02-0879 was underwater and its condition was not able to be determined.

**Equipment:** All wells have dedicated tubing and were sampled using the low-flow procedure. Dedicated bladder pumps were used to collect groundwater at 14 well locations and a peristaltic pump was used to collect groundwater at five well locations. The hose reel was decontaminated after using it at surface water locations. An equipment blank was collected to monitor the decontamination.

**Water Level Measurements:** Water level measurements were collected at all sampled wells. Two data loggers were downloaded successfully at well locations DUR03-NVP and MW-1. Todd Moon (RCT), from Monticello, was present to scan the water level meter after measuring water levels from these wells. Data logger from DUR03-P7 was removed because it would not connect (dead battery) and was not successfully downloaded.

**Institutional Controls:** All gates were appropriately closed and locked during the sampling event.

**Fences, Gates, Locks:** All were in good condition.

**Signs:** No missing signs.

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

**Site Issues:**

**Disposal Cell/Drainage Structure Integrity:** N/A

**Vegetation/Noxious Weed Concerns:** N/A

**Maintenance Requirements:**

- Well 0607 (DUR02) needs to be secured and modified to the current surface level. The casing is bent about 10 feet from the top.
- Well 0879 (DUR02) needs to be inspected after water recedes. Ground may need to be reworked to eliminate storm water runoff.
- Well 0612 (DUR01) needs to be further investigated to determine if the casing is damaged because the water continues to have high turbidity. Suggest that a camera be lowered in to it to view the quality of the casing and screen.
- Another data logger needs to be placed in DUR03-P7.
- Water level needs to be taken at DUR03-NVP.

**Corrective Action Taken:** None.

(DLS/lcg)

cc: (electronic)  
Joe Desormeau, DOE  
Cheri Bahrke, Stoller  
Steve Donovan, Stoller  
EDD Delivery

M:\09052334\09052334 DVP.doc

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