Data Validation Package

August 2015 Groundwater Sampling at the Grand Junction, Colorado, Disposal Site

October 2015

U.S. DEPARTMENT OF ENERGY | Legacy Management

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Sampling Event Summary

Site: Grand Junction, Colorado, Disposal Site

Sampling Period: August 4, 2015

The 1998 *Interim Long-Term Surveillance Plan for the Cheney Disposal Site Near Grand Junction, Colorado*, requires annual monitoring to assess the performance of the disposal cell. Monitoring wells 0731, 0732, and 0733 were sampled as specified in the plan. Sampling and analyses were conducted in accordance with *Sampling and Analysis Plan for the U.S. Department of Energy Office of Legacy Management Sites* (LMS/PRO/S04351, continually updated).

The water level was measured at each sampled well. The water level in well 0733, located in the disposal cell, is lower than water levels in adjacent wells 0731 and 0732, indicating a hydraulic gradient toward the disposal cell. The attached hydrograph shows stable water levels in well 0733 over the past several years.

Results from this sampling event were generally consistent with results from the past as shown in the attached concentration-versus-time graphs. There have been no large changes in contaminant concentration observed over the last several years with the following exception. The uranium concentration in well 0733 has been trending upward since 2003. Higher uranium concentrations are expected in this well because it is located in the disposal cell. The selenium concentrations observed in wells 0731 and 0732 are elevated when compared to the disposal cell well 0733. Wells 0731 and 0732 are completed at the alluvium/Mancos contact; here, elevated selenium concentrations are expected due to contributions from the Mancos shale.

Wells with sample concentrations that exceeded U.S. Environmental Protection Agency (EPA) groundwater standards (40 CFR 192) are listed in Table 1.

Table 1. Grand Junction Disposal Site Wells where EPA Standards were Exceeded in August 2015

Analyte	Standard [a]	Location	Concentration
Nitrate + Nitrite as Nitrogen	10	0731	38
		0732	37
Selenium	0.01	0731	0.61
		0732	0.39
Uranium	0.044	0733	0.18

[a] Standards are listed in 40 CFR 192.02 Table 1 to subpart A; units are in milligrams per liter (mg/L).

Gary R. Baur

11-03-15

Gary Baur, Site Lead
Navarro Research and Engineering, Inc.

Date

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Grand Junction, Colorado, Disposal Site, Sample Location Map

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Data Assessment Summary

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Water Sampling Field Activities Verification Checklist

Project	Grand Junction, Colorado	**Date(s) of Water Sampling**	August 4, 2015
Date(s) of Verification	September 30, 2015	**Name of Verifier**	Stephen Donivan

	Response (Yes, No, NA)	Comments
1. Is the SAP the primary document directing field procedures?	Yes	
List any Program Directives or other documents, SOPs, instructions.		Work Order letter dated July 8, 2015.
2. Were the sampling locations specified in the planning documents sampled?	Yes	
3. Were calibrations conducted as specified in the above-named documents?	Yes	Calibrations were performed on August 3, 2015.
4. Was an operational check of the field equipment conducted daily?	Yes	
Did the operational checks meet criteria?	Yes	
5. Were the number and types (alkalinity, temperature, specific conductance, pH, turbidity, DO, ORP) of field measurements taken as specified?	Yes	
6. Were wells categorized correctly?	Yes	All wells were Category I.
7. Were the following conditions met when purging a Category I well:		
Was one pump/tubing volume purged prior to sampling?	Yes	
Did the water level stabilize prior to sampling?	Yes	
Did pH, specific conductance, and turbidity measurements meet criteria prior to sampling?	Yes	
Was the flow rate less than 500 mL/min?	Yes	

Water Sampling Field Activities Verification Checklist (continued)

	Response (Yes, No, NA)	Comments
8. Were the following conditions met when purging a Category II well:		
Was the flow rate less than 500 mL/min?	NA	All wells were Category I.
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 from well 0731.
10. Were equipment blanks taken at a frequency of one per 20 samples that were collected with non-dedicated equipment?	NA	An equipment blank was not required.
11. Were trip blanks prepared and included with each shipment of VOC samples?	NA	
12. Were the true identities of the QC samples documented?	Yes	
13. Were samples collected in the containers specified?	Yes	
14. Were samples filtered and preserved as specified?	Yes	
15. Were the number and types of samples collected as specified?	Yes	
16. Were chain of custody records completed and was sample custody maintained?	Yes	
17. Was all pertinent information documented on the field data sheets?	Yes	
18. Was the presence or absence of ice in the cooler documented at every sample location?	Yes	
19. Were water levels measured at the locations specified in the planning documents?	Yes	

Laboratory Performance Assessment

General Information

Requisition Index No. (RIN):	15077245
Sample Event:	August 4, 2015
Site(s):	Grand Junction, Colorado, Disposal Site
Laboratory:	ALS Laboratory Group
Work Order No.:	1508080
Analysis:	Metals, Organics, and Wet Chemistry
Validator:	Stephen Donivan
Review Date:	October 1, 2015

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

Table 2. Analytes and Methods

Analyte	Line Item Code	Prep Method	Analytical Method
Metals: Ca, Fe, K, Mg, Mn, Na, Si, Sr	LMM-01	SW-846 3005A	SW-846 6010B
Metals: Mo, Se, U, V	LMM-02	SW-846 3005A	SW-846 6020A
Nitrate + Nitrite as N	WCH-A-022	EPA 353.2	EPA 353.2
Polychlorinated Biphenyls (PCBs)	PEP-A-006	SW-846 3520C, 3665A	SW-846 8082
Sulfate	MIS-A-044	SW-846 9056	SW-846 9056
Total Dissolved Solids	WCH-A-033	EPA 160.1	EPA 160.1
Total Organic Carbon	WCH-A-025	EPA 415.1	EPA 415.1

Data Qualifier Summary

None of the analytical results required qualification.

Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado, received four water samples on August 7, 2015, accompanied by Chain of Custody (COC) forms. The receiving documentation included copies of the air bills. The COC forms were 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 was complete with no errors or omissions.

Preservation and Holding Times

The sample shipment was received intact with the temperature inside the iced coolers at 3.2°C and 3.8°C, which complies with requirements. All samples were received in the correct container types and had been preserved correctly for the requested analyses. All samples were analyzed within the applicable holding times.

Detection and Quantitation Limits

The method detection limit (MDL) was reported for all 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 EPA 160.1
There are no calibration requirements associated with the determination of total dissolved solids.

Method EPA 353.2
Calibrations for nitrate + nitrite as N were performed using seven calibration standards on August 13, 2015. 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. All calibration check results were within the acceptance criteria.

Method EPA 415.1
Calibrations for total organic carbon were performed using six calibration standards on August 12, 2015. 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. All calibration check results were within the acceptance criteria.

Method SW-846 6010B
Calibrations for 6010B metals were performed on August 13, 2015, using three calibration standards. The calibration curve correlation coefficient values were greater than 0.995 and the absolute values of the intercepts were less than 3 times the MDL. Initial and continuing

calibration verification checks were made at the required frequency. 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.

Method SW-846 6020A
Calibrations for 6020A metals were performed on August 13, 2015, using four calibration standards. The calibration curve correlation coefficient values were greater than 0.995 and the absolute values of the intercepts were less than 3 times the MDL. Initial and continuing calibration verification checks were made at the required frequency. 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 with the exception of selenium. The associated sample selenium results are all greater than 5 times the PQL not requiring qualification. 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 8082
The initial calibrations for PCBs were performed using seven calibration standards on May 27, 2015. Calibration curves were established using linear regression. Linear regression calibrations had correlation coefficient values greater than 0.99 and intercepts less than 3 times the MDL. Initial and continuing calibration verification checks were made at the required frequency. All calibration checks met the acceptance criteria for all analytes on both gas chromatography columns. PCBs were not detected in any field sample.

Method SW-846 9056
Calibrations for sulfate were performed using seven calibration standards on August 18, 2015. 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. All calibration check results were within the acceptance criteria.

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.

Metals and Wet Chemistry
All method blank and calibration blank results associated with the samples were below the PQL for all analytes. In cases where a blank concentration exceeds 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.

Organics
The method blank results were below the MDLs for all target compounds.

Inductively Coupled Plasma Interference Check Sample Analysis

Interference check samples 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. The spike recoveries met the acceptance criteria for all analytes evaluated. The sulfate spike recoveries were below the laboratory acceptance range but within the validation range requiring no qualification.

Laboratory Replicate Analysis

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

Laboratory Control Sample

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

Metals Serial Dilution

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

PCB Surrogate Recoveries

Laboratory performance for individual samples is established by monitoring the recovery of surrogate spikes. The PCB surrogate recoveries were within the acceptance ranges for all samples.

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 chloride, PCB, and sulfate data. All peak integrations were satisfactory.

Electronic Data Deliverable (EDD) File

The EDD file arrived on August 27, 2015. 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: 15077245 **Lab Code:** PAR **Validator:** Stephen Donivan **Validation Date:** 09/30/2015

Project: Grand Junction Disp/Proc Sites **Analysis Type:** ☑ Metals ☑ General Chem ☐ Rad ☑ Organics

# of Samples: 4 **Matrix:** WATER **Requested Analysis Completed:** Yes

Chain of Custody

Present: OK **Signed:** OK **Dated:** OK

Sample

Integrity: OK **Preservation:** OK **Temperature:** OK

Select Quality Parameters

☑ Holding Times	All analyses were completed within the applicable holding times.
☑ Detection Limits	The reported detection limits are equal to or below contract requirements.
☐ Field/Trip Blanks	
☑ Field Duplicates	There was 1 duplicate evaluated.

SAMPLE MANAGEMENT SYSTEM

Metals Data Validation Worksheet

RIN: 15077245 **Lab Code:** PAR **Date Due:** 09/04/2015

Matrix: Water **Site Code:** GRJ03 **Date Completed:** 08/28/2015

Analyte	Method Type	Date Analyzed	CALIBRATION				Method Blank	LCS %R	MS %R	MSD %R	Dup. RPD	ICSAB %R	Serial Dil. %R	CRI %R
			Int.	R^2	CCV	CCB								
Calcium	ICP/ES	08/13/2015	0.0000	1.0000	OK	OK	OK	100.0	93.0	89.0	1.0	106.0	3.0	106.0
Iron	ICP/ES	08/13/2015	0.0000	1.0000	OK	OK	OK	94.0	82.0	81.0	1.0	105.0		99.0
Magnesium	ICP/ES	08/13/2015	0.0000	1.0000	OK	OK	OK	99.0	98.0	97.0	0.0	104.0	4.0	99.0
Manganese	ICP/ES	08/13/2015	0.0000	1.0000	OK	OK	OK	102.0	90.0	89.0	1.0	96.0		104.0
Molybdenum	ICP/MS	08/13/2015	0.0000	1.0000	OK	OK	OK	109.0	108.0	115.0	6.0	103.0		114.0
Potassium	ICP/ES	08/13/2015	0.0000	1.0000	OK	OK	OK	100.0	116.0	116.0	0.0		2.0	86.0
Selenium	ICP/MS	08/13/2015	0.0000	1.0000	OK	OK	OK	103.0			2.0	106.0	6.0	144.0
Silicon	ICP/ES	08/13/2015	0.0000	1.0000	OK	OK	OK	102.0	84.0	87.0	0.0	96.0	6.0	104.0
Sodium	ICP/ES	08/13/2015	0.0000	1.0000	OK	OK	OK	101.0			0.0		5.0	99.0
Strontium	ICP/ES	08/13/2015	0.0000	1.0000	OK	OK	OK	99.0			1.0	101.0	10.0	96.0
Uranium	ICP/MS	08/13/2015	0.0000	1.0000	OK	OK	OK	102.0	101.0	110.0	2.0	105.0	4.0	100.0
Vanadium	ICP/MS	08/13/2015	0.0000	1.0000	OK	OK	OK	105.0	112.0	117.0	4.0	98.0		73.0

SAMPLE MANAGEMENT SYSTEM
Organics Data Validation Summary

RIN: 15077245 **Project:** Grand Junction Disp/Proc Site **Lab Code:** PAR **Validation Date:** 09/30/2015

LCS Recovery: All LCS recoveries were within the laboratory acceptance limits.

Method Blank(s): All method blanks results were below the method detection limit.

MS/MSD Recovery: All MS/MSD recoveries were within the laboratory acceptance limits.

Surrogate Recovery: All surrogate recoveries were within the laboratory acceptance limits.

SAMPLE MANAGEMENT SYSTEM

Wet Chemistry Data Validation Worksheet

RIN: 15077245 **Lab Code:** PAR **Date Due:** 09/04/2015

Matrix: Water **Site Code:** GRJ03 **Date Completed:** 08/28/2015

Analyte	Date Analyzed	CALIBRATION				Method Blank	LCS %R	MS %R	MSD %R	DUP RPD	Serial Dil. %R
		Int.	R^2	CCV	CCB						
CHLORIDE	08/18/2015	0.000	1.0000	OK	OK	OK	99.00	95.0	95.0	0	
Nitrate+Nitrite as N	08/13/2015	0.000	0.9970	OK	OK	OK	106.00	81.0	79.0	1.00	
SULFATE	08/18/2015	0.000	1.0000	OK	OK	OK	97.00	84.0	84.0	0	
TOTAL DISSOLVED SOLIDS	08/12/2015					OK	105.00				
Total Organic Carbon	08/12/2015	0.000	0.9998	OK	OK	OK	105.00	93.0	101.0	5.00	

Sampling Quality Control Assessment

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

Sampling Protocol

Sample results for all monitoring wells met the Category I 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.

Equipment Blank Assessment

An equipment blank was not required because samples were collected using dedicated equipment.

Field Duplicate Analysis

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. A duplicate sample was collected from location 0731. The relative percent difference for duplicate results that are greater than 5 times the PQL should be less than 20 percent. For results that are less than 5 times the PQL, the range should be no greater than the PQL. The duplicate results met the criteria demonstrating acceptable overall precision.

SAMPLE MANAGEMENT SYSTEM

Validation Report: Field Duplicates

RIN: 15077245 **Lab Code:** PAR **Project:** Grand Junction Disp/Proc Sites **Validation Date:** 09/30/2015

Duplicate: 2978 **Sample:** 0731

Analyte	Sample				Duplicate				RPD	RER	Units
	Result	Flag	Error	Dilution	Result	Flag	Error	Dilution			
Aroclor 1016	0.3	U		1	0.32	U		1			UG/L
Aroclor 1221	0.3	U		1	0.32	U		1			UG/L
Aroclor 1232	0.3	U		1	0.32	U		1			UG/L
Aroclor 1242	0.3	U		1	0.32	U		1			UG/L
Aroclor 1248	0.3	U		1	0.32	U		1			UG/L
Aroclor 1254	0.3	U		1	0.32	U		1			UG/L
Aroclor 1260	0.3	U		1	0.32	U		1			UG/L
Calcium	320000			1	320000			1	0		UG/L
CHLORIDE	600			50	600			50	0		MG/L
Iron	9.6	J		1	10	J		1			UG/L
Magnesium	260000			1	260000			1	0		UG/L
Manganese	0.11	U		1	0.11	U		1			UG/L
Molybdenum	2.6			10	2.7			10	3.77		UG/L
Nitrate+Nitrite as N	38			50	40			20	5.13		MG/L
Potassium	17000			1	17000			1	0		UG/L
Selenium	610			10	630			10	3.23		UG/L
Silica	35000			1	35000			1	0		UG/L
Silicon	16000			1	16000			1	0		UG/L
Sodium	1500000			50	1500000			50	0		UG/L
Strontium	7200			1	7200			1	0		UG/L
SULFATE	4300			50	4300			50	0		MG/L
TOTAL DISSOLVED SOLIDS	7500			1	7500			1	0		MG/L
Total Organic Carbon	4.9			1	5			1			MG/L
Uranium	41			10	41			10	0		UG/L
Vanadium	0.62	J		10	0.85	J		10			UG/L

Certification

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

Laboratory Coordinator: Stephen Donivan — Stephen Donivan — 10-21-2015 — Date

Data Validation Lead: Stephen Donivan — Stephen Donivan — 10-21-2015 — 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 can result from transcription errors, data-coding errors, or measurement system problems. However, outliers can also represent true extreme values of a distribution and can 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.** Do this 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 as to whether the data are normally distributed using the Shapiro-Wilk Test.
2. **Apply the appropriate statistical test.** Dixon's Test for extreme values is used to test for statistical outliers when the sample size is less than or equal to 25. This test considers both extreme values that are much smaller than the rest of the data (case 1) and extreme values that are much larger than the rest of the data (case 2). This test is valid only if the data without the suspected outlier are normally distributed. Rosner's Test is a parametric test that is used to detect outliers for sample sizes of 25 or more. This test also assumes that the data without the suspected outliers are normally distributed.
3. **Scientifically review statistical outliers and decide on their disposition.** The review should include an evaluation of any notable trends in the data that may indicate the outliers represent true extreme values.

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

Data Validation Outliers Report - No Field Parameters

Comparison: All historical Data Beginning 01/01/2005

Laboratory: ALS Laboratory Group

RIN: 15077245

Report Date: 10/06/2015

Site Code	Location Code	Sample ID	Sample Date	Analyte	Current	Qualifiers		Historical Maximum	Qualifiers		Historical Minimum	Qualifiers		Number of Data Points		Statistical Outlier
					Result	*Lab*	*Data*	Result	*Lab*	*Data*	Result	*Lab*	*Data*	N	N Below Detect	
GRJ03	0732	N001	08/04/2015	Molybdenum	0.00330		F	0.00320		FJ	0.00180		UFQ	17	2	No
GRJ03	0732	N001	08/04/2015	Uranium	0.0270		F	0.0260		F	0.0170		FQJ	17	0	No
GRJ03	0733	N001	08/04/2015	Nitrate + Nitrite as Nitrogen	1.50		F	18.0		FQ	1.90		F	12	0	No
GRJ03	0733	N001	08/04/2015	Selenium	0.00520		F	0.00450		F	0.00240		F	12	0	No
GRJ03	0733	N001	08/04/2015	Sulfate	8100		F	6700		F	3200		FJ	12	0	NA
GRJ03	0733	N001	08/04/2015	Uranium	0.180		F	0.170		F	0.0290		FQJ	12	0	No

STATISTICAL TESTS:
The distribution of the data is tested for normality or lognormality using the Shapiro-Wilk Test.
Outliers are identified using Dixon's Test when there are 25 or fewer data points.
Outliers are identified using Rosner's Test when there are 26 or more data points.
See Data Quality Assessment: Statistical Methods for Practitioners, EPA QC/G-9S, February 2006.

NA: Data are not normally or lognormally distributed.

Attachment 2
Data Presentation

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Groundwater Quality Data

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Groundwater Quality Data by Location (USEE100) FOR SITE GRJ03, Grand Junction Disposal Site

REPORT DATE: 10/06/2015

Location: 0731 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	08/04/2015	N001	17	-	32	285		F	#		
Aroclor - 1016	ug/L	08/04/2015	N001	17	-	32	0.3	U	F	#	0.3	
Aroclor - 1016	ug/L	08/04/2015	N002	17	-	32	0.32	U	F	#	0.32	
Aroclor - 1221	ug/L	08/04/2015	N001	17	-	32	0.3	U	F	#	0.3	
Aroclor - 1221	ug/L	08/04/2015	N002	17	-	32	0.32	U	F	#	0.32	
Aroclor - 1232	ug/L	08/04/2015	N001	17	-	32	0.3	U	F	#	0.3	
Aroclor - 1232	ug/L	08/04/2015	N002	17	-	32	0.32	U	F	#	0.32	
Aroclor - 1242	ug/L	08/04/2015	N001	17	-	32	0.3	U	F	#	0.3	
Aroclor - 1242	ug/L	08/04/2015	N002	17	-	32	0.32	U	F	#	0.32	
Aroclor - 1248	ug/L	08/04/2015	N001	17	-	32	0.3	U	F	#	0.3	
Aroclor - 1248	ug/L	08/04/2015	N002	17	-	32	0.32	U	F	#	0.32	
Aroclor - 1254	ug/L	08/04/2015	N001	17	-	32	0.3	U	F	#	0.3	
Aroclor - 1254	ug/L	08/04/2015	N002	17	-	32	0.32	U	F	#	0.32	
Aroclor - 1260	ug/L	08/04/2015	N001	17	-	32	0.3	U	F	#	0.3	
Aroclor - 1260	ug/L	08/04/2015	N002	17	-	32	0.32	U	F	#	0.32	
Calcium	mg/L	08/04/2015	N001	17	-	32	320		F	#	0.012	
Calcium	mg/L	08/04/2015	N002	17	-	32	320		F	#	0.012	
Chloride	mg/L	08/04/2015	N001	17	-	32	600		F	#	10	
Chloride	mg/L	08/04/2015	N002	17	-	32	600		F	#	10	
Dissolved Oxygen	mg/L	08/04/2015	N001	17	-	32	9.12		F	#		
Iron	mg/L	08/04/2015	N001	17	-	32	0.0096	J	F	#	0.0049	
Iron	mg/L	08/04/2015	N002	17	-	32	0.01	J	F	#	0.0049	
Magnesium	mg/L	08/04/2015	N001	17	-	32	260		F	#	0.013	
Magnesium	mg/L	08/04/2015	N002	17	-	32	260		F	#	0.013	

Groundwater Quality Data by Location (USEE100) FOR SITE GRJ03, Grand Junction Disposal Site

REPORT DATE: 10/06/2015

Location: 0731 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Manganese	mg/L	08/04/2015	N001	17	-	32	0.00011	U	F	#	0.00011	
Manganese	mg/L	08/04/2015	N002	17	-	32	0.00011	U	F	#	0.00011	
Molybdenum	mg/L	08/04/2015	N001	17	-	32	0.0026		F	#	0.00032	
Molybdenum	mg/L	08/04/2015	N002	17	-	32	0.0027		F	#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	08/04/2015	N001	17	-	32	38		F	#	0.5	
Nitrate + Nitrite as Nitrogen	mg/L	08/04/2015	N002	17	-	32	40		F	#	0.2	
Oxidation Reduction Potential	mV	08/04/2015	N001	17	-	32	144.5		F	#		
pH	s.u.	08/04/2015	N001	17	-	32	7.21		F	#		
Potassium	mg/L	08/04/2015	N001	17	-	32	17		F	#	0.11	
Potassium	mg/L	08/04/2015	N002	17	-	32	17		F	#	0.11	
Selenium	mg/L	08/04/2015	N001	17	-	32	0.61		F	#	0.00032	
Selenium	mg/L	08/04/2015	N002	17	-	32	0.63		F	#	0.00032	
Silica	mg/L	08/04/2015	N001	17	-	32	35		F	#	0.0095	
Silica	mg/L	08/04/2015	N002	17	-	32	35		F	#	0.0095	
Silicon	mg/L	08/04/2015	N001	17	-	32	16		F	#	0.0044	
Silicon	mg/L	08/04/2015	N002	17	-	32	16		F	#	0.0044	
Sodium	mg/L	08/04/2015	N001	17	-	32	1500		F	#	0.33	
Sodium	mg/L	08/04/2015	N002	17	-	32	1500		F	#	0.33	
Specific Conductance	umhos /cm	08/04/2015	N001	17	-	32	8545		F	#		
Strontium	mg/L	08/04/2015	N001	17	-	32	7.2		F	#	0.000078	
Strontium	mg/L	08/04/2015	N002	17	-	32	7.2		F	#	0.000078	
Sulfate	mg/L	08/04/2015	N001	17	-	32	4300		F	#	25	
Sulfate	mg/L	08/04/2015	N002	17	-	32	4300		F	#	25	

Groundwater Quality Data by Location (USEE100) FOR SITE GRJ03, Grand Junction Disposal Site

REPORT DATE: 10/06/2015

Location: 0731 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Temperature	C	08/04/2015	N001	17	-	32	15.99		F	#		
Total Dissolved Solids	mg/L	08/04/2015	N001	17	-	32	7500		F	#	20	
Total Dissolved Solids	mg/L	08/04/2015	N002	17	-	32	7500		F	#	20	
Total Organic Carbon	mg/L	08/04/2015	N001	17	-	32	4.9		F	#	1	
Total Organic Carbon	mg/L	08/04/2015	N002	17	-	32	5		F	#	1	
Turbidity	NTU	08/04/2015	N001	17	-	32	5.79		F	#		
Uranium	mg/L	08/04/2015	N001	17	-	32	0.041		F	#	0.000029	
Uranium	mg/L	08/04/2015	N002	17	-	32	0.041		F	#	0.000029	
Vanadium	mg/L	08/04/2015	N001	17	-	32	0.00062	J	F	#	0.00015	
Vanadium	mg/L	08/04/2015	N002	17	-	32	0.00085	J	F	#	0.00015	

Groundwater Quality Data by Location (USEE100) FOR SITE GRJ03, Grand Junction Disposal Site

REPORT DATE: 10/06/2015

Location: 0732 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	08/04/2015	N001	17.52	-	33	217		F	#		
Aroclor - 1016	ug/L	08/04/2015	N001	17.52	-	33	0.3	U	F	#	0.3	
Aroclor - 1221	ug/L	08/04/2015	N001	17.52	-	33	0.3	U	F	#	0.3	
Aroclor - 1232	ug/L	08/04/2015	N001	17.52	-	33	0.3	U	F	#	0.3	
Aroclor - 1242	ug/L	08/04/2015	N001	17.52	-	33	0.3	U	F	#	0.3	
Aroclor - 1248	ug/L	08/04/2015	N001	17.52	-	33	0.3	U	F	#	0.3	
Aroclor - 1254	ug/L	08/04/2015	N001	17.52	-	33	0.3	U	F	#	0.3	
Aroclor - 1260	ug/L	08/04/2015	N001	17.52	-	33	0.3	U	F	#	0.3	
Calcium	mg/L	08/04/2015	N001	17.52	-	33	490		F	#	0.012	
Chloride	mg/L	08/04/2015	N001	17.52	-	33	980		F	#	10	
Dissolved Oxygen	mg/L	08/04/2015	N001	17.52	-	33	7.71		F	#		
Iron	mg/L	08/04/2015	N001	17.52	-	33	0.17		F	#	0.0049	
Magnesium	mg/L	08/04/2015	N001	17.52	-	33	300		F	#	0.013	
Manganese	mg/L	08/04/2015	N001	17.52	-	33	0.004	J	F	#	0.00011	
Molybdenum	mg/L	08/04/2015	N001	17.52	-	33	0.0033		F	#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	08/04/2015	N001	17.52	-	33	37		F	#	0.5	
Oxidation Reduction Potential	mV	08/04/2015	N001	17.52	-	33	146.4		F	#		
pH	s.u.	08/04/2015	N001	17.52	-	33	7.17		F	#		
Potassium	mg/L	08/04/2015	N001	17.52	-	33	19		F	#	0.11	
Selenium	mg/L	08/04/2015	N001	17.52	-	33	0.39		F	#	0.00032	
Silica	mg/L	08/04/2015	N001	17.52	-	33	27		F	#	0.0095	
Silicon	mg/L	08/04/2015	N001	17.52	-	33	12		F	#	0.0044	
Sodium	mg/L	08/04/2015	N001	17.52	-	33	1600		F	#	0.33	

Groundwater Quality Data by Location (USEE100) FOR SITE GRJ03, Grand Junction Disposal Site

REPORT DATE: 10/06/2015

Location: 0732 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Specific Conductance	umhos /cm	08/04/2015	N001	17.52	-	33	10138		F	#		
Strontium	mg/L	08/04/2015	N001	17.52	-	33	8.6		F	#	0.000078	
Sulfate	mg/L	08/04/2015	N001	17.52	-	33	4600		F	#	25	
Temperature	C	08/04/2015	N001	17.52	-	33	16.96		F	#		
Total Dissolved Solids	mg/L	08/04/2015	N001	17.52	-	33	8200		F	#	20	
Total Organic Carbon	mg/L	08/04/2015	N001	17.52	-	33	3.8		F	#	1	
Turbidity	NTU	08/04/2015	N001	17.52	-	33	3.26		F	#		
Uranium	mg/L	08/04/2015	N001	17.52	-	33	0.027		F	#	0.000029	
Vanadium	mg/L	08/04/2015	N001	17.52	-	33	0.00088	J	F	#	0.00015	

Groundwater Quality Data by Location (USEE100) FOR SITE GRJ03, Grand Junction Disposal Site

REPORT DATE: 10/06/2015

Location: 0733 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Alkalinity, Total (as $CaCO_3$)	mg/L	08/04/2015	N001	63.8	-	73.8	550		F	#		
Aroclor - 1016	ug/L	08/04/2015	N001	63.8	-	73.8	0.3	U	F	#	0.3	
Aroclor - 1221	ug/L	08/04/2015	N001	63.8	-	73.8	0.3	U	F	#	0.3	
Aroclor - 1232	ug/L	08/04/2015	N001	63.8	-	73.8	0.3	U	F	#	0.3	
Aroclor - 1242	ug/L	08/04/2015	N001	63.8	-	73.8	0.3	U	F	#	0.3	
Aroclor - 1248	ug/L	08/04/2015	N001	63.8	-	73.8	0.3	U	F	#	0.3	
Aroclor - 1254	ug/L	08/04/2015	N001	63.8	-	73.8	0.3	U	F	#	0.3	
Aroclor - 1260	ug/L	08/04/2015	N001	63.8	-	73.8	0.3	U	F	#	0.3	
Calcium	mg/L	08/04/2015	N001	63.8	-	73.8	420		F	#	0.012	
Chloride	mg/L	08/04/2015	N001	63.8	-	73.8	1600		F	#	20	
Dissolved Oxygen	mg/L	08/04/2015	N001	63.8	-	73.8	3.7		F	#		
Iron	mg/L	08/04/2015	N001	63.8	-	73.8	0.011	J	F	#	0.0049	
Magnesium	mg/L	08/04/2015	N001	63.8	-	73.8	610		F	#	0.65	
Manganese	mg/L	08/04/2015	N001	63.8	-	73.8	0.73		F	#	0.00011	
Molybdenum	mg/L	08/04/2015	N001	63.8	-	73.8	0.0016		F	#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	08/04/2015	N001	63.8	-	73.8	1.5		F	#	0.02	
Oxidation Reduction Potential	mV	08/04/2015	N001	63.8	-	73.8	146.3		F	#		
pH	s.u.	08/04/2015	N001	63.8	-	73.8	6.82		F	#		
Potassium	mg/L	08/04/2015	N001	63.8	-	73.8	52		F	#	0.11	
Selenium	mg/L	08/04/2015	N001	63.8	-	73.8	0.0052		F	#	0.00032	
Silica	mg/L	08/04/2015	N001	63.8	-	73.8	9.6		F	#	0.0095	
Silicon	mg/L	08/04/2015	N001	63.8	-	73.8	4.5		F	#	0.0044	
Sodium	mg/L	08/04/2015	N001	63.8	-	73.8	2300		F	#	0.33	
Specific Conductance	umhos /cm	08/04/2015	N001	63.8	-	73.8	13500		F	#		

Groundwater Quality Data by Location (USEE100) FOR SITE GRJ03, Grand Junction Disposal Site

REPORT DATE: 10/06/2015

Location: 0733 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers Lab	Qualifiers Data	Qualifiers QA	Detection Limit	Uncertainty
Strontium	mg/L	08/04/2015	N001	63.8	-	73.8	8.5		F	#	0.000078	
Sulfate	mg/L	08/04/2015	N001	63.8	-	73.8	8100		F	#	25	
Temperature	C	08/04/2015	N001	63.8	-	73.8	17.02		F	#		
Total Dissolved Solids	mg/L	08/04/2015	N001	63.8	-	73.8	12000		F	#	20	
Total Organic Carbon	mg/L	08/04/2015	N001	63.8	-	73.8	5.5		F	#	1	
Turbidity	NTU	08/04/2015	N001	63.8	-	73.8	3.63		F	#		
Uranium	mg/L	08/04/2015	N001	63.8	-	73.8	0.18		F	#	0.000029	
Vanadium	mg/L	08/04/2015	N001	63.8	-	73.8	0.0013	J	F	#	0.00015	

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

LAB QUALIFIERS:

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

DATA QUALIFIERS:

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

QA QUALIFIER:

#	Validated according to quality assurance guidelines.

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Static Water Level Data

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STATIC WATER LEVELS (USEE700) FOR SITE GRJ03, Grand Junction Disposal Site
REPORT DATE: 09/30/2015

Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Date	Measurement Time	Depth From Top of Casing (Ft)	Water Elevation (Ft)
0731	D	5218.52	08/04/2015	11:00:22	18.6	5199.92
0732	C	5202.5	08/04/2015	11:55:19	19.63	5182.87
0733	N	5232.84	08/04/2015	09:55:50	67.84	5165

FLOW CODES: B BACKGROUND C CROSS GRADIENT D DOWNGRADIENT
U UPGRADIENT N UNKNOWN O ONSITE
F OFFSITE

WATER LEVEL FLAGS: D Dry F Flowing B Below top of pump

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Hydrograph

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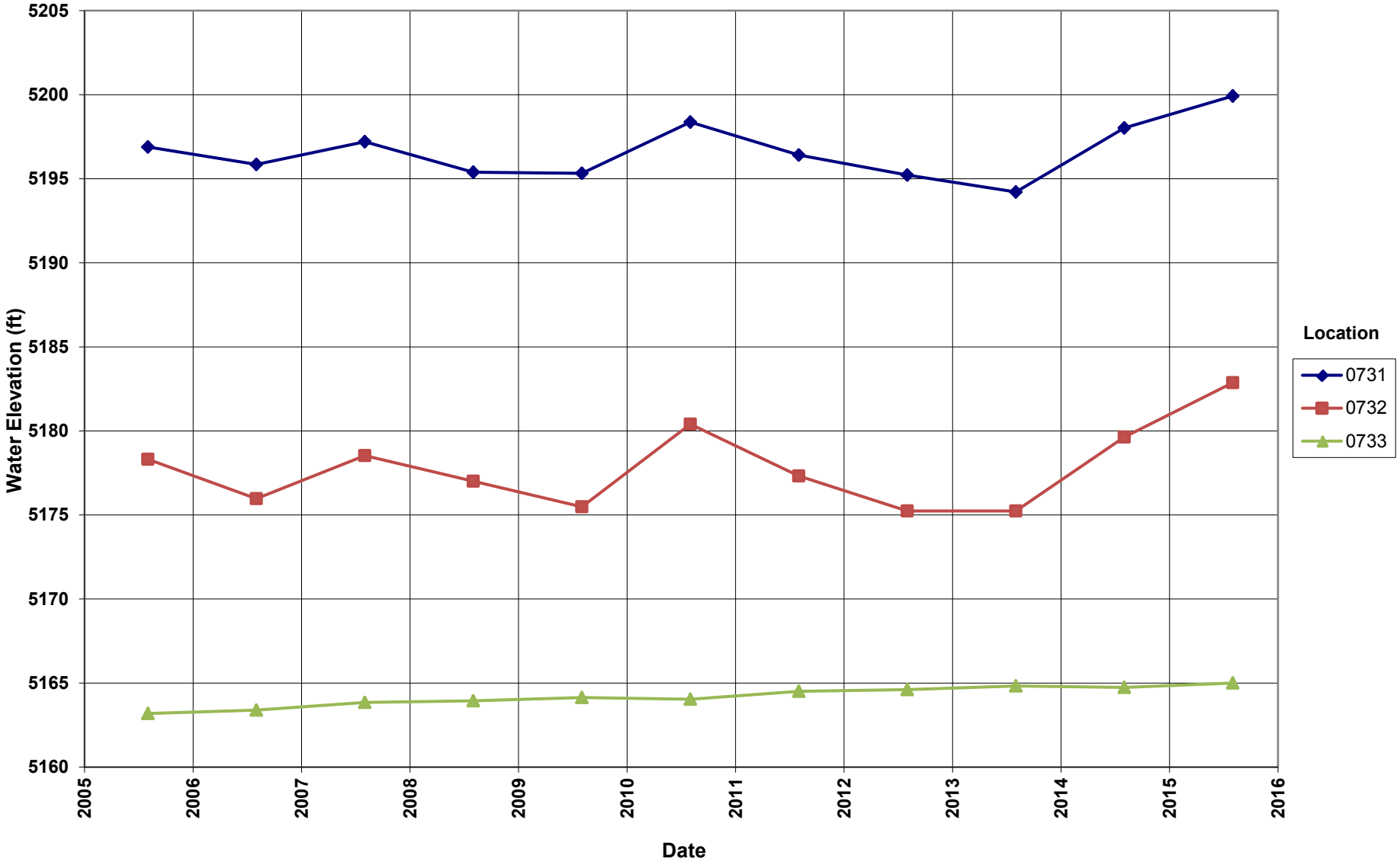
Grand Junction Disposal Site
Hydrograph



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Time-Concentration Graphs

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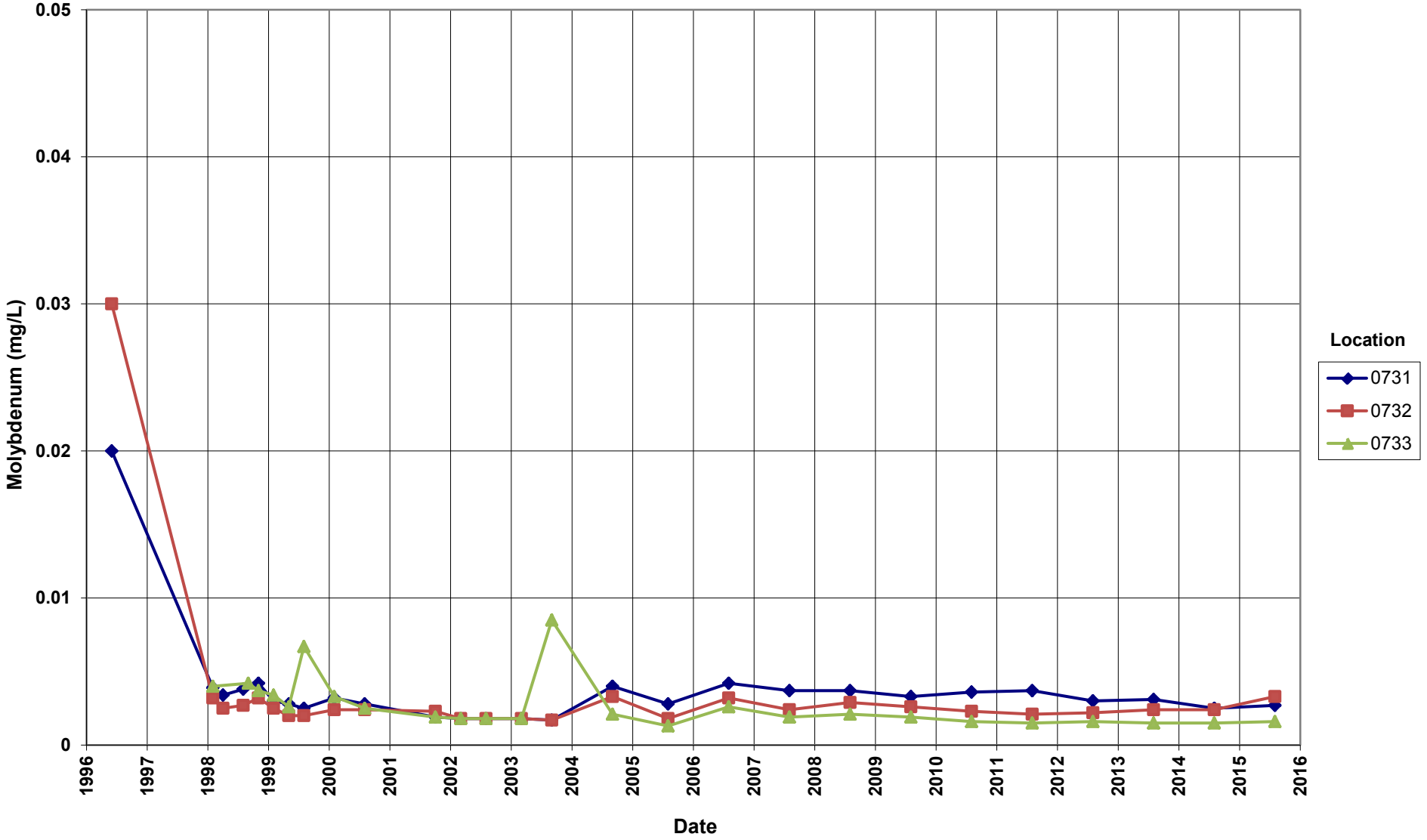
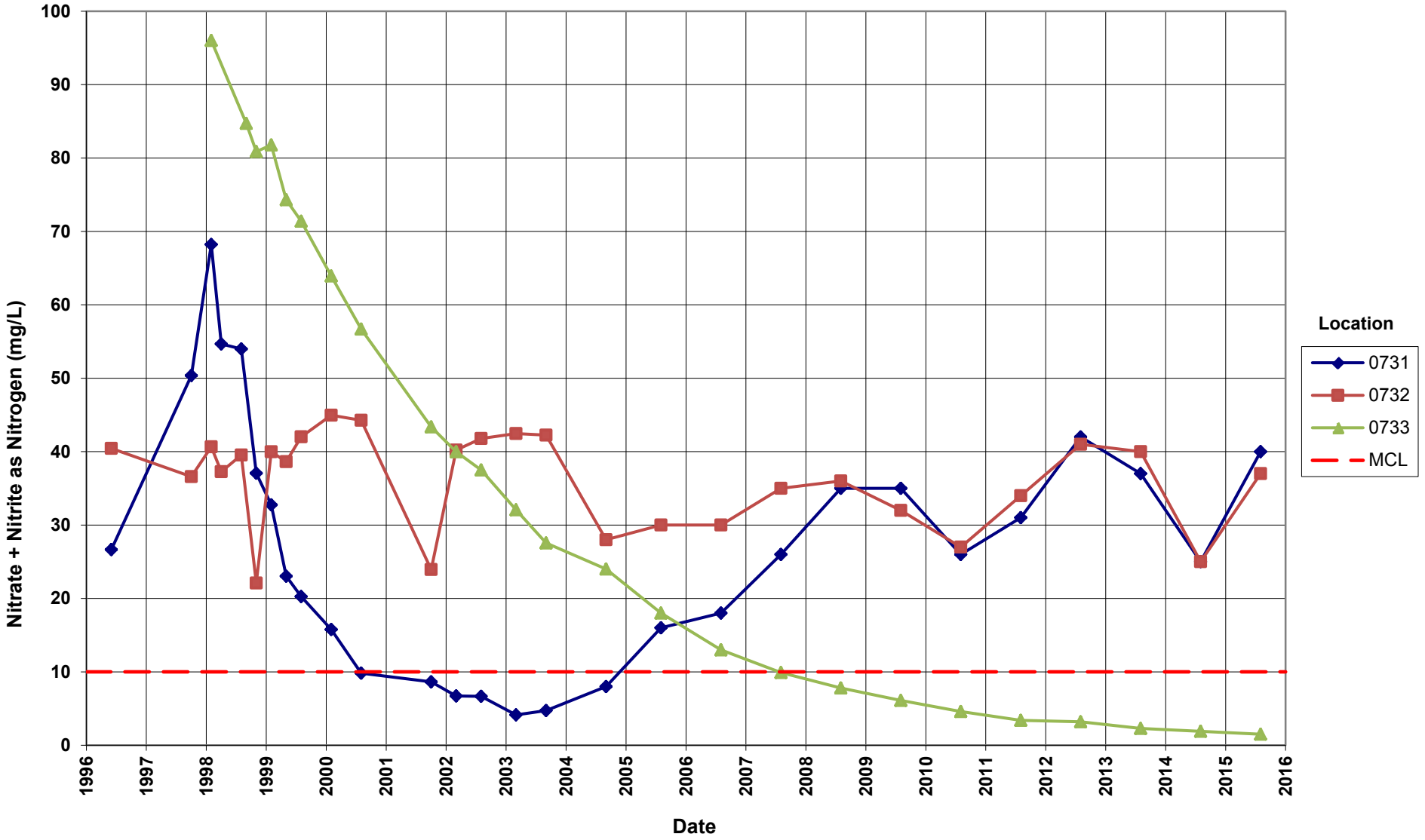
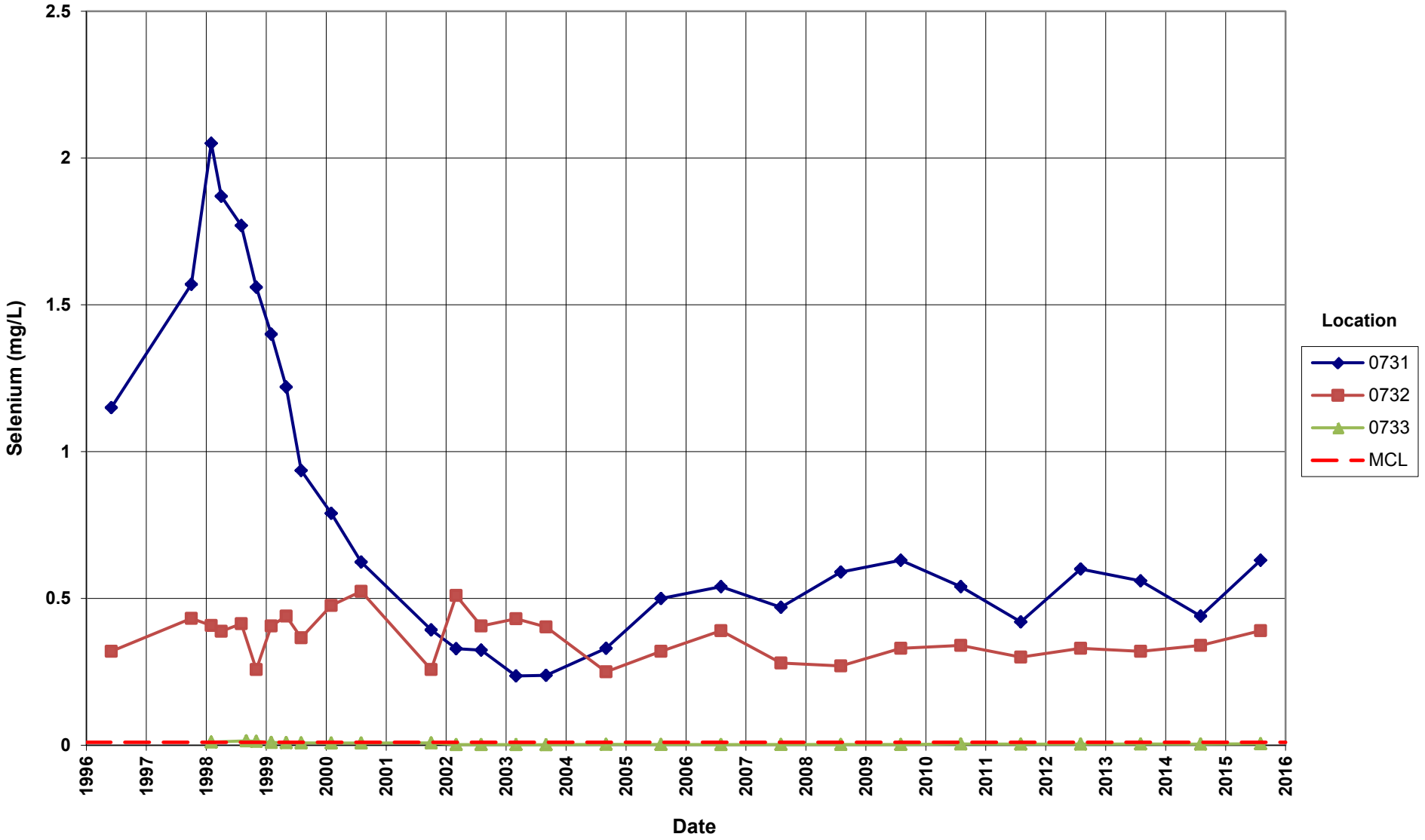
Grand Junction Disposal Site
Molybdenum Concentration
Maximum Concentration Limit (MCL) = 0.1 mg/L



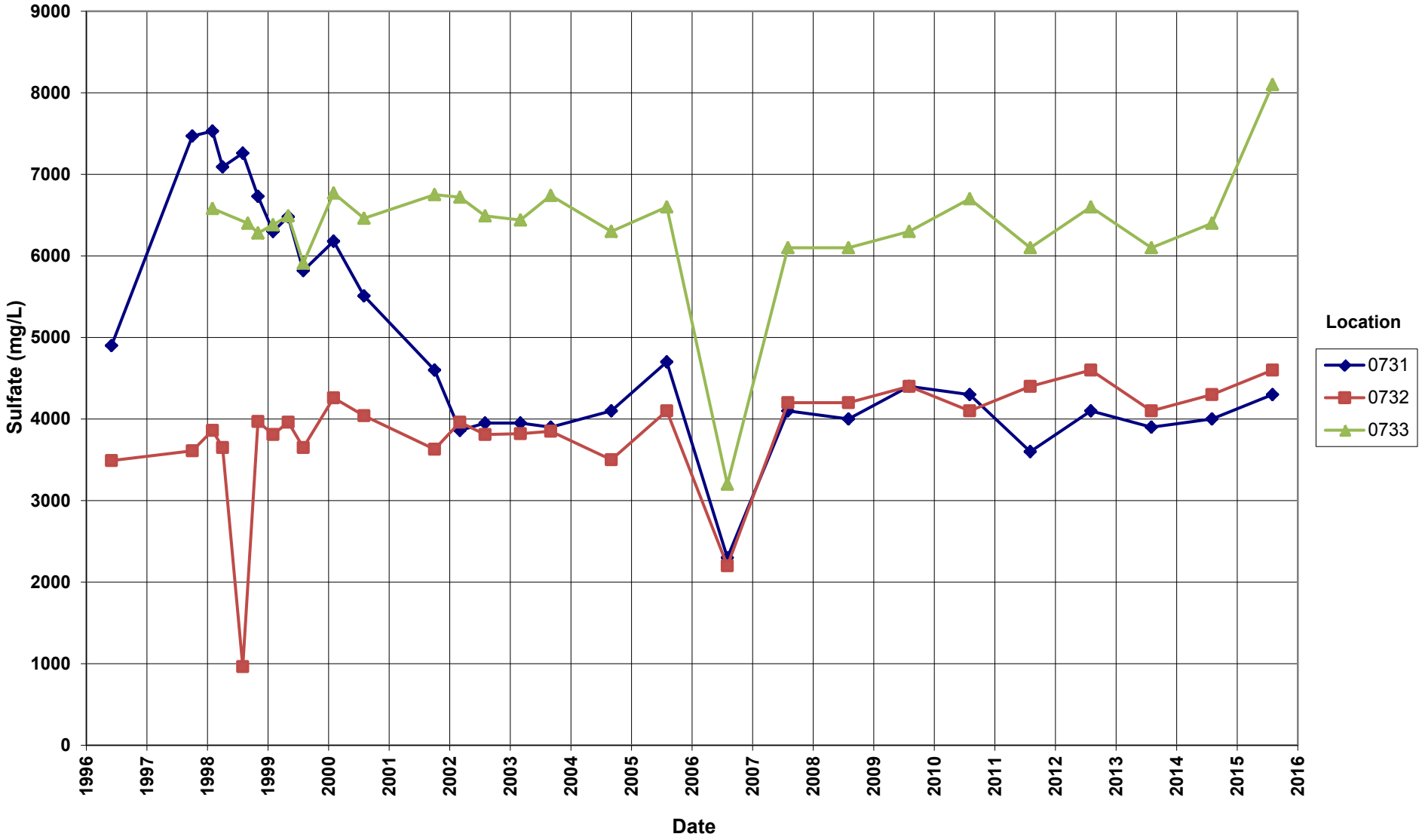
Grand Junction Disposal Site
Nitrate + Nitrite as Nitrogen Concentration
Maximum Concentration Limit (MCL) = 10.0 mg/L



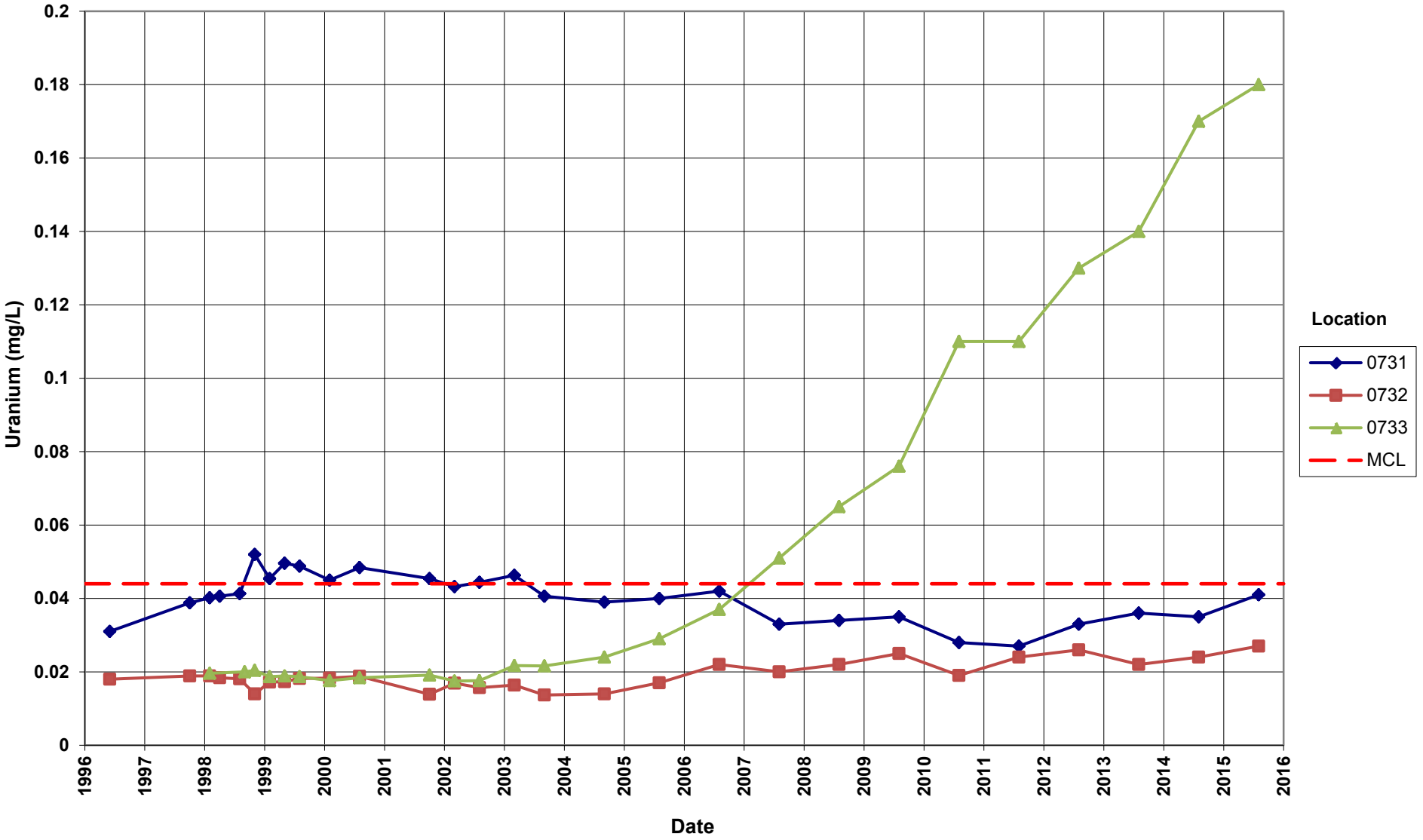
Grand Junction Disposal Site
Selenium Concentration
Maximum Concentration Limit (MCL) = 0.01 mg/L



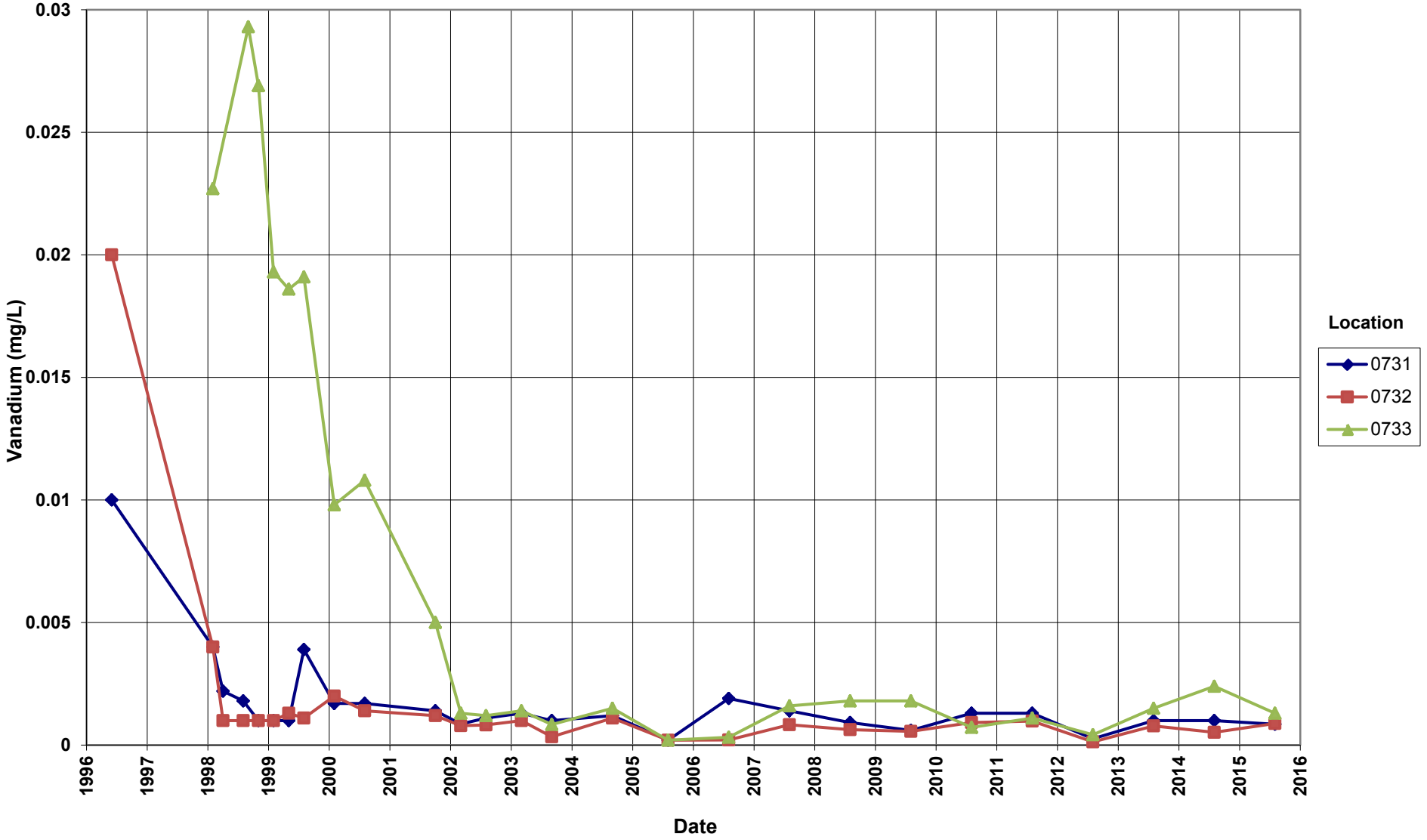
Grand Junction Disposal Site
Sulfate Concentration



Grand Junction Disposal Site
Uranium Concentration
Maximum Concentration Limit = 0.044 mg/L



Grand Junction Disposal Site
Vanadium Concentration



Attachment 3
Sampling and Analysis Work Order

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Stoller Newport News Nuclear

July 8, 2015

Task Assignment 103
Control Number 15-0636

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

SUBJECT: Contract No. DE-LM0000415, Stoller Newport News Nuclear, Inc. (SN3), a wholly owned subsidiary of Huntington Ingalls Industries, Inc.
Task Assignment 103 LTS&M - UMTRCA TI & TII, D&D, Others, and AS&T
August 2015 Environmental Sampling at the Grand Junction, Colorado, Disposal Site

REFERENCE: Task Assignment 103, 3-103-1-02-106, Grand Junction, Colorado, Disposal Site

Dear Mr. Dam:

The purpose of this letter is to inform you of the upcoming sampling event at Grand Junction, Colorado. Enclosed are the map and tables specifying sample locations and analytes for monitoring at the Grand Junction disposal site. Water quality data will be collected at this site as part of the routine environmental sampling currently scheduled to begin the week of August 3, 2015.

The following list shows the monitoring wells (along with associated zone of completion) scheduled for sampling during this event.

MONITORING WELLS

0731 Al 0732 Al 0733 Tl

*NOTE: Al = Alluvium; Tl = Tailings

All samples will be collected as directed in the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites*.

Please contact me at (970) 248-6391 if you have any questions.

Sincerely,

Gary K. Baur
Site Lead

GKB/bkb

Enclosures (3)

cc: (electronic)
Christina Pennal, DOE
Gary Baur, SN3
Steve Donivan, SN3
Lauren Goodknight, SN3
Diana Osborne, SN3
EDD Delivery
rc-grand.junction
File: GRJ 400.02

A SUBSIDIARY OF HUNTINGTON INGALLS INDUSTRIES
2597 Legacy Way • Grand Junction, CO 81503-1789 • Telephone (970) 248-6000 • Fax (970) 248-6040

Sampling Frequencies for Locations at Grand Junction Disposal Site, Colorado

Location ID	Quarterly	Semiannually	Annually	Biennially	Not Sampled	Notes
Monitoring Wells						
731			X			Download data logger
732			X			Download data logger
733			X			Download data logger

Sampling conducted in August

Constituent Sampling Breakdown

Site	Grand Junction Disposal Site				
Analyte	Groundwater	Surface Water	Required Detection Limit (mg/L)	Analytical Method	Line Item Code
Approx. No. Samples/yr	3	0			
Field Measurements					
Alkalinity	X				
Dissolved Oxygen	X				
Redox Potential	X				
pH	X				
Specific Conductance	X				
Turbidity	X				
Temperature	X				
Laboratory Measurements					
Aluminum					
Ammonia as N (NH3-N)					
Calcium	X				
Chloride	X				
Chromium					
Gross Alpha					
Gross Beta					
Iron	X				
Lead					
Magnesium	X				
Manganese	X				
Molybdenum	X		0.003	SW-846 6020	LMM-02
Nickel					
Nickel-63					
Nitrate + Nitrite as N (NO3+NO2)-N	X		0.05	EPA 353.1	WCH-A-022
PCBs	X		0.0005	SW-846 8082	PEP-A-006
Potassium	X				
Radium-226					
Radium-228					
Selenium	X		0.0001	SW-846 6020	LMM-02
Silica	X				
Sodium	X				
Strontium	X				
Sulfate	X		0.5	SW-846 9056	MIS-A-044
Sulfide					
Total Dissolved Solids	X		10	SM2540 C	WCH-A-033
Total Organic Carbon	X				
Uranium	X		0.0001	SW-846 6020	LMM-02
Vanadium	X		0.0003	SW-846 6020	LMM-02
Zinc					
Total No. of Analytes	18	0			

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

Attachment 4
Trip Report

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Stoller Newport News Nuclear

Memorandum

DATE: August 19, 2015

TO: Gary Baur

FROM: Jennifer Graham

SUBJECT: Trip Report

Site: Grand Junction, CO, Disposal Cell

Dates of Sampling Event: August 4, 2015

Team Members: Dan Sellers and Jennifer Graham

Number of Locations Sampled: Samples were collected from all 3 of the locations identified on the sampling notification letter.

	Locations That Were Sampled	Planned Locations
Monitoring wells	3	3

Locations Not Sampled/Reason: All scheduled locations were sampled.

Location Specific Information:

Location IDs	Comments
0733	This location was sampled with oversight by Scott Ficklin- RCT. Radiation levels were monitored for the location during sampling. Data logger was removed for maintenance and downloaded on 08/05/15.
0731	3 glass 1L bottles taken from location for QC.

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	Associated Samples
2978	NIZ 687	0731	Duplicate	Groundwater	N/A

Requisition Index Number (RIN) Assigned: Samples were assigned to RIN 15077245. Field data sheets can be found in \\crow\RAApps\SMS\15077245\FieldData.

Sample Shipment: Samples were shipped overnight via FedEx to ALS Fort Collins, CO, from Grand Junction, CO, on August 6, 2015.

Water Level Measurements: Water levels were measured in all sampled wells.

Well Inspection Summary: No issues were identified.

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

Field Variance: None. Samples were collected according to the SAP.

Equipment: All equipment functioned properly.

Dataloggers: Dataloggers were downloaded and checked for accuracy at the following locations: 0731, 0732, and 0733. Data and information from each data logger can be viewed electronically using SEEPro.

Stakeholder/Regulatory/DOE: Scott Ficklin, SN3 Health and Safety was on location for oversight of sampling.

Institutional Controls:

Fences, Gates, and Locks: All gates returned to locked condition upon leaving the site.
Signs: No issues were observed.
Trespassing/Site Disturbances: None observed.
Disposal Cell/Drainage Structure Integrity: None observed.

Safety Issues: Radiation Levels were monitored at well 0733 during work.

Access Issues: None.

General Information: Nothing to note.

Immediate Actions Taken: The non-functioning data logger was removed from well 0733.

Future Actions Required or Suggested: None.

JG/lcg

cc: (electronic)
William Dam, DOE
Gary Baur, SN3
Steve Donivan, SN3
EDD Delivery