

Data Validation Package

**October 2016
Groundwater and Surface Water
Sampling at the
Old and New Rifle, Colorado,
Processing Sites**

January 2017



**U.S. DEPARTMENT OF
ENERGY**

Legacy
Management

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Contents

Sampling Event Summary	1
Data Assessment Summary.....	3
Water Sampling Field Activities Verification Checklist	5
Laboratory Performance Assessment	7
Sampling Quality Control Assessment	23
Certification	26
New Rifle, Colorado, Processing Site, Planned Sampling Map.....	31
Old Rifle, Colorado, Processing Site, Planned Sampling Map.....	32

Attachment 1—Sampling and Analysis Work Order

Attachment 2—Trip Report

Attachment 3—Data Presentation

Groundwater Quality Data New Rifle
Surface Water Quality Data New Rifle
Groundwater Quality Data Old Rifle
Surface Water Quality Data Old Rifle
Static Water Level Data
Time-Concentration Graphs New Rifle Groundwater
Time-Concentration Graphs Old Rifle Groundwater

Attachment 4—Assessment of Anomalous Data

Potential Outliers Report

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Sampling Event Summary

Site: Old and New Rifle, Colorado, Processing Sites

Sampling Period: October 31–November 2, 2016

Water samples were collected from 38 locations at New Rifle and Old Rifle, Colorado, Processing Sites. Planned monitoring locations are shown in Attachment 1, Sampling and Analysis Work Order. Duplicate samples were collected from New Rifle (RFN) locations 0201 and 0216, and Old Rifle (RFO) location 0310. See Attachment 2, Trip Report, for additional details. Sampling and analyses were conducted as specified in *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites* (LMS/PRO/S04351, continually updated, <http://energy.gov/lm/downloads/sampling-and-analysis-plan-us-department-energy-office-legacy-management-sites>).

New Rifle Site

Samples were collected at the New Rifle site from 17 monitoring wells and 8 surface locations in compliance with the December 2008 *Groundwater Compliance Action Plan [GCAP] for the New Rifle, Colorado, Processing Site* (LMS/RFN/S01920).

Analytes measured at the New Rifle site included contaminants of concern (COCs) arsenic, molybdenum, nitrate + nitrite as nitrogen, selenium, uranium, and vanadium, ammonia as nitrogen, major cations, and major anions. Field measurements of total alkalinity, oxidation-reduction potential, pH, specific conductance, turbidity, and temperature were made at each location, and the water level was measured at each sampled well. A proposed alternate concentration limit (ACL) for vanadium of 50 milligrams per liter (mg/L), specific to the point-of-compliance wells (RFN-0217, 0659, 0664, and 0669) is included in the New Rifle GCAP. Vanadium concentrations in the wells were below the proposed ACL as shown in the time-concentration graphs in Attachment 3, Data Presentation.

The surface water locations were sampled to monitor the impact of groundwater discharge. COC concentrations at Colorado River surface water locations RFN-0324 and RFN-0326, downgradient of the site, remained low and were consistent with historical results, indicating no impact to the river due to groundwater discharge. In many cases, elevated COC concentrations at the New Rifle site pond locations were observed. As noted in the GCAP, this indicates impacts from groundwater discharge to the ponds.

Old Rifle Site

Samples were collected at the Old Rifle site from eight monitoring wells and five surface locations in compliance with the December 2001 *Groundwater Compliance Action Plan for the Old Rifle, Colorado, UMTRA Project Site* (GJO-2000-177-TAR).

Analytes measured at the Old Rifle site included COCs selenium, uranium, and vanadium, major cations, and major anions. Field measurements of total alkalinity, oxidation-reduction potential,

pH, specific conductance, turbidity, and temperature were made at each location, and the water level was measured at each sampled well.


The monitoring strategy described in the GCAP is designed to determine progress of the natural flushing process in meeting compliance standards for site COCs. Standards for selenium and vanadium are their proposed ACLs of 0.05 mg/L and 1.0 mg/L, respectively. For uranium the cleanup goal is the Uranium Mill Tailings Remedial Action (UMTRA) standard of 0.044 mg/L or background, whichever is higher. As shown in the time-concentration graphs, the uranium concentration exceeds the cleanup goal at groundwater monitoring locations RFO-0304, 0305, 0310, 0655, and 0656.

The surface water locations were sampled to monitor the impact of groundwater discharge at Colorado River surface water locations adjacent to (RFO-0396) and downgradient (RFO-0741) of the site. COC concentrations remain low and consistent with historical concentrations, which indicate no impacts from groundwater discharge to the river.

The assessment of anomalous data showed that none of the laboratory results for the Old Rifle sampling event are potential outliers, and that the results for Old Rifle are acceptable as qualified.

The assessment of anomalous data for the New Rifle sampling event showed 11 results as potential outliers, with the results being acceptable as qualified. Potential outliers are summarized below and in Attachment 4, Potential Outliers Report.

New Rifle Location Code	Analyte	Potential outlier status
0170	Calcium	Current result (180 mg/L) is greater than the historical maximum (160 mg/L).
0172	Uranium	Current result (0.0370 mg/L) is less than the historical minimum (0.0400 mg/L).
0215	Sodium	Current result (210 mg/L) is greater than the historical maximum (120 mg/L).
0452	Chloride	Current result (770 mg/L) is greater than the historical maximum (390 mg/L).
0452	Magnesium	Current result (110 mg/L) is greater than the historical maximum (61 mg/L).
0452	Potassium	Current result (58 mg/L) is greater than the historical maximum (35 mg/L).
0452	Sodium	Current result (830 mg/L) is greater than the historical maximum (400 mg/L).
0575	Calcium	Current result (500 mg/L) is greater than the historical maximum (410 mg/L).
0575	Chloride	Current result (680 mg/L) is greater than the historical maximum (570 mg/L).
0575	Magnesium	Current result (300 mg/L) is greater than the historical maximum (270 mg/L).
0620	Molybdenum	Current result (0.0160 mg/L) is greater than the historical maximum (0.0130 mg/L).


 Peter Lemke
 Navarro Research and Engineering, Inc.

2 Feb 2017
 Date

Data Assessment Summary

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Water Sampling Field Activities Verification Checklist

Project	Rifle, Colorado	Date(s) of Water Sampling	October 31–November 2, 2016
Date(s) of Verification	December 15 and 16, 2016	Name of Verifier	Samantha Tigar

	Response (Yes, No, NA)	Comments
1. Is the Sampling and Analysis Plan (SAP) the primary document directing field procedures? List any Program Directives or other documents, SOPs, instructions.	Yes	Work Order letter dated October 4, 2016.
2. Were the sampling locations specified in the planning documents sampled?	Yes	
3. Were field equipment calibrations conducted as specified in the above-named documents?	No	Calibrations were performed October 28 and 31, 2016. The specific conductance cell constant for sonde "E" was out of range. Associated results have been qualified.
4. Was an operational check of the field equipment conducted daily? Did the operational checks meet criteria?	Yes	On October 31, 2016, sonde "A" was calibrated and no operational check was performed, which is acceptable.
	No	The daily check for sonde "E" on November 2, 2016 was out of range for specific conductance. Associated results were previously qualified.
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	
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?	No	RFN-0195 did not meet Category I turbidity criteria and was filtered as required in the SAP. The pH did not stabilize at location RFO-0292A. The associated result has been qualified.
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?	Yes	
Was one pump/tubing volume removed prior to sampling?	Yes	
9. Were duplicates taken at a frequency of one per 20 samples?	Yes	Duplicate samples were collected from RFN-0201, RFN-0216, and RFO-0310.
10. Were equipment blanks taken at a frequency of one per 20 samples that were collected with non-dedicated equipment?	NA	
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	The anion and nitrate + nitrite as N labels had been switched on the containers for location RFO-0741. The laboratory identified the switch and corrected the labels before analysis.
15. Were the number and types of samples collected as specified?	Yes	
16. Were chain of custody records completed and was sample custody maintained?	No	Several anion and nitrate + nitrite as N samples were inadvertently not included in the original shipment, but were listed on the Chain of Custody form.
17. Was all pertinent information documented on the field data sheets?	Yes	
18. Was the presence or absence of ice in the cooler documented at every sample location?	Yes	
19. Were water levels measured at the locations specified in the planning documents?	Yes	

Laboratory Performance Assessment

General Information

Report Number (RIN): 16108114
Sample Event: October 31–November 2, 2016
Site(s): New Rifle, Colorado, Processing Site
Laboratory: ALS Laboratory Group, Fort Collins, Colorado
Work Order No.: 1611102
Analysis: Metals and Wet Chemistry
Validator: Samantha Tigar
Review Date: December 15, 2016

This validation was performed according to the “Standard Practice for Validation of Environmental Data” found in Appendix A of the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites* (LMS/PRO/S04351, continually updated, <http://energy.gov/lm/downloads/sampling-and-analysis-plan-us-department-energy-office-legacy-management-sites>). The procedure was applied at Level 3, Data Validation.

This validation includes the evaluation of data quality indicators (DQIs) associated with the data. DQIs are the quantitative and qualitative descriptors that are used to interpret the degree of acceptability or utility of data. Indicators of data quality include the analysis of laboratory control samples to assess accuracy; duplicates and replicates to assess precision; and interference check samples to assess bias (see attached Data Validation Worksheets). The DQIs comparability, completeness, and sensitivity are also evaluated in the sections to follow.

All analyses were successfully completed. The samples were prepared and analyzed using accepted procedures based on methods specified by line item code, which are listed in Table 1.

Table 1. Analytes and Methods

Analyte	Line Item Code	Prep Method	Analytical Method
Ammonia as N	WCH-A-005	EPA 350.1	EPA 350.1
Arsenic, Molybdenum, Selenium, Uranium, Vanadium	LMM-02	SW-846 3005A	SW-846 6020A
Calcium, Magnesium, Potassium, Sodium	LMM-01	SW-846 3005A	SW-846 6010B
Chloride, Sulfate	MIS-A-045	SW-846 9056	SW-846 9056
Nitrate + Nitrite as N	WCH-A-022	EPA 353.2	EPA 353.2

Data Qualifier Summary

Analytical results were qualified as listed in Table 2. Refer to the sections below for an explanation of the data qualifiers applied.

Table 2. Data Qualifier Summary

Sample Number	Location	Analyte(s)	Flag	Reason
1611102-1	0169	Molybdenum	U	Less than 5x the continuing calibration blank
1611102-5	0201	Nitrate + nitrite as N	J	Field duplicate difference > practical quantitation limit
1611102-27	0201 Duplicate	Nitrate + nitrite as N	J	Field duplicate difference > practical quantitation limit
All	All	Specific conductance	J	Calibration out of range

Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado, received 27 water samples on November 4, 2016, accompanied by Chain of Custody forms. Copies of the air bills were included in the receiving documentation. The Chain of Custody forms were checked to confirm that all of the samples were listed and that signatures and dates were present indicating sample relinquishment and receipt. The sample submittal documents including the Chain of Custody forms had no errors or omissions.

Preservation and Holding Times

The sample shipment was received intact with the temperature inside the iced cooler at 5.6 °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.

Detection and Quantitation Limits

A method detection limit (MDL) is defined in 40 CFR 136 as the minimum concentration of an analyte that can be measured and reported with 99% confidence that the analyte concentration is greater than zero. The MDLs reported by the laboratory were compared to the required MDLs to assess the sensitivity of the analyses and found to be in compliance with contractual requirements.

The practical quantitation limit (PQL) for an analyte, defined as 5 times the MDL, is the lowest concentration that can be quantitatively measured, and is used when evaluating laboratory method performance in the sections below.

Laboratory Instrument Calibration

Method requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the analytes of interest. Initial Calibration Verification (ICV) demonstrates that the instrument is capable of acceptable performance at the beginning of the analytical run. Continuing Calibration Verification (CCV) demonstrates that the initial calibration is still valid by checking the performance of the instrument on a continuing basis. Initial and continuing calibration standards must be prepared from independent sources to ensure the validity of the calibration. All

laboratory instrument calibrations and calibration verifications were performed correctly in accordance with the cited methods.

Method EPA 350.1 Ammonia as N

Calibrations were performed on November 23, 2016, using six 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 as required by the cited method. The ICV and CCV checks were made at the required frequency. All calibration checks met the acceptance criteria.

Method EPA 353.2 Nitrate + Nitrite as N

Calibrations were performed using seven calibration standards on November 22, 2016. 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 as required by the cited method. The ICV and CCV checks were made at the required frequency. All calibration checks met the acceptance criteria.

Method SW-846 6010B Ca, Mg, K, Na

Calibrations were performed on November 18, 2016, 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 as required by the cited method. The ICV and CCV 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 As, Mo, Se, U, V

Calibrations were performed using four calibration standards on November 18 and 19, 2016. 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 as required by the cited method. The ICV and CCV 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. 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 Chloride, Sulfate

Calibrations were performed on November 14, 2016, using six 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 as required by the cited method. The ICV and CCV checks were made at the required frequency. All calibration checks met 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. All method blank and calibration blank results associated with the samples were below the PQLs for all analytes. In cases where the blank concentration exceeds

the MDL, associated sample results that are greater than the MDL but less than 5 times the blank concentration are qualified with a “U” flag as not detected.

Inductively Coupled Plasma Interference Check Sample Analysis

Interference check samples are analyzed to verify the instrumental interelement and background correction factors and assess any bias due to interelement interferences. Interference check samples were analyzed at the required frequency with all results meeting the acceptance criteria.

Matrix Spike Analysis

Matrix spikes are aliquots of environmental samples to which a known concentration of an analyte has been added before analysis. Matrix spike and matrix-spike duplicate (MS/MSD) analysis is used to assess the performance of the method by measuring the effects of interferences caused by the sample matrix and reflects the bias of the method for the particular matrix in question.

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.

Laboratory Replicate Analysis

Laboratory replicate analyses are used to determine laboratory precision for each sample matrix. The relative percent difference for replicate results that are greater than 5 times the PQL should be less than 20%. 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 Samples

Laboratory control samples (LCS) were analyzed at the correct frequency to provide information on the accuracy of the analytical method and the overall laboratory performance, including sample preparation. The LCS results were acceptable for all analyses.

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.

Completeness

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

Electronic Data Deliverable (EDD) File

The EDD file arrived on December 3, 2016. The Sample Management System EDD validation module was used to verify that the EDD files were 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.

Anion/Cation Balance

Environmental water should be electrically neutral. Expressed in milliequivalents per liter (meq/L), the sum of the anions should equal the sum of the cations. The anion/cation balance is calculated as the difference between the anions and cations, divided by the sum of the anions and cations. The anion/cation balance can be used to identify potential errors in the analytical results. Typically, a charge balance of less than 10% is considered acceptable. When a charge balance is greater than 10%, the associated data are closely examined for error. If no errors are found, the results are considered to be acceptable. Table 3 shows the total anion and cation results from this event and the charge balance.

Table 3. Comparison of Major Anions and Cations

Location	Location Type	Cations (meq/L)	Anions (meq/L)	Charge Balance (%)
0169	Groundwater	23.7	24.1	0.9
0170	Groundwater	39.1	39.3	0.2
0172	Groundwater	137.5	155.6	6.2
0195	Groundwater	13.2	13.1	0.3
0201	Groundwater	46.6	47.1	0.5
0215	Groundwater	17.2	18.0	2.3
0216	Groundwater	13.9	14.7	2.8
0217	Groundwater	43.9	46.1	2.4
0320	Surface water	69.9	72.3	1.7
0322	Surface water	10.3	10.6	1.5
0323	Surface water	85.1	86.6	0.9
0324	Surface water	10.5	10.5	0.2
0326	Surface water	10.5	11.2	3.1
0452	Surface water	81.2	84.1	1.8
0453	Surface water	57.2	59.6	2.0
0575	Surface water	112.6	121.1	3.6
0590	Groundwater	60.3	64.2	3.1
0620	Groundwater	93.5	104.8	5.7
0635	Groundwater	28.9	30.7	2.9
0658	Groundwater	41.1	42.1	1.2
0659	Groundwater	43.4	41.0	2.8
0664	Groundwater	23.6	22.6	2.0
0669	Groundwater	25.6	30.3	8.3
0670	Groundwater	23.4	23.2	0.6
0855	Groundwater	24.3	23.9	0.8

All charge balance values were below 10%.

SAMPLE MANAGEMENT SYSTEM
General Data Validation Report

RIN: 16108114 Lab Code: PAR Validator: Samantha Tigar Validation Date: 12/13/2016
Project: Rifle Disposal/Processing Site (old/new) Analysis Type: Metals General Chem Rad Organics
of Samples: 27 Matrix: WATER Requested Analysis Completed: Yes

Chain of Custody

Present: OK Signed: OK Dated: OK

Sample

Integrity: OK Preservation: OK Temperature: OK

Select Quality Parameters

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

All analyses were completed within the applicable holding times.

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

There were 2 duplicates evaluated.

Figure 1. General Validation Worksheet

SAMPLE MANAGEMENT SYSTEM

Wet Chemistry Data Validation Worksheet

RIN: 16108114 **Lab Code:** PAR **Date Due:** 12/2/2016
Matrix: Water **Site Code:** RFL01 **Date Completed:** 12/5/2016

Analyte	Date Analyzed	CALIBRATION				Method Blank	LCS %R	MS %R	MSD %R	DUP RPD	Serial Dil. %R
		Int.	R^2	CCV	CCB						
AMMONIA AS N	11/23/2016	0.000	1.0000	OK	OK	OK	109.00	100.0	101.0	2.00	
AMMONIA AS N	11/23/2016	0.000	1.0000	OK	OK	OK	105.00				
CHLORIDE	11/15/2016	0.000	1.0000	OK	OK	OK	101.00				
CHLORIDE	11/15/2016			OK	OK	OK	100.00				
Nitrate+Nitrite as N	11/21/2016	0.000	1.0000	OK	OK	OK	97.00	99.0	100.0	1.00	
Nitrate+Nitrite as N	11/21/2016					OK	101.00	93.0	98.0	3.00	
SULFATE	11/15/2016	0.000	1.0000	OK	OK	OK	100.00	107.0	98.0	2.00	
SULFATE	11/15/2016			OK	OK	OK	100.00				

Figure 2. Wet Chemistry Validation Worksheet

SAMPLE MANAGEMENT SYSTEM
Metals Data Validation Worksheet

RIN: 16108114 Lab Code: PAR Date Due: 12/2/2016
 Matrix: Water Site Code: RFL01 Date Completed: 12/5/2016

Analyte	Method Type	Date Analyzed	CALIBRATION				Method Blank	LCS % R	MS % R	MSD % R	Dup. RPD	ICSAB % R	Serial Dil. % R	CRI % R
			Int.	R^2	CCV	CCB								
Arsenic	ICP/MS	11/18/2016	0.0000	1.0000	OK	OK	OK	96.0	95.0	102.0	3.0	99.0		118.0
Arsenic	ICP/MS	11/19/2016	0.0000	1.0000	OK	OK	OK	97.0	107.0	107.0	0.0	103.0	5.0	114.0
Calcium	ICP/ES	11/18/2016	0.0000	1.0000	OK	OK	OK	98.0	101.0	109.0	2.0	101.0	2.0	104.0
Calcium	ICP/ES	11/18/2016					OK	99.0			3.0	98.0	2.0	104.0
Magnesium	ICP/ES	11/18/2016	0.0000	1.0000	OK	OK	OK	98.0	99.0	102.0	2.0	97.0	1.0	104.0
Magnesium	ICP/ES	11/18/2016					OK	99.0	94.0	93.0	3.0	95.0	3.0	98.0
Molybdenum	ICP/MS	11/18/2016	0.0000	1.0000	OK	OK	OK	93.0			1.0	105.0		125.0
Molybdenum	ICP/MS	11/19/2016	0.0000	1.0000	OK	OK	OK	96.0	103.0	104.0	2.0	109.0	2.0	115.0
Potassium	ICP/ES	11/18/2016	0.0000	1.0000	OK	OK	OK	101.0	105.0	104.0	1.0		1.0	100.0
Potassium	ICP/ES	11/18/2016					OK	103.0	102.0	102.0	0.0			109.0
Selenium	ICP/MS	11/18/2016	0.0000	1.0000	OK	OK	OK	96.0	87.0	99.0	2.0	99.0		111.0
Selenium	ICP/MS	11/19/2016	0.0000	1.0000	OK	OK	OK	98.0	106.0	107.0	0.0	105.0	1.0	113.0
Sodium	ICP/ES	11/18/2016	0.0000	1.0000	OK	OK	OK	101.0	90.0	114.0	0.0		3.0	100.0
Sodium	ICP/ES	11/18/2016					OK	104.0			4.0		1.0	112.0
Uranium	ICP/MS	11/18/2016	0.0000	1.0000	OK	OK	OK	97.0			1.0	101.0	4.0	130.0
Uranium	ICP/MS	11/19/2016	0.0000	1.0000	OK	OK	OK	99.0	106.0	110.0	3.0	104.0	0.0	120.0
Vanadium	ICP/MS	11/18/2016	0.0000	1.0000	OK	OK	OK	92.0			2.0	96.0		97.0
Vanadium	ICP/MS	11/19/2016	0.0000	1.0000	OK	OK	OK	94.0	102.0	103.0	1.0	100.0	0.0	93.0

Figure 3. Metals Validation Worksheet

General Information

Report Number (RIN): 16108115
Sample Event: October 31–November 2, 2016
Site(s): Old Rifle, Colorado, Processing Site
Laboratory: ALS Laboratory Group, Fort Collins, Colorado
Work Order No.: 1611103
Analysis: Metals and Wet Chemistry
Validator: Samantha Tigar
Review Date: December 16, 2016

This validation was performed according to the “Standard Practice for Validation of Environmental Data” found in Appendix A of the *Sampling and Analysis Plan for U.S. Department of Energy Office of Legacy Management Sites* (LMS/PRO/S04351, continually updated, <http://energy.gov/lm/downloads/sampling-and-analysis-plan-us-department-energy-office-legacy-management-sites>). The procedure was applied at Level 3, Data Validation.

This validation includes the evaluation of data quality indicators (DQIs) associated with the data. DQIs are the quantitative and qualitative descriptors that are used to interpret the degree of acceptability or utility of data. Indicators of data quality include the analysis of laboratory control samples to assess accuracy; duplicates and replicates to assess precision; and interference check samples to assess bias (see attached Data Validation Worksheets). The DQIs comparability, completeness, and sensitivity are also evaluated in the sections to follow.

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 4.

Table 4. Analytes and Methods

Analyte	Line Item Code	Prep Method	Analytical Method
Selenium, Uranium, Vanadium	LMM-02	SW-846 3005A	SW-846 6020A
Calcium, Magnesium, Potassium, Sodium	LMM-01	SW-846 3005A	SW-846 6010B
Chloride, Sulfate	MIS-A-045	SW-846 9056	SW-846 9056
Nitrate + Nitrite as N	WCH-A-022	EPA 353.2	EPA 353.2

Data Qualifier Summary

Analytical results were qualified as listed in Table 5. Refer to the sections below for an explanation of the data qualifiers applied.

Table 5. Data Qualifier Summary

Sample Number	Location	Analyte(s)	Flag	Reason
1611103-1	0292A	pH	J	Stability criteria not met
1611103-8	0396	Specific conductance	J	Calibration did not meet criteria
1611103-13	0741	Specific conductance	J	Calibration did not meet criteria

Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado, received 14 water samples on November 4 and 9, 2016, accompanied by Chain of Custody forms. Copies of the air bills were included in the receiving documentation. The Chain of Custody forms were checked to confirm that all of the samples were listed and that signatures and dates were present indicating sample relinquishment and receipt. The sample submittal documents including the Chain of Custody forms contained the following errors. Due to an oversight, the sample containers for anions and nitrate + nitrite as N at several locations were not included in the first shipment but were listed on the Chain of Custody forms. For location RFO-0741, the labels were switched on the sample containers for anions and nitrate + nitrite as N. The laboratory discovered the error upon receipt and corrected the labels before analysis.

Preservation and Holding Times

The sample shipment was received intact with the temperature inside the iced coolers at 3.8 °C and 5.6 °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.

Detection and Quantitation Limits

A method detection limit (MDL) is defined in 40 CFR 136 as the minimum concentration of an analyte that can be measured and reported with 99% confidence that the analyte concentration is greater than zero. The MDLs reported by the laboratory were compared to the required MDLs to assess the sensitivity of the analyses and found to be in compliance with contractual requirements.

The practical quantitation limit (PQL) for an analyte, defined as 5 times the MDL, is the lowest concentration that can be quantitatively measured, and is used when evaluating laboratory method performance in the sections below.

Laboratory Instrument Calibration

Method requirements for satisfactory instrument calibration are established to ensure that the instrument is capable of producing acceptable qualitative and quantitative data for the analytes of interest. Initial Calibration Verification (ICV) demonstrates that the instrument is capable of acceptable performance at the beginning of the analytical run. Continuing Calibration Verification (CCV) demonstrates that the initial calibration is still valid by checking the

performance of the instrument on a continuing basis. Initial and continuing calibration standards must be prepared from independent sources to ensure the validity of the calibration. All laboratory instrument calibrations and calibration verifications were performed correctly in accordance with the cited methods.

Method EPA 353.2 Nitrate + Nitrite as N

Calibrations were performed using seven calibration standards on November 21, 2016. 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 as required by the cited method. The ICV and CCV checks were made at the required frequency. All calibration checks met the acceptance criteria.

Method SW-846 6010B Ca, Mg, K, Na

Calibrations were performed on November 18, 2016, 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 as required by the cited method. The ICV and CCV 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 Se, U, V

Calibrations were performed on November 18, 2016, 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 as required by the cited method. The ICV and CCV 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. 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 Chloride, Sulfate

Calibrations were performed on November 14, 2016, using six 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 as required by the cited method. The ICV and CCV checks were made at the required frequency. All calibration checks met 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. All method blank and calibration blank results associated with the samples were below the PQLs for all analytes. In cases where the blank concentration exceeds the MDL, associated sample results that are greater than the MDL but less than 5 times the blank concentration are qualified with a “U” flag as not detected.

Inductively Coupled Plasma Interference Check Sample Analysis

Interference check samples are analyzed to verify the instrumental interelement and background correction factors and assess any bias due to interelement interferences. Interference check samples were analyzed at the required frequency with all results meeting the acceptance criteria.

Matrix Spike Analysis

Matrix spikes are aliquots of environmental samples to which a known concentration of an analyte has been added before analysis. Matrix spike and matrix-spike duplicate (MS/MSD) analysis is used to assess the performance of the method by measuring the effects of interferences caused by the sample matrix and reflects the bias of the method for the particular matrix in question.

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.

Laboratory Replicate Analysis

Laboratory replicate analyses are used to determine laboratory precision for each sample matrix. The relative percent difference for replicate results that are greater than 5 times the PQL should be less than 20%. 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 Samples

Laboratory control samples (LCS) were analyzed at the correct frequency to provide information on the accuracy of the analytical method and the overall laboratory performance, including sample preparation. The LCS results were acceptable for all analyses.

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.

Completeness

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

Electronic Data Deliverable (EDD) File

The EDD file arrived on December 3, 2016. The Sample Management System EDD validation module was used to verify that the EDD files were 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.

Anion/Cation Balance

Environmental water should be electrically neutral. Expressed in milliequivalents per liter (meq/L), the sum of the anions should equal the sum of the cations. The anion/cation balance is calculated as the difference between the anions and cations, divided by the sum of the anions and cations. The anion/cation balance can be used to identify potential errors in the analytical results. Typically, a charge balance of less than 10% is considered acceptable. When a charge balance is greater than 10%, the associated data are closely examined for error. If no errors are found, the results are considered to be acceptable. Table 6 shows the total anion and cation results from this event and the charge balance.

Table 6. Comparison of Major Anions and Cations

Location	Location Type	Cations (meq/L)	Anions (meq/L)	Charge Balance (%)
0292A	Groundwater	29.1	32.2	4.9
0294	Surface water	10.4	9.6	3.9
0304	Groundwater	29.2	23.8	10.2
0305	Groundwater	24.6	30.5	10.7
0309	Groundwater	27.2	27.9	1.2
0310	Groundwater	31.2	32.1	1.4
0395	Surface water	20.6	20.2	1.1
0396	Surface water	10.5	10.6	0.2
0398	Surface water	15.5	14.5	3.5
0655	Groundwater	31.8	31.1	1.2
0656	Groundwater	26.7	27.2	0.9
0658	Groundwater	18.6	20.2	4.1
0741	Surface water	10.4	10.3	0.5

Locations RFO-0304 and RFO-0305 had charge balances slightly greater than 10%. There were no analytical errors identified during the review of the laboratory data. All other charge balances were below 10%.

SAMPLE MANAGEMENT SYSTEM
General Data Validation Report

RIN: 16108115 Lab Code: PAR Validator: Samantha Tigar Validation Date: 12/15/2016
Project: Rifle Disposal/Processing Site (old/new) Analysis Type: Metals General Chem Rad Organics
of Samples: 14 Matrix: WATER Requested Analysis Completed: Yes

Chain of Custody

Present: OK Signed: OK Dated: OK

Sample

Integrity: OK Preservation: OK Temperature: OK

Select Quality Parameters

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

All analyses were completed within the applicable holding times.

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

There was 1 duplicate evaluated.

Figure 4. General Validation Worksheet

SAMPLE MANAGEMENT SYSTEM Wet Chemistry Data Validation Worksheet

RIN: 16108115 **Lab Code:** PAR **Date Due:** 12/2/2016
Matrix: Water **Site Code:** RFL01 **Date Completed:** 12/5/2016

Analyte	Date Analyzed	CALIBRATION				Method Blank	LCS %R	MS %R	MSD %R	DUP RPD	Serial Dil. %R
		Int.	R^2	CCV	CCB						
CHLORIDE	11/15/2016	0.000	1.0000	OK	OK	OK	100.00				
CHLORIDE	11/16/2016	0.000	1.0000	OK	OK	OK	99.00	115.0	113.0	1.00	
Nitrate+Nitrite as N	11/21/2016	0.000	1.0000	OK	OK	OK	93.00	107.0	98.0	9.00	
SULFATE	11/15/2016	0.000	1.0000	OK	OK	OK	100.00				
SULFATE	11/16/2016	0.000	1.0000	OK	OK	OK	99.00				

Figure 5. Wet Chemistry Validation Worksheet

SAMPLE MANAGEMENT SYSTEM Metals Data Validation Worksheet

RIN: 16108115

Lab Code: PAR

Date Due: 12/2/2016

Matrix: Water

Site Code: RFL01

Date Completed: 12/5/2016

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	11/18/2016	0.0000	1.0000	OK	OK	OK	101.0			0.0	101.0	5.0	104.0
Magnesium	ICP/ES	11/18/2016	0.0000	1.0000	OK	OK	OK	100.0	98.0	88.0	0.0	95.0	4.0	98.0
Potassium	ICP/ES	11/18/2016	0.0000	1.0000	OK	OK	OK	102.0	107.0	102.0	1.0		2.0	109.0
Selenium	ICP/MS	11/19/2016	0.0000	1.0000	OK	OK	OK	99.0	99.0	100.0	1.0	99.0		111.0
Sodium	ICP/ES	11/18/2016	0.0000	1.0000	OK	OK	OK	102.0			6.0		8.0	112.0
Uranium	ICP/MS	11/19/2016	0.0000	1.0000	OK	OK	OK	102.0	107.0	107.0	0.0	101.0	3.0	130.0
Vanadium	ICP/MS	11/19/2016	0.0000	1.0000	OK	OK	OK	93.0	98.0	96.0	2.0	96.0		97.0

Figure 6. Metals Validation Worksheet

Sampling Quality Control Assessment

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

Sampling Protocol

Sample results for all monitoring wells were qualified with an “F” flag, indicating the wells were purged and sampled using the low-flow method. At all monitoring well locations, purging and sampling met the Category I criteria with the following exceptions. Wells RFN-0669 and RFN-0670 were classified as Category II because they produced water at a rate less than the minimum low-flow purging rate. The sample results for these wells were qualified with a “Q” flag (qualitative), indicating the samples were not collected under the optimal conditions of the Category I stability criteria.

During calibration of sonde “E,” the cell constant for specific conductance was out of range. All associated readings were qualified with a “J” flag as an estimated value. On November 2, 2016, the specific conductance was out of range for sonde “E.” Associated results were previously qualified. At location RFO-0292A, pH stability was not achieved and the associated reading was qualified with a “J” flag as an estimated value.

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 locations RFN-0201, RFN-0216, and RFO-0310. The relative percent difference for duplicate results that are greater than 5 times the PQL should be less than 20%. 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 with the following exception. Nitrate + nitrite as N at location RFN-0201 exceeded acceptance criteria and the associated results were qualified with a “J” flag as an estimated value.

SAMPLE MANAGEMENT SYSTEM
Validation Report: Field Duplicates

Page 1 of 1

RIN: 16108114 Lab Code: PAR Project: Rifle Disposal/Processing Site (old/new) Validation Date: 12/16/2016

Duplicate: 2548		Sample: 0216											
Analyte	Sample					Duplicate					RPD	RER	Units
	Result	Flag	Error	Dilution	Result	Flag	Error	Dilution					
AMMONIA AS N	7.1			25	6.8			25					MG/L
Arsenic	0.028			10	0.027			10	3.64				MG/L
Calcium	94			1	93			1	1.07				MG/L
CHLORIDE	150			20	150			20	0				MG/L
Magnesium	19			1	19			1	0				MG/L
Molybdenum	0.053			10	0.054			10	1.87				MG/L
Nitrate+Nitrite as N	0.01	U		1	0.01	U		1					MG/L
Potassium	8.3			1	8.3			1	0				MG/L
Selenium	0.00093	J		10	0.00084	J		10					MG/L
Sodium	160			1	160			1	0				MG/L
SULFATE	270			20	260			20	3.77				MG/L
Uranium	0.024			10	0.023			10	4.26				MG/L
Vanadium	0.32			10	0.32			10	0				MG/L

Duplicate: 2804		Sample: 0201											
Analyte	Sample					Duplicate					RPD	RER	Units
	Result	Flag	Error	Dilution	Result	Flag	Error	Dilution					
AMMONIA AS N	62			25	61			25					MG/L
Arsenic	0.00039	J		10	0.00051	J		10					MG/L
Calcium	520			5	510			5	1.94				MG/L
CHLORIDE	170			40	160			40					MG/L
Magnesium	46			5	45			5	2.20				MG/L
Molybdenum	1.5			10	1.5			10	0				MG/L
Nitrate+Nitrite as N	12			50	18			50	>PQL				MG/L
Potassium	11			5	10			5	9.52				MG/L
Selenium	0.024			10	0.027			10	11.76				MG/L
Sodium	280			5	280			5	0				MG/L
SULFATE	1700			40	1600			40	6.06				MG/L
Uranium	0.099			10	0.099			10	0				MG/L
Vanadium	0.00058	U		10	0.00069	J		10					MG/L

Figure 7. Field Duplicates Validation Worksheet, RIN 16108114

SAMPLE MANAGEMENT SYSTEM

Page 1 of 1

Validation Report: Field Duplicates

RIN: 16108115 Lab Code: PAR Project: Rifle Disposal/Processing Site (old/new) Validation Date: 12/15/2016

Duplicate: 2551

Sample: 0310

Analyte	Sample				Duplicate				RPD	RER	Units
	Result	Flag	Error	Dilution	Result	Flag	Error	Dilution			
Calcium	230			1	230			1	0		MG/L
CHLORIDE	210			25	200			25	4.88		MG/L
Magnesium	110			1	110			1	0		MG/L
Nitrate+Nitrite as N	0.01	U		1	0.01	U		1			MG/L
Potassium	9.7			1	9.7			1	0		MG/L
Selenium	0.00066	U		10	0.00066	U		10			MG/L
Sodium	240			1	240			1	0		MG/L
SULFATE	810			25	780			25	3.77		MG/L
Uranium	0.15			10	0.15			10	0		MG/L
Vanadium	0.0079			10	0.008			10	1.26		MG/L

Figure 8. Field Duplicate Validation Worksheet, RIN 16108115

Certification

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

Laboratory Coordinator: Stephen Donovan 1-26-2017
Stephen Donovan Date

Data Validation Lead: Samantha Tigar 1/25/2017
Samantha Tigar Date

Attachment 1

Sampling and Analysis Work Order

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October 4, 2016

Task Assignment 103
Control Number 16-0995

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

SUBJECT: Contract No. DE-LM0000421, Navarro Research & Engineering, Inc. (Navarro)
Task Assignment 103 LTS&M-UMTRCA Title I and II Sites, D&D Sites, Other
Sites, & Other,
October 2016 Environmental Sampling at the Rifle, Colorado, Processing Sites

REFERENCE: Task Assignment 103, 1-103-1-02-116, Rifle, Colorado, Processing Sites

Dear Mr. Bush:

The purpose of this letter is to inform you of the upcoming sampling event at Rifle, Colorado. Enclosed are the map and tables specifying sample locations and analytes for monitoring at the Rifle New and Old sites. Water quality data will be collected from these sites as part of the environmental sampling currently scheduled to begin the week of October 31, 2016.

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

MONITORING WELLS*

New Rifle

169 Al	195 Al	216 Al	620 Al	658 Al	664 Al	670 Al
170 Al	201 Al	217 Al	635 Al	659 Al	669 Al	855 Al
172 Al	215 Al	590 Al				

Old Rifle

292A Al	305 Al	309 Al	310 Al	655 Al	656 Al	658 Al
304 Al						

*NOTE: Al = Alluvium

SURFACE LOCATIONS

New Rifle

320	323	324	326	452	453	575
322						

Rich Bush
Control Number 16-0995
Page 2

Old Rifle

294 395 396 398 741

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 contact me at (970) 248-6103 if you have any questions.

Sincerely,



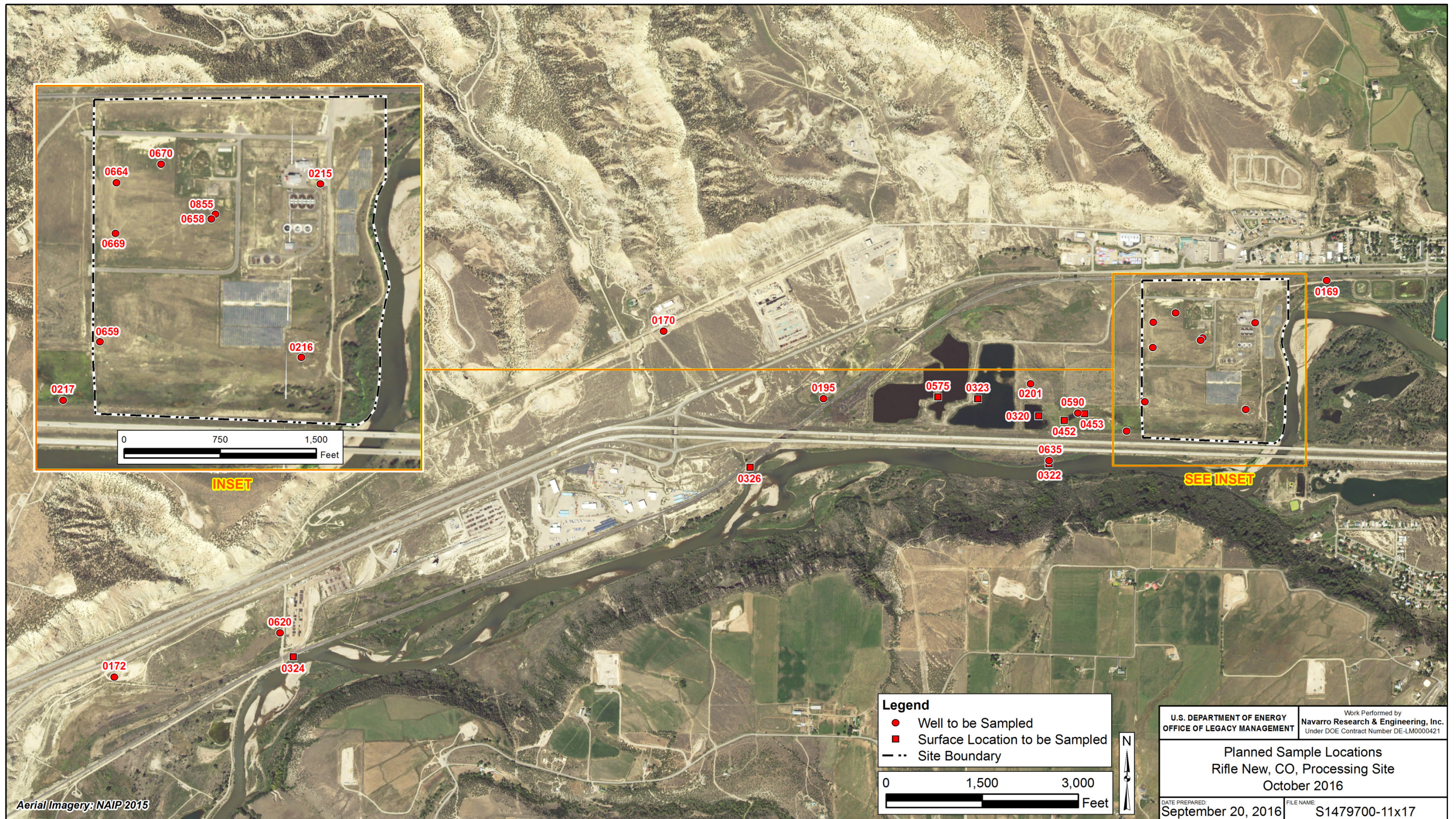
Peter Lemke
LMS Site Lead

SS/lcg/csa

Enclosures

cc: (electronic)

- Christina Pennal, DOE
- Jeff Carman, Navarro
- Beverly Cook, Navarro
- Steve Donovan, Navarro
- Lauren Goodknight, Navarro
- Peter Lemke, Navarro
- Sam Marutzky, Navarro
- Diana Osborne, Navarro
- Document Determination
- EDD Delivery
- rc-grand.junction
- File: RFN 400.02(A)
- File: RFO 400.02(A)



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New Rifle, Colorado, Processing Site, Planned Sampling Map



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Old Rifle, Colorado, Processing Site, Planned Sampling Map

Sampling Frequencies for Locations at Rifle, Colorado

Location ID	Quarterly	Semiannually	Annually	Biennially	Not Sampled	Notes
Monitoring Wells						
New Rifle						
169		X				Background well
170		X				Far downgradient
172		X				Far downgradient
195		X				Downgradient
201		X				Data logger; downgradient
215		X				Onsite
216		X				Onsite
217		X				Downgradient
590		X				Data logger; downgradient
620		X				Far downgradient
635		X				Downgradient
658		X				Onsite
659		X				Onsite
664		X				Onsite
669		X				Onsite
670		X				Onsite
855		X				Onsite
Old Rifle						
292A		X				Background well
304		X				Onsite
305		X				Onsite
309		X				Onsite
310		X				Data logger; onsite
655		X				Data logger; onsite
656		X				Onsite
658		X				Background well
Surface Locations						
New Rifle						
320		X				Wetland Pond
322		X				Colorado River
323		X				Gravel pit pond
324		X				Colorado River downgradient
326		X				Colorado River
452		X				Wetland Pond
453		X				Wetland Pond
575		X				Gravel pit pond
Old Rifle						
294		X				River, upstream
395		X				Seep, upgradient
396		X				River
398		X				Ditch, onsite
741		X				River

Semi-annual sampling conducted in June and November

Constituent Sampling Breakdown

Site	Rifle					Required Detection Limit (mg/L)	Analytical Method	Line Item Code
	Groundwater	Surface Water						
Analyte								
Approx. No. Samples/yr	51	26						
Field Measurements								
Alkalinity	X		X					
Dissolved Oxygen								
Redox Potential	X		X					
pH	X		X					
Specific Conductance	X		X					
Turbidity	X							
Temperature	X		X					
Laboratory Measurements								
	<i>*RFO</i>	<i>*RFN</i>	<i>RFO</i>	<i>RFN</i>	<i>RFL</i>			
Aluminum								
Ammonia as N (NH3-N)		X		X		0.1	EPA 350.1 WCH-A-005	
Arsenic		X		X		0.0001	SW-846 6020 LMM-02	
Calcium	X	X	X	X		5	SW-846 6010 LMM-01	
Chloride	X	X	X	X		0.5	SW-846 9056 MIS-A_039	
Chromium								
Gross Alpha								
Gross Beta								
Iron								
Lead								
Magnesium	X	X	X	X		5	SW-846 6010 LMM-01	
Manganese								
Molybdenum		X		X		0.003	SW-846 6020 LMM-02	
Nickel								
Nickel-63								
Nitrate + Nitrite as N (NO3+NO2)-N	X	X	X	X		0.05	EPA 353.1 WCH-A-022	
Potassium	X	X	X	X		1	SW-846 6010 LMM-01	
Radium-226								
Radium-228								
Selenium	X	X	X	X		0.0001	SW-846 6020 LMM-02	
Silica								
Sodium	X	X	X	X		1	SW-846 6010 LMM-01	
Strontium								
Sulfate	X	X	X	X		0.5	SW-846 9056 MIS-A-044	
Sulfide								
Total Dissolved Solids								
Total Organic Carbon								
Uranium	X	X	X	X	X	0.0001	SW-846 6020 LMM-02	
Vanadium	X	X	X	X	X	0.0003	SW-846 6020 LMM-02	
Zinc								
Total No. of Analytes	10	13	10	13	2			

*RFN = New Rifle; *RFO = Old Rifle

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

Attachment 2

Trip Report

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To: Peter Lemke, Navarro
 From: David Atkinson, Navarro
 Date: November 17, 2016
 CC: Richard Bush, DOE
 Steve Donivan, Navarro
 EDD Delivery
 Re: Sampling Trip Report

Site: Rifle, Colorado, New and Old Processing Sites

Dates of Event: October 31–November 2, 2016

Team Members: David Atkinson, Rob Rice, Jeff Price, and Tony Franzone, Navarro

Number of Locations Sampled: Samples were collected from all of the locations identified on the sampling notification letter; an additional 3 samples were collected as duplicates.

Locations Not Sampled/Reason: None.

Location Specific Information: New Rifle monitoring well 0195 had to be filtered because turbidity of less than 10 NTUs could not be achieved. In addition New Rifle monitoring wells 0664 and 0659 exhibited elevated turbidity; these wells should be redeveloped prior to subsequent sampling.

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
2548	OLY 022	RFN-0216	Duplicate	Ground Water
2804	OLY 026	0201	Duplicate	Ground Water
2551	OLY 043	RFO-0310	Duplicate	Ground Water

Requisition Index Number (RIN) Assigned: All New Rifle samples were assigned to RIN 16108114, all Old Rifle samples were assigned to RIN 16108115. Field data sheets can be found in [\\crow\SMS\16108114\FieldData](#) and [\\crow\SMS\16108115\FieldData](#).

Sample Shipment: Samples were shipped in two separate shipments, overnight via FedEx from Grand Junction, CO, to ALS Laboratory Group in Fort Collins, CO, on November 3, 2016 and November 8, 2016.

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

Dataloggers: Dataloggers were not downloaded during this trip.

Well Inspection Summary: New Rifle well 0658 needs to be relabeled.

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.

Equipment: All equipment functioned properly.

Stakeholder/Regulatory/DOE: Nothing to note.

Site Conditions:

Fences, Gates, and Locks: All gates were left as found on arrival and appeared to be in good condition.

Signs: No issues were observed.

Trespassing/Site Disturbances: None observed.

Disposal Cell/Drainage Structure Integrity: N/A

Safety Issues: None.

Access Issues: None.

General Information: Nothing to note.

Immediate Actions Taken: None.

Future Actions Required or Suggested: Wells RFN-0664 and 0659 need redeveloping; well RFN-0658 needs new label.

Attachment 3

Data Presentation

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Groundwater Quality Data

New Rifle

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Groundwater Quality Data by Location (USEE100) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 12/19/2016

Location: 0169 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
								Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	10/31/2016	N001	3.13	-	18.13	464		F	#		
Ammonia Total as N	mg/L	10/31/2016	N001	3.13	-	18.13	0.1	U	F	#	0.1	
Arsenic	mg/L	10/31/2016	N001	3.13	-	18.13	0.00046	J	F	#	0.00012	
Calcium	mg/L	10/31/2016	N001	3.13	-	18.13	170		F	#	0.024	
Chloride	mg/L	10/31/2016	N001	3.13	-	18.13	60		F	#	2	
Magnesium	mg/L	10/31/2016	N001	3.13	-	18.13	98		F	#	0.03	
Molybdenum	mg/L	10/31/2016	N001	3.13	-	18.13	0.0046		UF	#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	10/31/2016	N001	3.13	-	18.13	0.13		F	#	0.01	
Oxidation Reduction Potential	mV	10/31/2016	N001	3.13	-	18.13	103.3		F	#		
pH	s.u.	10/31/2016	N001	3.13	-	18.13	6.98		F	#		
Potassium	mg/L	10/31/2016	N001	3.13	-	18.13	5.5		F	#	0.052	
Selenium	mg/L	10/31/2016	N001	3.13	-	18.13	0.0047		F	#	0.00066	
Sodium	mg/L	10/31/2016	N001	3.13	-	18.13	160		F	#	0.047	
Specific Conductance	umhos/cm	10/31/2016	N001	3.13	-	18.13	1776		JF	#		
Sulfate	mg/L	10/31/2016	N001	3.13	-	18.13	630		F	#	5	
Temperature	C	10/31/2016	N001	3.13	-	18.13	16.81		F	#		
Turbidity	NTU	10/31/2016	N001	3.13	-	18.13	0.74		F	#		
Uranium	mg/L	10/31/2016	N001	3.13	-	18.13	0.02		F	#	0.000012	
Vanadium	mg/L	10/31/2016	N001	3.13	-	18.13	0.0009	J	F	#	0.00058	

Groundwater Quality Data by Location (USEE100) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 12/19/2016

Location: 0170 WELL Ground elevation was calculated as surveyed TOC elevation minus stick up height reported in the Borehole Summary

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)	Result	Qualifiers			Detection Limit	Uncertainty
						Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	11/02/2016	N001	92.23 - 112.23	512		F	#		
Ammonia Total as N	mg/L	11/02/2016	N001	92.23 - 112.23	0.64		F	#	0.1	
Arsenic	mg/L	11/02/2016	N001	92.23 - 112.23	0.00033	J	F	#	0.00012	
Calcium	mg/L	11/02/2016	N001	92.23 - 112.23	180		F	#	0.12	
Chloride	mg/L	11/02/2016	N001	92.23 - 112.23	190		F	#	8	
Magnesium	mg/L	11/02/2016	N001	92.23 - 112.23	110		F	#	0.15	
Molybdenum	mg/L	11/02/2016	N001	92.23 - 112.23	0.0026		F	#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	11/02/2016	N001	92.23 - 112.23	11		F	#	0.5	
Oxidation Reduction Potential	mV	11/02/2016	N001	92.23 - 112.23	89.1		F	#		
pH	s.u.	11/02/2016	N001	92.23 - 112.23	7		F	#		
Potassium	mg/L	11/02/2016	N001	92.23 - 112.23	6.7		F	#	0.26	
Selenium	mg/L	11/02/2016	N001	92.23 - 112.23	0.023		F	#	0.00066	
Sodium	mg/L	11/02/2016	N001	92.23 - 112.23	480		F	#	0.23	
Specific Conductance	umhos/cm	11/02/2016	N001	92.23 - 112.23	2943		JF	#		
Sulfate	mg/L	11/02/2016	N001	92.23 - 112.23	1100		F	#	20	
Temperature	C	11/02/2016	N001	92.23 - 112.23	15.89		F	#		
Turbidity	NTU	11/02/2016	N001	92.23 - 112.23	5.34		F	#		
Uranium	mg/L	11/02/2016	N001	92.23 - 112.23	0.062		F	#	0.000012	
Vanadium	mg/L	11/02/2016	N001	92.23 - 112.23	0.00082	J	F	#	0.00058	

Groundwater Quality Data by Location (USEE100) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 12/19/2016

Location: 0172 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	11/02/2016	N001	6.98	- 31.98	709		F	#		
Ammonia Total as N	mg/L	11/02/2016	N001	6.98	- 31.98	0.13		F	#	0.1	
Arsenic	mg/L	11/02/2016	N001	6.98	- 31.98	0.006		F	#	0.00012	
Calcium	mg/L	11/02/2016	N001	6.98	- 31.98	440		F	#	0.12	
Chloride	mg/L	11/02/2016	N001	6.98	- 31.98	1100		F	#	20	
Magnesium	mg/L	11/02/2016	N001	6.98	- 31.98	290		F	#	0.15	
Molybdenum	mg/L	11/02/2016	N001	6.98	- 31.98	0.01		F	#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	11/02/2016	N001	6.98	- 31.98	0.02		F	#	0.01	
Oxidation Reduction Potential	mV	11/02/2016	N001	6.98	- 31.98	-75.9		F	#		
pH	s.u.	11/02/2016	N001	6.98	- 31.98	7.19		F	#		
Potassium	mg/L	11/02/2016	N001	6.98	- 31.98	12		F	#	0.26	
Selenium	mg/L	11/02/2016	N001	6.98	- 31.98	0.00066	U	F	#	0.00066	
Sodium	mg/L	11/02/2016	N001	6.98	- 31.98	2100		F	#	0.23	
Specific Conductance	umhos/cm	11/02/2016	N001	6.98	- 31.98	10042		JF	#		
Sulfate	mg/L	11/02/2016	N001	6.98	- 31.98	5300		F	#	50	
Temperature	C	11/02/2016	N001	6.98	- 31.98	14.58		F	#		
Turbidity	NTU	11/02/2016	N001	6.98	- 31.98	1.82		F	#		
Uranium	mg/L	11/02/2016	N001	6.98	- 31.98	0.037		F	#	0.000012	
Vanadium	mg/L	11/02/2016	N001	6.98	- 31.98	0.00058	U	F	#	0.00058	

Groundwater Quality Data by Location (USEE100) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 12/19/2016

Location: 0195 WELL Ground elevation was calculated as surveyed TOC elevation minus stick up height reported in the Borehole Summary

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	11/02/2016	N001	5.29	- 25.29	459		F	#		
Ammonia Total as N	mg/L	11/02/2016	0001	5.29	- 25.29	0.1	U	F	#	0.1	
Arsenic	mg/L	11/02/2016	0001	5.29	- 25.29	0.00094	J	F	#	0.00012	
Calcium	mg/L	11/02/2016	0001	5.29	- 25.29	85		F	#	0.024	
Chloride	mg/L	11/02/2016	0001	5.29	- 25.29	20		F	#	1	
Magnesium	mg/L	11/02/2016	0001	5.29	- 25.29	48		F	#	0.03	
Molybdenum	mg/L	11/02/2016	0001	5.29	- 25.29	0.013		F	#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	11/02/2016	0001	5.29	- 25.29	0.01	U	F	#	0.01	
Oxidation Reduction Potential	mV	11/02/2016	N001	5.29	- 25.29	1.9		F	#		
pH	s.u.	11/02/2016	N001	5.29	- 25.29	7.11		F	#		
Potassium	mg/L	11/02/2016	0001	5.29	- 25.29	6.5		F	#	0.052	
Selenium	mg/L	11/02/2016	0001	5.29	- 25.29	0.00066	U	F	#	0.00066	
Sodium	mg/L	11/02/2016	0001	5.29	- 25.29	110		F	#	0.047	
Specific Conductance	umhos/cm	11/02/2016	N001	5.29	- 25.29	1022		JF	#		
Sulfate	mg/L	11/02/2016	0001	5.29	- 25.29	160		F	#	2.5	
Temperature	C	11/02/2016	N001	5.29	- 25.29	15.64		F	#		
Turbidity	NTU	11/02/2016	N001	5.29	- 25.29	27.4		F	#		
Uranium	mg/L	11/02/2016	0001	5.29	- 25.29	0.01		F	#	0.000012	
Vanadium	mg/L	11/02/2016	0001	5.29	- 25.29	0.00058	U	F	#	0.00058	

Groundwater Quality Data by Location (USEE100) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 12/19/2016

Location: 0201 WELL Ground elevation was calculated as surveyed TOC elevation minus stick up height reported in the Borehole Summary

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	11/02/2016	N001	7.35	- 22.35	300		F	#		
Ammonia Total as N	mg/L	11/02/2016	N001	7.35	- 22.35	62		F	#	2.5	
Ammonia Total as N	mg/L	11/02/2016	N002	7.35	- 22.35	61		F	#	2.5	
Arsenic	mg/L	11/02/2016	N001	7.35	- 22.35	0.00039	J	F	#	0.00012	
Arsenic	mg/L	11/02/2016	N002	7.35	- 22.35	0.00051	J	F	#	0.00012	
Calcium	mg/L	11/02/2016	N001	7.35	- 22.35	520		F	#	0.12	
Calcium	mg/L	11/02/2016	N002	7.35	- 22.35	510		F	#	0.12	
Chloride	mg/L	11/02/2016	N001	7.35	- 22.35	170		F	#	8	
Chloride	mg/L	11/02/2016	N002	7.35	- 22.35	160		F	#	8	
Magnesium	mg/L	11/02/2016	N001	7.35	- 22.35	46		F	#	0.15	
Magnesium	mg/L	11/02/2016	N002	7.35	- 22.35	45		F	#	0.15	
Molybdenum	mg/L	11/02/2016	N001	7.35	- 22.35	1.5		F	#	0.00032	
Molybdenum	mg/L	11/02/2016	N002	7.35	- 22.35	1.5		F	#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	11/02/2016	N001	7.35	- 22.35	12		JF	#	0.5	
Nitrate + Nitrite as Nitrogen	mg/L	11/02/2016	N002	7.35	- 22.35	18		JF	#	0.5	
Oxidation Reduction Potential	mV	11/02/2016	N001	7.35	- 22.35	92.5		F	#		
pH	s.u.	11/02/2016	N001	7.35	- 22.35	6.87		F	#		
Potassium	mg/L	11/02/2016	N001	7.35	- 22.35	11		F	#	0.26	

Groundwater Quality Data by Location (USEE100) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 12/19/2016

Location: 0201 WELL Ground elevation was calculated as surveyed TOC elevation minus stick up height reported in the Borehole Summary

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Potassium	mg/L	11/02/2016	N002	7.35	- 22.35	10		F	#	0.26	
Selenium	mg/L	11/02/2016	N001	7.35	- 22.35	0.024		F	#	0.00066	
Selenium	mg/L	11/02/2016	N002	7.35	- 22.35	0.027		F	#	0.00066	
Sodium	mg/L	11/02/2016	N001	7.35	- 22.35	280		F	#	0.23	
Sodium	mg/L	11/02/2016	N002	7.35	- 22.35	280		F	#	0.23	
Specific Conductance	umhos/cm	11/02/2016	N001	7.35	- 22.35	3331		JF	#		
Sulfate	mg/L	11/02/2016	N001	7.35	- 22.35	1700		F	#	20	
Sulfate	mg/L	11/02/2016	N002	7.35	- 22.35	1600		F	#	20	
Temperature	C	11/02/2016	N001	7.35	- 22.35	16.69		F	#		
Turbidity	NTU	11/02/2016	N001	7.35	- 22.35	0.67		F	#		
Uranium	mg/L	11/02/2016	N001	7.35	- 22.35	0.099		F	#	0.000012	
Uranium	mg/L	11/02/2016	N002	7.35	- 22.35	0.099		F	#	0.000012	
Vanadium	mg/L	11/02/2016	N001	7.35	- 22.35	0.00058	U	F	#	0.00058	
Vanadium	mg/L	11/02/2016	N002	7.35	- 22.35	0.00069	J	F	#	0.00058	

Groundwater Quality Data by Location (USEE100) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 12/19/2016

Location: 0215 WELL Ground elevation was calculated as surveyed TOC elevation minus stick up height reported in the Borehole Summary

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	11/02/2016	N001	6.84	- 21.84	240		F	#		
Ammonia Total as N	mg/L	11/02/2016	N001	6.84	- 21.84	1.5		F	#	0.1	
Arsenic	mg/L	11/02/2016	N001	6.84	- 21.84	0.00047	J	F	#	0.00012	
Calcium	mg/L	11/02/2016	N001	6.84	- 21.84	95		F	#	0.024	
Chloride	mg/L	11/02/2016	N001	6.84	- 21.84	200		F	#	4	
Magnesium	mg/L	11/02/2016	N001	6.84	- 21.84	37		F	#	0.03	
Molybdenum	mg/L	11/02/2016	N001	6.84	- 21.84	0.021		F	#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	11/02/2016	N001	6.84	- 21.84	7.1		F	#	0.1	
Oxidation Reduction Potential	mV	11/02/2016	N001	6.84	- 21.84	30.4		F	#		
pH	s.u.	11/02/2016	N001	6.84	- 21.84	7.42		F	#		
Potassium	mg/L	11/02/2016	N001	6.84	- 21.84	7.3		F	#	0.052	
Selenium	mg/L	11/02/2016	N001	6.84	- 21.84	0.0022		F	#	0.00066	
Sodium	mg/L	11/02/2016	N001	6.84	- 21.84	210		F	#	0.047	
Specific Conductance	umhos/cm	11/02/2016	N001	6.84	- 21.84	1533		JF	#		
Sulfate	mg/L	11/02/2016	N001	6.84	- 21.84	340		F	#	10	
Temperature	C	11/02/2016	N001	6.84	- 21.84	19.19		F	#		
Turbidity	NTU	11/02/2016	N001	6.84	- 21.84	0.87		F	#		
Uranium	mg/L	11/02/2016	N001	6.84	- 21.84	0.013		F	#	0.000012	
Vanadium	mg/L	11/02/2016	N001	6.84	- 21.84	0.0018	J	F	#	0.00058	

Groundwater Quality Data by Location (USEE100) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 12/19/2016

Location: 0216 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
								Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	10/31/2016	N001	5.5	-	20.5	244		F	#		
Ammonia Total as N	mg/L	10/31/2016	N001	5.5	-	20.5	7.1		F	#	2.5	
Ammonia Total as N	mg/L	10/31/2016	N002	5.5	-	20.5	6.8		F	#	2.5	
Arsenic	mg/L	10/31/2016	N001	5.5	-	20.5	0.028		F	#	0.00012	
Arsenic	mg/L	10/31/2016	N002	5.5	-	20.5	0.027		F	#	0.00012	
Calcium	mg/L	10/31/2016	N001	5.5	-	20.5	94		F	#	0.024	
Calcium	mg/L	10/31/2016	N002	5.5	-	20.5	93		F	#	0.024	
Chloride	mg/L	10/31/2016	N001	5.5	-	20.5	150		F	#	4	
Chloride	mg/L	10/31/2016	N002	5.5	-	20.5	150		F	#	4	
Magnesium	mg/L	10/31/2016	N001	5.5	-	20.5	19		F	#	0.03	
Magnesium	mg/L	10/31/2016	N002	5.5	-	20.5	19		F	#	0.03	
Molybdenum	mg/L	10/31/2016	N001	5.5	-	20.5	0.053		F	#	0.00032	
Molybdenum	mg/L	10/31/2016	N002	5.5	-	20.5	0.054		F	#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	10/31/2016	N001	5.5	-	20.5	0.01	U	F	#	0.01	
Nitrate + Nitrite as Nitrogen	mg/L	10/31/2016	N002	5.5	-	20.5	0.01	U	F	#	0.01	
Oxidation Reduction Potential	mV	10/31/2016	N001	5.5	-	20.5	-26.3		F	#		
pH	s.u.	10/31/2016	N001	5.5	-	20.5	7.46		F	#		
Potassium	mg/L	10/31/2016	N001	5.5	-	20.5	8.3		F	#	0.052	

Groundwater Quality Data by Location (USEE100) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 12/19/2016

Location: 0216 WELL

Parameter	Units	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data	QA		
Potassium	mg/L	10/31/2016	N002	5.5	-	20.5	8.3		F	#	0.052	
Selenium	mg/L	10/31/2016	N001	5.5	-	20.5	0.00093	J	F	#	0.00066	
Selenium	mg/L	10/31/2016	N002	5.5	-	20.5	0.00084	J	F	#	0.00066	
Sodium	mg/L	10/31/2016	N001	5.5	-	20.5	160		F	#	0.047	
Sodium	mg/L	10/31/2016	N002	5.5	-	20.5	160		F	#	0.047	
Specific Conductance	umhos/cm	10/31/2016	N001	5.5	-	20.5	1241		JF	#		
Sulfate	mg/L	10/31/2016	N001	5.5	-	20.5	270		F	#	10	
Sulfate	mg/L	10/31/2016	N002	5.5	-	20.5	260		F	#	10	
Temperature	C	10/31/2016	N001	5.5	-	20.5	17.19		F	#		
Turbidity	NTU	10/31/2016	N001	5.5	-	20.5	1.62		F	#		
Uranium	mg/L	10/31/2016	N001	5.5	-	20.5	0.024		F	#	0.000012	
Uranium	mg/L	10/31/2016	N002	5.5	-	20.5	0.023		F	#	0.000012	
Vanadium	mg/L	10/31/2016	N001	5.5	-	20.5	0.32		F	#	0.00058	
Vanadium	mg/L	10/31/2016	N002	5.5	-	20.5	0.32		F	#	0.00058	

Groundwater Quality Data by Location (USEE100) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 12/19/2016

Location: 0217 WELL Ground elevation was calculated as surveyed TOC elevation minus stick up height reported in the Borehole Summary

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
								Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	11/02/2016	N001	7.4	-	22.4	237		F	#		
Ammonia Total as N	mg/L	11/02/2016	N001	7.4	-	22.4	37		F	#	2.5	
Arsenic	mg/L	11/02/2016	N001	7.4	-	22.4	0.00053	J	F	#	0.00012	
Calcium	mg/L	11/02/2016	N001	7.4	-	22.4	600		F	#	0.12	
Chloride	mg/L	11/02/2016	N001	7.4	-	22.4	210		F	#	8	
Magnesium	mg/L	11/02/2016	N001	7.4	-	22.4	22		F	#	0.15	
Molybdenum	mg/L	11/02/2016	N001	7.4	-	22.4	1.4		F	#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	11/02/2016	N001	7.4	-	22.4	0.01	U	F	#	0.01	
Oxidation Reduction Potential	mV	11/02/2016	N001	7.4	-	22.4	100.5		F	#		
pH	s.u.	11/02/2016	N001	7.4	-	22.4	6.9		F	#		
Potassium	mg/L	11/02/2016	N001	7.4	-	22.4	15		F	#	0.26	
Selenium	mg/L	11/02/2016	N001	7.4	-	22.4	0.0042		F	#	0.00066	
Sodium	mg/L	11/02/2016	N001	7.4	-	22.4	210		F	#	0.23	
Specific Conductance	umhos/cm	11/02/2016	N001	7.4	-	22.4	3099		JF	#		
Sulfate	mg/L	11/02/2016	N001	7.4	-	22.4	1700		F	#	20	
Temperature	C	11/02/2016	N001	7.4	-	22.4	13.3		F	#		
Turbidity	NTU	11/02/2016	N001	7.4	-	22.4	0.83		F	#		
Uranium	mg/L	11/02/2016	N001	7.4	-	22.4	0.13		F	#	0.000012	
Vanadium	mg/L	11/02/2016	N001	7.4	-	22.4	1.9		F	#	0.00058	

Groundwater Quality Data by Location (USEE100) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 12/19/2016

Location: 0590 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
								Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	11/01/2016	N001	5.21	-	19.21	277		F	#		
Ammonia Total as N	mg/L	11/01/2016	N001	5.21	-	19.21	140		F	#	2.5	
Arsenic	mg/L	11/01/2016	N001	5.21	-	19.21	0.00091	J	F	#	0.00012	
Calcium	mg/L	11/01/2016	N001	5.21	-	19.21	550		F	#	0.12	
Chloride	mg/L	11/01/2016	N001	5.21	-	19.21	300		F	#	8	
Magnesium	mg/L	11/01/2016	N001	5.21	-	19.21	53		F	#	0.15	
Molybdenum	mg/L	11/01/2016	N001	5.21	-	19.21	1.1		F	#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	11/01/2016	N001	5.21	-	19.21	2.5		F	#	0.1	
Oxidation Reduction Potential	mV	11/01/2016	N001	5.21	-	19.21	197.6		F	#		
pH	s.u.	11/01/2016	N001	5.21	-	19.21	6.77		F	#		
Potassium	mg/L	11/01/2016	N001	5.21	-	19.21	25		F	#	0.26	
Selenium	mg/L	11/01/2016	N001	5.21	-	19.21	0.016		F	#	0.00066	
Sodium	mg/L	11/01/2016	N001	5.21	-	19.21	410		F	#	0.23	
Specific Conductance	umhos/cm	11/01/2016	N001	5.21	-	19.21	4360		JF	#		
Sulfate	mg/L	11/01/2016	N001	5.21	-	19.21	2400		F	#	20	
Temperature	C	11/01/2016	N001	5.21	-	19.21	15.22		F	#		
Turbidity	NTU	11/01/2016	N001	5.21	-	19.21	2		F	#		
Uranium	mg/L	11/01/2016	N001	5.21	-	19.21	0.079		F	#	0.000012	
Vanadium	mg/L	11/01/2016	N001	5.21	-	19.21	0.39		F	#	0.00058	

Groundwater Quality Data by Location (USEE100) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 12/19/2016

Location: 0620 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
								Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	11/02/2016	N001	6.7	-	10.7	662		F	#		
Ammonia Total as N	mg/L	11/02/2016	N001	6.7	-	10.7	0.1	U	F	#	0.1	
Arsenic	mg/L	11/02/2016	N001	6.7	-	10.7	0.00043	J	F	#	0.00012	
Calcium	mg/L	11/02/2016	N001	6.7	-	10.7	410		F	#	0.12	
Chloride	mg/L	11/02/2016	N001	6.7	-	10.7	1600		F	#	20	
Magnesium	mg/L	11/02/2016	N001	6.7	-	10.7	250		F	#	0.15	
Molybdenum	mg/L	11/02/2016	N001	6.7	-	10.7	0.016		F	#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	11/02/2016	N001	6.7	-	10.7	8.5		F	#	0.5	
Oxidation Reduction Potential	mV	11/02/2016	N001	6.7	-	10.7	178.8		F	#		
pH	s.u.	11/02/2016	N001	6.7	-	10.7	7.19		F	#		
Potassium	mg/L	11/02/2016	N001	6.7	-	10.7	10		F	#	0.26	
Selenium	mg/L	11/02/2016	N001	6.7	-	10.7	0.022		F	#	0.00066	
Sodium	mg/L	11/02/2016	N001	6.7	-	10.7	1200		F	#	0.23	
Specific Conductance	umhos/cm	11/02/2016	N001	6.7	-	10.7	7309		JF	#		
Sulfate	mg/L	11/02/2016	N001	6.7	-	10.7	2200		F	#	50	
Temperature	C	11/02/2016	N001	6.7	-	10.7	14.1		F	#		
Turbidity	NTU	11/02/2016	N001	6.7	-	10.7	1.05		F	#		
Uranium	mg/L	11/02/2016	N001	6.7	-	10.7	0.066		F	#	0.000012	
Vanadium	mg/L	11/02/2016	N001	6.7	-	10.7	0.003		F	#	0.00058	

Groundwater Quality Data by Location (USEE100) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 12/19/2016

Location: 0635 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
				Lab	Data	QA						
Alkalinity, Total (as CaCO ₃)	mg/L	11/01/2016	N001	12	-	17	254		F	#		
Ammonia Total as N	mg/L	11/01/2016	N001	12	-	17	54		F	#	2.5	
Arsenic	mg/L	11/01/2016	N001	12	-	17	0.00018	J	F	#	0.00012	
Calcium	mg/L	11/01/2016	N001	12	-	17	310		F	#	0.024	
Chloride	mg/L	11/01/2016	N001	12	-	17	160		F	#	4	
Magnesium	mg/L	11/01/2016	N001	12	-	17	23		F	#	0.03	
Molybdenum	mg/L	11/01/2016	N001	12	-	17	0.38		F	#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	11/01/2016	N001	12	-	17	3.3		F	#	0.1	
Oxidation Reduction Potential	mV	11/01/2016	N001	12	-	17	112.7		F	#		
pH	s.u.	11/01/2016	N001	12	-	17	7.01		F	#		
Potassium	mg/L	11/01/2016	N001	12	-	17	28		F	#	0.052	
Selenium	mg/L	11/01/2016	N001	12	-	17	0.0056		F	#	0.00066	
Sodium	mg/L	11/01/2016	N001	12	-	17	160		F	#	0.047	
Specific Conductance	umhos/cm	11/01/2016	N001	12	-	17	2327		JF	#		
Sulfate	mg/L	11/01/2016	N001	12	-	17	1000		F	#	10	
Temperature	C	11/01/2016	N001	12	-	17	13.92		F	#		
Turbidity	NTU	11/01/2016	N001	12	-	17	0.8		F	#		
Uranium	mg/L	11/01/2016	N001	12	-	17	0.051		F	#	0.000012	
Vanadium	mg/L	11/01/2016	N001	12	-	17	0.00058	U	F	#	0.00058	

Groundwater Quality Data by Location (USEE100) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 12/19/2016

Location: 0658 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
				Lab	Data	QA						
Alkalinity, Total (as CaCO ₃)	mg/L	11/01/2016	N001	.5	-	5.5	256	F	#			
Ammonia Total as N	mg/L	11/01/2016	N001	.5	-	5.5	47	F	#	2.5		
Arsenic	mg/L	11/01/2016	N001	.5	-	5.5	0.12	F	#	0.00012		
Calcium	mg/L	11/01/2016	N001	.5	-	5.5	520	F	#	0.12		
Chloride	mg/L	11/01/2016	N001	.5	-	5.5	200	F	#	8		
Magnesium	mg/L	11/01/2016	N001	.5	-	5.5	35	F	#	0.15		
Molybdenum	mg/L	11/01/2016	N001	.5	-	5.5	2.6	F	#	0.00032		
Nitrate + Nitrite as Nitrogen	mg/L	11/01/2016	N001	.5	-	5.5	1.5	F	#	0.1		
Oxidation Reduction Potential	mV	11/01/2016	N001	.5	-	5.5	191.7	F	#			
pH	s.u.	11/01/2016	N001	.5	-	5.5	6.81	F	#			
Potassium	mg/L	11/01/2016	N001	.5	-	5.5	8.6	F	#	0.26		
Selenium	mg/L	11/01/2016	N001	.5	-	5.5	0.99	F	#	0.00066		
Sodium	mg/L	11/01/2016	N001	.5	-	5.5	200	F	#	0.23		
Specific Conductance	umhos/cm	11/01/2016	N001	.5	-	5.5	2970	JF	#			
Sulfate	mg/L	11/01/2016	N001	.5	-	5.5	1500	F	#	20		
Temperature	C	11/01/2016	N001	.5	-	5.5	14.42	F	#			
Turbidity	NTU	11/01/2016	N001	.5	-	5.5	7.1	F	#			
Uranium	mg/L	11/01/2016	N001	.5	-	5.5	0.052	F	#	0.000012		
Vanadium	mg/L	11/01/2016	N001	.5	-	5.5	31	F	#	0.0058		

Groundwater Quality Data by Location (USEE100) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 12/19/2016

Location: 0659 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
								Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	11/01/2016	N001	.5	-	10.5	168		F	#		
Ammonia Total as N	mg/L	11/01/2016	N001	.5	-	10.5	13		F	#	2.5	
Arsenic	mg/L	11/01/2016	N001	.5	-	10.5	0.047		F	#	0.00012	
Calcium	mg/L	11/01/2016	N001	.5	-	10.5	610		F	#	0.12	
Chloride	mg/L	11/01/2016	N001	.5	-	10.5	170		F	#	8	
Magnesium	mg/L	11/01/2016	N001	.5	-	10.5	26		F	#	0.15	
Molybdenum	mg/L	11/01/2016	N001	.5	-	10.5	1.4		F	#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	11/01/2016	N001	.5	-	10.5	23		F	#	0.5	
Oxidation Reduction Potential	mV	11/01/2016	N001	.5	-	10.5	-36.7		F	#		
pH	s.u.	11/01/2016	N001	.5	-	10.5	6.99		F	#		
Potassium	mg/L	11/01/2016	N001	.5	-	10.5	12		F	#	0.26	
Selenium	mg/L	11/01/2016	N001	.5	-	10.5	0.16		F	#	0.00066	
Sodium	mg/L	11/01/2016	N001	.5	-	10.5	220		F	#	0.23	
Specific Conductance	umhos/cm	11/01/2016	N001	.5	-	10.5	2969		JF	#		
Sulfate	mg/L	11/01/2016	N001	.5	-	10.5	1500		F	#	20	
Temperature	C	11/01/2016	N001	.5	-	10.5	16.01		F	#		
Turbidity	NTU	11/01/2016	N001	.5	-	10.5	9.72		F	#		
Uranium	mg/L	11/01/2016	N001	.5	-	10.5	0.081		F	#	0.000012	
Vanadium	mg/L	11/01/2016	N001	.5	-	10.5	2.9		F	#	0.00058	

Groundwater Quality Data by Location (USEE100) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 12/19/2016

Location: 0664 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
				Lab	Data	QA						
Alkalinity, Total (as CaCO ₃)	mg/L	10/31/2016	N001	7.7	-	14.7	326	F	#			
Ammonia Total as N	mg/L	10/31/2016	N001	7.7	-	14.7	25	F	#	2.5		
Arsenic	mg/L	10/31/2016	N001	7.7	-	14.7	0.0041	F	#	0.00012		
Calcium	mg/L	10/31/2016	N001	7.7	-	14.7	140	F	#	0.024		
Chloride	mg/L	10/31/2016	N001	7.7	-	14.7	140	F	#	2		
Magnesium	mg/L	10/31/2016	N001	7.7	-	14.7	71	F	#	0.03		
Molybdenum	mg/L	10/31/2016	N001	7.7	-	14.7	0.24	F	#	0.00032		
Nitrate + Nitrite as Nitrogen	mg/L	10/31/2016	N001	7.7	-	14.7	4.2	F	#	0.1		
Oxidation Reduction Potential	mV	10/31/2016	N001	7.7	-	14.7	95.9	F	#			
pH	s.u.	10/31/2016	N001	7.7	-	14.7	7.06	F	#			
Potassium	mg/L	10/31/2016	N001	7.7	-	14.7	9.6	F	#	0.052		
Selenium	mg/L	10/31/2016	N001	7.7	-	14.7	0.19	F	#	0.00066		
Sodium	mg/L	10/31/2016	N001	7.7	-	14.7	200	F	#	0.047		
Specific Conductance	umhos/cm	10/31/2016	N001	7.7	-	14.7	1908	JF	#			
Sulfate	mg/L	10/31/2016	N001	7.7	-	14.7	570	F	#	5		
Temperature	C	10/31/2016	N001	7.7	-	14.7	16.88	F	#			
Turbidity	NTU	10/31/2016	N001	7.7	-	14.7	9.42	F	#			
Uranium	mg/L	10/31/2016	N001	7.7	-	14.7	0.047	F	#	0.000012		
Vanadium	mg/L	10/31/2016	N001	7.7	-	14.7	2.3	F	#	0.00058		

Groundwater Quality Data by Location (USEE100) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 12/19/2016

Location: 0669 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers		Detection Limit	Uncertainty
								Lab	Data QA		
Alkalinity, Total (as CaCO ₃)	mg/L	11/01/2016	N001	4	-	10.6	563	QF	#		
Ammonia Total as N	mg/L	11/01/2016	N001	4	-	10.6	49	QF	#	2.5	
Arsenic	mg/L	11/01/2016	N001	4	-	10.6	0.0096	QF	#	0.00012	
Calcium	mg/L	11/01/2016	N001	4	-	10.6	210	QF	#	0.024	
Chloride	mg/L	11/01/2016	N001	4	-	10.6	160	QF	#	2	
Magnesium	mg/L	11/01/2016	N001	4	-	10.6	39	QF	#	0.03	
Molybdenum	mg/L	11/01/2016	N001	4	-	10.6	0.52	QF	#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	11/01/2016	N001	4	-	10.6	1.7	QF	#	0.1	
Oxidation Reduction Potential	mV	11/01/2016	N001	4	-	10.6	148.4	QF	#		
pH	s.u.	11/01/2016	N001	4	-	10.6	7.02	QF	#		
Potassium	mg/L	11/01/2016	N001	4	-	10.6	6.7	QF	#	0.052	
Selenium	mg/L	11/01/2016	N001	4	-	10.6	0.048	QF	#	0.00066	
Sodium	mg/L	11/01/2016	N001	4	-	10.6	190	QF	#	0.047	
Specific Conductance	umhos/cm	11/01/2016	N001	4	-	10.6	2102	JQF	#		
Sulfate	mg/L	11/01/2016	N001	4	-	10.6	690	QF	#	5	
Temperature	C	11/01/2016	N001	4	-	10.6	16	QF	#		
Turbidity	NTU	11/01/2016	N001	4	-	10.6	3.71	QF	#		
Uranium	mg/L	11/01/2016	N001	4	-	10.6	0.061	QF	#	0.000012	
Vanadium	mg/L	11/01/2016	N001	4	-	10.6	3.9	QF	#	0.00058	

Groundwater Quality Data by Location (USEE100) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 12/19/2016

Location: 0670 WELL For Organics Study.

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers		Detection Limit	Uncertainty
				Lab	Data	QA					
Alkalinity, Total (as CaCO ₃)	mg/L	10/31/2016	N001	5.2	-	12.2	321	QF	#		
Ammonia Total as N	mg/L	10/31/2016	N001	5.2	-	12.2	14	QF	#	2.5	
Arsenic	mg/L	10/31/2016	N001	5.2	-	12.2	0.0041	QF	#	0.00012	
Calcium	mg/L	10/31/2016	N001	5.2	-	12.2	140	QF	#	0.024	
Chloride	mg/L	10/31/2016	N001	5.2	-	12.2	150	QF	#	2	
Magnesium	mg/L	10/31/2016	N001	5.2	-	12.2	79	QF	#	0.03	
Molybdenum	mg/L	10/31/2016	N001	5.2	-	12.2	0.2	QF	#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	10/31/2016	N001	5.2	-	12.2	5.9	QF	#	0.1	
Oxidation Reduction Potential	mV	10/31/2016	N001	5.2	-	12.2	69.3	QF	#		
pH	s.u.	10/31/2016	N001	5.2	-	12.2	7.04	QF	#		
Potassium	mg/L	10/31/2016	N001	5.2	-	12.2	9.3	QF	#	0.052	
Selenium	mg/L	10/31/2016	N001	5.2	-	12.2	0.41	QF	#	0.00066	
Sodium	mg/L	10/31/2016	N001	5.2	-	12.2	200	QF	#	0.047	
Specific Conductance	umhos/cm	10/31/2016	N001	5.2	-	12.2	1896	JQF	#		
Sulfate	mg/L	10/31/2016	N001	5.2	-	12.2	580	QF	#	5	
Temperature	C	10/31/2016	N001	5.2	-	12.2	17.08	QF	#		
Turbidity	NTU	10/31/2016	N001	5.2	-	12.2	2.58	QF	#		
Uranium	mg/L	10/31/2016	N001	5.2	-	12.2	0.053	QF	#	0.000012	
Vanadium	mg/L	10/31/2016	N001	5.2	-	12.2	1.8	QF	#	0.00058	

Groundwater Quality Data by Location (USEE100) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 12/19/2016

Location: 0855 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
								Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	11/01/2016	N001	6	-	11	240		F	#		
Ammonia Total as N	mg/L	11/01/2016	N001	6	-	11	23		F	#	2.5	
Arsenic	mg/L	11/01/2016	N001	6	-	11	0.14		F	#	0.00012	
Calcium	mg/L	11/01/2016	N001	6	-	11	190		F	#	0.024	
Chloride	mg/L	11/01/2016	N001	6	-	11	190		F	#	2	
Magnesium	mg/L	11/01/2016	N001	6	-	11	40		F	#	0.03	
Molybdenum	mg/L	11/01/2016	N001	6	-	11	0.33		F	#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	11/01/2016	N001	6	-	11	8.5		F	#	0.1	
Oxidation Reduction Potential	mV	11/01/2016	N001	6	-	11	173.1		F	#		
pH	s.u.	11/01/2016	N001	6	-	11	7.04		F	#		
Potassium	mg/L	11/01/2016	N001	6	-	11	11		F	#	0.052	
Selenium	mg/L	11/01/2016	N001	6	-	11	0.67		F	#	0.00066	
Sodium	mg/L	11/01/2016	N001	6	-	11	220		F	#	0.047	
Specific Conductance	umhos/cm	11/01/2016	N001	6	-	11	2027		JF	#		
Sulfate	mg/L	11/01/2016	N001	6	-	11	630		F	#	5	
Temperature	C	11/01/2016	N001	6	-	11	15.87		F	#		
Turbidity	NTU	11/01/2016	N001	6	-	11	1.8		F	#		
Uranium	mg/L	11/01/2016	N001	6	-	11	0.029		F	#	0.000012	
Vanadium	mg/L	11/01/2016	N001	6	-	11	9		F	#	0.00058	

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.

Surface Water Quality Data

New Rifle

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Surface Water Quality Data by Location (USEE102) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 12/19/2016

Location: 0320 SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID		Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	11/01/2016	N001	86			#		
Ammonia Total as N	mg/L	11/01/2016	N001	17			#	2.5	
Arsenic	mg/L	11/01/2016	N001	0.0027			#	0.00012	
Calcium	mg/L	11/01/2016	N001	640			#	0.12	
Chloride	mg/L	11/01/2016	N001	510			#	10	
Magnesium	mg/L	11/01/2016	N001	100			#	0.15	
Molybdenum	mg/L	11/01/2016	N001	0.69			#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	11/01/2016	N001	0.13			#	0.01	
Oxidation Reduction Potential	mV	11/01/2016	N001	180.8			#		
pH	s.u.	11/01/2016	N001	7.77			#		
Potassium	mg/L	11/01/2016	N001	45			#	0.26	
Selenium	mg/L	11/01/2016	N001	0.002			#	0.00066	
Sodium	mg/L	11/01/2016	N001	630			#	0.23	
Specific Conductance	umhos/cm	11/01/2016	N001	4860		J	#		
Sulfate	mg/L	11/01/2016	N001	2700			#	25	
Temperature	C	11/01/2016	N001	15.96			#		
Turbidity	NTU	11/01/2016	N001	8.42			#		
Uranium	mg/L	11/01/2016	N001	0.12			#	0.000012	
Vanadium	mg/L	11/01/2016	N001	0.033			#	0.00058	

Surface Water Quality Data by Location (USEE102) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 12/19/2016

Location: 0322 SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID		Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	11/01/2016	N001	124			#		
Ammonia Total as N	mg/L	11/01/2016	N001	0.14			#	0.1	
Arsenic	mg/L	11/01/2016	N001	0.00035	J		#	0.00012	
Calcium	mg/L	11/01/2016	N001	68			#	0.024	
Chloride	mg/L	11/01/2016	N001	200			#	4	
Magnesium	mg/L	11/01/2016	N001	14			#	0.03	
Molybdenum	mg/L	11/01/2016	N001	0.011			#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	11/01/2016	N001	0.01	U		#	0.01	
Oxidation Reduction Potential	mV	11/01/2016	N001	146			#		
pH	s.u.	11/01/2016	N001	8.36			#		
Potassium	mg/L	11/01/2016	N001	4.1			#	0.052	
Selenium	mg/L	11/01/2016	N001	0.00066	U		#	0.00066	
Sodium	mg/L	11/01/2016	N001	130			#	0.047	
Specific Conductance	umhos/cm	11/01/2016	N001	956		J	#		
Sulfate	mg/L	11/01/2016	N001	120			#	10	
Temperature	C	11/01/2016	N001	11.14			#		
Turbidity	NTU	11/01/2016	N001	5.57			#		
Uranium	mg/L	11/01/2016	N001	0.0022			#	0.000012	
Vanadium	mg/L	11/01/2016	N001	0.00091	J		#	0.00058	

Surface Water Quality Data by Location (USEE102) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 12/19/2016

Location: 0323 SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID		Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	11/01/2016	N001	112			#		
Ammonia Total as N	mg/L	11/01/2016	N001	14			#	2.5	
Arsenic	mg/L	11/01/2016	N001	0.00069	J		#	0.00012	
Calcium	mg/L	11/01/2016	N001	640			#	0.12	
Chloride	mg/L	11/01/2016	N001	470			#	10	
Magnesium	mg/L	11/01/2016	N001	140			#	0.15	
Molybdenum	mg/L	11/01/2016	N001	2			#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	11/01/2016	N001	5			#	0.1	
Oxidation Reduction Potential	mV	11/01/2016	N001	222.3			#		
pH	s.u.	11/01/2016	N001	7.54			#		
Potassium	mg/L	11/01/2016	N001	60			#	0.26	
Selenium	mg/L	11/01/2016	N001	0.0085			#	0.00066	
Sodium	mg/L	11/01/2016	N001	900			#	0.23	
Specific Conductance	umhos/cm	11/01/2016	N001	5404		J	#		
Sulfate	mg/L	11/01/2016	N001	3400			#	25	
Temperature	C	11/01/2016	N001	14.89			#		
Turbidity	NTU	11/01/2016	N001	2.53			#		
Uranium	mg/L	11/01/2016	N001	0.22			#	0.000012	
Vanadium	mg/L	11/01/2016	N001	0.0024	J		#	0.00058	

Surface Water Quality Data by Location (USEE102) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 12/19/2016

Location: 0324 SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID		Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	11/02/2016	N001	116			#		
Ammonia Total as N	mg/L	11/02/2016	N001	0.1	U		#	0.1	
Arsenic	mg/L	11/02/2016	N001	0.0004	J		#	0.00012	
Calcium	mg/L	11/02/2016	N001	70			#	0.024	
Chloride	mg/L	11/02/2016	N001	200			#	4	
Magnesium	mg/L	11/02/2016	N001	15			#	0.03	
Molybdenum	mg/L	11/02/2016	N001	0.011			#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	11/02/2016	N001	0.01	U		#	0.01	
Oxidation Reduction Potential	mV	11/02/2016	N001	163.1			#		
pH	s.u.	11/02/2016	N001	8.42			#		
Potassium	mg/L	11/02/2016	N001	4.2			#	0.052	
Selenium	mg/L	11/02/2016	N001	0.00066	U		#	0.00066	
Sodium	mg/L	11/02/2016	N001	130			#	0.047	
Specific Conductance	umhos/cm	11/02/2016	N001	1138		J	#		
Sulfate	mg/L	11/02/2016	N001	120			#	10	
Temperature	C	11/02/2016	N001	9.9			#		
Turbidity	NTU	11/02/2016	N001	2.19			#		
Uranium	mg/L	11/02/2016	N001	0.0024			#	0.000012	
Vanadium	mg/L	11/02/2016	N001	0.00058	U		#	0.00058	

Surface Water Quality Data by Location (USEE102) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 12/19/2016

Location: 0326 SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID		Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	11/02/2016	N001	140			#		
Ammonia Total as N	mg/L	11/02/2016	N001	0.1	U		#	0.1	
Arsenic	mg/L	11/02/2016	N001	0.00038	J		#	0.00012	
Calcium	mg/L	11/02/2016	N001	70			#	0.024	
Chloride	mg/L	11/02/2016	N001	200			#	4	
Magnesium	mg/L	11/02/2016	N001	15			#	0.03	
Molybdenum	mg/L	11/02/2016	N001	0.009			#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	11/02/2016	N001	0.01	U		#	0.01	
Oxidation Reduction Potential	mV	11/02/2016	N001	-22			#		
pH	s.u.	11/02/2016	N001	8.36			#		
Potassium	mg/L	11/02/2016	N001	4			#	0.052	
Selenium	mg/L	11/02/2016	N001	0.00066	U		#	0.00066	
Sodium	mg/L	11/02/2016	N001	130			#	0.047	
Specific Conductance	umhos/cm	11/02/2016	N001	1170		J	#		
Sulfate	mg/L	11/02/2016	N001	130			#	1	
Temperature	C	11/02/2016	N001	10.56			#		
Turbidity	NTU	11/02/2016	N001	3.29			#		
Uranium	mg/L	11/02/2016	N001	0.0021			#	0.000012	
Vanadium	mg/L	11/02/2016	N001	0.00071	J		#	0.00058	

Surface Water Quality Data by Location (USEE102) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 12/19/2016

Location: 0452 SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID		Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	11/01/2016	N001	80			#		
Ammonia Total as N	mg/L	11/01/2016	N001	1.3			#	0.1	
Arsenic	mg/L	11/01/2016	N001	0.0093			#	0.00012	
Calcium	mg/L	11/01/2016	N001	690			#	0.12	
Chloride	mg/L	11/01/2016	N001	770			#	10	
Magnesium	mg/L	11/01/2016	N001	110			#	0.15	
Molybdenum	mg/L	11/01/2016	N001	5.2			#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	11/01/2016	N001	5.6			#	0.5	
Oxidation Reduction Potential	mV	11/01/2016	N001	172.1			#		
pH	s.u.	11/01/2016	N001	7.64			#		
Potassium	mg/L	11/01/2016	N001	58			#	0.26	
Selenium	mg/L	11/01/2016	N001	0.0082			#	0.00066	
Sodium	mg/L	11/01/2016	N001	830			#	0.23	
Specific Conductance	umhos/cm	11/01/2016	N001	5621		J	#		
Sulfate	mg/L	11/01/2016	N001	2900			#	25	
Temperature	C	11/01/2016	N001	15.13			#		
Turbidity	NTU	11/01/2016	N001	9.67			#		
Uranium	mg/L	11/01/2016	N001	0.13			#	0.000012	
Vanadium	mg/L	11/01/2016	N001	0.58			#	0.00058	

Surface Water Quality Data by Location (USEE102) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 12/19/2016

Location: 0453 SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID		Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	11/01/2016	N001	78			#		
Ammonia Total as N	mg/L	11/01/2016	N001	3.1			#	0.1	
Arsenic	mg/L	11/01/2016	N001	0.013			#	0.00012	
Calcium	mg/L	11/01/2016	N001	610			#	0.12	
Chloride	mg/L	11/01/2016	N001	440			#	8	
Magnesium	mg/L	11/01/2016	N001	59			#	0.15	
Molybdenum	mg/L	11/01/2016	N001	3.1			#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	11/01/2016	N001	27			#	0.5	
Oxidation Reduction Potential	mV	11/01/2016	N001	193.4			#		
pH	s.u.	11/01/2016	N001	7.87			#		
Potassium	mg/L	11/01/2016	N001	33			#	0.26	
Selenium	mg/L	11/01/2016	N001	0.012			#	0.00066	
Sodium	mg/L	11/01/2016	N001	480			#	0.23	
Specific Conductance	umhos/cm	11/01/2016	N001	4261		J	#		
Sulfate	mg/L	11/01/2016	N001	2100			#	20	
Temperature	C	11/01/2016	N001	15.55			#		
Turbidity	NTU	11/01/2016	N001	9.41			#		
Uranium	mg/L	11/01/2016	N001	0.064			#	0.000012	
Vanadium	mg/L	11/01/2016	N001	1			#	0.00058	

Surface Water Quality Data by Location (USEE102) FOR SITE RFN01, Rifle New Processing Site

REPORT DATE: 12/19/2016

Location: 0575 SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers		Detection Limit	Uncertainty
		Date	ID		Lab	Data QA		
Alkalinity, Total (as CaCO ₃)	mg/L	11/01/2016	N001	96		#		
Ammonia Total as N	mg/L	11/01/2016	N001	1.1		#	0.1	
Arsenic	mg/L	11/01/2016	N001	0.0019		#	0.00012	
Calcium	mg/L	11/01/2016	N001	500		#	0.12	
Chloride	mg/L	11/01/2016	N001	680		#	20	
Magnesium	mg/L	11/01/2016	N001	300		#	0.15	
Molybdenum	mg/L	11/01/2016	N001	0.97		#	0.00032	
Nitrate + Nitrite as Nitrogen	mg/L	11/01/2016	N001	0.12		#	0.01	
Oxidation Reduction Potential	mV	11/01/2016	N001	110.5		#		
pH	s.u.	11/01/2016	N001	8.56		#		
Potassium	mg/L	11/01/2016	N001	80		#	0.26	
Selenium	mg/L	11/01/2016	N001	0.00066	U	#	0.00066	
Sodium	mg/L	11/01/2016	N001	1400		#	0.23	
Specific Conductance	umhos/cm	11/01/2016	N001	7674		J #		
Sulfate	mg/L	11/01/2016	N001	4800		#	50	
Temperature	C	11/01/2016	N001	17.34		#		
Turbidity	NTU	11/01/2016	N001	8.08		#		
Uranium	mg/L	11/01/2016	N001	0.15		#	0.000012	
Vanadium	mg/L	11/01/2016	N001	0.0022	J	#	0.00058	

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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Groundwater Quality Data

Old Rifle

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Groundwater Quality Data by Location (USEE100) FOR SITE RFO01, Rifle Old Processing Site

REPORT DATE: 12/19/2016

Location: 0292A WELL

Parameter	Units	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	11/01/2016	N001	10.5	-	20.5	498		F	#		
Calcium	mg/L	11/01/2016	N001	10.5	-	20.5	190		F	#	0.024	
Chloride	mg/L	11/01/2016	N001	10.5	-	20.5	100		F	#	2	
Magnesium	mg/L	11/01/2016	N001	10.5	-	20.5	110		F	#	0.03	
Nitrate + Nitrite as Nitrogen	mg/L	11/01/2016	N001	10.5	-	20.5	0.01	U	F	#	0.01	
Oxidation Reduction Potential	mV	11/01/2016	N001	10.5	-	20.5	-73		F	#		
pH	s.u.	11/01/2016	N001	10.5	-	20.5	7.37		JF	#		
Potassium	mg/L	11/01/2016	N001	10.5	-	20.5	5.9		F	#	0.052	
Selenium	mg/L	11/01/2016	N001	10.5	-	20.5	0.00066	U	F	#	0.00066	
Sodium	mg/L	11/01/2016	N001	10.5	-	20.5	240		F	#	0.047	
Specific Conductance	umhos/cm	11/01/2016	N001	10.5	-	20.5	2440		F	#		
Sulfate	mg/L	11/01/2016	N001	10.5	-	20.5	930		F	#	5	
Temperature	C	11/01/2016	N001	10.5	-	20.5	14.23		F	#		
Turbidity	NTU	11/01/2016	N001	10.5	-	20.5	1.49		F	#		
Uranium	mg/L	11/01/2016	N001	10.5	-	20.5	0.037		F	#	0.000012	
Vanadium	mg/L	11/01/2016	N001	10.5	-	20.5	0.00058	U	F	#	0.00058	

Groundwater Quality Data by Location (USEE100) FOR SITE RFO01, Rifle Old Processing Site

REPORT DATE: 12/19/2016

Location: 0304 WELL

Parameter	Units	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	10/31/2016	N001	13.2	-	18.2	364		F	#		
Calcium	mg/L	10/31/2016	N001	13.2	-	18.2	260		F	#	0.024	
Chloride	mg/L	10/31/2016	N001	13.2	-	18.2	240		F	#	4	
Magnesium	mg/L	10/31/2016	N001	13.2	-	18.2	100		F	#	0.03	
Nitrate + Nitrite as Nitrogen	mg/L	10/31/2016	N001	13.2	-	18.2	0.01	U	F	#	0.01	
Oxidation Reduction Potential	mV	10/31/2016	N001	13.2	-	18.2	-6		F	#		
pH	s.u.	10/31/2016	N001	13.2	-	18.2	7.07		F	#		
Potassium	mg/L	10/31/2016	N001	13.2	-	18.2	7.7		F	#	0.052	
Selenium	mg/L	10/31/2016	N001	13.2	-	18.2	0.0018		F	#	0.00066	
Sodium	mg/L	10/31/2016	N001	13.2	-	18.2	180		F	#	0.047	
Specific Conductance	umhos/cm	10/31/2016	N001	13.2	-	18.2	2533		F	#		
Sulfate	mg/L	10/31/2016	N001	13.2	-	18.2	470		F	#	10	
Temperature	C	10/31/2016	N001	13.2	-	18.2	15.41		F	#		
Turbidity	NTU	10/31/2016	N001	13.2	-	18.2	8.8		F	#		
Uranium	mg/L	10/31/2016	N001	13.2	-	18.2	0.058		F	#	0.000012	
Vanadium	mg/L	10/31/2016	N001	13.2	-	18.2	0.032		F	#	0.00058	

Groundwater Quality Data by Location (USEE100) FOR SITE RFO01, Rifle Old Processing Site

REPORT DATE: 12/19/2016

Location: 0305 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
								Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	10/31/2016	N001	13.76	-	18.76	380		F	#		
Calcium	mg/L	10/31/2016	N001	13.76	-	18.76	190		F	#	0.024	
Chloride	mg/L	10/31/2016	N001	13.76	-	18.76	340		F	#	5	
Magnesium	mg/L	10/31/2016	N001	13.76	-	18.76	76		F	#	0.03	
Nitrate + Nitrite as Nitrogen	mg/L	10/31/2016	N001	13.76	-	18.76	0.01	U	F	#	0.01	
Oxidation Reduction Potential	mV	10/31/2016	N001	13.76	-	18.76	29.4		F	#		
pH	s.u.	10/31/2016	N001	13.76	-	18.76	7.06		F	#		
Potassium	mg/L	10/31/2016	N001	13.76	-	18.76	7.7		F	#	0.052	
Selenium	mg/L	10/31/2016	N001	13.76	-	18.76	0.016		F	#	0.00066	
Sodium	mg/L	10/31/2016	N001	13.76	-	18.76	200		F	#	0.047	
Specific Conductance	umhos/cm	10/31/2016	N001	13.76	-	18.76	2182		F	#		
Sulfate	mg/L	10/31/2016	N001	13.76	-	18.76	640		F	#	12	
Temperature	C	10/31/2016	N001	13.76	-	18.76	16.29		F	#		
Turbidity	NTU	10/31/2016	N001	13.76	-	18.76	2.62		F	#		
Uranium	mg/L	10/31/2016	N001	13.76	-	18.76	0.074		F	#	0.000012	
Vanadium	mg/L	10/31/2016	N001	13.76	-	18.76	0.3		F	#	0.00058	

Groundwater Quality Data by Location (USEE100) FOR SITE RFO01, Rifle Old Processing Site

REPORT DATE: 12/19/2016

Location: 0309 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	10/31/2016	N001	16.93	- 21.93	376		F	#		
Calcium	mg/L	10/31/2016	N001	16.93	- 21.93	170		F	#	0.024	
Chloride	mg/L	10/31/2016	N001	16.93	- 21.93	140		F	#	5	
Magnesium	mg/L	10/31/2016	N001	16.93	- 21.93	120		F	#	0.03	
Nitrate + Nitrite as Nitrogen	mg/L	10/31/2016	N001	16.93	- 21.93	0.01	U	F	#	0.01	
Oxidation Reduction Potential	mV	10/31/2016	N001	16.93	- 21.93	-53		F	#		
pH	s.u.	10/31/2016	N001	16.93	- 21.93	7.14		F	#		
Potassium	mg/L	10/31/2016	N001	16.93	- 21.93	7.1		F	#	0.052	
Selenium	mg/L	10/31/2016	N001	16.93	- 21.93	0.00066	U	F	#	0.00066	
Sodium	mg/L	10/31/2016	N001	16.93	- 21.93	200		F	#	0.047	
Specific Conductance	umhos/cm	10/31/2016	N001	16.93	- 21.93	2310		F	#		
Sulfate	mg/L	10/31/2016	N001	16.93	- 21.93	790		F	#	12	
Temperature	C	10/31/2016	N001	16.93	- 21.93	16.3		F	#		
Turbidity	NTU	10/31/2016	N001	16.93	- 21.93	4.22		F	#		
Uranium	mg/L	10/31/2016	N001	16.93	- 21.93	0.02		F	#	0.000012	
Vanadium	mg/L	10/31/2016	N001	16.93	- 21.93	0.00058	U	F	#	0.00058	

Groundwater Quality Data by Location (USEE100) FOR SITE RFO01, Rifle Old Processing Site

REPORT DATE: 12/19/2016

Location: 0310 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)		Result	Qualifiers			Detection Limit	Uncertainty
							Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	10/31/2016	N001	17.93	- 22.93	465		F	#		
Calcium	mg/L	10/31/2016	N001	17.93	- 22.93	230		F	#	0.024	
Calcium	mg/L	10/31/2016	N002	17.93	- 22.93	230		F	#	0.024	
Chloride	mg/L	10/31/2016	N001	17.93	- 22.93	210		F	#	5	
Chloride	mg/L	10/31/2016	N002	17.93	- 22.93	200		F	#	5	
Magnesium	mg/L	10/31/2016	N001	17.93	- 22.93	110		F	#	0.03	
Magnesium	mg/L	10/31/2016	N002	17.93	- 22.93	110		F	#	0.03	
Nitrate + Nitrite as Nitrogen	mg/L	10/31/2016	N001	17.93	- 22.93	0.01	U	F	#	0.01	
Nitrate + Nitrite as Nitrogen	mg/L	10/31/2016	N002	17.93	- 22.93	0.01	U	F	#	0.01	
Oxidation Reduction Potential	mV	10/31/2016	N001	17.93	- 22.93	-55		F	#		
pH	s.u.	10/31/2016	N001	17.93	- 22.93	7.15		F	#		
Potassium	mg/L	10/31/2016	N001	17.93	- 22.93	9.7		F	#	0.052	
Potassium	mg/L	10/31/2016	N002	17.93	- 22.93	9.7		F	#	0.052	
Selenium	mg/L	10/31/2016	N001	17.93	- 22.93	0.00066	U	F	#	0.00066	
Selenium	mg/L	10/31/2016	N002	17.93	- 22.93	0.00066	U	F	#	0.00066	
Sodium	mg/L	10/31/2016	N001	17.93	- 22.93	240		F	#	0.047	
Sodium	mg/L	10/31/2016	N002	17.93	- 22.93	240		F	#	0.047	
Specific Conductance	umhos/cm	10/31/2016	N001	17.93	- 22.93	2668		F	#		

Groundwater Quality Data by Location (USEE100) FOR SITE RFO01, Rifle Old Processing Site

REPORT DATE: 12/19/2016

Location: 0310 WELL

Parameter	Units	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data	QA		
Sulfate	mg/L	10/31/2016	N001	17.93	-	22.93	810		F	#	12	
Sulfate	mg/L	10/31/2016	N002	17.93	-	22.93	780		F	#	12	
Temperature	C	10/31/2016	N001	17.93	-	22.93	16.2		F	#		
Turbidity	NTU	10/31/2016	N001	17.93	-	22.93	1.3		F	#		
Uranium	mg/L	10/31/2016	N001	17.93	-	22.93	0.15		F	#	0.000012	
Uranium	mg/L	10/31/2016	N002	17.93	-	22.93	0.15		F	#	0.000012	
Vanadium	mg/L	10/31/2016	N001	17.93	-	22.93	0.0079		F	#	0.00058	
Vanadium	mg/L	10/31/2016	N002	17.93	-	22.93	0.008		F	#	0.00058	

Groundwater Quality Data by Location (USEE100) FOR SITE RFO01, Rifle Old Processing Site

REPORT DATE: 12/19/2016

Location: 0655 WELL

Parameter	Units	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	10/31/2016	N001	13.6	-	23.6	476		F	#		
Calcium	mg/L	10/31/2016	N001	13.6	-	23.6	210		F	#	0.024	
Chloride	mg/L	10/31/2016	N001	13.6	-	23.6	160		F	#	5	
Magnesium	mg/L	10/31/2016	N001	13.6	-	23.6	140		F	#	0.03	
Nitrate + Nitrite as Nitrogen	mg/L	10/31/2016	N001	13.6	-	23.6	2.2		F	#	0.1	
Oxidation Reduction Potential	mV	10/31/2016	N001	13.6	-	23.6	-65		F	#		
pH	s.u.	10/31/2016	N001	13.6	-	23.6	7.03		F	#		
Potassium	mg/L	10/31/2016	N001	13.6	-	23.6	8.6		F	#	0.052	
Selenium	mg/L	10/31/2016	N001	13.6	-	23.6	0.059		F	#	0.00066	
Sodium	mg/L	10/31/2016	N001	13.6	-	23.6	220		F	#	0.047	
Specific Conductance	umhos/cm	10/31/2016	N001	13.6	-	23.6	2603		F	#		
Sulfate	mg/L	10/31/2016	N001	13.6	-	23.6	810		F	#	12	
Temperature	C	10/31/2016	N001	13.6	-	23.6	15.23		F	#		
Turbidity	NTU	10/31/2016	N001	13.6	-	23.6	1.09		F	#		
Uranium	mg/L	10/31/2016	N001	13.6	-	23.6	0.11		F	#	0.000012	
Vanadium	mg/L	10/31/2016	N001	13.6	-	23.6	0.3		F	#	0.00058	

Groundwater Quality Data by Location (USEE100) FOR SITE RFO01, Rifle Old Processing Site

REPORT DATE: 12/19/2016

Location: 0656 WELL

Parameter	Units	Sample Date	Sample ID	Depth Range (Ft BLS)			Result	Qualifiers			Detection Limit	Uncertainty
								Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	10/31/2016	N001	6.35	-	21.35	320		F	#		
Calcium	mg/L	10/31/2016	N001	6.35	-	21.35	170		F	#	0.024	
Chloride	mg/L	10/31/2016	N001	6.35	-	21.35	360		F	#	4	
Magnesium	mg/L	10/31/2016	N001	6.35	-	21.35	86		F	#	0.03	
Nitrate + Nitrite as Nitrogen	mg/L	10/31/2016	N001	6.35	-	21.35	0.29		F	#	0.01	
Oxidation Reduction Potential	mV	10/31/2016	N001	6.35	-	21.35	22		F	#		
pH	s.u.	10/31/2016	N001	6.35	-	21.35	7.12		F	#		
Potassium	mg/L	10/31/2016	N001	6.35	-	21.35	10		F	#	0.052	
Selenium	mg/L	10/31/2016	N001	6.35	-	21.35	0.0087		F	#	0.00066	
Sodium	mg/L	10/31/2016	N001	6.35	-	21.35	250		F	#	0.047	
Specific Conductance	umhos/cm	10/31/2016	N001	6.35	-	21.35	2486		F	#		
Sulfate	mg/L	10/31/2016	N001	6.35	-	21.35	510		F	#	10	
Temperature	C	10/31/2016	N001	6.35	-	21.35	19.4		F	#		
Turbidity	NTU	10/31/2016	N001	6.35	-	21.35	3.86		F	#		
Uranium	mg/L	10/31/2016	N001	6.35	-	21.35	0.22		F	#	0.000012	
Vanadium	mg/L	10/31/2016	N001	6.35	-	21.35	0.026		F	#	0.00058	

Groundwater Quality Data by Location (USEE100) FOR SITE RFO01, Rifle Old Processing Site

REPORT DATE: 12/19/2016

Location: 0658 WELL

Parameter	Units	Sample		Depth Range			Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID	(Ft BLS)				Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	11/01/2016	N001	2.3	-	17.3	575		F	#		
Calcium	mg/L	11/01/2016	N001	2.3	-	17.3	160		F	#	0.024	
Chloride	mg/L	11/01/2016	N001	2.3	-	17.3	27		F	#	2.5	
Magnesium	mg/L	11/01/2016	N001	2.3	-	17.3	89		F	#	0.03	
Nitrate + Nitrite as Nitrogen	mg/L	11/01/2016	N001	2.3	-	17.3	0.01	U	F	#	0.01	
Oxidation Reduction Potential	mV	11/01/2016	N001	2.3	-	17.3	-62		F	#		
pH	s.u.	11/01/2016	N001	2.3	-	17.3	7.29		F	#		
Potassium	mg/L	11/01/2016	N001	2.3	-	17.3	3.2		F	#	0.052	
Selenium	mg/L	11/01/2016	N001	2.3	-	17.3	0.00066	U	F	#	0.00066	
Sodium	mg/L	11/01/2016	N001	2.3	-	17.3	74		F	#	0.047	
Specific Conductance	umhos/cm	11/01/2016	N001	2.3	-	17.3	1510		F	#		
Sulfate	mg/L	11/01/2016	N001	2.3	-	17.3	380		F	#	6.2	
Temperature	C	11/01/2016	N001	2.3	-	17.3	12.4		F	#		
Turbidity	NTU	11/01/2016	N001	2.3	-	17.3	2.98		F	#		
Uranium	mg/L	11/01/2016	N001	2.3	-	17.3	0.0088		F	#	0.000012	
Vanadium	mg/L	11/01/2016	N001	2.3	-	17.3	0.00065	J	F	#	0.00058	

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.

Surface Water Quality Data

Old Rifle

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Surface Water Quality Data by Location (USEE102) FOR SITE RFO01, Rifle Old Processing Site

REPORT DATE: 12/19/2016

Location: 0294 SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID		Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	10/31/2016	N001	110			#		
Calcium	mg/L	10/31/2016	N001	69			#	0.024	
Chloride	mg/L	10/31/2016	N001	180			#	2	
Magnesium	mg/L	10/31/2016	N001	14			#	0.03	
Nitrate + Nitrite as Nitrogen	mg/L	10/31/2016	N001	0.01	U		#	0.01	
Oxidation Reduction Potential	mV	10/31/2016	N001	56			#		
pH	s.u.	10/31/2016	N001	7.67			#		
Potassium	mg/L	10/31/2016	N001	4.1			#	0.052	
Selenium	mg/L	10/31/2016	N001	0.00066	U		#	0.00066	
Sodium	mg/L	10/31/2016	N001	130			#	0.047	
Specific Conductance	umhos/cm	10/31/2016	N001	1010			#		
Sulfate	mg/L	10/31/2016	N001	110			#	5	
Temperature	C	10/31/2016	N001	16.3			#		
Turbidity	NTU	10/31/2016	N001	2.45			#		
Uranium	mg/L	10/31/2016	N001	0.0021			#	0.000012	
Vanadium	mg/L	10/31/2016	N001	0.00061	J		#	0.00058	

Surface Water Quality Data by Location (USEE102) FOR SITE RFO01, Rifle Old Processing Site

REPORT DATE: 12/19/2016

Location: 0395 SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID		Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	11/01/2016	N001	325			#		
Calcium	mg/L	11/01/2016	N001	150			#	0.024	
Chloride	mg/L	11/01/2016	N001	78			#	4	
Magnesium	mg/L	11/01/2016	N001	110			#	0.03	
Nitrate + Nitrite as Nitrogen	mg/L	11/01/2016	N001	0.01	U		#	0.01	
Oxidation Reduction Potential	mV	11/01/2016	N001	43			#		
pH	s.u.	11/01/2016	N001	7.92			#		
Potassium	mg/L	11/01/2016	N001	5.4			#	0.052	
Selenium	mg/L	11/01/2016	N001	0.00066	U		#	0.00066	
Sodium	mg/L	11/01/2016	N001	90			#	0.047	
Specific Conductance	umhos/cm	11/01/2016	N001	1710			#		
Sulfate	mg/L	11/01/2016	N001	550			#	10	
Temperature	C	11/01/2016	N001	12.48			#		
Turbidity	NTU	11/01/2016	N001	5.34			#		
Uranium	mg/L	11/01/2016	N001	0.015			#	0.000012	
Vanadium	mg/L	11/01/2016	N001	0.00083	J		#	0.00058	

Surface Water Quality Data by Location (USEE102) FOR SITE RFO01, Rifle Old Processing Site

REPORT DATE: 12/19/2016

Location: 0396 SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID		Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	11/02/2016	N001	146			#		
Calcium	mg/L	11/02/2016	N001	71			#	0.024	
Chloride	mg/L	11/02/2016	N001	190			#	2	
Magnesium	mg/L	11/02/2016	N001	15			#	0.03	
Nitrate + Nitrite as Nitrogen	mg/L	11/02/2016	N001	0.01	U		#	0.01	
Oxidation Reduction Potential	mV	11/02/2016	N001	183.2			#		
pH	s.u.	11/02/2016	N001	6.86			#		
Potassium	mg/L	11/02/2016	N001	4.1			#	0.052	
Selenium	mg/L	11/02/2016	N001	0.00066	U		#	0.00066	
Sodium	mg/L	11/02/2016	N001	130			#	0.047	
Specific Conductance	umhos/cm	11/02/2016	N001	1018		J	#		
Sulfate	mg/L	11/02/2016	N001	110			#	5	
Temperature	C	11/02/2016	N001	9.63			#		
Turbidity	NTU	11/02/2016	N001	4.81			#		
Uranium	mg/L	11/02/2016	N001	0.0022			#	0.000012	
Vanadium	mg/L	11/02/2016	N001	0.00058	U		#	0.00058	

Surface Water Quality Data by Location (USEE102) FOR SITE RFO01, Rifle Old Processing Site

REPORT DATE: 12/19/2016

Location: 0398 SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID		Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	10/31/2016	N001	226			#		
Calcium	mg/L	10/31/2016	N001	120			#	0.024	
Chloride	mg/L	10/31/2016	N001	130			#	2.5	
Magnesium	mg/L	10/31/2016	N001	46			#	0.03	
Nitrate + Nitrite as Nitrogen	mg/L	10/31/2016	N001	0.34			#	0.01	
Oxidation Reduction Potential	mV	10/31/2016	N001	-17			#		
pH	s.u.	10/31/2016	N001	8.04			#		
Potassium	mg/L	10/31/2016	N001	3.6			#	0.052	
Selenium	mg/L	10/31/2016	N001	0.0019			#	0.00066	
Sodium	mg/L	10/31/2016	N001	130			#	0.047	
Specific Conductance	umhos/cm	10/31/2016	N001	1428			#		
Sulfate	mg/L	10/31/2016	N001	300			#	6.2	
Temperature	C	10/31/2016	N001	15.15			#		
Turbidity	NTU	10/31/2016	N001	2.26			#		
Uranium	mg/L	10/31/2016	N001	0.013			#	0.000012	
Vanadium	mg/L	10/31/2016	N001	0.0025	J		#	0.00058	

Surface Water Quality Data by Location (USEE102) FOR SITE RFO01, Rifle Old Processing Site

REPORT DATE: 12/19/2016

Location: 0741 SURFACE LOCATION

Parameter	Units	Sample		Result	Qualifiers			Detection Limit	Uncertainty
		Date	ID		Lab	Data	QA		
Alkalinity, Total (as CaCO ₃)	mg/L	11/02/2016	N001	130			#		
Calcium	mg/L	11/02/2016	N001	69			#	0.024	
Chloride	mg/L	11/02/2016	N001	190			#	4	
Magnesium	mg/L	11/02/2016	N001	14			#	0.03	
Nitrate + Nitrite as Nitrogen	mg/L	11/02/2016	N001	0.01	U		#	0.01	
Oxidation Reduction Potential	mV	11/02/2016	N001	176.6			#		
pH	s.u.	11/02/2016	N001	7.65			#		
Potassium	mg/L	11/02/2016	N001	4			#	0.052	
Selenium	mg/L	11/02/2016	N001	0.00066	U		#	0.00066	
Sodium	mg/L	11/02/2016	N001	130			#	0.047	
Specific Conductance	umhos/cm	11/02/2016	N001	971		J	#		
Sulfate	mg/L	11/02/2016	N001	110			#	10	
Temperature	C	11/02/2016	N001	9.65			#		
Turbidity	NTU	11/02/2016	N001	2.35			#		
Uranium	mg/L	11/02/2016	N001	0.002			#	0.000012	
Vanadium	mg/L	11/02/2016	N001	0.00058	U		#	0.00058	

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.

Static Water Level Data

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STATIC WATER LEVELS (USEE700) FOR SITE RFN01, Rifle New Processing Site
REPORT DATE: 12/19/2016

Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Date	Measurement Time	Depth From Top of Casing (Ft)	Water Elevation (Ft)	Water Level Flag
0169	U	5275.47	10/31/2016	12:15:48	8.9	5266.57	
0170	D	5332.97	11/02/2016	15:45:37	94.8	5238.17	
0172	D	5229.45	11/02/2016	10:30:09	17.07	5212.38	
0195	D	5253.1	11/02/2016	14:55:48	10.52	5242.58	
0201	D	5261.07	11/02/2016	10:56:00	13.6	5247.47	
0215	O	5271.42	11/02/2016	14:15:29	10.38	5261.04	
0216	O	5265.41	10/31/2016	13:30:15	6.61	5258.8	
0217	D	5256.98	11/02/2016	13:35:18	4.7	5252.28	
0590	D	5256.37	11/01/2016	15:15:21	7.13	5249.24	
0620	D	5231.22	11/02/2016	09:40:25	10.79	5220.43	
0635	D	5256.12	11/01/2016	12:50:07	8.66	5247.46	
0658	O	5265.91	11/01/2016	10:55:23	6.33	5259.58	
0659	O	5261.33	11/01/2016	14:15:50	6.76	5254.57	
0664	O	5270.17	10/31/2016	14:45:15	12.89	5257.28	
0669	O	5266.56	11/01/2016	13:15:54	9.65	5256.91	
0670	O	5270.94	10/31/2016	13:55:24	12.43	5258.51	
0855	O	5267.24	11/01/2016	11:30:16	7.53	5259.71	

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

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

STATIC WATER LEVELS (USEE700) FOR SITE RFO01, Rifle Old Processing Site
REPORT DATE: 12/19/2016

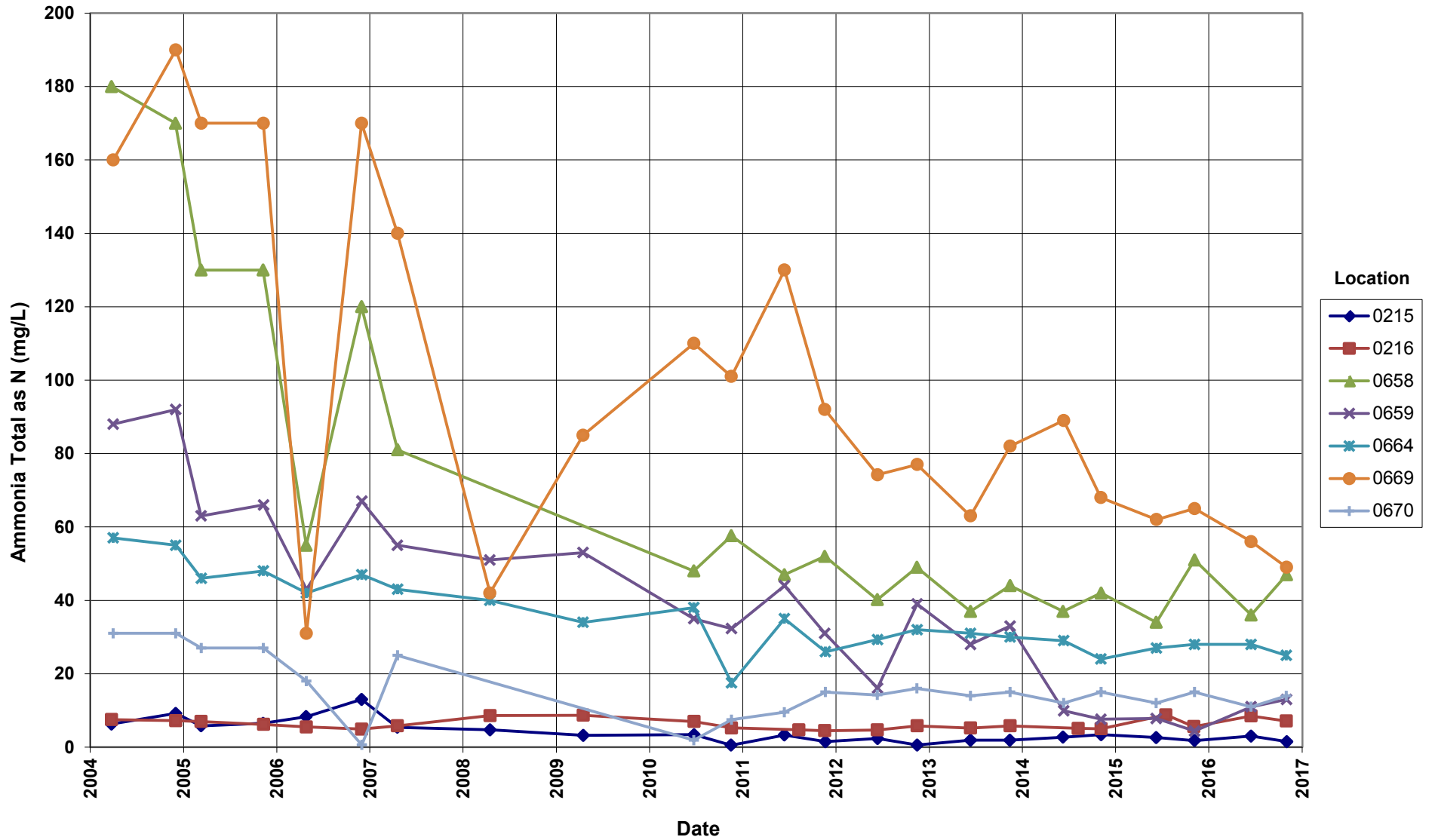
Location Code	Flow Code	Top of Casing Elevation (Ft)	Measurement Date	Measurement Time	Depth From Top of Casing (Ft)	Water Elevation (Ft)	Water Level Flag
0292A		5323.08	11/01/2016	11:05:51	11.32	5311.76	
0304	O	5310.63	10/31/2016	12:40:51	11.66	5298.97	
0305	O	5312.08	10/31/2016	12:20:04	12.48	5299.6	
0309	O	5313.37	10/31/2016	13:30:01	16.3	5297.07	
0310	O	5311.64	10/31/2016	13:00:16	14.02	5297.62	
0655	O	5312.87	10/31/2016	13:55:38	14.02	5298.85	
0656	O	5313.28	10/31/2016	14:40:54	13.71	5299.57	
0658	U	5323.07	11/01/2016	11:30:36	6.94	5316.13	

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

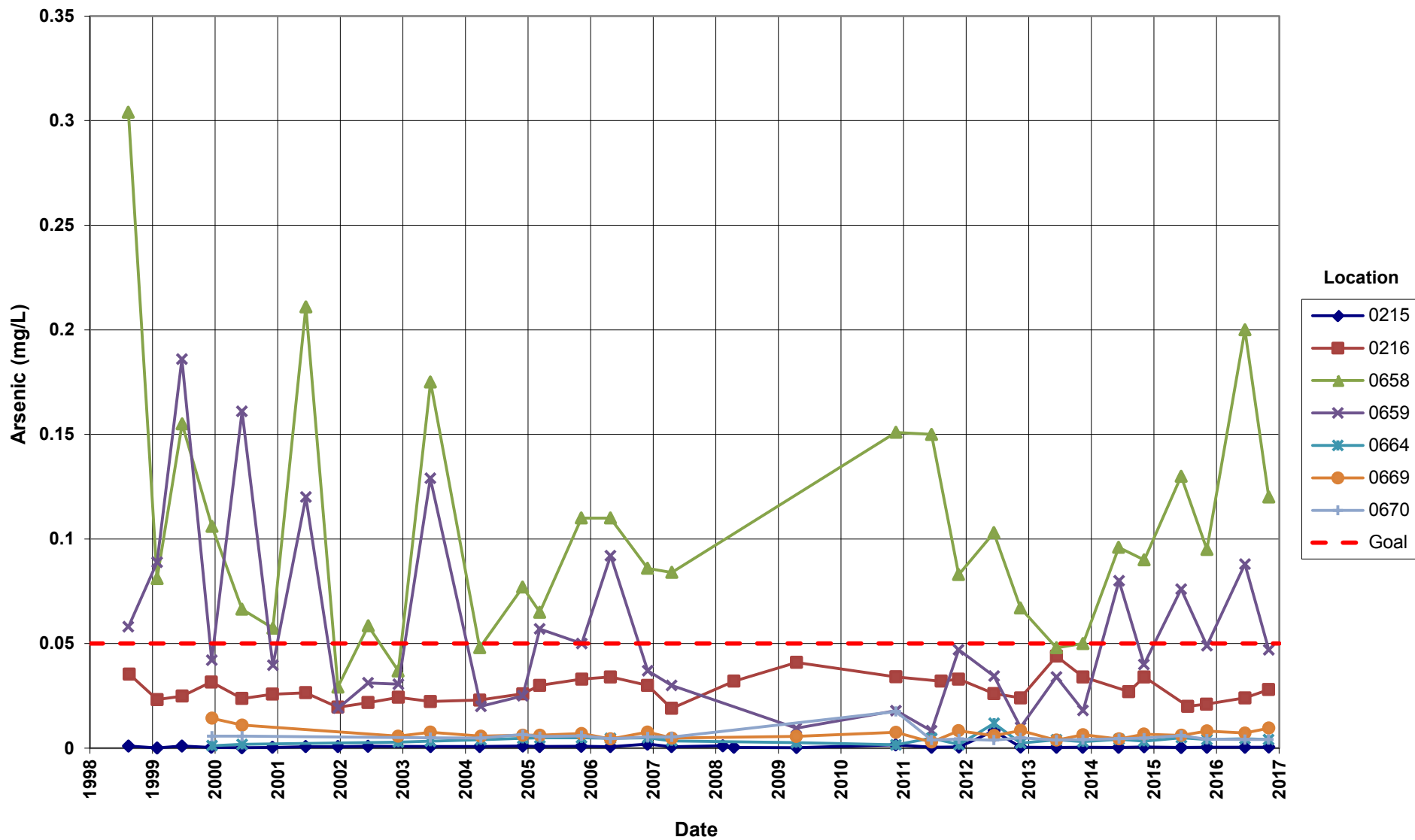
Time-Concentration Graphs
New Rifle Groundwater

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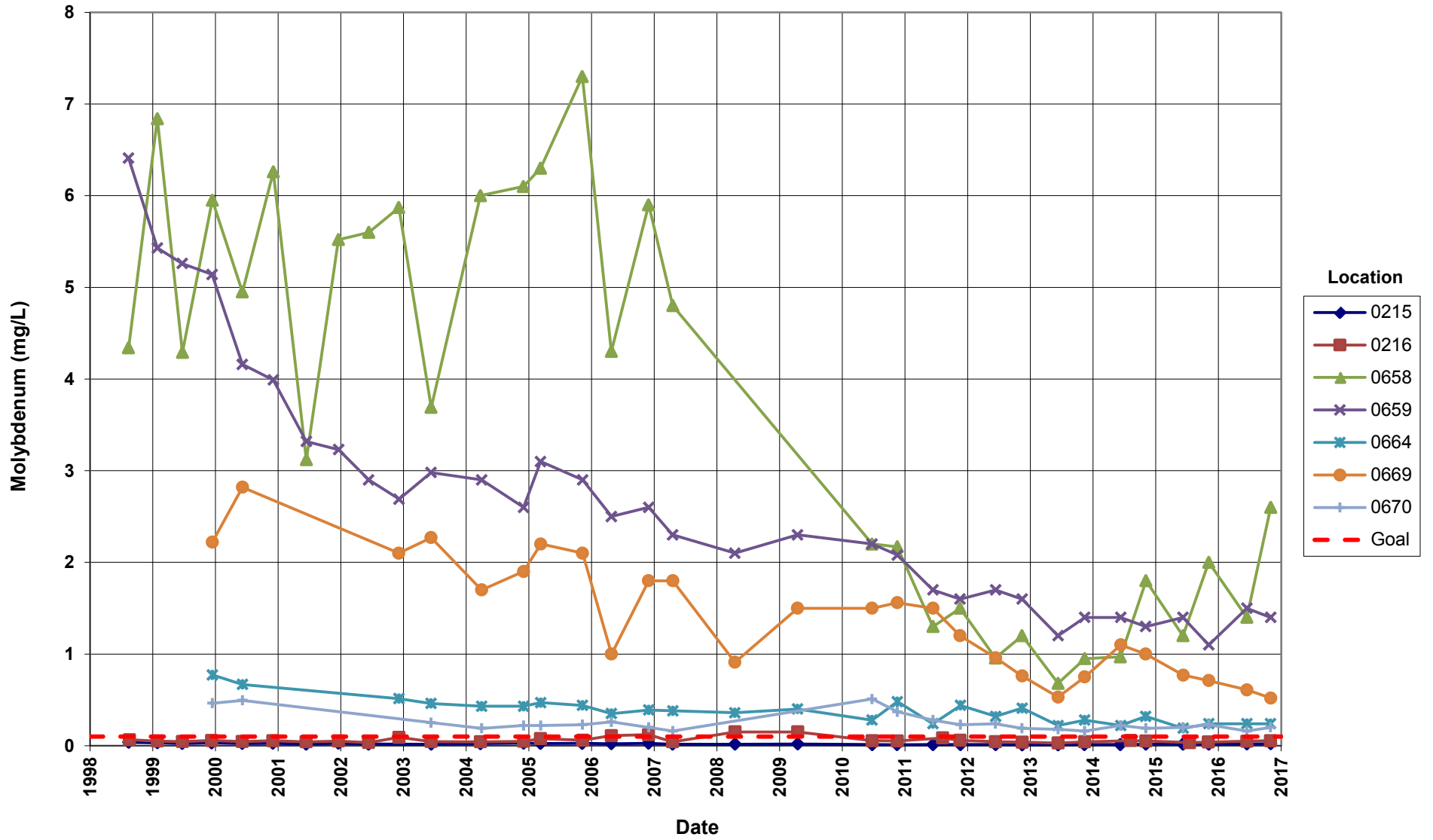
Rifle New Processing Site Ammonia Total as N Concentration On-Site Wells



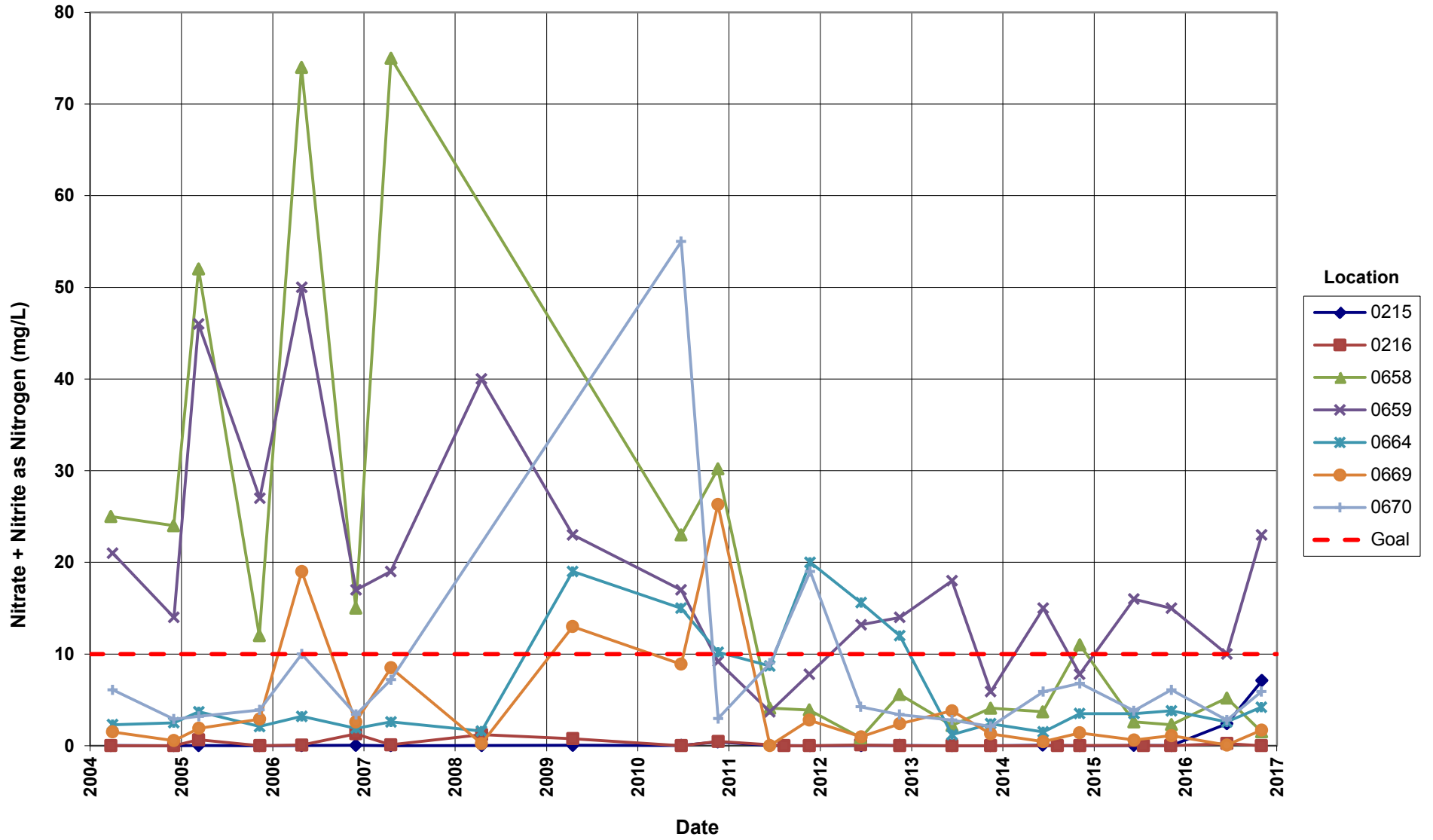
**Rifle New Processing Site
Arsenic Concentration
On-Site Wells
Remediation Goal = 0.05 mg/L**



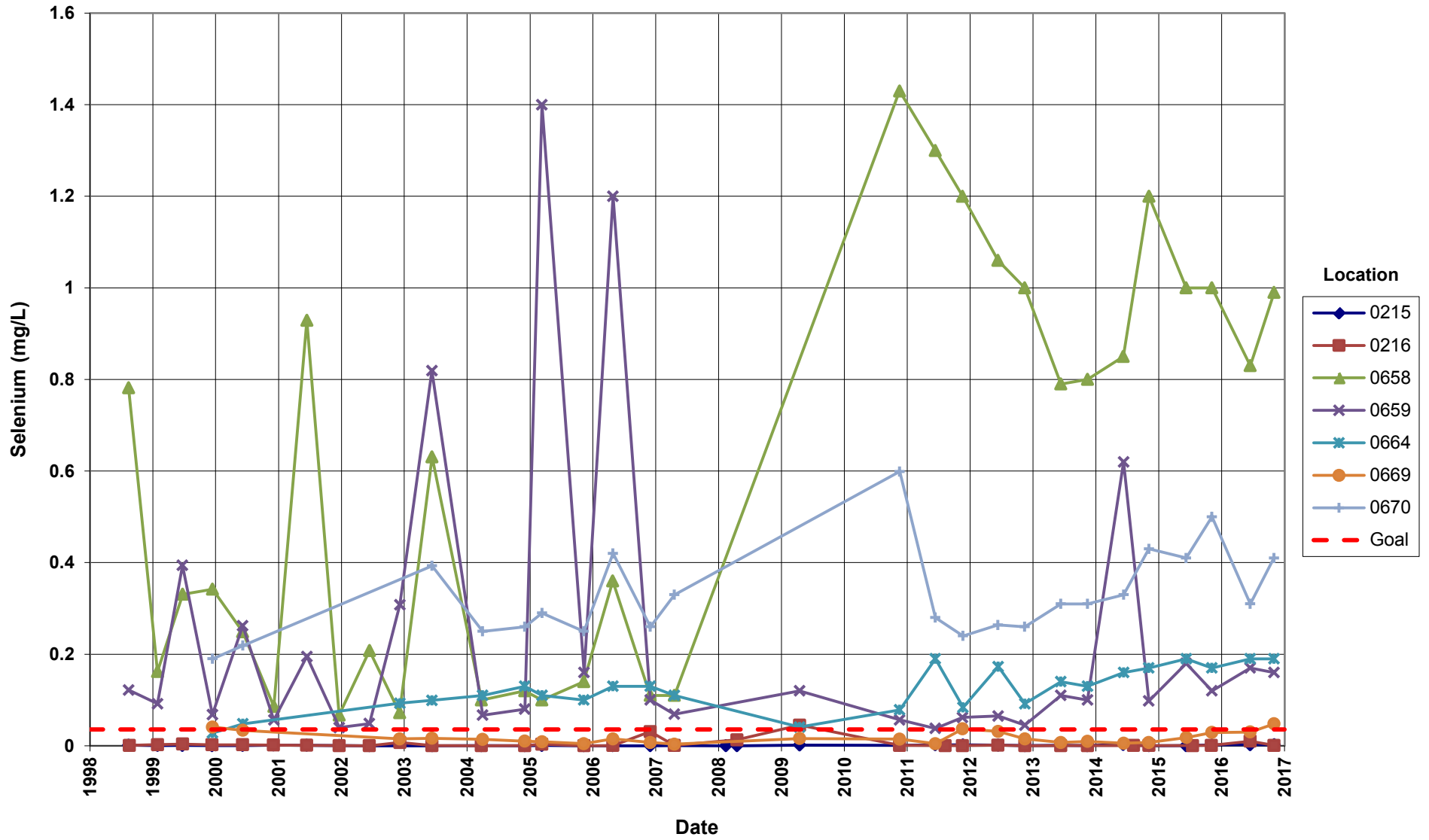
**Rifle New Processing Site
Molybdenum Concentration
On-Site Wells
Remediation Goal = 0.1 mg/L**



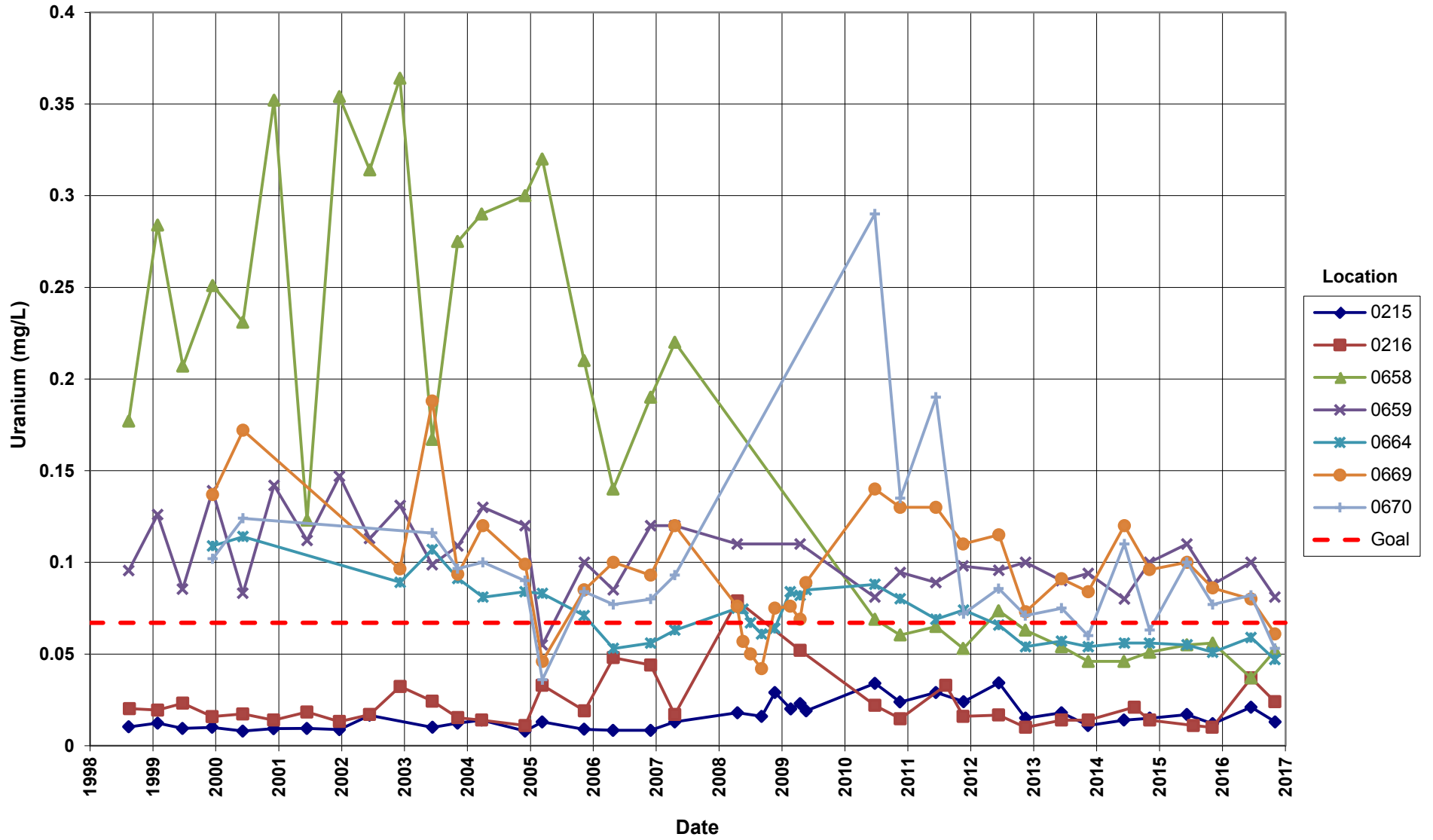
Rifle New Processing Site
Nitrate + Nitrite as Nitrogen Concentration
On-Site Wells
 Remediation Goal = 10 mg/L



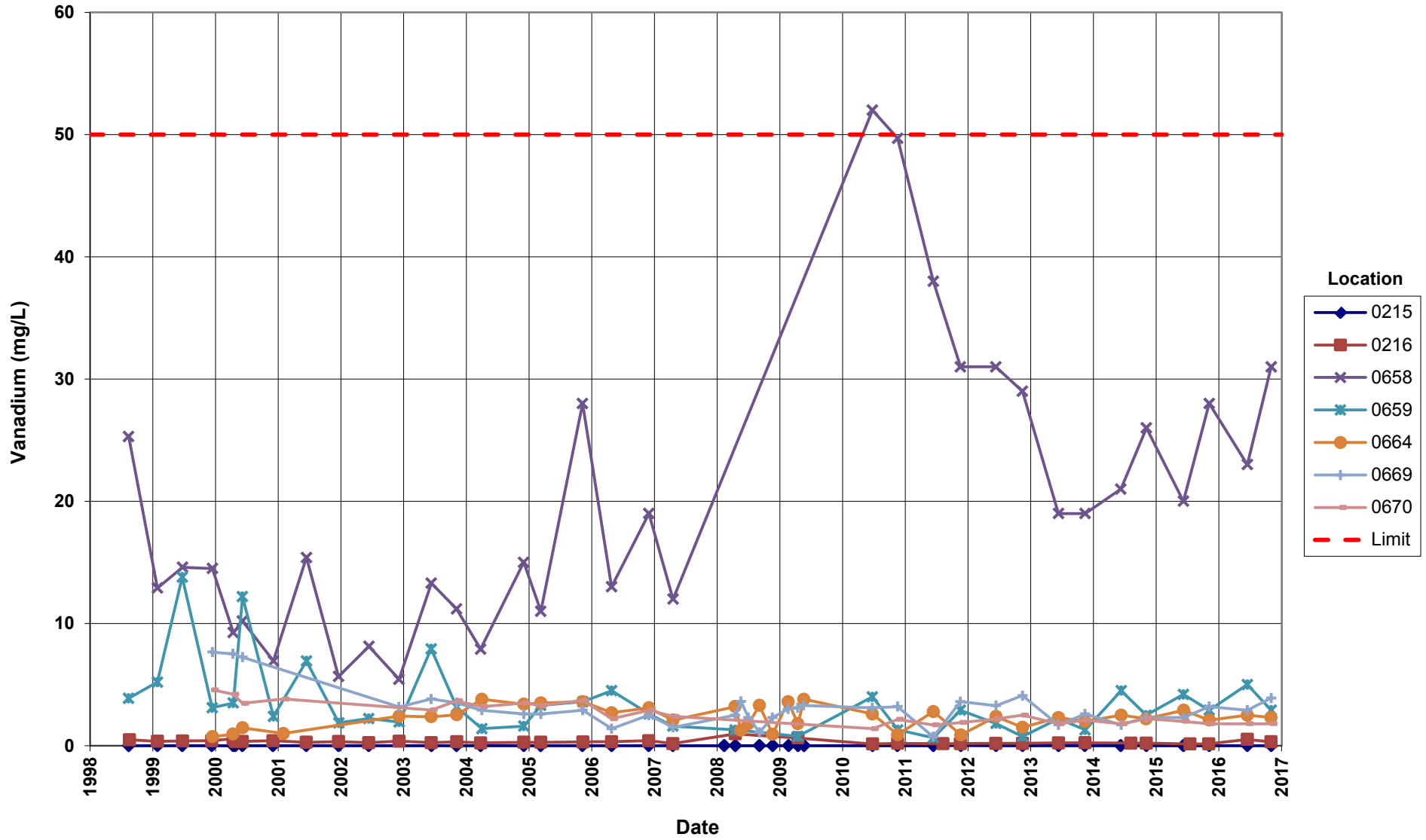
**Rifle New Processing Site
Selenium Concentration
On-Site Wells**
Remediation Goal = 0.036 mg/L



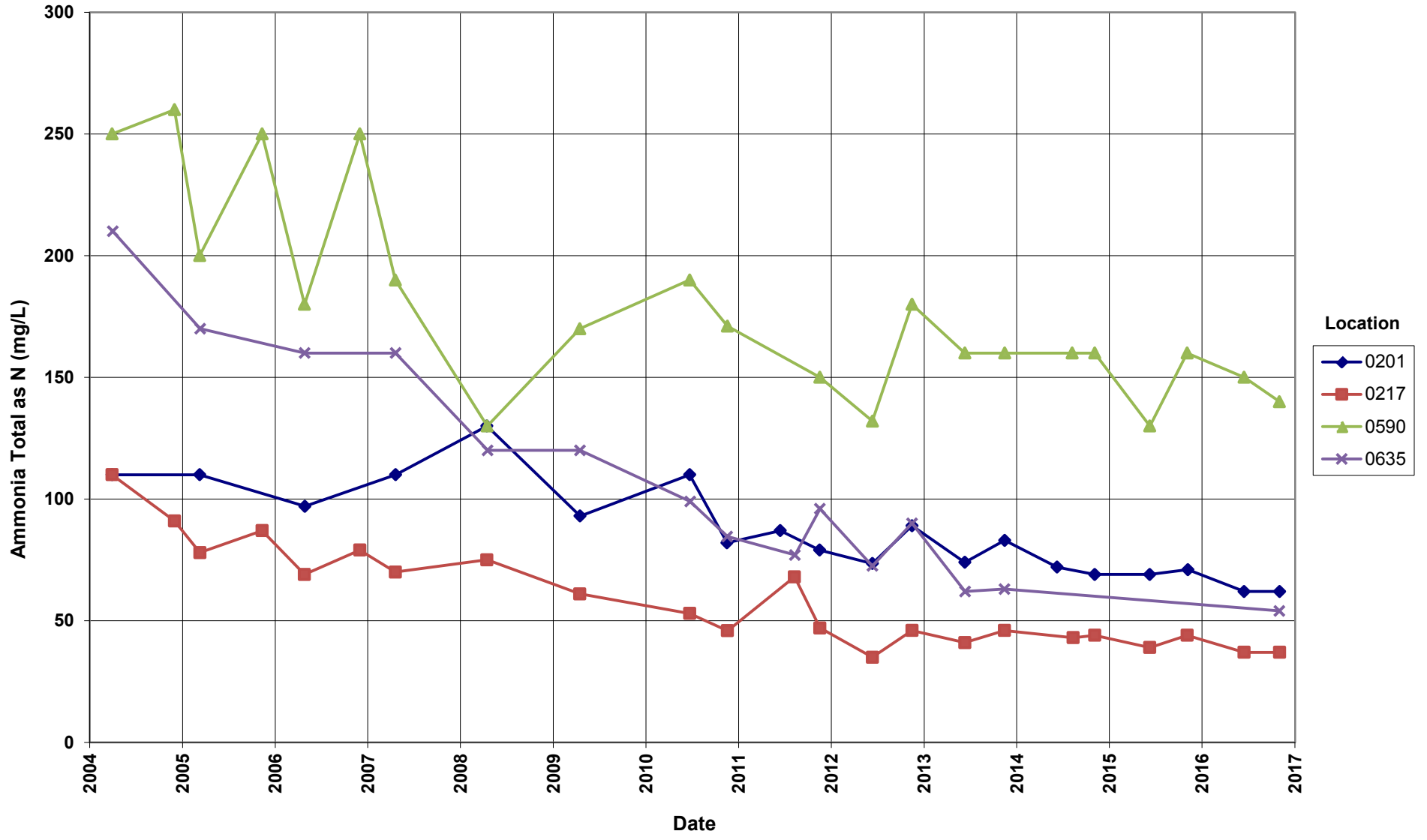
**Rifle New Processing Site
Uranium Concentration
On-Site Wells
Remediation Goal = 0.067 mg/L**



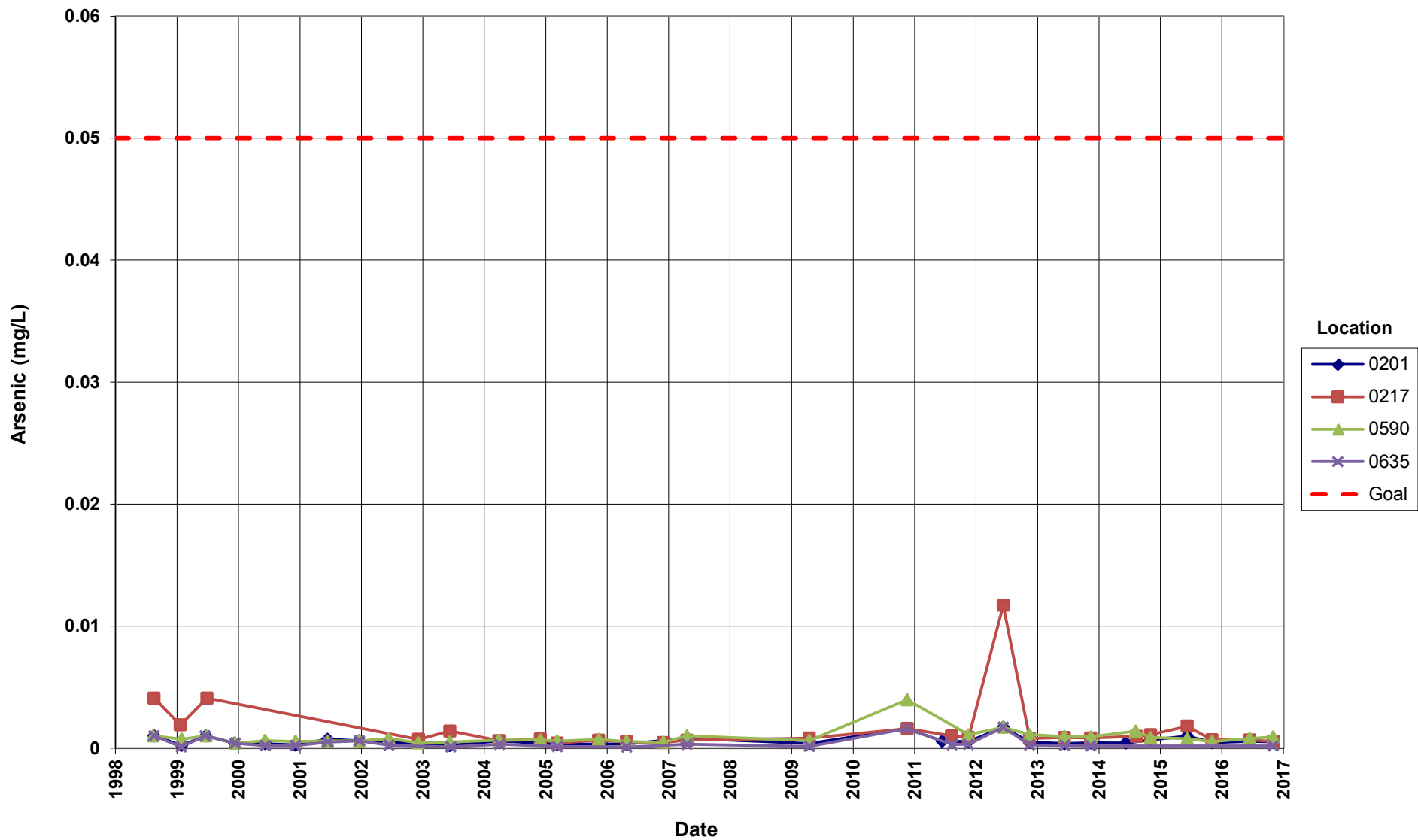
**Rifle New Processing Site
Vanadium Concentration
On-Site Wells**
Alternate Concentration Limit = 50 mg/L



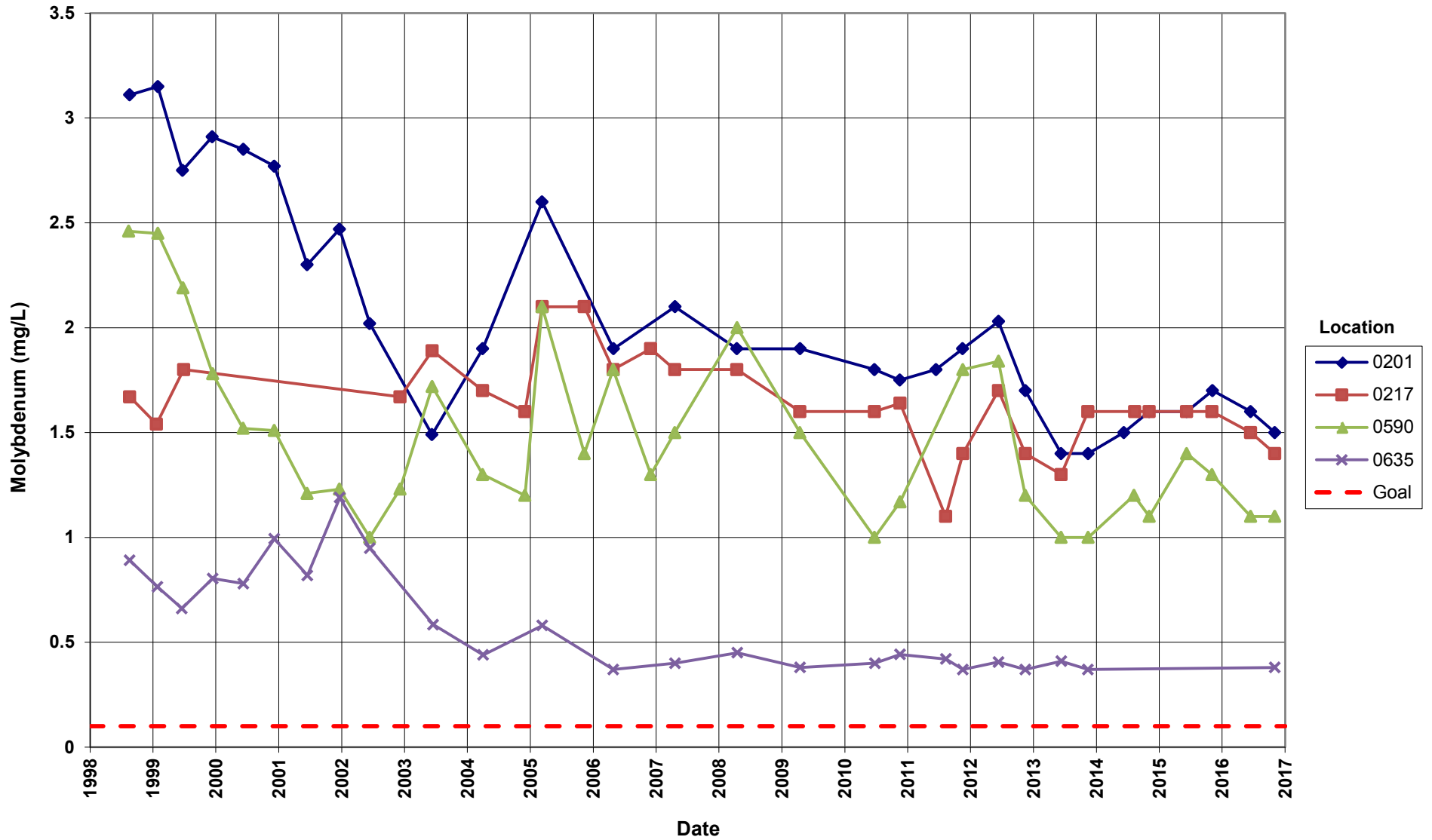
**Rifle New Processing Site
Ammonia Total as N Concentration
Adjacent to Site Wells**



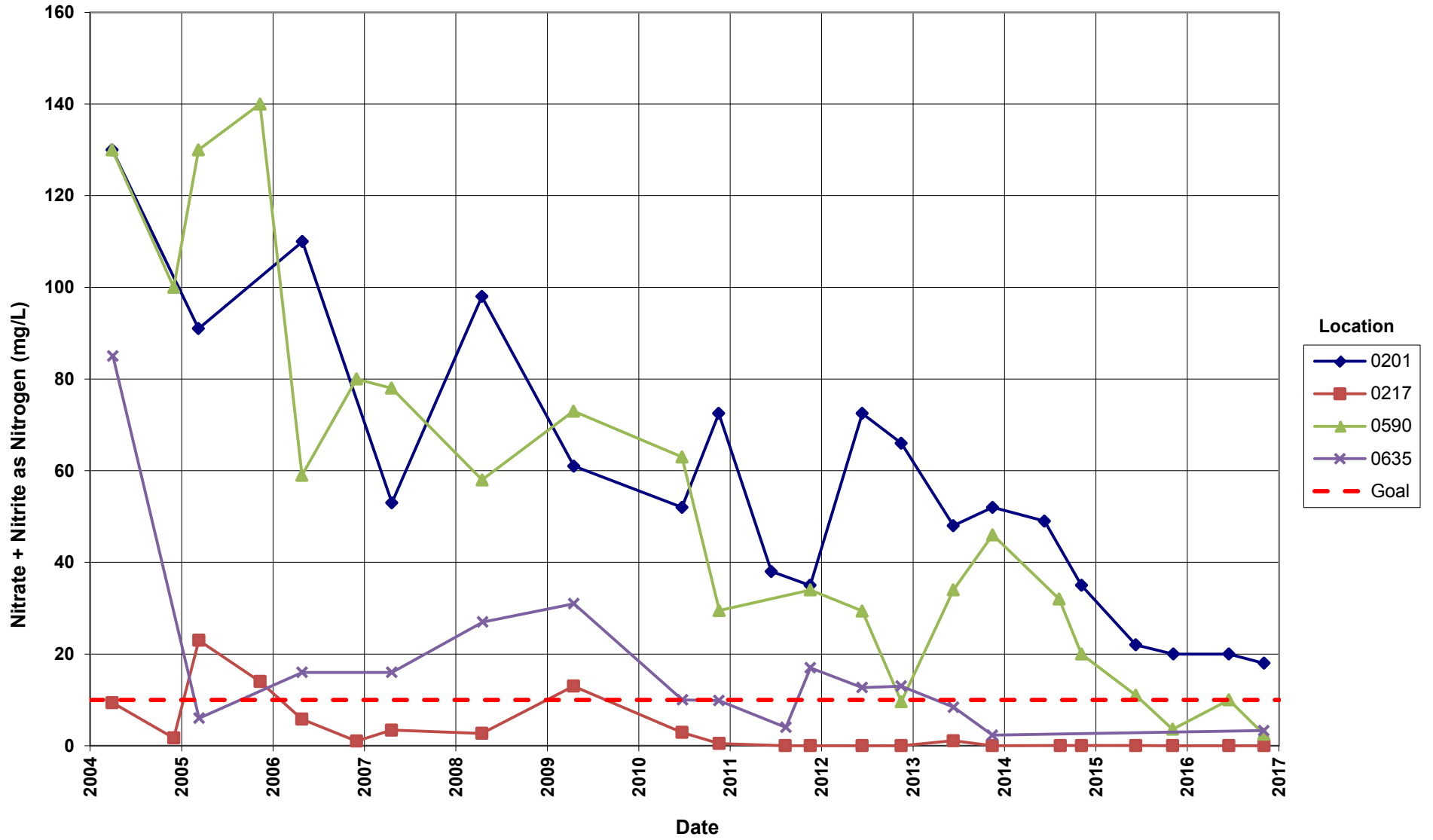
Rifle New Processing Site
Arsenic Concentration
Adjacent to Site Wells
Remediation Goal = 0.05 mg/L



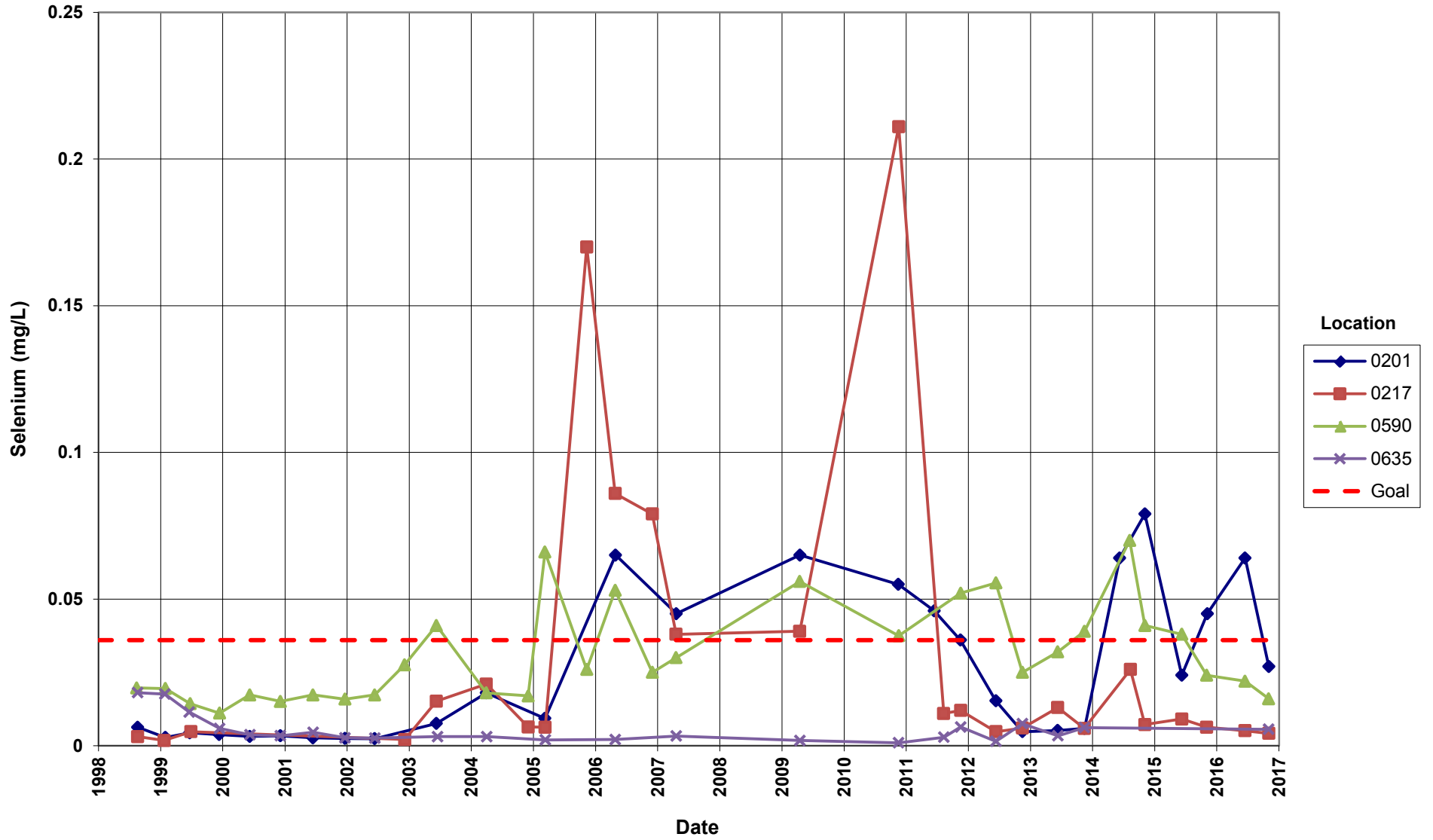
**Rifle New Processing Site
Molybdenum Concentration
Adjacent to Site Wells
Remediation Goal = 0.1 mg/L**



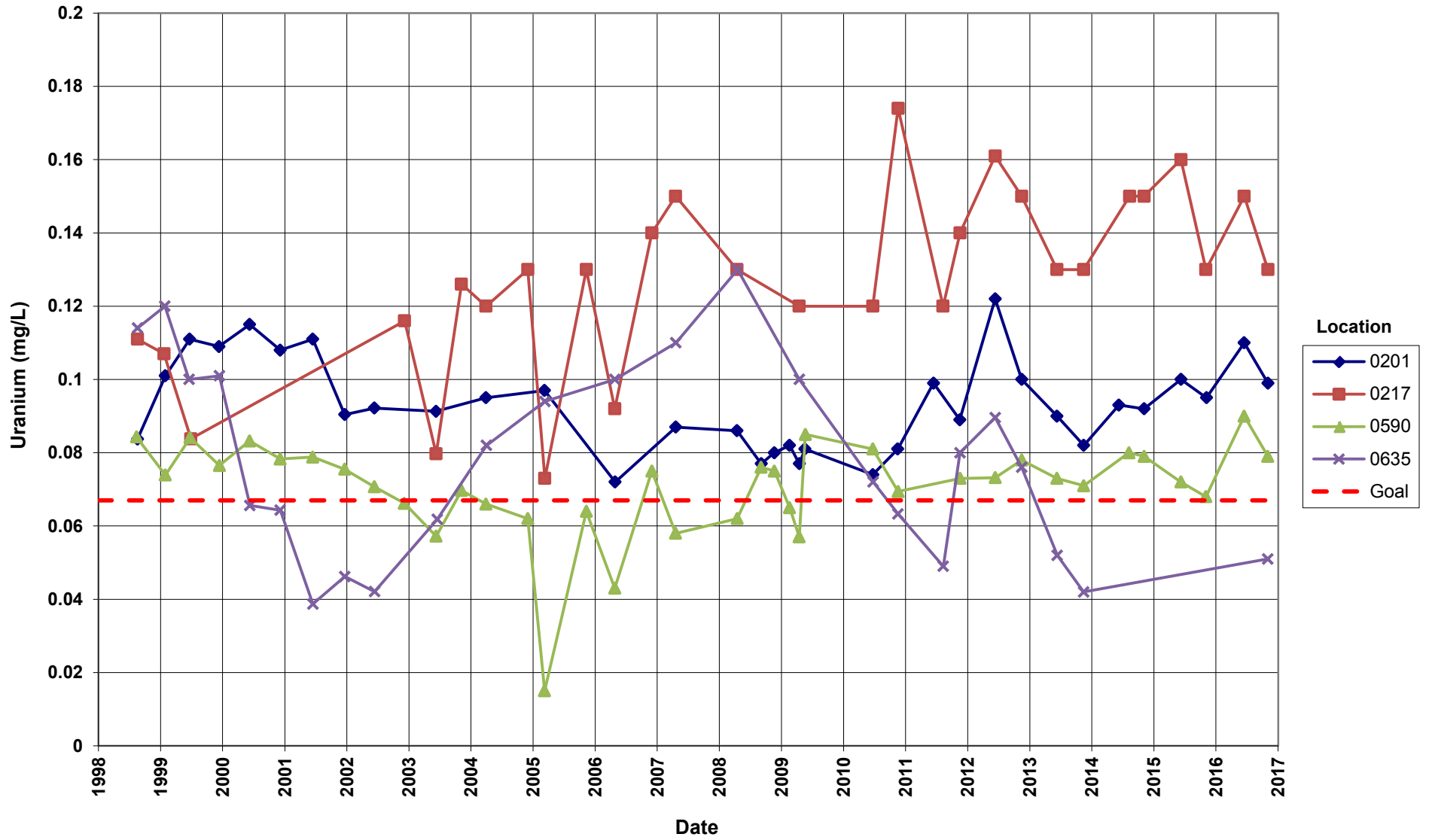
Rifle New Processing Site
Nitrate + Nitrite as Nitrogen Concentration
Adjacent to Site Wells
 Remediation Goal = 10 mg/L



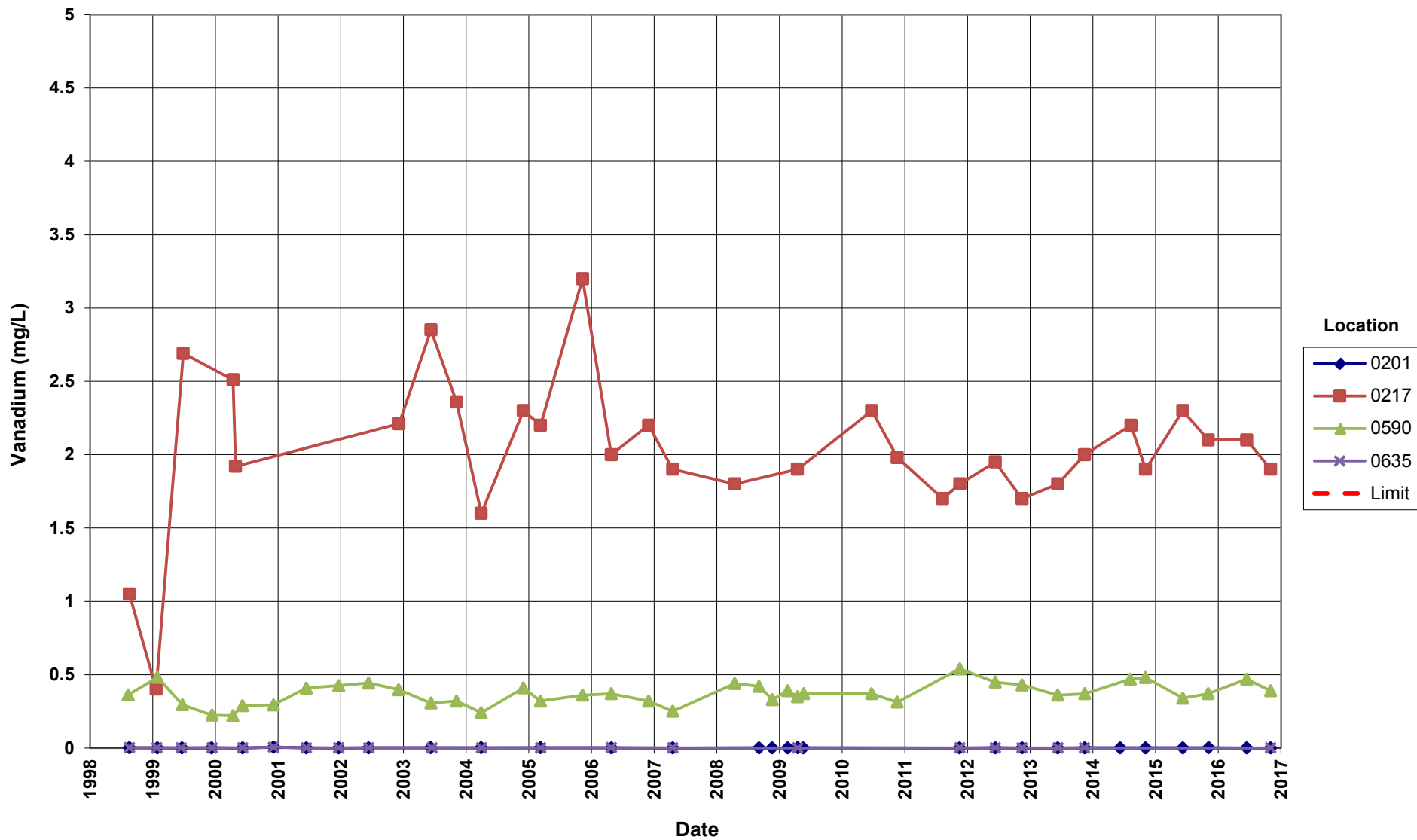
Rifle New Processing Site
Selenium Concentration
Adjacent to Site Wells
Remediation Goal = 0.036 mg/L



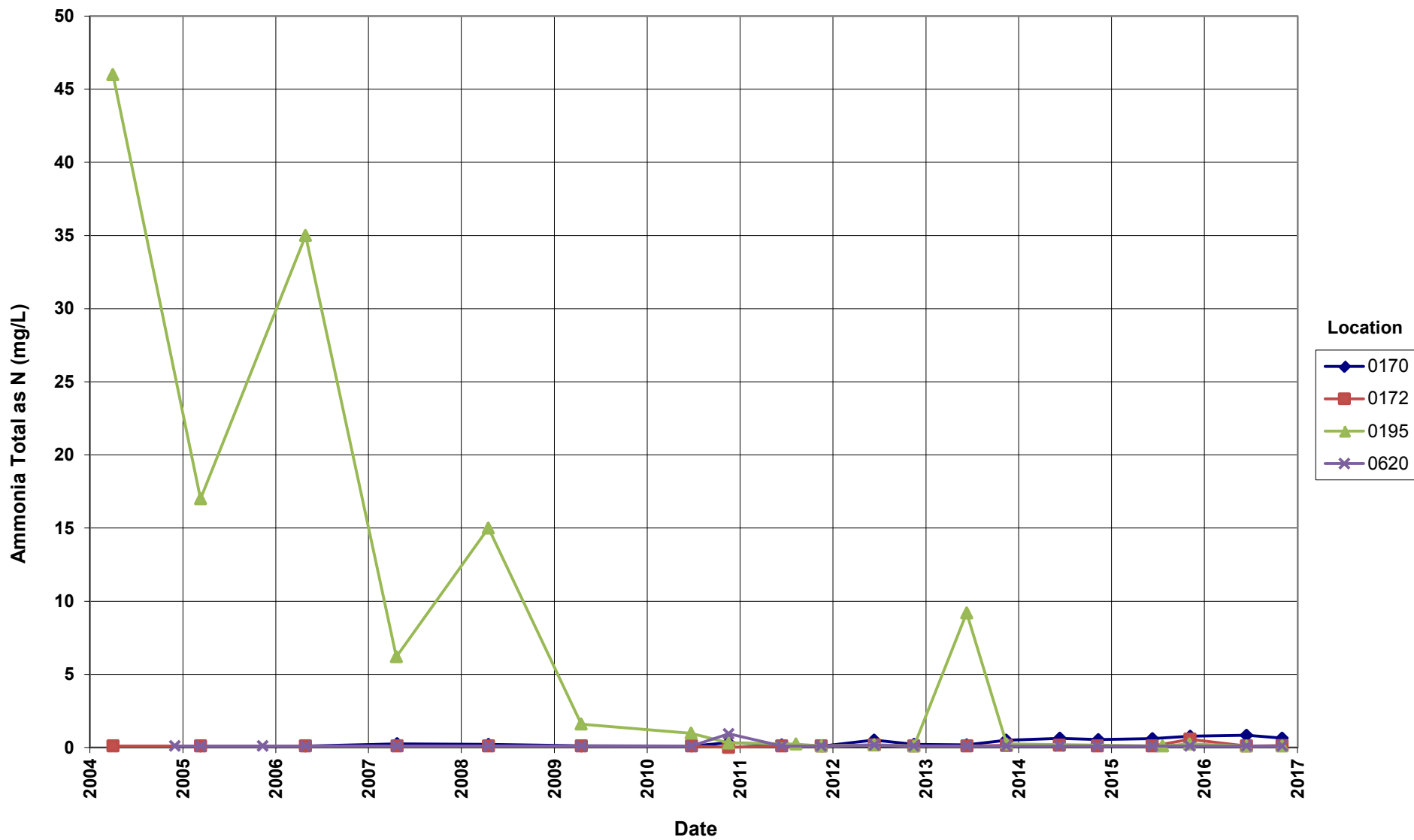
**Rifle New Processing Site
Uranium Concentration
Adjacent to Site Wells
Remediation Goal = 0.067 mg/L**



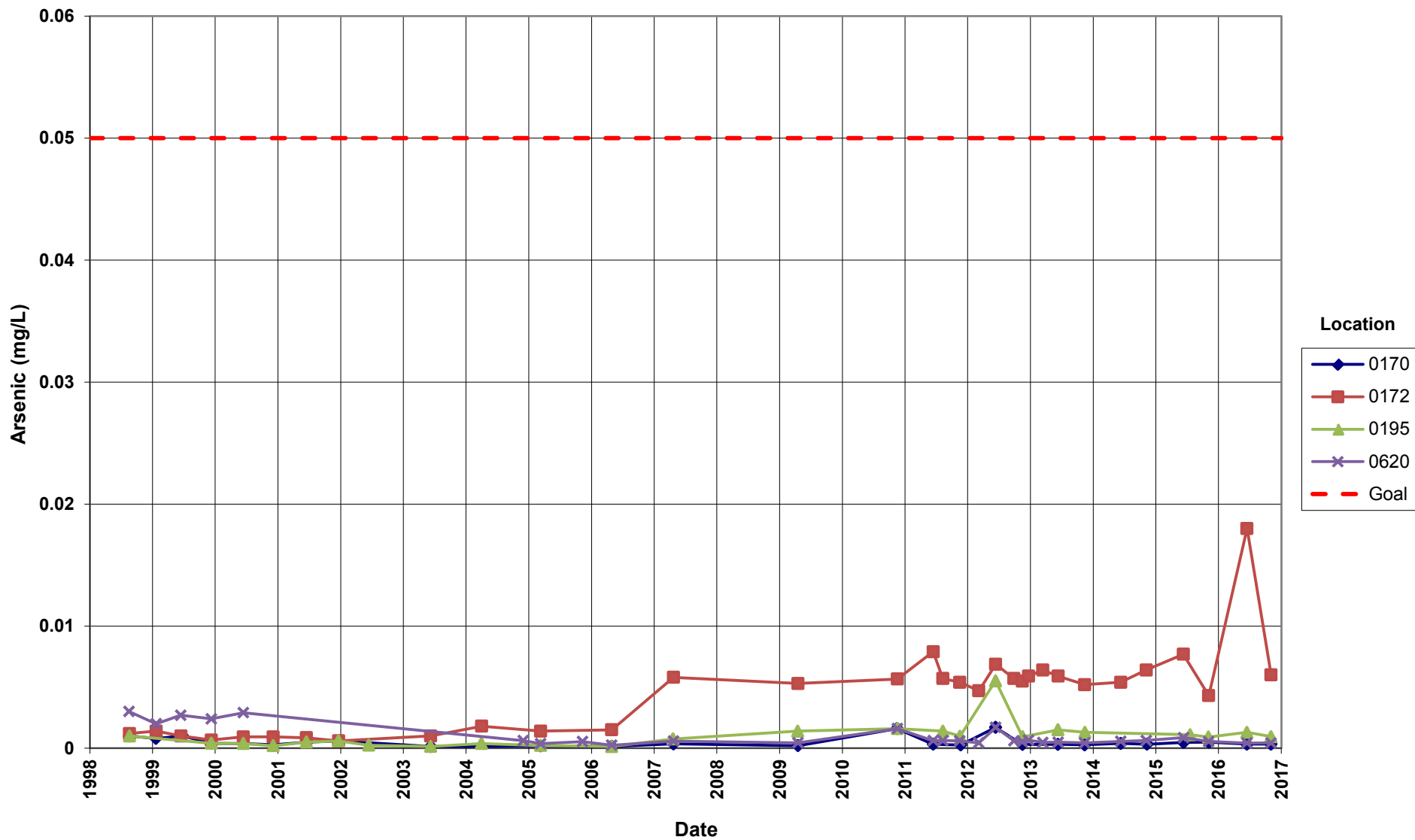
Rifle New Processing Site
Vanadium Concentration
Adjacent to Site Wells
Alternate Concentration Limit = 50 mg/L



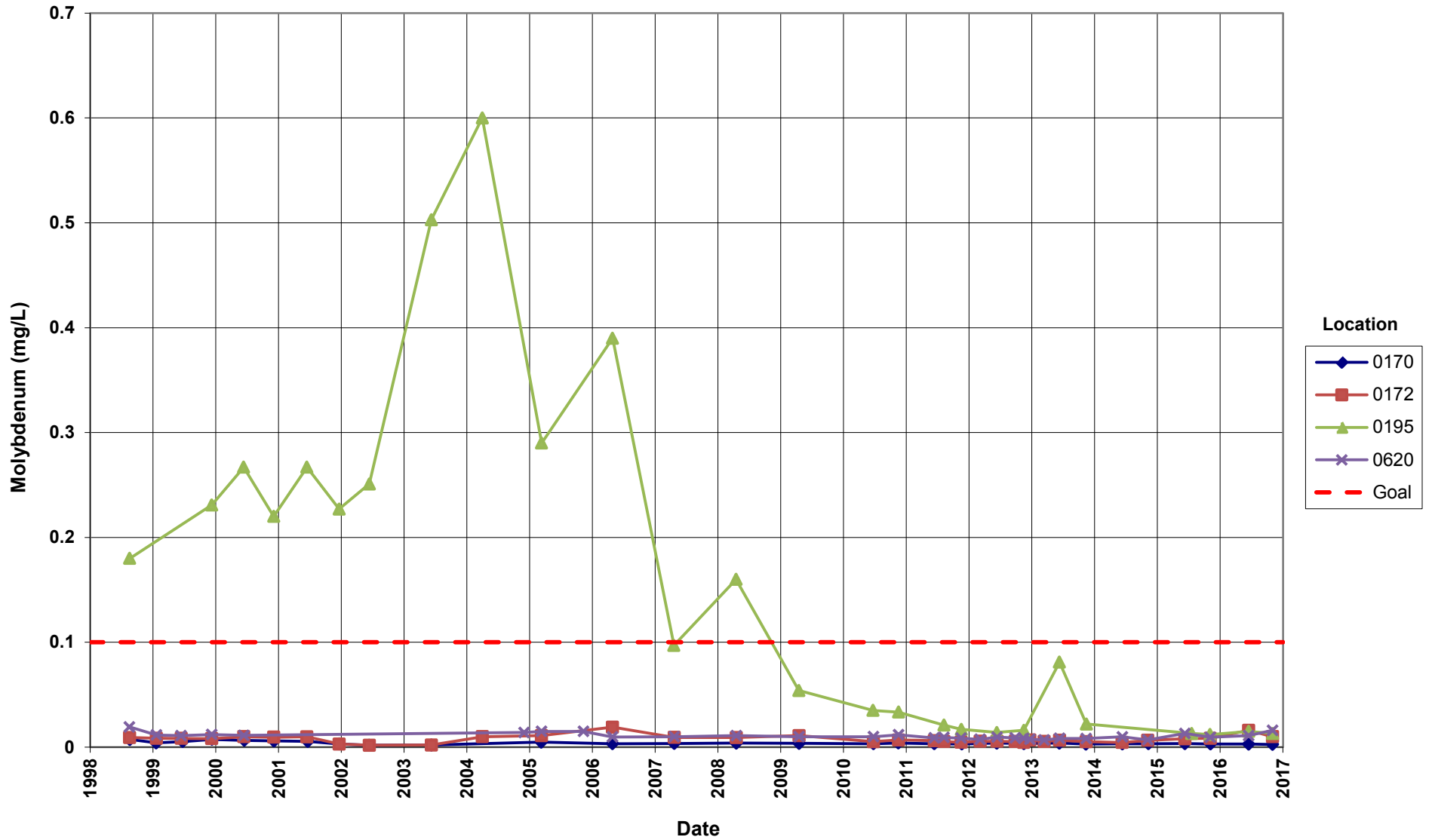
Rifle New Processing Site
Ammonia Total as N Concentration
Downgradient Wells



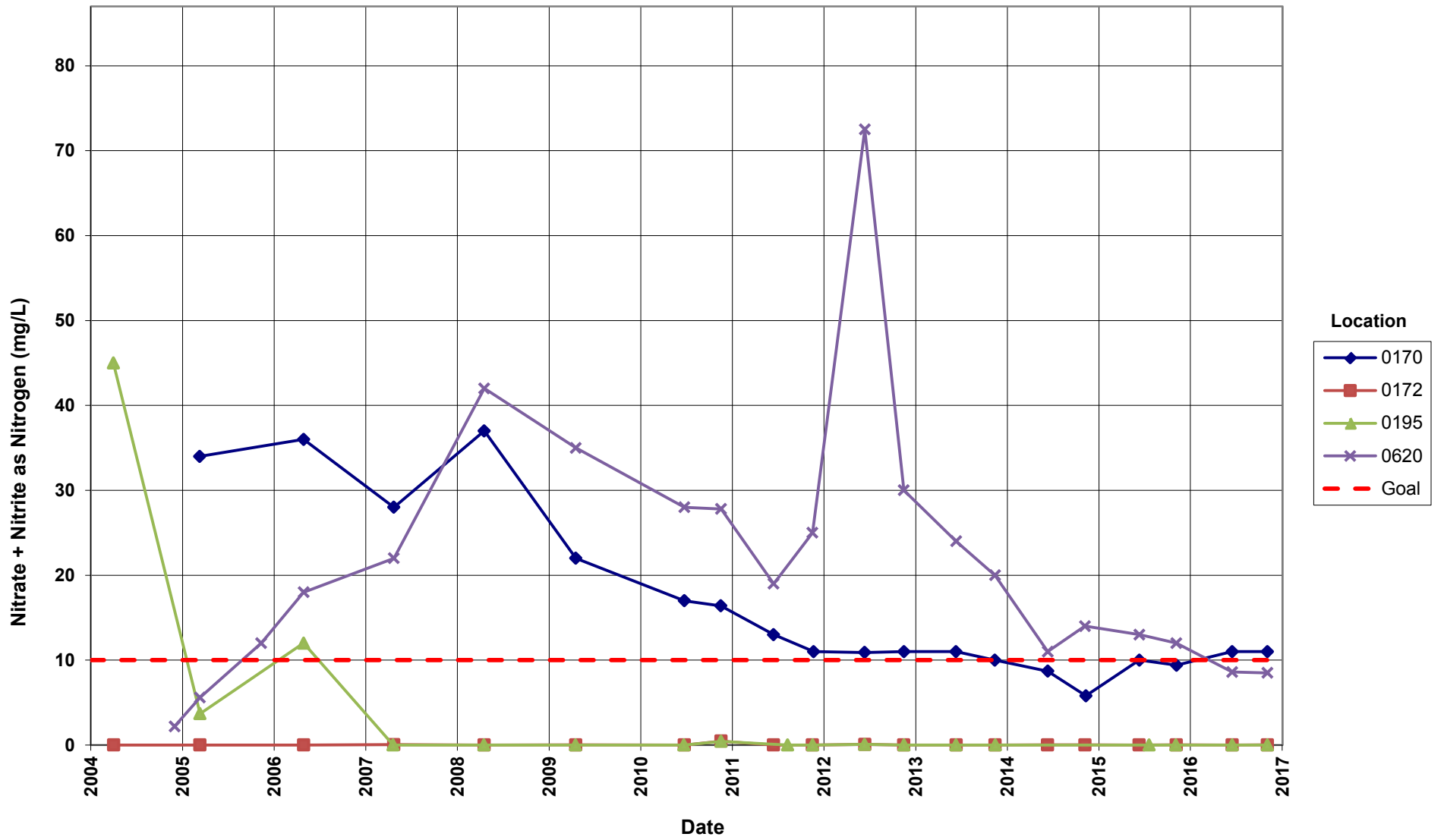
Rifle New Processing Site
Arsenic Concentration
Downgradient Wells
Remediation Goal = 0.05 mg/L



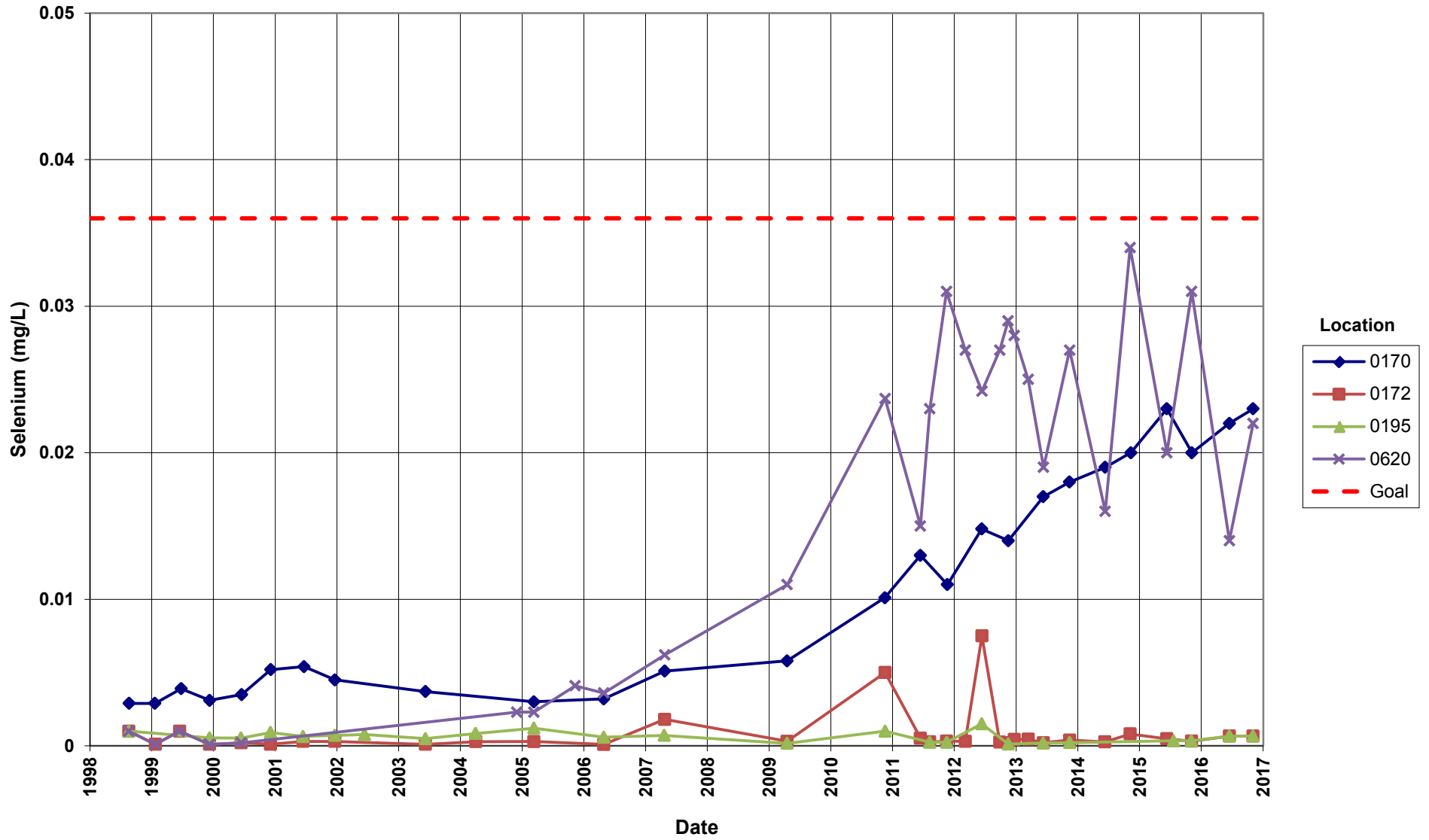
**Rifle New Processing Site
Molybdenum Concentration
Downgradient Wells
Remediation Goal = 0.1 mg/L**



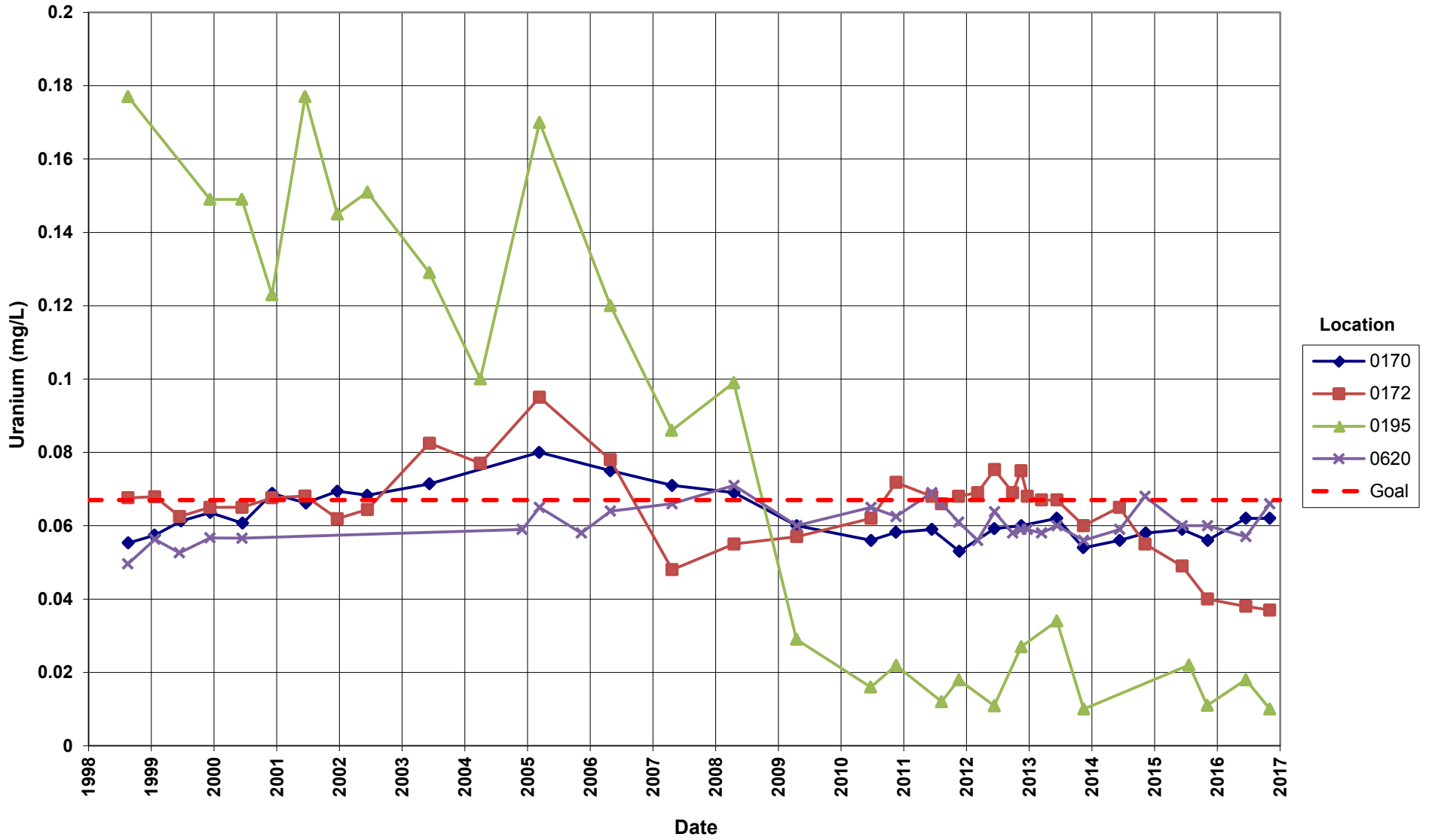
Rifle New Processing Site
Nitrate + Nitrite as Nitrogen Concentration
Downgradient Wells
 Remediation Goal = 10 mg/L



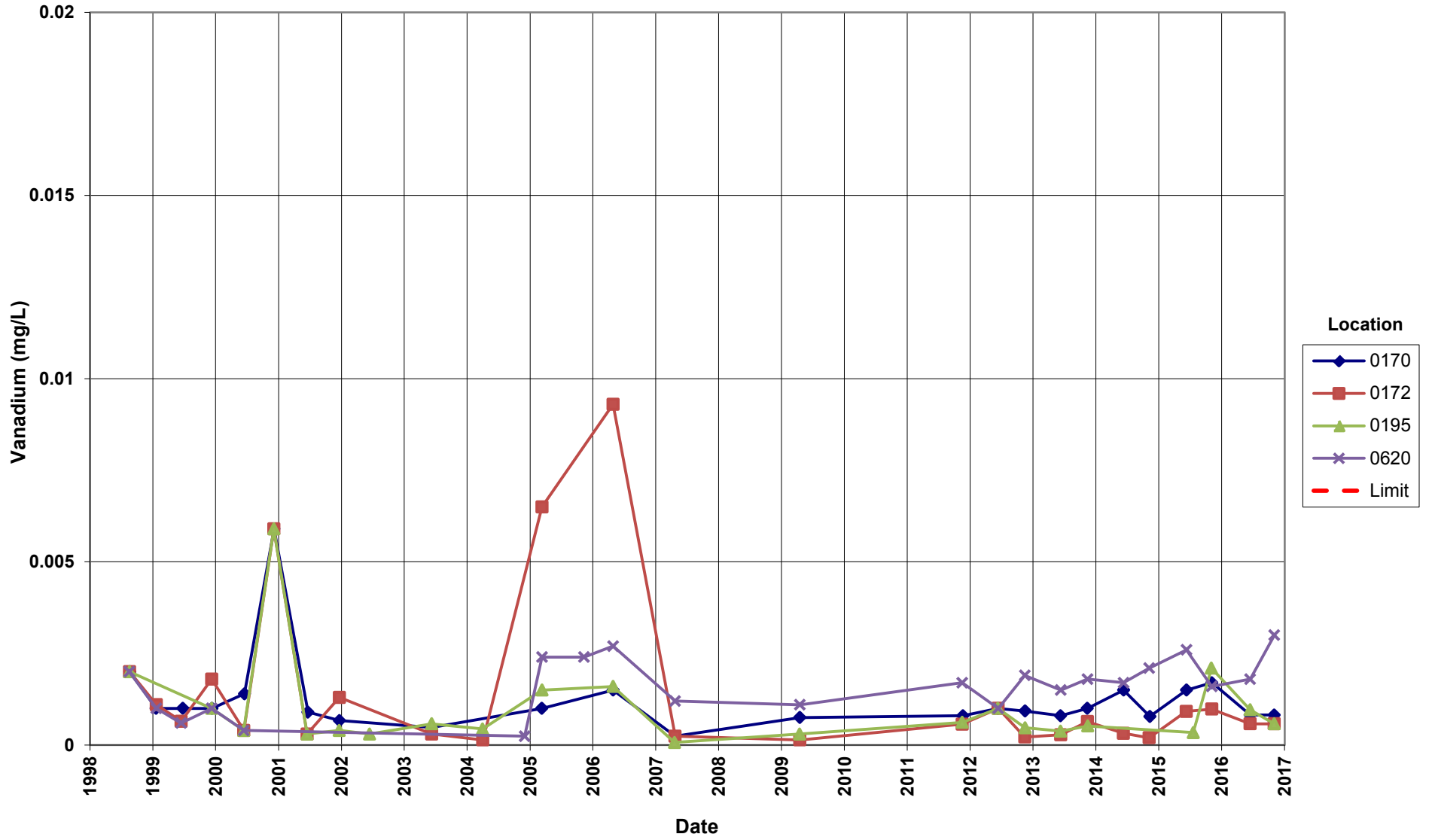
Rifle New Processing Site
Selenium Concentration
Downgradient Wells
Remediation Goal = 0.036 mg/L



**Rifle New Processing Site
Uranium Concentration
Downgradient Wells
Remediation Goal = 0.067 mg/L**



**Rifle New Processing Site
Vanadium Concentration
Downgradient Wells**
Alternate Concentration Limit = 50 mg/L

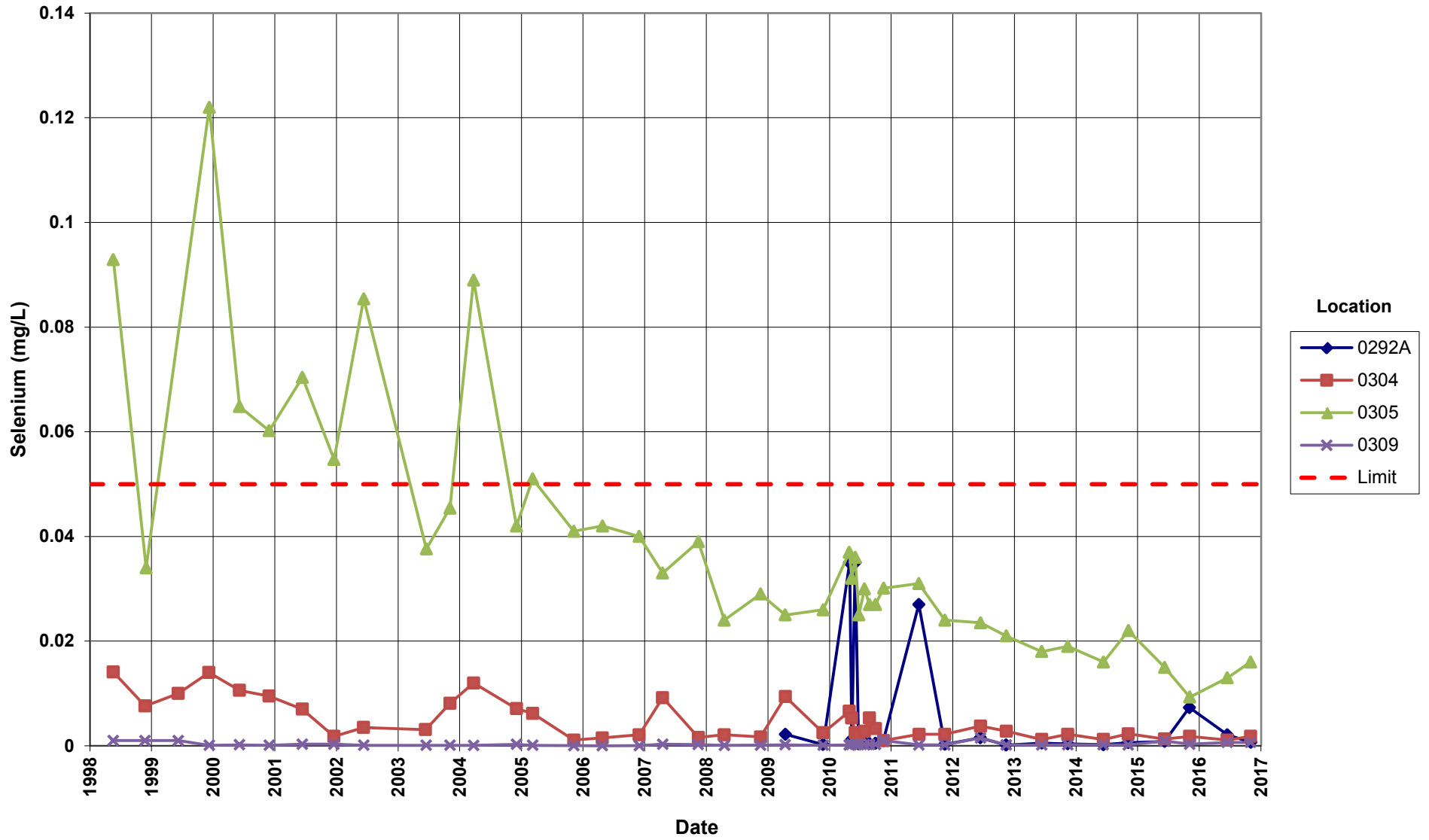


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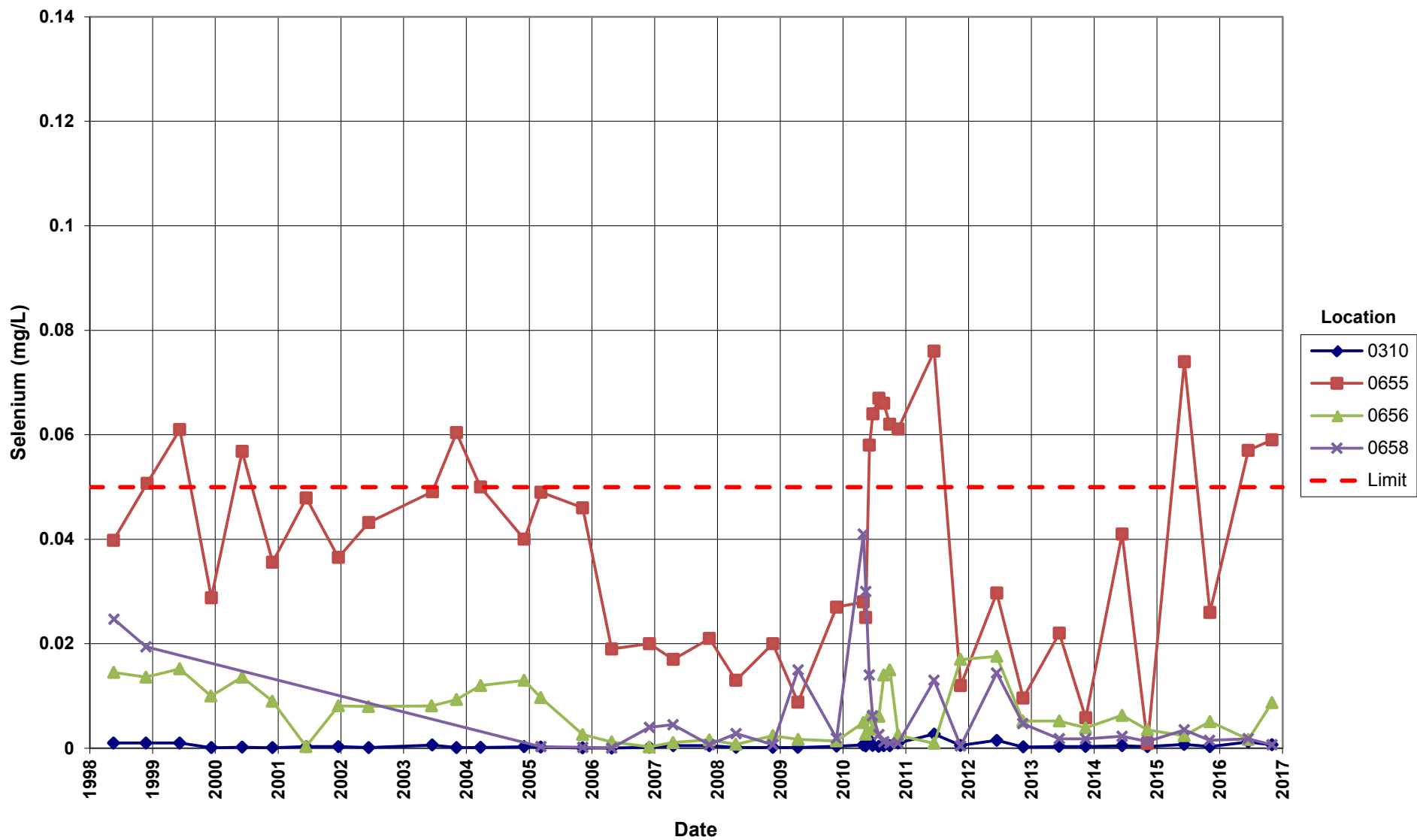
Time-Concentration Graphs
Old Rifle Groundwater

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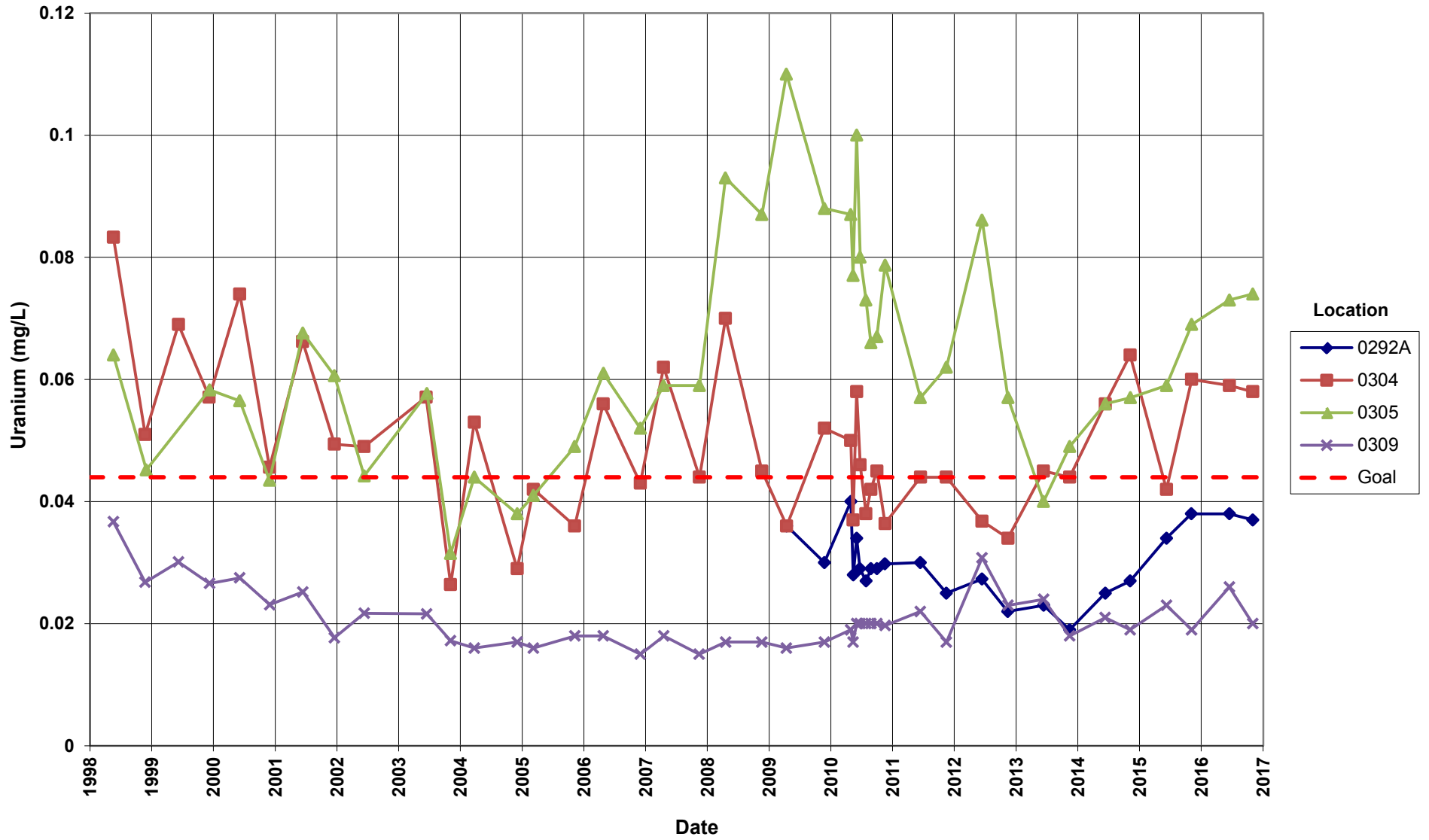
Rifle Old Processing Site
Selenium Concentration
Alternate Concentration Limit = 0.05 mg/L



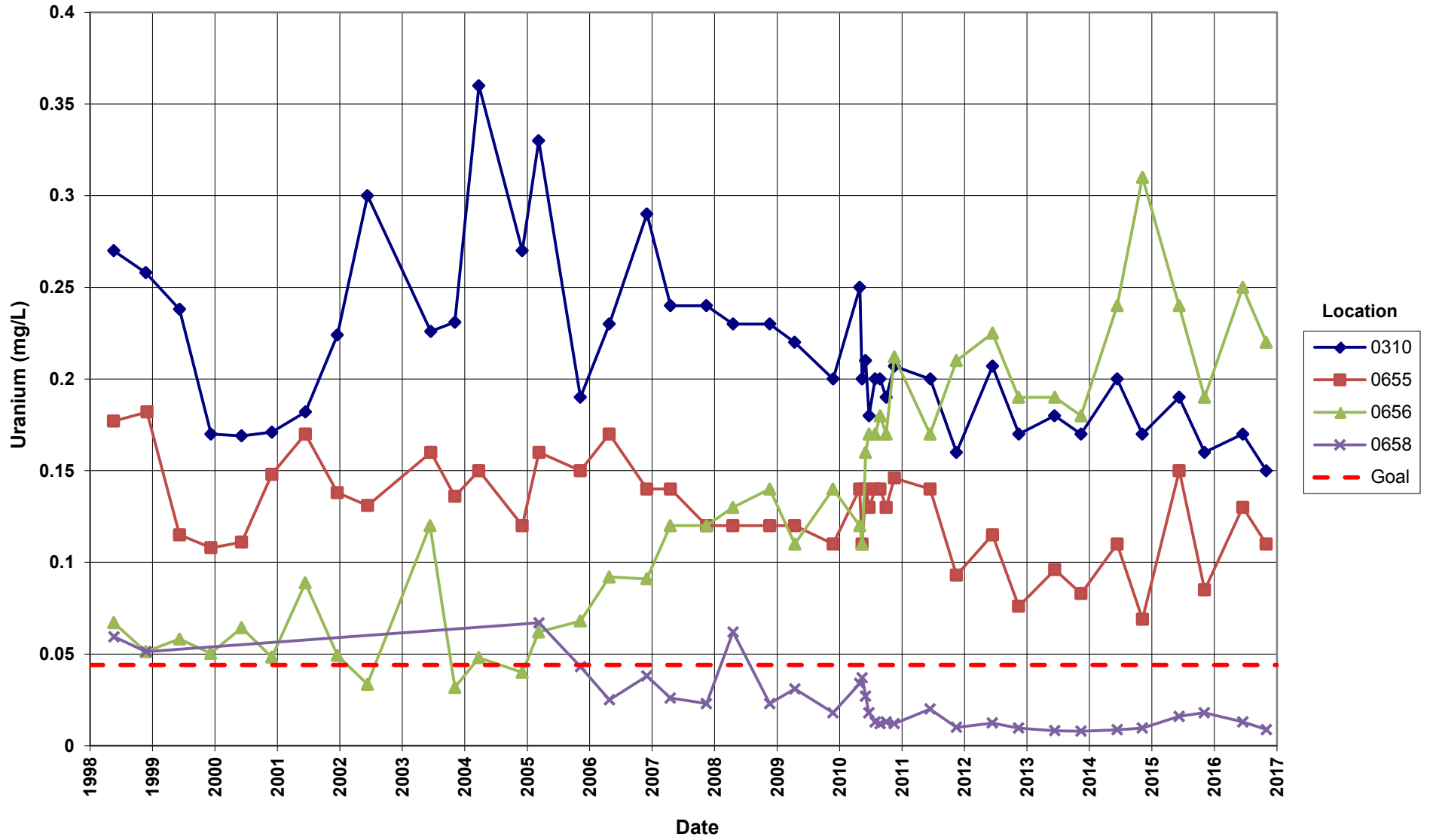
**Rifle Old Processing Site
Selenium Concentration**
Alternate Concentration Limit = 0.05 mg/L



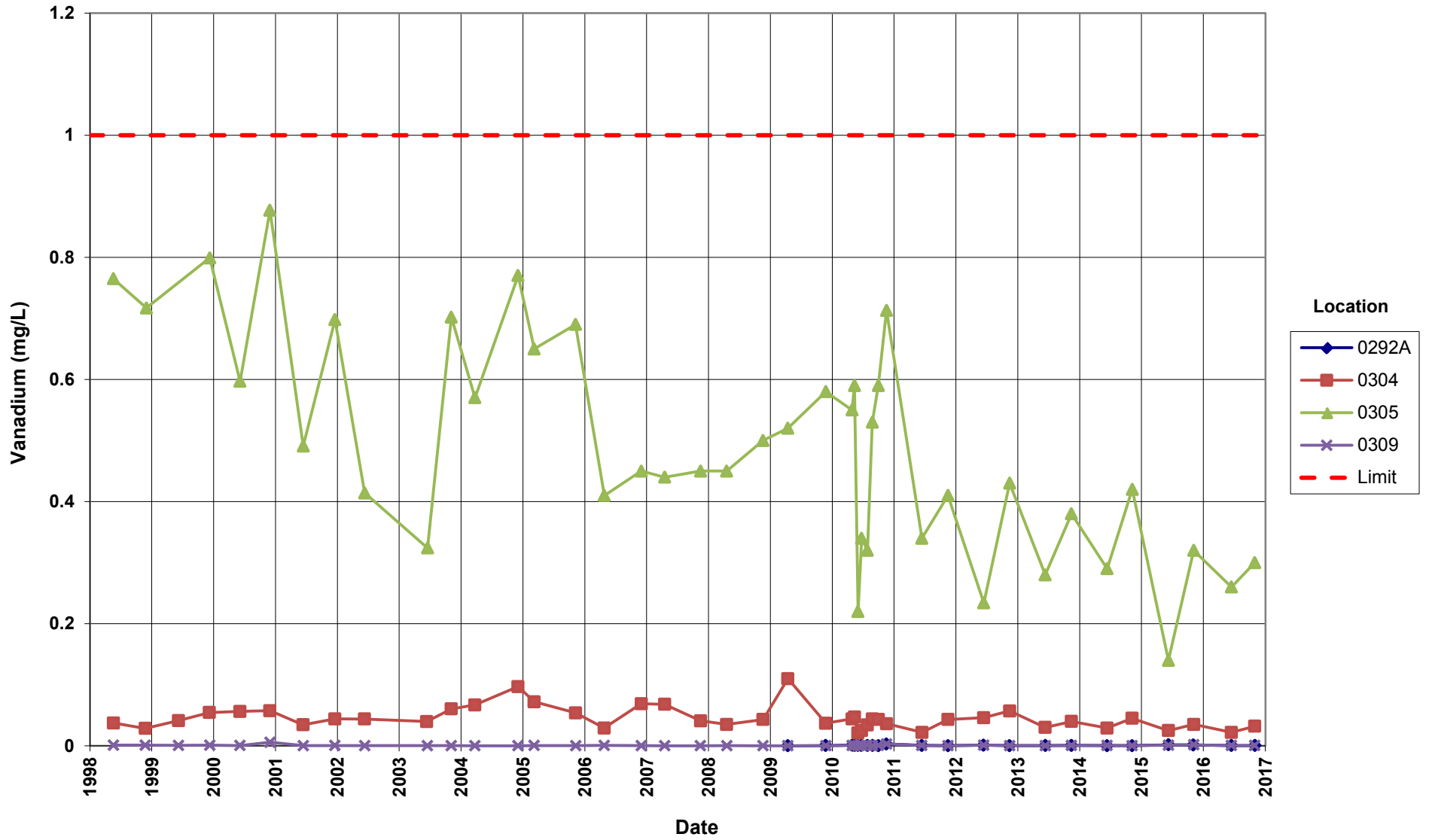
Rifle Old Processing Site
Uranium Concentration
Cleanup Goal = 0.044 mg/L



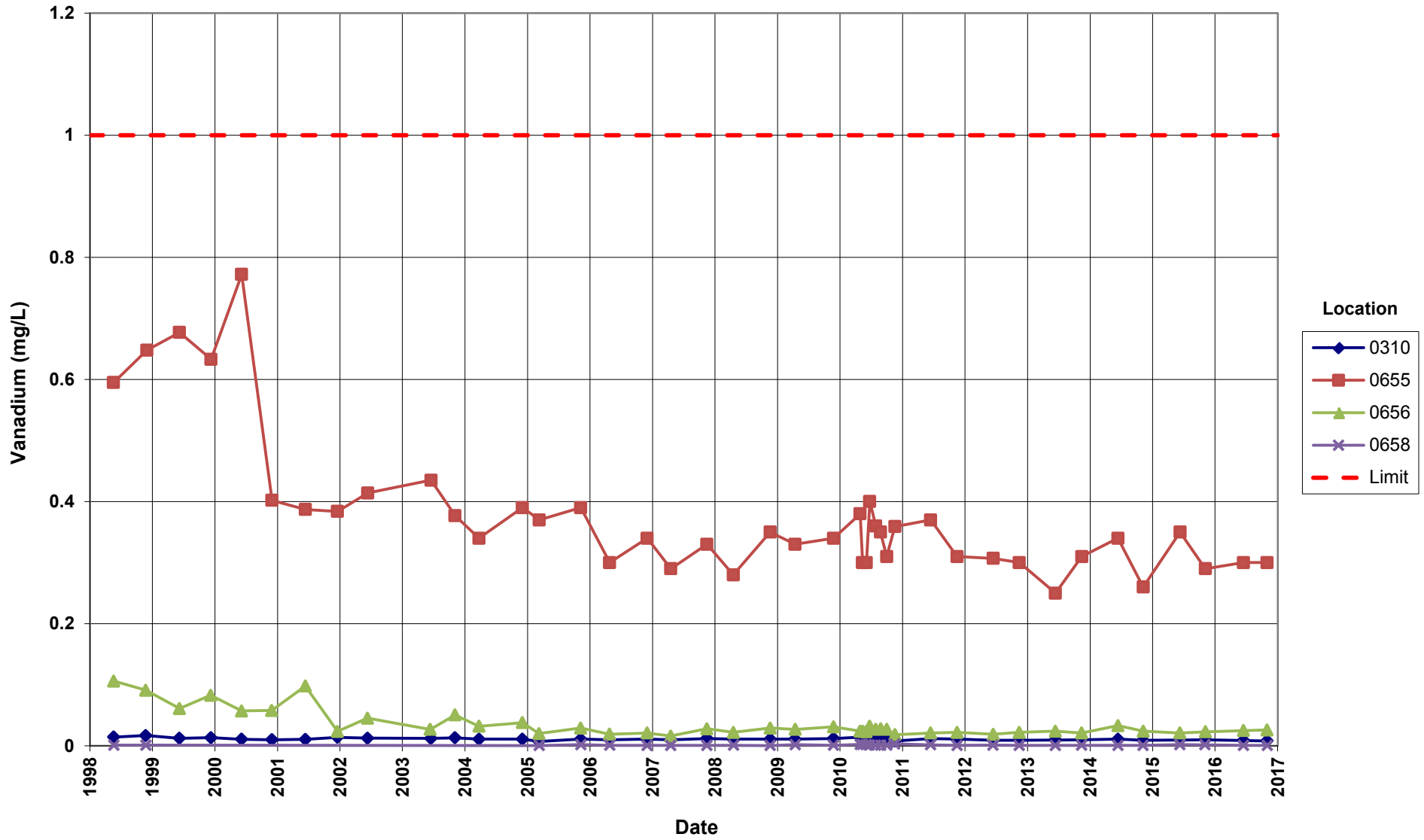
Rifle Old Processing Site
Uranium Concentration
Cleanup Goal = 0.044 mg/L



Rifle Old Processing Site
Vanadium Concentration
Alternate Concentration Limit = 1.0 mg/L



Rifle Old Processing Site
Vanadium Concentration
Alternate Concentration Limit = 1.0 mg/L



Attachment 4

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.

Eleven laboratory results from the New Rifle site sampling event were identified as potential outliers. (See the Data Validation Outliers Reports, below.) Nitrate + nitrite as N at location RFN-0215 was not identified as an outlier but is considerably higher than historical values. The data associated with these results were reviewed in detail with no errors noted. The results for the New Rifle site sampling event are acceptable as qualified.

None of the laboratory results from the Old Rifle site sampling event were identified as potential outliers. The results for the Old Rifle site sampling event are acceptable as qualified.

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Data Validation Outliers Report - No Field Parameters

Comparison: All historical Data Beginning 1/1/2006

Laboratory: ALS Laboratory Group

RIN: 16108114

Report Date: 12/21/2016

Site Code	Location Code	Sample ID	Sample Date	Analyte	Current	Qualifiers		Historical Maximum			Historical Minimum			Number of Data Points		Statistical Outlier
					Result	Lab	Data	Result	Lab	Data	Result	Lab	Data	N	N Below Detect	
RFN01	0170	N001	11/02/2016	Calcium	180		F	160		F	140		F	7	0	Yes
RFN01	0170	N001	11/02/2016	Chloride	190		F	170		F	150		F	7	0	NA
RFN01	0170	N001	11/02/2016	Magnesium	110		F	99.0		F	85.0		F	7	0	No
RFN01	0170	N001	11/02/2016	Molybdenum	0.00260		F	0.00393		F	0.00290		F	16	1	No
RFN01	0172	N001	11/02/2016	Chloride	1100		F	3000		F	1200		F	8	0	No
RFN01	0172	N001	11/02/2016	Magnesium	290		F	710		F	300		F	8	0	No
RFN01	0172	N001	11/02/2016	Sodium	2100		F	3600		F	2200		F	8	0	No
RFN01	0172	N001	11/02/2016	Uranium	0.0370		F	0.0780		F	0.0400		F	27	0	Yes
RFN01	0195	0001	11/02/2016	Chloride	20.0		F	43.0		F	21.0		F	5	0	No
RFN01	0201	N002	11/02/2016	Ammonia Total as N	61.0		F	130		F	69.0		F	19	0	No
RFN01	0201	N001	11/02/2016	Ammonia Total as N	62.0		F	130		F	69.0		F	19	0	No
RFN01	0201	N002	11/02/2016	Calcium	510		F	610		F	550		F	7	0	No
RFN01	0201	N001	11/02/2016	Calcium	520		F	610		F	550		F	7	0	No
RFN01	0201	N001	11/02/2016	Magnesium	46.0		F	62.0		F	48.0		F	7	0	No
RFN01	0201	N002	11/02/2016	Magnesium	45.0		F	62.0		F	48.0		F	7	0	No
RFN01	0201	N001	11/02/2016	Nitrate + Nitrite as Nitrogen	12.0		JF	110		F	20.0		F	19	0	No
RFN01	0201	N002	11/02/2016	Nitrate + Nitrite as Nitrogen	18.0		JF	110		F	20.0		F	19	0	No
RFN01	0201	N002	11/02/2016	Sulfate	1600		F	2100		F	1700		F	7	0	No

Data Validation Outliers Report - No Field Parameters

Comparison: All historical Data Beginning 1/1/2006

Laboratory: ALS Laboratory Group

RIN: 16108114

Report Date: 12/21/2016

Site Code	Location Code	Sample ID	Sample Date	Analyte	Current	Qualifiers		Historical Maximum			Historical Minimum			Number of Data Points		Statistical Outlier
					Result	Lab	Data	Result	Lab	Data	Result	Lab	Data	N	N Below Detect	
RFN01	0215	N001	11/02/2016	Nitrate + Nitrite as Nitrogen	7.10		F	0.420	J	UF	0.01000	U	F	19	7	NA
RFN01	0215	N001	11/02/2016	Potassium	7.30		F	6.40		F	3.70		F	9	0	No
RFN01	0215	N001	11/02/2016	Sodium	210		F	120		F	89.0		F	9	0	Yes
RFN01	0215	N001	11/02/2016	Sulfate	340		F	250		F	140		F	9	0	No
RFN01	0216	N002	10/31/2016	Calcium	93.0		F	87.0		F	58.0		F	9	0	No
RFN01	0216	N001	10/31/2016	Calcium	94.0		F	87.0		F	58.0		F	9	0	No
RFN01	0216	N001	10/31/2016	Sodium	160		F	130		F	74.0		F	9	0	No
RFN01	0216	N002	10/31/2016	Sodium	160		F	130		F	74.0		F	9	0	No
RFN01	0216	N002	10/31/2016	Sulfate	260		F	210		F	100.0		F	9	0	NA
RFN01	0216	N001	10/31/2016	Sulfate	270		F	210		F	100.0		F	9	0	NA
RFN01	0217	N001	11/02/2016	Selenium	0.00420		F	0.211	N	F	0.00477	B	F	15	0	No
RFN01	0217	N001	11/02/2016	Sulfate	1700		F	1600		F	1500		F	7	0	NA
RFN01	0320	N001	11/01/2016	Selenium	0.00200			0.0330			0.00360			12	0	No
RFN01	0322	N001	11/01/2016	Molybdenum	0.0110			0.00910			0.00130		J	14	2	No
RFN01	0323	N001	11/01/2016	Ammonia Total as N	14.0			42.0			15.0			20	0	No
RFN01	0323	N001	11/01/2016	Nitrate + Nitrite as Nitrogen	5.00			130			15.0			19	0	No
RFN01	0323	N001	11/01/2016	Vanadium	0.00240	J		0.00640			0.00270			20	3	No
RFN01	0324	N001	11/02/2016	Chloride	200			190			20.0			5	0	No

Data Validation Outliers Report - No Field Parameters

Comparison: All historical Data Beginning 1/1/2006

Laboratory: ALS Laboratory Group

RIN: 16108114

Report Date: 12/21/2016

Site Code	Location Code	Sample ID	Sample Date	Analyte	Current	Qualifiers		Historical Maximum			Historical Minimum			Number of Data Points		Statistical Outlier
					Result	Lab	Data	Result	Lab	Data	Result	Lab	Data	N	N Below Detect	
RFN01	0324	N001	11/02/2016	Magnesium	15.0			14.0			5.30			5	0	No
RFN01	0324	N001	11/02/2016	Potassium	4.20			3.80			1.20			5	0	No
RFN01	0324	N001	11/02/2016	Sodium	130			110			16.0			5	0	No
RFN01	0452	N001	11/01/2016	Calcium	690			640			310			5	0	No
RFN01	0452	N001	11/01/2016	Chloride	770			390	J		250			5	0	Yes
RFN01	0452	N001	11/01/2016	Magnesium	110			61.0			45.0			5	0	Yes
RFN01	0452	N001	11/01/2016	Potassium	58.0			35.0			26.0			5	0	Yes
RFN01	0452	N001	11/01/2016	Sodium	830			400			270			5	0	Yes
RFN01	0453	N001	11/01/2016	Ammonia Total as N	3.10			120			4.60			14	0	No
RFN01	0453	N001	11/01/2016	Chloride	440			330	J		260			5	0	No
RFN01	0453	N001	11/01/2016	Magnesium	59.0			51.0			41.0			5	0	No
RFN01	0453	N001	11/01/2016	Sodium	480			360			290			5	0	No
RFN01	0575	N001	11/01/2016	Calcium	500			410			210			7	0	Yes
RFN01	0575	N001	11/01/2016	Chloride	680			570			320			7	0	Yes
RFN01	0575	N001	11/01/2016	Magnesium	300			270			200			7	0	Yes
RFN01	0575	N001	11/01/2016	Potassium	80.0			74.0			41.0			7	0	No
RFN01	0575	N001	11/01/2016	Sodium	1400			1100			610			7	0	NA
RFN01	0575	N001	11/01/2016	Sulfate	4800			3900			990			10	0	No

Data Validation Outliers Report - No Field Parameters

Comparison: All historical Data Beginning 1/1/2006

Laboratory: ALS Laboratory Group

RIN: 16108114

Report Date: 12/21/2016

Site Code	Location Code	Sample ID	Sample Date	Analyte	Current	Qualifiers		Historical Maximum			Historical Minimum			Number of Data Points		Statistical Outlier
					Result	Lab	Data	Result	Lab	Data	Result	Lab	Data	N	N Below Detect	
RFN01	0590	N001	11/01/2016	Nitrate + Nitrite as Nitrogen	2.50		F	80.0		F	3.60		F	17	0	No
RFN01	0590	N001	11/01/2016	Selenium	0.0160		F	0.0700		F	0.0240		F	15	0	No
RFN01	0620	N001	11/02/2016	Calcium	410		F	400		F	340		F	9	0	No
RFN01	0620	N001	11/02/2016	Chloride	1600		F	1400		F	550		F	9	0	No
RFN01	0620	N001	11/02/2016	Molybdenum	0.0160		F	0.0130		F	0.00680		F	24	0	Yes
RFN01	0620	N001	11/02/2016	Nitrate + Nitrite as Nitrogen	8.50		F	72.5		F	11.0		F	19	0	No
RFN01	0620	N001	11/02/2016	Vanadium	0.00300		F	0.00270		F	0.001	U	F	15	3	No
RFN01	0635	N001	11/01/2016	Ammonia Total as N	54.0		F	160		F	62.0		F	12	0	No
RFN01	0658	N001	11/01/2016	Calcium	520		F	490		F	370		F	6	0	No
RFN01	0658	N001	11/01/2016	Sodium	200		F	190		F	150		F	6	0	No
RFN01	0658	N001	11/01/2016	Sulfate	1500		F	1400		F	1000		F	6	0	No
RFN01	0664	N001	10/31/2016	Calcium	140		F	280		FQ	150		F	6	0	NA
RFN01	0664	N001	10/31/2016	Chloride	140		F	130		F	70.0		FQ	6	0	NA
RFN01	0664	N001	10/31/2016	Sulfate	570		F	870		FQ	620		F	6	0	No
RFN01	0664	N001	10/31/2016	Uranium	0.0470		F	0.0880		F	0.0490		F	25	0	No
RFN01	0669	N001	11/01/2016	Arsenic	0.00960		QF	0.00840		FQ	0.00290		FQ	15	0	No
RFN01	0669	N001	11/01/2016	Calcium	210		QF	530		FQ	250		FQ	7	0	No
RFN01	0669	N001	11/01/2016	Chloride	160		QF	150		F	120		FQ	7	0	No

Data Validation Outliers Report - No Field Parameters

Comparison: All historical Data Beginning 1/1/2006

Laboratory: ALS Laboratory Group

RIN: 16108114

Report Date: 12/21/2016

Site Code	Location Code	Sample ID	Sample Date	Analyte	Current	Qualifiers		Historical Maximum			Historical Minimum			Number of Data Points		Statistical Outlier
					Result	Lab	Data	Result	Lab	Data	Result	Lab	Data	N	N Below Detect	
RFN01	0669	N001	11/01/2016	Molybdenum	0.520		QF	1.80		FQ	0.530		FQ	17	0	No
RFN01	0669	N001	11/01/2016	Selenium	0.0480		QF	0.0370		FQ	0.00350			15	0	No
RFN01	0669	N001	11/01/2016	Sulfate	690		QF	1700		FQ	810		FQ	7	0	No
RFN01	0670	N001	10/31/2016	Chloride	150		QF	130		F	110		F	6	0	NA
RFN01	0670	N001	10/31/2016	Uranium	0.0530		QF	0.290		FQ	0.0600		F	16	0	NA
RFN01	0855	N001	11/01/2016	Arsenic	0.140		F	2.20		FQ	0.150		F	19	0	No
RFN01	0855	N001	11/01/2016	Calcium	190		F	780		FQ	200		F	10	0	No
RFN01	0855	N001	11/01/2016	Molybdenum	0.330		F	18.0		FQ	0.380		F	19	0	NA
RFN01	0855	N001	11/01/2016	Sodium	220		F	210		F	160		F	10	0	No
RFN01	0855	N001	11/01/2016	Sulfate	630		F	1500		FQ	670		F	10	0	No
RFN01	0855	N001	11/01/2016	Vanadium	9.00		F	1600			9.40		F	23	0	NA

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.

Data Validation Outliers Report - No Field Parameters

Comparison: All historical Data Beginning 1/1/2006

Laboratory: ALS Laboratory Group

RIN: 16108115

Report Date: 12/21/2016

Site Code	Location Code	Sample ID	Sample Date	Analyte	Current	Qualifiers		Historical Maximum			Historical Minimum			Number of Data Points		Statistical Outlier
					Result	Lab	Data	Result	Lab	Data	Result	Lab	Data	N	N Below Detect	
RFO01	0292A	N001	11/01/2016	Sulfate	930		F	820		JF	480		F	15	0	No
RFO01	0304	N001	10/31/2016	Magnesium	100.0		F	98.0		F	48.8		F	19	0	No
RFO01	0305	N001	10/31/2016	Chloride	340		F	330		F	120		F	15	0	No
RFO01	0310	N002	10/31/2016	Uranium	0.150		F	0.290		F	0.160		F	29	0	No
RFO01	0310	N001	10/31/2016	Uranium	0.150		F	0.290		F	0.160		F	29	0	No
RFO01	0310	N001	10/31/2016	Vanadium	0.00790		F	0.0140		F	0.00806	B	JF	29	0	No
RFO01	0310	N002	10/31/2016	Vanadium	0.00800		F	0.0140		F	0.00806	B	JF	29	0	No
RFO01	0395	N001	11/01/2016	Selenium	0.00066	U		0.01000			0.00093			18	0	No
RFO01	0395	N001	11/01/2016	Sodium	90.0			84.0			62.0			14	0	No
RFO01	0395	N001	11/01/2016	Uranium	0.0150			0.0420			0.0190			18	0	No
RFO01	0395	N001	11/01/2016	Vanadium	0.00083	J		0.00510			0.00098			18	1	No
RFO01	0396	N001	11/02/2016	Calcium	71.0			69.0			25.0			14	0	No
RFO01	0396	N001	11/02/2016	Chloride	190			180		J	16.0			14	0	No
RFO01	0396	N001	11/02/2016	Magnesium	15.0			14.0			4.50			14	0	No
RFO01	0396	N001	11/02/2016	Sodium	130			120			13.0			14	0	No
RFO01	0398	N001	10/31/2016	Vanadium	0.00250	J		0.00820			0.00282	B		26	3	No
RFO01	0741	N001	11/02/2016	Chloride	190			180			2.00	U		14	1	No
RFO01	0741	N001	11/02/2016	Sodium	130			120			13.0			14	0	No

STATISTICAL TESTS:

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

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

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

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