U.S. DEPARTMENT OF ENERGY | Legacy Management

# *Data Review and Validation Report*

General Information

| | |
|---|---|
| Report Number (RIN): | 12054532 |
| Sample Event: | May 3, 2012 |
| Site(s): | Riverton, Wyoming |
| Laboratory: | ALS Laboratory Group, Fort Collins, Colorado |
| Work Order No.: | 1205086 |
| Analysis: | Uranium |
| Validator: | Gretchen Baer |
| Review Date: | May 10, 2012 |

This validation was performed according to the *Environmental Procedures Catalog*, (LMS/PRO/S04325, continually updated) "Standard Practice for Validation of Laboratory Data." The procedure was applied at Level 3, Data Validation. 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 |
|---|---|---|---|
| Uranium | LMM-02 | SW-846 3005A | SW-846 6020A |

Data Qualifier Summary

None of the sample results required additional qualification.

Sample Shipping/Receiving

ALS Laboratory Group in Fort Collins, Colorado, received six water samples on May 4, 2012, accompanied by a Chain of Custody (COC) form. The COC form was checked to confirm that all of the samples were listed with sample collection dates and times, and that signatures and dates were present indicating sample relinquishment and receipt. The sample submittal documents had no errors or omissions.

Preservation and Holding Times

The sample shipment was received intact and at ambient temperature, which complies with requirements. All samples were received in the correct container types and had been preserved

correctly for the requested analyses. All analyses were performed within the required holding times.

Detection and Quantitation Limits

The method detection limit (MDL) was reported for all analytes as required. The MDL, as defined in 40 CFR 136, is the minimum concentration of an analyte that can be measured and reported with 99% confidence that the analyte concentration is greater than zero. The practical quantitation limit (PQL) for these analytes is the lowest concentration that can be reliably measured, and is defined as 5 times the MDL.

The reported MDLs for all analytes demonstrate compliance with contractual requirements.

Laboratory Instrument Calibration

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

*Method SW-846 6020, Uranium*
Calibrations for uranium were performed on May 7, 2012, using four calibration standards. The calibration curve correlation coefficient values were greater than 0.995 and the absolute values of the intercepts were less than 3 times the MDL. Initial and continuing calibration verification checks were made at the required frequency resulting in two verification checks. All calibration checks met the acceptance criteria. Reporting limit verification checks were made at the required frequency to verify the linearity of the calibration curve near the practical quantitation limit and all results were within the acceptance range. Mass calibration and resolution verifications were performed at the beginning of each analytical run in accordance with the analytical procedure. Internal standard recoveries associated with requested analytes were stable and within acceptable ranges.

Method and Calibration Blanks

Method blanks are analyzed to assess any contamination that may have occurred during sample preparation. Calibration blanks are analyzed to assess instrument contamination prior to and during sample analysis. All method blank and calibration blank results associated with the samples were below the MDL.

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

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

Matrix Spike Analysis

A post-digestion spike was prepared and analyzed for uranium. The post-digestion spike recovery met the ±15 percent acceptance criteria.

Laboratory Replicate Analysis

Laboratory replicate analyses are used to determine laboratory precision for each sample matrix. The relative percent difference for replicate results that are greater than 5 times the PQL should be less than 20 percent. For results that are less than 5 times the PQL, the range should be no greater than the PQL. The replicate results met these criteria.

Laboratory Control Sample

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

Metals Serial Dilution

Serial dilutions were prepared and analyzed for the metals analyses to monitor chemical or physical interferences in the sample matrix. Serial dilution data are evaluated when the concentration of the undiluted sample is greater than 50 times the MDL. No serial dilution data required evaluation.

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 May 9, 2012. 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 files to the requested analyses to ensure all and only the requested data are delivered. The contents of the EDDs were manually examined to verify that the sample results accurately reflect the data contained in the sample data package.

Potential Outliers Report

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

Statistical outlier tests give probabilistic evidence that an extreme value does not "fit" with the distribution of the remainder of the data and is therefore a statistical outlier. These tests should

only be used to identify data points that require further investigation. The tests alone cannot determine whether a statistical outlier should be discarded or corrected within a data set.

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

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

No values from this sampling event were identified as potential outliers. The data for this RIN are acceptable as qualified.

Sampling Protocol

Domestic wells were classified as Category IV and were sampled by filling bottles at the discharge point.

Field Duplicate Assessment

Field duplicate samples are collected and analyzed as an indication of overall precision of the measurement process. The precision observed includes both field and laboratory precision and has more variability than laboratory duplicates, which measure only laboratory performance. The relative percent difference for duplicate results that are greater than 5 times the PQL should be less than 20 percent. For results that are less than 5 times the PQL, the range should be no greater than the PQL. A duplicate sample was collected from location 0816. The duplicate results met the criteria, demonstrating acceptable overall precision.

Gretchen Baer
Data Validator
2012.05.10 10:19:47 -06'00'

Report Prepared By: _____

Gretchen Baer
Data Validator

**Data Validation Outliers Report - No Field Parameters**
**Comparison: All Historical Data**
Laboratory:
RIN: 12054532
Report Date: 5/10/2012

| | | | | | Current | | | Historical Maximum | | | Historical Minimum | | | Number of Data Points | | Statistical Outlier |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Qualifiers | | | Qualifiers | | | Qualifiers | | | | |
| Site Code | Location Code | Sample ID | Sample Date | Analyte | Result | Lab | Data | Result | Lab | Data | Result | Lab | Data | N | N Below Detect | |
| RVT01 | 0813 | N001 | 05/03/2012 | Uranium | 0.000100 | | | 0.000097 | B | U | 0.000089 | B | U | 5 | 5 | 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.

# SAMPLE MANAGEMENT SYSTEM

## General Data Validation Report

**RIN:** 12054532 **Lab Code:** PAR **Validator:** Gretchen Baer **Validation Date:** 5/10/2012

**Project:** Riverton **Analysis Type:** ☑ Metals ☐ General Chem ☐ Rad ☐ Organics

**# of Samples:** 6 **Matrix:** WATER **Requested Analysis Completed:** Yes

**Chain of Custody**

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

**Sample**

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

**Select Quality Parameters**

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

# SAMPLE MANAGEMENT SYSTEM

## Validation Report: Field Duplicates

**RIN:** 12054532 **Lab Code:** PAR **Project:** Riverton **Validation Date:** 5/10/2012

**Duplicate:** 2339 **Sample:** 0816

| Analyte | Sample Result | Flag | Error | Dilution | Duplicate Result | Flag | Error | Dilution | RPD | RER | Units |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Uranium | 0.09 | B | | 10 | 0.1 | | | 10 | | | UG/L |

# SAMPLE MANAGEMENT SYSTEM

## Metals Data Validation Worksheet

**RIN:** 12054532 **Lab Code:** PAR **Date Due:** 5/6/2012

**Matrix:** Water **Site Code:** RVT **Date Completed:** 5/10/2012

| Analyte | Method Type | Date Analyzed | CALIBRATION | | | | | | Method Blank | LCS %R | MS %R | MSD %R | Dup. RPD | ICSAB %R | Serial Dil. %R | CRI %R |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Int. | R^2 | ICV | CCV | ICB | CCB | | | | | | | | |
| Uranium | ms | 05/07/2012 | -0.0010 | 1.0000 | OK | OK | OK | OK | OK | 101.0 | 101.0 | | | 104.0 | | 90.0 |