



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

OFFICE OF RADIATION AND INDOOR AIR National Air and Radiation Environmental Laboratory 540 South Morris Avenue, Montgomery, AL 36115-2601 (334) 270-3400

November 30, 2007

MEMORANDUM

SUBJECT:	Radiochemical Results for
	Salmon River Uranium Samples
FROM:	John Griggs, Chief John Dugg Monitoring and Analytical Services Branch

TO: Greg Weigel, Remedial Project Manager Region 10

Attached are data packages reported electronically for gamma and isotopic uranium and thorium analysis of samples collected from the Salmon River Uranium site in North Fork, ID. The samples constitute NAREL batch number 0700040.

Radiochemical analyses usually require the subtraction of an instrument background measurement from a gross sample measurement. Both values are positive, but when the sample activity is low, random variations in the two measurements can cause the gross value to be less than the background, resulting in a measured activity less than zero. Although negative activities have no physical significance, they do have statistical significance, as for example in the evaluation of trends or the comparison of two groups of samples.

For all analyses except gamma spectroscopy, it is the policy of NAREL to report results as generated, whether positive, negative, or zero, together with the 2-sigma measurement uncertainty and a sample-specific estimate of the minimum detectable concentration (MDC). The activity, uncertainty, and MDC are given in the same units. The activity and 2-sigma uncertainty for a radionuclide measured by gamma spectroscopy are reported only if the nuclide is detected; so, the results of gamma analyses are never zero or negative. Nuclides that are not detected do not appear in the report, with the exception of Ba-140, Cs-137, I-131, K-40, Ra-226, and Ra-228. If one of these six nuclides is undetected, NAREL reports it as "Not Detected," or "ND," and provides a sample-specific estimate of the MDC.

Specific information concerning all aspects of the radiological analysis of the samples is contained in the batch case narratives of the data packages. If you have any questions concerning the analytical results, please contact me at (334)270-3450.

Attachments

cc: Rick Poeton, Region 10, w/o attachments Ron Fraass, NAREL



REPORT OF SAMPLE DELIVERY GROUP #0700040

Project:Salmon River Uranium, North Fork, IDAnalysis Procedure:Actinides (Uranium) by Extraction ChromatographyReport ID:0700040-UReport Type:OriginalDate Reported:10/30/2007Total Pages in Report:16

SAMPLES

NAREL Sample #	Client Sample ID	Туре	Matrix	Date Collected	Date Received
A7.06957W	SR-WP1-01	SAM	SOIL	10/26/2007	10/29/2007
A7.06958X	SR-WM-04	SAM	SOIL	10/26/2007	10/29/2007
A7.06959Y	SR-WP2-02	SAM	SOIL	10/26/2007	10/29/2007
A7.06960Q	SP-WP3-03	SAM	SOIL	10/26/2007	10/29/2007

EXCEPTIONS

- 1. Packaging and Shipping NAREL sample A7.06957 container 2 was damaged en route to NAREL. The glass container was broken, and the sample was leaking into the bag surrounding it which was not damaged.
- 2. Documentation No problems were observed.
- 3. Sample Preparation In order to analyze the samples as quickly as possible, the analyst, with the client's approval, deviated from NAREL SOPs and took shortcuts in preparation for analysis.
- 4. Analysis All results in this SDG are estimations of the concentrations of uranium isotopes present in the samples. During analysis, complete separation of the uranium and thorium was not achieved which caused thorium interference in the uranium spectra. The uranium spectral regions of interest were adjusted, but it is impossible to eliminate all thorium interference.
- 5. Holding Times All holding times were met.

QUALITY CONTROL

- 1. QC samples All QC analysis results met NAREL acceptance criteria.
- 2. Yields All chemical yields were within acceptance limits except the yield for NAREL sample A7.06960 which was above acceptance limits.
- 3. Instruments Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Chief of the Monitoring and Analytical Services Branch and the NAREL Quality Assurance Manager, or their designees, as verified by the following signatures.

isdom <u>//-8-07</u> Date

Mary F. Wisdom Quality Assurance Manager, NAREL

11/29/07 n 91 Date Griggs, Ph.D.

John G Chief, Monitoring and Analytical Services Branch

Original

GENERAL INFORMATION

SAMPLE TYPES

BLD Blind sample FBK Field blank

SAM Normal sample

ANALYSIS QC TYPES

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ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Method blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A method blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "Z scores." A Z score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The Z score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The Z score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the Z score is computed.

Each standard uncertainty used to compute a Z score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

SDG #0700040

ANALYSIS SUMMARY

Analysis Procedure:	NAREL U-EICHROM
Title:	Actinides (Uranium) by Extraction Chromatography

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Assay Batch #	QC Batch #
A7.06957W		N/A	10/30/2007	0011979P	0004712K
A7.06957W	DUP	N/A	10/30/2007	0011979P	0004712K
A7.06958X		N/A	10/30/2007	0011979P	0004712K
A7.06959Y		N/A	10/30/2007	0011979P	0004712K
A7.06960Q		N/A	10/30/2007	0011979P	0004712K
LCS-00529669A *	LCS	N/A	10/30/2007	0011979P	0004712K
RBK-00529668Z *	RBK	N/A	10/30/2007	0011979P	0004712K

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

PREPARATION METHOD(S) USED

Procedure ID	Title	

SDG #0700040

SAMPLE ANALYSIS REPORT

Sample #:	A7.06957W	QC batch #:	0004712K
Matrix:	SOIL	Assay batch #:	0011979P
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	4.172e-01 GWET	Analysis procedure:	NAREL U-EICHROM
Dry/wet weight:	N/A	Analyst:	SPK
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
10/29/2007 14:41	1000.0	AS33	DPG

ANALYTICAL RESULTS

Analyte		Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
U234	*	2.17e+00	4.0e-01	9.5e-02	PCI/GWET	10/29/2007
U235	*	9.77e-02	9.0e-02	9.4e-02	PCI/GWET	10/29/2007
U238	*	1.83e+00	3.6e-01	8.8e-02	PCI/GWET	10/29/2007

* An asterisk indicates a result that may be significantly under or overestimated

Report: 0700040-U

SDG #0700040

SAMPLE ANALYSIS REPORT

Sample #:	A7.06957W	QC batch #:	0004712K
Matrix:	SOIL	Assay batch #:	0011979P
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.951e-01 GWET	Analysis procedure:	NAREL U-EICHROM
Dry/wet weight:	N/A	Analyst:	SPK
Ash/dry weight:	N/A	QC type:	DUP
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
10/29/2007 14:41	1000.0	AS34	DPG

ANALYTICAL RESULTS

Analyte		Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
U234	*	2.80e+00	4.6e-01	4.1e-02	PCI/GWET	10/29/2007
U235	*	1.36e-01	1.1e-01	9.9e-02	PCI/GWET	10/29/2007
U238	*	2.68e+00	4.5e-01	7.1e-02	PCI/GWET	10/29/2007

SDG #0700040

SAMPLE ANALYSIS REPORT

Sample #:	A7.06958X	QC batch #:	0004712K
Matrix:	SOIL	Assay batch #:	0011979P
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.017e-01 GWET	Analysis procedure:	NAREL U-EICHROM
Dry/wet weight:	N/A	Analyst:	SPK
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		,

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
10/29/2007 14:41	1000.0	AS35	DPG

ANALYTICAL RESULTS

Analyte		Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
U234	*	2.47e+01	2.6e+00	9.6e-02	PCI/GWET	10/29/2007
U235	*	1.66e+00	4.0e-01	1.3e-01	PCI/GWET	10/29/2007
U238	*	2.06e+01	2.2e+00	8.2e-02	PCI/GWET	10/29/2007

* An asterisk indicates a result that may be significantly under or overestimated

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SDG #0700040

SAMPLE ANALYSIS REPORT

Sample #:	A7.06959Y	QC batch #:	0004712K
Matrix:	SOIL	Assay batch #:	0011979P
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.575e-01 GWET	Analysis procedure:	NAREL U-EICHROM
Dry/wet weight:	N/A	Analyst:	SPK
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
10/29/2007 14:41	1000.0	AS36	DPG

ANALYTICAL RESULTS

Analyte		Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
U234	*	1.81e+00	4.0e-01	1.6e-01	PCI/GWET	10/29/2007
U235	*	2.30e-01	1.5e-01	1.1e-01	PCI/GWET	10/29/2007
U238	*	2.02e+00	4.3e-01	1.1e-01	PCI/GWET	10/29/2007

SDG #0700040

SAMPLE ANALYSIS REPORT

Sample #:	A7.06960Q	QC batch #:	0004712K
Matrix:	SOIL	Assay batch #:	0011979P
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.737e-01 GWET	Analysis procedure:	NAREL U-EICHROM
Dry/wet weight:	N/A	Analyst:	SPK
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
10/29/2007 14:41	1000.0	AS37	DPG

ANALYTICAL RESULTS

Analyte		Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
U234	*	1.77e+01	1.5e+00	5.0e-02	PCI/GWET	10/29/2007
U235	*	1.17e+00	2.4e-01	5.9e-02	PCI/GWET	10/29/2007
U238	*	1.46e+01	1.2e+00	5.0e-02	PCI/GWET	10/29/2007

SDG #0700040

SAMPLE ANALYSIS REPORT

Sample #:	LCS-00529669A	QC batch #:	0004712K
Matrix:	N/A	Assay batch #:	0011979P
Sample type:	N/A	Prep procedure:	N/A
Amount analyzed:	1.000e+00 SAMP	Analysis procedure:	NAREL U-EICHROM
Dry/wet weight:	N/A	Analyst:	SPK
Ash/dry weight:	N/A	QC type:	LCS
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
10/29/2007 14:41	1000.0	AS38	DPG

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
U234	1.86e+00	2.5e-01	3.4e-02	PCI	10/29/2007
U235	1.04e-01	5.0e-02	1.6e-02	PCI	10/29/2007
U238	2.02e+00	2.6e-01	2.4e-02	PCI	10/29/2007

SDG #0700040

SAMPLE ANALYSIS REPORT

Sample #:	RBK-00529668Z	QC batch #:	0004712K
Matrix:	N/A	Assay batch #:	0011979P
Sample type:	N/A	Prep procedure:	N/A
Amount analyzed:	1.000e+00 SAMP	Analysis procedure:	NAREL U-EICHROM
Dry/wet weight:	N/A	Analyst:	SPK
Ash/dry weight:	N/A	QC type:	RBK
Sample description:	N/A		
Comment:	N/A		

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COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
10/29/2007 14:41	1000.0	AS40	DPG

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
U234	2.09e-02	2.2e-02	2.3e-02	PCI	10/29/2007
U235	8.92e-03	1.9e-02	2.8e-02	PCI	10/29/2007
U238	-1.49e-03	1.4e-02	3.3e-02	PCI	10/29/2007

SDG 0700040

QC BATCH SUMMARY

QC batch #:	0004712K
Preparation procedure:	N/A
Analysis procedure:	NAREL U-EICHROM

NAREL Sample #	QC Type	Yield (%)	$\pm 2 \sigma$ Uncertainty (%)	Analyst
A7.06957W		71.88 %	7.24 %	SPK
A7.06957W	DUP	86.25 %	7.87 %	SPK
A7.06958X		85.03 %	8.21 %	SPK
A7.06959Y	1	87.68 %	8.42 %	SPK
A7.06960Q		193.97 %	15.29 %	SPK
LCS-00529669A *	LCS	91.40 %	8.78 %	SPK
RBK-00529668Z *	RBK	90.42 %	8.57 %	SPK

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

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National Air and Radiation Environmental Laboratory QC Batch Report

QC Batch #: 0004712K

Analytical Procedure: NAREL U-EICHROM

REAGENT BLANKS (PCI)

Sample ID	Nuclide	Activity ± 2 σ	Prep Date
00529668Z	U234	2.09e-02 ± 2.2e-02	2007-10-29
00529668Z	U235	8.92e-03 ± 1.9e-02	2007-10-29
00529668Z	U238	-1.49e-03 ± 1.4e-02	2007-10-29

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LABORATORY DUPLICATES (PCI/GWET)

Sample ID	Nuclide	Original ± 2σ	Duplicate ± 2σ	RPD	Z
A7.06957W	U234	2.17e+00 ± 4.0e-01	2.80e+00 ± 4.6e-01	25.30	2.07 OK
A7.06957W	U235	9.77e-02 ± 9.0e-02	1.36e-01 ± 1.1e-01	32.59	0.54 OK
A7.06957W	U238	1.83e+00 ± 3.6e-01	2.68e+00 ± 4.5e-01	37.56	2.96 OK

Sample ID Nuclide Amt Added ± 2σ Measured ± 2σ θR Ζ 00529669A 1.86e+00 ± 2.5e-01 94.45 -0.86 OK U234 1.97e+00 ± 3.2% 00529669A 00529669A 9.27e-02 ± 3.3% 2.01e+00 ± 3.3% $1.04e-01 \pm 5.0e-02$ 2.02e+00 $\pm 2.6e-01$ 0.42 OK 0.04 OK 111.69 U235 100.25 U238 0 [07 10 Q Analyst: Knockemus, *f*shane Ρ.

QA Officer:

<u>56-01</u> 2.588700 1 4.58-01

LAB CONTROL SAMPLES (PCI)





Analyst: Knockemus, Shane P.



0.050

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REPORT OF SAMPLE DELIVERY GROUP #0700040

Project:	Salmon River Uranium, North Fork, ID
Analysis Procedure:	Actinides (Thorium) by Extraction Chromatography
Report ID:	0700040-TH
Report Type:	Original
Date Reported:	10/30/2007
Total Pages in Report:	17

SAMPLES

NAREL Sample #	Client Sample ID	Туре	Matrix	Date Collected	Date Received
A7.06957W	SR-WP1-01	SAM	SOIL	10/26/2007	10/29/2007
A7.06958X	SR-WM-04	SAM	SOIL	10/26/2007	10/29/2007
A7.06959Y	SR-WP2-02	SAM	SOIL	10/26/2007	10/29/2007
A7.06960Q	SP-WP3-03	SAM	SOIL	10/26/2007	10/29/2007

EXCEPTIONS

- 1. Packaging and Shipping NAREL sample A7.06957 container 2 was damaged en route to NAREL. The glass container was broken, and the sample was leaking into the bag surrounding it which was not damaged.
- 2. Documentation No problems were observed.
- 3. Sample Preparation In order to analyze the samples as quickly as possible, the analyst, with the client's approval, deviated from NAREL SOPs and took shortcuts in preparation for analysis.
- 4. Analysis All results in this SDG are estimations of the concentrations of thorium isotopes present in the samples. The thorium yields for all samples except A7.06959 are low because complete separation of the thorium and uranium was not achieved.
- 5. Holding Times All holding times were met.

QUALITY CONTROL

- 1. QC samples All QC analysis results met NAREL acceptance criteria except the duplicate result for Th-228 and the method blank result for Th-232.
- 2. Yields All chemical yields were below NAREL acceptance criteria except the yields for NAREL sample A7.06959, the LCS, and the method blank which were within the acceptance criteria.
- 3. Instruments Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Chief of the Monitoring and Analytical Services Branch and the NAREL Quality Assurance Manager, or their designees, as verified by the following signatures.

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Mary F. Wisdom Quality Assurance Manager, NAREL

<u>11/29/07</u> Date ign

John & Griggs, Ph.D. Chief, Monitoring and Analytical Services Branch

GENERAL INFORMATION

SAMPLE TYPES

BLD Blind sample FBK Field blank

SAM Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Method blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A method blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "Z scores." A Z score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The Z score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The Z score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the Z score is computed.

Each standard uncertainty used to compute a Z score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

SDG #0700040

ANALYSIS SUMMARY

Analysis Procedure:	NAREL TH-EICHROM
Title:	Actinides (Thorium) by Extraction Chromatography

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Assay Batch #	QC Batch #
A7.06957W		N/A	10/30/2007	0011978N	0004711J
A7.06957W	DUP	N/A	10/30/2007	0011978N	0004711J
A7.06958X	l	N/A	10/30/2007	0011978N	0004711J
A7.06959Y		N/A	10/30/2007	0011978N	0004711J
A7.06960Q	ļ	N/A	10/30/2007	0011978N	0004711J
LCS-00529666X *	LCS	N/A	10/30/2007	0011978N	0004711J
RBK-00529665W *	RBK	N/A	10/30/2007	0011978N	0004711J

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

PREPARATION METHOD(S) USED

Procedure ID	Title

SDG #0700040

SAMPLE ANALYSIS REPORT

Sample #:	A7.06957W	QC batch #:	0004711J
Matrix:	SOIL	Assay batch #:	0011978N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	4.172e-01 GWET	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	SPK
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time Duration (min)		Detector ID	Operator
10/29/2007 15:20	1000.0	AS01	DPG

ANALYTICAL RESULTS

Analyte		Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Th227	*	2.72e+00	1.0e+00	8.1e-01	PCI/GWET	10/29/2007
Th228	*	1.83e+02	1.4e+01	7.6e-01	PCI/GWET	10/29/2007
Th230	*	4.58e+00	9.1e-01	3.2e-01	PCI/GWET	10/29/2007
Th232	*	1.45e+02	1.1e+01	2.0e-01	PCI/GWET	10/29/2007

* An asterisk indicates a result that may be significantly under or overestimated

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SDG #0700040

SAMPLE ANALYSIS REPORT

Sample #:	A7.06957W	QC batch #:	0004711J
Matrix:	SOIL	Assay batch #:	0011978N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.951e-01 GWET	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	SPK
Ash/dry weight:	N/A	QC type:	DUP
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time Duration (min)		Detector ID	Operator
10/29/2007 15:20	1000.0	AS03	DPG

ANALYTICAL RESULTS

Analyte		Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Th227	*	2.04e+00	9.1e-01	8.4e-01	PCI/GWET	10/29/2007
Th228	*	1.50e+02	1.1e+01	7.7e-01	PCI/GWET	10/29/2007
Th230	*	5.92e+00	1.1e+00	2.9e-01	PCI/GWET	10/29/2007
Th232	*	1.34e+02	1.0e+01	2.2e-01	PCI/GWET	10/29/2007

SDG #0700040

SAMPLE ANALYSIS REPORT

Sample #:	A7.06958X	QC batch #:	0004711J
Matrix:	SOIL	Assay batch #:	0011978N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.017e-01 GWET	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	SPK
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time Duration (min)		Detector ID	Operator
10/29/2007 15:20	1000.0	AS04	DPG

ANALYTICAL RESULTS

Analyte		Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Th227	*	2.92e+01	4.9e+00	9.3e-01	PCI/GWET	10/29/2007
Th228	*	6.85e+00	1.5e+00	1.2e+00	PCI/GWET	10/29/2007
Th230	*	5.71e+02	4.3e+01	4.1e-01	PCI/GWET	10/29/2007
Th232	*	6.89e+00	1.4e+00	4.4e-01	PCI/GWET	10/29/2007

SDG #0700040

SAMPLE ANALYSIS REPORT

Sample #:	A7.06959Y	QC batch #:	0004711J
Matrix:	SOIL	Assay batch #:	0011978N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.575e-01 GWET	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	SPK
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time Duration (min)		Detector ID	Operator
10/29/2007 15:20	1000.0	AS05	DPG

ANALYTICAL RESULTS

Analyte		Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
	*	1.14e-01	2.3e-01	3.8e-01	PCI/GWET	10/29/2007
Th228	*	1.53e+01	1.5e+00	3.9e-01	PCI/GWET	10/29/2007
Th230	*	2.13e+00	4.8e-01	1.8e-01	PCI/GWET	10/29/2007
Th232	*	1.50e+01	1.5e+00	1.8e-01	PCI/GWET	10/29/2007

SDG #0700040

SAMPLE ANALYSIS REPORT

Sample #:	A7.06960Q	QC batch #:	0004711J
Matrix:	SOIL	Assay batch #:	0011978N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.737e-01 GWET	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	SPK
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A	-	
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
10/29/2007 15:20	1000.0	AS06	DPG

ANALYTICAL RESULTS

Analyte	e	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Th227	*	6.07e+00	1.8e+00	8.1e-01	PCI/GWET	10/29/2007
Th228	*	3.74e+02	2.8e+01	1.1e+00	PCI/GWET	10/29/2007
Th230	*	4.22e+01	4.4e+00	4.8e-01	PCI/GWET	10/29/2007
Th232	*	3.48e+02	2.6e+01	3.7e-01	PCI/GWET	10/29/2007

SDG #0700040

SAMPLE ANALYSIS REPORT

Sample #:	LCS-00529666X	QC batch #:	0004711J
Matrix:	N/A	Assay batch #:	0011978N
Sample type:	N/A	Prep procedure:	N/A
Amount analyzed:	1.000e+00 SAMP	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	SPK
Ash/dry weight:	N/A	QC type:	LCS
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
10/29/2007 15:20	1000.0	AS07	DPG

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Th227	-1.14e-02	3.5e-02	8.5e-02	PCI	10/29/2007
Th228	3.22e-02	5.0e-02	8.4e-02	PCI	10/29/2007
Th230	2.35e+00	2.5e-01	4.3e-02	PCI	10/29/2007
Th232	-4.82e-03	1.6e-02	4.0e-02	PCI	10/29/2007

SDG #0700040

SAMPLE ANALYSIS REPORT

Sample #:	RBK-00529665W	QC batch #:	0004711J
Matrix:	N/A	Assay batch #:	0011978N
Sample type:	N/A	Prep procedure:	N/A
Amount analyzed:	1.000e+00 SAMP	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	SPK
Ash/dry weight:	N/A	QC type:	RBK
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time Duration (min)		Detector ID	Operator
10/29/2007 15:20	1000.0	AS21	DPG

ANALYTICAL RESULTS

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Th227	1.40e-02	4.9e-02	9.1e-02	PCI	10/29/2007
Th228	1.44e-01	6.8e-02	8.2e-02	PCI	10/29/2007
Th230	6.28e-03	2.3e-02	4.3e-02	PCI	10/29/2007
Th232	1.33e-01	5.2e-02	2.9e-02	PCI	10/29/2007

SDG 0700040

QC BATCH SUMMARY

QC batch #:	0004711J
Preparation procedure:	N/A
Analysis procedure:	NAREL TH-EICHROM

NAREL Sample #	QC Type	Yield (%)	$\pm 2 \sigma$ Uncertainty (%)	Analyst
A7.06957W		23.72 %	1.25 %	SPK
A7.06957W	DUP	34.41 %	1.57 %	SPK
A7.06958X	}	24.11 %	1.24 %	SPK
A7.06959Y		68.56 %	2.52 %	SPK
A7.06960Q		27.58 %	. 1.35 %	SPK
LCS-00529666X *	LCS	90.28 %	3.11 %	SPK
RBK-00529665W *	RBK	85.91 %	2.97 %	SPK

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

National Air and Radiation Environmental Laboratory QC Batch Report

QC Batch #: 0004711J

Analytical Procedure: NAREL TH-EICHROM

REAGENT BLANKS (PCI)

Sample ID	Nuclide	Activity ± 2σ	Prep Date
00529665W	TH227	1.40e-02 ± 4.9e-02	2007-10-29
00529665W	TH228	1.44e-01 ± 6.8e-02	2007-10-29
00529665W	TH230	6.28e-03 ± 2.3e-02	2007-10-29
00529665W	TH232	1.33e-01 ± 5.2e-02	2007-10-29

LABORATORY DUPLICATES (PCI/GWET)

Sain; I - ID	Nuclide	Original ± 2 σ	Duplicate ± 2σ	RPD	Z
A7.16957W	TH227	2.72e+00 ± 1.0e+00	2.04e+00 ± 9.1e-01	28.52	-1.01 OK
A7.16957W	TH228	1.83e+02 ± 1.4e+01	1.50e+02 ± 1.1e+01	19.29	-3.56 LOW
A7.06957W	TH230	4.58e+00 ± 9.1e-01	5.92e+00 ± 1.1e+00	25.35	1.88 OK
A7.06957W	TH232	1.45e+02 ± 1.1e+01	1.34e+02 ± 1.0e+01	8.03	-1.47 OK

LAB CONTROL SAMPLES (PCI)

Sampl- TD	Nuclide	Amt Added ± 2σ	Measured ± 2σ	%R	Z
00519566X 00519566X 00519366X 00519366X	TH227 TH228 TH230 TH232	NO SPIKE DATA NO SPIKE DATA 2.47e+00 ± 2.8% NO SPIKE DATA	2.35e+00 ± 2.5e-01	95.24	-0.89 OK
Analyst:	8	- Koch	-o	50/07	
OF triver:	Knockemu	s, Shane P.	11/	8/07	

Analyst:

OA stiver:

OUP Failure KOM Blank failure Kom

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Method Blanks

Analyte: TH230

Procedure: NAREL TH-EICHROM

Analyst: Knockemus, Shane P.







REPORT OF SAMPLE DELIVERY GROUP #0700040

Project:Salmon River Uranium, North Fork, IDAnalysis Procedure:Gamma SpectrometryReport ID:0700040-GAMMAReport Type:OriginalDate Reported:11/07/2007Total Pages in Report:13

SAMPLES

NAREL Sample #	Client Sample ID	Туре	Matrix	Date Collected	Date Received
A7.06957W	SR-WP1-01	SAM	SOIL	10/26/2007	10/29/2007
A7.06958X	SR-WM-04	SAM	SOIL	10/26/2007	10/29/2007
A7.06959Y	SR-WP2-02	SAM	SOIL	10/26/2007	10/29/2007
A7.06960Q	SP-WP3-03	SAM	SOIL	10/26/2007	10/29/2007

EXCEPTIONS

- 1. Packaging and Shipping NAREL sample A7.06957 container 2 was damaged en route to NAREL. The glass container was broken, and the sample was leaking into the bag surrounding it which was not damaged.
- 2. Documentation No problems were observed.
- 3. Sample Preparation No problems were observed.
- 4. Analysis No problems were encountered.
- 5. Holding Times All holding times were met.

QUALITY CONTROL

1. QC samples - All QC analysis results met NAREL acceptance criteria.

2. Instruments - Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Chief of the Monitoring and Analytical Services Branch and the NAREL Quality Assurance Manager, or their designees, as verified by the following signatures.

<u>//-&-0</u> Date

Mary F. Wisdom Quality Assurance Manager, NAREL

11/29/07 Date Juga John G, Griggs, Ph.D.

Chief, Monitoring and Analytical Services Branch

GENERAL INFORMATION

SAMPLE TYPES

BLDBlind sampleFBKField blankSAMNormal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Method blank

QUALITY INDICATORS

RPDRelative Percent Difference%RPercent RecoveryZNumber of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A method blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "Z scores." A Z score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The Z score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The Z score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the Z score is computed.

Each standard uncertainty used to compute a Z score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

GENERAL INFORMATION (CONTINUED)

GAMMA ANALYSIS

The reporting format lists the gamma emitters in alphabetical order. The activity and 2-sigma uncertainty for radionuclides measured by gamma spectroscopy are reported only if the nuclide is detected. Nuclides that are not detected do not appear in the report, with the exception of Ba-140, Co-60, Cs-137, I-131, K-40, Ra-226 and Ra-228. If one of these seven nuclides is undetected, NAREL reports it as "Not Detected" or "ND", and provides a sample-specific estimate of the MDC.

Due to potential spectral interferences and other possible problems associated with the determination of the activity of certain radionuclides, the activities for Bi-214, Pb-214, Th-234, Pa-234m, Ra-226, Th-231, and U-235 are subject to greater possible uncertainty than other commonly reported radionuclides. It should be noted that this potential uncertainty is not included in the two-sigma counting uncertainty which is reported with each activity. Although in this report we do provide the calculated activities for these radionuclides, we recommend that the results be used only as a qualitative means of indicating the presence of these radionuclides and not as a quantitative measure of their concentration. The results for these nuclides are not used in the evaluation of quality control samples. Furthermore, because of mutual interference between Ra-226 and U-235, NAREL's gamma analysis software tends to overestimate the amounts of these nuclides whenever both are present in a sample. Lower estimates for Ra-226 activities can be obtained from the reported activities of its decay products, Pb-214 and Bi-214, which are likely to be somewhat less than the Ra-226 activity because of the potential escape of radon gas.

NAREL's gamma spectroscopy software corrects activities and MDCs for decay between collection and analysis, but only up to a limit of ten half-lives. So, if the decay time for a sample is more than ten half-lives of a radionuclide, that nuclide will almost always be undetected and the reported MDC will be meaningless. This is usually a problem only for short-lived radionuclides, such as I-131 and Ba-140, when there is a long delay between collection and analysis.

SDG #0700040

ANALYSIS SUMMARY

Analysis Procedure:	NAREL GAM-01	
Title:	Gamma Spectrometry	•

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Assay Batch #	QC Batch #
A7.06957W		N/A	10/30/2007	0011981H	0004714M
A7.06958X		N/A	10/30/2007	0011981H	0004714M
A7.06959Y	ļ	N/A	10/30/2007	0011981H	0004714M
A7.06960Q		N/A	10/30/2007	0011981H	0004714M
A7.06960Q	DUP	N/A	10/31/2007	0011981H	0004714M
LCS-00529749Z *	LCS	N/A	11/02/2007	0011981H	0004714M

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

PREPARATION METHOD(S) USED

Procedure ID	Title	

SDG #0700040

SAMPLE ANALYSIS REPORT

Sample #:	A7.06957W	QC batch #:	0004714M
Matrix:	SOIL	Assay batch #:	0011981H
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	7.230e+01 GWET	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		i -

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
10/29/2007 15:16	1000.0	GE09	RCL

Analyte		Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ba140		ND		1.1e+00	PCI/GWET	10/26/2007
Bi212		2.57e+02	3.0e+01		PCI/GWET	10/26/2007
Bi214	*	3.17e+00	4.5e-01		PCI/GWET	10/26/2007
Co60		ND		2.5e-01	PCI/GWET	10/26/2007
Cs137		ND		3.1e-01	PCI/GWET	10/26/2007
I131		ND		3.0e-01	PCI/GWET	10/26/2007
K40		3.88e+01	4.7e+00		PCI/GWET	10/26/2007
Pb212		2.39e+02	2.7e+01		PCI/GWET	10/26/2007
Pb214	*	3.29e+00	4.4e-01		PCI/GWET	10/26/2007
Ra223	*	4.77e+01	5.5e+00		PCI/GWET	10/26/2007
Ra224		2.48e+02	2.9e+01		PCI/GWET	10/26/2007
Ra226	*	1.19e+01	4.3e+00		PCI/GWET	10/26/2007
Ra228	·	2.53e+02	2.9e+01		PCI/GWET	10/26/2007
Rn220		2.77e+02	9.0e+01		PCI/GWET	10/26/2007
Th227		2.00e+00	1.4e+00		PCI/GWET	10/26/2007
Th228		2.55e+02	4.8e+01		PCI/GWET	10/26/2007
T1208		7.59e+01	8.7e+00		PCI/GWET	10/26/2007
U235	*	7.76e-01	2.7e-01		PCI/GWET	10/26/2007

ANALYTICAL RESULTS

SDG #0700040

SAMPLE ANALYSIS REPORT

Sample #:	A7.06958X	QC batch #:	0004714M
Matrix:	SOIL	Assay batch #:	0011981H
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	7.270e+01 GWET	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA .
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
10/29/2007 15:16	1000.0	GE10	RCL

Analyte		Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Bi212		9.95e+00	2.1e+00		PCI/GWET	10/26/2007
Bi214	*	3.24e+02	3.7e+01		PCI/GWET	10/26/2007
Co60		ND		3.5e-01	PCI/GWET	10/26/2007
Cs137		1.63e-01	1.1e-01		PCI/GWET	10/26/2007
I131		ND		3.0e-01	PCI/GWET	10/26/2007
K40		4.25e+00	1.5e+00		PCI/GWET	10/26/2007
Pb211		3.36e+01	5.1e+00		PCI/GWET	10/26/2007
Pb212		8.28e+00	9.8e-01		PCI/GWET	10/26/2007
Pb214	*	3.59e+02	4.1e+01		PCI/GWET	10/26/2007
Ra223	*	3.16e+01	3.7e+00		PCI/GWET	10/26/2007
Ra224		5.00e+00	3.6e+00		PCI/GWET	10/26/2007
Ra226	*	7.30e+02	8.4e+01		PCI/GWET	10/26/2007
Ra228		8.46e+00	1.1e+00		PCI/GWET	10/26/2007
Rn219		3.06e+01	3.6e+00		PCI/GWET	10/26/2007
Th227		2.17e+01	2.6e+00		PCI/GWET	10/26/2007
T1208		2.46e+00	3.1e-01		PCI/GWET	10/26/2007
U235	*	4.35e+01	5.0e+00		PCI/GWET	10/26/2007

ANALYTICAL RESULTS

SDG #0700040

SAMPLE ANALYSIS REPORT

Sample #:	A7.06959Y	QC batch #:	0004714M
Matrix:	SOIL	Assay batch #:	0011981H
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	9.160e+01 GWET	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
10/29/2007 15:16	1000.0	GE11	RCL

Analyte		Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ba140		ND		3.5e-01	PCI/GWET	10/26/2007
Bi212		5.26e+01	6.1e+00		PCI/GWET	10/26/2007
Bi214	*	2.63e+00	3.2e-01		PCI/GWET	10/26/2007
Co60		ND		8.6e-02	PCI/GWET	10/26/2007
Cs137		ND		1 1e-01	PCI/GWET	10/26/2007
I131		ND		1.0e-01	PCI/GWET	10/26/2007
K40		8.77e+00	1.1e+00		PCI/GWET	10/26/2007
Pb212		4.85e+01	5.6e+00		PCI/GWET	10/26/2007
Pb214	*	2.80e+00	3.3e-01		PCI/GWET	10/26/2007
Ra223	*	9.25e+00	1.1e+00		PCI/GWET	10/26/2007
Ra224		4.74e+01	5.5e+00		PCI/GWET	10/26/2007
Ra226	*	5.95e+00	1.1e+00		PCI/GWET	10/26/2007
Ra228		5.10e+01	5.9e+00		PCI/GWET	10/26/2007
Rn220		6.83e+01	3.1e+01		PCI/GWET	10/26/2007
Th228		5.01e+01	1.5e+01		PCI/GWET	10/26/2007
T1208		1.51e+01	1.7e+00		PCI/GWET	10/26/2007
U235	*	3.76e-01	7.1e-02		PCI/GWET	10/26/2007

ANALYTICAL RESULTS

SDG #0700040

SAMPLE ANALYSIS REPORT

Sample #:	A7.06960Q	QC batch #:	0004714M
Matrix:	SOIL	Assay batch #:	0011981H
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	7.160e+01 GWET	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
10/29/2007 15:16	1000.0	GE12	RCL

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ba140	ND		2.1e+00	PCI/GWET	10/26/2007
Bi212	4.14e+02	4.8e+01		PCI/GWET	10/26/2007
Bi214 *	1.72e+01	2.0e+00		PCI/GWET	10/26/2007
Co60	ND		4.2e-01	PCI/GWET	10/26/2007
Cs137	ND		5.9e-01	PCI/GWET	10/26/2007
1131	ND		6.0e-01	PCI/GWET	10/26/2007
K40	ND		3.7e+00	PCI/GWET	10/26/2007
Pb212	3.77e+02	4.3e+01		PCI/GWET	10/26/2007
Pb214 *	1.82e+01	2.1e+00		PCI/GWET	10/26/2007
Ra224	3.83e+02	4.4e+01		PCI/GWET	10/26/2007
Ra226 *	7.00e+01	9.6e+00		PCI/GWET	10/26/2007
Ra228	4.13e+02	4.7e+01		PCI/GWET	10/26/2007
Rn220	4.42e+02	1.7e+02		PCI/GWET	10/26/2007
Th234 *	1.59e+01	3.9e+00		PCI/GWET	10/26/2007
T1208	1.23e+02	1.4e+01		PCI/GWET	10/26/2007
U235 *	4.43e+00	6.1e-01		PCI/GWET	10/26/2007

ANALYTICAL RESULTS

SDG #0700040

SAMPLE ANALYSIS REPORT

Sample #:	A7.06960Q	QC batch #:	0004714M
Matrix:	SOIL	Assay batch #:	0011981H
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	7.160e+01 GWET	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	DUP
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
10/30/2007 15:08	1000.0	GE11	RCL

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ba140	ND		1.1e+00	PCI/GWET	10/26/2007
Bi212	3.82e+02	4.4e+01		PCI/GWET	10/26/2007
Bi214 *	1.62e+01	1.9e+00		PCI/GWET	10/26/2007
Co60	ND		2.5e-01	PCI/GWET	10/26/2007
Cs137	ND		3.1e-01	PCI/GWET	10/26/2007
I131	ND		3.2e-01	PCI/GWET	10/26/2007
K40	3.35e+01	4.0e+00		PCI/GWET	10/26/2007
Pb212	3.41e+02	3.9e+01		PCI/GWET	10/26/2007
Pb214 *	1.69e+01	2.0e+00		PCI/GWET	10/26/2007
Ra223 *	6.91e+01	8.0e+00		PCI/GWET	10/26/2007
Ra224	3.61e+02	4.2e+01		PCI/GWET	10/26/2007
Ra226 *	5.59e+01	7.0e+00		PCI/GWET	10/26/2007
Ra228	3.79e+02	4.4e+01		PCI/GWET	10/26/2007
Rn220	3.76e+02	1.1e+02		PCI/GWET	10/26/2007
Th228	3.83e+02	6.1e+01		PCI/GWET	10/26/2007
Th234 *	2.74e+01	4.1e+00		PCI/GWET	10/26/2007
T1208	1.10e+02	1.3e+01		PCI/GWET	10/26/2007
U235 *	3.35e+00	4.2e-01		PCI/GWET	10/26/2007

ANALYTICAL RESULTS

SDG #0700040

SAMPLE ANALYSIS REPORT

Sample #:	LCS-00529749Z	QC batch #:	0004714M
Matrix:	N/A	Assay batch #:	0011981H
Sample type:	N/A	Prep procedure:	N/A
Amount analyzed:	1.000e+00 SAMP	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	RCL
Ash/dry weight:	N/A	QC type:	LCS
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time Duration (min)		Detector ID	Operator
11/02/2007 14:27	500.0	GE13	

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	MDC	Unit	Date
Ba133	4.05e+01	5.4e+00		PCI	11/01/2006
Ba140	ND		1.1e+04	PCI	11/01/2006
Bi212	2.03e+01	2.8e+01		PCI	11/01/2006
Bi214 *	1.69e+01	5.0e+00		PCI	11/01/2006
C060	3.03e+01	4.1e+00		PCI	11/01/2006
Cs137	4.86e+01	6.4e+00		PCI	11/01/2006
Eu152	3.70e+01	6.2e+00		PCI	11/01/2006
I131	ND		3.3e+03	PCI	11/01/2006
K40	2.02e+02	3.7e+01		PCI	11/01/2006
Pb212	2.12e+01	4.6e+00		PCI	11/01/2006
Pb214 *	2.11e+01	5.0e+00		PCI	11/01/2006
Ra226 *	1.06e+02	4.5e+01		PCI	11/01/2006
Ra228	2.84e+01	8.3e+00		PCI	11/01/2006
T1208	8.56e+00	3.5e+00		PCI	11/01/2006
U235	ND		1.9e+01	PCI	11/01/2006

ANALYTICAL RESULTS

SDG 0700040

QC BATCH SUMMARY

QC batch #:	0004714M
Preparation procedure:	N/A
Analysis procedure:	NAREL GAM-01

NAREL Sample #	QC Type	Yield (%)	$\pm 2 \sigma$ Uncertainty (%)	Analyst
A7.06957W		N/A		RCL
A7.06958X		N/A		RCL
A7.06959Y	}	N/A		RCL
A7.06960Q	1	N/A		RCL
A7.06960Q	DUP	N/A		RCL
LCS-00529749Z *	LCS	N/A		RCL

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

National Air and Radiation Environmental Laboratory QC Batch Report

QC Batch #: 0004714M Analytical Procedure: NAREL GAM-01

LABORATORY DUPLICATES (PCI/GWET)

Sample ID	Nuclide	Original ± 2 0	Duplicate ± 2σ	RPD	Z
A7.06960Q A7.06960Q A7.06960Q A7.06960Q A7.06960Q	BA140 BI212 CO60 CS137	4.14e+02 ± 4.8e+01	3.82e+02 ± 4.4e+01	8.04	-0.99 ок
A7.069600 A7.069600 A7.069600 A7.069600 A7.069600 A7.069600 A7.069600	K40 PB212 RA224 RA228 RN220 TL208	3.77e+02 ± 4.3e+01 3.83e+02 ± 4.4e+01 4.13e+02 ± 4.7e+01 4.42e+02 ± 1.7e+02 1.23e+02 ± 1.4e+01	3.35e+01 ± 4.0e+00 3.41e+02 ± 3.9e+01 3.61e+02 ± 4.2e+01 3.79e+02 ± 4.4e+01 3.76e+02 ± 1.1e+02 1.10e+02 ± 1.3e+01	10.03 5.91 8.59 16.14 11.16	-1.23 OK -0.73 OK -1.06 OK -0.64 OK -1.37 OK

LAB CONTROL SAMPLES (PCI)

Sample ID	Nuclide	Amt Added ± 2 σ	Measured $\pm \pm \sigma$	%R	Z	
005297 49 Z	BA133	3.75e+01 ± 2.1%	4.05e+01 ± 4.4e+00	108.08	1.12 OK	
00529749Z 00529749Z	BA140 BI212	NO SPIKE DATA NO SPIKE DATA				
00529749Z 00529749Z	CO60 CS137	2.66e+01 ± 2.1% 4.18e+01 ± 2.1%	3.03e+01 ± 4.ie+00 4.86e+01 ·4e+00	113.95 116.27	1.80 OK 2.10 OK	
00529749z 00529749z	EU152 I131	3.45e+01 ± 2.1% NO SPIKE DATA	3.70e+01 ± +.2+2+00	107.25	0.81 OK	
00529749Z	K40 PB212	NO SPIKE DATA				
00529749Z	RA228	NO SPIKE DATA				
005297492 005297492	U235	NO SPIKE DATA				
$\sum Q + Q - Q$						
Analyst:	50 h	have for	<u>→</u> /-2	200	2	
Lowry, Robert C. \sim						
QA Officer: 11/2/07						