U.S.ENVIRONMENTAL PROTECTION AGENCY
NATIONAL ANALYTICAL RADIATION ENVIRONMENTAL LABORATORY
540 S. MORRIS AVE., MONTGOMERY, AL 36115
TH ANALYSES

REPORT OF SAMPLE DELIVERY GROUP #1900152

Project:	Canadian Radium and Uranium 9/19
Analysis method:	Isotopic Thorium Using NaOH Fusion
Report ID:	1900152-TH
Report type:	Original
Date reported:	11/25/2019
Total pages in report:	32

SAMPLES

NAREL Sample #	Client Sample ID	Location	Matrix	Date Collected	Date Received
B9.10537D	C008-SB001-036048-01	NY:MT. KISCO	SOIL	09/08/2019	09/10/2019
B9.10538E	C008-SB001-036048-02	NY:MT. KISCO	SOIL	09/08/2019	09/10/2019
B9.10539F	C008-SB001-108120-01	NY:MT. KISCO	SOIL	09/08/2019	09/10/2019
B9.10540Y	C008-SB002-024036-01	NY:MT. KISCO	SOIL	09/08/2019	09/10/2019
B9.10541Z	C008-SB002-060072-01	NY:MT. KISCO	SOIL	09/08/2019	09/10/2019
B9.10542A	C008-SB003-000012-01	NY:MT. KISCO	SOIL	09/08/2019	09/10/2019
B9.10543B	C008-SB003-072084-01	NY:MT. KISCO	SOIL	09/08/2019	09/10/2019
B9.10544C	C008-SB004-012024-01	NY:MT. KISCO	SOIL	09/08/2019	09/10/2019
B9.10545D	C008-SB004-084096-01	NY:MT. KISCO	SOIL	09/08/2019	09/10/2019
B9.10546E	C008-SB005-036048-01	NY:MT. KISCO	SOIL	09/08/2019	09/10/2019
B9.10547F	C008-SB005-060072-01	NY:MT. KISCO	SOIL	09/08/2019	09/10/2019
B9.10548G	C008-SB006-024036-01	NY:MT. KISCO	SOIL	09/08/2019	09/10/2019
B9.10549H	C008-SB006-060072-01	NY:MT. KISCO	SOIL	09/09/2019	09/10/2019
B9.10550A	C008-SB007-024036-01	NY:MT. KISCO	SOIL	09/09/2019	09/10/2019
B9.10551B	C008-SB007-060072-01	NY:MT. KISCO	SOIL	09/09/2019	09/10/2019
B9.10552C	C008-SB008-048060-01	NY:MT. KISCO	SOIL	09/09/2019	09/10/2019
B9.10553D	C008-SB008-084096-01	NY:MT. KISCO	SOIL	09/09/2019	09/10/2019
B9.10554E	C008-SB009-000012-01	NY:MT. KISCO	SOIL	09/09/2019	09/10/2019
B9.10555F	C008-SB009-072084-01	NY:MT. KISCO	SOIL	09/09/2019	09/10/2019

EXCEPTIONS

1. **Packaging and shipping** – Upon inspection at NAREL, it was discovered that the lid on sample B9.10551 was off the container. Client was informed and instructed NAREL to proceed with analysis of the sample as received.
2. **Documentation** – No problems were observed.
3. **Sample preparation** – No problems were encountered.
4. **Analysis** – No problems were encountered.
5. **Holding times** – No holding times were specified.

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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 B9.10543 which was below NAREL's lower acceptance criterion. The yield was approved, because it met NAREL's criteria for approving low yields, i.e., the analyst noted that some of the sample was spilled during analysis, and the relative standard uncertainty of the yield was below 7.5%.Therefore, the results of the analysis of B9.10543 are reported in this data package.
3. **Instruments** – Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

OTHER INFORMATION

Since the ^{230}Th and ^{229}Th peaks can be difficult to resolve because of their proximity to each other, the alpha spectrometry analyst examines each spectrum closely and adjusts the regions of interest manually when a shift of the tracer peak is observed or when necessary to improve the separation between clearly identifiable peaks. Such manual adjustments are always documented.

ACCREDITATION

NAREL is accredited by the Oregon Environmental Laboratory Accreditation Program (ORELAP) to the TNI standard. NAREL maintains accreditation for all its radiological analyses except the following:

- Analyses of drinking water
- Gross alpha and gross beta of solid matrices, including swipes
- Tritium analysis of solid matrices, including swipes
- Analyses for Ra-226 by method NAREL RA-07-EC
- Analyses for Am-241 by method NAREL ACT-02F
- Curium-244/243

CERTIFICATION

I certify that this data report complies with the terms and conditions of the Project Acceptance Form and/or the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Director of the Center for Environmental Radioanalytical Laboratory Science and the NAREL Quality Assurance Manager, or their designees, as verified by the following signatures.

for Velinda Herbert — 11/25/19
Quality Assurance Manager, NAREL — Date

Cynthia White — 11-25-19
Director, Center for Environmental Radioanalytical Laboratory Science — Date

If you have questions about the data, please contact Cynthia White (white.cindy@epa.gov).

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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, or blank spike
LCX	Laboratory control sample duplicate
MS	Matrix spike
MSD	Matrix spike duplicate (not currently analyzed)
RBK	Method blank
STD	External standard (used for ^{228}Ra yield determination)

QUALITY INDICATORS

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

RADIOCHEMICAL DATA

Radiochemical analyses usually require the subtraction of an instrument background measurement result from a gross sample measurement result. 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 importance, as for example in the evaluation of trends or the comparison of two groups of samples.

To the extent practical, 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 measurement result, uncertainty, and MDC are always expressed in the same unit of measurement.

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. Generally 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.

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 of most analyses. An exception is the use of %R in the evaluation of gross alpha matrix spike results. A gross alpha matrix spike result is considered acceptable if either $|Z| \leq 3$ or $60 \leq \%R \leq 110$.

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Chain of Custody Forms

USEPA
DateShipped: 9/9/2019
CarrierName: FedEx
AirbillNo: 7761-9080-7836

CHAIN OF CUSTODY RECORD
Canadian Radium & Uranium Corp/NY
Contact Name: Bernard Nwosu
Contact Phone: 908-565-2980

No: 2-090919-0032-0030-0001
Lab: NAREL
Lab Contact: Tonya Hudson
Lab Phone: 343-270-3433

Lab #	Sample #	Location	Matrix	Analyses	Sample Date	Sample Time	Numb Cont	Container	Preservative	Lab QC
	C008-SB001-036048-01	C008-SB001	Soil	Alpha Spec (U, Th) & Gamma Spec	9/8/2019	14:10	2	32 oz poly	None	Y 89.10537D
	C008-SB001-036048-02	C008-SB001	Soil	Alpha Spec (U, Th) & Gamma Spec	9/8/2019	14:10	1	32 oz poly	None	N 89.10538E
	C008-SB001-108120-01	C008-SB001	Soil	Alpha Spec (U, Th) & Gamma Spec	9/8/2019	14:15	1	32 oz poly	None	N 89.10539F
	C008-SB002-024036-01	C008-SB002	Soil	Alpha Spec (U, Th) & Gamma Spec	9/8/2019	15:25	1	32 oz poly	None	N 89.10540Y
	C008-SB002-060072-01	C008-SB002	Soil	Alpha Spec (U, Th) & Gamma Spec	9/8/2019	15:30	1	32 oz poly	None	N 89.10541Z
	C008-SB003-000012-01	C008-SB003	Soil	Alpha Spec (U, Th) & Gamma Spec	9/8/2019	16:15	1	32 oz poly	None	N 89.10542A
	C008-SB003-072084-01	C008-SB003	Soil	Alpha Spec (U, Th) & Gamma Spec	9/8/2019	16:20	1	32 oz poly	None	N 89.10543B
	C008-SB004-012024-01	C008-SB004	Soil	Alpha Spec (U, Th) & Gamma Spec	9/8/2019	16:50	1	32 oz poly	None	N 89.10544C
	C008-SB004-084096-01	C008-SB004	Soil	Alpha Spec (U, Th) & Gamma Spec	9/8/2019	16:55	1	32 oz poly	None	N 89.10545D
	C008-SB005-036048-01	C008-SB005	Soil	Alpha Spec (U, Th) & Gamma Spec	9/8/2019	17:35	1	32 oz poly	None	N 89.10546E
	C008-SB005-060072-01	C008-SB005	Soil	Alpha Spec (U, Th) & Gamma Spec	9/8/2019	17:40	1	32 oz poly	None	N 89.10547F
	C008-SB006-024036-01	C008-SB006	Soil	Alpha Spec (U, Th) & Gamma Spec	9/8/2019	18:15	1	32 oz poly	None	N 89.10548G
	C008-SB006-060072-01	C008-SB006	Soil	Alpha Spec (U, Th) & Gamma Spec	9/8/2019	18:20	1	32 oz poly	None	N 89.10549H
	C008-SB007-024036-01	C008-SB007	Soil	Alpha Spec (U, Th) & Gamma Spec	9/9/2019	08:20	1	32 oz poly	None	N 89.10550A
	C008-SB007-060072-01	C008-SB007	Soil	Alpha Spec (U, Th) & Gamma Spec	9/9/2019	08:25	1	32 oz poly	None	N 89.10551B
	C008-SB008-048060-01	C008-SB008	Soil	Alpha Spec (U, Th) & Gamma Spec	9/9/2019	09:35	1	32 oz poly	None	N 89.10552C
	C008-SB008-084096-01	C008-SB008	Soil	Alpha Spec (U, Th) & Gamma Spec	9/9/2019	09:40	1	32 oz poly	None	N 89.10553D
	C008-SB009-000012-01	C008-SB009	Soil	Alpha Spec (U, Th) & Gamma Spec	9/9/2019	10:00	1	32 oz poly	None	N 89.10554E
	C008-SB009-072084-01	C008-SB009	Soil	Alpha Spec (U, Th) & Gamma Spec	9/9/2019	10:05	1	32 oz poly	None	N 89.10555F

Special Instructions: Please email results to s.sumbaly@westonsolutions.com and ben.nwosu@westonsolutions.com. Samples to be run for isotopic thorium via NAREL ACT-02FTH, Isotopic Uranium via NAREL ACT-02F-U, other gamma isotopes via NAREL GM-01-RA, and Radium-226 and Radium-228 via 21-day ingrowth. 60 day TAT.

SAMPLES TRANSFERRED FROM

CHAIN OF CUSTODY #

Items/Reason	Relinquished by (Signature and Organization)	Date/Time	Received by (Signature and Organization)	Date/Time	Sample Condition Upon Receipt
All Samples/ All Analysis	(Weston)	9/9/19 1600	Zachary Chambers	9/10/19 0920	Most Good. 1 sample missing a lid

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL ANALYTICAL RADIATION ENVIRONMENTAL LABORATORY

SDG #1900152

ANALYSIS SUMMARY

Analysis method: NAREL ACT-02F-TH
Title: Isotopic Thorium Using NaOH Fusion

NAREL Sample #	Client Sample ID	QC Type	Date Completed	Preparation Batch #	Assay Batch #
B9.10537D	C008-SB001-036048-01		11/15/2019	0016819K	0024716K
B9.10537D	C008-SB001-036048-01	DUP	11/15/2019	0016819K	0024716K
B9.10538E	C008-SB001-036048-02		11/15/2019	0016819K	0024716K
B9.10539F	C008-SB001-108120-01		11/15/2019	0016819K	0024716K
B9.10540Y	C008-SB002-024036-01		11/15/2019	0016819K	0024716K
B9.10541Z	C008-SB002-060072-01		11/15/2019	0016819K	0024716K
B9.10542A	C008-SB003-000012-01		11/15/2019	0016819K	0024716K
B9.10543B	C008-SB003-072084-01		11/15/2019	0016819K	0024716K
B9.10544C	C008-SB004-012024-01		11/15/2019	0016819K	0024716K
B9.10545D	C008-SB004-084096-01		11/15/2019	0016819K	0024716K
B9.10546E	C008-SB005-036048-01		11/20/2019	0016830E	0024737Q
B9.10546E	C008-SB005-036048-01	DUP	11/20/2019	0016830E	0024737Q
B9.10547F	C008-SB005-060072-01		11/20/2019	0016830E	0024737Q
B9.10548G	C008-SB006-024036-01		11/20/2019	0016830E	0024737Q
B9.10549H	C008-SB006-060072-01		11/20/2019	0016830E	0024737Q
B9.10550A	C008-SB007-024036-01		11/20/2019	0016830E	0024737Q
B9.10551B	C008-SB007-060072-01		11/20/2019	0016830E	0024737Q
B9.10552C	C008-SB008-048060-01		11/20/2019	0016830E	0024737Q
B9.10553D	C008-SB008-084096-01		11/20/2019	0016830E	0024737Q
B9.10554E	C008-SB009-000012-01		11/20/2019	0016830E	0024737Q
B9.10555F	C008-SB009-072084-01		11/20/2019	0016830E	0024737Q
LCS-00786562X *		LCS	11/15/2019	0016819K	0024716K
RBK-00786561W *		RBK	11/15/2019	0016819K	0024716K
LCS-00786691F *		LCS	11/20/2019	0016830E	0024737Q
RBK-00786690E *		RBK	11/20/2019	0016830E	0024737Q

* 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 ANALYTICAL RADIATION ENVIRONMENTAL LABORATORY

SDG #1900152

SAMPLE ANALYSIS REPORT

Lab sample #:	B9.10537D	Amount analyzed:	1.009e+00 GASH
Client sample ID:	C008-SB001-036048-01	Preparation batch #:	0016819K
Matrix:	SOIL	Assay batch #:	0024716K
Collected:	2019-09-08 14:10 EDT	Prep procedure:	N/A
Sample type:	SAM	Analysis method:	NAREL ACT-02F-TH
Dry/wet weight:	94.64 %	Analyst:	SPK
Ash/dry weight:	95.64 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/14/2019 15:22	1000.0	AS81	CEB

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	DLC	MDC	Unit	Reference Date
Th227	2.93e-02	2.6e-02	6.5e-03	2.5e-02	PCI/GDRY	11/14/2019 15:22 CST
Th228	6.32e-01	1.0e-01	1.1e-02	2.8e-02	PCI/GDRY	11/14/2019 15:22 CST
Th230	6.01e-01	1.0e-01	2.8e-02	6.2e-02	PCI/GDRY	11/14/2019 15:22 CST
Th232	5.73e-01	9.6e-02	4.8e-03	1.6e-02	PCI/GDRY	11/14/2019 15:22 CST

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U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL ANALYTICAL RADIATION ENVIRONMENTAL LABORATORY

SDG #1900152

SAMPLE ANALYSIS REPORT

Lab sample #:	B9.10537D	Amount analyzed:	1.023e+00 GASH
Client sample ID:	C008-SB001-036048-01	Preparation batch #:	0016819K
Matrix:	SOIL	Assay batch #:	0024716K
Collected:	2019-09-08 14:10 EDT	Prep procedure:	N/A
Sample type:	SAM	Analysis method:	NAREL ACT-02F-TH
Dry/wet weight:	94.64 %	Analyst:	SPK
Ash/dry weight:	95.64 %	QC type:	DUP
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/14/2019 15:22	1000.0	AS82	CEB

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	DLC	MDC	Unit	Reference Date
Th227	1.87e-02	2.3e-02	9.9e-03	3.1e-02	PCI/GDRY	11/14/2019 15:22 CST
Th228	5.11e-01	9.1e-02	6.9e-03	2.0e-02	PCI/GDRY	11/14/2019 15:22 CST
Th230	6.94e-01	1.2e-01	2.8e-02	6.2e-02	PCI/GDRY	11/14/2019 15:22 CST
Th232	5.06e-01	9.0e-02	5.0e-03	1.7e-02	PCI/GDRY	11/14/2019 15:22 CST

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U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL ANALYTICAL RADIATION ENVIRONMENTAL LABORATORY

SDG #1900152

SAMPLE ANALYSIS REPORT

Lab sample #:	B9.10538E	Amount analyzed:	1.030e+00 GASH
Client sample ID:	C008-SB001-036048-02	Preparation batch #:	0016819K
Matrix:	SOIL	Assay batch #:	0024716K
Collected:	2019-09-08 14:10 EDT	Prep procedure:	N/A
Sample type:	SAM	Analysis method:	NAREL ACT-02F-TH
Dry/wet weight:	93.01 %	Analyst:	SPK
Ash/dry weight:	95.21 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/14/2019 15:22	1000.0	AS83	CEB

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	DLC	MDC	Unit	Reference Date
Th227	6.03e-02	3.9e-02	7.3e-03	2.8e-02	PCI/GDRY	11/14/2019 15:22 CST
Th228	5.97e-01	1.0e-01	1.1e-02	2.9e-02	PCI/GDRY	11/14/2019 15:22 CST
Th230	6.43e-01	1.1e-01	2.8e-02	6.3e-02	PCI/GDRY	11/14/2019 15:22 CST
Th232	5.67e-01	1.0e-01	7.8e-03	2.3e-02	PCI/GDRY	11/14/2019 15:22 CST

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U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL ANALYTICAL RADIATION ENVIRONMENTAL LABORATORY

SDG #1900152

SAMPLE ANALYSIS REPORT

Lab sample #:	B9.10539F	Amount analyzed:	1.004e+00 GASH
Client sample ID:	C008-SB001-108120-01	Preparation batch #:	0016819K
Matrix:	SOIL	Assay batch #:	0024716K
Collected:	2019-09-08 14:15 EDT	Prep procedure:	N/A
Sample type:	SAM	Analysis method:	NAREL ACT-02F-TH
Dry/wet weight:	59.03 %	Analyst:	SPK
Ash/dry weight:	91.71 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/14/2019 15:22	1000.0	AS84	CEB

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	DLC	MDC	Unit	Reference Date
Th227	2.50e-02	2.5e-02	6.7e-03	2.5e-02	PCI/GDRY	11/14/2019 15:22 CST
Th228	8.17e-01	1.2e-01	4.1e-03	1.5e-02	PCI/GDRY	11/14/2019 15:22 CST
Th230	7.60e-01	1.2e-01	2.7e-02	6.1e-02	PCI/GDRY	11/14/2019 15:22 CST
Th232	7.56e-01	1.2e-01	6.2e-03	1.9e-02	PCI/GDRY	11/14/2019 15:22 CST

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U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL ANALYTICAL RADIATION ENVIRONMENTAL LABORATORY

SDG #1900152

SAMPLE ANALYSIS REPORT

Lab sample #:	B9.10540Y	Amount analyzed:	1.005e+00 GASH
Client sample ID:	C008-SB002-024036-01	Preparation batch #:	0016819K
Matrix:	SOIL	Assay batch #:	0024716K
Collected:	2019-09-08 15:25 EDT	Prep procedure:	N/A
Sample type:	SAM	Analysis method:	NAREL ACT-02F-TH
Dry/wet weight:	88.87 %	Analyst:	SPK
Ash/dry weight:	86.80 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/14/2019 15:22	1000.0	AS85	CEB

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	DLC	MDC	Unit	Reference Date
Th227	4.90e-02	3.5e-02	9.8e-03	3.1e-02	PCI/GDRY	11/14/2019 15:22 CST
Th228	9.51e-01	1.4e-01	6.8e-03	2.0e-02	PCI/GDRY	11/14/2019 15:22 CST
Th230	1.25e+00	1.7e-01	2.6e-02	5.9e-02	PCI/GDRY	11/14/2019 15:22 CST
Th232	9.06e-01	1.3e-01	4.9e-03	1.6e-02	PCI/GDRY	11/14/2019 15:22 CST

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U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL ANALYTICAL RADIATION ENVIRONMENTAL LABORATORY

SDG #1900152

SAMPLE ANALYSIS REPORT

Lab sample #:	B9.10541Z	Amount analyzed:	1.006e+00 GASH
Client sample ID:	C008-SB002-060072-01	Preparation batch #:	0016819K
Matrix:	SOIL	Assay batch #:	0024716K
Collected:	2019-09-08 15:30 EDT	Prep procedure:	N/A
Sample type:	SAM	Analysis method:	NAREL ACT-02F-TH
Dry/wet weight:	84.06 %	Analyst:	SPK
Ash/dry weight:	90.68 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/14/2019 15:22	1000.0	AS86	CEB

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	DLC	MDC	Unit	Reference Date
Th227	6.71e-02	4.0e-02	6.9e-03	2.6e-02	PCI/GDRY	11/14/2019 15:22 CST
Th228	6.41e-01	1.1e-01	7.9e-03	2.2e-02	PCI/GDRY	11/14/2019 15:22 CST
Th230	7.41e-01	1.2e-01	2.7e-02	6.1e-02	PCI/GDRY	11/14/2019 15:22 CST
Th232	6.21e-01	1.0e-01	7.3e-03	2.1e-02	PCI/GDRY	11/14/2019 15:22 CST

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U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL ANALYTICAL RADIATION ENVIRONMENTAL LABORATORY

SDG #1900152

SAMPLE ANALYSIS REPORT

Lab sample #:	B9.10542A	Amount analyzed:	1.018e+00 GASH
Client sample ID:	C008-SB003-000012-01	Preparation batch #:	0016819K
Matrix:	SOIL	Assay batch #:	0024716K
Collected:	2019-09-08 16:15 EDT	Prep procedure:	N/A
Sample type:	SAM	Analysis method:	NAREL ACT-02F-TH
Dry/wet weight:	91.27 %	Analyst:	SPK
Ash/dry weight:	96.18 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/14/2019 15:23	1000.0	AS88	CEB

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	DLC	MDC	Unit	Reference Date
Th227	1.23e-02	2.2e-02	1.2e-02	3.7e-02	PCI/GDRY	11/14/2019 15:23 CST
Th228	7.03e-01	1.1e-01	1.1e-02	2.9e-02	PCI/GDRY	11/14/2019 15:23 CST
Th230	4.93e-01	9.6e-02	2.9e-02	6.4e-02	PCI/GDRY	11/14/2019 15:23 CST
Th232	6.37e-01	1.1e-01	7.5e-03	2.2e-02	PCI/GDRY	11/14/2019 15:23 CST

ED_006395_00002088-00012

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL ANALYTICAL RADIATION ENVIRONMENTAL LABORATORY

SDG #1900152

SAMPLE ANALYSIS REPORT

Lab sample #:	B9.10543B	Amount analyzed:	9.996e-01 GASH
Client sample ID:	C008-SB003-072084-01	Preparation batch #:	0016819K
Matrix:	SOIL	Assay batch #:	0024716K
Collected:	2019-09-08 16:20 EDT	Prep procedure:	N/A
Sample type:	SAM	Analysis method:	NAREL ACT-02F-TH
Dry/wet weight:	81.19 %	Analyst:	SPK
Ash/dry weight:	73.08 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/14/2019 15:22	1000.0	AS97	CEB

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	DLC	MDC	Unit	Reference Date
Th227	1.68e-01	8.6e-02	1.2e-02	4.7e-02	PCI/GDRY	11/14/2019 15:22 CST
Th228	1.94e+00	3.2e-01	1.7e-02	4.6e-02	PCI/GDRY	11/14/2019 15:22 CST
Th230	1.87e+00	3.2e-01	2.9e-02	6.9e-02	PCI/GDRY	11/14/2019 15:22 CST
Th232	2.14e+00	3.5e-01	1.1e-02	3.4e-02	PCI/GDRY	11/14/2019 15:22 CST

ED_006395_00002088-00013

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL ANALYTICAL RADIATION ENVIRONMENTAL LABORATORY

SDG #1900152

SAMPLE ANALYSIS REPORT

Lab sample #:	B9.10544C	Amount analyzed:	1.037e+00 GASH
Client sample ID:	C008-SB004-012024-01	Preparation batch #:	0016819K
Matrix:	SOIL	Assay batch #:	0024716K
Collected:	2019-09-08 16:50 EDT	Prep procedure:	N/A
Sample type:	SAM	Analysis method:	NAREL ACT-02F-TH
Dry/wet weight:	89.22 %	Analyst:	SPK
Ash/dry weight:	97.28 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/14/2019 15:22	1000.0	AS98	CEB

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	DLC	MDC	Unit	Reference Date
Th227	4.03e-02	3.2e-02	1.0e-02	3.2e-02	PCI/GDRY	11/14/2019 15:22 CST
Th228	8.44e-01	1.3e-01	1.0e-02	2.7e-02	PCI/GDRY	11/14/2019 15:22 CST
Th230	6.19e-01	1.1e-01	2.9e-02	6.4e-02	PCI/GDRY	11/14/2019 15:22 CST
Th232	8.38e-01	1.3e-01	7.5e-03	2.2e-02	PCI/GDRY	11/14/2019 15:22 CST

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL ANALYTICAL RADIATION ENVIRONMENTAL LABORATORY

SDG #1900152

SAMPLE ANALYSIS REPORT

Lab sample #:	B9.10545D	Amount analyzed:	1.029e+00 GASH
Client sample ID:	C008-SB004-084096-01	Preparation batch #:	0016819K
Matrix:	SOIL	Assay batch #:	0024716K
Collected:	2019-09-08 16:55 EDT	Prep procedure:	N/A
Sample type:	SAM	Analysis method:	NAREL ACT-02F-TH
Dry/wet weight:	48.26 %	Analyst:	SPK
Ash/dry weight:	78.67 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/14/2019 15:22	1000.0	AS99	CEB

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	DLC	MDC	Unit	Reference Date
Th227	5.92e-02	3.9e-02	1.2e-02	3.6e-02	PCI/GDRY	11/14/2019 15:22 CST
Th228	1.67e+00	2.2e-01	7.0e-03	2.1e-02	PCI/GDRY	11/14/2019 15:22 CST
Th230	1.49e+00	2.0e-01	2.5e-02	5.6e-02	PCI/GDRY	11/14/2019 15:22 CST
Th232	1.76e+00	2.3e-01	6.3e-03	1.9e-02	PCI/GDRY	11/14/2019 15:22 CST

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U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL ANALYTICAL RADIATION ENVIRONMENTAL LABORATORY

SDG #1900152

SAMPLE ANALYSIS REPORT

Lab sample #:	B9.10546E	Amount analyzed:	1.056e+00 GASH
Client sample ID:	C008-SB005-036048-01	Preparation batch #:	0016830E
Matrix:	SOIL	Assay batch #:	0024737Q
Collected:	2019-09-08 17:35 EDT	Prep procedure:	N/A
Sample type:	SAM	Analysis method:	NAREL ACT-02F-TH
Dry/wet weight:	90.31 %	Analyst:	SPK
Ash/dry weight:	88.79 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/19/2019 16:19	1000.0	AS80	MO

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	DLC	MDC	Unit	Reference Date
Th227	5.58e-02	3.3e-02	5.7e-03	2.2e-02	PCI/GDRY	11/19/2019 16:19 CST
Th228	6.84e-01	1.0e-01	1.2e-02	2.9e-02	PCI/GDRY	11/19/2019 16:19 CST
Th230	1.82e+00	2.2e-01	2.5e-02	5.5e-02	PCI/GDRY	11/19/2019 16:19 CST
Th232	7.35e-01	1.1e-01	5.3e-03	1.6e-02	PCI/GDRY	11/19/2019 16:19 CST

ED_006395_00002088-00016

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL ANALYTICAL RADIATION ENVIRONMENTAL LABORATORY

SDG #1900152

SAMPLE ANALYSIS REPORT

Lab sample #:	B9.10546E	Amount analyzed:	1.009e+00 GASH
Client sample ID:	C008-SB005-036048-01	Preparation batch #:	0016830E
Matrix:	SOIL	Assay batch #:	0024737Q
Collected:	2019-09-08 17:35 EDT	Prep procedure:	N/A
Sample type:	SAM	Analysis method:	NAREL ACT-02F-TH
Dry/wet weight:	90.31 %	Analyst:	SPK
Ash/dry weight:	88.79 %	QC type:	DUP
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/19/2019 16:19	1000.0	AS86	MO

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	DLC	MDC	Unit	Reference Date
Th227	6.01e-02	3.7e-02	6.7e-03	2.5e-02	PCI/GDRY	11/19/2019 16:19 CST
Th228	6.17e-01	1.0e-01	4.1e-03	1.5e-02	PCI/GDRY	11/19/2019 16:19 CST
Th230	1.45e+00	1.9e-01	2.7e-02	6.0e-02	PCI/GDRY	11/19/2019 16:19 CST
Th232	7.56e-01	1.2e-01	6.1e-03	1.9e-02	PCI/GDRY	11/19/2019 16:19 CST

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL ANALYTICAL RADIATION ENVIRONMENTAL LABORATORY

SDG #1900152

SAMPLE ANALYSIS REPORT

Lab sample #:	B9.10547F	Amount analyzed:	1.011e+00 GASH
Client sample ID:	C008-SB005-060072-01	Preparation batch #:	0016830E
Matrix:	SOIL	Assay batch #:	0024737Q
Collected:	2019-09-08 17:40 EDT	Prep procedure:	N/A
Sample type:	SAM	Analysis method:	NAREL ACT-02F-TH
Dry/wet weight:	81.14 %	Analyst:	SPK
Ash/dry weight:	90.29 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/19/2019 16:19	1000.0	AS88	MO

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	DLC	MDC	Unit	Reference Date
Th227	5.34e-02	3.6e-02	7.1e-03	2.7e-02	PCI/GDRY	11/19/2019 16:19 CST
Th228	9.66e-01	1.4e-01	9.7e-03	2.6e-02	PCI/GDRY	11/19/2019 16:19 CST
Th230	9.61e-01	1.5e-01	2.7e-02	6.1e-02	PCI/GDRY	11/19/2019 16:19 CST
Th232	9.84e-01	1.4e-01	6.5e-03	2.0e-02	PCI/GDRY	11/19/2019 16:19 CST

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U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL ANALYTICAL RADIATION ENVIRONMENTAL LABORATORY

SDG #1900152

SAMPLE ANALYSIS REPORT

Lab sample #:	B9.10548G	Amount analyzed:	1.021e+00 GASH
Client sample ID:	C008-SB006-024036-01	Preparation batch #:	0016830E
Matrix:	SOIL	Assay batch #:	0024737Q
Collected:	2019-09-08 18:15 EDT	Prep procedure:	N/A
Sample type:	SAM	Analysis method:	NAREL ACT-02F-TH
Dry/wet weight:	95.38 %	Analyst:	SPK
Ash/dry weight:	98.58 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/19/2019 16:18	1000.0	AS97	MO

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	DLC	MDC	Unit	Reference Date
Th227	3.20e-02	3.3e-02	1.7e-02	4.6e-02	PCI/GDRY	11/19/2019 16:18 CST
Th228	6.79e-01	1.1e-01	1.1e-02	2.9e-02	PCI/GDRY	11/19/2019 16:18 CST
Th230	3.98e-01	8.9e-02	3.0e-02	6.6e-02	PCI/GDRY	11/19/2019 16:18 CST
Th232	5.51e-01	9.9e-02	5.4e-03	1.8e-02	PCI/GDRY	11/19/2019 16:18 CST

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U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL ANALYTICAL RADIATION ENVIRONMENTAL LABORATORY

SDG #1900152

SAMPLE ANALYSIS REPORT

Lab sample #:	B9.10549H	Amount analyzed:	1.012e+00 GASH
Client sample ID:	C008-SB006-060072-01	Preparation batch #:	0016830E
Matrix:	SOIL	Assay batch #:	0024737Q
Collected:	2019-09-09 18:20 EDT	Prep procedure:	N/A
Sample type:	SAM	Analysis method:	NAREL ACT-02F-TH
Dry/wet weight:	79.29 %	Analyst:	SPK
Ash/dry weight:	86.11 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/19/2019 16:18	1000.0	AS98	MO

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	DLC	MDC	Unit	Reference Date
Th227	8.49e-02	4.5e-02	9.8e-03	3.1e-02	PCI/GDRY	11/19/2019 16:18 CST
Th228	1.40e+00	1.9e-01	6.8e-03	2.0e-02	PCI/GDRY	11/19/2019 16:18 CST
Th230	1.31e+00	1.8e-01	2.6e-02	5.9e-02	PCI/GDRY	11/19/2019 16:18 CST
Th232	1.26e+00	1.7e-01	8.1e-03	2.3e-02	PCI/GDRY	11/19/2019 16:18 CST

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U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL ANALYTICAL RADIATION ENVIRONMENTAL LABORATORY

SDG #1900152

SAMPLE ANALYSIS REPORT

Lab sample #:	B9.10550A	Amount analyzed:	1.006e+00 GASH
Client sample ID:	C008-SB007-024036-01	Preparation batch #:	0016830E
Matrix:	SOIL	Assay batch #:	0024737Q
Collected:	2019-09-09 08:20 EDT	Prep procedure:	N/A
Sample type:	SAM	Analysis method:	NAREL ACT-02F-TH
Dry/wet weight:	85.05 %	Analyst:	SPK
Ash/dry weight:	37.87 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/19/2019 16:18	1000.0	AS99	MO

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	DLC	MDC	Unit	Reference Date
Th227	8.74e-02	3.2e-02	4.6e-03	1.5e-02	PCI/GDRY	11/19/2019 16:18 CST
Th228	8.82e-01	1.1e-01	5.4e-03	1.4e-02	PCI/GDRY	11/19/2019 16:18 CST
Th230	2.07e+00	2.3e-01	1.2e-02	2.6e-02	PCI/GDRY	11/19/2019 16:18 CST
Th232	8.50e-01	1.1e-01	3.4e-03	9.8e-03	PCI/GDRY	11/19/2019 16:18 CST

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U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL ANALYTICAL RADIATION ENVIRONMENTAL LABORATORY

SDG #1900152

SAMPLE ANALYSIS REPORT

Lab sample #:	B9.10551B	Amount analyzed:	1.070e+00 GASH
Client sample ID:	C008-SB007-060072-01	Preparation batch #:	0016830E
Matrix:	SOIL	Assay batch #:	0024737Q
Collected:	2019-09-09 08:25 EDT	Prep procedure:	N/A
Sample type:	SAM	Analysis method:	NAREL ACT-02F-TH
Dry/wet weight:	85.12 %	Analyst:	SPK
Ash/dry weight:	88.68 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/19/2019 16:18	1000.0	AS100	MO

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	DLC	MDC	Unit	Reference Date
Th227	4.81e-02	3.2e-02	8.7e-03	2.8e-02	PCI/GDRY	11/19/2019 16:18 CST
Th228	7.33e-01	1.1e-01	7.6e-03	2.1e-02	PCI/GDRY	11/19/2019 16:18 CST
Th230	1.29e+00	1.7e-01	2.5e-02	5.5e-02	PCI/GDRY	11/19/2019 16:18 CST
Th232	6.28e-01	9.9e-02	7.2e-03	2.0e-02	PCI/GDRY	11/19/2019 16:18 CST

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U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL ANALYTICAL RADIATION ENVIRONMENTAL LABORATORY

SDG #1900152

SAMPLE ANALYSIS REPORT

Lab sample #:	B9.10552C	Amount analyzed:	1.005e+00 GASH
Client sample ID:	C008-SB008-048060-01	Preparation batch #:	0016830E
Matrix:	SOIL	Assay batch #:	0024737Q
Collected:	2019-09-09 09:35 EDT	Prep procedure:	N/A
Sample type:	SAM	Analysis method:	NAREL ACT-02F-TH
Dry/wet weight:	94.57 %	Analyst:	SPK
Ash/dry weight:	98.42 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/19/2019 16:18	1000.0	AS101	MO

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	DLC	MDC	Unit	Reference Date
Th227	2.76e-02	2.8e-02	1.2e-02	3.6e-02	PCI/GDRY	11/19/2019 16:18 CST
Th228	6.03e-01	1.0e-01	1.0e-02	2.7e-02	PCI/GDRY	11/19/2019 16:18 CST
Th230	4.19e-01	8.8e-02	2.9e-02	6.5e-02	PCI/GDRY	11/19/2019 16:18 CST
Th232	5.38e-01	9.4e-02	5.1e-03	1.7e-02	PCI/GDRY	11/19/2019 16:18 CST

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL ANALYTICAL RADIATION ENVIRONMENTAL LABORATORY

SDG #1900152

SAMPLE ANALYSIS REPORT

Lab sample #:	B9.10553D	Amount analyzed:	9.846e-01 GASH
Client sample ID:	C008-SB008-084096-01	Preparation batch #:	0016830E
Matrix:	SOIL	Assay batch #:	0024737Q
Collected:	2019-09-09 09:40 EDT	Prep procedure:	N/A
Sample type:	SAM	Analysis method:	NAREL ACT-02F-TH
Dry/wet weight:	20.50 %	Analyst:	SPK
Ash/dry weight:	27.77 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/19/2019 16:18	1000.0	AS102	MO

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	DLC	MDC	Unit	Reference Date
Th227	3.56e-02	1.8e-02	2.6e-03	9.9e-03	PCI/GDRY	11/19/2019 16:18 CST
Th228	4.82e-01	6.8e-02	3.6e-03	9.7e-03	PCI/GDRY	11/19/2019 16:18 CST
Th230	7.09e-01	9.3e-02	9.2e-03	2.1e-02	PCI/GDRY	11/19/2019 16:18 CST
Th232	4.55e-01	6.5e-02	2.4e-03	7.3e-03	PCI/GDRY	11/19/2019 16:18 CST

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U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL ANALYTICAL RADIATION ENVIRONMENTAL LABORATORY

SDG #1900152

SAMPLE ANALYSIS REPORT

Lab sample #:	B9.10554E	Amount analyzed:	1.002e+00 GASH
Client sample ID:	C008-SB009-000012-01	Preparation batch #:	0016830E
Matrix:	SOIL	Assay batch #:	0024737Q
Collected:	2019-09-09 10:00 EDT	Prep procedure:	N/A
Sample type:	SAM	Analysis method:	NAREL ACT-02F-TH
Dry/wet weight:	95.17 %	Analyst:	SPK
Ash/dry weight:	96.68 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/19/2019 16:18	1000.0	AS103	MO

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	DLC	MDC	Unit	Reference Date
Th227	2.73e-02	2.7e-02	7.3e-03	2.7e-02	PCI/GDRY	11/19/2019 16:18 CST
Th228	9.13e-01	1.4e-01	8.3e-03	2.4e-02	PCI/GDRY	11/19/2019 16:18 CST
Th230	7.44e-01	1.2e-01	2.9e-02	6.5e-02	PCI/GDRY	11/19/2019 16:18 CST
Th232	8.29e-01	1.3e-01	8.7e-03	2.4e-02	PCI/GDRY	11/19/2019 16:18 CST

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL ANALYTICAL RADIATION ENVIRONMENTAL LABORATORY

SDG #1900152

SAMPLE ANALYSIS REPORT

Lab sample #:	B9.10555F	Amount analyzed:	1.039e+00 GASH
Client sample ID:	C008-SB009-072084-01	Preparation batch #:	0016830E
Matrix:	SOIL	Assay batch #:	0024737Q
Collected:	2019-09-09 10:05 EDT	Prep procedure:	N/A
Sample type:	SAM	Analysis method:	NAREL ACT-02F-TH
Dry/wet weight:	84.76 %	Analyst:	SPK
Ash/dry weight:	93.63 %	QC type:	ANA
Sample description:	N/A		
Comment:	N/A		

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
11/19/2019 16:18	1000.0	AS105	MO

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	DLC	MDC	Unit	Reference Date
Th227	1.96e-02	2.1e-02	8.1e-03	2.6e-02	PCI/GDRY	11/19/2019 16:18 CST
Th228	4.47e-01	7.7e-02	7.0e-03	1.9e-02	PCI/GDRY	11/19/2019 16:18 CST
Th230	7.69e-01	1.1e-01	2.6e-02	5.8e-02	PCI/GDRY	11/19/2019 16:18 CST
Th232	4.63e-01	7.8e-02	6.8e-03	1.9e-02	PCI/GDRY	11/19/2019 16:18 CST

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U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL ANALYTICAL RADIATION ENVIRONMENTAL LABORATORY

SDG #1900152

SAMPLE ANALYSIS REPORT

Lab sample #:	LCS-00786562X	Amount analyzed:	1.000e+00 SAMP
Client sample ID:	N/A	Preparation batch #:	0016819K
Matrix:	N/A	Assay batch #:	0024716K
Collected:	N/A	Prep procedure:	N/A
Sample type:	N/A	Analysis method:	NAREL ACT-02F-TH
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
11/14/2019 15:22	1000.0	AS100	CEB

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	DLC	MDC	Unit	Reference Date
Th227	3.97e-03	1.8e-02	1.2e-02	3.7e-02	PCI	11/14/2019 15:22 CST
Th228	1.33e-02	1.7e-02	9.1e-03	2.6e-02	PCI	11/14/2019 15:22 CST
Th230	2.05e+00	2.5e-01	3.1e-02	6.9e-02	PCI	11/14/2019 15:22 CST
Th232	5.93e-03	1.2e-02	5.7e-03	1.9e-02	PCI	11/14/2019 15:22 CST

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL ANALYTICAL RADIATION ENVIRONMENTAL LABORATORY

SDG #1900152

SAMPLE ANALYSIS REPORT

Lab sample #:	RBK-00786561W	Amount analyzed:	1.000e+00 SAMP
Client sample ID:	N/A	Preparation batch #:	0016819K
Matrix:	N/A	Assay batch #:	0024716K
Collected:	N/A	Prep procedure:	N/A
Sample type:	N/A	Analysis method:	NAREL ACT-02F-TH
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
11/14/2019 15:22	1000.0	AS101	CEB

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	DLC	MDC	Unit	Reference Date
Th227	4.38e-03	2.0e-02	1.3e-02	4.1e-02	PCI	11/14/2019 15:22 CST
Th228	3.53e-03	1.4e-02	1.0e-02	2.8e-02	PCI	11/14/2019 15:22 CST
Th230	2.63e-02	4.1e-02	3.1e-02	7.1e-02	PCI	11/14/2019 15:22 CST
Th232	-8.00e-04	1.2e-02	1.0e-02	2.9e-02	PCI	11/14/2019 15:22 CST

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U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL ANALYTICAL RADIATION ENVIRONMENTAL LABORATORY

SDG #1900152

SAMPLE ANALYSIS REPORT

Lab sample #:	LCS-00786691F	Amount analyzed:	1.000e+00 SAMP
Client sample ID:	N/A	Preparation batch #:	0016830E
Matrix:	N/A	Assay batch #:	0024737Q
Collected:	N/A	Prep procedure:	N/A
Sample type:	N/A	Analysis method:	NAREL ACT-02F-TH
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
11/19/2019 16:18	1000.0	AS106	MO

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	DLC	MDC	Unit	Reference Date
Th227	1.99e-03	1.8e-02	1.4e-02	4.1e-02	PCI	11/19/2019 16:18 CST
Th228	2.79e-02	2.6e-02	1.5e-02	3.7e-02	PCI	11/19/2019 16:18 CST
Th230	2.10e+00	2.5e-01	3.1e-02	6.8e-02	PCI	11/19/2019 16:18 CST
Th232	9.31e-03	1.4e-02	5.7e-03	1.9e-02	PCI	11/19/2019 16:18 CST

U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL ANALYTICAL RADIATION ENVIRONMENTAL LABORATORY

SDG #1900152

SAMPLE ANALYSIS REPORT

Lab sample #:	RBK-00786690E	Amount analyzed:	1.000e+00 SAMP
Client sample ID:	N/A	Preparation batch #:	0016830E
Matrix:	N/A	Assay batch #:	0024737Q
Collected:	N/A	Prep procedure:	N/A
Sample type:	N/A	Analysis method:	NAREL ACT-02F-TH
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
11/19/2019 16:18	1000.0	AS107	MO

ANALYTICAL RESULTS

Analyte	Activity	± 2 σ Uncertainty	DLC	MDC	Unit	Reference Date
Th227	0.00e+00	1.0e-02	6.6e-03	2.5e-02	PCI	11/19/2019 16:18 CST
Th228	6.31e-03	1.5e-02	1.1e-02	2.8e-02	PCI	11/19/2019 16:18 CST
Th230	2.92e-02	3.9e-02	2.9e-02	6.5e-02	PCI	11/19/2019 16:18 CST
Th232	1.28e-04	8.5e-03	7.1e-03	2.0e-02	PCI	11/19/2019 16:18 CST

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U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL ANALYTICAL RADIATION ENVIRONMENTAL LABORATORY

SDG 1900152

PREPARATION BATCH SUMMARY

Preparation batch #: 0016819K
Analysis method: NAREL ACT-02F-TH
Preparation procedure: N/A

NAREL Sample #	Client Sample ID	Analysis #	QC Type	Yield	± 2 σ Uncertainty	Analyst
B9.10537D	C008-SB001-036048-01	00783843Q		100.26 %	8.44 %	SPK
B9.10537D	C008-SB001-036048-01	00786560V	DUP	91.11 %	7.85 %	SPK
B9.10538E	C008-SB001-036048-02	00783847V		87.61 %	7.82 %	SPK
B9.10539F	C008-SB001-108120-01	00783851Q		92.82 %	8.02 %	SPK
B9.10540Y	C008-SB002-024036-01	00783855V		84.51 %	7.50 %	SPK
B9.10541Z	C008-SB002-060072-01	00783859Z		89.57 %	7.88 %	SPK
B9.10542A	C008-SB003-000012-01	00783863V		95.12 %	8.28 %	SPK
B9.10543B	C008-SB003-072084-01	00783867Z		37.68 %	4.74 %	SPK
B9.10544C	C008-SB004-012024-01	00783871V		87.21 %	7.60 %	SPK
B9.10545D	C008-SB004-084096-01	00783875Z		72.33 %	6.86 %	SPK
LCS-00786562X *		00786562X	LCS	85.55 %	7.66 %	SPK
RBK-00786561W *		00786561W	RBK	74.48 %	6.95 %	SPK

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

QC RESULTS FOR BATCH 0016819K

NAREL Sample #	Analysis #	QC Type	Analyte	%R	RPD	Z	Evaluation
B9.10537D	00786560V	DUP	TH227		44.1	-0.60	PASS
B9.10537D	00786560V	DUP	TH228		21.1	-1.76	PASS
B9.10537D	00786560V	DUP	TH230		14.4	1.19	PASS
B9.10537D	00786560V	DUP	TH232		12.3	-1.01	PASS
LCS-00786562X	00786562X	LCS	TH230	102.3		0.37	PASS
RBK-00786561W	00786561W	RBK	TH227				PASS
RBK-00786561W	00786561W	RBK	TH228				PASS
RBK-00786561W	00786561W	RBK	TH230				PASS
RBK-00786561W	00786561W	RBK	TH232				PASS

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U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL ANALYTICAL RADIATION ENVIRONMENTAL LABORATORY

SDG 1900152

PREPARATION BATCH SUMMARY

Preparation batch #: 0016830E
Analysis method: NAREL ACT-02F-TH
Preparation procedure: N/A

NAREL Sample #	Client Sample ID	Analysis #	QC Type	Yield	± 2 σ Uncertainty	Analyst
B9.10546E	C008-SB005-036048-01	00783879D		102.56 %	8.61 %	SPK
B9.10546E	C008-SB005-036048-01	00786689M	DUP	90.06 %	7.90 %	SPK
B9.10547F	C008-SB005-060072-01	00783883Z		88.67 %	7.95 %	SPK
B9.10548G	C008-SB006-024036-01	00783887D		82.44 %	7.31 %	SPK
B9.10549H	C008-SB006-060072-01	00783891Z		81.76 %	7.32 %	SPK
B9.10550A	C008-SB007-024036-01	00783895D		78.10 %	7.17 %	SPK
B9.10551B	C008-SB007-060072-01	00783899H		93.62 %	8.07 %	SPK
B9.10552C	C008-SB008-048060-01	00783903K		92.47 %	7.87 %	SPK
B9.10553D	C008-SB008-084096-01	00783907P		69.64 %	6.69 %	SPK
B9.10554E	C008-SB009-000012-01	00783911K		88.48 %	7.74 %	SPK
B9.10555F	C008-SB009-072084-01	00783915P		102.38 %	8.26 %	SPK
LCS-00786691F *		00786691F	LCS	83.02 %	7.44 %	SPK
RBK-00786690E *		00786690E	RBK	104.38 %	8.63 %	SPK

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

QC RESULTS FOR BATCH 0016830E

NAREL Sample #	Analysis #	QC Type	Analyte	%R	RPD	Z	Evaluation
B9.10546E	00786689M	DUP	TH227		7.4	0.17	PASS
B9.10546E	00786689M	DUP	TH228		10.4	-0.93	PASS
B9.10546E	00786689M	DUP	TH230		22.8	-2.58	WARN
B9.10546E	00786689M	DUP	TH232		2.8	0.26	PASS
LCS-00786691F	00786691F	LCS	TH230	105.2		0.81	PASS
RBK-00786690E	00786690E	RBK	TH227				PASS
RBK-00786690E	00786690E	RBK	TH228				PASS
RBK-00786690E	00786690E	RBK	TH230				PASS
RBK-00786690E	00786690E	RBK	TH232				PASS