

**U.S.ENVIRONMENTALPROTECTIONAGENCY  
NATIONALANALYTICAL RADIATIONENVIRONMENTALLABORATORY  
540S.MORRIS AVE.,MONTGOMERY,AL36115  
RA226 ANALYSES**

**REPORTOFSAMPLEDELIVERYGROUP#2100007**

Project: Piney Point 2021  
Analysismethod: Radium-226 Analysis of Liquid and Solid Matrices  
ReportID: 2100007-RA226  
Reporttype: Original  
Datereported: 04/13/2021  
Totalpagesinreport: 20

**SAMPLES**

NAREL Sample #	Client Sample ID	Location	Matrix	Date Collected	Date Received
C1.02831Q	NW DITCH	FL:PALMETTO	EFFLUENT	04/08/2021	04/09/2021
C1.02832R	DECANT OUTFALL	FL:PALMETTO	EFFLUENT	04/08/2021	04/09/2021

**EXCEPTIONS**

1. **Packaging and shipping** – No problems were observed.
2. **Documentation** – Samples arrived with a laboratory submittal form instead of a chain of custody.
3. **Sample preparation** – No problems were encountered.
4. **Analysis** – Sample C1.02832 was reanalyzed because there was visible mass on the sample test source which resulted in poor spectral resolution and a low yield. A smaller aliquot was taken for the reanalysis which caused the result to not meet NAREL's standard MDC. The result of the reanalysis is reported in this data package.
5. **Holding times** – No holding times were specified.

**QUALITY CONTROL**

1. **QC samples** – All QC analysis results met NAREL acceptance criteria.
2. **Yields** – All chemical yields were within acceptance limits.
3. **Instruments** – Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

**OTHER INFORMATION**

The count times are different for samples C1.02831 (3000 minutes) and C1.02832 (1500) minutes because C1.02832 was reanalyzed and counted for as long as possible given the desired turnaround time.

## ACCREDITATION

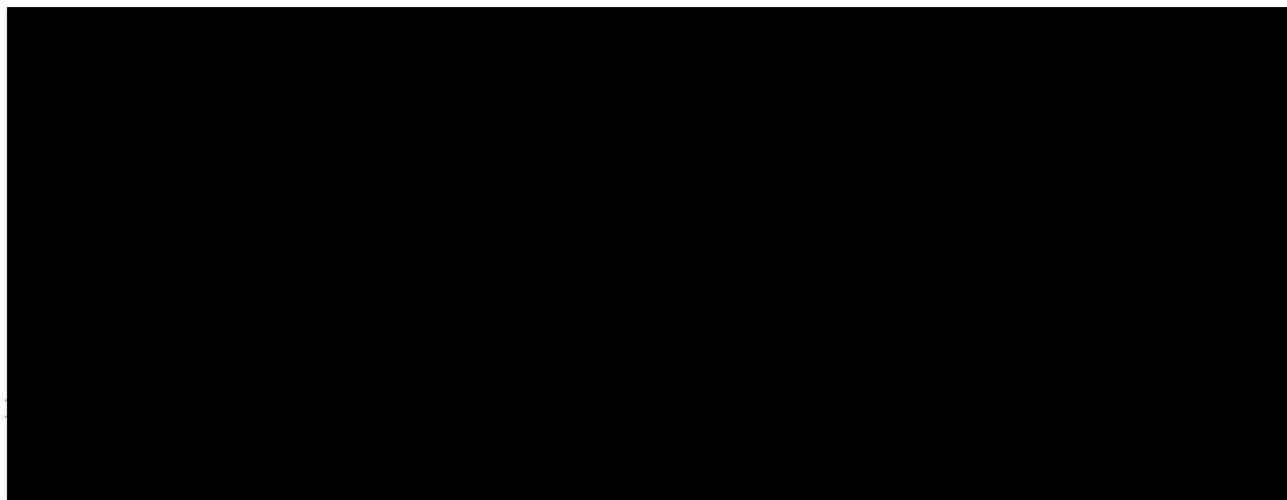


NAREL is accredited by the New Hampshire Environmental Laboratory Accreditation Program (NH ELAP) to the TNI standard. NAREL maintains accreditation for the following types of analyses:

- Gross alpha and gross beta analysis of water by method GR-01 (AM/SOP-4)
- Am-241 and isotopic plutonium, thorium, and uranium analysis of water by method ACT-01-xx (AM/SOP-1)
- Am-241 and isotopic plutonium, thorium, and uranium analysis of solid matrices by method ACT-02F-xx (AM/SOP-41)
- Analysis for gamma-emitters by method GAM-01 (AM/SOP-3)
- Iodine-131 analysis of water by method I-01 (AM/SOP-9)
- Radium-226 analysis by method RA-07-EC (AM/SOP-43)
- Strontium-89 and 90 analysis of water by method SR-05-EC-ISO (AM/SOP-35)
- Tritium analysis of water by method H-02 (AM/SOP-7)

## 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.



## 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
MRC	Matrix recount
MS	Matrix spike
MSD	Matrix spike duplicate (not currently analyzed)
RBK	Method blank
STD	External standard (used for <sup>228</sup> 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  $60 \leq \%R \leq 110$ .

# Chain of Custody Forms

**Request Number:** RA-2021-09-29-03-44  
**Requester:** [Redacted]  
**Project ID:** OTHER-BMR  
**Customer:** BMR-TAMPA  
**Field Report Prepared By:** [Redacted]  
**Requester:** [Redacted]  
**Collected By:** [Redacted]  
**Project ID:** OTHER-BMR  
**Field Report Prepared By:** [Redacted]  
**Requester:** [Redacted]  
**Collected By:** [Redacted]  
**Sampling Agency:** FDEP-SWA

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 last revised Jan 25, 2018

**Florida Department of Environmental Protection**  
**Central Laboratory Submittal Form**

Location	Collection (comp begin or grab)	Time	Composite end	Bottle Group(s)
Field ID WINSTORET # Location Piney Point N.W. Ditch	<input type="checkbox"/> Comp Grab <input checked="" type="checkbox"/> Matrix (type, e.g., Salt, Fresh, etc)	Date: 4/8/21 Time: 1051 a	Date: [Blank] Time: [Blank]	A
Latitude: 27°38'01.9"N 82°31'38.3"W Longitude: [Blank]	Temp (C): 21.8 pH: 4.49 Salinity (ppt): 11.78 Comments: [Blank]	Diss. Oxygen: 1.73 Sample Depth: [Blank]	Total Res. Chlorine (mg/L): [Blank] % sat: [Blank] Sp. Conductance (umho/cm): 19740	
Field ID WINSTORET # Location Piney Point N.W. Ditch	<input type="checkbox"/> Comp Grab <input checked="" type="checkbox"/> Matrix (type, e.g., Salt, Fresh, etc)	Date: 4/8/21 Time: 1051 a	Date: [Blank] Time: [Blank]	B
Latitude: 27°38'01.9"N 82°31'38.3"W Longitude: [Blank]	Temp (C): 21.8 pH: 4.49 Salinity (ppt): 11.78 Comments: Collected during same sampling event as Group A	Diss. Oxygen: 1.73 Sample Depth: 0.15	Total Res. Chlorine (mg/L): [Blank] % sat: [Blank] Sp. Conductance (umho/cm): 19740	
Field ID WINSTORET # Location [Blank]	<input type="checkbox"/> Comp Grab <input type="checkbox"/> Matrix (type, e.g., Salt, Fresh, etc)	Date: [Blank] Time: [Blank]	Date: [Blank] Time: [Blank]	[Blank]
Latitude: [Blank] Longitude: [Blank]	Temp (C): [Blank] pH: [Blank] Salinity (ppt): [Blank] Comments: [Blank]	Diss. Oxygen: [Blank] Sample Depth: [Blank]	Total Res. Chlorine (mg/L): [Blank] % sat: [Blank] Sp. Conductance (umho/cm): [Blank]	

Relinquished By: [Redacted]	Date/Time: 4/8/21/309	Shipping Method: FEDEX	Number of Coolers Shipped: [Blank]
Received By: [Redacted]		Date/Time: [Blank]	

Group	Bottle Type	BP-1L	# of Bottles	Preservative	ICE	Enter Number of Bottles Sent to Lab
Group: A	CHLSUITE-W	BP-1L	18			0
Group: A	TURBIDITY	P-1L	18			0
	W-CL-IC					
	W-F					
	W-SO4-IC					
	W-TSS					
Group: A	W-ICP	P-500ML	18		HNO3	0
	W-ICPMS					
Group: A	W-NH3	P-500ML	18		ICE And H2SO4	0
	W-NO2NO3					
	W-S-A-TP					
	W-TKN					
Group: A	W-PO4-F	P-125ML	18		FILTER-ICE	0
Group: B	OV-ALPHA	P-1L	18		HNO3	1
Group: B	OV-RAD226	P-1L	18		HNO3	1
Group: B	OV-RAD228	P-1L	18		HNO3	1
Group: C	TURBIDITY	P-1L	3		ICE	0
	W-CL-IC					
	W-F					
	W-SO4-IC					
	W-TSS					
Group: C	W-ICP	P-500ML	3		HNO3	0
	W-ICPMS					11

Contains: 1:1 HNO3  
 Lot No.: NA0344090  
 Expires: 01/04/22  
 See Safety Data Sheet (SDS)

*Not to be used*

Group:	C	Bottle Type:	P-500ML	# of Bottles:	3	Preservative:	ICE And H2SO4	Enter Number of Bottles Sent to Lab	
		W-NH3							
		W-NO2NO3							
		W-S-A-TP							
		W-TKN							
Group:	C	Bottle Type:	P-125ML	# of Bottles:	3	Preservative:	FILTER:ICE	Enter Number of Bottles Sent to Lab	
		W-PO4-F							
Group:	D	Bottle Type:	PT-50ML	# of Bottles:	18	Preservative:	ICE	Enter Number of Bottles Sent to Lab	
		ALGAL_ID							

**Florida Department of Environmental Protection**  
**Central Laboratory Submittal Form**

Request Number: **RA-2021-03-29-83 MD**  
Piney Point April #1 **RA-2021-04-05-79**

Requester: [Redacted] Field Report Prepared By: [Redacted]  
Collected By: [Redacted] Sampling Agency: **FDEP-SWD**

Customer: **BMR-TAMPA**  
Project ID: **OTHER-BMR**

Location	Collection (comp begin or grab)	Composite end	Bottle Group(s)
Field ID	Date	Date	(See pg 2)
WINSTORET #	Time	Time	
Matrix (type, e.g., Salt, Fresh, etc)	Diss. Oxygen	Total Res. Chlorine	
Temp (C)	pH	% sat	
Salinity (ppt)	Sample Depth	Sp. Conductance	
Comments			
Collection (comp begin or grab)	Composite end	Bottle Group(s)	
Date	Date	(See pg 2)	
Time	Time		
Matrix (type, e.g., Salt, Fresh, etc)	Diss. Oxygen	Total Res. Chlorine	
Temp (C)	pH	% sat	
Salinity (ppt)	Sample Depth	Sp. Conductance	
Comments			
Collection (comp begin or grab)	Composite end	Bottle Group(s)	
Date	Date	(See pg 2)	
Time	Time		
Matrix (type, e.g., Salt, Fresh, etc)	Diss. Oxygen	Total Res. Chlorine	
Temp (C)	pH	% sat	
Salinity (ppt)	Sample Depth	Sp. Conductance	
Comments			
Collection (comp begin or grab)	Composite end	Bottle Group(s)	
Date	Date	(See pg 2)	
Time	Time		
Matrix (type, e.g., Salt, Fresh, etc)	Diss. Oxygen	Total Res. Chlorine	
Temp (C)	pH	% sat	
Salinity (ppt)	Sample Depth	Sp. Conductance	
Comments			
Collection (comp begin or grab)	Composite end	Bottle Group(s)	
Date	Date	(See pg 2)	
Time	Time		
Matrix (type, e.g., Salt, Fresh, etc)	Diss. Oxygen	Total Res. Chlorine	
Temp (C)	pH	% sat	
Salinity (ppt)	Sample Depth	Sp. Conductance	
Comments			
Collection (comp begin or grab)	Composite end	Bottle Group(s)	
Date	Date	(See pg 2)	
Time	Time		
Matrix (type, e.g., Salt, Fresh, etc)	Diss. Oxygen	Total Res. Chlorine	
Temp (C)	pH	% sat	
Salinity (ppt)	Sample Depth	Sp. Conductance	
Comments			

Relinquished By: [Redacted] Date/Time: **4/8/2021 5:00pm** Shipping Method: **FDEX** Number of Coolers Shipped: [Redacted] Received By: [Redacted] Date/Time: [Redacted]

*Please Return the Coolers!*

Group: A	Bottle Type: CHLSUITE-W	BP-1L	# of Bottles: 18	Preservative: ICE	Enter Number of Bottles Sent to Lab
Group: A	Bottle Type: TURBIDITY W-CL-IC W-F W-SO4-IC W-TSS	P-1L	# of Bottles: 18	Preservative: ICE	Enter Number of Bottles Sent to Lab
Group: A	Bottle Type: W-ICP W-ICPMS	P-500ML	# of Bottles: 18	Preservative: HNO3	Enter Number of Bottles Sent to Lab
Group: A	Bottle Type: W-NH3 W-NO2NO3 W-S-A-TP W-TKN	P-500ML	# of Bottles: 18	Preservative: ICE And H2SO4	Enter Number of Bottles Sent to Lab
Group: A	Bottle Type: W-PO4-F	P-125ML	# of Bottles: 18	Preservative: FILTER-ICE	Enter Number of Bottles Sent to Lab
Group: B	Bottle Type: OV-ALPHA	P-1L	# of Bottles: 18	Preservative: HNO3	Enter Number of Bottles Sent to Lab
Group: B	Bottle Type: OV-RAD226 OV-RAD228	P-1L	# of Bottles: 18	Preservative: HNO3	Enter Number of Bottles Sent to Lab
Group: C	Bottle Type: TURBIDITY W-CL-IC W-F W-SO4-IC W-TSS	P-1L	# of Bottles: 3	Preservative: ICE	Enter Number of Bottles Sent to Lab
Group: C	Bottle Type: W-ICP W-ICPMS	P-500ML	# of Bottles: 3	Preservative: HNO3	Enter Number of Bottles Sent to Lab

Contains: 1 \* HNO3  
Lot No: N40344060  
Expires: 07/04/22  
See Safety Data Sheet (SDS)

Group: C	Bottle Type:	P-500ML	# of Bottles: 3	Preservative: ICE And H2SO4	Enter Number of Bottles Sent to Lab
	W-NH3				
	W-NO2NO3				
	W-S-A-TP				
	W-TKN				
Group: C	Bottle Type:	P-125ML	# of Bottles: 3	Preservative: FILTER-ICE	Enter Number of Bottles Sent to Lab
	W-PO4-F				
Group: D	Bottle Type:	PT-50ML	# of Bottles: 18	Preservative: ICE	Enter Number of Bottles Sent to Lab
	ALGAL_ID				

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

**SDG #2100007**

**ANALYSIS SUMMARY**

Analysis method: NAREL RA-07-EC  
Title: Radium-226 Analysis of Liquid and Solid Matrices

NAREL Sample #	Client Sample ID	QC Type	Date Completed	Preparation Batch #	Assay Batch #
C1.02831Q	NW DITCH		04/12/2021	0017737N	0025758A
C1.02832R	DECANT OUTFALL		04/13/2021	0017741J	0025764Y
LCS-00800813J *		LCS	04/12/2021	0017737N	0025758A
LCX-00800814K *		LCX	04/12/2021	0017737N	0025758A
RBK-00800812H *		RBK	04/12/2021	0017737N	0025758A
LCS-00800871V *		LCS	04/13/2021	0017741J	0025764Y
LCX-00800872W *		LCX	04/13/2021	0017741J	0025764Y
RBK-00800870U *		RBK	04/13/2021	0017741J	0025764Y

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

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

**SDG #2100007**

**SAMPLE ANALYSIS REPORT**

Lab sample #:	C1.02831Q	Amount analyzed:	5.000e-02 L
Client sample ID:	NW DITCH	Preparation batch #:	0017737N
Matrix:	EFFLUENT	Assay batch #:	0025758A
Collected:	2021-04-08 10:51 EDT	Prep procedure:	N/A
Sample type:	SAM	Analysis method:	NAREL RA-07-EC
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
04/10/2021 14:58	3000.0	AS114	CEB

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	DLC	MDC	Unit	Reference Date
Ra226	3.07e+00	5.7e-01	9.7e-02	2.3e-01	PCI/L	04/10/2021 13:10 CDT

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

**SDG #2100007**

**SAMPLE ANALYSIS REPORT**

Lab sample #:	C1.02832R	Amount analyzed:	3.000e-02 L
Client sample ID:	DECANT OUTFALL	Preparation batch #:	0017741J
Matrix:	EFFLUENT	Assay batch #:	0025764Y
Collected:	2021-04-08 11:52 EDT	Prep procedure:	N/A
Sample type:	SAM	Analysis method:	NAREL RA-07-EC
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
04/12/2021 15:24	1500.0	AS154	CEB

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	DLC	MDC	Unit	Reference Date
Ra226	1.57e+00	9.3e-01	3.7e-01	9.7e-01	PCI/L	04/12/2021 12:50 CDT

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

**SDG #2100007**

**SAMPLE ANALYSIS REPORT**

Lab sample #:	LCS-00800813J	Amount analyzed:	1.000e+00 SAMP
Client sample ID:	N/A	Preparation batch #:	0017737N
Matrix:	N/A	Assay batch #:	0025758A
Collected:	N/A	Prep procedure:	N/A
Sample type:	N/A	Analysis method:	NAREL RA-07-EC
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
04/10/2021 14:58	3000.0	AS116	CEB

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2\sigma$ Uncertainty	DLC	MDC	Unit	Reference Date
Ra226	1.73e+00	1.1e-01	3.7e-03	8.7e-03	PCI	04/10/2021 13:10 CDT

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

**SDG #2100007**

**SAMPLE ANALYSIS REPORT**

Lab sample #:	LCX-00800814K	Amount analyzed:	1.000e+00 SAMP
Client sample ID:	N/A	Preparation batch #:	0017737N
Matrix:	N/A	Assay batch #:	0025758A
Collected:	N/A	Prep procedure:	N/A
Sample type:	N/A	Analysis method:	NAREL RA-07-EC
Dry/wet weight:	N/A	Analyst:	SPK
Ash/dry weight:	N/A	QC type:	LCX
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
04/10/2021 14:58	3000.0	AS117	CEB

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	DLC	MDC	Unit	Reference Date
Ra226	1.72e+00	1.1e-01	4.6e-03	1.1e-02	PCI	04/10/2021 13:10 CDT

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

**SDG #2100007**

**SAMPLE ANALYSIS REPORT**

Lab sample #:	RBK-00800812H	Amount analyzed:	1.000e+00 SAMP
Client sample ID:	N/A	Preparation batch #:	0017737N
Matrix:	N/A	Assay batch #:	0025758A
Collected:	N/A	Prep procedure:	N/A
Sample type:	N/A	Analysis method:	NAREL RA-07-EC
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
04/10/2021 14:58	3000.0	AS118	CEB

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	DLC	MDC	Unit	Reference Date
Ra226	1.26e-02	7.5e-03	2.7e-03	7.0e-03	PCI	04/10/2021 13:10 CDT

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

**SDG #2100007**

**SAMPLE ANALYSIS REPORT**

Lab sample #:	LCS-00800871V	Amount analyzed:	1.000e+00 SAMP
Client sample ID:	N/A	Preparation batch #:	0017741J
Matrix:	N/A	Assay batch #:	0025764Y
Collected:	N/A	Prep procedure:	N/A
Sample type:	N/A	Analysis method:	NAREL RA-07-EC
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
04/12/2021 15:24	1500.0	AS155	CEB

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	DLC	MDC	Unit	Reference Date
Ra226	3.49e+00	2.5e-01	5.7e-03	1.5e-02	PCI	04/12/2021 12:50 CDT

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

**SDG #2100007**

**SAMPLE ANALYSIS REPORT**

Lab sample #:	LCX-00800872W	Amount analyzed:	1.000e+00 SAMP
Client sample ID:	N/A	Preparation batch #:	0017741J
Matrix:	N/A	Assay batch #:	0025764Y
Collected:	N/A	Prep procedure:	N/A
Sample type:	N/A	Analysis method:	NAREL RA-07-EC
Dry/wet weight:	N/A	Analyst:	SPK
Ash/dry weight:	N/A	QC type:	LCX
Sample description:	N/A		
Comment:	N/A		

**COUNTING INFORMATION**

Date and time	Duration (min)	Detector ID	Operator
04/12/2021 15:24	1500.0	AS157	CEB

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	DLC	MDC	Unit	Reference Date
Ra226	3.54e+00	2.6e-01	6.0e-03	1.6e-02	PCI	04/12/2021 12:50 CDT

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

**SDG #2100007**

**SAMPLE ANALYSIS REPORT**

Lab sample #:	RBK-00800870U	Amount analyzed:	1.000e+00 SAMP
Client sample ID:	N/A	Preparation batch #:	0017741J
Matrix:	N/A	Assay batch #:	0025764Y
Collected:	N/A	Prep procedure:	N/A
Sample type:	N/A	Analysis method:	NAREL RA-07-EC
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
04/12/2021 15:24	1500.0	AS158	CEB

**ANALYTICAL RESULTS**

Analyte	Activity	$\pm 2 \sigma$ Uncertainty	DLC	MDC	Unit	Reference Date
Ra226	2.25e-02	1.4e-02	3.5e-03	1.1e-02	PCI	04/12/2021 12:50 CDT

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

**SDG 2100007**

**PREPARATION BATCH SUMMARY**

Preparation batch #: 0017737N  
 Analysis method: NAREL RA-07-EC  
 Preparation procedure: N/A

NAREL Sample #	Client Sample ID	Analysis #	QC Type	Yield	± 2 σ Uncertainty	Analyst
C1.02831Q	NW DITCH	00800777Y		68.82 %	3.80 %	SPK
LCS-00800813J *		00800813J	LCS	82.55 %	4.14 %	SPK
LCX-00800814K *		00800814K	LCX	82.41 %	4.17 %	SPK
RBK-00800812H *		00800812H	RBK	80.74 %	4.16 %	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 0017737N**

NAREL Sample #	Analysis #	QC Type	Analyte	%R	RPD	Z	Evaluation
LCS-00800813J	00800813J	LCS	RA226	102.5	0.8	0.66	PASS
LCX-00800814K	00800814K	LCX	RA226			-0.17	PASS
RBK-00800812H	00800812H	RBK	RA226				PASS

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

**SDG 2100007**

**PREPARATION BATCH SUMMARY**

Preparation batch #: 0017741J  
 Analysis method: NAREL RA-07-EC  
 Preparation procedure: N/A

NAREL Sample #	Client Sample ID	Analysis #	QC Type	Yield	$\pm 2 \sigma$ Uncertainty	Analyst
C1.02832R	DECANT OUTFALL	00800818P		49.82 %	3.53 %	SPK
LCS-00800871V *		00800871V	LCS	82.08 %	4.70 %	SPK
LCX-00800872W *		00800872W	LCX	79.17 %	4.60 %	SPK
RBK-00800870U *		00800870U	RBK	79.97 %	4.71 %	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 0017741J**

NAREL Sample #	Analysis #	QC Type	Analyte	%R	RPD	Z	Evaluation
LCS-00800871V	00800871V	LCS	RA226	103.3		0.82	PASS
LCX-00800872W	00800872W	LCX	RA226		1.6	0.31	PASS
RBK-00800870U	00800870U	RBK	RA226				PASS