Isotopic Uranium

Case Narrative

Cabrera Services, Inc.

UNC New Haven CT – 10-1007.00

Work Order Number: 1709014

1. This report consists of the analytical results for one soil sample and one solid sample received by ALS on 09/01/2017.

2. These samples were prepared according to the current revisions of SOP 773 and SOP 778.

3. The samples were analyzed for the presence of isotopic uranium according to the current revision of SOP 714. The analyses were completed on 09/24/2017.

4. The isotopic analysis results for these samples are reported on an 'As Received' basis in units of pCi/gram.

5. This analytical method quantifies U-235 alpha activity in a specific region of interest corresponding to emission energies between those of U-234 and U-238. A potential limitation of this method is that measurable amounts of U-234 in the sample may cause a small amount of characteristic activity in the U-235 region of interest due to poorly resolved alpha activity at the boundary between the two regions. To minimize the potential for a high bias in the U-235 analytical results, the U-235 region of interest has been narrowed and limited to a lower energy region. An 85.1% abundance correction has been made to the final U-235 results.

6. ALS uses the following convention for reporting significant digits in the TPU and MDC results. The TPU value is rounded to two significant digits. The MDC value is rounded to the same decimal place as the TPU value. In practice, this could result in an MDC reported value of zero for samples with significant activity, including the batch laboratory control sample.

7. The requested MDC for U-234, U-235, and U-238 was not met for samples 1709014-1 and -2. These samples were prepared at a reduced aliquot due to high alpha activity detected in pre-screen. The reported activity for these samples is greater than the achieved MDC. These samples are identified with an "M3" flag on the final reports.

8. No further anomalous situations were encountered during the preparation or analysis of these samples. All remaining quality control criteria were met.

The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, ALS certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.

Jean Anderson — 9/27/17
Jean Anderson — Date
Radiochemistry Primary Data Reviewer

9/30/17
Radiochemistry Final Data Reviewer — Date

ALS -- Fort Collins

Sample Number(s) Cross-Reference Table

OrderNum: 1709014
Client Name: Cabrera Services, Inc.
Client Project Name: UNC New Haven CT
Client Project Number: 10-1007.00
Client PO Number:

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
UNC-6H-001	1709014-1		SOIL	30-Aug-17	19:00
UNC-3H-002	1709014-2		SOLID	30-Aug-17	19:00

ALS Laboratory Group

225 Commerce Drive, Fort Collins, Colorado 80524
TF: (800) 443-1511 PH: (970) 490-1511 FX: (970) 490-1522

C ı-of-Custody

Form 202r6

WORKORDER # 1709014

		SAMPLER	Mike Plonski	DATE	8/31/2017
PROJECT NAME	UNC New Haven	SITE ID		TURNAROUND	Standard
PROJECT No.	10-1007.00	EDD FORMAT			
		PURCHASE ORDER			
COMPANY NAME	Cabrera Services	BILL TO COMPANY	Cabrera Services		
SEND REPORT TO	Mike Plonski	INVOICE ATTN TO	Mike Plonski		
ADDRESS	50 Founders plaza	ADDRESS	50 Founders plaza		
CITY / STATE / ZIP	East Hartford CT 06108	CITY / STATE / ZIP	East Hartford CT 06108		
PHONE	860-569-0095	PHONE	860-569-0095		
FAX		FAX			
E-MAIL	mplonski@cabreraservices.com	E-MAIL	mplonski@cabreraservices.com		

PAGE 1 of 1

DISPOSAL By Lab or Return to Client

Lab ID	Field ID	Matrix	Sample Date	Sample Time	# Bottles	Pres.	QC	Alpha Spec	ISO-U
1	UNC-6H-001	Soil	8/30/2017	01/00/1900	1			X	X
2	UNC-3H-002	Scale	8/30/2017	01/00/1900	1			X	X

*Time Zone (Circle): (EST) CST MST PST Matrix: O = oil S = soil NS = non-soil solid W = water L = liquid E = extract F = filter

For metals or anions, please detail analytes below.

Comments:
UNC-6H-001 Radioactive

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QC PACKAGE (check below)	
	LEVEL II (Standard QC)
	LEVEL III (Std QC + forms)
	LEVEL IV (Std QC + forms + raw data)

Preservative Key: 1-HCl 2-HNO3 3-H2SO4 4-NaOH 5-NaHSO4 7-Other 8-4 degrees C 9-5035

	SIGNATURE	PRINTED NAME	DATE	TIME
RELINQUISHED BY	M	Mike Plonski	8/31/17	1400
RECEIVED BY	C Brunell	C Trimble	9-1-17	1030
RELINQUISHED BY				
RECEIVED BY				
RELINQUISHED BY				
RECEIVED BY				

ALS Environmental - Fort Collins
CONDITION OF SAMPLE UPON RECEIPT FORM

Client: CABRERA Workorder No: 1709014

Project Manager: LS Initials: COS Date: 9-1-17

1. Does this project require any special handling in addition to standard ALS procedures?		YES	(NO)
2. Are custody seals on shipping containers intact?	(NONE)	YES	NO
3. Are Custody seals on sample containers intact?	(NONE)	YES	NO
4. Is there a COC (Chain-of-Custody) present or other representative documents?		(YES)	NO
5. Are the COC and bottle labels complete and legible?		(YES)	NO
6. Is the COC in agreement with samples received? (IDs, dates, times, no. of samples, no. of containers, matrix, requested analyses, etc.)		(YES)	NO
7. Were airbills / shipping documents present and/or removable?	DROP OFF	(YES)	NO
8. Are all aqueous samples requiring preservation preserved correctly? (excluding volatiles)	(N/A)	YES	NO
9. Are all aqueous non-preserved samples pH 4-9?	(N/A)	YES	NO
10. Is there sufficient sample for the requested analyses?		(YES)	NO
11. Were all samples placed in the proper containers for the requested analyses?		(YES)	NO
12. Are all samples within holding times for the requested analyses?		(YES)	NO
13. Were all sample containers received intact? (not broken or leaking, etc.)		(YES)	NO
14. Are all samples requiring no headspace (VOC, GRO, RSK/MEE, Rx CN/S, radon) headspace free? Size of bubble: ____ < green pea ____ > green pea	(N/A)	YES	NO
15. Do any water samples contain sediment? Amount Amount of sediment: ____ dusting ____ moderate ____ heavy	(N/A)	YES	NO
16. Were the samples shipped on ice?		YES	(NO)
17. Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #2 #4	(RAD ONLY)	YES	(NO)

Cooler #:	1							
Temperature (°C):	Amb							
No. of custody seals on cooler:	0							
DOT Survey/ Acceptance Information — External µR/hr reading:	13							
Background µR/hr reading:	10							

Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? **(YES) / NO / NA** (If no, see Form 008.)

Additional Information: PROVIDE DETAILS BELOW FOR A NO RESPONSE TO ANY QUESTION ABOVE, EXCEPT #1 AND #16.

If applicable, was the client contacted? **YES / NO / NA** Contact: _____ Date/Time: _____

Project Manager Signature / Date: 9/6/17

*IR Gun #2: Oakton, SN 29922500201-0066
*IR Gun #4: Oakton, SN 2372220101-0002

ORIGIN ID:BDNA (203) 231-0614
AL CRAG
CABRERA SERVICES
53 HAMPTON RD
WATERBURY, CT 06708
UNITED STATES US

SHIP DATE: 31AUG11
ACTWGT: 1.00 LB
CAD: 111120925/INET3920

BILL SENDER

TO **LANCE STEERE/SAMPLE CONTROL**
ALS LABORATORIES
225 COMMERCE DR

FORT COLLINS CO 80524
(970) 490-1511
REF: 10-1007.00
INV:
PO:
DEPT:

549J1/FF19/104C

J17201706290tuv

FedEx Express

FRI - 01 SEP 10:30A
PRIORITY OVERNIGHT

TRK# 0201 **7701 5754 7948**

80524
CO-US **DEN**

NA FTCA

13-0

1709014

After printing this label:
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

/templates/components/dotcom_label_contents/WarningsOriginalLabel/en/Folding_warning.html loading...
/templates/components/dotcom_label_contents/TnCDom/us/en/TC_dom.html loading...

Isotopic Uranium by Alpha Spectroscopy

PAI 714 Rev 13

Method Blank Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1709014
Client Name: Cabrera Services, Inc.
ClientProject ID: UNC New Haven CT 10-1007.00

Lab ID: AS170921-3MB

Sample Matrix: SOLID
Prep SOP: PAI 778 Rev 14
Date Collected: 22-Sep-17
Date Prepared: 22-Sep-17
Date Analyzed: 24-Sep-17

Prep Batch: AS170921-3
QCBatchID: AS170921-3-3
Run ID: AS170921-3UR
Count Time: 360 minutes

Final Aliquot: 2.00 g
Result Units: pCi/g
File Name: Spectrum #1

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13966-29-5	U-234	0.0015 +/- 0.0087	0.0129	0.05	NA	U
15117-96-1	U-235	0.003 +/- 0.010	0.007	0.05	NA	U
7440-61-1	U-238	-0.0017 +/- 0.0087	0.0157	0.05	NA	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
U-232	2.172	1.72	pCi/g	79.2	30 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

M - Requested MDC not met.

B - Analyte concentration greater than MDC.

B3 - Analyte concentration greater than MDC but less than Requested MDC.

DL - Decision Level

Data Package ID: *UR1709014-1*

Isotopic Uranium by Alpha Spectroscopy

PAI 714 Rev 13

Laboratory Control Sample(s)

Lab Name: ALS -- Fort Collins
Work Order Number: 1709014
Client Name: Cabrera Services, Inc.
ClientProject ID: UNC New Haven CT 10-1007.00

Lab ID: AS170921-3LCS

Sample Matrix: SOLID
Prep SOP: PAI 778 Rev 14
Date Collected: 22-Sep-17
Date Prepared: 22-Sep-17
Date Analyzed: 24-Sep-17

Prep Batch: AS170921-3
QCBatchID: AS170921-3-3
Run ID: AS170921-3UR
Count Time: 360 minutes

Final Aliquot: 2.00 g
Result Units: pCi/g
File Name: Spectrum #1

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
13966-29-5	U-234	2.11 +/- 0.37	0.03	2.110	99.8	82 - 122	P
7440-61-1	U-238	2.34 +/- 0.41	0.02	2.191	107	82 - 122	P

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
U-232	2.172	1.83	pCi/g	84.1	30 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

LT - Result is less than Requested MDC, greater than sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

L - LCS Recovery below lower control limit.

H - LCS Recovery above upper control limit.

P - LCS Recovery within control limits.

M - The requested MDC was not met.

M3 - The requested MDC was not met, but thereported activity is greater than the reported MDC.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

Data Package ID: *UR1709014-1*

Isotopic Uranium by Alpha Spectroscopy

PAI 714 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1709014
Client Name: Cabrera Services, Inc.
ClientProject ID: UNC New Haven CT 10-1007.00

Field ID: UNC-6H-001
Lab ID: 1709014-1

Sample Matrix: SOIL
Prep SOP: PAI 778 Rev 14
Date Collected: 30-Aug-17
Date Prepared: 22-Sep-17
Date Analyzed: 24-Sep-17

Prep Batch: AS170921-3
QCBatchID: AS170921-3-1
Run ID: AS170921-3UR
Count Time: 360 minutes
Report Basis: As Received

Final Aliquot: 0.0488 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: Spectrum #1

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13966-29-5	U-234	117000 +/- 20000	0	0.05	NA	M3
15117-96-1	U-235	3960 +/- 670	0	0.05	NA	M3
7440-61-1	U-238	1680 +/- 290	0	0.05	NA	M3

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
U-232	89.03	50.2	pCi/g	56.3	30 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: *UR1709014-1*

Isotopic Uranium by Alpha Spectroscopy

PAI 714 Rev 13

Sample Results

Lab Name: ALS -- Fort Collins
Work Order Number: 1709014
Client Name: Cabrera Services, Inc.
ClientProject ID: UNC New Haven CT 10-1007.00

Field ID: UNC-3H-002
Lab ID: 1709014-2

Sample Matrix: SOLID
Prep SOP: PAI 778 Rev 14
Date Collected: 30-Aug-17
Date Prepared: 22-Sep-17
Date Analyzed: 24-Sep-17

Prep Batch: AS170921-3
QCBatchID: AS170921-3-3
Run ID: AS170921-3UR
Count Time: 360 minutes
Report Basis: As Received

Final Aliquot: 0.0504 g
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/g
File Name: Spectrum #1

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	DL	Lab Qualifier
13966-29-5	U-234	233 +/- 39	1	0.05	NA	M3
15117-96-1	U-235	11.0 +/- 2.8	0.3	0.05	NA	M3
7440-61-1	U-238	2.6 +/- 1.1	0.6	0.05	NA	M3

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
U-232	86.14	68	pCi/g	78.7	30 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.

Y2 - Chemical Yield outside default limits.

LT - Result is less than Requested MDC, greater than sample specific MDC.

M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Sample specific Minimum Detectable Concentration

BDL - Below Detection Limit

DL - Decision Level

Data Package ID: *UR1709014-1*