

ALS Laboratory Group

ANALYTICAL CHEMISTRY & TESTING SERVICES



Environmental Division

January 13, 2010

Mr. Mike Barsa
Cabrera Services, Inc.
103 E Mount Royal Ave. Ste. 2B
Baltimore, MD 21202

Re: ALS Workorder: 09-12-168
Project Name: Forest Glen Rad Scoping Survey
Project Number: 08-3800.04

Dear Mr. Barsa:

Five wipe samples were received from Cabrera Services, Inc. on December 19, 2009. The samples were scheduled for the following analysis:

Gamma Spectroscopy pages 1-124

The results for this analysis are contained in the enclosed reports.

Thank you for your confidence in ALS Laboratory Group. Should you have any questions, please call.

Sincerely,

ALS Laboratory Group
Lance Steere
Senior Project Manager

LRS/eh
Enclosure (s): Report

ALS Laboratory Group -- FC

Sample Number(s) Cross-Reference Table

Paragon OrderNum: 0912168

Client Name: Cabrera Services Inc.

Client Project Name: Forest Glen Rad Scoping Survey

Client Project Number: 08-3800.04

Client PO Number: 10-30322

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
SU-ALL-COMP	0912168-1	SU01-COMP	WIPE	18-Dec-09	12:00
SU-ALL-COMP a	0912168-2	SU02-TOP-CO	WIPE	18-Dec-09	
SU-ALL-COMP b	0912168-3	SU02-BOTTO	WIPE	18-Dec-09	
SU-ALL-COMP c	0912168-4	SU03-COMP	WIPE	18-Dec-09	
SU-ALL-COMP d	0912168-5	REF-COMP	WIPE	18-Dec-09	

ALS Laboratory Group

Project Name / No.: Forest Glen Rad Scoping Survey Sampler(s): KK, AC, MB, AW Turnaround Standard or Rush Fee: Dispose or Return to Client

Report To: Michael Barsa
Phone: 410-332-8177
Fax: 410-332-8183
Company: Cabrera Services
Address: 103 E. Mount Royal Ave, Suite 2B
Baltimore, MD 21202
mbarasa@cabreraseservices.com

circle method or specify under comments

Sample ID	Date	Time *	Lab ID	Matrix	No. of Containers	Gamma spec (method TBD, see attached message)
SU-ALL-COMP1	12/18/09	12:00	1	SM	5	X

Comments: 08-3800.04, Task 2 WRAMC Forest Glen Annex Radiological Survey SM=Smeas Smeas collected 11/17 and 11/18, held until necessity of analysis determined Submitted to lab - 12/18/2009 1 COMPOSITE SAMPLE MADE UP OF SU01-COMP, SU02-TOP-COMP, SU02-BOTTOM-COMP, SU03-COMP, and REF-COMP - TO BE SPLIT AND ANALYZED SEPARATELY IF ANY EXCEEDANCES ARE FOUND	Relinquished By: (1) Signature: <u>[Signature]</u> Printed Name: <u>Michael Barsa</u> Date: <u>12/18/09</u> Time: <u>1300</u> Company: <u>Cabrera</u>	Relinquished By: (2) Signature: _____ Printed Name: _____ Date: _____ Time: _____ Company: _____
Total number of containers: <u>5</u>	Received By: (1) Signature: <u>[Signature]</u> Printed Name: <u>Cheryl Trumble</u> Date: <u>12-19-09</u> Time: <u>1100</u> Company: <u>ALS</u>	Received By: (2) Signature: _____ Printed Name: _____ Date: _____ Time: _____ Company: _____

* Time Zone (circle one): EDT ODT MDT POT
** Indicate specific analytes under comments.
Distribution: white / yellow (Paragon); pink retained by originator.
Form 202r4.xls (1/3/01)



CONDITION OF SAMPLE UPON RECEIPT FORM

Client: Cabrera

Workorder No: 0912168

Project Manager: LS

Initials: CDT Date: 12-19-09

1. Does this project require any special handling in addition to standard Paragon procedures?		YES	<input checked="" type="radio"/> NO
2. Are custody seals on shipping containers intact?	NONE	<input checked="" type="radio"/> YES	NO
3. Are Custody seals on sample containers intact?	<input checked="" type="radio"/> NONE	YES	NO
4. Is there a COC (Chain-of-Custody) present or other representative documents?		<input checked="" type="radio"/> YES	NO
5. Are the COC and bottle labels complete and legible?		<input checked="" type="radio"/> YES	NO
6. Is the COC in agreement with samples received? (IDs, dates, times, no. of samples, no. of containers, matrix, requested analyses, etc.)		<input checked="" type="radio"/> YES	NO
7. Were airbills / shipping documents present and/or removable?	DROP OFF	<input checked="" type="radio"/> YES	NO
8. Are all aqueous samples requiring preservation preserved correctly? (excluding volatiles)	<input checked="" type="radio"/> N/A	YES	NO
9. Are all aqueous non-preserved samples pH 4-9?	<input checked="" type="radio"/> N/A	YES	NO
10. Is there sufficient sample for the requested analyses?		<input checked="" type="radio"/> YES	NO
11. Were all samples placed in the proper containers for the requested analyses?		<input checked="" type="radio"/> YES	NO
12. Are all samples within holding times for the requested analyses?		<input checked="" type="radio"/> YES	NO
13. Were all sample containers received intact? (not broken or leaking, etc.)		<input checked="" type="radio"/> 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	<input checked="" type="radio"/> N/A	YES	NO
15. Do perchlorate LCMS-MS samples have headspace? (at least 1/3 of container required)	<input checked="" type="radio"/> N/A	YES	NO
16. Were samples checked for and free from the presence of residual chlorine? (Applicable when PM has indicated samples are from a chlorinated water source; note if field preservation with sodium thiosulfate was not observed.)	<input checked="" type="radio"/> N/A	YES	NO
17. Were the samples shipped on ice?		YES	<input checked="" type="radio"/> NO
18. Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #2 #4	<input checked="" type="radio"/> RAD ONLY	YES	<input checked="" type="radio"/> NO
Cooler #: <u>1</u>			
Temperature (°C): <u>Amb</u>			
No. of custody seals on cooler: <u>2</u>			
External µR/hr reading: <u>12</u>			
Background µR/hr reading: <u>13</u>			
Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? <input checked="" type="radio"/> YES <input type="radio"/> NO <input type="radio"/> NA (If no, see Form 008.)			

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

- ① SU-ALL-COMP (SU01-COMP)
- ② SU-ALL-COMP (SU02-TOP-COMP)
- ③ SU-ALL-COMP (SU02-BOTTOM-COMP)
- ④ SU-ALL-COMP (SU03-COMP)
- ⑤ SU-ALL-COMP (REF-COMP)

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

Project Manager Signature / Date: [Signature] 12/21/09

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

From: Origin ID: ODMA (410) 332-8177
Mike Barsa
CABRERA SERVICES
103 E. Mount Royal Ave
Ste 2B
Baltimore, MD 21202



Ship Date: 18DEC09
ActWgt: 2.0 LB
CAD: 4239785/NET9090
Account#: S *****

Delivery Address Bar Code



Ref # 08-3800.04 Task 200
Invoice #
PO #
Dept #

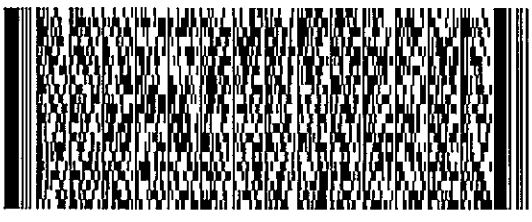
12/18/09

SHIP TO: (970) 490-1511 BILL SENDER
Lance Steere
ALS-Paragon
225 COMMERCE DR

FORT COLLINS, CO 80524

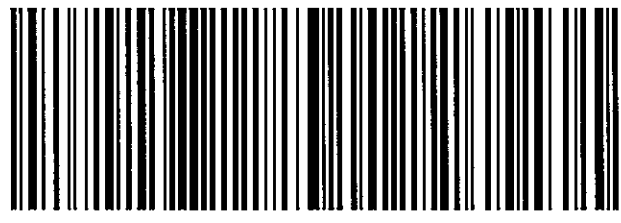
TRK# 7931 1700 1376
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Gamma Spectroscopy Case Narrative

Cabrera Services Inc.

Forest Glen Rad Scoping Survey -- 08-3800.04

Work Order Number: 0912168

1. This report consists of analytical results and supporting documentation for one composite wipe sample received by ALS on 12/19/09. This sample was comprised of 48 wipes.
2. This sample was prepared according to procedure SOP739R9.
3. The sample was analyzed for the presence of gamma emitting radionuclides according to procedure SOP713R10. The analysis was completed on 01/04/10.
4. The analysis results for this sample are reported on an "As Received" basis in units of pCi/sample.
5. Sample volume was insufficient to allow preparation of a duplicate. A duplicate analysis of this sample was performed in lieu of a prepared duplicate.
6. Activity concentrations above the calculated MDC are reported in some instances where minimum nuclide identification criteria are not met. Such tentative identifications result when the software attempts to calculate net activity concentrations for analytes where either one or both of the following criteria are not satisfied: the 'diagnostic' peak for a nuclide must be identified above the critical level, or the minimum library peak abundance must be attained. Nuclides not meeting these requirements have been flagged with a "TI" qualifier.
7. ALS has found there to be a significant low bias to ^{214}Pb and ^{214}Bi results when using a mixed nuclide gamma source for efficiency calibrations. The magnitude of this bias has been determined to be approximately 32% for ^{214}Bi , and 23% for ^{214}Pb . Therefore, any reported results for ^{214}Pb and ^{214}Bi are flagged with a "J" qualifier, indicating the activity values to be an estimated value. Results are reported without further qualification.

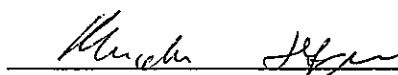


8. The efficiency calibrations used in the activity calculations for this sample was obtained using a NIST traceable mixed gamma source consisting of 500g of sand. Due to differences between the calibration standard and the sample, the analytical results may be biased.
9. Technical considerations made in the creation of the gamma spectroscopy library used in this analysis are detailed in the document "Technical Comments Regarding Gamma Spectroscopy Libraries" found in Section 5.
10. The requested detection limits of several nuclides were not met for samples 0912168-1, -1DUP, and the method blank. The samples were counted for the maximum count time of 1000 minutes. The results have been flagged with an "M" qualifier on the final reports. The results are submitted without further qualification.
11. The requested detection limit of 1.3 pCi/sample for ^{235}U was not met for sample 0912168-1DUP. This sample was counted for the maximum count time of 1000 minutes. The reported activity is greater than the achieved detection limit. The results have been flagged with an "M3" qualifier on the final reports. Results are submitted without further qualification.
12. There are cases where the magnitude of negative activity is greater than the 3σ TPU. ALS is currently investigating the possible cause and frequency of this occurrence. Review of the data does not indicate a problem with the instrument or reporting systems and results are reported without further qualification.
13. There are cases where the magnitude of negative activity is greater than the 2σ TPU. Under typical conditions, where background data is normally distributed and analyzed by paired observations, this event is likely to occur at least 2.5% of the time. Review of the data does not indicate a problem with the instrument or reporting systems and results are reported without further qualification.
14. No further problems were encountered with either the client sample or the associated quality control 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.


Linda Arend
Radiochemistry Primary Data Reviewer

01/11/10
Date


Radiochemistry Final Data Reviewer

1-11-10
Date



Section 1

CHAIN OF CUSTODY

ALS Laboratory Group -- FC

Sample Number(s) Cross-Reference Table

Paragon OrderNum: 0912168

Client Name: Cabrera Services Inc.

Client Project Name: Forest Glen Rad Scoping Survey

Client Project Number: 08-3800.04

Client PO Number: 10-30322

Client Sample Number	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
SU-ALL-COMP	0912168-1	SU01-COMP	WIPE	18-Dec-09	12:00
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SU-ALL-COMP c	0912168-4	SU03-COMP	WIPE	18-Dec-09	
SU-ALL-COMP d	0912168-5	REF-COMP	WIPE	18-Dec-09	



CONDITION OF SAMPLE UPON RECEIPT FORM

Client: Cabrera

Workorder No: 0912168

Project Manager: LS

Initials: CDT Date: 12-19-09

1. Does this project require any special handling in addition to standard Paragon procedures?		YES	<input checked="" type="radio"/> NO
2. Are custody seals on shipping containers intact?	NONE	<input checked="" type="radio"/> YES	NO
3. Are Custody seals on sample containers intact?	<input checked="" type="radio"/> NONE	YES	NO
4. Is there a COC (Chain-of-Custody) present or other representative documents?		<input checked="" type="radio"/> YES	NO
5. Are the COC and bottle labels complete and legible?		<input checked="" type="radio"/> YES	NO
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7. Were airbills / shipping documents present and/or removable?	DROP OFF	<input checked="" type="radio"/> YES	NO
8. Are all aqueous samples requiring preservation preserved correctly? (excluding volatiles)	<input checked="" type="radio"/> N/A	YES	NO
9. Are all aqueous non-preserved samples pH 4-9?	<input checked="" type="radio"/> N/A	YES	NO
10. Is there sufficient sample for the requested analyses?		<input checked="" type="radio"/> YES	NO
11. Were all samples placed in the proper containers for the requested analyses?		<input checked="" type="radio"/> YES	NO
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13. Were all sample containers received intact? (not broken or leaking, etc.)		<input checked="" type="radio"/> YES	NO
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16. Were samples checked for and free from the presence of residual chlorine? (Applicable when PM has indicated samples are from a chlorinated water source; note if field preservation with sodium thiosulfate was not observed.)	<input checked="" type="radio"/> N/A	YES	NO
17. Were the samples shipped on ice?		YES	<input checked="" type="radio"/> NO
18. Were cooler temperatures measured at 0.1-6.0°C? IR gun used*: #2 #4	<input checked="" type="radio"/> RAD ONLY	YES	<input checked="" type="radio"/> NO
Cooler #: <u>1</u>			
Temperature (°C): <u>Amb</u>			
No. of custody seals on cooler: <u>2</u>			
External µR/hr reading: <u>12</u>			
Background µR/hr reading: <u>13</u>			
Were external µR/hr readings ≤ two times background and within DOT acceptance criteria? <input checked="" type="radio"/> YES <input type="radio"/> NO <input type="radio"/> NA (If no, see Form 008.)			

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- ② SU-ALL-COMP (SU02-TOP-COMP)
- ③ SU-ALL-COMP (SU02-BOTTOM-COMP)
- ④ SU-ALL-COMP (SU03-COMP)
- ⑤ SU-ALL-COMP (REF-COMP)

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

Project Manager Signature / Date: [Signature] 12/19/09

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

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

From: Origin ID: ODMA (410) 332-8177
Mike Barsa
CABRERA SERVICES
103 E. Mount Royal Ave
Ste 2B
Baltimore, MD 21202



Ship Date: 18DEC09
ActWgt: 2.0 LB
CAD: 4239785/NET9090
Account#: S*****

Delivery Address Bar Code



Ref # 08-3800.04 Task 200
Invoice #
PO #
Dept #

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2-

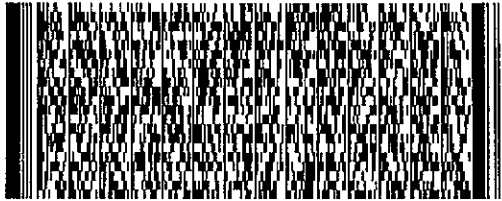
SHIP TO: (970) 490-1511 BILL SENDER

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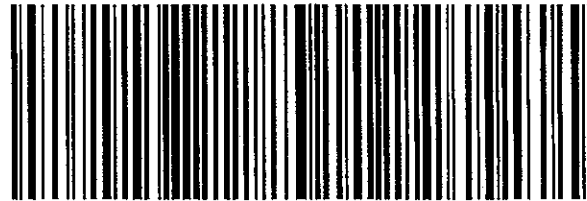
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Section 2



SAMPLE RESULTS SUMMARY



Due to the nature of gamma spectroscopy data, a summary report is not provided.

Please refer to the individual sample results in Section 4.



Section 3

QC RESULTS SUMMARY



Gamma Spectroscopy Results

PAI 713 Rev 10

Method Blank Results

Lab Name: ALS Laboratory Group -- FC
Work Order Number: 0912168
Client Name: Cabrera Services Inc.
ClientProject ID: Forest Glen Rad Scoping Survey 08-3800.04

Lab ID: GS091231-1MB	Sample Matrix: WIPE	Prep Batch: GS091231-1	Final Aliquot: 1.00 sample
Library: CAB_LIB3_APRF	Prep SOP: PAI 739 Rev 9	QCBatchID: GS091231-1-1	Result Units: pCi/sample
	Date Collected: 31-Dec-09	Run ID: GS091231-1A	File Name: 100004d04
	Date Prepared: 31-Dec-09	Count Time: 1000 minutes	
	Date Analyzed: 02-Jan-10		

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
15262-20-1	Ra-228	14 +/- 11	17		U
14391-76-5	Ag-110m	0.4 +/- 2.5	4.3		U
14682-66-7	Al-26	0.2 +/- 3.1	5.3		U
14596-10-2	Am-241	-7 +/- 17	29		U
13966-02-4	Be-7	-7 +/- 19	33		U
14913-49-6	Bi-212	23 +/- 26	43		U
14733-03-0	Bi-214	4 +/- 15	25		U,J
14109-32-1	Cd-109	-3 +/- 52	88		U
13982-30-4	Ce-139	-1.2 +/- 1.6	2.7		U
14762-78-8	Ce-144	0.9 +/- 9.7	16.4		U
14093-03-9	Co-56	1.8 +/- 4.3	7.3		U
13981-50-5	Co-57	0.5 +/- 1.3	2.1		U
13981-38-9	Co-58	-0.6 +/- 2.7	4.6		U
10198-40-0	Co-60	-1.5 +/- 3.1	5.5	0.5	U,M
14392-02-0	Cr-51	21 +/- 18	29		U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU
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.
SQ - Spectral quality prevents accurate quantitation.
SI - Nuclide identification and/or quantitation is tentative.
TI - Nuclide identification is tentative.
R - Nuclide has exceeded 8 half-lives.
M - Requested MDC not met.
B - Analyte concentration greater than MDC.
B3 - Analyte concentration greater than MDC but less than Requested MDC.

Abbreviations:

TPU - Total Propagated Uncertainty
MDC - Minimum Detectable Concentration
BDL - Below Detection Limit

Data Package ID: GSF0912168-1

Gamma Spectroscopy Results

PAI 713 Rev 10

Method Blank Results

Lab Name: ALS Laboratory Group -- FC

Work Order Number: 0912168

Client Name: Cabrera Services Inc.

ClientProject ID: Forest Glen Rad Scoping Survey 08-3800.04

Lab ID: GS091231-1MB

Library: CAB_LIB3_APRF

Sample Matrix: WIPE
Prep SOP: PAI 739 Rev 9

Date Collected: 31-Dec-09

Date Prepared: 31-Dec-09

Date Analyzed: 02-Jan-10

Prep Batch: GS091231-1
QC Batch ID: GS091231-1-1

Run ID: GS091231-1A

Count Time: 1000 minutes

Final Aliquot: 1.00 sample
Result Units: pCi/sample

File Name: 100004d04

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
13967-70-9	Cs-134	0.1 +/- 4.8	8.0		U
10045-97-3	Cs-137	-0.6 +/- 2.9	5.0	0.5	U,M
14683-23-9	Eu-152	9 +/- 14	23	1.5	U,M
15585-10-1	Eu-154	13 +/- 15	24		U
14391-16-3	Eu-155	-2.9 +/- 5.8	10.0		U
14596-12-4	Fe-59	-0.1 +/- 4.7	8.1		U
10043-66-0	I-131	0.3 +/- 2.1	3.6		U
13966-00-2	K-40	-6 +/- 74	125		U
13966-31-9	Mn-54	-0.6 +/- 2.9	4.9	0.4	U,M
13966-32-0	Na-22	-1.2 +/- 2.8	4.9		U
14681-63-1	Nb-94	0.5 +/- 3.1	5.3		U
13967-76-5	Nb-95	-0.3 +/- 2.3	4.0		U
15100-28-4	Pa-234m	-150 +/- 460	810		U
15092-94-1	Pb-212	-5.3 +/- 8.4	14.0		U
15067-28-4	Pb-214	-2.9 +/- 9.9	16.6		U,J

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU
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.
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R - Nuclide has exceeded 8 half-lives.
M - Requested MDC not met.
B - Analyte concentration greater than MDC.
B3 - Analyte concentration greater than MDC but less than Requested MDC.

Abbreviations:

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MDC - Minimum Detectable Concentration
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Data Package ID: GSF0912168-1

Gamma Spectroscopy Results

PAI 713 Rev 10

Method Blank Results

Lab Name: ALS Laboratory Group -- FC
Work Order Number: 0912168
Client Name: Cabrera Services Inc.
ClientProject ID: Forest Glen Rad Scoping Survey 08-3800.04

Lab ID: GS091231-1MB	Sample Matrix: WIPE	Prep Batch: GS091231-1	Final Aliquot: 1.00 sample
Library: CAB_LIB3_APRF	Prep SOP: PAI 739 Rev 9	QC Batch ID: GS091231-1-1	Result Units: pCi/sample
	Date Collected: 31-Dec-09	Run ID: GS091231-1A	File Name: 100004d04
	Date Prepared: 31-Dec-09	Count Time: 1000 minutes	
	Date Analyzed: 02-Jan-10		

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
13967-48-1	Ru-106	-20 +/- 26	45		U
14683-10-4	Sb-124	-1.8 +/- 3.2	5.5		U
14234-35-6	Sb-125	5.5 +/- 6.5	10.6		U
13967-63-0	Sc-46	-1.7 +/- 2.6	4.6		U
15623-47-9	Th-227	-1 +/- 12	20		U
15065-10-8	Th-234	-10 +/- 83	138	3.5	U,M
14913-50-9	Tl-208	1.2 +/- 6.2	10.4		U
15117-96-1	U-235	14.7 +/- 9.0	16.3	1.3	U,M
13982-39-3	Zn-65	-0.6 +/- 6.1	10.5	1.1	U,M
15237-97-5	Cf-249	0.2 +/- 2.9	4.9		U
13233-32-4	Ra-224	-38 +/- 66	112		U
13982-63-3	Ra-226	-30 +/- 110	180		U
13967-76-2	Sr-85	1.6 +/- 3.3	5.5		U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU
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.
SQ - Spectral quality prevents accurate quantitation.
SI - Nuclide identification and/or quantitation is tentative.
TI - Nuclide identification is tentative.
R - Nuclide has exceeded 8 half-lives.
M - Requested MDC not met.
B - Analyte concentration greater than MDC.
B3 - Analyte concentration greater than MDC but less than Requested MDC.

Abbreviations:

TPU - Total Propagated Uncertainty
MDC - Minimum Detectable Concentration
BDL - Below Detection Limit

Data Package ID: GSF0912168-1

Gamma Spectroscopy Results

PAI 713 Rev 10

Laboratory Control Sample(s)

Lab Name: ALS Laboratory Group -- FC

Work Order Number: 0912168

Client Name: Cabrera Services Inc.

ClientProject ID: Forest Glen Rad Scoping Survey 08-3800.04

Lab ID: GS091231-1LCS	Sample Matrix: WIPE	Prep Batch: GS091231-1	Final Aliquot: 1.00 sample
Library: ANALYTICAL.LIB	Prep SOP: PAI 739 Rev 9	QC Batch ID: GS091231-1-1	Result Units: pCi/sample
	Date Collected: 31-Dec-09	Run ID: GS091231-1A	File Name: 100009d04
	Date Prepared: 31-Dec-09	Count Time: 30 minutes	
	Date Analyzed: 04-Jan-10		

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
14596-10-2	Am-241	98000 +/- 12000	2000	101000	97.9	85 - 115	P
10198-40-0	Co-60	42300 +/- 5000	200	43400	97.4	85 - 115	P,M3
10045-97-3	Cs-137	37900 +/- 4500	300	37000	102	85 - 115	P,M3

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU

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

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 half-lives.

Data Package ID: GSF0912168-1

Gamma Spectroscopy Results

PAI 713 Rev 10

Duplicate Sample Results (DER)

Lab Name: ALS Laboratory Group -- FC

Work Order Number: 0912168

Client Name: Cabrera Services Inc.

ClientProject ID: Forest Glen Rad Scoping Survey 08-3800.04

Field ID: SU-ALL-COMP

Lab ID: 0912168-1DUP

Library: CAB_LIB3_APRF

Sample Matrix: WIPE

Prep SOP: PAI 739 Rev 9

Date Collected: 18-Dec-09

Date Prepared: 31-Dec-09

Date Analyzed: 04-Jan-10

Prep Batch: GS091231-1

QC Batch ID: GS091231-1-1

Run ID: GS091231-1A

Count Time: 1000 minutes

Report Basis: As Received

Final Aliquot: 1.00 sample

Prep Basis: As Received

Moisture(%): NA

Result Units: pCi/sample

File Name: 100010d04

CASNO	Analyte	Sample			Duplicate			DER	DER Lim
		Result +/- 2 s TPU	MDC	Flags	Result +/- 2 s TPU	MDC	Flags		
15262-20-1	Ra-228	10 +/- 23	37	U	7 +/- 11	18	U	0.133	2
14391-76-5	Ag-110m	-0.1 +/- 2.7	4.6	U	0.5 +/- 2.5	4.3	U	0.158	2
14682-66-7	Al-26	-2.1 +/- 3.5	6.2	U	1.9 +/- 3.1	5.1	U	0.863	2
14596-10-2	Am-241	-7 +/- 19	32	U	3 +/- 16	27	U	0.399	2
13966-02-4	Be-7	-3 +/- 23	40	U	1 +/- 24	40	U	0.129	2
14913-49-6	Bi-212	5 +/- 43	72	U	32 +/- 38	62	U	0.476	2
14733-03-0	Bi-214	1 +/- 15	25	U,J	0 +/- 14	23	U,J	0.0608	2
14109-32-1	Cd-109	-11 +/- 94	157	U	10 +/- 53	89	U	0.196	2
13982-30-4	Ce-139	0.7 +/- 1.7	2.8	U	-0.4 +/- 1.7	2.9	U	0.446	2
14762-78-8	Ce-144	1 +/- 12	19	U	5.4 +/- 10	16.8	U	0.301	2
14093-03-9	Co-56	2.6 +/- 5.6	9.4	U	4.8 +/- 5.1	8.2	U	0.289	2
13981-50-5	Co-57	-0.5 +/- 1.6	2.6	U	0.8 +/- 1.4	2.3	U	0.631	2
13981-38-9	Co-58	0.1 +/- 2.7	4.6	U	0.4 +/- 3.2	5.4	U	0.0716	2
10198-40-0	Co-60	-3.9 +/- 3.4	6.0	U,M	-0.6 +/- 3.1	5.4	U,M	0.729	2
14392-02-0	Cr-51	0 +/- 26	44	U	-26 +/- 27	47	U	0.682	2
13967-70-9	Cs-134	-5.3 +/- 3.2	5.6	U	-1.7 +/- 3.2	5.5	U	0.786	2
10045-97-3	Cs-137	-0.7 +/- 2.9	4.9	U,M	-0.4 +/- 3.0	5.1	U,M	0.0722	2

Comments:

Duplicate 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.
- W - DER is greater than Warning Limit of 1.42
- D - DER is greater than Control Limit of 2
- LT - Result is less than Request MDC, greater than sample specific MDC
- M - Requested MDC not met.
- M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
- L - LCS Recovery below lower control limit.
- H - LCS Recovery above upper control limit.
- P - LCS, Matrix Spike Recovery within control limits.
- N - Matrix Spike Recovery outside control limits

Abbreviations:

- TPU - Total Propagated Uncertainty
- DER - Duplicate Error Ratio
- BDL - Below Detection Limit
- NR - Not Reported
- SQ - Spectral quality prevents accurate quantitation.
- SI - Nuclide identification and/or quantitation is tentative.
- TI - Nuclide identification is tentative.
- R - Nuclide has exceeded 8 halfives.
- G - Sample density differs by more than 15% of LCS density.

Data Package ID: GSF0912168-1

Date Printed: Friday, January 08, 2010

ALS Laboratory Group -- FC

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LIMS Version: 6.323A

Gamma Spectroscopy Results

PAI 713 Rev 10

Duplicate Sample Results (DER)

Lab Name: ALS Laboratory Group -- FC
 Work Order Number: 0912168
 Client Name: Cabrera Services Inc.
 ClientProject ID: Forest Glen Rad Scoping Survey 08-3800.04

Field ID: SU-ALL-COMP Lab ID: 0912168-1DUP	Sample Matrix: WIPE Prep SOP: PAI 739 Rev 9 Date Collected: 18-Dec-09 Date Prepared: 31-Dec-09 Date Analyzed: 04-Jan-10	Prep Batch: GS091231-1 QCBatchID: GS091231-1-1 Run ID: GS091231-1A Count Time: 1000 minutes Report Basis: As Received	Final Aliquot: 1.00 sample Prep Basis: As Received Moisture(%): NA Result Units: pCi/sample File Name: 100010d04
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CASNO	Analyte	Sample			Duplicate			DER	DER Lim
		Result +/- 2 s TPU	MDC	Flags	Result +/- 2 s TPU	MDC	Flags		
14683-23-9	Eu-152	-26 +/- 18	32	U,M	4 +/- 14	24	U,M	1.36	2
15585-10-1	Eu-154	-4 +/- 22	37	U	-14 +/- 15	27	U	0.37	2
14391-16-3	Eu-155	0.2 +/- 7.1	11.9	U	2.7 +/- 5.9	9.8	U	0.273	2
14596-12-4	Fe-59	1.6 +/- 6.5	11.0	U	-0.4 +/- 6.2	10.7	U	0.217	2
10043-66-0	I-131	-3.5 +/- 8.6	14.7	U	-0.1 +/- 9.5	16.1	U	0.267	2
13966-00-2	K-40	43 +/- 80	131	U	-39 +/- 75	127	U	0.759	2
13966-31-9	Mn-54	0.5 +/- 3.1	5.2	U,M	-1.3 +/- 4.3	7.3	U,M	0.34	2
13966-32-0	Na-22	0.9 +/- 3.1	5.2	U	-0.7 +/- 2.7	4.8	U	0.394	2
14681-63-1	Nb-94	4.8 +/- 3.1	4.8	U	2.2 +/- 3.2	5.2	U	0.592	2
13967-76-5	Nb-95	-0.6 +/- 2.9	5.0	U	-1.7 +/- 2.9	5.1	U	0.27	2
15100-28-4	Pa-234m	310 +/- 310	500	U	100 +/- 470	800	U	0.366	2
15092-94-1	Pb-212	-2.0 +/- 7.7	12.9	U	-1.6 +/- 8.5	14.1	U	0.0305	2
15067-28-4	Pb-214	-3 +/- 11	18	U,J	2.3 +/- 10	17	U,J	0.323	2
13967-48-1	Ru-106	-6 +/- 28	48	U	-10 +/- 25	44	U	0.0908	2
14683-10-4	Sb-124	0.7 +/- 3.7	6.3	U	4.8 +/- 3.8	6.2	U	0.776	2
14234-35-6	Sb-125	-5.7 +/- 7.1	12.3	U	-2.3 +/- 6.5	11.1	U	0.36	2
13967-63-0	Sc-46	-0.1 +/- 3.0	5.2	U	0.8 +/- 2.9	4.8	U	0.213	2

Comments:

Duplicate 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.
- W - DER is greater than Warning Limit of 1.42
- D - DER is greater than Control Limit of 2
- LT - Result is less than Request MDC, greater than sample specific MDC
- M - Requested MDC not met.
- M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
- L - LCS Recovery below lower control limit.
- H - LCS Recovery above upper control limit.
- P - LCS, Matrix Spike Recovery within control limits.
- N - Matrix Spike Recovery outside control limits

Abbreviations:

- TPU - Total Propagated Uncertainty
- DER - Duplicate Error Ratio
- BDL - Below Detection Limit
- NR - Not Reported
- SQ - Spectral quality prevents accurate quantitation.
- SI - Nuclide identification and/or quantitation is tentative.
- TI - Nuclide identification is tentative.
- R - Nuclide has exceeded 8 half-lives.
- G - Sample density differs by more than 15% of LCS density.

Data Package ID: GSF0912168-1

Gamma Spectroscopy Results

PAI 713 Rev 10

Duplicate Sample Results (DER)

Lab Name: ALS Laboratory Group -- FC
 Work Order Number: 0912168
 Client Name: Cabrera Services Inc.
 ClientProject ID: Forest Glen Rad Scoping Survey 08-3800.04

Field ID: SU-ALL-COMP Lab ID: 0912168-1DUP Library: CAB_LIB3_APRF	Sample Matrix: WIPE Prep SOP: PAI 739 Rev 9 Date Collected: 18-Dec-09 Date Prepared: 31-Dec-09 Date Analyzed: 04-Jan-10	Prep Batch: GS091231-1 QCBatchID: GS091231-1-1 Run ID: GS091231-1A Count Time: 1000 minutes Report Basis: As Received	Final Aliquot: 1.00 sample Prep Basis: As Received Moisture(%): NA Result Units: pCi/sample File Name: 100010d04
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CASNO	Analyte	Sample			Duplicate			DER	DER Lim
		Result +/- 2 s TPU	MDC	Flags	Result +/- 2 s TPU	MDC	Flags		
15623-47-9	Th-227	-4 +/- 20	34	U	-1 +/- 12	20	U	0.141	2
15065-10-8	Th-234	-31 +/- 88	146	U,M	-14 +/- 83	138	U,M	0.139	2
14913-50-9	Tl-208	-2.1 +/- 7.7	12.8	U	2.2 +/- 6.3	10.5	U	0.427	2
15117-96-1	U-235	7.3 +/- 7.4	12.0	U,M	19.6 +/- 10	15.9	M3,TI	0.965	2
13982-39-3	Zn-65	-2.6 +/- 6.7	11.6	U,M	-2.8 +/- 6.0	10.5	U,M	0.0297	2
15237-97-5	Cf-249	1.9 +/- 2.8	4.6	U	-2.2 +/- 3.0	5.2	U	1.01	2
13233-32-4	Ra-224	4 +/- 43	71	U	-32 +/- 39	68	U	0.624	2
13982-63-3	Ra-226	-10 +/- 110	190	U	-20 +/- 110	180	U	0.0541	2
13967-76-2	Sr-85	0.3 +/- 4.3	7.2	U	1.8 +/- 3.7	6.0	U	0.275	2

Comments:

Duplicate 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.
- W - DER is greater than Warning Limit of 1.42
- D - DER is greater than Control Limit of 2
- LT - Result is less than Request MDC, greater than sample specific MDC
- M - Requested MDC not met.
- M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
- L - LCS Recovery below lower control limit.
- H - LCS Recovery above upper control limit.
- P - LCS, Matrix Spike Recovery within control limits.
- N - Matrix Spike Recovery outside control limits

Abbreviations:

- TPU - Total Propagated Uncertainty
- DER - Duplicate Error Ratio
- BDL - Below Detection Limit
- NR - Not Reported

- SQ - Spectral quality prevents accurate quantitation.
- SI - Nuclide identification and/or quantitation is tentative.
- TI - Nuclide identification is tentative.
- R - Nuclide has exceeded 8 half-lives.
- G - Sample density differs by more than 15% of LCS density.

Data Package ID: GSF0912168-1



Section 4

INDIVIDUAL SAMPLE RESULTS

4

Gamma Spectroscopy Results

PAI 713 Rev 10
Sample Results

Lab Name: ALS Laboratory Group -- FC
Work Order Number: 0912168
Client Name: Cabrera Services Inc.
ClientProject ID: Forest Glen Rad Scoping Survey 08-3800.04

Field ID: SU-ALL-COMP
Lab ID: 0912168-1

Library: CAB_LIB3_APRF

Sample Matrix: WIPE
Prep SOP: PAI 739 Rev 9
Date Collected: 18-Dec-09
Date Prepared: 31-Dec-09
Date Analyzed: 02-Jan-10

Prep Batch: GS091231-1
QCBatchID: GS091231-1-1
Run ID: GS091231-1A
Count Time: 1000 minutes
Report Basis: As Received

Final Aliquot: 1.00 sample
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/sample
File Name: 100004d02

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
15262-20-1	Ra-228	10 +/- 23	37		U
14391-76-5	Ag-110m	-0.1 +/- 2.7	4.6		U
14682-66-7	Al-26	-2.1 +/- 3.5	6.2		U
14596-10-2	Am-241	-7 +/- 19	32		U
13966-02-4	Be-7	-3 +/- 23	40		U
14913-49-6	Bi-212	5 +/- 43	72		U
14733-03-0	Bi-214	1 +/- 15	25		U,J
14109-32-1	Cd-109	-11 +/- 94	157		U
13982-30-4	Ce-139	0.7 +/- 1.7	2.8		U
14762-78-8	Ce-144	1 +/- 12	19		U
14093-03-9	Co-56	2.6 +/- 5.6	9.4		U
13981-50-5	Co-57	-0.5 +/- 1.6	2.6		U
13981-38-9	Co-58	0.1 +/- 2.7	4.6		U
10198-40-0	Co-60	-3.9 +/- 3.4	6.0	0.5	U,M
14392-02-0	Cr-51	0 +/- 26	44		U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU
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.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 half-lives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: GSF0912168-1

Gamma Spectroscopy Results

PAI 713 Rev 10

Sample Results

Lab Name: ALS Laboratory Group -- FC

Work Order Number: 0912168

Client Name: Cabrera Services Inc.

ClientProject ID: Forest Glen Rad Scoping Survey 08-3800.04

Field ID: SU-ALL-COMP
Lab ID: 0912168-1

Library: CAB_LIB3_APRF

Sample Matrix: WIPE
Prep SOP: PAI 739 Rev 9
Date Collected: 18-Dec-09
Date Prepared: 31-Dec-09
Date Analyzed: 02-Jan-10

Prep Batch: GS091231-1
QCBatchID: GS091231-1-1
Run ID: GS091231-1A
Count Time: 1000 minutes
Report Basis: As Received

Final Aliquot: 1.00 sample
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/sample
File Name: 100004d02

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
13967-70-9	Cs-134	-5.3 +/- 3.2	5.6		U
10045-97-3	Cs-137	-0.7 +/- 2.9	4.9	0.5	U,M
14683-23-9	Eu-152	-26 +/- 18	32	1.5	U,M
15585-10-1	Eu-154	-4 +/- 22	37		U
14391-16-3	Eu-155	0.2 +/- 7.1	11.9		U
14596-12-4	Fe-59	1.6 +/- 6.5	11.0		U
10043-66-0	I-131	-3.5 +/- 8.6	14.7		U
13966-00-2	K-40	43 +/- 80	131		U
13966-31-9	Mn-54	0.5 +/- 3.1	5.2	0.4	U,M
13966-32-0	Na-22	0.9 +/- 3.1	5.2		U
14681-63-1	Nb-94	4.8 +/- 3.1	4.8		U
13967-76-5	Nb-95	-0.6 +/- 2.9	5.0		U
15100-28-4	Pa-234m	310 +/- 310	500		U
15092-94-1	Pb-212	-2.0 +/- 7.7	12.9		U
15067-28-4	Pb-214	-3 +/- 11	18		U,J

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU

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 - Minimum Detectable Concentration

BDL - Below Detection Limit

SQ - Spectral quality prevents accurate quantitation.

S1 - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 half-lives.

G - Sample density differs by more than 15% of LCS density.

Data Package ID: GSF0912168-1

Gamma Spectroscopy Results

PAI 713 Rev 10

Sample Results

Lab Name: ALS Laboratory Group -- FC
 Work Order Number: 0912168
 Client Name: Cabrera Services Inc.
 Client Project ID: Forest Glen Rad Scoping Survey 08-3800.04

Field ID: SU-ALL-COMP
Lab ID: 0912168-1

Library: CAB_LIB3_APRF

Sample Matrix: WIPE
 Prep SOP: PAI 739 Rev 9
 Date Collected: 18-Dec-09
 Date Prepared: 31-Dec-09
 Date Analyzed: 02-Jan-10

Prep Batch: GS091231-1
 QCBatchID: GS091231-1-1
 Run ID: GS091231-1A
 Count Time: 1000 minutes
 Report Basis: As Received

Final Aliquot: 1.00 sample
 Prep Basis: As Received
 Moisture(%): NA
 Result Units: pCi/sample
 File Name: 100004d02

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
13967-48-1	Ru-106	-6 +/- 28	48		U
14683-10-4	Sb-124	0.7 +/- 3.7	6.3		U
14234-35-6	Sb-125	-5.7 +/- 7.1	12.3		U
13967-63-0	Sc-46	-0.1 +/- 3.0	5.2		U
15623-47-9	Th-227	-4 +/- 20	34		U
15065-10-8	Th-234	-31 +/- 88	146	3.5	U,M
14913-50-9	Tl-208	-2.1 +/- 7.7	12.8		U
15117-96-1	U-235	7.3 +/- 7.4	12.0	1.3	U,M
13982-39-3	Zn-65	-2.6 +/- 6.7	11.6	1.1	U,M
15237-97-5	Cf-249	1.9 +/- 2.8	4.6		U
13233-32-4	Ra-224	4 +/- 43	71		U
13982-63-3	Ra-226	-10 +/- 110	190		U
13967-76-2	Sr-85	0.3 +/- 4.3	7.2		U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU
 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.

SQ - Spectral quality prevents accurate quantitation.
 SI - Nuclide identification and/or quantitation is tentative.
 TI - Nuclide identification is tentative.
 R - Nuclide has exceeded 8 half-lives.
 G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty
 MDC - Minimum Detectable Concentration
 BDL - Below Detection Limit

Data Package ID: GSF0912168-1

Gamma Spectroscopy Results

PAI 713 Rev 10

Sample Duplicate Results

Lab Name: ALS Laboratory Group -- FC
 Work Order Number: 0912168
 Client Name: Cabrera Services Inc.
 ClientProject ID: Forest Glen Rad Scoping Survey 08-3800.04

Field ID: SU-ALL-COMP Lab ID: 0912168-1DUP Library: CAB_LIB3_APRF	Sample Matrix: WIPE Prep SOP: PAI 739 Rev 9 Date Collected: 18-Dec-09 Date Prepared: 31-Dec-09 Date Analyzed: 04-Jan-10	Prep Batch: GS091231-1 QCBatchID: GS091231-1-1 Run ID: GS091231-1A Count Time: 1000 minutes Report Basis: As Received	Final Aliquot: 1.00 sample Prep Basis: As Received Moisture(%): NA Result Units: pCi/sample File Name: 100010d04
---	---	---	--

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
15262-20-1	Ra-228	7 +/- 11	18		U
14391-76-5	Ag-110m	0.5 +/- 2.5	4.3		U
14682-66-7	Al-26	1.9 +/- 3.1	5.1		U
14596-10-2	Am-241	3 +/- 16	27		U
13966-02-4	Be-7	1 +/- 24	40		U
14913-49-6	Bi-212	32 +/- 38	62		U
14733-03-0	Bi-214	0 +/- 14	23		U,J
14109-32-1	Cd-109	10 +/- 53	89		U
13982-30-4	Ce-139	-0.4 +/- 1.7	2.9		U
14762-78-8	Ce-144	5.4 +/- 10	16.8		U
14093-03-9	Co-56	4.8 +/- 5.1	8.2		U
13981-50-5	Co-57	0.8 +/- 1.4	2.3		U
13981-38-9	Co-58	0.4 +/- 3.2	5.4		U

Comments:

Qualifiers/Flags:

- | | |
|--|--|
| U - Result is less than the sample specific MDC or less than the associated TPU.
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.
M - The requested MDC was not met.
M3 - The requested MDC was not met, but thereported activity is greater than the reported MDC.
W - DER is greater than Warning Limit of 1.42
D - DER is greater than Control Limit of 2 | SQ - Spectral quality prevents accurate quantitation.
SI - Nuclide identification and/or quantitation is tentative.
TI - Nuclide identification is tentative.
R - Nuclide has exceeded 8 halfives.
G - Sample density differs by more than 15% of LCS density. |
|--|--|

Abbreviations:

- TPU - Total Propagated Uncertainty
 MDC - Minimum Detectable Concentration
 BDL - Below Detection Limit

Data Package ID: GSF0912168-1

Gamma Spectroscopy Results

PAI 713 Rev 10

Sample Duplicate Results

Lab Name: ALS Laboratory Group -- FC
 Work Order Number: 0912168
 Client Name: Cabrera Services Inc.
 ClientProject ID: Forest Glen Rad Scoping Survey 08-3800.04

Field ID: SU-ALL-COMP	Sample Matrix: WIPE	Prep Batch: GS091231-1	Final Aliquot: 1.00 sample
Lab ID: 0912168-1DUP	Prep SOP: PAI 739 Rev 9	QC Batch ID: GS091231-1-1	Prep Basis: As Received
Library: CAB_LIB3_APRF	Date Collected: 18-Dec-09	Run ID: GS091231-1A	Moisture(%): NA
	Date Prepared: 31-Dec-09	Count Time: 1000 minutes	Result Units: pCi/sample
	Date Analyzed: 04-Jan-10	Report Basis: As Received	File Name: 100010d04

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
10198-40-0	Co-60	-0.6 +/- 3.1	5.4	0.5	U,M
14392-02-0	Cr-51	-26 +/- 27	47		U
13967-70-9	Cs-134	-1.7 +/- 3.2	5.5		U
10045-97-3	Cs-137	-0.4 +/- 3.0	5.1	0.5	U,M
14683-23-9	Eu-152	4 +/- 14	24	1.5	U,M
15585-10-1	Eu-154	-14 +/- 15	27		U
14391-16-3	Eu-155	2.7 +/- 5.9	9.8		U
14596-12-4	Fe-59	-0.4 +/- 6.2	10.7		U
10043-66-0	I-131	-0.1 +/- 9.5	16.1		U
13966-00-2	K-40	-39 +/- 75	127		U
13966-31-9	Mn-54	-1.3 +/- 4.3	7.3	0.4	U,M
13966-32-0	Na-22	-0.7 +/- 2.7	4.8		U
14681-63-1	Nb-94	2.2 +/- 3.2	5.2		U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.
 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.
 M - The requested MDC was not met.
 M3 - The requested MDC was not met, but thereported activity is greater than the reported MDC.
 W - DER is greater than Warning Limit of 1.42
 D - DER is greater than Control Limit of 2

SQ - Spectral quality prevents accurate quantitation.
 SI - Nuclide identification and/or quantitation is tentative.
 TI - Nuclide identification is tentative.
 R - Nuclide has exceeded 8 halflives.
 G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty
 MDC - Minimum Detectable Concentration
 BDL - Below Detection Limit

Data Package ID: GSF0912168-1

Gamma Spectroscopy Results

PAI 713 Rev 10

Sample Duplicate Results

Lab Name: ALS Laboratory Group -- FC
 Work Order Number: 0912168
 Client Name: Cabrera Services Inc.
 ClientProject ID: Forest Glen Rad Scoping Survey 08-3800.04

Field ID: SU-ALL-COMP
 Lab ID: 0912168-1DUP

Library: CAB_LIB3_APRF

Sample Matrix: WIPE
 Prep SOP: PAI 739 Rev 9
 Date Collected: 18-Dec-09
 Date Prepared: 31-Dec-09
 Date Analyzed: 04-Jan-10

Prep Batch: GS091231-1
 QCBatchID: GS091231-1-1
 Run ID: GS091231-1A
 Count Time: 1000 minutes
 Report Basis: As Received

Final Aliquot: 1.00 sample
 Prep Basis: As Received
 Moisture(%): NA
 Result Units: pCi/sample
 File Name: 100010d04

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
13967-76-5	Nb-95	-1.7 +/- 2.9	5.1		U
15100-28-4	Pa-234m	100 +/- 470	800		U
15092-94-1	Pb-212	-1.6 +/- 8.5	14.1		U
15067-28-4	Pb-214	2.3 +/- 10	17		U,J
13967-48-1	Ru-106	-10 +/- 25	44		U
14683-10-4	Sb-124	4.8 +/- 3.8	6.2		U
14234-35-6	Sb-125	-2.3 +/- 6.5	11.1		U
13967-63-0	Sc-46	0.8 +/- 2.9	4.8		U
15623-47-9	Th-227	-1 +/- 12	20		U
15065-10-8	Th-234	-14 +/- 83	138	3.5	U,M
14913-50-9	Tl-208	2.2 +/- 6.3	10.5		U
15117-96-1	U-235	19.6 +/- 10	15.9	1.3	M3,TI
13982-39-3	Zn-65	-2.8 +/- 6.0	10.5	1.1	U,M

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.
 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.
 M - The requested MDC was not met.
 M3 - The requested MDC was not met, but thereported activity is greater than the reported MDC.
 W - DER is greater than Warning Limit of 1.42
 D - DER is greater than Control Limit of 2

SQ - Spectral quality prevents accurate quantitation.
 SI - Nuclide identification and/or quantitation is tentative.
 TI - Nuclide identification is tentative.
 R - Nuclide has exceeded 8 halfives.
 G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty
 MDC - Minimum Detectable Concentration
 BDL - Below Detection Limit

Data Package ID: GSF0912168-1

Gamma Spectroscopy Results

PAI 713 Rev 10

Sample Duplicate Results

Lab Name: ALS Laboratory Group -- FC

Work Order Number: 0912168

Client Name: Cabrera Services Inc.

ClientProject ID: Forest Glen Rad Scoping Survey 08-3800.04

Field ID: SU-ALL-COMP

Lab ID: 0912168-1DUP

Library: CAB_LIB3_APRF

Sample Matrix: WIPE

Prep SOP: PAI 739 Rev 9

Date Collected: 18-Dec-09

Date Prepared: 31-Dec-09

Date Analyzed: 04-Jan-10

Prep Batch: GS091231-1

QCBatchID: GS091231-1-1

Run ID: GS091231-1A

Count Time: 1000 minutes

Report Basis: As Received

Final Aliquot: 1.00 sample

Prep Basis: As Received

Moisture(%): NA

Result Units: pCi/sample

File Name: 100010d04

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
15237-97-5	Cf-249	-2.2 +/- 3.0	5.2		U
13233-32-4	Ra-224	-32 +/- 39	68		U
13982-63-3	Ra-226	-20 +/- 110	180		U
13967-76-2	Sr-85	1.8 +/- 3.7	6.0		U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

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.

M - The requested MDC was not met.

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

W - DER is greater than Warning Limit of 1.42

D - DER is greater than Control Limit of 2

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halfives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: GSF0912168-1



Section 5

RAW DATA



100004D02.SPC Analyzed by JP

 SEEKER G A M M A A N A L Y S I S R E S U L T S PS Version 1.8.4

ALS Laboratory Group - Fort Collins
 GammaScan

Geo 13 / Solid

Sample ID: 0912168-1 GS091231-1

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Sampling Start: 12/18/2009 12:00:00 | Counting Start: 01/02/2010 11:08:46
Sampling Stop: 12/18/2009 12:00:00 | Decay Time. . . . . 3.59E+002 Hrs
Buildup Time. . . . . 0.00E+000 Hrs | Live Time . . . . . 60000 Sec
Sample Size . . . . . 1.00E+000 Sample | Real Time . . . . . 60083 Sec
Collection Efficiency . . . . . 1.0000 | Spc. File . . . . . 100004D02.SPC
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Detector #: 2 (Detector 2)

Energy (keV) = -0.48 + 0.501*Ch + 0.00E+00*Ch^2 + 0.00E+00*Ch^3 01/02/2010
 FWHM(keV) = 0.69 + 0.006*En + 1.41E-03*En^2 + 0.00E+00*En^3 05/06/2009
 Where En = Sqrt(Energy in keV)

Search Sensitivity: 1.00 | Sigma Multiplier: 2.00 | Search Start/End: 80/4000

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	46.71	94.23	88	52	40	385	0.54	a
2	49.81	100.41	32	60	48	513	0.71	b NET< CL
3	53.73	108.24	96	81	65	769	1.05	c
4	63.36	127.47	162	58	43	452	0.53	a
5	66.42	133.57	150	58	43	452	0.46	b
6	69.79	140.29	30	53	43	452	0.42	c NET< CL
7	74.97	150.64	44	65	52	602	0.66	a NET< CL
8	77.15	155.00	30	53	43	452	0.43	b NET< CL
9	84.76	170.18	42	70	56	640	0.84	a NET< CL
10	92.69	186.01	402	79	56	624	0.83	a
11	139.92	280.32	134	59	45	447	0.70	a
12	143.58	287.63	47	47	37	336	0.49	b
13	185.75	371.82	293	72	52	552	0.85	a
14	198.37	397.01	231	91	70	781	1.29	a
15	229.15	458.47	47	76	61	644	1.22	a NET< CL
16	238.74	477.61	286	67	48	460	0.88	a
17	241.32	482.76	66	60	48	460	0.79	b
18	295.36	590.66	89	60	47	465	0.95	a
19	351.89	703.51	179	59	43	390	1.03	a
20	493.48	986.21	37	46	36	287	1.11	a
21	511.20	1021.57	1615	121	75	763	2.77	a Wide Pk
22	558.61	1116.23	181	53	38	291	1.26	a
23	570.04	1139.06	94	58	45	398	1.45	a
24	583.54	1166.00	130	49	35	272	1.23	a

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PEAK SEARCH RESULTS

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PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
25	596.11	1191.11	105	76	60	576	2.12	a
26	609.49	1217.81	189	65	49	462	1.51	a
27	670.48	1339.58	41	44	35	248	1.24	a
28	694.57	1387.67	117	66	52	491	1.92	a
29	803.38	1604.92	134	50	36	252	1.87	a
30	911.74	1821.27	120	49	36	223	2.22	a
31	962.65	1922.90	42	42	33	214	1.73	a
32	1001.24	1999.95	29	29	22	112	1.17	a
33	1461.33	2918.51	217	49	32	155	2.96	a
34	1765.47	3525.73	39	31	24	88	2.65	a

100004D02.SPC Analyzed by

SEEKER B A C K G R O U N D S U B T R A C T R E S U L T S Vers. 2.2.1

ALS Laboratory Group - Fort Collins
GammaScan

Background File: DET021231.BKG (091231-2 WEEKLY BKG)

Bkg.File Detector #: 2

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BACKGROUND SUBTRACT RESULTS

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PK#	ENERGY (keV)	OLD NET COUNTS	OLD UN- CERTAINTY	OLD CR.LEVEL	NEW NET COUNTS	NEW UN- CERTAINTY	NEW CR.LEVEL	FLAG
1	46.71	88	52	40	32	115	94	NET<CL
3	53.73	96	81	65	63	128	104	NET<CL
4	63.36	162	58	43	18	143	117	NET<CL
5	66.42	150	58	43	-15	162	133	NET<CL
6	69.79	30	53	43	0	250	205	NET<CL
7	74.97	44	65	52	-39	127	105	NET<CL
8	77.15	30	53	43	-83	142	118	NET<CL
9	84.76	42	70	56	-63	219	181	NET<CL
10	92.69	402	79	56	-66	189	156	NET<CL
11	139.92	134	59	45	36	130	107	NET<CL
13	185.75	293	72	52	-18	200	164	NET<CL
14	198.37	231	91	70	37	188	154	NET<CL
16	238.74	286	67	48	-39	151	125	NET<CL
17	241.32	66	60	48	-30	135	112	NET<CL
18	295.36	89	60	47	-60	138	114	NET<CL
19	351.89	179	59	43	-33	142	117	NET<CL
21	511.20	1615	121	75	39	274	225	NET<CL
22	558.61	181	53	38	19	124	102	NET<CL
23	570.04	94	58	45	37	107	88	NET<CL
24	583.54	130	49	35	-42	154	128	NET<CL
25	596.11	105	76	60	19	184	151	NET<CL
26	609.49	189	65	49	10	157	129	NET<CL
28	694.57	117	66	52	26	133	109	NET<CL
29	803.38	134	50	36	10	106	87	NET<CL
30	911.74	120	49	36	44	98	80	NET<CL
33	1461.33	217	49	32	57	104	85	NET<CL
34	1765.47	39	31	24	-1	77	63	NET<CL

ALS Laboratory Group - Fort Collins
GammaScan

Geo 13 / Solid

Sample ID: 0912168-1 GS091231-1

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Sampling Start: 12/18/2009 12:00:00 | Counting Start: 01/02/2010 11:08:46
Sampling Stop: 12/18/2009 12:00:00 | Decay Time. . . . . 3.59e+002 Hrs
Buildup Time. . . . . 0.00e+000 Hrs | Live Time . . . . . 60000 Sec
Sample Size . . . . . 1.00e+000 Sample | Real Time . . . . . 60083 Sec
Collection Efficiency . . . . . 1.0000 | Spectrum File . . . . . 100004D02.SPC
Cr. Level Confidence Interval: 95 % | Det. Limit Confidence Interval: 95 %
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Detector #: 2 (Detector 2)

Efficiency File: (D02)(Sh13).EFF (Geo 13 Eff Cal)
 Eff.=1/[2.22E-03*En^-4.05E+00 + 1.40E+02*En^7.52E-01] 05/27/2009

Library File: . . CAB_LIB3_APRF.LIB (CAB_LIB3_APRF)

MEASURED or MDA CONCENTRATIONS

Nuclide	ENERGY E (keV)	N T	Concentration (pCi/Sample)	MDA	Critical Level	Halflife (hrs)
Th-234	92.50	N-3.08E+01	+ 8.79E+01	1.46E+02	7.26E+01	3.92E+13
U-235	143.76		7.32E+00 +- 7.35E+00	1.20E+01	5.78E+00	6.17E+12
Ra-226	186.21	N-1.01E+01	+ 1.14E+02	1.89E+02	9.35E+01	1.40E+07
Pb-212	238.63	N-1.99E+00	+ 7.71E+00	1.29E+01	6.36E+00	1.67E+04
Pb-214	351.99	N-2.57E+00	+ 1.10E+01	1.83E+01	9.05E+00	1.40E+07
Tl-208	583.14	N-2.08E+00	+ 7.66E+00	1.28E+01	6.32E+00	1.27E+14
Bi-214	609.32	N 9.22E-01	+ 1.48E+01	2.45E+01	1.21E+01	1.40E+07
Ra-228	911.07	N 1.01E+01	+ 2.25E+01	3.72E+01	1.83E+01	5.04E+04
Pa-234m	1001.03		3.05E+02 +- 3.06E+02	4.96E+02	2.34E+02	3.92E+13
K-40	1460.75	N 4.33E+01	+ 7.93E+01	1.31E+02	6.46E+01	1.12E+13
Am-241	59.54	N-7.09E+00	+ 1.85E+01	3.16E+01	1.54E+01	3.80E+06
Cd-109	88.04	N-1.12E+01	+ 9.39E+01	1.57E+02	7.74E+01	1.09E+04
Eu-155	105.31	N 1.95E-01	+ 7.07E+00	1.19E+01	5.81E+00	4.35E+04
Co-57	122.07	N-5.00E-01	+ 1.56E+00	2.65E+00	1.29E+00	6.48E+03
Ce-144	133.53	N 8.08E-01	+ 1.16E+01	1.94E+01	9.49E+00	6.82E+03
Ce-139	165.85	N 7.14E-01	+ 1.70E+00	2.83E+00	1.38E+00	3.30E+03
Th-227	236.00	N-3.86E+00	+ 2.02E+01	3.39E+01	1.67E+01	1.90E+05
Ra-224	240.98	N 4.29E+00	+ 4.26E+01	7.14E+01	3.50E+01	1.23E+14
Cr-51	320.07	N-3.93E-01	+ 2.61E+01	4.40E+01	2.15E+01	6.65E+02
I-131	364.48	N-3.51E+00	+ 8.59E+00	1.47E+01	7.16E+00	1.93E+02
Cf-249	388.16	N 1.92E+00	+ 2.80E+00	4.63E+00	2.25E+00	3.08E+06
Sb-125	427.95	N-5.72E+00	+ 7.09E+00	1.23E+01	5.98E+00	2.43E+04
Be-7	477.56	N-3.35E+00	+ 2.33E+01	3.97E+01	1.93E+01	1.28E+03
Sr-85	513.99	N 2.74E-01	+ 4.29E+00	7.16E+00	3.52E+00	1.56E+03
Sb-124	602.71	N 6.78E-01	+ 3.74E+00	6.26E+00	3.06E+00	1.44E+03

MEASURED or MDA CONCENTRATIONS

Nuclide	ENERGY E (keV)	N T	Concentration (pCi/Sample)	MDA	Critical Level	Half-life (hrs)
Cs-134	604.66	N-5.28E+00	+ 3.16E+00	5.56E+00B	2.72E+00	1.81E+04
Ru-106	621.84	N-6.23E+00	+ 2.84E+01	4.83E+01	2.35E+01	8.84E+03
Ag-110M	657.75	N-1.32E-01	+ 2.70E+00	4.59E+00	2.23E+00	6.00E+03
Cs-137	661.62	N-6.72E-01	+ 2.89E+00	4.95E+00	2.40E+00	2.64E+05
Nb-94	702.50	N 4.83E+00	+ 3.02E+00	4.84E+00b	2.35E+00	1.78E+08
Bi-212	727.17	N 4.58E+00	+ 4.28E+01	7.22E+01	3.51E+01	1.67E+04
Nb-95	765.82	N-6.07E-01	+ 2.94E+00	5.04E+00	2.44E+00	1.54E+03
Co-58	810.75	N 1.25E-01	+ 2.71E+00	4.61E+00b	2.22E+00	1.70E+03
Mn-54	834.81	N 4.83E-01	+ 3.06E+00	5.16E+00	2.50E+00	7.49E+03
Sc-46	889.26	N-5.99E-02	+ 3.03E+00	5.17E+00	2.50E+00	2.01E+03
Eu-154	1004.80	N-4.16E+00	+ 2.19E+01	3.74E+01r	1.82E+01	7.45E+04
Fe-59	1099.22	N 1.59E+00	+ 6.53E+00	1.10E+01	5.31E+00	1.08E+03
Zn-65	1115.52	N-2.57E+00	+ 6.72E+00	1.16E+01	5.62E+00	5.85E+03
Co-56	1238.28	N 2.63E+00	+ 5.64E+00	9.42E+00	4.54E+00	1.86E+03
Na-22	1274.54	N 9.22E-01	+ 3.08E+00	5.19E+00	2.49E+00	2.28E+04
Co-60	1332.51	N-3.94E+00	+ 3.34E+00	6.00E+00	2.89E+00	4.62E+04
Eu-152	1408.08	N-2.64E+01	+ 1.75E+01	3.17E+01	1.53E+01	1.17E+05
Al-26	1808.65	N-2.12E+00	+ 3.50E+00	6.21E+00	2.97E+00	6.31E+09

MEASURED TOTAL: 3.91E+02 +- 5.70E+02 pCi/Sample

UNKNOWN, SUM or ESCAPE PEAKS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	46.71	94.23	32	115	94	385	0.54	Deleted
2	49.81	100.41	32	60	48	513	0.71	Deleted
3	53.73	108.24	63	128	104	769	1.05	Deleted
4	63.36	127.47	18	143	117	452	0.53	Deleted
5	66.42	133.57	-15	162	133	452	0.46	Deleted
6	69.79	140.29	0	250	205	452	0.42	Deleted
7	74.97	150.64	-39	127	105	602	0.66	Deleted
8	77.15	155.00	-83	142	118	452	0.43	Deleted
9	84.76	170.18	-63	219	181	640	0.84	Deleted
11	139.92	280.32	36	130	107	447	0.70	Deleted
14	198.37	397.01	37	188	154	781	1.29	Deleted
15	229.15	458.47	47	76	61	644	1.22	Deleted
17	241.32	482.76	-30	135	112	460	0.79	Deleted
18	295.36	590.66	-60	138	114	465	0.95	Deleted
20	493.48	986.21	37	46	36	287	1.11	Unknown
21	511.20	1021.57	39	274	225	763	2.77	Deleted
22	558.61	1116.23	19	124	102	291	1.26	Deleted
23	570.04	1139.06	37	107	88	398	1.45	Deleted
25	596.11	1191.11	19	184	151	576	2.12	Deleted
27	670.48	1339.58	41	44	35	248	1.24	Unknown
28	694.57	1387.67	26	133	109	491	1.92	Deleted
29	803.38	1604.92	10	106	87	252	1.87	Deleted

100004D02.SPC Analyzed by

=====

UNKNOWN, SUM or ESCAPE PEAKS

=====

PK: #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
31	962.65	1922.90	42	42	33	214	1.73	Unknown
34	1765.47	3525.73	-1	77	63	88	2.65	Deleted

c:\SEEKER\BIN\100004d02.res Analysis Results Saved.

 SEEKER G A M M A A N A L Y S I S R E S U L T S PS Version 1.8.4

ALS Laboratory Group - Fort Collins
 GammaScan

Geo 13 / Solid

Sample ID: 0912168-1D GS091231-1

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Sampling Start: 12/18/2009 12:00:00 | Counting Start: 01/04/2010 15:02:48
Sampling Stop: 12/18/2009 12:00:00 | Decay Time. . . . . 4.11E+002 Hrs
Buildup Time. . . . . 0.00E+000 Hrs | Live Time . . . . . 60000 Sec
Sample Size . . . . . 1.00E+000 Sample | Real Time . . . . . 60081 Sec
Collection Efficiency . . . . . 1.0000 | Spc. File . . . . . 100010D04.SPC
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Detector #: 4 (Detector 4)

Energy(keV) = -0.83 + 0.501*Ch + 0.00E+00*Ch^2 + 0.00E+00*Ch^3 01/04/2010
 FWHM(keV) = 0.60 + 0.011*En + 1.26E-03*En^2 +-9.06E-06*En^3 01/09/2009
 Where En = Sqrt(Energy in keV)

Search Sensitivity: 1.00 | Sigma Multiplier: 2.00 | Search Start/End: 80/4000

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	46.51	94.52	143	46	32	283	0.37	a
2	63.27	127.99	195	77	59	698	0.74	a
3	66.55	134.54	154	56	41	419	0.45	b
4	69.73	140.89	51	73	59	698	0.84	c NET< CL
5	74.88	151.17	120	73	57	666	0.82	a
6	77.16	155.73	121	73	57	666	0.76	b
7	84.29	169.97	118	96	77	931	1.35	a
8	87.26	175.90	77	68	54	582	0.80	b
9	92.59	186.54	561	80	53	565	0.86	a
10	98.80	198.93	37	70	57	594	0.99	a NET< CL
11	113.07	227.44	105	100	81	903	1.57	a Wide Pk
12	139.95	281.10	135	55	41	374	0.72	a
13	143.82	288.82	100	70	55	561	0.94	b
14	185.80	372.65	394	71	48	467	0.88	a
15	198.32	397.66	204	70	53	510	0.92	a
16	238.66	478.21	314	65	45	403	0.87	a
17	241.88	484.63	64	72	58	565	1.17	b
18	250.85	502.55	41	39	30	224	0.53	a
19	270.84	542.47	105	82	66	598	1.63	a
20	283.68	568.10	34	57	46	395	0.94	a NET< CL
21	295.34	591.39	116	47	34	261	0.66	a
22	335.39	671.36	24	41	33	241	0.58	a NET< CL
23	351.87	704.26	195	61	44	387	1.14	a
24	511.13	1022.28	1309	110	68	598	2.47	a Wide Pk

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PEAK SEARCH RESULTS

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PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
25	558.49	1116.85	113	43	31	201	0.97	a
26	569.56	1138.94	65	46	36	249	1.20	a
27	583.39	1166.57	127	52	39	260	1.51	a
28	609.18	1218.06	139	57	43	337	1.30	a
29	692.34	1384.12	60	49	38	278	1.41	a
30	694.76	1388.95	53	34	25	155	0.83	b
31	802.86	1604.80	123	43	30	180	1.53	a
32	837.17	1673.32	44	42	33	200	1.61	a
33	911.28	1821.31	47	36	27	142	1.40	a
34	962.72	1924.01	24	28	21	107	1.18	a
35	1460.81	2918.60	100	36	25	105	2.36	a

100010D04.SPC Analyzed by

SEEKER B A C K G R O U N D S U B T R A C T R E S U L T S V e r s . 2.2.1

ALS Laboratory Group - Fort Collins
GammaScan

Background File: DET041231.BKG (091231-4 WEEKLY BKG)

Bkg.File Detector #: 4

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BACKGROUND SUBTRACT RESULTS

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PK#	ENERGY (keV)	OLD NET COUNTS	OLD UN- CERTAINTY	OLD CR.LEVEL	NEW NET COUNTS	NEW UN- CERTAINTY	NEW CR.LEVEL	FLAG
1	46.51	143	46	32	25	136	112	NET<CL
2	63.27	195	77	59	19	150	123	NET<CL
3	66.55	154	56	41	4	157	129	NET<CL
5	74.88	120	73	57	-41	165	136	NET<CL
6	77.16	121	73	57	-17	131	108	NET<CL
8	87.26	77	68	54	47	122	100	NET<CL
9	92.59	561	80	53	-31	183	151	NET<CL
10	98.80	37	70	57	0	112	92	NET<CL
12	139.95	135	55	41	-14	127	105	NET<CL
13	143.82	100	70	55	18	145	119	NET<CL
14	185.80	394	71	48	-30	174	143	NET<CL
15	198.32	204	70	53	44	152	125	NET<CL
16	238.66	314	65	45	-30	153	126	NET<CL
17	241.88	64	72	58	-10	118	97	NET<CL
21	295.34	116	47	34	-8	116	95	NET<CL
23	351.87	195	61	44	26	119	98	NET<CL
24	511.13	1309	110	68	46	244	200	NET<CL
25	558.49	113	43	31	-9	97	80	NET<CL
26	569.56	65	46	36	3	97	80	NET<CL
27	583.39	127	52	39	38	112	91	NET<CL
28	609.18	139	57	43	-3	129	106	NET<CL
29	692.34	60	49	38	-8	112	92	NET<CL
31	802.86	123	43	30	11	97	80	NET<CL
33	911.28	47	36	27	29	62	50	NET<CL
34	962.72	24	28	21	-21	82	68	NET<CL
35	1460.81	100	36	25	-44	82	68	NET<CL

ALS Laboratory Group - Fort Collins
 GammaScan

Geo 13 / Solid

Sample ID: 0912168-1D GS091231-1

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Sampling Start: 12/18/2009 12:00:00 | Counting Start: 01/04/2010 15:02:48
Sampling Stop: 12/18/2009 12:00:00 | Decay Time. . . . . 4.11e+002 Hrs
Buildup Time. . . . . 0.00e+000 Hrs | Live Time . . . . . 60000 Sec
Sample Size . . . . . 1.00e+000 Sample | Real Time . . . . . 60081 Sec
Collection Efficiency . . . . . 1.0000 | Spectrum File . . . . . 100010D04.SPC
Cr. Level Confidence Interval: 95 % | Det. Limit Confidence Interval: 95 %
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Detector #: 4 (Detector 4)

Efficiency File: (D04)(Sh13).EFF (Geo. 13)
 Eff.=1/[2.81E-03*En^-3.92E+00 + 1.63E+02*En^8.04E-01] 03/11/2009

Library File: . . CAB_LIB3_APRF.LIB (CAB_LIB3_APRF)

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MEASURED or MDA CONCENTRATIONS

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Nuclide	ENERGY E (keV)	N T	Concentration (pCi/Sample)	MDA	Critical Level	Halflife (hrs)
Th-234	92.50	N-1.40E+01	+ - 8.31E+01	1.38E+02	6.85E+01	3.92E+13
Ra-226	186.21	N-1.85E+01	+ - 1.06E+02	1.76E+02	8.72E+01	1.40E+07
Pb-212	238.63	N-1.64E+00	+ - 8.48E+00	1.41E+01	6.99E+00	1.67E+04
Pb-214	351.99	N 2.28E+00	+ - 1.02E+01	1.70E+01	8.38E+00	1.40E+07
Tl-208	583.14	N 2.17E+00	+ - 6.31E+00	1.05E+01	5.16E+00	1.27E+14
Bi-214	609.32	N-3.11E-01	+ - 1.39E+01	2.31E+01	1.14E+01	1.40E+07
Ce-144	Average:	x 5.42E+00	+ - 1.00E+01	. . . . .	. . . . .	6.82E+03
	696.49	2.35E+02	+ - 1.49E+02	2.33E+02	1.11E+02	6.82E+03
	133.53	N 4.37E+00	+ - 1.01E+01	1.68E+01	8.16E+00	6.82E+03
K-40	1460.75	N-3.95E+01	+ - 7.46E+01	1.27E+02	6.21E+01	1.12E+13
Am-241	59.54	N 2.69E+00	+ - 1.60E+01	2.69E+01	1.31E+01	3.80E+06
Cd-109	88.04	N 1.00E+01	+ - 5.33E+01	8.93E+01	4.36E+01	1.09E+04
Eu-155	105.31	N 2.71E+00	+ - 5.90E+00	9.81E+00	4.77E+00	4.35E+04
Co-57	122.07	N 8.20E-01	+ - 1.39E+00	2.30E+00	1.12E+00	6.48E+03
U-235	143.76	N 1.96E+01	+ - 1.01E+01	1.59E+01	7.72E+00	6.17E+12
Ce-139	165.85	N-3.58E-01	+ - 1.70E+00	2.88E+00	1.41E+00	3.30E+03
Th-227	236.00	N-5.72E-01	+ - 1.19E+01	2.01E+01	9.79E+00	1.90E+05
Ra-224	240.98	N-3.19E+01	+ - 3.91E+01	6.75E+01	3.30E+01	1.23E+14
Cr-51	320.07	N-2.61E+01	+ - 2.70E+01	4.71E+01	2.29E+01	6.65E+02
I-131	364.48	N-9.04E-02	+ - 9.49E+00	1.61E+01	7.81E+00	1.93E+02
Cf-249	388.16	N-2.24E+00	+ - 2.98E+00	5.17E+00	2.51E+00	3.08E+06
Sb-125	427.95	N-2.26E+00	+ - 6.45E+00	1.11E+01	5.37E+00	2.43E+04
Be-7	477.56	N 9.70E-01	+ - 2.38E+01	4.04E+01	1.96E+01	1.28E+03
Sr-85	513.99	N 1.83E+00	+ - 3.68E+00	6.02E+00	2.94E+00	1.56E+03
Sb-124	602.71	N 4.84E+00	+ - 3.80E+00	6.16E+00	3.00E+00	1.44E+03

MEASURED or MDA CONCENTRATIONS

Nuclide	ENERGY (keV)	N T	Concentration		MDA	Critical Level	Halflife (hrs)
			(pCi/Sample)			
Cs-134	604.66	N	-1.70E+00	+ - 3.21E+00	5.51E+00	2.68E+00	1.81E+04
Ru-106	621.84	N	-9.69E+00	+ - 2.54E+01	4.39E+01	2.12E+01	8.84E+03
Ag-110M	657.75	N	4.52E-01	+ - 2.53E+00	4.29E+00	2.06E+00	6.00E+03
Cs-137	661.62	N	-3.73E-01	+ - 2.97E+00	5.07E+00	2.45E+00	2.64E+05
Nb-94	702.50	N	2.21E+00	+ - 3.17E+00	5.24E+00	2.54E+00	1.78E+08
Bi-212	727.17	N	3.17E+01	+ - 3.75E+01	6.15E+01	2.96E+01	1.67E+04
Nb-95	765.82	N	-1.72E+00	+ - 2.90E+00	5.10E+00	2.45E+00	1.54E+03
Co-58	810.75	N	4.23E-01	+ - 3.15E+00	5.36E+00	2.58E+00	1.70E+03
Mn-54	834.81	N	-1.30E+00	+ - 4.25E+00	7.31E+00	3.57E+00	7.49E+03
Sc-46	889.26	N	8.28E-01	+ - 2.86E+00	4.84E+00	2.31E+00	2.01E+03
Ra-228	911.07	N	6.82E+00	+ - 1.07E+01	1.78E+01	8.52E+00	5.04E+04
Pa-234m	1001.03	N	9.99E+01	+ - 4.68E+02	7.96E+02	3.81E+02	3.92E+13
Eu-154	1004.80	N	-1.40E+01	+ - 1.49E+01	2.69E+01	1.29E+01	7.45E+04
Fe-59	1099.22	N	-3.68E-01	+ - 6.20E+00	1.07E+01	5.11E+00	1.08E+03
Zn-65	1115.52	N	-2.84E+00	+ - 5.96E+00	1.05E+01	5.03E+00	5.85E+03
Co-56	1238.28	N	4.83E+00	+ - 5.04E+00	8.21E+00	3.90E+00	1.86E+03
Na-22	1274.54	N	-7.03E-01	+ - 2.75E+00	4.84E+00	2.30E+00	2.28E+04
Co-60	1332.51	N	-6.07E-01	+ - 3.09E+00	5.39E+00	2.57E+00	4.62E+04
Eu-152	1408.08	N	4.47E+00	+ - 1.39E+01	2.37E+01	1.12E+01	1.17E+05
Al-26	1808.65	N	1.90E+00	+ - 3.06E+00	5.10E+00	2.39E+00	6.31E+09

MEASURED TOTAL: 2.07E+02 +- 6.95E+02 pCi/Sample

UNKNOWN, SUM or ESCAPE PEAKS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	46.51	94.52	25	136	112	283	0.37	Deleted
2	63.27	127.99	19	150	123	698	0.74	Deleted
3	66.55	134.54	4	157	129	419	0.45	Deleted
4	69.73	140.89	51	73	59	698	0.84	Deleted
5	74.88	151.17	-41	165	136	666	0.82	Deleted
6	77.16	155.73	-17	131	108	666	0.76	Deleted
7	84.29	169.97	118	96	77	931	1.35	Unknown
8	87.26	175.90	47	122	100	582	0.80	Deleted
10	98.80	198.93	0	112	92	594	0.99	Deleted
11	113.07	227.44	105	100	81	903	1.57	Unknown
12	139.95	281.10	-14	127	105	374	0.72	Deleted
13	143.82	288.82	18	145	119	561	0.94	Deleted
15	198.32	397.66	44	152	125	510	0.92	Deleted
17	241.88	484.63	-10	118	97	565	1.17	Deleted
18	250.85	502.55	41	39	30	224	0.53	Unknown
19	270.84	542.47	105	82	66	598	1.63	Unknown
20	283.68	568.10	34	57	46	395	0.94	Deleted
21	295.34	591.39	-8	116	95	261	0.66	Deleted
22	335.39	671.36	24	41	33	241	0.58	Deleted
24	511.13	1022.28	46	244	200	598	2.47	Deleted

100010D04.SPC Analyzed by

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UNKNOWN, SUM or ESCAPE PEAKS

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PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.I. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
25	558.49	1116.85	-9	97	80	201	0.97	Deleted
26	569.56	1138.94	3	97	80	249	1.20	Deleted
29	692.34	1384.12	-8	112	92	278	1.41	Deleted
31	802.86	1604.80	11	97	80	180	1.53	Deleted
32	837.17	1673.32	44	42	33	200	1.61	Unknown
33	911.28	1821.31	29	62	50	142	1.40	Deleted
34	962.72	1924.01	-21	82	68	107	1.18	Deleted

c:\SEEKER\BIN\100010d04.res Analysis Results Saved.

 SEEKER G A M M A A N A L Y S I S R E S U L T S PS Version 1.8.4

ALS Laboratory Group - Fort Collins
 GammaScan

Geo 13 / Solid

Sample ID: GS091231-1MB GS091231-1

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Sampling Start:   01/02/2010 11:00:00 | Counting Start:   01/02/2010 11:08:55
Sampling Stop:    01/02/2010 11:00:00 | Decay Time. . . . . 1.49E-001 Hrs
Buildup Time. . . . . 0.00E+000 Hrs | Live Time . . . . . 60000 Sec
Sample Size . . . . . 1.00E+000 Sample | Real Time . . . . . 60083 Sec
Collection Efficiency . . . . . 1.0000 | Spc. File . . . . . 100004D04.SPC
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Detector #: 4 (Detector 4)

Energy(keV) = -0.85 + 0.501*Ch + 0.00E+00*Ch^2 + 0.00E+00*Ch^3 01/02/2010

FWHM(keV) = 0.60 + 0.011*En + 1.26E-03*En^2 + -9.06E-06*En^3 01/09/2009

Where En = Sqrt(Energy in keV)

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Search Sensitivity: 1.00 | Sigma Multiplier: 2.00 | Search Start/End: 80/4000
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PEAK SEARCH RESULTS

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PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	46.54	94.64	91	54	42	425	0.54	a
2	53.65	108.84	55	69	55	613	0.82	a NET< CL
3	63.20	127.90	121	77	61	741	0.80	a
4	66.37	134.23	120	77	61	741	0.80	b
5	69.76	141.00	7	40	33	296	0.39	c NET< CL
6	74.69	150.84	130	76	59	711	0.78	a
7	77.04	155.54	152	56	42	427	0.52	b
8	87.14	175.70	42	51	40	398	0.41	a
9	92.56	186.52	570	81	54	581	0.84	a
10	102.70	206.78	31	44	35	308	0.42	a NET< CL
11	139.79	280.83	149	56	42	384	0.70	a
12	143.78	288.81	83	54	42	384	0.59	b
13	159.18	319.54	58	77	62	657	1.20	a NET< CL
14	185.65	372.41	367	79	56	588	0.91	a
15	198.34	397.74	148	63	48	463	0.74	a
16	205.24	411.51	38	43	34	277	0.51	a
17	238.56	478.05	247	65	47	443	0.78	a
18	295.26	591.27	85	47	35	275	0.65	a
19	338.64	677.88	41	41	32	226	0.74	a
20	351.80	704.16	135	53	39	327	0.91	a
21	511.04	1022.12	1241	112	72	658	2.48	a Wide Pk
22	537.51	1074.97	42	44	35	224	1.29	a
23	558.50	1116.88	143	52	38	266	1.28	a
24	569.64	1139.13	77	56	44	332	1.45	a

=====

PEAK SEARCH RESULTS

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PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
25	583.18	1166.17	110	49	36	244	1.32	a
26	609.12	1217.96	180	74	57	483	1.91	a
27	624.86	1249.40	17	32	26	161	0.76	a NET< CL
28	693.78	1387.01	83	74	59	510	2.42	a
29	725.77	1450.87	27	30	24	128	1.03	a
30	803.18	1605.44	80	42	31	192	1.50	a
31	911.09	1820.91	40	35	27	145	1.52	a
32	1460.64	2918.22	137	36	22	87	2.18	a

100004D04.SPC Analyzed by

SEEKER BACKGROUND SUBTRACT RESULTS Vers. 2.2.1

ALS Laboratory Group - Fort Collins
GammaScan

Background File: DET041231.BKG (091231-4 WEEKLY BKG)

Bkg.File Detector #: 4

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BACKGROUND SUBTRACT RESULTS

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PK#	ENERGY (keV)	OLD NET COUNTS	OLD UN-CERTAINTY	OLD CR.LEVEL	NEW NET COUNTS	NEW UN-CERTAINTY	NEW CR.LEVEL	FLAG
1	46.54	91	54	42	-27	139	115	NET<CL
2	53.65	55	69	55	-17	152	125	NET<CL
3	63.20	121	77	61	-55	150	124	NET<CL
4	66.37	120	77	61	-29	166	136	NET<CL
6	74.69	130	76	59	-32	167	137	NET<CL
7	77.04	153	56	42	14	122	100	NET<CL
8	87.14	42	51	40	12	113	93	NET<CL
9	92.56	570	81	54	-22	183	151	NET<CL
11	139.79	149	56	42	1	128	105	NET<CL
12	143.78	83	54	42	2	138	113	NET<CL
14	185.65	367	79	56	-57	177	146	NET<CL
15	198.34	148	63	48	-12	149	123	NET<CL
17	238.56	247	65	47	-97	153	127	NET<CL
18	295.26	85	47	35	-38	115	95	NET<CL
19	338.64	41	41	32	-8	90	74	NET<CL
20	351.80	135	53	39	-34	115	95	NET<CL
21	511.04	1241	112	72	-22	245	201	NET<CL
22	537.51	42	44	35	-2	95	78	NET<CL
23	558.50	143	52	38	21	101	83	NET<CL
24	569.64	77	56	44	15	102	84	NET<CL
25	583.18	110	49	36	22	110	90	NET<CL
26	609.12	180	75	57	38	138	113	NET<CL
28	693.78	83	74	59	15	125	103	NET<CL
30	803.18	80	42	31	-31	97	80	NET<CL
31	911.09	40	35	27	22	62	50	NET<CL
32	1460.64	137	36	22	-7	82	68	NET<CL

ALS Laboratory Group - Fort Collins
 GammaScan

Geo 13 / Solid

Sample ID: GS091231-1MB GS091231-1

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Sampling Start: 01/02/2010 11:00:00 | Counting Start: 01/02/2010 11:08:55
Sampling Stop: 01/02/2010 11:00:00 | Decay Time. . . . . 1.49e-001 Hrs
Buildup Time. . . . . 0.00e+000 Hrs | Live Time . . . . . 60000 Sec
Sample Size . . . . . 1.00e+000 Sample | Real Time . . . . . 60083 Sec
Collection Efficiency . . . . . 1.0000 | Spectrum File . . . . . 100004D04.SPC
Cr. Level Confidence Interval: 95 % | Det. Limit Confidence Interval: 95 %
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Detector #: 4 (Detector 4)

Efficiency File: (D04) (Sh13).EFF (Geo. 13)

Eff.=1/[2.81E-03*En^-3.92E+00 + 1.63E+02*En^8.04E-01] 03/11/2009

Library File: . . CAB_LIB3_APRF.LIB (CAB_LIB3_APRF)

MEASURED or MDA CONCENTRATIONS

Nuclide	ENERGY E (keV)	N T	Concentration (pCi/Sample)	MDA	Critical Level	Halflife (hrs)
Th-234	92.50	N-9.98E+00	+ - 8.33E+01	1.38E+02	6.86E+01	3.92E+13
Ra-226	186.21	N-3.50E+01	+ - 1.08E+02	1.80E+02	8.90E+01	1.40E+07
U-235	Average: x	1.47E+01	+ - 8.82E+00	. . . . .	. . . . .	6.17E+12
	205.31	1.63E+01	+ - 1.80E+01	2.96E+01	1.42E+01	6.17E+12
	143.76	N 1.42E+01	+ - 1.01E+01	1.63E+01	7.92E+00	6.17E+12
Pb-212	238.63	N-5.29E+00	+ - 8.34E+00	1.40E+01	6.91E+00	1.67E+04
Pb-214	351.99	N-2.89E+00	+ - 9.91E+00	1.66E+01	8.19E+00	1.40E+07
Tl-208	583.14	N 1.24E+00	+ - 6.23E+00	1.04E+01	5.11E+00	1.27E+14
Bi-214	609.32	N 4.12E+00	+ - 1.48E+01	2.45E+01	1.21E+01	1.40E+07
Bi-212	727.17	2.30E+01	+ - 2.63E+01	4.31E+01	2.04E+01	1.67E+04
K-40	1460.75	N-6.07E+00	+ - 7.43E+01	1.25E+02	6.13E+01	1.12E+13
Am-241	59.54	N-7.18E+00	+ - 1.69E+01	2.89E+01	1.41E+01	3.80E+06
Cd-109	88.04	N-3.08E+00	+ - 5.24E+01	8.85E+01	4.32E+01	1.09E+04
Eu-155	105.31	N-2.92E+00	+ - 5.80E+00	9.96E+00	4.85E+00	4.35E+04
Co-57	122.07	N 4.84E-01	+ - 1.28E+00	2.14E+00	1.04E+00	6.48E+03
Ce-144	133.53	N 9.46E-01	+ - 9.75E+00	1.64E+01	7.99E+00	6.82E+03
Ce-139	165.85	N-1.20E+00	+ - 1.57E+00	2.71E+00	1.32E+00	3.30E+03
Th-227	236.00	N-9.52E-01	+ - 1.18E+01	2.00E+01B	9.74E+00	1.90E+05
Ra-224	240.98	N-3.77E+01	+ - 6.63E+01	1.12E+02	5.50E+01	1.23E+14
Cr-51	320.07	N 2.13E+01	+ - 1.79E+01	2.90E+01	1.41E+01	6.65E+02
I-131	364.48	N 2.74E-01	+ - 2.12E+00	3.58E+00	1.74E+00	1.93E+02
Cf-249	388.16	N 1.57E-01	+ - 2.93E+00	4.94E+00	2.40E+00	3.08E+06
Sb-125	427.95	N 5.46E+00	+ - 6.49E+00	1.07E+01	5.16E+00	2.43E+04
Be-7	477.56	N-6.60E+00	+ - 1.91E+01	3.29E+01	1.59E+01	1.28E+03
Sr-85	513.99	N 1.64E+00	+ - 3.34E+00	5.47E+00r	2.68E+00	1.56E+03

MEASURED or MDA CONCENTRATIONS

Nuclide	ENERGY E (keV)	N T	Concentration (pCi/Sample)	MDA	Critical Level	Half-life (hrs)
Sb-124	602.71	N-1.79E+00	+ 3.21E+00	5.52E+00	2.69E+00	1.44E+03
Cs-134	604.66	N 5.03E-02	+ 4.75E+00	7.95E+00	3.91E+00	1.81E+04
Ru-106	621.84	N-2.03E+01	+ 2.54E+01	4.45E+01	2.16E+01	8.84E+03
Ag-110M	657.75	N 4.48E-01	+ 2.51E+00	4.25E+00	2.05E+00	6.00E+03
Cs-137	661.62	N-5.58E-01	+ 2.90E+00	4.97E+00	2.40E+00	2.64E+05
Nb-94	702.50	N 5.09E-01	+ 3.14E+00	5.28E+00	2.56E+00	1.78E+08
Nb-95	765.82	N-2.98E-01	+ 2.35E+00	4.05E+00	1.94E+00	1.54E+03
Co-58	810.75	N-6.15E-01	+ 2.65E+00	4.58E+00	2.21E+00	1.70E+03
Mn-54	834.81	N-6.44E-01	+ 2.85E+00	4.91E+00	2.37E+00	7.49E+03
Sc-46	889.26	N-1.69E+00	+ 2.58E+00	4.58E+00	2.20E+00	2.01E+03
Ra-228	911.07	N 1.37E+01	+ 1.07E+01	1.71E+01	8.19E+00	5.04E+04
Pa-234m	1001.03	N-1.50E+02	+ 4.63E+02	8.09E+02	3.88E+02	3.92E+13
Eu-154	1004.80	N 1.27E+01	+ 1.45E+01	2.38E+01	1.13E+01	7.45E+04
Fe-59	1099.22	N-1.41E-01	+ 4.67E+00	8.08E+00	3.85E+00	1.08E+03
Zn-65	1115.52	N-6.36E-01	+ 6.08E+00	1.05E+01	5.03E+00	5.85E+03
Co-56	1238.28	N 1.85E+00	+ 4.33E+00	7.29E+00	3.47E+00	1.86E+03
Na-22	1274.54	N-1.19E+00	+ 2.76E+00	4.90E+00	2.33E+00	2.28E+04
Co-60	1332.51	N-1.55E+00	+ 3.11E+00	5.52E+00	2.63E+00	4.62E+04
Eu-152	1408.08	N 8.54E+00	+ 1.38E+01	2.30E+01	1.09E+01	1.17E+05
Al-26	1808.65	N 1.58E-01	+ 3.06E+00	5.34E+00	2.51E+00	6.31E+09

MEASURED TOTAL: 1.11E+02 +- 1.57E+02 pCi/Sample

UNKNOWN, SUM or ESCAPE PEAKS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	46.54	94.64	-27	139	115	425	0.54	Deleted
2	53.65	108.84	-17	152	125	613	0.82	Deleted
3	63.20	127.90	-55	150	124	741	0.80	Deleted
4	66.37	134.23	-29	166	136	741	0.80	Deleted
5	69.76	141.00	7	40	33	296	0.39	Deleted
6	74.69	150.84	-32	167	137	711	0.78	Deleted
7	77.04	155.54	14	122	100	427	0.52	Deleted
8	87.14	175.70	12	113	93	398	0.41	Deleted
10	102.70	206.78	31	44	35	308	0.42	Deleted
11	139.79	280.83	1	128	105	384	0.70	Deleted
12	143.78	288.81	2	138	113	384	0.59	Deleted
13	159.18	319.54	58	77	62	657	1.20	Deleted
15	198.34	397.74	-12	149	123	463	0.74	Deleted
18	295.26	591.27	-38	115	95	275	0.65	Deleted
19	338.64	677.88	-8	90	74	226	0.74	Deleted
21	511.04	1022.12	-22	245	201	658	2.48	Deleted
22	537.51	1074.97	-2	95	78	224	1.29	Deleted
23	558.50	1116.88	21	101	83	266	1.28	Deleted
24	569.64	1139.13	15	102	84	332	1.45	Deleted
27	624.86	1249.40	17	32	26	161	0.76	Deleted

100004D04.SPC Analyzed by

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UNKNOWN, SUM or ESCAPE PEAKS

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PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
28	693.78	1387.01	15	125	103	510	2.42	Deleted
30	803.18	1605.44	-31	97	80	192	1.50	Deleted
31	911.09	1820.91	22	62	50	145	1.52	Deleted

c:\SEEKER\BIN\100004d04.res Analysis Results Saved.

 SEEKER G A M M A A N A L Y S I S R E S U L T S PS Version 1.8.4

ALS Laboratory Group - Fort Collins
 GammaScan

Geo 13 / Solid

Sample ID: GS091231-1LCS GS091231-1

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Sampling Start: 01/04/2010 14:00:00 | Counting Start: 01/04/2010 14:25:34
Sampling Stop: 01/04/2010 14:00:00 | Decay Time. . . . . 4.26E-001 Hrs
Buildup Time. . . . . 0.00E+000 Hrs | Live Time . . . . . 1800 Sec
Sample Size . . . . . 1.00E+000 Sample | Real Time . . . . . 1863 Sec
Collection Efficiency . . . . . 1.0000 | Spc. File . . . . . 100009D04.SPC
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Detector #: 4 (Detector 4)

Energy(keV) = -0.83 + 0.501*Ch + 0.00E+00*Ch^2 + 0.00E+00*Ch^3 01/04/2010

FWHM(keV) = 0.60 + 0.011*En + 1.26E-03*En^2 +-9.06E-06*En^3 01/09/2009

Where En = Sqrt(Energy in keV)

 Search Sensitivity: 1.00 | Sigma Multiplier: 2.00 | Search Start/End: 80/4000

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PEAK SEARCH RESULTS

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PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	59.54	120.54	12067	250	97	2101	0.72	a
2	72.64	146.69	96	68	54	800	0.39	a
3	87.99	177.36	10304	237	101	2067	0.78	a
4	122.11	245.47	2754	148	86	1503	0.80	a
5	136.62	274.45	334	109	85	1442	0.82	a
6	165.91	332.93	236	103	81	1323	0.75	a
7	287.45	575.64	48	62	50	608	0.55	a NET< CL
8	336.85	674.27	44	69	56	685	0.67	a NET< CL
9	661.73	1323.00	18349	281	62	747	1.53	a HiResid
10	1173.33	2344.56	15262	256	55	540	2.07	a HiResid
11	1332.52	2662.42	13612	236	28	133	2.24	a HiResid
12	1836.15	3668.08	37	17	10	18	1.94	a

100009D04.SPC Analyzed by

SEEKER B A C K G R O U N D S U B T R A C T R E S U L T S V e r s . 2 . 2 . 1

ALS Laboratory Group - Fort Collins
GammaScan

Background File: DET031231.BKG (091231-3 WEEKLY BKG)

Bkg.File Detector #: 3

=====
BACKGROUND SUBTRACT RESULTS
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PK#	ENERGY (keV)	OLD NET COUNTS	OLD UN- CERTAINTY	OLD CR.LEVEL	NEW NET COUNTS	NEW UN- CERTAINTY	NEW CR.LEVEL	FLAG
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ALS Laboratory Group - Fort Collins
 GammaScan

Geo 13 / Solid

Sample ID: GS091231-1LCS GS091231-1

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Sampling Start: 01/04/2010 14:00:00 | Counting Start: 01/04/2010 14:25:34
Sampling Stop: 01/04/2010 14:00:00 | Decay Time. . . . . 4.26e-001 Hrs
Buildup Time. . . . . 0.00e+000 Hrs | Live Time . . . . . 1800 Sec
Sample Size . . . . . 1.00e+000 Sample | Real Time . . . . . 1863 Sec
Collection Efficiency . . . . . 1.0000 | Spectrum File . . . . . 100009D04.SPC
Cr. Level Confidence Interval: 95 % | Det. Limit Confidence Interval: 95 %
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Detector #: 4 (Detector 4)

Efficiency File: (D04) (Sh13).EFF (Geo. 13)

Eff.=1/[2.81E-03*En^-3.92E+00 + 1.63E+02*En^8.04E-01] 03/11/2009

Library File:ANALYTICAL.LIB (Analytical)

MEASURED or MDA CONCENTRATIONS

Nuclide	ENERGY E (keV)	Concentration (pCi/Sample)	MDA	Critical Level	Half-life (hrs)
Am-241	59.54	9.85E+04 +- 2.04E+03	1.61E+03	7.94E+02	3.79E+06
Cd-109	88.02	2.64E+05 +- 6.09E+03	5.26E+03	2.60E+03	1.11E+04
Co-57	122.07	1.97E+03 +- 1.06E+02	1.26E+02	6.18E+01	6.50E+03
Ce-139	165.85	1.84E+02 +- 8.05E+01	1.29E+02	6.33E+01	3.30E+03
Cs-137	661.62	3.79E+04 +- 5.81E+02	2.62E+02	1.28E+02	2.64E+05
Co-60	Average:x	4.23E+04 +- 5.10E+02	. . . . .	. . . . .	4.62E+04
	1173.21	4.26E+04 +- 7.14E+02	3.15E+02	1.54E+02	4.62E+04
	1332.48	4.21E+04 +- 7.29E+02	1.81E+02	8.63E+01	4.62E+04
Y-88	1836.01	1.47E+02 +- 6.83E+01	9.03E+01	3.97E+01	2.56E+03
Hg-203	279.18	MDA	1.99E+02	9.79E+01	1.12E+03
Sn-113	391.68	MDA	3.05E+02	1.50E+02	2.76E+03
Y-88	898.02	MDA	3.82E+02	1.88E+02	2.56E+03

MEASURED TOTAL: 4.45E+05 +- 9.47E+03 pCi/Sample

UNKNOWN, SUM or ESCAPE PEAKS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
2	72.64	146.69	96	68	54	800	0.39	Unknown
5	136.62	274.45	334	109	85	1442	0.82	Unknown
7	287.45	575.64	48	62	50	608	0.55	Deleted
8	336.85	674.27	44	69	56	685	0.67	Deleted

100009D04.SPC Analyzed by

c:\SEEKER\BIN\100009d04.res Analysis Results Saved.



Gamma Spectrometer Run Log

Date: 1/02/10

Reviewed By/Date: JP 1/04/10

Sample ID	Ver ¹	Det. No.	Geo ²	Count Dur. (min.) ³	Start Time	Analyst	File ID/Comments	Saved?
0912192-72	JP	8	6	600	11:03	JP	100004D08.SPC	JP
GS091228-ZMB	↓	10	↓	↓	↓	↓	100004D10.SPC	JP
0912168-1	JP	2	13	1000	11:08	JP	100004D02.SPC	JP
GS091231-1MB	↓	4	↓	↓	↓	↓	100004D04.SPC	JP
JP 1/02/10								

- ¹ Analyst will verify the position, detector, and geometry when the sample is removed from the detector.
- ² Calibration geometry.
- ³ Count duration.

KEY:

- * sample was counted on a puck
- ↑ sample was counted with air flow arrow pointing up
- ↓ sample was counted with air flow arrow pointing down

385412 B



Gamma Spectrometer Run Log

Date: 1/04/10

Reviewed By/Date: JP 1/05/10

Sample ID	Ver ¹	Det. No.	Geo ²	Count Dur. (min.) ³	Start Time	Analyst	File ID/Comments	Saved?
0913510-2A(857)	JP	2	7*	360	9:22	JP	100010002.SPC	JP
0912190-2D	JP	4	13	60	11:56	JP	100007004.SPC	JP
6S091231-1LCS	JP	4	13	30	13:14	JP	100008004.SPC	JP
6S091231-1LCS	JP	4	13	30	14:25	JP	100009004.SPC	JP
0912168-1D	JP	4	13	1000	15:02	JP	100010004.SPC	JP
0913510-8A(857)	JP	8	7*	400	15:49	JP	100007008.SPC	JP
JP 1/05/10								

- ¹ Analyst will verify the position, detector, and geometry when the sample is removed from the detector.
- ² Calibration geometry.
- ³ Count duration.

KEY:

- * sample was counted on a puck
- ↑ sample was counted with air flow arrow pointing up
- ↓ sample was counted with air flow arrow pointing down

Technical Comments Regarding Analysis using the CAB LIB3 APRF Gamma Spectroscopy Library

Analysis using the CAB_LIB3_APRF library is limited to the list of gamma emitting radionuclides specified by the client. The client provides all energies and abundances for all radionuclides in this library. ALS has made no assessment as to the validity of any equilibrium assumptions that may have been made in the creation of this library. In cases where multiple gamma emissions are used to quantify activity, the most abundant emission is used for quantification in the absence of any supporting gamma emissions. It should be noted that the current software program used for gamma spectroscopic analysis is limited to a +/- 2.0 keV photo-peak resolution tolerance. Thus, any gamma emissions occurring within the same +/- 2.0 keV range will suffer interference, consequently preventing accurate quantification. Nuclide specific information regarding analysis using the CAB_LIB3_APRF library is as follows:

Nuclide: ^{56}Co Energy: 1175.13 keV Photon Abundance: 0.0228

This emission for this nuclide suffers from possible resolution interference due to the ^{60}Co gamma emission occurring at 1173.23 keV (0.9997, abundance). Therefore, a possibility of a high bias to the ^{56}Co results may occur in the presence of elevated ^{60}Co activity.

Nuclide: ^{57}Co Energy: 122.07 Photon Abundance: 0.8560

The most abundant gamma emission specified for quantification of this nuclide suffers from possible resolution interference due to the ^{152}Eu gamma emission occurring at 121.78 keV (0.2050, abundance). Therefore, a possibility of a high bias to the ^{57}Co results may occur in the presence of elevated ^{152}Eu activity.

Nuclide: ^{134}Cs Energy: 604.66 Photon Abundance: 0.9762

Cesium-134 suffers from coincidence summing, due to the multiple simultaneous photon emissions during each decay event. This results in a potentially low bias in the final analytical results. The magnitude of this low bias is highly dependent on the ^{134}Cs activity levels and the specific counting geometry. Any ^{134}Cs activity reported above the associated Minimum Detectable Concentration should be considered to have a potential low bias.

The most abundant gamma emission specified for quantification of this nuclide suffers from possible resolution interference due to the ^{124}Sb gamma emission occurring at 602.71 keV (0.9826, abundance). Therefore, a possibility of a high bias to the ^{134}Cs results may occur in the presence of elevated ^{124}Sb activity.

Other gamma emissions used for quantification of this nuclide suffer from possible resolution interference due to multiple gamma emissions of ^{228}Ac . Therefore, a possible high bias to the ^{134}Cs activity results may occur in the presence of elevated ^{228}Ac activity.

Nuclide: ^{155}Eu Energy: 105.31 Photon Abundance: 0.2120

The only gamma emission useful for quantification of this nuclide suffers from possible resolution interference due to the ^{235}U gamma emission occurring at 105 keV (0.0210, abundance). Therefore, a possibility of a high bias to the ^{155}Eu results may occur in the presence of elevated ^{235}U activity.

Nuclide: ^{40}K Energy: 1460.75 Photon Abundance: 0.1100

The only gamma emission useful for quantification of this nuclide suffers from possible resolution interference due to the ^{228}Ac gamma emission occurring at 1459.2 keV (0.0104, abundance). Therefore, a possibility of a high bias to the ^{40}K results may occur in the presence of elevated ^{228}Ac activity.

Nuclide: ^{54}Mn Energy: 834.81 Photon Abundance: 0.9997

The only gamma emission useful for quantification of this nuclide suffers from possible resolution interference due to the ^{228}Ac gamma emission occurring at 835.6 keV (0.0182, abundance). Therefore, a possibility of a high bias to the ^{54}Mn results may occur in the presence of elevated ^{228}Ac activity.

Nuclide: ^{95}Nb Energy: 765.82 Photon Abundance: 0.9999

The only gamma emission useful for quantification of this nuclide suffers from possible resolution interference due to the $^{234\text{m}}\text{Pa}$ gamma emission occurring at 766.6 keV (0.0020, abundance). Therefore, a possibility of a high bias to the ^{95}Nb results may occur in the presence of elevated $^{234\text{m}}\text{Pa}$ activity.

Nuclide: ^{224}Ra Energy: 240.98 Photon Abundance: 0.041

Radium-224 quantification based on the 240.98 keV photon suffers from interference with the 241 keV photon emitted by ^{214}Pb . Therefore, a possibility of a high bias to the ^{224}Ra results may occur in the presence of elevated ^{214}Pb activity.

Nuclide: ^{226}Ra Energy: 186.21 Photon Abundance: 0.0328

Radium-226 quantification based on the 186.21 keV photon suffers from interference with the 185.72 keV photon emitted by ^{235}U . Due to the high abundance of this photon in ^{235}U emissions, even undetectable amounts of ^{235}U may bias the ^{226}Ra results high. Consequently, any reported activity greater than the achieved detection limit for this nuclide will be "SI" flagged, denoting spectral interference.

Nuclide: ^{106}Ru Energy: various Photon Abundance: various

Ruthenium-106 does not emit any gamma photons. Therefore, all activity values for ^{106}Ru are calculated using the gamma emissions of the short-lived ^{106}Rh daughter. The half-life, $t_{1/2}=368.2$ days, of the ^{106}Ru parent is used in the activity calculations. It is assumed that a secular equilibrium is achieved between the ^{106}Ru parent and the ^{106}Rh progeny.

Nuclide: ^{124}Sb Energy: 602.71 Photon Abundance: 0.9826

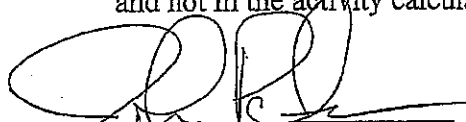
The most abundant gamma emission specified for quantification of this nuclide suffers from possible resolution interference due to the ^{134}Cs gamma emission occurring at 604.66 keV (0.9762, abundance). Therefore, a possibility of a high bias to the ^{124}Sb results may occur in the presence of elevated ^{134}Cs activity.

Nuclide: ^{125}Sb Energy: 600.77 Photon Abundance: 0.1786

The gamma emission specified for quantification of this nuclide that occurs at 600.77 keV suffers from possible resolution interference due to the ^{124}Sb gamma emission occurring at 602.71 keV (0.9826, abundance). Therefore, a possibility of a high bias to the ^{125}Sb results may occur in the presence of elevated ^{124}Sb activity.

Nuclide: ^{235}U Energy: 185.72 Photon Abundance: 0.5720

Quantifying ^{235}U activity using the 185.72 keV photo-peak is vulnerable to a significant high bias due to interference from gamma emissions from ^{226}Ra occurring at 186.21 keV (0.0328, abundance). Therefore, this emission will be used as an identifier only and not in the activity calculations for this nuclide.



Gamma Spectroscopist
Radiochemistry Instrumentation Laboratory

04/30/09
Date



Radiochemistry Manager

04/30/09
Date

Pk. #	Energy (keV)	Isotope Name	2ndary Pk #	Type	Gamma Fraction	Half-life
48	657.75	Ag-110M	50	NET	0.9400	2.4990E+02 dys
50	677.71	Ag-110M	53	QUANT	0.1068	2.4990E+02 dys
53	706.67	Ag-110M	56	QUANT	0.1668	2.4990E+02 dys
56	763.93	Ag-110M	66	QUANT	0.2214	2.4990E+02 dys
66	884.67	Ag-110M	69	QUANT	0.7220	2.4990E+02 dys
69	937.48	Ag-110M	91	QUANT	0.3413	2.4990E+02 dys
91	1384.27	Ag-110M	94	QUANT	0.2412	2.4990E+02 dys
94	1505.00	Ag-110M	48	QUANT	0.1306	2.4990E+02 dys
97	1808.65	Al-26	0	NET	0.9973	7.2000E+05 yrs
1	59.54	Am-241	0	NET	0.3590	4.3310E+02 yrs
35	477.56	Be-7	0	NET	0.1052	5.3440E+01 dys
55	727.17	Bi-212	0	NET	0.0658	1.9100E+00 yrs
45	609.32	Bi-214	80	NET	0.4609	1.6000E+03 yrs
80	1120.28	Bi-214	45	QUANT	0.1510	1.6000E+03 yrs
3	88.04	Cd-109	0	NET	0.0361	1.2410E+00 yrs
12	165.85	Ce-139	0	NET	0.8035	1.3766E+02 dys
8	133.53	Ce-144	51	NET	0.1109	2.8414E+02 dys
51	696.49	Ce-144	8	QUANT	0.0130	2.8414E+02 dys
27	333.37	Cf-249	32	QUANT	0.1460	3.5100E+02 yrs
32	388.16	Cf-249	27	NET	0.6600	3.5100E+02 yrs
63	846.81	Co-56	74	QUANT	0.9999	7.7300E+01 dys
74	1037.83	Co-56	83	QUANT	0.1400	7.7300E+01 dys
83	1175.13	Co-56	84	QUANT	0.0228	7.7300E+01 dys
84	1238.28	Co-56	88	NET	0.6760	7.7300E+01 dys
88	1360.22	Co-56	96	QUANT	0.0429	7.7300E+01 dys
96	1771.49	Co-56	63	QUANT	0.1570	7.7300E+01 dys
7	122.07	Co-57	9	NET	0.8560	2.7000E+02 dys
9	136.43	Co-57	7	QUANT	0.1068	2.7000E+02 dys
61	810.75	Co-58	0	NET	0.9945	7.0780E+01 dys
82	1173.23	Co-60	87	QUANT	0.9997	5.2721E+00 yrs
87	1332.51	Co-60	82	NET	0.9998	5.2721E+00 yrs
26	320.07	Cr-51	0	NET	0.1000	2.7700E+01 dys
37	563.26	Cs-134	38	QUANT	0.0835	2.0623E+00 yrs
38	569.29	Cs-134	43	QUANT	0.1538	2.0623E+00 yrs
43	604.66	Cs-134	59	NET	0.9762	2.0623E+00 yrs
59	795.76	Cs-134	60	QUANT	0.8553	2.0623E+00 yrs
60	801.84	Cs-134	81	QUANT	0.0869	2.0623E+00 yrs
81	1167.86	Cs-134	89	QUANT	0.0180	2.0623E+00 yrs
89	1365.13	Cs-134	37	QUANT	0.0304	2.0623E+00 yrs
49	661.62	Cs-137	0	NET	0.8512	3.0104E+01 yrs
29	344.30	Eu-152	58	QUANT	0.2650	1.3330E+01 yrs
58	778.90	Eu-152	76	QUANT	0.1294	1.3330E+01 yrs
76	1085.80	Eu-152	78	QUANT	0.1021	1.3330E+01 yrs
78	1112.07	Eu-152	92	QUANT	0.1364	1.3330E+01 yrs
92	1408.08	Eu-152	29	NET	0.2100	1.3330E+01 yrs
21	248.04	Eu-154	40	QUANT	0.0660	8.5019E+00 yrs
40	591.70	Eu-154	65	QUANT	0.0460	8.5019E+00 yrs
65	873.20	Eu-154	71	QUANT	0.1227	8.5019E+00 yrs
71	996.30	Eu-154	73	QUANT	0.1030	8.5019E+00 yrs
73	1004.80	Eu-154	21	NET	0.1801	8.5019E+00 yrs
5	105.31	Eu-155	0	NET	0.2120	4.9600E+00 yrs

Pk. #	Energy (keV)	Isotope Name	2ndary Pk #	Type	Gamma Fraction	Halflife
16	192.34	Fe-59	77	QUANT	0.0308	4.5100E+01 dys
77	1099.22	Fe-59	86	NET	0.5650	4.5100E+01 dys
86	1291.56	Fe-59	16	QUANT	0.4320	4.5100E+01 dys
23	284.29	I-131	31	QUANT	0.0614	8.0405E+00 dys
31	364.48	I-131	23	NET	0.8170	8.0405E+00 dys
93	1460.75	K-40	0	NET	0.1100	1.2800E+09 yrs
62	834.81	Mn-54	0	NET	0.9997	3.1220E+02 dys
85	1274.54	Na-22	0	NET	0.9994	2.6000E+00 yrs
52	702.50	Nb-94	0	NET	0.9790	2.0300E+04 yrs
57	765.82	Nb-95	0	NET	0.9999	6.4020E+01 dys
72	1001.03	Pa-234m	0	NET	0.0059	4.4680E+09 yrs
6	115.18	Pb-212	19	QUANT	0.0059	1.9100E+00 yrs
19	238.63	Pb-212	25	NET	0.4330	1.9100E+00 yrs
25	300.09	Pb-212	6	QUANT	0.0327	1.9100E+00 yrs
24	295.22	Pb-214	30	QUANT	0.1920	1.6000E+03 yrs
30	351.99	Pb-214	24	NET	0.3710	1.6000E+03 yrs
20	240.98	Ra-224	0	NET	0.0410	1.4050E+10 yrs
15	186.21	Ra-226	0	NET	0.0328	1.6000E+03 yrs
28	338.40	Ra-228	68	QUANT	0.1127	5.7500E+00 yrs
68	911.07	Ra-228	70	NET	0.2580	5.7500E+00 yrs
70	968.90	Ra-228	28	QUANT	0.1580	5.7500E+00 yrs
46	621.84	Ru-106	75	NET	0.0981	3.6820E+02 dys
75	1050.47	Ru-106	46	QUANT	0.0173	3.6820E+02 dys
42	602.71	Sb-124	47	NET	0.9826	6.0200E+01 dys
47	645.84	Sb-124	54	QUANT	0.0745	6.0200E+01 dys
54	713.82	Sb-124	90	QUANT	0.0238	6.0200E+01 dys
90	1368.21	Sb-124	95	QUANT	0.0251	6.0200E+01 dys
95	1691.04	Sb-124	42	QUANT	0.4779	6.0200E+01 dys
13	176.29	Sb-125	33	QUANT	0.0682	2.7702E+00 yrs
33	427.95	Sb-125	34	NET	0.3000	2.7702E+00 yrs
34	463.51	Sb-125	41	QUANT	0.1049	2.7702E+00 yrs
41	600.77	Sb-125	44	QUANT	0.1786	2.7702E+00 yrs
44	606.82	Sb-125	13	QUANT	0.0502	2.7702E+00 yrs
67	889.26	Sc-46	0	NET	0.9998	8.3850E+01 dys
36	513.99	Sr-85	0	NET	0.9927	6.4840E+01 dys
18	236.00	Th-227	0	NET	0.1230	2.1700E+01 yrs
2	63.29	Th-234	4	QUANT	0.0390	4.4680E+09 yrs
4	92.50	Th-234	2	NET	0.0553	4.4680E+09 yrs
22	277.36	Tl-208	39	QUANT	0.0631	1.4500E+10 yrs
39	583.14	Tl-208	64	NET	0.8450	1.4500E+10 yrs
64	860.47	Tl-208	22	QUANT	0.1242	1.4500E+10 yrs
10	143.76	U-235	11	NET	0.1096	7.0379E+08 yrs
11	163.35	U-235	14	QUANT	0.0508	7.0379E+08 yrs
14	185.72	U-235	17	ID	0.5720	7.0379E+08 yrs
17	205.31	U-235	10	QUANT	0.0501	7.0379E+08 yrs
79	1115.52	Zn-65	0	NET	0.5060	2.4380E+02 dys



Section 6

QUALITY ASSURANCE SUMMARY REPORTS

6



No *NON-CONFORMANCE REPORTS* or *QUALITY ASSURANCE SUMMARY SHEETS* are included in this data package.



Section 7

LABORATORY BENCH SHEETS



Radiochemistry Instrument Worksheet

ALS Laboratory Group -- FC

Prep Batch: GS091231-1

Prep Procedure: **GAMMASCAN**

Analytical QASS / NCR? Y / **NA**

Prep Num	Lab ID	QC Type	Init Aliq	Fin Aliq	Units	Report Units	Cnt 1 File Cnt Dur (min)	Cnt 1 Ins/Det	Cnt 1 Count Data	Cnt 2 File Cnt Dur (min)	Cnt 2 Ins/Det	Cnt 2 Count Data	Cnt 3 File Cnt Dur (min)	Cnt 3 Ins/Det	Cnt 3 Count Date	Notes	
1	0912168-1 12/18/09 12:00	SMP	1	1	sample pCi/sam 13 pCi	1000	2	01/02/10									
1	0912168-1 12/18/09 12:00	DUP	1	1	sample pCi/sam 13 pCi		4	01/04/10									COUNT DUPLICATE
1	GS091231-1 12/31/09 10:32	MB	1	1	sample pCi/sam 13 pCi		4	01/02/10									
1	GS091231-1 12/31/09 10:32	LCS	1	1	sample pCi/sam 13 pCi	30	1	01/04/10									

Spill Solution Information

Soln #	Nuclide	SchID	Prep Contc	Units	Prep Date	Aliquot Units	Pipet ID
S1	Am-241	829	446.730	DPW/g	12/31/09	500 g	N/A
S1	Co-60	829	193.193	DPW/g	12/31/09	500 g	N/A
S1	Cs-137	829	164.505	DPW/g	12/31/09	500 g	N/A

Reporting Units

LabID: **TstGrpName:** RptUnits:
 0912168-1 Gamma_Cabrera_Lib3_APRF pCi/samp

Sample Barcodes

0912168-1 GS091231-1PS1		0912168-1DUP GS091231-1PS2
GS091231-1MB GS091231-1PS3		GS091231-1LCS GS091231-1PS4

Radiochemistry Instrument Worksheet

ALS Laboratory Group -- FC

Prep Batch: GS091231-1

Prep Procedure: GAMMASCAN

Analytical QASS / NCR? Y N NA

Prep Num	Lab ID Collection Date	QC Type	Init Aliq	Fin Aliq	Units Geo.	Report Units	Cnt 1 File Cnt Dur (min)	Cnt 1 Inst/Det	Cnt 1 Count Date	Cnt 2 File Cnt Dur (min)	Cnt 2 Inst/Det	Cnt 2 Count Date	Cnt 3 File Cnt Dur (min)	Cnt 3 Inst/Det	Cnt 3 Count Date	Notes
1	0912168-1 12/18/09 12:00	SMP	1	1	sample 43	pCi/sam pic										
1	0912168-1 12/18/09 12:00	DUP	1	1	sample 43	pCi/sam pic										
1	GS091231-1 12/31/09 10:32	MB	1	1	sample 43	pCi/sam pic										JP 11/6/10
1	GS091231-1 12/31/09 10:32	LCS	500	500	g 43	pCi/sam pic										

See Previous

Spike Solution Information							
Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot Units	Pipet ID
S1	Am-241	829	446.730	DPM/g	12/31/09	500 g	N/A
S1	Co-60	829	193.193	DPM/g	12/31/09	500 g	N/A
S1	Cs-137	829	104.505	DPM/g	12/31/09	500 g	N/A

Reporting Units

LabID: 0912168-1 TstGrpName: Gamma_Cabrera_Lib3_APRF RptUnits: pCi/samp

Sample Barcodes

0912168-1 GS091231-1PS1		0912168-1DUP GS091231-1PS2
GS091231-1MB GS091231-1PS3		GS091231-1LCS GS091231-1PS4

Radiochemistry Instrument Worksheet

ALS Laboratory Group -- FC

Prep Batch: GS091231-1

Prep Procedure: GAMMASCAN

Analytical QASS / NCR? Y N NA

Prep Num	Lab ID	QC Type	Init Aliq	Fin Aliq	Units	Report Units	Cnt 1 File Cnt Dur (min)	Cnt 1 Inst/Det	Cnt 1 Count Date	Cnt 2 File Cnt Dur (min)	Cnt 2 Inst/Det	Cnt 2 Count Date	Cnt 3 File Cnt Dur (min)	Cnt 3 Inst/Det	Cnt 3 Count Date	Notes	
1	0912168-1	SMP	1	1	sample	pCi/g	1000	2	12/10								
1	0912168-1	DUP	1	1	sample	pCi/g		4	1/4/10								
1	GS091231-1	MB	1	1	sample	pCi/g		4	12/10								Count Duplicate
1	GS091231-1	LCS	500	500	g	pCi/g	30	4	1/4/10	30	4	1/4/10					JP 1/6/10

Spike Solution Information

Soln. #	Nuclide	Sample ID	Prep Conc. Units	Prep Date	Aliquot Units	Pipet ID
S1	Am-241	829	446.730 DPM/g	12/31/09	500 g	N/A
S1	Co-60	829	183.193 DPM/g	12/31/09	500 g	N/A
S1	Cs-137	829	164.505 DPM/g	12/31/09	500 g	N/A

CAB_LIB3_APR.F.LIB
 Co 60 0.5
 Cs 137 0.5
 Eu 152 1.5
 Mn 54 0.4
 Th 234 3.5
 V 235 1.3

*Recount. Am-241 Peak Fit Error
 JP 1/4/09

Reporting Units
 LabID: IsotopeName: RptUnits: pCi/g
 0912168-1 Gamma_Cabrera_Lib3_APRF

Sample Barcodes

0912168-1 GS091231-1PS1		0912168-1DUP GS091231-1PS2	
GS091231-1MB GS091231-1PS3		GS091231-1LCS GS091231-1PS4	

Radiochemistry Prep Worksheet

ALS Laboratory Group -- FC

Prep Batch: GS091231-1

Prep Procedure: GAMMASCAN

Reviewed By: mbc ^{MC} 01/07/10 Review Date: 1/7/2010

Non-Routine Pre-Treatment? Y / N Batch: NA Re-Prep? Y / N Batch: NA Prep QASS / NCR? Y / N NA

Prep Analyst: Crystal Shaeffer
 Prep Date: 12/31/2009
 Prep Dept: GM

Balance: _____
 Balance: _____

Samp Num	Prep Num	LabID	QC Type	Dish No.	Init. Aliq sample	Fin Aliq sample	Prep Basis	Geometry	Standards	Prep Notes
1	1	0912168-1	SMP		1	1	As Received	13		
2	1	0912168-1	DUP		1	1	As Received	13		
3	1	GS091231-1	MB		1	1	As Received	13		Count Duplicate: Insufficient volume
4	1	GS091231-1	LCS		1	1	As Received	13		

Comments: Each sample was placed into a ziplock bag and labeled with sample ID. All 5 ziplock bags were then placed in one gamma container to be analyzed for geometry 13. Weight of composited wipes and ziplock bags is 79.8 g.

Spiked By: N/A Date: N/A
 Witnessed By: N/A Date: N/A

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	Am-241	829	446.730	DFM/g	12/31/09	500	g	N/A
S1	Co-60	829	193.193	DFM/g	12/31/09	500	g	N/A
S1	Cs-137	829	184.505	DFM/g	12/31/09	500	g	N/A

Radiochemistry Prep Worksheet

Prep Batch: GS091231-1

ALS Laboratory Group -- FC

Prep Procedure: **GAMMASCAN**

Reviewed By: cas *cas* Review Date: 12/31/2009

Non-Routine Pre-Treatment? Y / N Batch: N/A Re-Prep? Y / N Prep QASS / NCR? Y / N N/A

Prep Analyst: Crystal Shaeffer
 Prep Date: 12/31/2009 *cas*
 Prep Dept: GM

Balance:
 Balance:

Samp Num	Prep Num	LabID	QC Type	Dish No.	Init Aliq sample	Fin Aliq sample	Prep Basis	Geometry	Standards	Prep Notes
1	1	0912168-1	SMP	1	1	1	As Received	13		
2	1	0912168-1	DUP	1	1	1	As Received	13		
3	1	GS091231-1	MB	1	1	1	As Received	13		
4	1	GS091231-1	LCS	500	500	500	As Received	13	S1	Count Duplicate: Insufficient volume <i>cas 12/31/09</i>

Comments

Each sample consisted of numerous wipes (actual number is on the sample condition form). Each sample was placed into a ziplock bag and labeled with sample ID. All 5 ziplock bags were then placed in one gamma container to be analyzed for geometry 13. Weight of composited wipes and ziplock bags is 79.8 g.

Spiked By: N/A Date: N/A
 Witnessed By: N/A Date: N/A

Spike Solution Information						
Soln #	Nuclide	SoilID	Prep Conc	Units	Prep Date	Pipet ID
S1	Am-241	829	446.730	DFM/g	12/31/09	500 9
S1	Co-60	829	193.193	DFM/g	12/31/09	500 9
S1	Cs-137	829	164.505	DFM/g	12/31/09	500 9

SAMPLE CONDITION FORM (SOLIDS)

ANALYST: *Ces*

ANALYSIS DATE: *12/31/09*

METHOD: *Prep*

WORK ORDER	SAMPLE ID	SAMPLE CONDITION		
		Dry/Wet	TEXTURE	Remarks
<i>0912168</i>	<i>1</i>	<i>AS Rec'd</i>	<i>Wipe</i>	<i>48 wipes</i>
↓	<i>2</i>	↓	↓	<i>33</i>
↓	<i>3</i>	↓	↓	<i>32</i>
↓	<i>4</i>	↓	↓	<i>36</i>
↓	<i>5</i>	↓	↓	<i>7</i>
<div style="position: absolute; top: 50%; left: 50%; transform: translate(-50%, -50%); opacity: 0.5;"> <i>Ces 12/31/09</i> </div>				



Section 8

STANDARDS TRACEABILITY DOCUMENTS



RSO #829
Rec'd 2/5/07
QCS

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

74248A-307

Sand in 16 Ounce PP MRP Jar

Customer: Paragon Analytics / Fort Collins, CO
P.O. No.: 71239, DCB 11/03/06, Item 3
Calibration Date: 01-Jan-2007 12:00 EST **Grams of Master Source:** 0.01064

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analyticals maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* $\mu\text{ps/gram}$	This Source μps	Uncertainty, %			Calibration Method
					u_A	u_B	U	
Am-241	59.5	157860	—	1.343E+03	0.33	1.46	2.99	4 π LS
Cd-109	88.0	462.60	1.777E+05	1.890E+03	0.57	1.70	3.59	HPGe
Co-57	122.1	271.79	9.484E+04	1.009E+03	0.34	1.30	2.69	HPGe
Ce-139	165.9	137.6	1.339E+05	1.424E+03	0.35	1.10	2.31	HPGe
Hg-203	279.2	46.61	2.680E+05	2.851E+03	0.40	1.10	2.34	HPGe
Sn-113	391.7	115.1	1.861E+05	1.979E+03	0.42	1.10	2.35	HPGe
Cs-137	661.7	10983	1.176E+05	1.251E+03	0.70	1.20	2.78	HPGe
Y-88	898.0	106.6	4.568E+05	4.859E+03	0.50	1.10	2.42	HPGe
Co-60	1173.2	1925.4	2.244E+05	2.387E+03	0.60	1.10	2.51	HPGe
Co-60	1332.5	1925.4	2.247E+05	2.390E+03	0.90	1.10	2.84	HPGe
Y-88	1836.1	106.6	4.843E+05	5.151E+03	0.90	1.10	2.84	HPGe

* Master Source refers to Analyticals' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4 π LS - 4 π Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
500 grams/290 mL customer supplied sand.
This standard will expire one year after the calibration date.

SOURCE RE-VERIFIED
ON 01/27/09. NEW
EXPIRATION DATE
IS 01/27/10.
MC 02/16/09

Source Prepared by: M. D. Dimitrova
M. D. Dimitrova, Radiochemist

QA Approved: D. M. Montgomery
D. M. Montgomery, QA Manager

Date: 1-30-07

End of Certificate



Section 9

ADDITIONAL SUPPORTING DOCUMENTATION



Gamma Spectroscopy

Initial Calibration Standards Traceability

 SEEKER G A M M A A N A L Y S I S R E S U L T S PS Version 1.8.4

ALS Laboratory Group - Fort Collins
 GammaScan

Geo.11 / Solid

Sample ID: 0913501-2 FWHM CAL (869)

```
-----
Sampling Start: 07/01/2008 12:00:00 | Counting Start: 05/06/2009 07:41:06
Sampling Stop: 07/01/2008 12:00:00 | Decay Time. . . . . 7.41E+003 Hrs
Buildup Time. . . . . 0.00E+000 Hrs | Live Time . . . . . 3600 Sec
Sample Size . . . . . 1.00E+002 g | Real Time . . . . . 3764 Sec
Collection Efficiency . . . . . 1.0000 | Spc. File . . . . . 090748D02.SPC
-----
```

Detector #: 2 (Detector 2)

Energy(keV) = -0.66 + 0.501*Ch + 0.00E+00*Ch^2 + 0.00E+00*Ch^3 05/06/2009
 FWHM(keV) = 0.69 + 0.003*En + 1.19E-03*En^2 + 0.00E+00*En^3 05/08/2008
 Where En = Sqrt(Energy in keV)

Search Sensitivity: 1.00 | Sigma Multiplier: 2.00 | Search Start/End: 80/4000

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	57.55	116.27	4894	704	568	35733	2.34	a HiResid Wide Pk
2	59.51	120.17	53568	555	252	12762	0.84	b HiResid
3	87.96	177.00	170632	908	309	19281	0.87	a
4	122.05	245.10	92778	669	227	10396	0.89	a HiResid
5	136.48	273.91	12422	350	222	9067	0.97	a
6	164.19	329.26	1739	459	371	16966	2.02	a Wide Pk
7	165.83	332.55	61146	559	214	8483	1.01	b
8	255.17	510.99	1672	277	218	8111	1.16	a
9	279.18	558.95	5199	314	229	8305	1.27	a
10	310.49	621.48	242	295	241	8618	1.47	a
11	391.73	783.75	35757	445	193	6881	1.38	a
12	422.94	846.10	173	189	154	5024	0.93	a
13	511.13	1022.23	740	356	289	10314	2.64	a Wide Pk
14	661.71	1323.01	91825	651	195	6705	1.75	a HiResid
15	813.98	1627.15	534	232	187	5884	1.92	a
16	821.77	1642.72	329	187	151	4413	1.54	b
17	898.13	1795.23	34947	450	206	7529	2.15	a
18	1173.32	2344.88	91370	636	162	4168	2.58	a HiResid
19	1332.52	2662.87	81236	591	129	2545	2.77	a HiResid
20	1835.98	3668.48	20099	296	71	658	3.57	a HiResid

090748D02.SPC Analyzed by

SEEKER CALIBRATION RESULTS Version 2.0.4

Sample ID: 0913501-2 FWHM CAL (869)
Stds. Match Tolerance: 2.00 keV

Detector Number: 02 Calibration Date. . . 05/06/2009 07:41:06

FWHM(keV) = 0.69 + 0.006*En + 1.41e-03*En^2 + 0.00e+00*En^3
(Where En = SQR(Energy in keV))

Pk. #	Energy (keV)	Measured FWHM(keV)	% Diff.	Calculated FWHM(keV)	% Diff.	Prev.Calc. FWHM(keV)
1	59.50	0.840	-1.66	0.827	-5.42*	0.784
2	88.04	0.871	0.72	0.877	-6.60	0.823
3	122.06	0.885	5.40	0.936	-7.75	0.868
4	165.85	1.007	0.20	1.009	-8.97	0.926
5	279.00	1.265	-6.11	1.192	-11.27	1.071
6	391.68	1.379	-0.65	1.371	-12.84	1.215
7	661.64	1.747	2.34	1.789	-15.16	1.553
8	898.02	2.154	-0.24	2.149	-16.35	1.847
9	1173.21	2.581	-0.64	2.564	-17.25	2.187
10	1332.48	2.771	1.14	2.803	-17.62	2.383
11	1836.01	3.570	-0.44	3.554	-18.42	3.001

Calibration Results Saved.

OK JP 5/13/09

* FWHM > 5% from previous FWHM calibration. Detector will be re-calibrated for individual geometries as Tl expire.

JP 5/13/09



Eckert & Ziegler

Analytics

RSO# 869

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404-352-8677
Fax 404-352-2837
www.analyticsinc.com

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

77651-307

100 Grams Sand in 16 Ounce PP MRP Jar

Customer: Paragon Analytics
P.O. No.: 73625, 5/19/08 Rel., Item 8
Calibration Date: 01-Jul-2008 12:00 EST Grams of Master Source: 0.01114

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* yps/gram	This Source yps	Uncertainty, %			Calibration Method
					u _A	u _B	U	
Am-241	59.5	157860	-----	1.341E+03	0.3	1.5	3.1	4π LS
Cd-109	88.0	462.60	1.681E+05	1.873E+03	0.5	1.7	3.5	HPGe
Co-57	122.1	271.79	8.748E+04	9.745E+02	0.6	1.3	2.9	HPGe
Ce-139	165.9	137.6	1.218E+05	1.357E+03	0.6	1.1	2.5	HPGe
Hg-203	279.2	46.61	2.761E+05	3.076E+03	0.6	1.1	2.5	HPGe
Sn-113	391.7	115.1	1.725E+05	1.922E+03	0.7	1.1	2.6	HPGe
Cs-137	661.7	10983	1.078E+05	1.201E+03	0.7	1.2	2.8	HPGe
Y-88	898.0	106.6	4.154E+05	4.628E+03	0.8	1.1	2.7	HPGe
Co-60	1173.2	1925.4	2.017E+05	2.247E+03	0.8	1.1	2.7	HPGe
Co-60	1332.5	1925.4	2.020E+05	2.250E+03	0.6	1.1	2.5	HPGe
Y-88	1836.1	106.6	4.398E+05	4.899E+03	0.7	1.1	2.6	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. Uncertainty: U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:

55 mL/100 grams customer supplied sand.
This standard will expire one year after the calibration date.

Source Prepared by: N. E. Tibbitts
N. E. Tibbitts, Radiochemist

QA Approved: D. M. Montgomery
D. M. Montgomery, QA Manager

Date: 7-22-08

End of Certificate

SEEKER G A M M A A N A L Y S I S R E S U L T S PS Version 1.8.4

Paragon Analytics, Div. of DataChem Lab
GammaScan

Geo.11 / Solid

Sample ID: 0913501-4 FWHM CAL (869)

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Sampling Start: 07/01/2008 10:00:00 | Counting Start: 01/09/2009 10:52:34
Sampling Stop: 07/01/2008 10:00:00 | Decay Time. . . . . 4.61E+003 Hrs
Buildup Time. . . . . 0.00E+000 Hrs | Live Time . . . . . 1800 Sec
Sample Size . . . . . 1.00E+002 g | Real Time . . . . . 1984 Sec
Collection Efficiency . . . . . 1.0000 | Spc. File . . . . . 090040D04.SPC
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Detector #: 4 (Detector 4)

Energy(keV) = -0.93 + 0.501*Ch + 0.00E+00*Ch^2 + 0.00E+00*Ch^3 01/09/2009

FWHM(keV) = 0.49 + 0.022*En + 5.65E-04*En^2 + 0.00E+00*En^3 09/04/2008

Where En = Sqrt(Energy in keV)

Search Sensitivity: 1.00 | Sigma Multiplier: 2.00 | Search Start/End: 80/4000

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PEAK SEARCH RESULTS

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PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	59.45	120.60	28895	435	223	9988	0.76	a
2	70.72	143.10	417	195	157	6067	0.52	a
3	72.82	147.29	618	237	191	8089	0.62	b
4	87.93	177.48	101465	695	229	10611	0.79	a Wide Pk
5	89.32	180.27	3967	374	290	13274	1.32	b
6	122.04	245.61	60332	541	186	6965	0.87	a
7	136.46	274.41	7814	263	160	5178	0.88	a
8	165.82	333.05	50822	504	185	6302	0.93	a
9	255.12	511.40	1570	219	168	4829	1.16	a
10	268.59	538.32	86	110	89	1945	0.57	a NET< CL
11	272.34	545.80	116	178	145	3889	1.01	b NET< CL
12	279.16	559.43	12657	297	160	4368	1.11	a
13	310.21	621.44	302	220	178	4706	1.51	a
14	367.50	735.87	167	191	156	3844	1.36	a
15	391.70	784.19	31575	396	144	3540	1.22	a HiResid
16	457.57	915.76	128	125	101	2341	0.88	a
17	474.57	949.71	110	106	86	1803	0.70	a
18	511.21	1022.89	553	267	216	5736	2.61	a Wide Pk
19	573.67	1147.65	72	119	97	1988	1.05	a NET< CL
20	580.12	1160.54	105	119	97	1967	0.96	a
21	661.68	1323.42	39623	437	147	3569	1.56	a HiResid
22	814.02	1627.69	635	171	134	3028	1.94	a
23	898.09	1795.61	31526	391	134	3175	1.82	a HiResid
24	1173.29	2345.25	39501	416	100	1786	2.08	a HiResid

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PEAK SEARCH RESULTS

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PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
25	1325.31	2648.90	716	145	111	1566	3.73	a HiResid Wide Pk
26	1332.48	2663.22	35802	389	75	953	2.24	b HiResid
27	1835.96	3668.81	17398	270	46	339	2.67	a HiResid

090040D04.SPC Analyzed by

SEEKER CALIBRATION RESULTS Version 2.0.4

Sample ID: 0913501-4 FWHM CAL (869)
Stds. Match Tolerance: 2.00 keV

Detector Number: 04 Calibration Date. . . 01/09/2009 10:52:34

FWHM(keV) = 0.60 + 0.011*En + 1.26e-03*En^2 + -9.06e-06*En^3
(Where En = SQR(Energy in keV))

Pk. #	Energy (keV)	Measured FWHM(keV)	% Diff.	Calculated FWHM(keV)	% Diff.	Prev.Calc. FWHM(keV)
1	59.50	0.756	-0.52	0.752	-9.40	0.688
2	88.04	0.789	1.75	0.803	-8.53	0.740
3	122.06	0.866	-0.72	0.860	-8.05	0.796
4	165.85	0.931	-0.35	0.928	-7.86	0.860
5	279.00	1.108	-1.66	1.090	-8.15	1.008
6	391.68	1.217	1.72	1.238	-8.70	1.139
7	661.64	1.559	0.05	1.560	-9.76	1.421
8	898.02	1.821	-0.35	1.815	-10.17	1.647
9	1173.21	2.085	0.18	2.088	-10.13	1.896
10	1332.48	2.240	-0.13	2.237	-9.92	2.035
11	1836.01	2.669	0.04	2.670	-8.59	2.459

Calibration Results Saved.

OK
MC
01/12/09



Eckert & Ziegler
Analytics

RSO#
869

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318
Tel 404-352-8677
Fax 404-352-2837
www.analytiscinc.com

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

77651-307

100 Grams Sand in 16 Ounce PP MRP Jar

Customer: Paragon Analytics
P.O. No.: 73625, 5/19/08 Rel., Item 3
Calibration Date: 01-Jul-2008 12:00 EST **Grams of Master Source:** 0.01114

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* yps/gram	This Source yps	Uncertainty, %			Calibration Method
					u _k	u _s	U	
Am-241	59.5	157860	—	1.341E+03	0.3	1.5	3.1	4π LS
Cd-109	88.0	462.60	1.681E+05	1.873E+03	0.5	1.7	3.5	HPGe
Co-57	122.1	271.79	8.748E+04	9.745E+02	0.6	1.3	2.9	HPGe
Ce-139	165.9	137.6	1.218E+05	1.357E+03	0.6	1.1	2.5	HPGe
Hg-203	279.2	46.61	2.761E+05	3.076E+03	0.6	1.1	2.5	HPGe
Sn-113	391.7	115.1	1.725E+05	1.922E+03	0.7	1.1	2.6	HPGe
Cs-137	661.7	10983	1.078E+05	1.201E+03	0.7	1.2	2.8	HPGe
Y-88	898.0	106.6	4.154E+05	4.628E+03	0.8	1.1	2.7	HPGe
Co-60	1173.2	1925.4	2.017E+05	2.247E+03	0.8	1.1	2.7	HPGe
Co-60	1332.5	1925.4	2.020E+05	2.250E+03	0.6	1.1	2.5	HPGe
Y-88	1836.1	106.6	4.398E+05	4.899E+03	0.7	1.1	2.6	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. **Uncertainty:** U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:

55 mL/100 grams customer supplied sand.
This standard will expire one year after the calibration date.

Source Prepared by: N. E. Tibbitts
N. E. Tibbitts, Radiochemist

QA Approved: D. M. Montgomery
D. M. Montgomery, QA Manager

Date: 7-22-08

End of Certificate

Corporate Office
24937 Avenue Tibbitts Valencia, California 91355

Laboratory
1380 Seaboard Industrial Blvd. Atlanta, Georgia, 30318

ANA Form 005 Rev. 11-00

SEEKER G A M M A A N A L Y S I S R E S U L T S PS Version 1.8.4

ALS Laboratory Group - Fort Collins
GammaScan

Geo 13 / Solid

Sample ID: 0913512-2 GEO 13 EFF CAL (876)

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Sampling Start: 01/01/2009 10:00:00 | Counting Start: 05/27/2009 16:15:34
Sampling Stop: 01/01/2009 10:00:00 | Decay Time. . . . . 3.51E+003 Hrs
Buildup Time. . . . . 0.00E+000 Hrs | Live Time . . . . . 5400 Sec
Sample Size . . . . . 5.00E+002 g | Real Time . . . . . 5611 Sec
Collection Efficiency . . . . . 1.0000 | Spc. File . . . . . 090840D02.SPC
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Detector #: 2 (Detector 2)

Energy (keV) = $-0.66 + 0.500 \cdot Ch + 0.00E+00 \cdot Ch^2 + 0.00E+00 \cdot Ch^3$ 05/27/2009
 FWHM(keV) = $0.69 + 0.006 \cdot En + 1.41E-03 \cdot En^2 + 0.00E+00 \cdot En^3$ 05/06/2009
 Where En = Sqrt(Energy in keV)

Search Sensitivity: 1.00 | Sigma Multiplier: 2.00 | Search Start/End: 80/4000

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	57.99	117.19	3461	723	587	42400	1.92	a Wide Pk
2	59.49	120.20	31238	504	296	17667	0.82	b
3	70.65	142.49	515	286	232	13249	0.49	a
4	72.81	146.81	1208	350	282	17665	0.66	b
5	87.94	177.03	141119	859	342	23573	0.86	a
6	120.33	241.75	3767	769	624	45509	2.05	a HiResid Wide Pk
7	122.04	245.16	89079	696	295	17503	0.86	b HiResid
8	136.45	273.96	11226	438	315	18332	0.98	a
9	165.82	332.65	89822	698	294	16000	0.99	a HiResid
10	255.12	511.07	3017	378	297	14007	1.29	a
11	279.19	559.17	35829	473	234	10764	1.16	a
12	391.76	784.07	64834	573	216	8655	1.34	a HiResid
13	511.28	1022.90	1763	357	285	12038	2.40	a
14	661.79	1323.61	65596	578	220	8531	1.74	a HiResid
15	813.86	1627.46	1237	251	198	6971	2.05	a
16	898.22	1796.02	72385	588	196	7097	1.96	a HiResid
17	1173.47	2345.97	75628	583	159	4158	2.47	a HiResid
18	1325.66	2650.06	1760	215	163	3456	3.63	a HiResid
19	1332.67	2664.07	70533	553	126	2513	2.65	b HiResid
20	1836.21	3670.16	45357	435	73	700	3.53	a HiResid

090840D02.SPC Analyzed by

SEEKER BACKGROUND SUBTRACT RESULTS Version 1.8.2

ALS Laboratory Group - Fort Collins
GammaScan

Background File: DET020522.BKG (090522-2 WEEKLY BKG)

Bkg.File Detector #: 2

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BACKGROUND SUBTRACT RESULTS

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PK#	ENERGY (keV)	OLD NET COUNTS	OLD UN- CERTAINTY	OLD CR.LEVEL	NEW NET COUNTS	NEW UN- CERTAINTY	NEW CR.LEVEL	FLAG
3	70.65	515	286	232	514	286	232	
13	511.28	1763	357	285	1628	358	286	
16	898.22	72385	588	196	72380	589	196	

 SEEKER CALIBRATION RESULTS Version 2.0.4

Sample ID: 0913512-2 GEO 13 EFF CAL (876)
 Stds. Match Tolerance: 2.00 keV

 Detector Number: 02 Calibration Date. . . 05/27/2009 16:15:34
 Geometry File (D02)(Sh13).EFF ID. Geo 13 Eff Cal
 Amount of Std. in Calib. Source: 500.000000 gm

Eff = 1 / [2.22e-03*En^-4.05e+00 + 1.40e+02*En^ 7.52e-01]
 (Where En = Energy in MeV) (Exponential)

Pk. #	Energy (keV)	Measured Efficiency	% Difference	Calculated Efficiency	% Difference	Prev. Calc. Efficiency
1	59.50	4.39e-03	4.47	4.59e-03	2.37	4.70e-03
2	* 88.04	1.64e-02	-4.31	1.57e-02	1.16	1.59e-02
3	122.06	2.45e-02	2.79	2.52e-02	0.24	2.53e-02
4	165.85	2.51e-02	1.30	2.54e-02	-0.02	2.54e-02
5	279.00	1.91e-02	-2.61	1.86e-02	0.13	1.86e-02
6	391.68	1.49e-02	-2.88	1.45e-02	0.29	1.45e-02
7	661.64	1.01e-02	-2.96	9.78e-03	0.52	9.83e-03
8	898.02	7.47e-03	3.89	7.77e-03	0.66	7.82e-03
9	1173.21	6.23e-03	1.99	6.36e-03	0.78	6.41e-03
10	1332.48	5.80e-03	-0.45	5.78e-03	0.84	5.82e-03
11	1836.01	4.42e-03	2.52	4.54e-03	0.99	4.58e-03

Calibration Results Saved.

* Manually adjusted the efficiency value of 88.04keV.
 original value (1.69e-02)

% difference of newly calibrated values:
 1.57×10^{-2}

MC 07/24/09 $\left(\frac{1.69e-02}{1.57e-02} \right) - 1 \times 100 = 7.64\%$ MC 07/24/09
 7.1%

change is OK Per SOP 715 MC 5-28-09

OK
 MC
 07/24/09

Standards File. Gsstd13.std
 Assay Date 01/01/2009 10:00
 ID.: Geo 13 Std#876 500-g. mixed gamma

Pk #	Nuclide	Energy	Halflife	Br.Ratio	dps/gm
1	Am-241	59.50	4.320E+02 yrs	0.35900	7.35
2	Cd-109	88.04	4.626E+02 dys	0.03610	106.76
3	Co-57	122.06	2.718E+02 dys	0.85510	2.29
4	Ce-139	165.85	1.376E+02 dys	0.85350	3.24
5	Hg-203	279.00	4.661E+01 dys	0.77300	7.92
6	Sn-113	391.68	1.151E+02 dys	0.64900	5.99
7	Cs-137	661.64	3.007E+01 yrs	0.85120	2.86
8	Y-88	898.02	1.066E+02 dys	0.93400	9.95
9	Co-60	1173.21	5.271E+00 yrs	0.99980	4.74
10	Co-60	1332.48	5.271E+00 yrs	0.99990	4.75
11	Y-88	1836.01	1.066E+02 dys	0.99380	9.89



Eckert & Ziegler

Analytics

RSO # 878 01-20-09 576

1380 Seaboard Industrial Blvd. Atlanta, Georgia 30318 Tel 404-352-8677 Fax 404-352-2837 www.analyticsinc.com

CERTIFICATE OF CALIBRATION Standard Radionuclide Source

78802-307

Sand in 16 Ounce PP MRP Jar

Customer: Paragon Analytics P.O. No.: 73625 12-10-08, Item 1 Calibration Date: 01-Jan-2009 12:00 EST

Grams of Master Source: 0.011374

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Table with columns: Nuclide, Gamma-Ray Energy (keV), Half-Life, Days, Master Source* (yps/gram), This Source (yps), Uncertainty, % (Type, uA, uB, U), Calibration Method. Rows include Am-241, Cd-109, Co-57, Ce-139, Hg-203, Sn-113, Cs-137, Y-88, Co-60, and Y-88.

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4pi LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. Uncertainty: U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:

500 g / 290 mL of customer supplied sand. This standard will expire one year after the calibration date.

Source Prepared by: M. I. Taskaeva, Radiochemist

QA Approved: D. M. Montgomery, QA Manager

Date: 1-20-09

End of Certificate

Geometry 13 Calibration Verification: Gamma Mixed Nuclide Source: Geometry 13
 Std. # 876 Detector 2

NEW SOURCE : 829				REF DATE : 1/1/2007		count date 5/28/2009						
FROM CALIBRATION CERTIFICATE				FROM ANALYTICS.LIB								
Isotope	KeV	Half Life(y)	Gamm/sec	Gamma Fraction:	Mass of Standard	EXPECTED ACTIVITY						
Am-241	59.9	432.0000	1343	0.3590	500 g	Am-241	DPS	pCi/g	Activity	Recovery	Pass/Fail	# of half-lives expired
Cd-109	88	1.2666	1890	0.0361		Cd-109	3740.9	202.2	199	98%	Pass	0.01
Co-57	122	0.7441	1009	0.8551		Co-57	52354.6	2830.0	2700	95%	Pass	1.90
Ce-139	166	0.3768	1424	0.8035		Ce-139	1180.0	63.8	63	99%	Pass	3.23
Hg-203	279	0.1276	2851	0.7730		Hg-203	1772.2	95.8	NA	>5 h-lives	>5 h-lives	6.38
Sn-113	392	0.3151	1979	0.6490		Sn-113	3688.2	199.4	NA	>5 h-lives	>5 h-lives	18.84
Cs-137	662	30.0000	1251	0.8512		Cs-137	3049.3	164.8	NA	>5 h-lives	>5 h-lives	7.63
Y-88	898	0.2919	4859	0.9340		Y-88	1469.7	79.4	82	103%	Pass	0.08
Co-60	1173	5.2714	2387	1.0000		Co-60	5202.4	281.2	NA	>5 h-lives	>5 h-lives	8.23
Co-60	1332	5.2714	2390	1.0000		Co-60	2387.0	129.0	129	100%	Pass	0.46
Y-88	1836	0.2919	5151	0.9938		Y-88	2390.0	129.2	128	99%	Pass	0.46
							5183.1	280.2	NA	>5 h-lives	>5 h-lives	8.23

OK 5/28/09

 SEEKER G A M M A A N A L Y S I S R E S U L T S PS Version 1.8.4

ALS Laboratory Group - Fort Collins
 GammaScan

Geo 13 / Solid

Sample ID: 0913512-2 GEO 13 LCS VER (829)

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Sampling Start:   01/01/2007 10:00:00 | Counting Start:   05/28/2009 08:52:22
Sampling Stop:    01/01/2007 10:00:00 | Decay Time. . . . . 2.11E+004 Hrs
Buildup Time. . . . . 0.00E+000 Hrs | Live Time . . . . . 1800 Sec
Sample Size . . . . . 5.00E+002 g | Real Time . . . . . 1831 Sec
Collection Efficiency . . . . . 1.0000 | Spc. File . . . . . 090842D02.SPC
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Detector #: 2 (Detector 2)

Energy(keV) = -0.67 + 0.500*Ch + 0.00E+00*Ch^2 + 0.00E+00*Ch^3 05/28/2009

FWHM(keV) = 0.69 + 0.006*En + 1.41E-03*En^2 + 0.00E+00*En^3 05/06/2009

Where En = Sqrt(Energy in keV)

Search Sensitivity: 1.00 | Sigma Multiplier: 2.00 | Search Start/End: 80/4000

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PEAK SEARCH RESULTS

=====

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	58.23	117.70	574	229	185	5034	1.51 a	Wide Pk
2	59.41	120.06	10904	246	107	2298	0.80 b	
3	87.85	176.88	13753	272	113	2597	0.86 a	
4	121.95	245.02	4819	191	108	2151	0.93 a	
5	130.00	261.10	81	113	91	1685	0.80 a	NET< CL
6	136.40	273.89	693	135	103	1945	1.05 a	
7	165.71	332.46	816	145	109	2043	1.11 a	
8	334.02	668.78	88	104	84	1403	1.07 a	
9	391.70	784.04	257	102	80	1256	1.13 a	
10	661.59	1323.32	21382	308	80	1114	1.74 a	
11	897.87	1795.45	142	117	94	1581	2.21 a	
12	1173.18	2345.56	19861	292	63	659	2.52 a	HiResid
13	1332.38	2663.68	17941	271	33	175	2.69 a	HiResid
14	1835.95	3669.90	113	32	20	46	4.07 a	

090842D02.SPC Analyzed by

SEEKER B A C K G R O U N D S U B T R A C T R E S U L T S V e r s . 2 . 2 . 1

ALS Laboratory Group - Fort Collins
GammaScan

Background File: DET020522.BKG (090522-2 WEEKLY BKG)

Bkg.File Detector #: 2

=====

BACKGROUND SUBTRACT RESULTS

=====

PK#	ENERGY (keV)	OLD NET COUNTS	OLD UN- CERTAINTY	OLD CR.LEVEL	NEW NET COUNTS	NEW UN- CERTAINTY	NEW CR.LEVEL	FLAG
11	897.87	142	117	94	140	117	94	

ALS Laboratory Group - Fort Collins
 GammaScan

Geo 13 / Solid

Sample ID: 0913512-2 GEO 13 LCS VER (829)

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Sampling Start: 01/01/2007 10:00:00 | Counting Start: 05/28/2009 08:52:22
Sampling Stop: 01/01/2007 10:00:00 | Decay Time. . . . . 2.11e+004 Hrs
Buildup Time. . . . . 0.00e+000 Hrs | Live Time . . . . . 1800 Sec
Sample Size . . . . . 5.00e+002 g | Real Time . . . . . 1831 Sec
Collection Efficiency . . . . . 1.0000 | Spectrum File . . . . . 090842D02.SPC
Cr. Level Confidence Interval: 95 % | Det. Limit Confidence Interval: 95 %
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```

Detector #: 2 (Detector 2)

Efficiency File: (D02)(Sh13).EFF (Geo 13 Eff Cal)
 Eff.=1/[2.22E-03*En^-4.05E+00 + 1.40E+02*En^7.52E-01] 05/27/2009

Library File:ANALYTICAL.LIB (Analytical)

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MEASURED or MDA CONCENTRATIONS

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Nuclide	ENERGY E (keV)	Concentration (pCi/g)	MDA	Critical Level	Halflife (hrs)
Am-241	59.54	1.99E+02 +- 4.49E+00	3.95E+00	1.95E+00	3.79E+06
Cd-109	88.02	2.70E+03 +- 5.35E+01	4.52E+01	2.23E+01	1.11E+04
Co-57	122.07	6.34E+01 +- 2.51E+00	2.87E+00	1.42E+00	6.50E+03
Ce-139	165.85	9.96E+01 +- 1.77E+01	2.70E+01	1.34E+01	3.30E+03
Sn-113	391.68	1.62E+02 +- 6.45E+01	1.02E+02	5.04E+01	2.76E+03
Cs-137	661.62	8.15E+01 +- 1.17E+00	6.17E-01	3.03E-01	2.64E+05
Co-60	Average:x	1.28E+02 +- 1.35E+00	. . . .	. . . .	4.62E+04
	1173.21	1.29E+02 +- 1.89E+00	8.39E-01	4.11E-01	4.62E+04
	1332.48	1.28E+02 +- 1.93E+00	4.93E-01	2.37E-01	4.62E+04
Hg-203	279.18	MDA	1.78E+05	8.76E+04	1.12E+03
Y-88	898.02	MDA	1.58E+02r	7.71E+01	2.56E+03

MEASURED TOTAL: 3.44E+03 +- 1.45E+02 pCi/g

=====

UNKNOWN, SUM or ESCAPE PEAKS

=====

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	58.23	117.70	574	229	185	5034	1.51	Unknown
5	130.00	261.10	81	113	91	1685	0.80	Deleted
6	136.40	273.89	693	135	103	1945	1.05	Unknown
8	334.02	668.78	88	104	84	1403	1.07	Unknown
11	897.87	1795.45	140	117	94	1581	2.21	Unknown

090842D02.SPC Analyzed by

=====

UNKNOWN, SUM or ESCAPE PEAKS

=====

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
14	1835.95	3669.90	113	32	20	46	4.07	Unknown

c:\SEEKER\BIN\090842d02.res Analysis Results Saved.

R50 #829
Rec'd 2/5/07
ESB

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

74248A-307

Sand in 16 Ounce PP MRP Jar

Customer: Paragon Analytics / Fort Collins, CO
P.O. No.: 71239, DCB 11/03/06, Item 8
Calibration Date: 01-Jan-2007 12:00 EST Grams of Master Source: 0.01064

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* yps/gram	This Source yps	Uncertainty, %			Calibration Method
					u ₁	u ₂	U	
Am-241	59.5	157860	—	1.343E+03	0.33	1.46	2.99	4π LS
Cd-109	88.0	462.60	1.777E+06	1.890E+03	0.57	1.70	3.59	HPGe
Co-57	122.1	271.79	9.484E+04	1.009E+03	0.34	1.30	2.69	HPGe
Ce-139	165.9	137.6	1.339E+05	1.424E+03	0.35	1.10	2.31	HPGe
Hg-203	279.2	46.61	2.680E+05	2.851E+03	0.40	1.10	2.34	HPGe
Sn-113	391.7	115.1	1.861E+05	1.979E+03	0.42	1.10	2.35	HPGe
Cs-137	661.7	10983	1.176E+05	1.251E+03	0.70	1.20	2.78	HPGe
Y-88	898.0	106.6	4.568E+05	4.859E+03	0.50	1.10	2.42	HPGe
Co-60	1173.2	1925.4	2.244E+05	2.387E+03	0.60	1.10	2.51	HPGe
Co-60	1332.5	1925.4	2.247E+05	2.390E+03	0.90	1.10	2.84	HPGe
Y-88	1836.1	106.6	4.843E+05	5.151E+03	0.90	1.10	2.84	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. Uncertainty: U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
500 grams/290 mL customer supplied sand.
This standard will expire one year after the calibration date.

SOURCE RE-VERIFIED
ON 01/27/09. NEW
EXPIRATION DATE
IS 01/27/10.
MC 02/16/09

Source Prepared by: M. D. Dimitrova
M. D. Dimitrova, Radiochemist

QA Approved: D. M. Montgomery
D. M. Montgomery, QA Manager

Date: 1-30-07

End of Certificate

Corporate Office

Laboratory

 SEEKER G A M M A A N A L Y S I S R E S U L T S PS Version 1.8.4

Paragon Analytics, Div. of DataChem Lab
 GammaScan

Geo 13 / Solid

Sample ID: 0913512-4 GEO 13 EFF CAL (876)

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Sampling Start: 01/01/2009 10:00:00 | Counting Start: 03/11/2009 13:33:31
Sampling Stop: 01/01/2009 10:00:00 | Decay Time. . . . . 1.66E+003 Hrs
Buildup Time. . . . . 0.00E+000 Hrs | Live Time . . . . . 1800 Sec
Sample Size . . . . . 5.00E+002 g | Real Time . . . . . 1956 Sec
Collection Efficiency . . . . . 1.0000 | Spc. File . . . . . 090403D04.SPC
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Detector #: 4 (Detector 4)

Energy(keV) = -0.95 + 0.501*Ch + 0.00E+00*Ch^2 + 0.00E+00*Ch^3 03/11/2009
 FWHM(keV) = 0.60 + 0.011*En + 1.26E-03*En^2 +-9.06E-06*En^3 01/09/2009
 Where En = Sqrt(Energy in keV)

Search Sensitivity: 1.00 | Sigma Multiplier: 2.00 | Search Start/End: 80/4000

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PEAK SEARCH RESULTS

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PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	59.44	120.61	11613	336	212	9054	0.78	a
2	70.76	143.22	1175	356	287	14089	1.14	a
3	72.69	147.08	1546	245	191	8051	0.71	b
4	80.68	163.04	1019	418	340	17040	1.51	a HiResid Wide Pk
5	82.39	166.46	2698	426	340	17040	1.39	b HiResid
6	84.97	171.60	5747	649	519	28400	2.39	c HiResid
7	87.91	177.49	54745	557	248	11360	0.98	d HiResid
8	122.03	245.62	34840	449	205	8438	0.89	a
9	127.59	256.72	101	199	163	5867	0.61	a NET< CL
10	136.45	274.42	4480	300	220	8982	0.90	a
11	165.80	333.06	41700	480	207	7941	0.93	a
12	255.09	511.39	1358	206	158	4600	0.95	a
13	279.16	559.45	34779	424	166	4727	1.09	a HiResid
14	391.69	784.22	30539	379	121	2903	1.19	a
15	393.33	787.49	588	170	134	3318	1.34	b
16	510.73	1021.99	209	146	118	2562	1.32	a
17	511.44	1023.40	401	213	172	4163	2.07	b
18	661.70	1323.51	18861	312	122	2904	1.52	a
19	813.82	1627.34	594	131	100	1840	1.58	a
20	898.13	1795.73	34636	397	113	2251	1.82	a HiResid
21	1173.34	2345.41	22020	314	85	1292	2.09	a HiResid
22	1325.06	2648.44	798	149	113	1584	3.94	a HiResid Wide Pk

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PEAK SEARCH RESULTS

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PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
23	1332.54	2663.38	20381	299	74	924	2.22	b HiResid
24	1836.05	3669.04	20434	290	40	257	2.70	a HiResid

090403D04.SPC Analyzed by

SEEKER BACKGROUND SUBTRACT RESULTS Version 1.8.2

Paragon Analytics, Div. of DataChem Lab
GammaScan

Background File: DET040306.BKG (090306-4 WEEKLY BKG)

Bkg.File Detector #: 4

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BACKGROUND SUBTRACT RESULTS

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PK#	ENERGY (keV)	OLD NET COUNTS	OLD UN- CERTAINTY	OLD CR.LEVEL	NEW NET COUNTS	NEW UN- CERTAINTY	NEW CR.LEVEL	FLAG
2	70.76	1175	356	287	1172	356	287	
3	72.69	1546	245	191	1541	245	191	
5	82.39	2698	426	340	2695	426	340	
7	87.91	54745	557	248	54742	557	248	
16	510.73	209	146	118	167	146	118	
20	898.13	34636	397	113	34634	397	113	

 SEEKER CALIBRATION RESULTS Version 2.0.4

Sample ID: 0913512-4 GEO 13 EFF CAL (876)
 Stds. Match Tolerance: 2.00 keV

 Detector Number: 04 Calibration Date. . . 03/11/2009 13:33:31
 Geometry File (D04)(Sh13).EFF ID. Geo. 13
 Amount of Std. in Calib. Source: 500.000000 gm

Eff = 1 / [2.81e-03*En^-3.92e+00 + 1.63e+02*En^ 8.04e-01]
 (Where En = Energy in MeV) (Exponential)

Pk. #	Energy (keV)	Measured Efficiency	% Difference	Calculated Efficiency	% Difference	Prev. Calc. Efficiency
1	59.50	4.89e-03	4.39	5.11e-03	-2.00	5.01e-03
2	88.04X	1.70e-02	-4.80	1.62e-02	2.92	1.67e-02
3	122.06	2.36e-02	3.62	2.45e-02	3.70	2.54e-02
4	165.85	2.37e-02	0.96	2.39e-02	-2.85	2.33e-02
5	279.00	1.76e-02	-4.06	1.70e-02	2.81	1.74e-02
6	391.68	1.32e-02	-1.94	1.30e-02	1.05	1.31e-02
7	661.64	8.64e-03	-1.31	8.53e-03	-1.11	8.44e-03
8	898.02	6.49e-03	2.68	6.67e-03	-2.33	6.52e-03
9	1173.21	5.29e-03	1.68	5.38e-03	-3.38	5.21e-03
10	1332.48	4.89e-03	-0.67	4.86e-03	-3.86	4.68e-03
11	1836.01	3.62e-03	3.56	3.76e-03	-5.02	3.58e-03

Calibration Results Saved.

X Manually adjusted the efficiency value of 88.04 keV (original value 1.75e-02)
 % difference of new ^{1.62e-02} value.

$$\left| \frac{1.62e-02}{1.75e-02} - 1 \right| \times 100 = 7.43\%$$

change OK per SOP ⁷¹⁵ ₇₁₃ ^{note 3-11-09} into 3-11-09

OK
 MC
 07/23/09

Standards File. Gsstd13.std
Assay Date 01/01/2009 10:00
ID.: Geo 13 Std#876 500-g. mixed gamma

Pk #	Nuclide	Energy	Halflife	Br.Ratio	dps/gm
1	Am-241	59.50	4.320E+02 yrs	0.35900	7.35
2	Cd-109	88.04	4.626E+02 dys	0.03610	106.76
3	Co-57	122.06	2.718E+02 dys	0.85510	2.29
4	Ce-139	165.85	1.376E+02 dys	0.85350	3.24
5	Hg-203	279.00	4.661E+01 dys	0.77300	7.92
6	Sn-113	391.68	1.151E+02 dys	0.64900	5.99
7	Cs-137	661.64	3.007E+01 yrs	0.85120	2.86
8	Y-88	898.02	1.066E+02 dys	0.93400	9.95
9	Co-60	1173.21	5.271E+00 yrs	0.99980	4.74
10	Co-60	1332.48	5.271E+00 yrs	0.99990	4.75
11	Y-88	1836.01	1.066E+02 dys	0.99380	9.89



Eckert & Ziegler

Analytics

RSO # 878 876 01-20-09

1380 Seaboard Industrial Blvd. Atlanta, Georgia 30318 Tel 404-352-8677 Fax 404-352-2837 www.analyticsinc.com

CERTIFICATE OF CALIBRATION Standard Radionuclide Source

78802-307

Sand in 16 Ounce PP MRP Jar

Customer: Paragon Analytics P.O. No.: 73625 12-10-08, Item 1 Calibration Date: 01-Jan-2009 12:00 EST

Grams of Master Source: 0.011374

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Table with columns: Nuclide, Gamma-Ray Energy (keV), Half-Life, Days, Master Source* (yps/gram), This Source (yps), Uncertainty, % (uA, uB, U), Calibration Method. Rows include Am-241, Cd-109, Co-57, Ce-139, Hg-203, Sn-113, Cs-137, Y-88, Co-60, and Y-88.

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4pi LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. Uncertainty: U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:

800 g / 290 mL of customer supplied sand. This standard will expire one year after the calibration date.

Source Prepared by: M. I. Taskaeva, Radiochemist

QA Approved: D. M. Montgomery, QA Manager

Date: 1-20-09

End of Certificate

ANA Form005 Rev. 11

Geometry 13 Calibration Verification: Gamma Mixed Nuclide Source: Geometry 13
 Std. # 876 Detector 4

NEW SOURCE: 829				REF DATE: 1/1/2007		count date 3/11/2009					
FROM CALIBRATION CERTIFICATE				FROM ANALYTICS.LIB		EXPECTED ACTIVITY					
Isotope	KeV	Half Life(y)	Gammas/Sec.	Gamma Fraction:	Mass of Standard	DPS	pCi/g	Activity	Recovery	Pass/Fail	# of half-lives expired
Am-241	59.9	432.0000	1343	0.3590	500 g	3740.9	202.2	196	97%	Pass	0.01
Cd-109	88	1.2666	1890	0.0361		52354.6	2830.0	2660	94%	Pass	1.73
Co-57	122	0.7441	1009	0.8551		1180.0	63.8	62	98%	Pass	2.94
Ce-139	166	0.3768	1424	0.8035		1772.2	95.8	NA	>5 h-lives	>5 h-lives	5.81
Hg-203	279	0.1276	2851	0.7730		3688.2	199.4	NA	>5 h-lives	>5 h-lives	17.17
Sn-113	392	0.3151	1979	0.6490		3049.3	164.8	NA	>5 h-lives	>5 h-lives	6.95
Cs-137	662	30.0000	1251	0.8512		1469.7	79.4	80	100%	Pass	0.07
Y-88	898	0.2919	4859	0.9340		5202.4	281.2	NA	>5 h-lives	>5 h-lives	7.50
Co-60	1173	5.2714	2387	1.0000		2387.0	129.0	124	96%	Pass	0.42
Co-60	1332	5.2714	2390	1.0000		2390.0	129.2	126	98%	Pass	0.42
Y-88	1836	0.2919	5151	0.9938		5183.1	280.2	NA	>5 h-lives	>5 h-lives	7.50

Handwritten notes:
 OK
 NMD
 3/11/09

 SEEKER G A M M A A N A L Y S I S R E S U L T S P S Version 1.8.4

Paragon Analytics, Div. of DataChem Lab
 GammaScan

Geo 13 / Solid

Sample ID: 0913512-4 GEO 13 LCS VER (829)

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Sampling Start:   01/01/2007 10:00:00 | Counting Start:   03/11/2009 14:13:36
Sampling Stop:   01/01/2007 10:00:00 | Decay Time. . . . . 1.92E+004 Hrs
Buildup Time. . . . . 0.00E+000 Hrs | Live Time . . . . . 1800 Sec
Sample Size . . . . . 5.00E+002 g | Real Time . . . . . 1851 Sec
Collection Efficiency . . . . . 1.0000 | Spc. File . . . . . 090404D04.SPC
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Detector #: 4 (Detector 4)

Energy(keV) = -0.95 + 0.501*Ch + 0.00E+00*Ch^2 + 0.00E+00*Ch^3 03/11/2009

FWHM(keV) = 0.60 + 0.011*En + 1.26E-03*En^2 +-9.06E-06*En^3 01/09/2009

Where En = Sqrt(Energy in keV)

Search Sensitivity: 1.00 | Sigma Multiplier: 2.00 | Search Start/End: 80/4000

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PEAK SEARCH RESULTS

=====

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	49.59	100.94	124	144	117	2768	0.77	a
2	59.47	120.67	11982	254	106	2505	0.72	a
3	87.93	177.52	15716	287	114	2642	0.79	a
4	93.67	188.99	11	77	63	992	0.41	b NET< CL
5	102.85	207.31	94	82	65	1051	0.42	a
6	122.02	245.62	5621	188	93	1760	0.80	a
7	136.49	274.52	675	106	76	1267	0.72	a
8	147.72	296.93	47	76	62	933	0.45	a NET< CL
9	165.77	332.99	1014	122	86	1476	0.76	a
10	238.99	479.23	71	71	57	796	0.52	a
11	310.01	621.09	98	135	110	1785	1.40	a NET< CL
12	343.50	687.98	68	79	64	920	0.83	a
13	391.70	784.25	321	83	62	870	0.89	a
14	440.45	881.61	34	66	53	704	0.65	a NET< CL
15	661.69	1323.50	18314	282	66	848	1.48	a HiResid
16	898.07	1795.62	268	91	70	958	1.42	a
17	946.24	1891.83	61	68	55	741	0.94	a
18	1173.32	2345.38	16627	266	55	554	1.91	a HiResid
19	1332.55	2663.40	15282	250	28	139	2.14	a HiResid
20	1836.26	3669.47	159	31	14	36	2.09	a

090404D04.SPC Analyzed by

SEEKER B A C K G R O U N D S U B T R A C T R E S U L T S Vers. 2.2.1

Paragon Analytics, Div. of DataChem Lab
GammaScan

Background File: DET040306.BKG (090306-4 WEEKLY BKG)

Bkg.File Detector #: 4

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BACKGROUND SUBTRACT RESULTS

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PK#	ENERGY (keV)	OLD NET COUNTS	OLD UN- CERTAINTY	OLD CR.LEVEL	NEW NET COUNTS	NEW UN- CERTAINTY	NEW CR.LEVEL	FLAG
3	87.93	15716	287	114	15714	287	115	
4	93.67	11	77	63	-6	78	64	NET<CL
10	238.99	71	71	57	61	71	57	
16	898.07	268	91	70	267	91	70	

Paragon Analytics, Div. of DataChem Lab
 GammaScan

Geo 13 / Solid

Sample ID: 0913512-4 GEO 13 LCS VER (829)

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Sampling Start: 01/01/2007 10:00:00 | Counting Start: 03/11/2009 14:13:36
Sampling Stop: 01/01/2007 10:00:00 | Decay Time. . . . . 1.92e+04 Hrs
Buildup Time. . . . . 0.00e+000 Hrs | Live Time . . . . . 1800 Sec
Sample Size . . . . . 5.00e+002 g | Real Time . . . . . 1851 Sec
Collection Efficiency . . . . . 1.0000 | Spectrum File . . . . . 090404D04.SPC
Cr. Level Confidence Interval: 95 % | Det. Limit Confidence Interval: 95 %
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Detector #: 4 (Detector 4)

Efficiency File: (D04)(Sh13).BPF (Geo. 13)

Eff.=1/[2.81E-03*En^-3.92E+00 + 1.63E+02*En^8.04E-01] 03/11/2009

Library File:ANALYTICAL.LIB (Analytical)

MEASURED or MDA CONCENTRATIONS

Nuclide	ENERGY E (keV)	N T	Concentration (pCi/g)	MDA	Critical Level	Halflife (hrs)
Am-241	59.54	1.96E+02	+ - 4.16E+00	3.53E+00	1.74E+00	3.79E+06
Cd-109	88.02	2.66E+03	+ - 4.86E+01	3.93E+01	1.94E+01	1.11E+04
Co-57	122.07	6.23E+01	+ - 2.09E+00	2.10E+00	1.04E+00	6.50E+03
Ce-139	165.85	8.89E+01	+ - 1.07E+01	1.52E+01	7.50E+00	3.30E+03
Sn-113	391.68	1.42E+02	+ - 3.67E+01	5.57E+01	2.73E+01	2.76E+03
Cs-137	661.62	7.96E+01	+ - 1.23E+00	5.86E-01	2.87E-01	2.64E+05
Y-88	Average:x	2.32E+02	+ - 3.90E+01	. . . . .	. . . . .	2.56E+03
	898.02	2.33E+02	+ - 8.00E+01	1.25E+02	6.15E+01	2.56E+03
	1836.01	2.32E+02	+ - 4.46E+01	4.55E+01	2.08E+01	2.56E+03
Co-60	Average:x	1.25E+02	+ - 1.43E+00	. . . . .	. . . . .	4.62E+04
	1173.21	1.24E+02	+ - 1.98E+00	8.35E-01	4.08E-01	4.62E+04
	1332.48	1.26E+02	+ - 2.06E+00	4.83E-01	2.31E-01	4.62E+04
Hg-203	279.18	MDA	. . . . .	6.05E+04	2.98E+04	1.12E+03

MEASURED TOTAL: 3.59E+03 +- 1.44E+02 pCi/g

UNKNOWN, SUM or ESCAPE PEAKS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	49.59	100.94	124	144	117	2768	0.77	Unknown
4	93.67	188.99	-6	78	64	992	0.41	Deleted
5	102.85	207.31	94	82	65	1051	0.42	Unknown

090404D04.SPC Analyzed by

=====

UNKNOWN, SUM or ESCAPE PEAKS

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PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
7	136.49	274.52	675	106	76	1267	0.72	Unknown
8	147.72	296.93	47	76	62	933	0.45	Deleted
10	238.99	479.23	61	71	57	796	0.52	Unknown
11	310.01	621.09	98	135	110	1785	1.40	Deleted
12	343.50	687.98	68	79	64	920	0.83	Unknown
14	440.45	881.61	34	66	53	704	0.65	Deleted
17	946.24	1891.83	61	68	55	741	0.94	Unknown

c:\SEEKER\BIN\090404d04.res Analysis Results Saved.

RSO #829
Rec'd 2/5/07
DB

CERTIFICATE OF CALIBRATION
Standard Radionuclide Source

74248A-307

Sand in 16 Ounce PP MRP Jar

Customer: Paragon Analytics / Fort Collins, CO
P.O. No.: 71239, DCB 11/03/06, Item 3
Calibration Date: 01-Jan-2007 12:00 EST Grams of Master Source: 0.01064

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solutions. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytics maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Revision 1, February, 1979, and compliance with ANSI N42.22-1995, "Traceability of Radioactive Sources to NIST."

Nuclide	Gamma-Ray Energy (keV)	Half-Life, Days	Master Source* yps/gram	This Source yps	Uncertainty, %			Calibration Method
					U _k	U _p	U	
Am-241	59.5	157860	—	1.343E+03	0.33	1.46	2.99	4π LS
Cd-109	88.0	462.60	1.777E+05	1.890E+03	0.57	1.70	3.59	HPGe
Co-57	122.1	271.79	9.484E+04	1.009E+03	0.34	1.30	2.69	HPGe
Ce-139	165.9	137.6	1.339E+05	1.424E+03	0.35	1.10	2.31	HPGe
Hg-203	279.2	46.61	2.680E+05	2.851E+03	0.40	1.10	2.34	HPGe
Sn-113	391.7	115.1	1.861E+05	1.979E+03	0.42	1.10	2.35	HPGe
Cs-137	661.7	10983	1.176E+05	1.251E+03	0.70	1.20	2.78	HPGe
Y-88	898.0	106.6	4.568E+05	4.859E+03	0.50	1.10	2.42	HPGe
Co-60	1173.2	1925.4	2.244E+05	2.387E+03	0.60	1.10	2.51	HPGe
Co-60	1332.5	1925.4	2.247E+05	2.390E+03	0.90	1.10	2.84	HPGe
Y-88	1836.1	106.6	4.843E+05	5.151E+03	0.90	1.10	2.84	HPGe

* Master Source refers to Analytics' 8-isotope mixture which is calibrated quarterly.

Calibration Methods: 4π LS - 4 pi Liquid Scintillation Counting, HPGe - High Purity Germanium Gamma-Ray Spectrometer, IC - Ionization Chamber. Uncertainty: U - Relative expanded uncertainty, k = 2. See NIST Technical Note 1297, "Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results."

Comments:
500 grams/290 mL customer supplied sand.
This standard will expire one year after the calibration date.

SOURCE RE-VERIFIED
ON 01/27/09. NEW
EXPIRATION DATE
IS 01/27/10.
MC 02/16/09

Source Prepared by: M. D. Dimitrova
M. D. Dimitrova, Radiochemist

QA Approved: D. M. Montgomery
D. M. Montgomery, QA Manager

Date: 1-30-07

End of Certificate

Corporate Office

Laboratory



Gamma Spectroscopy

Quality Control Data

Weekly Background Calibrations



Gamma Spectrometer Calibration Log

Date: 12-31-09

Reviewed By/Date: JP 1/01/10

Det. No.	Out Of Service	Background		Source Check			Repeat Source Check			
		Started	OK	Started	OK	Failed Parameter(s)	OK	Failed Parameter(s)	Corrective Action Taken **	Removed from Service
1.	MC	/	/	/	/					
2.		JP	JP	MC	MC					
3.		JP	JP	✓	✓					
4.		JP	JP	JP	JP					
5.	MC	/	/	/	/					
6.		JP	JP	MC	MC					
7.		JP	JP	|	|					
8.		JP	JP	|	|					
9.		JP	✱	|	|					
10.		JP	JP	✓	✓					

** Corrective Action:

** Failed 100-150 KeV Bounds Test*

SEEKER G A M M A A N A L Y S I S R E S U L T S PS Version 1.8.4

ALS Laboratory Group - Fort Collins
GammaScan

Weekly Background Check

Sample ID: 091231-2 WEEKLY BKG

```
-----
Sampling Start: 12/31/2009 12:00:00 | Counting Start: 12/31/2009 12:02:16
Sampling Stop: 12/31/2009 12:00:00 | Decay Time. . . . . 3.78E-002 Hrs
Buildup Time. . . . . 0.00E+000 Hrs | Live Time . . . . . 60000 Sec
Sample Size . . . . . 1.00E+000 L | Real Time . . . . . 60101 Sec
Collection Efficiency . . . . . 1.0000 | Spc. File . . . . . 092116D02.SPC
-----
```

Detector #: 2 (Detector 2)

Energy(keV) = -0.58 + 0.501*Ch + 0.00E+00*Ch^2 + 0.00E+00*Ch^3 12/31/2009

FWHM(keV) = 0.69 + 0.006*En + 1.41E-03*En^2 + 0.00E+00*En^3 05/06/2009

Where En = Sqrt(Energy in keV)

Search Sensitivity: 1.00 | Sigma Multiplier: 2.00 | Search Start/End: 80/4000

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PEAK SEARCH RESULTS

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PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	46.69	94.39	57	51	40	401	0.50	a
2	53.71	108.40	33	49	40	385	0.45	a NET< CL
3	63.27	127.48	144	65	50	553	0.59	a HiResid Wide Pk
4	66.37	133.67	165	76	59	692	0.78	b HiResid
5	70.10	141.13	30	122	100	1383	1.65	c NET< CL HiResid
6	74.77	150.45	83	54	42	438	0.43	a
7	76.94	154.79	113	66	51	584	0.73	b
8	84.32	169.52	104	104	84	1038	1.39	a Wide Pk
9	86.98	174.82	50	48	37	346	0.46	b
10	87.60	176.07	24	47	37	346	0.54	c NET< CL
11	92.52	185.89	468	86	61	692	1.06	d
12	112.15	225.08	64	63	50	503	0.81	a
13	139.77	280.24	98	58	45	445	0.59	a
14	185.55	371.65	311	93	71	796	1.24	a
15	198.23	396.96	194	82	64	692	1.13	a
16	238.65	477.67	325	68	47	449	0.85	a
17	241.83	484.01	96	61	47	449	0.88	b
18	295.21	590.59	150	62	47	464	1.04	a
19	338.71	677.46	50	43	34	277	0.65	a
20	351.84	703.67	212	64	47	441	1.21	a
21	511.11	1021.68	1576	123	77	811	2.72	a Wide Pk
22	558.39	1116.09	162	56	41	327	1.49	a

=====

PEAK SEARCH RESULTS

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PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
23	569.91	1139.09	57	45	35	281	0.99	a
24	583.47	1166.16	171	73	56	489	2.34	a
25	597.46	1194.10	85	84	67	693	2.25	a
26	609.44	1218.03	179	72	55	550	1.65	a
27	693.19	1385.24	91	58	45	402	1.58	a
28	803.19	1604.88	125	47	34	234	1.58	a
29	898.75	1795.67	41	45	35	230	2.01	a
30	911.23	1820.59	75	43	32	208	1.71	a
31	1120.08	2237.60	36	31	24	123	1.27	a
32	1461.01	2918.34	160	46	32	149	2.99	a
33	1765.38	3526.07	39	35	27	105	3.07	a

092116D02.SPC Analyzed by

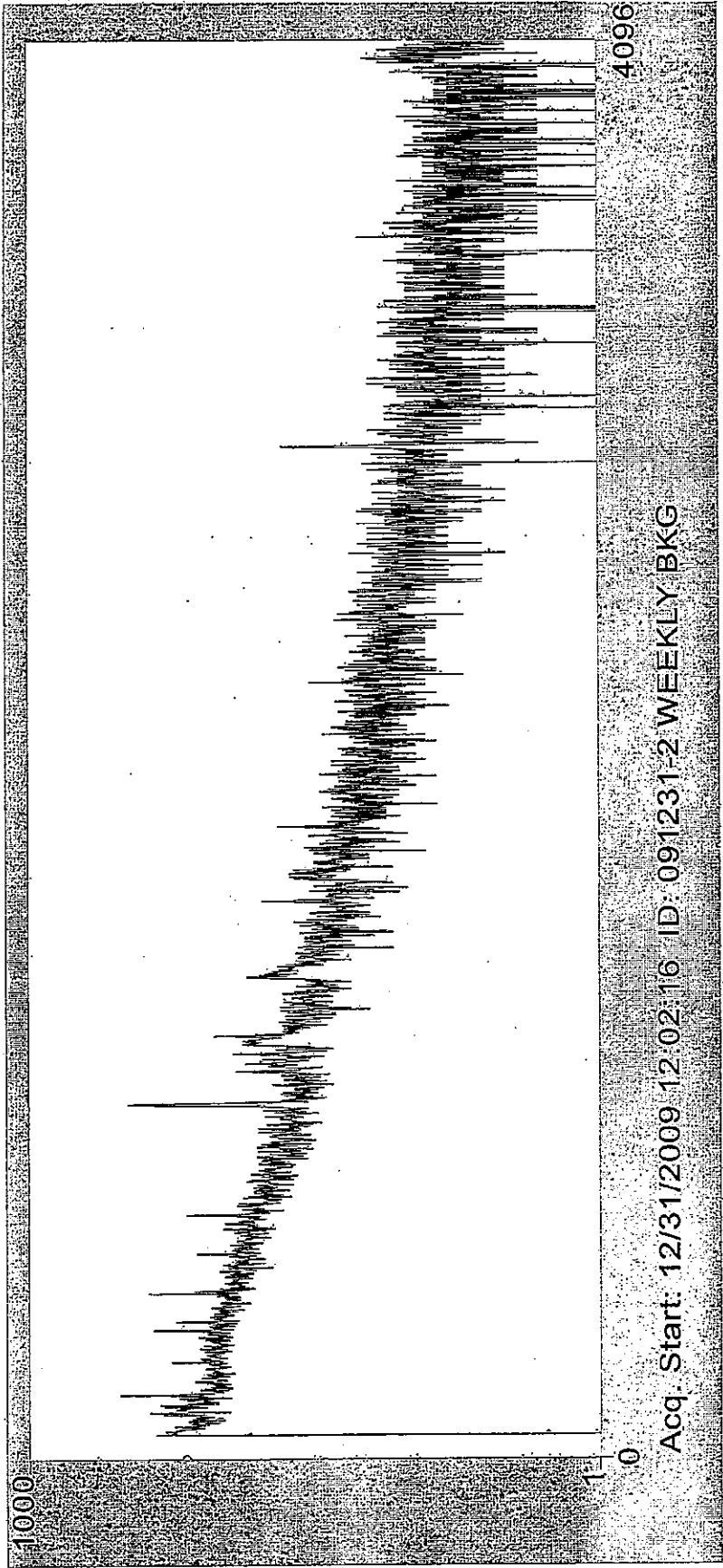
SEEKER B A C K G R O U N D Q . C . A N A L Y S I S V e r s i o n 2 . 2 . 2

ID: 091231-2 WEEKLY BKG

Detector # 2 Background Q.C. Analysis for 12/31/2009 12:02:16

#	Parameter	Value	n Sigma Test	Bounds Test	T-Test
10	50-> 150 keV Bkg	24.588	N.A.	Pass	N.A.
11	150-> 250 keV Bkg	20.326	N.A.	Pass	N.A.
12	250-> 500 keV Bkg	30.455	N.A.	Pass	N.A.
13	500->1000 keV Bkg	32.222	N.A.	Pass	N.A.
14	1000->2000 keV Bkg	17.847	N.A.	Pass	N.A.
15	40-> 50 keV Bkg	2.889	N.A.	Pass	N.A.

Q.C. Results Saved.



 SEEKER G A M M A A N A L Y S I S R E S U L T S PS Version 1.8.4

ALS Laboratory Group - Fort Collins
 GammaScan

Weekly Background Check

Sample ID: 091231-4 WEEKLY BKG

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Sampling Start: 12/31/2009 12:00:00 | Counting Start: 12/31/2009 12:02:24
Sampling Stop: 12/31/2009 12:00:00 | Decay Time. . . . . 4.00E-002 Hrs
Buildup Time. . . . . 0.00E+000 Hrs | Live Time . . . . . 60000 Sec
Sample Size . . . . . 1.00E+000 L | Real Time . . . . . 60101 Sec
Collection Efficiency . . . . . 1.0000 | Spc. File . . . . . 091990D04.SPC
-----
```

Detector #: 4 (Detector 4)

Energy(keV) = -0.86 + 0.501*Ch + 0.00E+00*Ch^2 + 0.00E+00*Ch^3 12/31/2009
 FWHM(keV) = 0.60 + 0.011*En + 1.26E-03*En^2 + -9.06E-06*En^3 01/09/2009
 Where En = Sqrt(Energy in keV)

Search Sensitivity: 1.00 | Sigma Multiplier: 2.00 | Search Start/End: 80/4000

PEAK SEARCH RESULTS

PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN-CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
1	46.29	94.15	118	64	50	546	0.74	a
2	53.16	107.88	72	68	54	588	0.88	a
3	63.32	128.16	177	65	48	521	0.71	a
4	66.31	134.13	150	73	57	652	0.81	b
5	74.76	151.01	161	74	57	663	0.78	a
6	77.02	155.53	138	54	40	398	0.54	b
7	87.03	175.52	30	51	41	409	0.42	a NET< CL
8	92.57	186.58	592	82	55	601	0.87	a
9	99.88	201.18	37	44	35	298	0.41	a
10	139.85	281.00	148	57	43	403	0.67	a
11	143.77	288.82	81	63	50	504	0.84	b
12	163.36	327.95	41	60	48	470	0.81	a NET< CL
13	185.78	372.72	424	79	56	574	1.00	a
14	198.32	397.76	160	68	52	491	1.05	a
15	238.60	478.21	344	69	48	426	0.93	a
16	242.07	485.14	73	47	36	284	0.73	b
17	245.48	491.95	50	46	36	284	0.60	c
18	287.13	575.12	42	51	40	328	0.78	a
19	295.09	591.02	124	53	39	313	0.79	a
20	338.39	677.50	49	40	31	232	0.59	a
21	351.76	704.19	169	51	36	299	0.89	a
22	381.05	762.69	26	46	37	287	0.93	a NET< CL
23	420.85	842.18	36	53	42	327	1.31	a NET< CL
24	510.92	1022.05	1263	109	68	589	2.47	a Wide Pk

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PEAK SEARCH RESULTS

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PK. #	ENERGY (keV)	ADDRESS CHANNEL	NET/MDA COUNTS	UN- CERTAINTY	C.L. COUNTS	BKG COUNTS	FWHM (keV)	FLAG
25	537.50	1075.12	44	42	33	209	1.11	a
26	558.33	1116.72	122	44	31	202	1.03	a
27	569.62	1139.27	62	43	33	224	0.99	a
28	583.01	1166.01	88	49	38	262	1.24	a
29	597.90	1195.74	38	41	32	236	0.74	a
30	609.11	1218.13	142	58	44	351	1.36	a
31	693.10	1385.87	68	50	39	299	1.46	a
32	803.07	1605.49	112	44	31	183	1.62	a
33	911.68	1822.37	17	25	20	89	0.91	a NET< CL
34	961.65	1922.17	46	39	30	172	1.81	a
35	1460.74	2918.87	144	37	23	91	2.24	a

091990D04.SPC Analyzed by

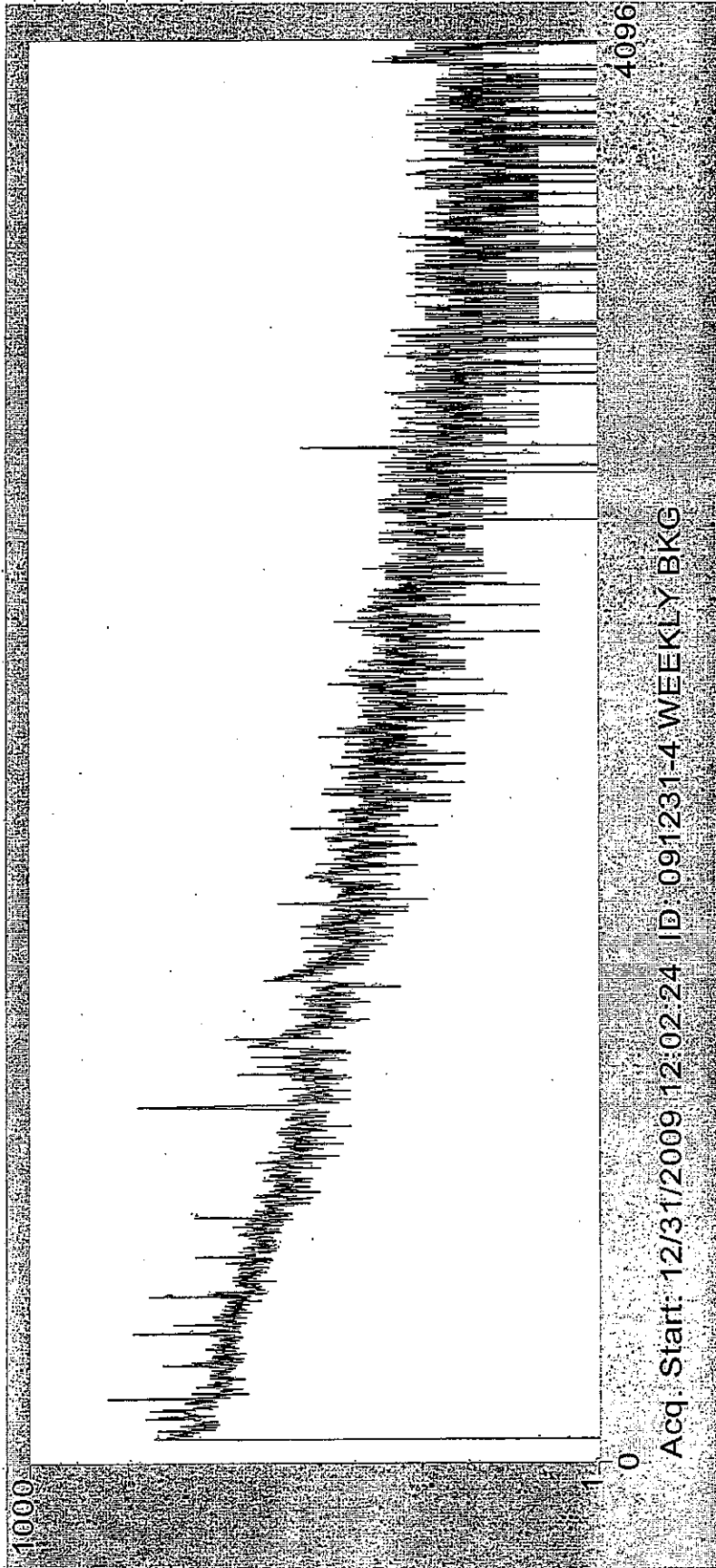
SEEKER B A C K G R O U N D Q . C . A N A L Y S I S Version 2.2.2

ID: 091231-4 WEEKLY BKG

Detector # 4 Background Q.C. Analysis for 12/31/2009 12:02:24

#	Parameter	Value	n Sigma Test	Bounds Test	T- Test
10	50-> 150 keV Bkg	23.580	N.A.	Pass	N.A.
11	150-> 250 keV Bkg	18.028	N.A.	Pass	N.A.
12	250-> 500 keV Bkg	25.853	N.A.	Pass	N.A.
13	500->1000 keV Bkg	26.468	N.A.	Pass	N.A.
14	1000->2000 keV Bkg	14.556	N.A.	Pass	N.A.
15	40-> 50 keV Bkg	3.106	N.A.	Pass	N.A.

Q.C. Results Saved.





Gamma Spectroscopy

Quality Control Data

Daily Instrument Performance Checks

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

PAIIP0720

66354A-307

215 Grams of Sand in Metal Can

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solution sources. The Am-241 was calibrated by 4 pi alpha liquid scintillation counting. All other radionuclides were calibrated using a germanium gamma spectrometer system. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytix maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Rev. 1, February, 1979.

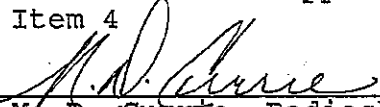
Calibration date: July 1, 2003 12:00 EST

ISOTOPE	GAMMA-RAY ENERGY	HALF-LIFE	GAMMA-RAYS PER SECOND	TOTAL UNCERTAINTY %
Am-241	59.5	432 y	1316	3.0
Cd-109	88	462.6 d	1879	3.3
Co-57	122	271.79 d	1042	2.8
Ce-139	166	137.6 d	1432	2.8
Hg-203	279	46.61 d	3223	2.7
Sn-113	392	115.1 d	1978	2.6
Cs-137	662	30.07 y	1272	3.0
Y-88	898	106.6 d	5106	2.6
Co-60	1173	5.2714 y	2424	2.7
Co-60	1332	5.2714 y	2449	2.6
Y-88	1836	106.6 d	5335	2.6

Approximately 126.5 mL of customer supplied sand.

P O NUMBER EW060303, Item 4

SOURCE PREPARED BY:


 M. D. Currie, Radiochemist

Q A APPROVED:

 8-1-03

This standard will expire one year after the calibration date.

RSO # 767
Rec'd 8/12/04
JJB

1380 Seaboard Industrial Blvd.
Atlanta, Georgia 30318 • U.S.A.

Phone (404) 352-8677
Fax (404) 352-2837



CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

68681-307

215 Grams of Sand in Metal Can

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solution sources. The Am-241 was calibrated by 4 pi alpha liquid scintillation counting. All other radionuclides were calibrated using a germanium gamma spectrometer system. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytical maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Rev. 1, February, 1979.

Calibration date: July 1, 2004 12:00 EST

ISOTOPE	GAMMA-RAY ENERGY	HALF-LIFE	GAMMA-RAYS PER SECOND	TOTAL UNCERTAINTY %
Am-241	59.5	432 y	1355	3.0
Cd-109	88	462.6 d	1900	3.3
Co-57	122	271.79 d	995.1	3.0
Ce-139	166	137.6 d	1411	2.8
Hg-203	279	46.61 d	3241	2.7
Sn-113	392	115.1 d	1939	2.6
Cs-137	662	30.07 y	1247	3.0
Y-88	898	106.6 d	4853	2.6
Co-60	1173	5.2714 y	2457	2.7
Co-60	1332	5.2714 y	2474	2.6
Y-88	1836	106.6 d	5064	2.6

140 mL of customer supplied sand.

P O NUMBER 70564, Item 4

SOURCE PREPARED BY:

M. D. Currie for
M. D. Currie, Radiochemist

Q A APPROVED:

IM [Signature] 8-4-04

This standard will expire one year after the calibration date.

≈ 203µCi

PAID 0636
rec'd 8-02-02
Phone (404) 352-8677
Fax (404) 352-2837

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

64122-307

215 Grams of Sand in Metal Can

This standard radionuclide source was prepared using aliquots measured gravimetrically from master radionuclide solution sources. The Am-241 was calibrated by 4 pi alpha liquid scintillation counting. All other radionuclides were calibrated using a germanium gamma spectrometer system. Calibration and purity were checked using a germanium gamma spectrometer system. At the time of calibration no interfering gamma-ray emitting impurities were detected. The gamma-ray emission rates for the most intense gamma-ray lines are given. Analytix maintains traceability to the National Institute of Standards and Technology through a Measurements Assurance Program as described in USNRC Regulatory Guide 4.15, Rev. 1, February, 1979.

Calibration date: July 1, 2002 12:00 EST

ISOTOPE	GAMMA-RAY ENERGY	HALF-LIFE	GAMMA-RAYS PER SECOND	TOTAL UNCERTAINTY %
Am-241	59.5	432 y	1301	5.0
Cd-109	88	462.6 d	1882	5.0
Co-57	122	271.79 d	994.2	4.7
Ce-139	166	137.6 d	1420	4.3
Hg-203	279	46.61 d	3085	4.1
Sn-113	392	115.1 d	2094	4.1
Cs-137	662	30.07 y	1320	4.8
Y-88	898	106.6 d	4847	4.2
Co-60	1173	5.2714 y	2354	4.1
Co-60	1332	5.2714 y	2382	4.2
Y-88	1836	106.6 d	5068	4.0

Approximately 140 mL customer supplied sand.
P O NUMBER EW060602, Item 4

SOURCE PREPARED BY: M. Taskaeva
M. Taskaeva Radiochemist

Q A APPROVED: Rec'd 7/3/02

This standard will expire one year after the calibration date.

RSO # 720 was opened and split into multiple LSC vials, as shown

720.3020.47	-1	35.8071 g	(Bal 12)
	-2	36.1586 g	
	-3	36.1325	
	-4	36.0040	
	-5	36.4197	
	-6	34.5663	

These will be used as δ daily check sources

[Signature]
10/30/06

Continued on Page _____

Read and Understood By

[Signature]

10/30/06

Signed

Date

Signed

Date

RSO #969 was opened and split into multiple LSC vials, to be used as check sources, as shown

767.3020.48-7	36.6640g	(Bal 12)
↓	8	36.1856g
	9	36.3376g
	10	35.9937g
	11	36.7952g
↓	12	33.1100g
		↓

JRS
10/30/06

Continued on Page _____

[Signature]

10/30/06

Read and Understood By

Signed

Date

Signed

RSO# 636 was opened and split into multiple LSC vials, to be used as daily check sources, as shown

636.3020.49 - 13	34.2237 g	(Bal 12)
↓	14 33.7917	↓
	15 34.6628	
	16 34.1622	
	17 34.2401	
	18 34.6838	

The remaining 9.1386g was transferred to a 200 ml plastic beaker and marked for disposal.

[Signature]
10/30/06

Continued on Page _____

Read and Understood By

[Signature] 10/30/06

Signed

Date

Signed

Date



Gamma Spectrometer Calibration Log

Date: 1/02/10

Reviewed By/Date: JP 1/02/10

Det. No.	Out Of Service	Background		Source Check			Repeat Source Check			
		Started	OK	Started	OK	Failed Parameter(s)	OK	Failed Parameter(s)	Corrective Action Taken **	Removed from Service
1.	JP			/	/					
2.				JP	JP					
3.				JP	JP					
4.				JP	JP					
5.	JP			/	/					
6.				JP	JP					
7.				JP	JP					
8.				JP	JP					
9.				JP	JP					
10.				JP	JP					

** Corrective Action:

100003D02.SPC Analyzed by JP

SEEKER D E T E C T O R Q . C . A N A L Y S I S V e r s i o n 2 . 2 . 2

ID: DAILY CHECK

Detector # 2 Detector Q.C. Analysis for 01/02/2010 10:33:52

Standards File #: 97 (Daily Performance Check(S SOURCES 1-12))

#	Parameter	Value	n Sigma Test	Bounds Test	T-Test
1	60 keV Centroid	119.717	N.A.	Pass	N.A.
2	60 keV FWHM	8.237E-01	N.A.	Pass	N.A.
3	60 keV Efficiency	1.223E-02	N.A.	Pass	N.A.
4	662 keV Centroid	1322.012	N.A.	Pass	N.A.
5	662 keV FWHM	1.780	N.A.	Pass	N.A.
6	662 keV Efficiency	1.839E-02	N.A.	Pass	N.A.
7	1332 keV Centroid	2661.231	N.A.	Pass	N.A.
8	1332 keV FWHM	2.990	N.A.	Pass	N.A.
9	1332 keV Efficiency	8.115E-03	N.A.	Pass	N.A.

100003D04.SPC Analyzed by JP

SEEKER D E T E C T O R Q . C . A N A L Y S I S V e r s i o n 2 . 2 . 2

ID: DAILY CHECK

Detector # 4 Detector Q.C. Analysis for 01/02/2010 10:34:10

Standards File #: 97 (Daily Performance Check(S SOURCES 1-12))

#	Parameter	Value	n Sigma Test	Bounds Test	T-Test
1	60 keV Centroid	120.467	N.A.	Pass	N.A.
2	60 keV FWHM	7.210E-01	N.A.	Pass	N.A.
3	60 keV Efficiency	1.376E-02	N.A.	Pass	N.A.
4	662 keV Centroid	1322.911	N.A.	Pass	N.A.
5	662 keV FWHM	1.448	N.A.	Pass	N.A.
6	662 keV Efficiency	1.637E-02	N.A.	Pass	N.A.
7	1332 keV Centroid	2662.281	N.A.	Pass	N.A.
8	1332 keV FWHM	2.194	N.A.	Pass	N.A.
9	1332 keV Efficiency	7.795E-03	N.A.	Pass	N.A.



Gamma Spectrometer Calibration Log

Date: 1/04/10

Reviewed By/Date: JP 1/04/10

Det. No.	Out Of Service	Background		Source Check			Repeat Source Check			
		Started	OK	Started	OK	Failed Parameter(s)	OK	Failed Parameter(s)	Corrective Action Taken **	Removed from Service
1.	JP			/	/					
2.				JP	JP					
3.				JP	JP					
4.				JP	/	662 FWHM	JP			
5.	JP			/	/					
6.				JP	JP					
7.				JP	JP					
8.				JP	JP					
9.				JP	JP					
10.				JP	JP					

** Corrective Action:

100005D02.SPC Analyzed by JP

SEEKER D E T E C T O R Q . C . A N A L Y S I S V e r s i o n 2 . 2 . 2

ID: DAILY CHECK

Detector # 2 Detector Q.C. Analysis for 01/04/2010 08:16:07

Standards File #: 97 (Daily Performance Check(S SOURCES 1-12))

#	Parameter	Value	n Sigma Test	Bounds Test	T-Test
1	60 keV Centroid	119.825	N.A.	Pass	N.A.
2	60 keV FWHM	7.760E-01	N.A.	Pass	N.A.
3	60 keV Efficiency	1.205E-02	N.A.	Pass	N.A.
4	662 keV Centroid	1322.129	N.A.	Pass	N.A.
5	662 keV FWHM	1.809	N.A.	Pass	N.A.
6	662 keV Efficiency	1.766E-02	N.A.	Pass	N.A.
7	1332 keV Centroid	2661.523	N.A.	Pass	N.A.
8	1332 keV FWHM	2.978	N.A.	Pass	N.A.
9	1332 keV Efficiency	8.287E-03	N.A.	Pass	N.A.

100005D04.SPC Analyzed by JP

SEEKER D E T E C T O R Q . C . A N A L Y S I S V e r s i o n 2 . 2 . 2

ID: DAILY CHECK

Detector # 4 Detector Q.C. Analysis for 01/04/2010 08:16:22

Standards File #: 97 (Daily Performance Check(S SOURCES 1-12))

#	Parameter	Value	n Sigma Test	Bounds Test	T-Test
1	60 keV Centroid	120.482	N.A.	Pass	N.A.
2	60 keV FWHM	6.950E-01	N.A.	Pass	N.A.
3	60 keV Efficiency	1.486E-02	N.A.	Pass	N.A.
4	662 keV Centroid	1322.937	N.A.	Pass	N.A.
5	662 keV FWHM	1.567	N.A.	<FAIL>	N.A.
6	662 keV Efficiency	1.654E-02	N.A.	Pass	N.A.
7	1332 keV Centroid	2662.249	N.A.	Pass	N.A.
8	1332 keV FWHM	2.266	N.A.	Pass	N.A.
9	1332 keV Efficiency	7.046E-03	N.A.	Pass	N.A.

100006D04.SPC Analyzed by JY

SEEKER D E T E C T O R Q . C . A N A L Y S I S Version 2.2.2

ID: DAILY CHECK

Detector # 4 Detector Q.C. Analysis for 01/04/2010 09:01:58

Standards File #: 97 (Daily Performance Check(S SOURCES 1-12))

#	Parameter	Value	n Sigma Test	Bounds Test	T-Test
1	60 keV Centroid	120.410	N.A.	Pass	N.A.
2	60 keV FWHM	6.740E-01	N.A.	Pass	N.A.
3	60 keV Efficiency	1.437E-02	N.A.	Pass	N.A.
4	662 keV Centroid	1322.916	N.A.	Pass	N.A.
5	662 keV FWHM	1.374	N.A.	Pass	N.A.
6	662 keV Efficiency	1.643E-02	N.A.	Pass	N.A.
7	1332 keV Centroid	2662.305	N.A.	Pass	N.A.
8	1332 keV FWHM	2.200	N.A.	Pass	N.A.
9	1332 keV Efficiency	7.062E-03	N.A.	Pass	N.A.



Gamma Spectrometer Calibration Log

Date: 11/5/10

Reviewed By/Date: JP 11/05/10

Det. No.	Out Of Service	Background		Source Check			Repeat Source Check			
		Started	OK	Started	OK	Failed Parameter(s)	OK	Failed Parameter(s)	Corrective Action Taken **	Removed from Service
1.	JP			/	/					
2.				JP	JP					
3.				JP	JP					
4.				JP	JP					
5.	JP			/	/					
6.				JP	JP					
7.				JP	JP					
8.				JP	JP					
9.				JP	JP					
10.				JP	JP					

** Corrective Action:

100011D04.SPC Analyzed by JP

SEEKER D E T E C T O R Q . C . A N A L Y S I S Version 2.2.2

ID: DAILY CHECK

Detector # 4 Detector Q.C. Analysis for 01/05/2010 07:55:17

Standards File #: 97 (Daily Performance Check(S SOURCES 1-12))

#	Parameter	Value	n Sigma Test	Bounds Test	T- Test
1	60 keV Centroid	120.567	N.A.	Pass	N.A.
2	60 keV FWHM	7.128E-01	N.A.	Pass	N.A.
3	60 keV Efficiency	1.396E-02	N.A.	Pass	N.A.
4	662 keV Centroid	1322.926	N.A.	Pass	N.A.
5	662 keV FWHM	1.534	N.A.	Pass	N.A.
6	662 keV Efficiency	1.565E-02	N.A.	Pass	N.A.
7	1332 keV Centroid	2662.446	N.A.	Pass	N.A.
8	1332 keV FWHM	2.234	N.A.	Pass	N.A.
9	1332 keV Efficiency	7.783E-03	N.A.	Pass	N.A.

Gamma Spectroscopy Results

PAI 713 Rev 10

Method Blank Results

Lab Name: ALS Laboratory Group -- FC

Work Order Number: 0912168

Client Name: Cabrera Services Inc.

ClientProject ID: Forest Glen Rad Scoping Survey 08-3800.04

Lab ID: GS091231-1MB

Library: CAB_LIB3_APRF

Sample Matrix: WIPE

Prep SOP: PAI 739 Rev 9

Date Collected: 31-Dec-09

Date Prepared: 31-Dec-09

Date Analyzed: 02-Jan-10

Prep Batch: GS091231-1

QCBatchID: GS091231-1-1

Run ID: GS091231-1A

Count Time: 1000 minutes

Final Aliquot: 1.00 sample

Result Units: pCi/sample

File Name: 100004d04

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
15262-20-1	Ra-228	14 +/- 11	17		U
14391-76-5	Ag-110m	0.4 +/- 2.5	4.3		U
14682-66-7	Al-26	0.2 +/- 3.1	5.3		U
14596-10-2	Am-241	-7 +/- 17	29		U
13966-02-4	Be-7	-7 +/- 19	33		U
14913-49-6	Bi-212	23 +/- 26	43		U
14733-03-0	Bi-214	4 +/- 15	25		U,J
14109-32-1	Cd-109	-3 +/- 52	88		U
13982-30-4	Ce-139	-1.2 +/- 1.6	2.7		U
14762-78-8	Ce-144	0.9 +/- 9.7	16.4		U
14093-03-9	Co-56	1.8 +/- 4.3	7.3		U
13981-50-5	Co-57	0.5 +/- 1.3	2.1		U
13981-38-9	Co-58	-0.6 +/- 2.7	4.6		U
10198-40-0	Co-60	-1.5 +/- 3.1	5.5	0.5	U,M
14392-02-0	Cr-51	21 +/- 18	29		U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU
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.
SQ - Spectral quality prevents accurate quantitation.
SI - Nuclide identification and/or quantitation is tentative.
TI - Nuclide identification is tentative.
R - Nuclide has exceeded 8 half-lives.
M - Requested MDC not met.
B - Analyte concentration greater than MDC.
B3 - Analyte concentration greater than MDC but less than Requested MDC.

Abbreviations:

TPU - Total Propagated Uncertainty
MDC - Minimum Detectable Concentration
BDL - Below Detection Limit

Data Package ID: GSF0912168-1

Gamma Spectroscopy Results

PAI 713 Rev 10

Method Blank Results

Lab Name: ALS Laboratory Group -- FC

Work Order Number: 0912168

Client Name: Cabrera Services Inc.

ClientProject ID: Forest Glen Rad Scoping Survey 08-3800.04

Lab ID: GS091231-1MB

Library: CAB_LIB3_APRF

Sample Matrix: WIPE

Prep SOP: PAI 739 Rev 9

Date Collected: 31-Dec-09

Date Prepared: 31-Dec-09

Date Analyzed: 02-Jan-10

Prep Batch: GS091231-1

QCBatchID: GS091231-1-1

Run ID: GS091231-1A

Count Time: 1000 minutes

Final Aliquot: 1.00 sample

Result Units: pCi/sample

File Name: 100004d04

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
13967-70-9	Cs-134	0.1 +/- 4.8	8.0		U
10045-97-3	Cs-137	-0.6 +/- 2.9	5.0	0.5	U,M
14683-23-9	Eu-152	9 +/- 14	23	1.5	U,M
15585-10-1	Eu-154	13 +/- 15	24		U
14391-16-3	Eu-155	-2.9 +/- 5.8	10.0		U
14596-12-4	Fe-59	-0.1 +/- 4.7	8.1		U
10043-66-0	I-131	0.3 +/- 2.1	3.6		U
13966-00-2	K-40	-6 +/- 74	125		U
13966-31-9	Mn-54	-0.6 +/- 2.9	4.9	0.4	U,M
13966-32-0	Na-22	-1.2 +/- 2.8	4.9		U
14681-63-1	Nb-94	0.5 +/- 3.1	5.3		U
13967-76-5	Nb-95	-0.3 +/- 2.3	4.0		U
15100-28-4	Pa-234m	-150 +/- 460	810		U
15092-94-1	Pb-212	-5.3 +/- 8.4	14.0		U
15067-28-4	Pb-214	-2.9 +/- 9.9	16.6		U,J

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU

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.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 half-lives.

M - Requested MDC not met.

B - Analyte concentration greater than MDC.

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

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: GSF0912168-1

Gamma Spectroscopy Results

PAI 713 Rev 10

Method Blank Results

Lab Name: ALS Laboratory Group -- FC

Work Order Number: 0912168

Client Name: Cabrera Services Inc.

ClientProject ID: Forest Glen Rad Scoping Survey 08-3800.04

Lab ID: GS091231-1MB

Library: CAB_LIB3_APRF

Sample Matrix: WIPE

Prep SOP: PAI 739 Rev 9

Date Collected: 31-Dec-09

Date Prepared: 31-Dec-09

Date Analyzed: 02-Jan-10

Prep Batch: GS091231-1

QCBatchID: GS091231-1-1

Run ID: GS091231-1A

Count Time: 1000 minutes

Final Aliquot: 1.00 sample

Result Units: pCi/sample

File Name: 100004d04

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
13967-48-1	Ru-106	-20 +/- 26	45		U
14683-10-4	Sb-124	-1.8 +/- 3.2	5.5		U
14234-35-6	Sb-125	5.5 +/- 6.5	10.6		U
13967-63-0	Sc-46	-1.7 +/- 2.6	4.6		U
15623-47-9	Th-227	-1 +/- 12	20		U
15065-10-8	Th-234	-10 +/- 83	138	3.5	U,M
14913-50-9	Tl-208	1.2 +/- 6.2	10.4		U
15117-96-1	U-235	14.7 +/- 9.0	16.3	1.3	U,M
13982-39-3	Zn-65	-0.6 +/- 6.1	10.5	1.1	U,M
15237-97-5	Cf-249	0.2 +/- 2.9	4.9		U
13233-32-4	Ra-224	-38 +/- 66	112		U
13982-63-3	Ra-226	-30 +/- 110	180		U
13967-76-2	Sr-85	1.6 +/- 3.3	5.5		U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU

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.

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 half-lives.

M - Requested MDC not met.

B - Analyte concentration greater than MDC.

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

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: GSF0912168-1

Gamma Spectroscopy Results

PAI 713 Rev 10

Laboratory Control Sample(s)

Lab Name: ALS Laboratory Group -- FC

Work Order Number: 0912168

Client Name: Cabrera Services Inc.

ClientProject ID: Forest Glen Rad Scoping Survey 08-3800.04

Lab ID: GS091231-1LCS	Sample Matrix: WIPE	Prep Batch: GS091231-1	Final Aliquot: 1.00 sample
Library: ANALYTICAL.LIB	Prep SOP: PAI 739 Rev 9	QCBatchID: GS091231-1-1	Result Units: pCi/sample
	Date Collected: 31-Dec-09	Run ID: GS091231-1A	File Name: 100009d04
	Date Prepared: 31-Dec-09	Count Time: 30 minutes	
	Date Analyzed: 04-Jan-10		

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
14596-10-2	Am-241	98000 +/- 12000	2000	101000	97.9	85 - 115	P
10198-40-0	Co-60	42300 +/- 5000	200	43400	97.4	85 - 115	P,M3
10045-97-3	Cs-137	37900 +/- 4500	300	37000	102	85 - 115	P,M3

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU

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

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 half-lives.

Data Package ID: GSF0912168-1

Gamma Spectroscopy Results

PAI 713 Rev 10

Duplicate Sample Results (DER)

Lab Name: ALS Laboratory Group -- FC

Work Order Number: 0912168

Client Name: Cabrera Services Inc.

ClientProject ID: Forest Glen Rad Scoping Survey 08-3800.04

Field ID:	SU-ALL-COMP
Lab ID:	0912168-1DUP

Library: CAB_LIB3_APRF

Sample Matrix: WIPE
 Prep SOP: PAI 739 Rev 9
 Date Collected: 18-Dec-09
 Date Prepared: 31-Dec-09
 Date Analyzed: 04-Jan-10

Prep Batch: GS091231-1
 QCBatchID: GS091231-1-1
 Run ID: GS091231-1A
 Count Time: 1000 minutes
 Report Basis: As Received

Final Aliquot: 1.00 sample
 Prep Basis: As Received
 Moisture(%): NA
 Result Units: pCi/sample
 File Name: 100010d04

CASNO	Analyte	Sample				Duplicate			DER	DER Lim	
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC			Flags
15262-20-1	Ra-228	10 +/-	23	37	U	7 +/-	11	18	U	0.133	2
14391-76-5	Ag-110m	-0.1 +/-	2.7	4.6	U	0.5 +/-	2.5	4.3	U	0.158	2
14682-66-7	Al-26	-2.1 +/-	3.5	6.2	U	1.9 +/-	3.1	5.1	U	0.863	2
14596-10-2	Am-241	-7 +/-	19	32	U	3 +/-	16	27	U	0.399	2
13966-02-4	Be-7	-3 +/-	23	40	U	1 +/-	24	40	U	0.129	2
14913-49-6	Bi-212	5 +/-	43	72	U	32 +/-	38	62	U	0.476	2
14733-03-0	Bi-214	1 +/-	15	25	U,J	0 +/-	14	23	U,J	0.0608	2
14109-32-1	Cd-109	-11 +/-	94	157	U	10 +/-	53	89	U	0.196	2
13982-30-4	Ce-139	0.7 +/-	1.7	2.8	U	-0.4 +/-	1.7	2.9	U	0.446	2
14762-78-8	Ce-144	1 +/-	12	19	U	5.4 +/-	10	16.8	U	0.301	2
14093-03-9	Co-56	2.6 +/-	5.6	9.4	U	4.8 +/-	5.1	8.2	U	0.289	2
13981-50-5	Co-57	-0.5 +/-	1.6	2.6	U	0.8 +/-	1.4	2.3	U	0.631	2
13981-38-9	Co-58	0.1 +/-	2.7	4.6	U	0.4 +/-	3.2	5.4	U	0.0716	2
10198-40-0	Co-60	-3.9 +/-	3.4	6.0	U,M	-0.6 +/-	3.1	5.4	U,M	0.729	2
14392-02-0	Cr-51	0 +/-	26	44	U	-26 +/-	27	47	U	0.682	2
13967-70-9	Cs-134	-5.3 +/-	3.2	5.6	U	-1.7 +/-	3.2	5.5	U	0.786	2
10045-97-3	Cs-137	-0.7 +/-	2.9	4.9	U,M	-0.4 +/-	3.0	5.1	U,M	0.0722	2

Comments:

Duplicate 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.
- W - DER is greater than Warning Limit of 1.42
- D - DER is greater than Control Limit of 2
- LT - Result is less than Request MDC, greater than sample specific MDC
- M - Requested MDC not met.
- M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
- L - LCS Recovery below lower control limit.
- H - LCS Recovery above upper control limit.
- P - LCS, Matrix Spike Recovery within control limits.
- N - Matrix Spike Recovery outside control limits

Abbreviations:

- TPU - Total Propagated Uncertainty
- DER - Duplicate Error Ratio
- BDL - Below Detection Limit
- NR - Not Reported

- SQ - Spectral quality prevents accurate quantitation.
- SI - Nuclide identification and/or quantitation is tentative.
- TI - Nuclide identification is tentative.
- R - Nuclide has exceeded 8 half-lives.
- G - Sample density differs by more than 15% of LCS density.

Data Package ID: GSF0912168-1

Gamma Spectroscopy Results

PAI 713 Rev 10

Duplicate Sample Results (DER)

Lab Name: ALS Laboratory Group -- FC

Work Order Number: 0912168

Client Name: Cabrera Services Inc.

ClientProject ID: Forest Glen Rad Scoping Survey 08-3800.04

Field ID:	SU-ALL-COMP
Lab ID:	0912168-1DUP

Library: CAB_LIB3_APRF

Sample Matrix: WIPE
 Prep SOP: PAI 739 Rev 9
 Date Collected: 18-Dec-09
 Date Prepared: 31-Dec-09
 Date Analyzed: 04-Jan-10

Prep Batch: GS091231-1
 QCBatchID: GS091231-1-1
 Run ID: GS091231-1A
 Count Time: 1000 minutes
 Report Basis: As Received

Final Aliquot: 1.00 sample
 Prep Basis: As Received
 Moisture(%): NA
 Result Units: pCi/sample
 File Name: 100010d04

CASNO	Analyte	Sample				Duplicate			DER	DER Lim	
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC			Flags
14683-23-9	Eu-152	-26 +/-	18	32	U,M	4 +/-	14	24	U,M	1.36	2
15585-10-1	Eu-154	-4 +/-	22	37	U	-14 +/-	15	27	U	0.37	2
14391-16-3	Eu-155	0.2 +/-	7.1	11.9	U	2.7 +/-	5.9	9.8	U	0.273	2
14596-12-4	Fe-59	1.6 +/-	6.5	11.0	U	-0.4 +/-	6.2	10.7	U	0.217	2
10043-66-0	I-131	-3.5 +/-	8.6	14.7	U	-0.1 +/-	9.5	16.1	U	0.267	2
13966-00-2	K-40	43 +/-	80	131	U	-39 +/-	75	127	U	0.759	2
13966-31-9	Mn-54	0.5 +/-	3.1	5.2	U,M	-1.3 +/-	4.3	7.3	U,M	0.34	2
13966-32-0	Na-22	0.9 +/-	3.1	5.2	U	-0.7 +/-	2.7	4.8	U	0.394	2
14681-63-1	Nb-94	4.8 +/-	3.1	4.8	U	2.2 +/-	3.2	5.2	U	0.592	2
13967-76-5	Nb-95	-0.6 +/-	2.9	5.0	U	-1.7 +/-	2.9	5.1	U	0.27	2
15100-28-4	Pa-234m	310 +/-	310	500	U	100 +/-	470	800	U	0.366	2
15092-94-1	Pb-212	-2.0 +/-	7.7	12.9	U	-1.6 +/-	8.5	14.1	U	0.0305	2
15067-28-4	Pb-214	-3 +/-	11	18	U,J	2.3 +/-	10	17	U,J	0.323	2
13967-48-1	Ru-106	-6 +/-	28	48	U	-10 +/-	25	44	U	0.0908	2
14683-10-4	Sb-124	0.7 +/-	3.7	6.3	U	4.8 +/-	3.8	6.2	U	0.776	2
14234-35-6	Sb-125	-5.7 +/-	7.1	12.3	U	-2.3 +/-	6.5	11.1	U	0.36	2
13967-63-0	Sc-46	-0.1 +/-	3.0	5.2	U	0.8 +/-	2.9	4.8	U	0.213	2

Comments:

Duplicate 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.
- W - DER is greater than Warning Limit of 1.42
- D - DER is greater than Control Limit of 2
- LT - Result is less than Request MDC, greater than sample specific MDC
- M - Requested MDC not met.
- M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
- L - LCS Recovery below lower control limit.
- H - LCS Recovery above upper control limit.
- P - LCS, Matrix Spike Recovery within control limits.
- N - Matrix Spike Recovery outside control limits

Abbreviations:

- TPU - Total Propagated Uncertainty
- DER - Duplicate Error Ratio
- BDL - Below Detection Limit
- NR - Not Reported
- SQ - Spectral quality prevents accurate quantitation.
- SI - Nuclide identification and/or quantitation is tentative.
- TI - Nuclide identification is tentative.
- R - Nuclide has exceeded 8 half-lives.
- G - Sample density differs by more than 15% of LCS density.

Data Package ID: GSF0912168-1

Gamma Spectroscopy Results

PAI 713 Rev 10

Duplicate Sample Results (DER)

Lab Name: ALS Laboratory Group -- FC

Work Order Number: 0912168

Client Name: Cabrera Services Inc.

ClientProject ID: Forest Glen Rad Scoping Survey 08-3800.04

Field ID: SU-ALL-COMP
Lab ID: 0912168-1DUP
Library: CAB_LIB3_APRF

Sample Matrix: WIPE
Prep SOP: PAI 739 Rev 9
Date Collected: 18-Dec-09
Date Prepared: 31-Dec-09
Date Analyzed: 04-Jan-10

Prep Batch: GS091231-1
QCBatchID: GS091231-1-1
Run ID: GS091231-1A
Count Time: 1000 minutes
Report Basis: As Received

Final Aliquot: 1.00 sample
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/sample
File Name: 100010d04

CASNO	Analyte	Sample				Duplicate				DER	DER Lim
		Result +/-	2 s TPU	MDC	Flags	Result +/-	2 s TPU	MDC	Flags		
15623-47-9	Th-227	-4 +/-	20	34	U	-1 +/-	12	20	U	0.141	2
15065-10-8	Th-234	-31 +/-	88	146	U,M	-14 +/-	83	138	U,M	0.139	2
14913-50-9	Tl-208	-2.1 +/-	7.7	12.8	U	2.2 +/-	6.3	10.5	U	0.427	2
15117-96-1	U-235	7.3 +/-	7.4	12.0	U,M	19.6 +/-	10	15.9	M3,TI	0.965	2
13982-39-3	Zn-65	-2.6 +/-	6.7	11.6	U,M	-2.8 +/-	6.0	10.5	U,M	0.0297	2
15237-97-5	Cf-249	1.9 +/-	2.8	4.6	U	-2.2 +/-	3.0	5.2	U	1.01	2
13233-32-4	Ra-224	4 +/-	43	71	U	-32 +/-	39	68	U	0.624	2
13982-63-3	Ra-226	-10 +/-	110	190	U	-20 +/-	110	180	U	0.0541	2
13967-76-2	Sr-85	0.3 +/-	4.3	7.2	U	1.8 +/-	3.7	6.0	U	0.275	2

Comments:

Duplicate 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.
W - DER is greater than Warning Limit of 1.42
D - DER is greater than Control Limit of 2
LT - Result is less than Request MDC, greater than sample specific MDC
M - Requested MDC not met.
M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
L - LCS Recovery below lower control limit.
H - LCS Recovery above upper control limit.
P - LCS, Matrix Spike Recovery within control limits.
N - Matrix Spike Recovery outside control limits

Abbreviations:

TPU - Total Propagated Uncertainty
DER - Duplicate Error Ratio
BDL - Below Detection Limit
NR - Not Reported
SQ - Spectral quality prevents accurate quantitation.
SI - Nuclide identification and/or quantitation is tentative.
TI - Nuclide identification is tentative.
R - Nuclide has exceeded 8 half-lives.
G - Sample density differs by more than 15% of LCS density.

Data Package ID: GSF0912168-1



Section 4

INDIVIDUAL SAMPLE RESULTS



Gamma Spectroscopy Results

PAI 713 Rev 10

Sample Results

Lab Name: ALS Laboratory Group -- FC

Work Order Number: 0912168

Client Name: Cabrera Services Inc.

ClientProject ID: Forest Glen Rad Scoping Survey 08-3800.04

Field ID: SU-ALL-COMP

Lab ID: 0912168-1

Library: CAB_LIB3_APRF

Sample Matrix: WIPE

Prep SOP: PAI 739 Rev 9

Date Collected: 18-Dec-09

Date Prepared: 31-Dec-09

Date Analyzed: 02-Jan-10

Prep Batch: GS091231-1

QCBatchID: GS091231-1-1

Run ID: GS091231-1A

Count Time: 1000 minutes

Report Basis: As Received

Final Aliquot: 1.00 sample

Prep Basis: As Received

Moisture(%): NA

Result Units: pCi/sample

File Name: 100004d02

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
15262-20-1	Ra-228	10 +/- 23	37		U
14391-76-5	Ag-110m	-0.1 +/- 2.7	4.6		U
14682-66-7	Al-26	-2.1 +/- 3.5	6.2		U
14596-10-2	Am-241	-7 +/- 19	32		U
13966-02-4	Be-7	-3 +/- 23	40		U
14913-49-6	Bi-212	5 +/- 43	72		U
14733-03-0	Bi-214	1 +/- 15	25		U,J
14109-32-1	Cd-109	-11 +/- 94	157		U
13982-30-4	Ce-139	0.7 +/- 1.7	2.8		U
14762-78-8	Ce-144	1 +/- 12	19		U
14093-03-9	Co-56	2.6 +/- 5.6	9.4		U
13981-50-5	Co-57	-0.5 +/- 1.6	2.6		U
13981-38-9	Co-58	0.1 +/- 2.7	4.6		U
10198-40-0	Co-60	-3.9 +/- 3.4	6.0	0.5	U,M
14392-02-0	Cr-51	0 +/- 26	44		U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU

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 - Minimum Detectable Concentration

BDL - Below Detection Limit

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 half-lives.

G - Sample density differs by more than 15% of LCS density.

Data Package ID: GSF0912168-1

Gamma Spectroscopy Results

PAI 713 Rev 10

Sample Results

Lab Name: ALS Laboratory Group -- FC

Work Order Number: 0912168

Client Name: Cabrera Services Inc.

ClientProject ID: Forest Glen Rad Scoping Survey 08-3800.04

Field ID:	SU-ALL-COMP
Lab ID:	0912168-1

Library: CAB_LIB3_APRF

Sample Matrix: WIPE

Prep SOP: PAI 739 Rev 9

Date Collected: 18-Dec-09

Date Prepared: 31-Dec-09

Date Analyzed: 02-Jan-10

Prep Batch: GS091231-1

QCBatchID: GS091231-1-1

Run ID: GS091231-1A

Count Time: 1000 minutes

Report Basis: As Received

Final Aliquot: 1.00 sample

Prep Basis: As Received

Moisture(%): NA

Result Units: pCi/sample

File Name: 100004d02

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
13967-70-9	Cs-134	-5.3 +/- 3.2	5.6		U
10045-97-3	Cs-137	-0.7 +/- 2.9	4.9	0.5	U,M
14683-23-9	Eu-152	-26 +/- 18	32	1.5	U,M
15585-10-1	Eu-154	-4 +/- 22	37		U
14391-16-3	Eu-155	0.2 +/- 7.1	11.9		U
14596-12-4	Fe-59	1.6 +/- 6.5	11.0		U
10043-66-0	I-131	-3.5 +/- 8.6	14.7		U
13966-00-2	K-40	43 +/- 80	131		U
13966-31-9	Mn-54	0.5 +/- 3.1	5.2	0.4	U,M
13966-32-0	Na-22	0.9 +/- 3.1	5.2		U
14681-63-1	Nb-94	4.8 +/- 3.1	4.8		U
13967-76-5	Nb-95	-0.6 +/- 2.9	5.0		U
15100-28-4	Pa-234m	310 +/- 310	500		U
15092-94-1	Pb-212	-2.0 +/- 7.7	12.9		U
15067-28-4	Pb-214	-3 +/- 11	18		U,J

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU

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 - Minimum Detectable Concentration

BDL - Below Detection Limit

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 half-lives.

G - Sample density differs by more than 15% of LCS density.

Data Package ID: GSF0912168-1

Gamma Spectroscopy Results

PAI 713 Rev 10

Sample Results

Lab Name: ALS Laboratory Group -- FC

Work Order Number: 0912168

Client Name: Cabrera Services Inc.

ClientProject ID: Forest Glen Rad Scoping Survey 08-3800.04

Field ID:	SU-ALL-COMP
Lab ID:	0912168-1

Library: CAB_LIB3_APRF

Sample Matrix: WIPE
Prep SOP: PAI 739 Rev 9
Date Collected: 18-Dec-09
Date Prepared: 31-Dec-09
Date Analyzed: 02-Jan-10

Prep Batch: GS091231-1
QCBatchID: GS091231-1-1
Run ID: GS091231-1A
Count Time: 1000 minutes
Report Basis: As Received

Final Aliquot: 1.00 sample
Prep Basis: As Received
Moisture(%): NA
Result Units: pCi/sample
File Name: 100004d02

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
13967-48-1	Ru-106	-6 +/- 28	48		U
14683-10-4	Sb-124	0.7 +/- 3.7	6.3		U
14234-35-6	Sb-125	-5.7 +/- 7.1	12.3		U
13967-63-0	Sc-46	-0.1 +/- 3.0	5.2		U
15623-47-9	Th-227	-4 +/- 20	34		U
15065-10-8	Th-234	-31 +/- 88	146	3.5	U,M
14913-50-9	Tl-208	-2.1 +/- 7.7	12.8		U
15117-96-1	U-235	7.3 +/- 7.4	12.0	1.3	U,M
13982-39-3	Zn-65	-2.6 +/- 6.7	11.6	1.1	U,M
15237-97-5	Cf-249	1.9 +/- 2.8	4.6		U
13233-32-4	Ra-224	4 +/- 43	71		U
13982-63-3	Ra-226	-10 +/- 110	190		U
13967-76-2	Sr-85	0.3 +/- 4.3	7.2		U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU
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 - Minimum Detectable Concentration
BDL - Below Detection Limit

SQ - Spectral quality prevents accurate quantitation.
SI - Nuclide identification and/or quantitation is tentative.
TI - Nuclide identification is tentative.
R - Nuclide has exceeded 8 half-lives.
G - Sample density differs by more than 15% of LCS density.

Data Package ID: GSF0912168-1

Gamma Spectroscopy Results

PAI 713 Rev 10

Sample Duplicate Results

Lab Name: ALS Laboratory Group -- FC

Work Order Number: 0912168

Client Name: Cabrera Services Inc.

ClientProject ID: Forest Glen Rad Scoping Survey 08-3800.04

Field ID:	SU-ALL-COMP
Lab ID:	0912168-1DUP

Library: CAB_LIB3_APRF

Sample Matrix: WIPE
 Prep SOP: PAI 739 Rev 9
 Date Collected: 18-Dec-09
 Date Prepared: 31-Dec-09
 Date Analyzed: 04-Jan-10

Prep Batch: GS091231-1
 QCBatchID: GS091231-1-1
 Run ID: GS091231-1A
 Count Time: 1000 minutes
 Report Basis: As Received

Final Aliquot: 1.00 sample
 Prep Basis: As Received
 Moisture(%): NA
 Result Units: pCi/sample
 File Name: 100010d04

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
15262-20-1	Ra-228	7 +/- 11	18		U
14391-76-5	Ag-110m	0.5 +/- 2.5	4.3		U
14682-66-7	Al-26	1.9 +/- 3.1	5.1		U
14596-10-2	Am-241	3 +/- 16	27		U
13966-02-4	Be-7	1 +/- 24	40		U
14913-49-6	Bi-212	32 +/- 38	62		U
14733-03-0	Bi-214	0 +/- 14	23		U,J
14109-32-1	Cd-109	10 +/- 53	89		U
13982-30-4	Ce-139	-0.4 +/- 1.7	2.9		U
14762-78-8	Ce-144	5.4 +/- 10	16.8		U
14093-03-9	Co-56	4.8 +/- 5.1	8.2		U
13981-50-5	Co-57	0.8 +/- 1.4	2.3		U
13981-38-9	Co-58	0.4 +/- 3.2	5.4		U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

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.

M - The requested MDC was not met.

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

W - DER is greater than Warning Limit of 1.42

D - DER is greater than Control Limit of 2

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halfives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: GSF0912168-1

Gamma Spectroscopy Results

PAI 713 Rev 10

Sample Duplicate Results

Lab Name: ALS Laboratory Group -- FC

Work Order Number: 0912168

Client Name: Cabrera Services Inc.

ClientProject ID: Forest Glen Rad Scoping Survey 08-3800.04

Field ID:	SU-ALL-COMP
Lab ID:	0912168-1DUP

Library: CAB_LIB3_APRF

Sample Matrix: WIPE

Prep SOP: PAI 739 Rev 9

Date Collected: 18-Dec-09

Date Prepared: 31-Dec-09

Date Analyzed: 04-Jan-10

Prep Batch: GS091231-1

QCBatchID: GS091231-1-1

Run ID: GS091231-1A

Count Time: 1000 minutes

Report Basis: As Received

Final Aliquot: 1.00 sample

Prep Basis: As Received

Moisture(%): NA

Result Units: pCi/sample

File Name: 100010d04

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
10198-40-0	Co-60	-0.6 +/- 3.1	5.4	0.5	U,M
14392-02-0	Cr-51	-26 +/- 27	47		U
13967-70-9	Cs-134	-1.7 +/- 3.2	5.5		U
10045-97-3	Cs-137	-0.4 +/- 3.0	5.1	0.5	U,M
14683-23-9	Eu-152	4 +/- 14	24	1.5	U,M
15585-10-1	Eu-154	-14 +/- 15	27		U
14391-16-3	Eu-155	2.7 +/- 5.9	9.8		U
14596-12-4	Fe-59	-0.4 +/- 6.2	10.7		U
10043-66-0	I-131	-0.1 +/- 9.5	16.1		U
13966-00-2	K-40	-39 +/- 75	127		U
13966-31-9	Mn-54	-1.3 +/- 4.3	7.3	0.4	U,M
13966-32-0	Na-22	-0.7 +/- 2.7	4.8		U
14681-63-1	Nb-94	2.2 +/- 3.2	5.2		U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

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.

M - The requested MDC was not met.

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

W - DER is greater than Warning Limit of 1.42

D - DER is greater than Control Limit of 2

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halfives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: GSF0912168-1

Gamma Spectroscopy Results

PAI 713 Rev 10

Sample Duplicate Results

Lab Name: ALS Laboratory Group -- FC

Work Order Number: 0912168

Client Name: Cabrera Services Inc.

ClientProject ID: Forest Glen Rad Scoping Survey 08-3800.04

Field ID:	SU-ALL-COMP
Lab ID:	0912168-1DUP

Library: CAB_LIB3_APRF

Sample Matrix: WIPE

Prep SOP: PAI 739 Rev 9

Date Collected: 18-Dec-09

Date Prepared: 31-Dec-09

Date Analyzed: 04-Jan-10

Prep Batch: GS091231-1

QCBatchID: GS091231-1-1

Run ID: GS091231-1A

Count Time: 1000 minutes

Report Basis: As Received

Final Aliquot: 1.00 sample

Prep Basis: As Received

Moisture(%): NA

Result Units: pCi/sample

File Name: 100010d04

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
13967-76-5	Nb-95	-1.7 +/- 2.9	5.1		U
15100-28-4	Pa-234m	100 +/- 470	800		U
15092-94-1	Pb-212	-1.6 +/- 8.5	14.1		U
15067-28-4	Pb-214	2.3 +/- 10	17		U,J
13967-48-1	Ru-106	-10 +/- 25	44		U
14683-10-4	Sb-124	4.8 +/- 3.8	6.2		U
14234-35-6	Sb-125	-2.3 +/- 6.5	11.1		U
13967-63-0	Sc-46	0.8 +/- 2.9	4.8		U
15623-47-9	Th-227	-1 +/- 12	20		U
15065-10-8	Th-234	-14 +/- 83	138	3.5	U,M
14913-50-9	Tl-208	2.2 +/- 6.3	10.5		U
15117-96-1	U-235	19.6 +/- 10	15.9	1.3	M3,TI
13982-39-3	Zn-65	-2.8 +/- 6.0	10.5	1.1	U,M

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

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.

M - The requested MDC was not met.

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

W - DER is greater than Warning Limit of 1.42

D - DER is greater than Control Limit of 2

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halfives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: GSF0912168-1

Gamma Spectroscopy Results

PAI 713 Rev 10

Sample Duplicate Results

Lab Name: ALS Laboratory Group -- FC

Work Order Number: 0912168

Client Name: Cabrera Services Inc.

ClientProject ID: Forest Glen Rad Scoping Survey 08-3800.04

Field ID:	SU-ALL-COMP
Lab ID:	0912168-1DUP

Library: CAB_LIB3_APRF

Sample Matrix: WIPE

Prep SOP: PAI 739 Rev 9

Date Collected: 18-Dec-09

Date Prepared: 31-Dec-09

Date Analyzed: 04-Jan-10

Prep Batch: GS091231-1

QCBatchID: GS091231-1-1

Run ID: GS091231-1A

Count Time: 1000 minutes

Report Basis: As Received

Final Aliquot: 1.00 sample

Prep Basis: As Received

Moisture(%): NA

Result Units: pCi/sample

File Name: 100010d04

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Requested MDC	Lab Qualifier
15237-97-5	Cf-249	-2.2 +/- 3.0	5.2		U
13233-32-4	Ra-224	-32 +/- 39	68		U
13982-63-3	Ra-226	-20 +/- 110	180		U
13967-76-2	Sr-85	1.8 +/- 3.7	6.0		U

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC or less than the associated TPU.

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.

M - The requested MDC was not met.

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

W - DER is greater than Warning Limit of 1.42

D - DER is greater than Control Limit of 2

SQ - Spectral quality prevents accurate quantitation.

SI - Nuclide identification and/or quantitation is tentative.

TI - Nuclide identification is tentative.

R - Nuclide has exceeded 8 halfives.

G - Sample density differs by more than 15% of LCS density.

Abbreviations:

TPU - Total Propagated Uncertainty

MDC - Minimum Detectable Concentration

BDL - Below Detection Limit

Data Package ID: GSF0912168-1