



Paragon Analytics

Radiochemistry Case Narrative

Isotopic Uranium

New Horizons

CSMRI / 2135

PA WO 0404241

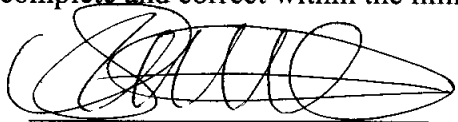
1. This report consists of the analytical results and supporting documentation for six soil samples received by Paragon on 04/23/04.
2. These samples were prepared according to Paragon Analytics procedures PA SOP721R10, PA SOP773R8, and PA SOP778R9. Modifications were made to the method as described on QASS 268110.
3. The samples were analyzed for the presence of isotopic uranium according to Paragon Analytics procedure PA SOP714R8. The analyses were completed on 05/19/04.
4. The isotopic analysis results for these samples are reported on a dry weight basis in units of pCi/gram.
5. This analytical method quantifies U-235 alpha activity in a specific region of interest corresponding to emission energies between those of U-234 and U-238. A potential limitation of this method is that measurable amounts of U-234 in the sample may cause a small amount of characteristic activity in the U-235 region of interest due to poorly resolved alpha activity at the boundary between the two regions. To minimize the potential for a high bias in the U-235 analytical results, the U-235 region of interest has been narrowed and limited to a lower energy region. An 85.1% abundance correction has been made to the final U-235 results.
6. Paragon Analytics follows the convention outlined in ANSI N42.23 for reporting significant digits in the TPU and MDC results. ANSI N42.23 states that the TPU result should be rounded to two significant digits and that the MDC result should be rounded to the same decimal place as the TPU result. In practice, this could result in an MDC result with a reported value of 0 for samples with significant activity, including the batch laboratory control sample.
7. These samples were initially prepared in batch AS040428-5 on 04/28/04. Samples H07 and BB04 (PA IDs 0404241-9 and -12) had chemical recoveries below the 30% lower control limit. This was likely caused by elevated levels of native uranium

000001

present in the samples. Spectral quality was inadequate for accurate quantification of the data in these two samples, as well as in sample H07S (PA ID 0404241-11). These three samples as well as the method blank and laboratory control sample (LCS) were submitted to the preparation lab for a clean-up procedure described on QASS 268168. The samples were then reanalyzed as the same batch ID on 05/16/04. The cleanup procedure provided adequate spectral quality for accurate quantification of the data. However, the chemical recovery of samples 0404241-9 and -11 is below the 30% lower control limit at 26.76% and 28.68% respectively. After the cleanup procedure, the chemical recovery for sample 0404241-12 is within control limits. The method blank and LCS were analyzed and meet all quality control criteria, but due to a reporting limitation, the results are not able to be included in this report. The cleanup results of samples 0404241-9, -11, and -12 are submitted in this report. Please refer to NCR 5663 for further details.

8. U-234 activity is reported in the associated method blank above the minimum detectable concentration value. The measured blank activity is below the requested MDC (0.1 pCi/g). Results are acceptable according to PAI SOP 715, and are submitted without further qualification.
9. No anomalous situations were encountered during the preparation or analysis of these samples. All quality control criteria were met.

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



Skye Dobberstein
Radiochemistry Instrumentation

5/21/04

Date

 FOR JOHN PETROVIC

Radiochemistry Final Data Review

5-21-04

Date

000002

PARAGON ANALYTICS
Radiochemistry Data Package

Section 1

SAMPLE RESULTS
SUMMARY

Isotopic Uranium By Alpha Spectroscopy Sample Results Summary

Client Name: New Horizons
 Client Project Name: CSMRI
 Client Project Number: 2135

Laboratory Name: Paragon Analytix
 PAI Work Order: 0404241

Page: 1 of 2
 Reported on: Friday, May 21, 2004
 9:51:19 AM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0404241-3	BI17	Sample	U-234	1.88 +/- 0.36	0.05	pCi/g	SOIL	AS040428-5	5/10/2004	
0404241-3	BI17	Sample	U-235	0.082 +/- 0.044	0.015	pCi/g	SOIL	AS040428-5	5/10/2004	LT
0404241-3	BI17	Sample	U-238	2.00 +/- 0.38	0.04	pCi/g	SOIL	AS040428-5	5/10/2004	
0404241-5	BI37	Sample	U-234	2.85 +/- 0.50	0.03	pCi/g	SOIL	AS040428-5	5/10/2004	
0404241-5	BI37	Sample	U-235	0.212 +/- 0.073	0.034	pCi/g	SOIL	AS040428-5	5/10/2004	
0404241-5	BI37	Sample	U-238	2.82 +/- 0.50	0.01	pCi/g	SOIL	AS040428-5	5/10/2004	
0404241-7	BI42	Sample	U-234	1.02 +/- 0.21	0.04	pCi/g	SOIL	AS040428-5	5/10/2004	
0404241-7	BI42	Sample	U-235	0.040 +/- 0.029	0.014	pCi/g	SOIL	AS040428-5	5/10/2004	LT
0404241-7	BI42	Sample	U-238	0.98 +/- 0.20	0.03	pCi/g	SOIL	AS040428-5	5/10/2004	

Comments:

Data Package ID: U0404241-1

Qualifiers/Flags:

- U - Result is less than the sample specific MDC.
- LT - Result is less than Requested MDC, greater than sample specific MDC.
- Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
- Y2 - Chemical Yield outside default limits.
- M - The requested MDC was not met.
- M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:

- TPU - Total Propagated Uncertainty (see PAI SOP 743)
- MDC - Minimum Detectable Concentration (see PAI SOP 709)
- BDL - Below Detection Limit

Date Printed: Friday, May 21, 2004

Paragon Analytix
 LIMS Version: 5.018A

Page 1 of 2

000004

Isotopic Uranium By Alpha Spectroscopy Sample Results Summary

Client Name: New Horizons
 Client Project Name: CSMRI
 Client Project Number: 2135

Laboratory Name: Paragon Analytics
 PAI Work Order: 0404241

Page: 2 of 2
 Reported on: Friday, May 21, 2004
 9:51:19 AM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0404241-9	H07	Sample	U-234	58 +/- 10	0	pCi/g	SOIL	AS040428-5	5/19/2004	Y2
0404241-9	H07	Sample	U-235	3.49 +/- 0.71	0.07	pCi/g	SOIL	AS040428-5	5/19/2004	Y2
0404241-9	H07	Sample	U-238	59 +/- 10	0	pCi/g	SOIL	AS040428-5	5/19/2004	Y2
0404241-11	H07S	Sample	U-234	54.2 +/- 9.6	0.1	pCi/g	SOIL	AS040428-5	5/16/2004	Y2
0404241-11	H07S	Sample	U-235	2.44 +/- 0.55	0.03	pCi/g	SOIL	AS040428-5	5/16/2004	Y2
0404241-11	H07S	Sample	U-238	58 +/- 10	0	pCi/g	SOIL	AS040428-5	5/16/2004	Y2
0404241-12	BB04	Sample	U-234	11.1 +/- 1.9	0	pCi/g	SOIL	AS040428-5	5/19/2004	
0404241-12	BB04	Sample	U-235	0.51 +/- 0.15	0.05	pCi/g	SOIL	AS040428-5	5/19/2004	
0404241-12	BB04	Sample	U-238	11.6 +/- 2.0	0	pCi/g	SOIL	AS040428-5	5/19/2004	

Comments:

Data Package ID: U0404241-1

Qualifiers/Flags:

- U - Result is less than the sample specific MDC.
- LT - Result is less than Requested MDC, greater than sample specific MDC.
- Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
- Y2 - Chemical Yield outside default limits.
- M - The requested MDC was not met.
- M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.

Abbreviations:

- TPU - Total Propagated Uncertainty (see PAI SOP 743)
- MDC - Minimum Detectable Concentration (see PAI SOP 709)
- BDL - Below Detection Limit

Date Printed: Friday, May 21, 2004

Paragon Analytics
 LIMS Version: 5.018A

Page 2 of 2

000005

2

PARAGON ANALYTICS
Radiochemistry Data Package

Section 2

**QC RESULTS
SUMMARY**

000006

Isotopic Uranium By Alpha Spectroscopy

PAI 714 Rev 8

Method Blank Results

Lab Name: Paragon Analytics

Work Order Number: 0404241

Client Name: New Horizons

ClientProject ID: CSMRI 2135

Lab ID: AS040428-5MB

Sample Matrix: SOIL
Prep SOP: PAI 778 Rev 9
Date Collected: 28-Apr-04
Date Prepared: 28-Apr-04
Date Analyzed: 10-May-04

Prep Batch: AS040428-5
QCBatchID: AS040428-5-1
Run ID: AS040428-5A
Count Time: 300 minutes

Final Aliquot: 2.00 g
Result Units: pCi/g
File Name: U4285B

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
13966-29-5	U-234	0.046 +/- 0.029	0.027	B3
15117-96-1	U-235	0.011 +/- 0.016	0.028	U
7440-61-1	U-238	0.005 +/- 0.014	0.024	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
U-232	4.272	2.97	pCi/g	69.6	30 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
Y2 - Chemical Yield outside default limits.
LT - Result is less than Requested MDC, greater than sample specific MDC.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)
MDC - Minimum Detectable Concentration (see PAI SOP 709)
BDL - Below Detection Limit

M - Requested MDC not met.
B - Analyte concentration greater than MDC.
B3 - Analyte concentration greater than MDC but less than Requested MDC.

Data Package ID: U0404241-1

Isotopic Uranium By Alpha Spectroscopy

PAI 714 Rev 8

Laboratory Control Sample(s)

Lab Name: Paragon Analytics

Work Order Number: 0404241

Client Name: New Horizons

ClientProject ID: CSMRI 2135

Lab ID: AS040428-5LCS	Sample Matrix: SOIL Prep SOP: PAI 778 Rev 9 Date Collected: 28-Apr-04 Date Prepared: 28-Apr-04 Date Analyzed: 10-May-04	Prep Batch: AS040428-5 QCBatchID: AS040428-5-1 Run ID: AS040428-5A Count Time: 300 minutes	Final Aliquot: 2.00 g Result Units: pCi/g File Name: U4285L
------------------------------	--	---	--

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
13966-29-5	U-234	4.45 +/- 0.73	0.02	4.34	103	82 - 122	P
7440-61-1	U-238	4.51 +/- 0.74	0.01	4.50	100	82 - 122	P

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
U-232	4.272	3.26	pCi/g	76.4	30 - 110 %	

Comments:

Qualifiers/Flags:

- U - Result is less than the sample specific MDC.
- LT - Result is less than Requested MDC, greater than sample specific MDC.
- Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
- Y2 - Chemical Yield outside default limits.
- L - LCS Recovery below lower control limit.
- H - LCS Recovery above upper control limit.
- P - LCS Recovery within control limits.
- M - The requested MDC was not met.
- M3 - The requested MDC was not met, but thereported activity is greater than the reported MDC.

Abbreviations:

- TPU - Total Propagated Uncertainty (see PAI SOP 743)
- MDC - Minimum Detectable Concentration (see PAI SOP 709)

Data Package ID: U0404241-1

Isotopic Uranium By Alpha Spectroscopy

PAI 714 Rev 8

Duplicate Sample Results (DER)

Lab Name: Paragon Analytics

Work Order Number: 0404241

Client Name: New Horizons

ClientProject ID: CSMRI 2135

Field ID: BI42
Lab ID: 0404241-7DUP

Sample Matrix: SOIL
Prep SOP: PAI 778 Rev 9
Date Collected: 19-Apr-04
Date Prepared: 28-Apr-04
Date Analyzed: 10-May-04

Prep Batch: AS040428-5
QCBatchID: AS040428-5-1
Run ID: AS040428-5A
Count Time: 300 minutes
Report Basis: Dry Weight

Final Aliquot: 2.07 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: U42417D

CASNO	Analyte	Sample Result +/- 2 s TPU	Duplicate Result +/- 2 s TPU	DER	Control Limit	Lab Qualifiers
13966-29-5	U-234	1.02 +/- 0.21	0.89 +/- 0.19	0.48	2.13	
15117-96-1	U-235	0.040 +/- 0.029	0.057 +/- 0.036	0.35	2.13	LT
7440-61-1	U-238	0.98 +/- 0.20	1.00 +/- 0.20	0.06	2.13	

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 2.13
- 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 (see PAI SOP 743)
- DER - Duplicate Error Ratio
- BDL - Below Detection Limit
- NR - Not Reported

Data Package ID: U0404241-1

PARAGON ANALYTICS
Radiochemistry Data Package

3

Section 3

**INDIVIDUAL
SAMPLE RESULTS**

000010

Isotopic Uranium By Alpha Spectroscopy

PAI 714 Rev 8 Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0404241
Client Name: New Horizons
ClientProject ID: CSMRI 2135

Field ID: BI17	Sample Matrix: SOIL	Prep Batch: AS040428-5	Final Aliquot: 2.13 g
Lab ID: 0404241-3	Prep SOP: PAI 778 Rev 9	QC Batch ID: AS040428-5-1	Prep Basis: Dry Weight
	Date Collected: 19-Apr-04	Run ID: AS040428-5A	Moisture(%): NA
	Date Prepared: 28-Apr-04	Count Time: 300 minutes	Result Units: pCi/g
	Date Analyzed: 10-May-04	Report Basis: Dry Weight	File Name: U42413

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
13966-29-5	U-234	1.88 +/- 0.36	0.05	
15117-96-1	U-235	0.082 +/- 0.044	0.015	LT
7440-61-1	U-238	2.00 +/- 0.38	0.04	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
U-232	4.014	2.04	pCi/g	50.9	30 - 110 %	

Comments:

Qualifiers/Flags:

- U - Result is less than the sample specific MDC.
- Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
- Y2 - Chemical Yield outside default limits.
- LT - Result is less than Requested MDC, greater than sample specific MDC.
- M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
- M - The requested MDC was not met.

Abbreviations:

- TPU - Total Propagated Uncertainty (see PAI SOP 743)
- MDC - Minimum Detectable Concentration (see PAI SOP 709)
- BDL - Below Detection Limit

Data Package ID: U0404241-1

Isotopic Uranium By Alpha Spectroscopy

PAI 714 Rev 8
Sample Results

Lab Name: Paragon Analytics

Work Order Number: 0404241

Client Name: New Horizons

ClientProject ID: CSMRI 2135

Field ID: BI37
Lab ID: 0404241-5

Sample Matrix: SOIL
Prep SOP: PAI 778 Rev 9
Date Collected: 19-Apr-04
Date Prepared: 28-Apr-04
Date Analyzed: 10-May-04

Prep Batch: AS040428-5
QCBatchID: AS040428-5-1
Run ID: AS040428-5A
Count Time: 300 minutes
Report Basis: Dry Weight

Final Aliquot: 2.03 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: U42415

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
13966-29-5	U-234	2.85 +/- 0.50	0.03	
15117-96-1	U-235	0.212 +/- 0.073	0.034	
7440-61-1	U-238	2.82 +/- 0.50	0.01	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
U-232	4.200	2.61	pCi/g	62.1	30 - 110 %	

Comments:

Qualifiers/Flags:

- U - Result is less than the sample specific MDC.
- Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
- Y2 - Chemical Yield outside default limits.
- LT - Result is less than Requested MDC, greater than sample specific MDC.
- M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
- M - The requested MDC was not met.

Abbreviations:

- TPU - Total Propagated Uncertainty (see PAI SOP 743)
- MDC - Minimum Detectable Concentration (see PAI SOP 709)
- BDL - Below Detection Limit

Data Package ID: U0404241-1

Isotopic Uranium By Alpha Spectroscopy

PAI 714 Rev 8
Sample Results

Lab Name: Paragon Analytics

Work Order Number: 0404241

Client Name: New Horizons

ClientProject ID: CSMRI 2135

Field ID: BI42
Lab ID: 0404241-7

Sample Matrix: SOIL
Prep SOP: PAI 778 Rev 9
Date Collected: 19-Apr-04
Date Prepared: 28-Apr-04
Date Analyzed: 10-May-04

Prep Batch: AS040428-5
QCBatchID: AS040428-5-1
Run ID: AS040428-5A
Count Time: 300 minutes
Report Basis: Dry Weight

Final Aliquot: 2.06 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: U42417

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
13966-29-5	U-234	1.02 +/- 0.21	0.04	
15117-96-1	U-235	0.040 +/- 0.029	0.014	LT
7440-61-1	U-238	0.98 +/- 0.20	0.03	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
U-232	4.148	2.35	pCi/g	56.6	30 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Data Package ID: U0404241-1

Isotopic Uranium By Alpha Spectroscopy

PAI 714 Rev 8

Sample Duplicate Results

Lab Name: Paragon Analytics

Work Order Number: 0404241

Client Name: New Horizons

ClientProject ID: CSMRI 2135

Field ID: BI42	Sample Matrix: SOIL	Prep Batch: AS040428-5	Final Aliquot: 2.07 g
Lab ID: 0404241-7DUP	Prep SOP: PAI 778 Rev 9	QC Batch ID: AS040428-5-1	Prep Basis: Dry Weight
	Date Collected: 19-Apr-04	Run ID: AS040428-5A	Moisture(%): NA
	Date Prepared: 28-Apr-04	Count Time: 300 minutes	Result Units: pCi/g
	Date Analyzed: 10-May-04	Report Basis: Dry Weight	File Name: U42417D

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
13966-29-5	U-234	0.89 +/- 0.19	0.03	
15117-96-1	U-235	0.057 +/- 0.036	0.037	LT
7440-61-1	U-238	1.00 +/- 0.20	0.03	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
U-232	4.129	2.49	pCi/g	60.3	30 - 110 %	

Comments:

Qualifiers/Flags:

- U - Result is less than the sample specific MDC.
- Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.
- Y2 - Chemical Yield outside default limits.
- LT - Result is less than Requested MDC, greater than sample specific MDC.
- 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 2.13

Abbreviations:

- TPU - Total Propagated Uncertainty (see PAI SOP 743)
- MDC - Minimum Detectable Concentration (see PAI SOP 709)
- BDL - Below Detection Limit

Data Package ID: U0404241-1

Isotopic Uranium By Alpha Spectroscopy

PAI 714 Rev 8 Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0404241
Client Name: New Horizons
ClientProject ID: CSMRI 2135

Field ID: H07
Lab ID: 0404241-9

Sample Matrix: SOIL
Prep SOP: PAI 778 Rev 9
Date Collected: 22-Apr-04
Date Prepared: 28-Apr-04
Date Analyzed: 19-May-04

Prep Batch: AS040428-5
QCBatchID: AS040428-5-1
Run ID: AS040428-5A
Count Time: 300 minutes
Report Basis: Dry Weight

Final Aliquot: 2.06 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: UZ42419

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
13966-29-5	U-234	58 +/- 10	0	Y2
15117-96-1	U-235	3.49 +/- 0.71	0.07	Y2
7440-61-1	U-238	59 +/- 10	0	Y2

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
U-232	4.155	1.11	pCi/g	26.8	30 - 110 %	Y2

Comments:

Qualifiers/Flags:

- U - Result is less than the sample specific MDC.
- Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
- Y2 - Chemical Yield outside default limits.
- LT - Result is less than Requested MDC, greater than sample specific MDC.
- M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
- M - The requested MDC was not met.

Abbreviations:

- TPU - Total Propagated Uncertainty (see PAI SOP 743)
- MDC - Minimum Detectable Concentration (see PAI SOP 709)
- BDL - Below Detection Limit

Data Package ID: U0404241-1

Isotopic Uranium By Alpha Spectroscopy

PAI 714 Rev 8
Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0404241
Client Name: New Horizons
ClientProject ID: CSMRI 2135

Field ID: H07S	Sample Matrix: SOIL	Prep Batch: AS040428-5	Final Aliquot: 2.02 g
Lab ID: 0404241-11	Prep SOP: PAI 778 Rev 9	QCBatchID: AS040428-5-1	Prep Basis: Dry Weight
	Date Collected: 22-Apr-04	Run ID: AS040428-5A	Moisture(%): NA
	Date Prepared: 28-Apr-04	Count Time: 300 minutes	Result Units: pCi/g
	Date Analyzed: 16-May-04	Report Basis: Dry Weight	File Name: UC424111

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
13966-29-5	U-234	54.2 +/- 9.6	0.1	Y2
15117-96-1	U-235	2.44 +/- 0.55	0.03	Y2
7440-61-1	U-238	58 +/- 10	0	Y2

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
U-232	4.238	1.22	pCi/g	28.7	30 - 110 %	Y2

Comments:

Qualifiers/Flags:

- U - Result is less than the sample specific MDC.
- Y1 - Chemical Yield is in control at 100-110%. Quantitative Yield is assumed.
- Y2 - Chemical Yield outside default limits.
- LT - Result is less than Requested MDC, greater than sample specific MDC.
- M3 - The requested MDC was not met, but the reported activity is greater than the reported MDC.
- M - The requested MDC was not met.

Abbreviations:

- TPU - Total Propagated Uncertainty (see PAI SOP 743)
- MDC - Minimum Detectable Concentration (see PAI SOP 709)
- BDL - Below Detection Limit

Data Package ID: U0404241-1

Isotopic Uranium By Alpha Spectroscopy

PAI 714 Rev 8 Sample Results

Lab Name: Paragon Analytics

Work Order Number: 0404241

Client Name: New Horizons

ClientProject ID: CSMRI 2135

Field ID: BB04

Lab ID: 0404241-12

Sample Matrix: SOIL

Prep SOP: PAI 778 Rev 9

Date Collected: 16-Apr-04

Date Prepared: 28-Apr-04

Date Analyzed: 19-May-04

Prep Batch: AS040428-5

QCBatchID: AS040428-5-1

Run ID: AS040428-5A

Count Time: 300 minutes

Report Basis: Dry Weight

Final Aliquot: 2.05 g

Prep Basis: Dry Weight

Moisture(%): NA

Result Units: pCi/g

File Name: UZ424112

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
13966-29-5	U-234	11.1 +/- 1.9	0	
15117-96-1	U-235	0.51 +/- 0.15	0.05	
7440-61-1	U-238	11.6 +/- 2.0	0	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
U-232	4.165	1.59	pCi/g	38.1	30 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Data Package ID: U0404241-1

PARAGON ANALYTICS
Radiochemistry Data Package

Section 4

4

RAW DATA

000018

Isotopic Uranium By Alpha Spectroscopy Raw Data Report

Laboratory Name: Paragon Analytics
 PAI Work Order: 0404241

Prep SOP: PAI 778
 Analytical SOP: PAI 714

Reported on: Friday, May 21, 2004
 9:49:38 AM

Sample ID QC Type	Nuclide Type	Sample Date/Time	Prep Batch QC/BatchID	Ingrowth Date / Time	Decay Date/Time	Matrix %Moist.	Samp Alq Analy Alq	Inst ID Det ID	AnRunID File Name	Count Date/Time	Net Cnts Bkg Cnts	BaseEff Bkg(min)	Cnt(Dur)(min) Yield	Activity +/- 2 s TPU	MDC DeclLev	ReportUnits ReportBasis	DER RPD	%Spk Recover	Flags
0404241-3 SMP	U-232 Tracer	4/19/2004 11:00:00 AM	AS040428-5 AS040428-5-1	NA NA	NA NA	SOIL NA	2.13 g 2.13 g	Alpha Spec 15	AS040428-5A U42413	5/10/2004 2:37 PM	868,000 40,000	29.99% 1000	300 50.9%	2.04 0.33	0.04 NA	pCi/g Dry Weight	NA NA	NA NA	
0404241-3 SMP	U-234 Trg. Analyte	4/19/2004 11:00:00 AM	AS040428-5 AS040428-5-1	NA NA	NA NA	SOIL NA	2.13 g 2.13 g	Alpha Spec 15	AS040428-5A U42413	5/10/2004 2:37 PM	405,600 8,000	29.99% 1000	300 50.9%	1.88 0.36	0.05 NA	pCi/g Dry Weight	NA NA	NA NA	
0404241-3 SMP	U-235 Trg. Analyte	4/19/2004 11:00:00 AM	AS040428-5 AS040428-5-1	NA NA	NA NA	SOIL NA	2.13 g 2.13 g	Alpha Spec 15	AS040428-5A U42413	5/10/2004 2:37 PM	15,000 0,000	29.99% 1000	300 50.9%	0.062 0.044	0.015 NA	pCi/g Dry Weight	NA NA	NA LT	
0404241-3 SMP	U-238 Trg. Analyte	4/19/2004 11:00:00 AM	AS040428-5 AS040428-5-1	NA NA	NA NA	SOIL NA	2.13 g 2.13 g	Alpha Spec 15	AS040428-5A U42413	5/10/2004 2:37 PM	432,200 6,000	29.99% 1000	300 50.9%	2.00 0.38	0.04 NA	pCi/g Dry Weight	NA NA	NA NA	
0404241-5 SMP	U-232 Tracer	4/19/2004 2:15:00 PM	AS040428-5 AS040428-5-1	NA NA	NA NA	SOIL NA	2.03 g 2.03 g	Alpha Spec 16	AS040428-5A U42415	5/10/2004 2:37 PM	1025,400 12,000	29.04% 1000	300 62.1%	2.61 0.41	0.03 NA	pCi/g Dry Weight	NA NA	NA NA	
0404241-5 SMP	U-234 Trg. Analyte	4/19/2004 2:15:00 PM	AS040428-5 AS040428-5-1	NA NA	NA NA	SOIL NA	2.03 g 2.03 g	Alpha Spec 16	AS040428-5A U42415	5/10/2004 2:37 PM	697,500 5,000	29.04% 1000	300 62.1%	2.85 0.50	0.03 NA	pCi/g Dry Weight	NA NA	NA NA	
0404241-5 SMP	U-235 Trg. Analyte	4/19/2004 2:15:00 PM	AS040428-5 AS040428-5-1	NA NA	NA NA	SOIL NA	2.03 g 2.03 g	Alpha Spec 16	AS040428-5A U42415	5/10/2004 2:37 PM	44,100 3,000	29.04% 1000	300 62.1%	0.212 0.073	0.034 NA	pCi/g Dry Weight	NA NA	NA NA	
0404241-5 SMP	U-238 Trg. Analyte	4/19/2004 2:15:00 PM	AS040428-5 AS040428-5-1	NA NA	NA NA	SOIL NA	2.03 g 2.03 g	Alpha Spec 16	AS040428-5A U42415	5/10/2004 2:37 PM	690,000 0,000	29.04% 1000	300 62.1%	2.82 0.50	0.01 NA	pCi/g Dry Weight	NA NA	NA NA	
0404241-7 SMP	U-232 Tracer	4/19/2004 3:15:00 PM	AS040428-5 AS040428-5-1	NA NA	NA NA	SOIL NA	2.06 g 2.06 g	Alpha Spec 17	AS040428-5A U42417	5/10/2004 2:38 PM	973,700 41,000	30.21% 1000	300 56.6%	2.35 0.37	0.05 NA	pCi/g Dry Weight	NA NA	NA NA	
0404241-7 SMP	U-234 Trg. Analyte	4/19/2004 3:15:00 PM	AS040428-5 AS040428-5-1	NA NA	NA NA	SOIL NA	2.06 g 2.06 g	Alpha Spec 17	AS040428-5A U42417	5/10/2004 2:38 PM	239,500 5,000	30.21% 1000	300 56.6%	1.02 0.21	0.04 NA	pCi/g Dry Weight	NA NA	NA NA	
0404241-7 SMP	U-235 Trg. Analyte	4/19/2004 3:15:00 PM	AS040428-5 AS040428-5-1	NA NA	NA NA	SOIL NA	2.06 g 2.06 g	Alpha Spec 17	AS040428-5A U42417	5/10/2004 2:38 PM	8,000 0,000	30.21% 1000	300 56.6%	0.040 0.029	0.014 NA	pCi/g Dry Weight	NA NA	NA LT	

Comments:

Data Package ID: U0404241-1

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 2.13
- +- Duplicate RPD not within limits.
- LT - Result is less than Request MDC, greater than sample specific MDC
- * - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
- # - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.

Notes:

- 1) The Tracer results are not yield corrected (i.e. activity measured not activity added).
- 2) Where sample time is not available, 12:00 PM (Mountain) is used for decay correction.

Abbreviations:

- TR - Tracer
- TA - Target Analyte
- TPU - Total Propagated Uncertainty (see PAI SOP 743)
- MDC - Minimum Detectable Concentration (see PAI SOP 709)
- DER - Duplicate Error Ratio
- BDL - Below Detection Limit

00019

Isotopic Uranium By Alpha Spectroscopy Raw Data Report

Laboratory Name: Paragon Analytics
 PAI Work Order: 0404241

Prep SOP: PAI 778
 Analytical SOP: PAI 714

Reported on: Friday, May 21, 2004
 9:49:38 AM

Sample ID QC Type	Nuclide Type	Sample Date/Time	Prep Batch QC Batch ID	Ingrwth Date / Time	Decay Date/Time	Matrix %Moist.	Samp Aliq Analy Aliq	Inst ID Det ID	AnRunID File Name	Count Date/Time	Net Cnts Bkg Cnts	BaseEff Bkg(min)	Yield	Activity +/- 2 s TPU	MDC DeclEv	ReportUnits ReportBasis	DER RPD	%Spk. Recov Flags
0404241-7 SMP	U-238 Trg. Analyte	4/19/2004 3:15:00 PM	AS040428-5 AS040428-5-1	NA NA	NA NA	SOIL NA	2.06 g 2.06 g	17 17	AS040428-5A U42417	5/10/2004 2:38 PM	229,800 4,000	30.21% 1000	300 56.8%	0.98 0.20	0.03 NA	pCi/g Dry Weight	NA NA	NA NA
0404241-7 DUP	U-232 Tracer	4/19/2004 3:15:00 PM	AS040428-5 AS040428-5-1	NA NA	NA NA	SOIL NA	2.07 g 2.07 g	18 18	AS040428-5A U42417D	5/10/2004 2:38 PM	1013,600 28,000	29.54% 1000	300 60.3%	2.49 0.40	0.04 NA	pCi/g Dry Weight	NA NA	NA NA
0404241-7 DUP	U-234 Trg. Analyte	4/19/2004 3:15:00 PM	AS040428-5 AS040428-5-1	NA NA	NA NA	SOIL NA	2.07 g 2.07 g	18 18	AS040428-5A U42417D	5/10/2004 2:38 PM	217,500 5,000	29.54% 1000	300 60.3%	0.89 0.19	0.03 NA	pCi/g Dry Weight	0.48 NA	NA NA
0404241-7 DUP	U-235 Trg. Analyte	4/19/2004 3:15:00 PM	AS040428-5 AS040428-5-1	NA NA	NA NA	SOIL NA	2.07 g 2.07 g	18 18	AS040428-5A U42417D	5/10/2004 2:38 PM	11,800 4,000	29.54% 1000	300 60.3%	0.057 0.036	0.037 NA	pCi/g Dry Weight	0.35 NA	NA LT
0404241-7 DUP	U-238 Trg. Analyte	4/19/2004 3:15:00 PM	AS040428-5 AS040428-5-1	NA NA	NA NA	SOIL NA	2.07 g 2.07 g	18 18	AS040428-5A U42417D	5/10/2004 2:38 PM	244,500 5,000	29.54% 1000	300 60.3%	1.00 0.20	0.03 NA	pCi/g Dry Weight	0.06 NA	NA NA
0404241-9 SMP	U-232 Tracer	4/22/2004 1:00:00 PM	AS040428-5 AS040428-5-1	NA NA	NA NA	SOIL NA	2.06 g 2.06 g	18 18	AS040428-5A U424219	5/19/2004 2:14 PM	473,400 22,000	31.08% 1000	300 26.8%	1.11 0.19	0.03 NA	pCi/g Dry Weight	NA NA	Y2 Y2
0404241-9 SMP	U-234 Trg. Analyte	4/22/2004 1:00:00 PM	AS040428-5 AS040428-5-1	NA NA	NA NA	SOIL NA	2.06 g 2.06 g	18 18	AS040428-5A U424219	5/19/2004 2:14 PM	6606,700 1,000	31.08% 1000	300 26.8%	58 10	0 NA	pCi/g Dry Weight	NA NA	NA Y2
0404241-9 SMP	U-235 Trg. Analyte	4/22/2004 1:00:00 PM	AS040428-5 AS040428-5-1	NA NA	NA NA	SOIL NA	2.06 g 2.06 g	18 18	AS040428-5A U424219	5/19/2004 2:14 PM	338,400 2,000	31.08% 1000	300 26.8%	3.49 0.71	0.07 NA	pCi/g Dry Weight	NA NA	Y2 Y2
0404241-9 SMP	U-238 Trg. Analyte	4/22/2004 1:00:00 PM	AS040428-5 AS040428-5-1	NA NA	NA NA	SOIL NA	2.06 g 2.06 g	18 18	AS040428-5A U424219	5/19/2004 2:14 PM	6753,800 4,000	31.08% 1000	300 26.8%	59 10	0 NA	pCi/g Dry Weight	NA NA	Y2 Y2
0404241-11 SMP	U-232 Tracer	4/22/2004 1:05:00 PM	AS040428-5 AS040428-5-1	NA NA	NA NA	SOIL NA	2.02 g 2.02 g	60 60	UC424111	5/16/2004 2:16 PM	420,400 12,000	25.75% 1000	300 28.7%	1.22 0.21	0.03 NA	pCi/g Dry Weight	NA NA	NA Y2
0404241-11 SMP	U-234 Trg. Analyte	4/22/2004 1:05:00 PM	AS040428-5 AS040428-5-1	NA NA	NA NA	SOIL NA	2.02 g 2.02 g	60 60	UC424111	5/16/2004 2:16 PM	5378,400 2,000	25.75% 1000	300 28.7%	54.2 9.6	0.1 NA	pCi/g Dry Weight	NA NA	NA Y2

Comments:

Data Package ID: U0404241-1

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 2.13
- + - Duplicate RPD not within limits.
- LT - Result is less than Request MDC, greater than sample specific MDC
- * - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
- # - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.
- 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
- NC - Not Calculated for duplicate results less than 5 times MDC
- B - Analyte concentration greater than MDC.
- B3 - Analyte concentration greater than MDC but less than Requested MDC.

Notes:

- 1) The Tracer results are not yield corrected (i.e. activity measured not activity added).
- 2) Where sample time is not available, 12:00 PM (Mountain) is used for decay correction.

Abbreviations:

- TR - Tracer
- TA - Target Analyte
- TPU - Total Propagated Uncertainty (see PAI SOP 743)
- MDC - Minimum Detectable Concentration (see PAI SOP 709)
- DER - Duplicate Error Ratio
- BDL - Below Detection Limit

Isotopic Uranium By Alpha Spectroscopy Raw Data Report

Laboratory Name: Paragon Analytics

Prep SOP: PAI 778

Reported on: Friday, May 21, 2004

PAI Work Order: 0404241

Analytical SOP: PAI 714

9:49:38 AM

Sample ID GC Type	Nuclide Type	Sample Date/Time	Prep Batch QC Batch ID	Ingrrowth Date / Time	Decay Date/Time	Matrix %Moist.	Samp Aliq Analy Aliq	Inst ID Det ID	AnRunID File Name	Count Date/Time	Net Cnts Bkg Cnts	BaseEff Bkg(min)	ConDur(min) Yield	Activity +/- 2 s TPU Dec Lev	ReportUnits ReportBasis	DER RPD	%Spk. Recov Flags
0404241-11 SMP	U-235 Trg. Analyte	4/22/2004 1:05:00 PM	AS040428-5 AS040428-5-1	NA NA	NA NA	SOIL NA	2.02 g 2.02 g	60 60	AS040428-5A UC424111	5/16/2004 2:16 PM	206,000 0,000	25.75% 1000	300 28.7%	2.44 0.55	pCi/g Dry Weight	NA NA	NA Y2
0404241-11 SMP	U-238 Trg. Analyte	4/22/2004 1:05:00 PM	AS040428-5 AS040428-5-1	NA NA	NA NA	SOIL NA	2.02 g 2.02 g	60 60	AS040428-5A UC424111	5/16/2004 2:16 PM	5749,000 0,000	25.75% 1000	300 28.7%	58 10	pCi/g Dry Weight	NA NA	NA Y2
0404241-12 SMP	U-232 Tracer	4/16/2004 1:10:00 PM	AS040428-5 AS040428-5-1	NA NA	NA NA	SOIL NA	2.05 g 2.05 g	19 19	AS040428-5A UZ424112	5/19/2004 2:14 PM	628,300 9,000	29.02% 1000	300 38.1%	1.59 0.26	pCi/g Dry Weight	NA NA	NA NA
0404241-12 SMP	U-234 Trg. Analyte	4/16/2004 1:10:00 PM	AS040428-5 AS040428-5-1	NA NA	NA NA	SOIL NA	2.05 g 2.05 g	19 19	AS040428-5A UZ424112	5/19/2004 2:14 PM	1668,700 1,000	29.02% 1000	300 38.1%	11.1 1.9	pCi/g Dry Weight	NA NA	NA NA
0404241-12 SMP	U-235 Trg. Analyte	4/16/2004 1:10:00 PM	AS040428-5 AS040428-5-1	NA NA	NA NA	SOIL NA	2.05 g 2.05 g	19 19	AS040428-5A UZ424112	5/19/2004 2:14 PM	65,400 2,000	29.02% 1000	300 38.1%	0.51 0.15	pCi/g Dry Weight	NA NA	NA NA
0404241-12 SMP	U-238 Trg. Analyte	4/16/2004 1:10:00 PM	AS040428-5 AS040428-5-1	NA NA	NA NA	SOIL NA	2.05 g 2.05 g	19 19	AS040428-5A UZ424112	5/19/2004 2:14 PM	1753,400 2,000	29.02% 1000	300 38.1%	11.6 2.0	pCi/g Dry Weight	NA NA	NA NA
AS040428-5 MB	Tracer	4/28/2004 7:52:04 AM	AS040428-5 AS040428-5-1	NA NA	NA NA	SOIL NA	2 g 2 g	23 23	AS040428-5A U42858	5/10/2004 2:39 PM	1124,400 12,000	28.40% 1000	300 69.6%	2.97 0.47	pCi/g Dry Weight	NA NA	NA NA
AS040428-5 MB	U-234 Trg. Analyte	4/28/2004 7:52:04 AM	AS040428-5 AS040428-5-1	NA NA	NA NA	SOIL NA	2 g 2 g	23 23	AS040428-5A U42858	5/10/2004 2:39 PM	12,100 3,000	28.40% 1000	300 69.6%	0.046 0.029	pCi/g Dry Weight	NA NA	B3
AS040428-5 MB	U-235 Trg. Analyte	4/28/2004 7:52:04 AM	AS040428-5 AS040428-5-1	NA NA	NA NA	SOIL NA	2 g 2 g	23 23	AS040428-5A U42858	5/10/2004 2:39 PM	2,400 2,000	28.40% 1000	300 69.6%	0.011 0.016	pCi/g Dry Weight	NA NA	U
AS040428-5 MB	U-238 Trg. Analyte	4/28/2004 7:52:04 AM	AS040428-5 AS040428-5-1	NA NA	NA NA	SOIL NA	2 g 2 g	23 23	AS040428-5A U42858	5/10/2004 2:39 PM	1,400 2,000	28.40% 1000	300 69.6%	0.005 0.014	pCi/g Dry Weight	NA NA	U
AS040428-5 LCS	U-232 Tracer	4/28/2004 7:52:04 AM	AS040428-5 AS040428-5-1	NA NA	NA NA	SOIL NA	2 g 2 g	42	AS040428-5A U4285L	5/10/2004 2:40 PM	1389,600 8,000	31.96% 1000	300 76.4%	3.26 0.51	pCi/g Dry Weight	NA NA	NA NA

Comments:

Data Package ID: U0404241-1

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 2.13
- +- Duplicate RPD not within limits.
- LT - Result is less than Request MDC, greater than sample specific MDC
- * - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
- # - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.
- 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.
- NC - Not Calculated for duplicate results less than 5 times MDC
- B - Analyte concentration greater than MDC.
- B3 - Analyte concentration greater than MDC but less than Requested MDC.
- Notes:
 - 1) The Tracer results are not yield corrected (i.e. activity measured not activity added).
 - 2) Where sample time is not available, 12:00 PM (Mountain) is used for decay correction.
- Abbreviations:
 - TR - Tracer
 - TA - Target Analyte
 - TPU - Total Propagated Uncertainty (see PAI SOP 743)
 - MDC - Minimum Detectable Concentration (see PAI SOP 709)
 - DER - Duplicate Error Ratio
 - BDL - Below Detection Limit

Isotopic Uranium By Alpha Spectroscopy Raw Data Report

Laboratory Name: Paragon Analytics
 PAJ Work Order: 0404241

Prep SOP: PAI 778
 Analytical SOP: PAI 714

Reported on: Friday, May 21, 2004
 9:49:38 AM

Sample ID QC Type	Nuclide Type	Sample Date/Time	Prep Batch QC Batch ID	Ingrowth Date / Time	Decay Date/Time	Matrix %Moist.	Samp. Aliq Analy Aliq	Inst ID Det ID	AnRunID File Name	Count Date/Time	Net Cnts Bkg Cnts	BaseEff Bkg(min)	CntDur(min) Yield	Activity +/- 2 s TPU	MDC DeclLev	ReportUnits ReportBasis	DER RPD	%Spk. Recov Flags
AS040428-5 LCS	U-234 Trg. Analyte	4/28/2004 7:52:04 AM	AS040428-5	NA	NA	SOIL NA	2 g 2 g	Alpha Spec 42	AS040428-5A U4285L	5/10/2004 2:40 PM	1448.100 3.000	31.96% 1000	300 76.4%	4.45 0.73	0.02 NA	pCi/g Dry Weight	NA NA	103 P
AS040428-5 LCS	U-238 Trg. Analyte	4/28/2004 7:52:04 AM	AS040428-5	NA	NA	SOIL NA	2 g 2 g	Alpha Spec 42	AS040428-5A U4285L	5/10/2004 2:40 PM	1468.000 0.000	31.96% 1000	300 76.4%	4.51 0.74	0.01 NA	pCi/g Dry Weight	NA NA	100 P

Comments:

Data Package ID: U0404241-1

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 2.13
- +- Duplicate RPD not within limits.
- LT - Result is less than Request MDC, greater than sample specific MDC
- * - Aliquot Basis is 'As Received' while the Report Basis is 'Dry Weight'.
- # - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Received'.

Notes:

- 1) The Tracer results are not yield corrected (i.e. activity measured not activity added).
- 2) Where sample time is not available, 12:00 PM (Mountain) is used for decay correction.

Abbreviations:

- TR - Tracer
- TA - Target Analyte
- TPU - Total Propagated Uncertainty (see PAI SOP 743)
- MDC - Minimum Detectable Concentration (see PAI SOP 709)
- DER - Duplicate Error Ratio
- BDL - Below Detection Limit

Date Printed: Friday, May 21, 2004

Paragon Analytics
 LIMS Version: 5.018A

00022

Paragon Analytics

Alpha Spectroscopy Analysis

Report Printed:
5/11/04 3:57:50 PM

Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0404241-3 UAS040428-5

Analysis Type: Uranium Default

Detector: MCB 2 Input 7

Date/Time of Count: 5/10/04 2:37:37 PM

Sample Volume: 2.129 Total, 2.129 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: **50.84%**

Real Time: 300.01 Minutes

Total Eff.: 15.25 %

Dead Time: 0.0 %

Tracer Amount: 18.976 DPM.

Acquisition: 512 Channels

Efficiency: 29.99%

Analysis: Relative Region-Of-Interest

Original: 3,029 + 9.9308 * Chn + -0.00052 * Chn **2.

Spectrum Calibration: 3,029 + 10.0273 * Chn + -0.00052 * Chn **2.

Cal File:

Spectrum File: C:\User\Alpha\ALPHA\U42413.SPC

Background File: C:\USER\ALPHA\BKGND\B4050415.SPC

Library File: C:\User\Alpha\ALPHA\VIS.ALB

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	117.19	94	122	4.00	49.00	434.00	1.80	432.20	9.45
2	175.70	153	181	6.00	39.00	408.00	2.40	405.60	8.87
3	137.70	123	139	2.00	3.00	15.00	0.00	15.00	0.33
Tracer	231.25	212	239	8.00	79.00	880.00	12.00	868.00	18.98

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	U-238	4197.00	39.62	2.000	n/a	9.45 %
2	U-234	4774.80	59.06	1.877	n/a	9.76 %
3	U-235	4400.00	19.77	0.069	n/a	50.61 %
Tracer	U-232	5320.00	78.29	4.016	n/a	6.61 %

Totals

		% Total
Gross Count:	1,939.00	100.00
Net Area:	1,807.90	93.24
Background:	131.10	6.76
Composite Fit:	1,737.00	89.58
Residuals:	202.00	10.42

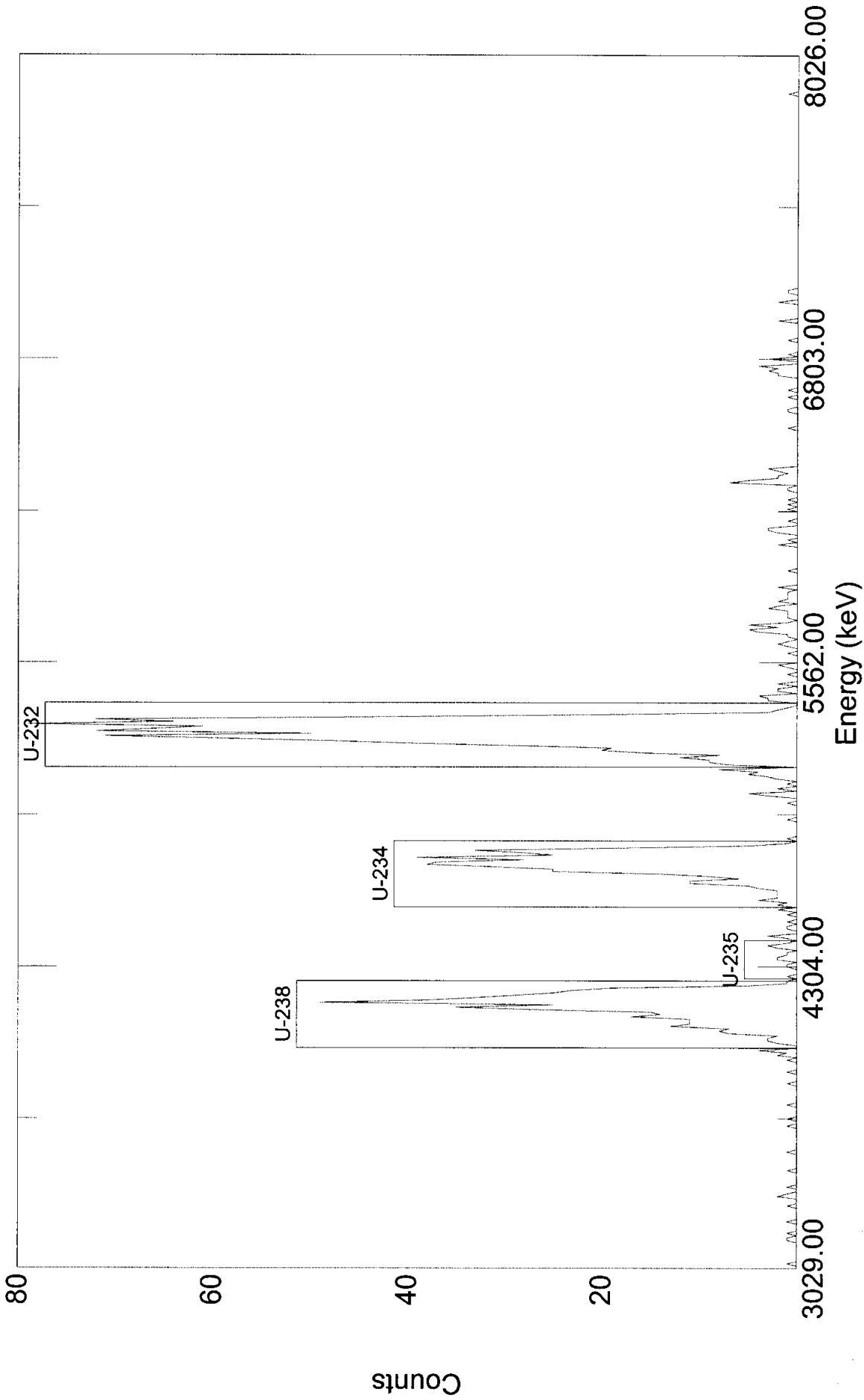
Analyzed By: *Sm JP*

Checked By: _____

000023

U42413

AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 14:37:37 on 10-May-2004
File: C:\User\Alpha\ALPHA\U42413.SPC
Sample: 0404241-3 UAS040428-5
Real Time: 18000.30 s. Live Time: 18000.00 s.
Detector: #15 MCB 2 Input 7
Type: Uranium Default

720000

Paragon Analytics

Alpha Spectroscopy Analysis

Report Printed:

5/11/04 4:00:17 PM

Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0404241-5 UAS040428-5

Analysis Type: Uranium Default

Detector: MCB 2 Input 8

Date/Time of Count: 5/10/04 2:37:56 PM

Sample Volume: 2.035 Total, 2.035 Aliquot.

Live Time: 300.00 Minutes

Chem. Yield: 62.09%

Real Time: 300.01 Minutes

Total Eff.: 18.03 %

Dead Time: 0.0 %

Tracer Amount: 18.976 DPM.

Acquisition: 512 Channels

Efficiency: 29.04%

Analysis: Relative Region-Of-Interest

Original: 3,019 + 10.0498 * Chn + -0.00064 * Chn **2.

Spectrum Calibration: 3,019 + 10.0842 * Chn + -0.00064 * Chn **2.

Cal File:

Spectrum File: C:\User\Alpha\ALPHA\U42415.SPC

Background File: C:\USER\ALPHA\BKGND\B4050416.SPC

Library File: C:\User\Alpha\ALPHA\VIS.ALB

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	117.71	96	124	4.00	54.00	690.00	0.00	690.00	12.76
2	176.10	154	180	6.00	58.00	699.00	1.50	697.50	12.90
3	138.18	125	140	4.00	6.00	45.00	0.90	44.10	0.82
Tracer	231.61	207	238	4.00	90.00	1,030.00	3.60	1026.40	18.98

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	U-238	4197.00	39.73	2.824	n/a	7.46 %
2	U-234	4774.80	59.15	2.855	n/a	7.43 %
3	U-235	4400.00	39.63	0.181	n/a	29.84 %
Tracer	U-232	5320.00	39.15	4.201	n/a	6.11 %

Totals

% Total

Gross Count:	2,805.00	100.00
Net Area:	2,727.90	97.25
Background:	77.10	2.75
Composite Fit:	2,464.00	87.84
Residuals:	341.00	12.16

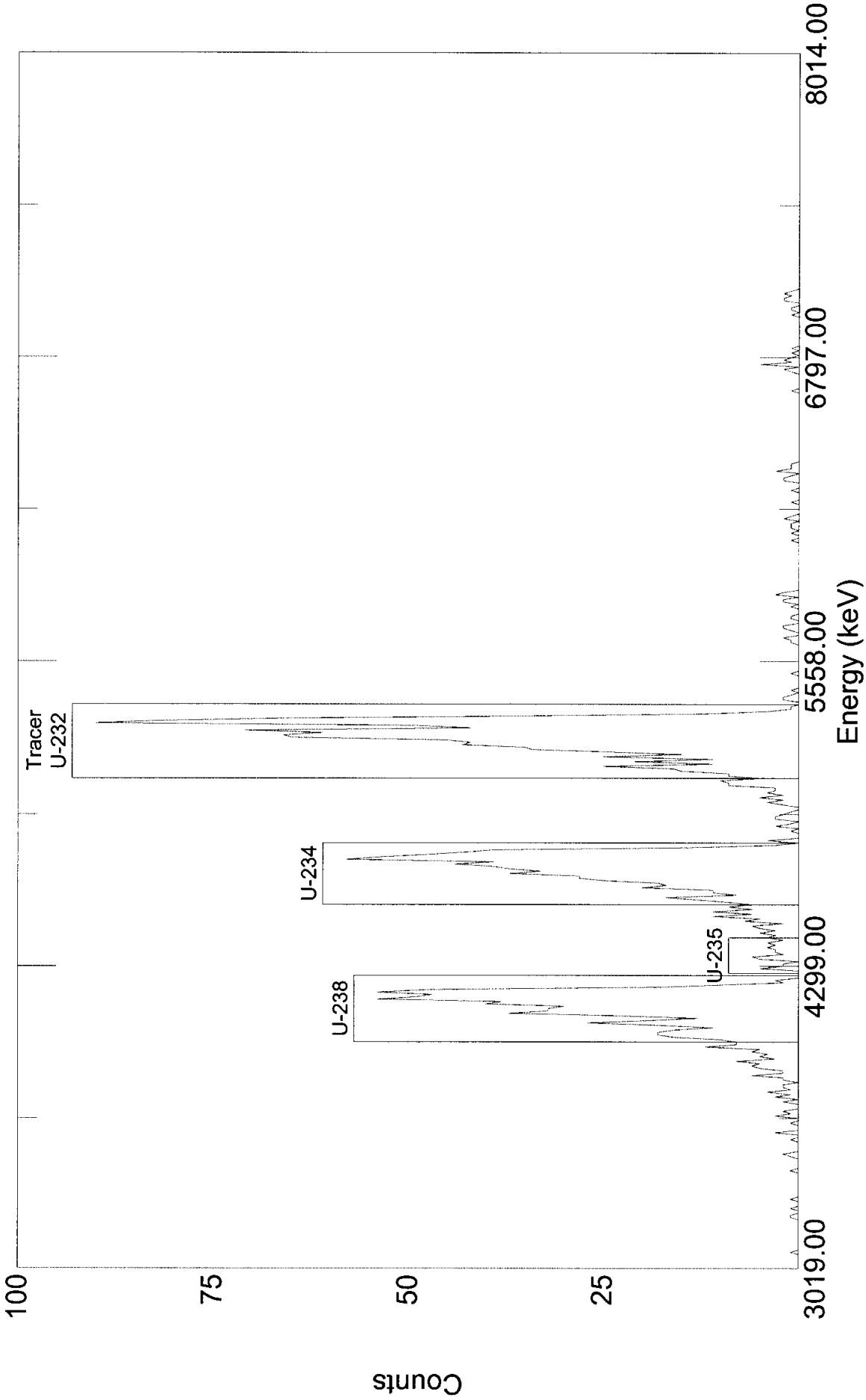
Analyzed By: Sm JP

Checked By: _____

000025

U42415

AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Real Time: 18000.30 s. Live Time: 18000.00 s.
Detector: #16 MCB 2 Input 8
Type: Uranium Default

Acquired: 14:37:56 on 10-May-2004
File: C:\User\Alpha\ALPHA\U42415.SPC
Sample: 0404241-5 UAS040428-5

920000

Paragon Analytics

Alpha Spectroscopy Analysis

Report Printed:
5/11/04 4:02:03 PM
Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0404241-7 UAS040428-5

Analysis Type: Uranium Default

Detector: MCB 3 Input 1

Date/Time of Count: 5/10/04 2:38:14 PM

Sample Volume: 2.060 Total, 2.060 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: 56.62%

Real Time: 300.01 Minutes

Total Eff.: 17.10 %

Dead Time: 0.0 %

Tracer Amount: 18.976 DPM.

Acquisition: 512 Channels

Efficiency: 30.21%

Analysis: Relative Region-Of-Interest

Original: 3,045 + 9.7400 * Chn + -0.00013 * Chn **2.

Spectrum Calibration: 3,045 + 9.8704 * Chn + -0.00013 * Chn **2.

Cal File:

Spectrum File: C:\User\Alpha\ALPHA\U42417.SPC

Background File: C:\USER\ALPHA\BKGND\B4050417.SPC

Library File: C:\User\Alpha\ALPHAVIS.ALB

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	116.85	95	123	6.00	23.00	231.00	1.20	229.80	4.48
2	175.62	155	183	8.00	20.00	241.00	1.50	239.50	4.67
3	137.49	124	139	2.00	2.00	8.00	0.00	8.00	0.16
Tracer	231.15	208	239	10.00	76.00	986.00	12.30	973.70	18.98

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	U-238	4197.00	59.04	0.979	n/a	12.97 %
2	U-234	4774.80	78.60	1.021	n/a	12.71 %
3	U-235	4400.00	19.67	0.034	n/a	69.30 %
Tracer	U-232	5320.00	98.10	4.149	n/a	6.24 %

Totals

		% Total
Gross Count:	1,656.00	100.00
Net Area:	1,535.10	92.70
Background:	120.90	7.30
Composite Fit:	1,466.00	88.53
Residuals:	190.00	11.47

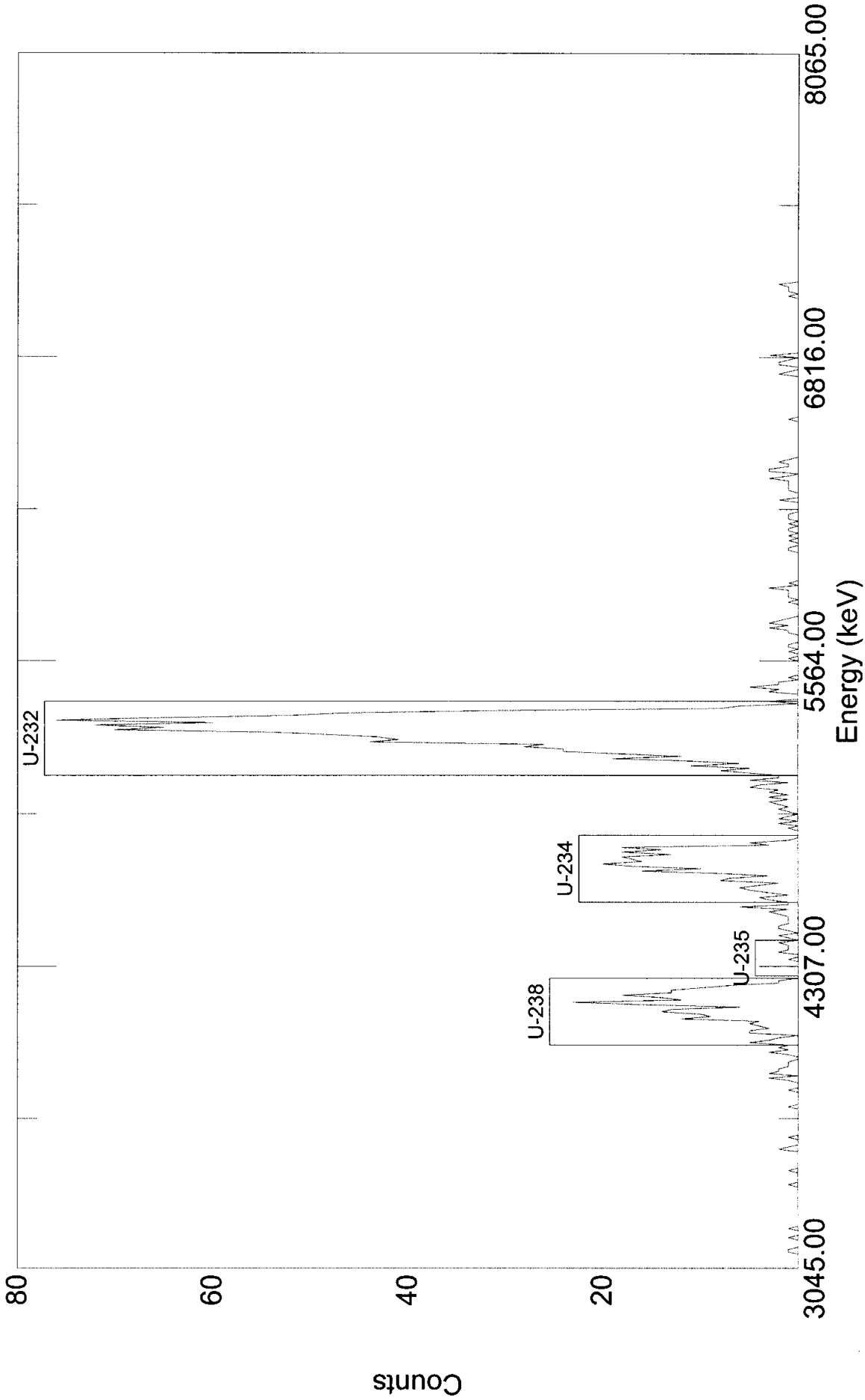
Analyzed By: Sm JP

Checked By: _____

000027

U42417

AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 14:38:14 on 10-May-2004
File: C:\User\Alpha\ALPHA\U42417.SPC
Sample: 0404241-7 UAS040428-5

Real Time: 18000.86 s. Live Time: 18000.00 s.
Detector: #17 MCB 3 Input 1
Type: Uranium Default

820000

Paragon Analytics

Alpha Spectroscopy Analysis

Report Printed:
5/11/04 4:03:21 PM

Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0404241-7D UAS040428-5

Analysis Type: Uranium Default

Detector: MCB 3 Input 2

Date/Time of Count: 5/10/04 2:38:29 PM

Sample Volume: 2.069 Total, 2.069 Aliquot.

Live Time: 300.00 Minutes

Chem. Yield: 60.27%

Real Time: 300.01 Minutes

Total Eff.: 17.80 %

Dead Time: 0.0 %

Tracer Amount: 18.976 DPM.

Acquisition: 512 Channels

Efficiency: 29.54%

Analysis: Relative Region-Of-Interest

Original: 3,055 + 9.7892 * Chn + -0.00024 * Chn **2.

Spectrum Calibration: 3,055 + 9.8423 * Chn + -0.00024 * Chn **2.

Cal File:

Spectrum File: C:\User\Alpha\ALPHA\U42417D.SPC

Background File: C:\USER\ALPHA\BKGND\B4050418.SPC

Library File: C:\User\Alpha\ALPHAVIS.ALB

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	116.35	94	123	4.00	22.00	246.00	1.50	244.50	4.58
2	175.47	154	180	4.00	20.00	219.00	1.50	217.50	4.07
3	137.11	124	140	2.00	3.00	13.00	1.20	11.80	0.22
Tracer	231.41	210	236	6.00	86.00	1,022.00	8.40	1013.60	18.98

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	U-238	4197.00	39.15	0.996	n/a	12.58 %
2	U-234	4774.80	39.04	0.886	n/a	13.34 %
3	U-235	4400.00	19.56	0.048	n/a	60.14 %
Tracer	U-232	5320.00	58.40	4.131	n/a	6.13 %

Totals

		% Total
Gross Count:	1,711.00	100.00
Net Area:	1,615.60	94.42
Background:	95.40	5.58
Composite Fit:	1,500.00	87.67
Residuals:	211.00	12.33

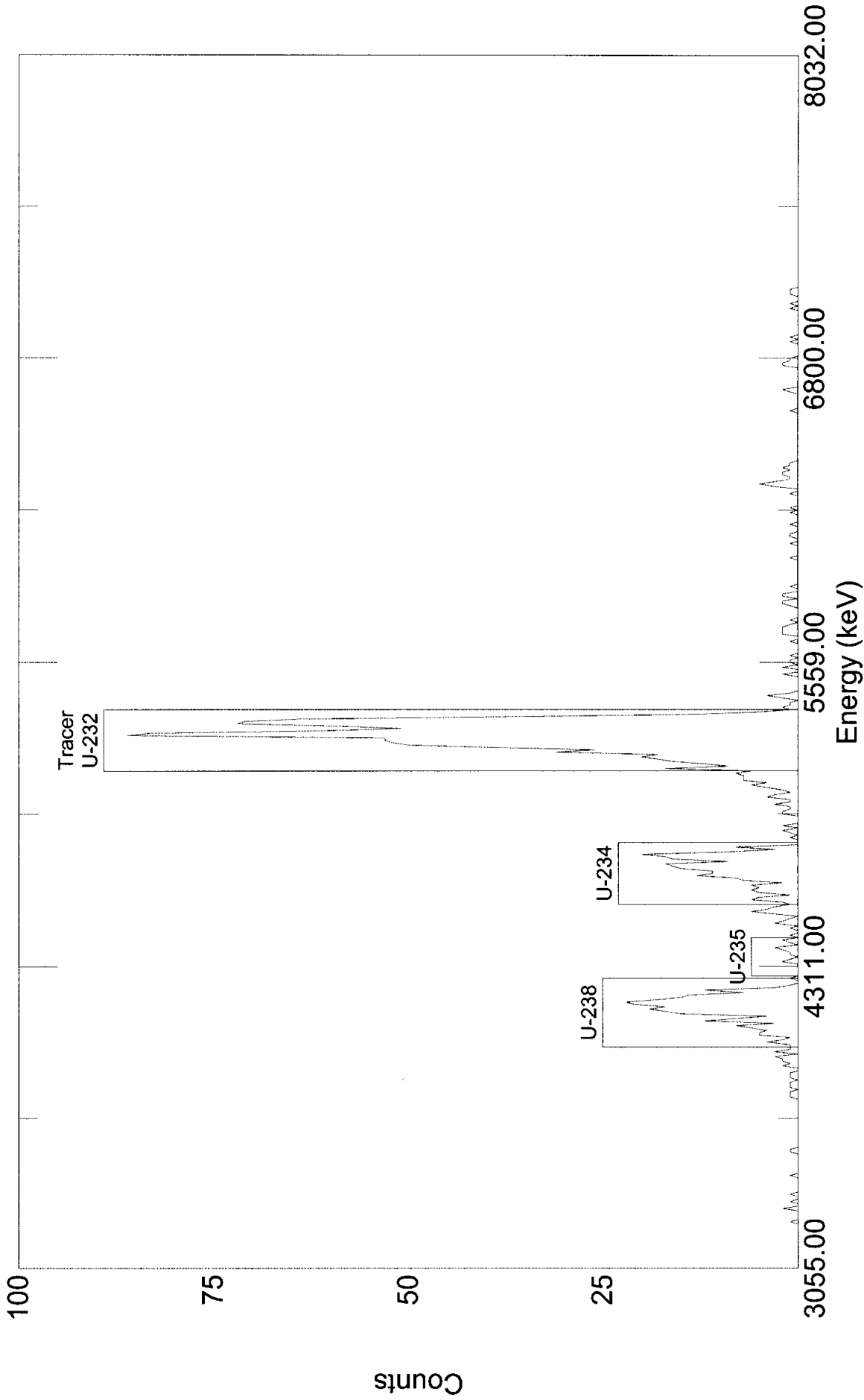
Analyzed By: Sm JP

Checked By: _____

000029

U42417D

AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 14:38:29 on 10-May-2004
File: C:\User\Alpha\ALPHA\U42417D.SPC
Sample: 0404241-7D UAS040428-5

Real Time: 18000.88 s. Live Time: 18000.00 s.
Detector: #18 MCB 3 Input 2
Type: Uranium Default

030000

Paragon Analytics

Alpha Spectroscopy Analysis

Report Printed:
5/20/04 10:30:48 AM

Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0404241-9 UAS040428-5

Analysis Type: Uranium Default

Detector: MCB 3 Input 2

Date/Time of Count: 5/19/04 2:14:16 PM

Sample Volume: 2.056 Total, 2.056 Aliquot.

Live Time: 300.00 Minutes

Chem. Yield: 26.76%

Real Time: 300.01 Minutes

Total Eff.: 8.32 %

Dead Time: 0.0 %

Tracer Amount: 18.976 DPM.

Acquisition: 512 Channels

Efficiency: 31.08%

Analysis: Relative Region-Of-Interest

Original: 3,025 + 10.1587 * Chn + -0.00110 * Chn **2.

Spectrum Calibration: 3,025 + 10.4851 * Chn + -0.00110 * Chn **2.

Cal File:

Spectrum File: C:\User\Alpha\ALPHA\UZ42419.SPC

Background File: C:\USER\ALPHA\BKGND\B4051818.SPC

Library File: C:\User\Alpha\ALPHAVIS.ALB

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	113.15	92	121	10.00	437.00	6,755.00	1.20	6753.80	270.72
2	169.94	150	179	12.00	431.00	6,607.00	0.30	6606.70	264.83
3	133.03	122	140	8.00	29.00	339.00	0.60	338.40	13.56
Tracer	224.19	206	234	12.00	45.00	480.00	6.60	473.40	18.98

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	U-238	4197.00	102.36	59.316	n/a	2.39 %
2	U-234	4774.80	121.33	58.024	n/a	2.41 %
3	U-235	4400.00	81.54	2.972	n/a	10.66 %
Tracer	U-232	5320.00	119.90	4.158	n/a	8.95 %

Totals

% Total

Gross Count:	15,188.00	100.00
Net Area:	15,108.50	99.48
Background:	79.50	0.52
Composite Fit:	14,181.00	93.37
Residuals:	1,007.00	6.63

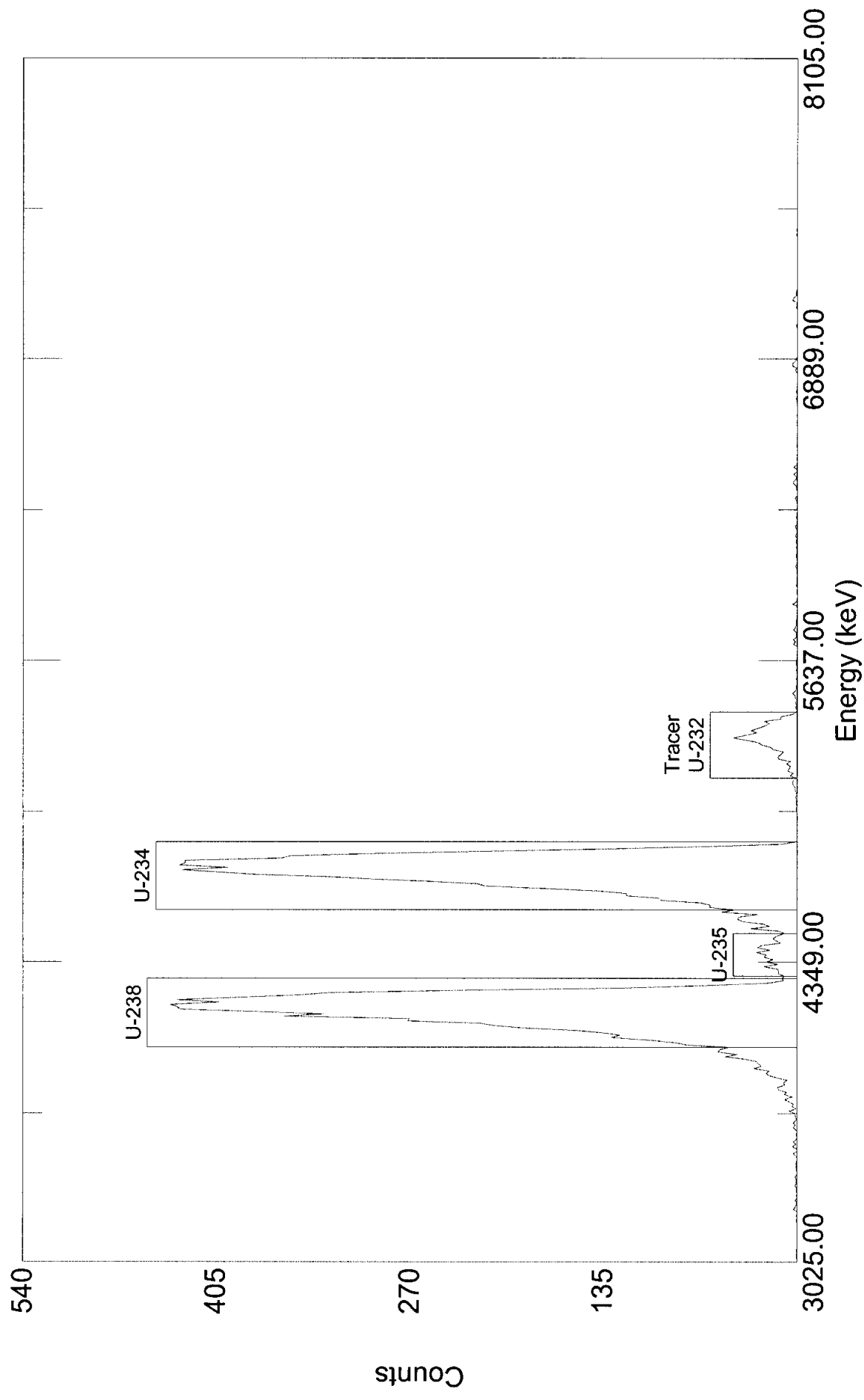
Analyzed By: Sm

Checked By: JP

000031

UZ42419

AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 14:14:16 on 19-May-2004
File: C:\User\Alpha\ALPHA\UZ42419.SPC
Sample: 0404241-9 UAS040428-5

Real Time: 18000.88 s. Live Time: 18000.00 s.
Detector: #18 MCB 3 Input 2
Type: Uranium Default

230002

Paragon Analytics

Alpha Spectroscopy Analysis

Report Printed:
5/17/04 8:51:52 AM

Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0404241-11 UAS040428-5

Analysis Type: Uranium Default

Detector: MCB 8 Input 4

Date/Time of Count: 5/16/04 2:16:48 PM

Sample Volume: 2.016 Total, 2.016 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: 28.68%

Real Time: 300.02 Minutes

Total Eff.: 7.38 %

Dead Time: 0.0 %

Tracer Amount: 18.976 DPM.

Acquisition: 512 Channels

Efficiency: 25.75%

Analysis: Relative Region-Of-Interest

Original: 3,016 + 10.1594 * Chn + -0.00120 * Chn **2.

Spectrum Calibration: 3,016 + 10.2438 * Chn + -0.00120 * Chn **2.

Cal File:

Spectrum File: C:\User\Alpha\ALPHA\UC424111.SPC

Background File: C:\USER\ALPHA\BKGND\B4051160.SPC

Library File: C:\User\Alpha\ALPHAVIS.ALB

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	116.92	94	125	6.00	401.00	5,749.00	0.00	5749.00	259.50
2	175.33	155	183	8.00	349.00	5,379.00	0.60	5378.40	242.77
3	137.35	126	141	10.00	21.00	206.00	0.00	206.00	9.30
Tracer	231.21	208	239	6.00	37.00	424.00	3.60	420.40	18.98

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	U-238	4197.00	59.78	57.982	n/a	2.58 %
2	U-234	4774.80	78.58	54.244	n/a	2.67 %
3	U-235	4400.00	99.14	2.078	n/a	13.66 %
Tracer	U-232	5320.00	58.13	4.240	n/a	9.52 %

Totals

% Total

Gross Count:	12,407.00	100.00
Net Area:	12,375.50	99.75
Background:	31.50	0.25
Composite Fit:	11,758.00	94.77
Residuals:	649.00	5.23

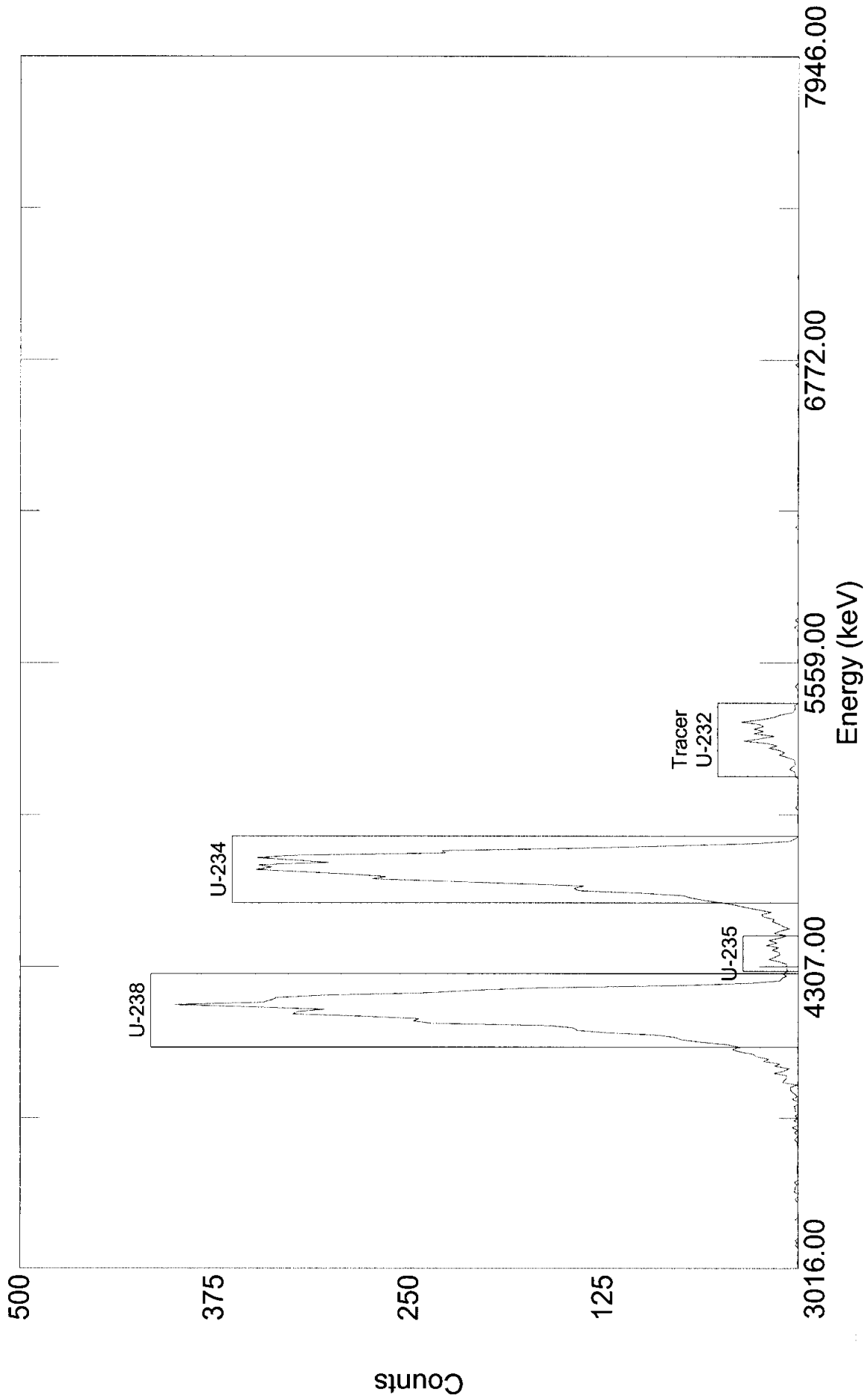
Analyzed By: Sm

Checked By: JP

000033

UC424111

AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 14:16:48 on 16-May-2004

File: C:\User\Alpha\ALPHA\UC424111.SPC

Sample: 0404241-11 UAS040428-5

Real Time: 18001.12 s. Live Time: 18000.00 s.

Detector: #60 MCB 8 Input 4

Type: Uranium Default

430000

Paragon Analytics

Alpha Spectroscopy Analysis

Report Printed:
5/20/04 10:27:41 AM

Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0404241-12 UAS040428-5

Analysis Type: Uranium Default

Detector: MCB 3 Input 3

Date/Time of Count: 5/19/04 2:14:55 PM

Sample Volume: 2.051 Total, 2.051 Aliquot.

Live Time: 300.00 Minutes

Chem. Yield: 38.03%

Real Time: 300.01 Minutes

Total Eff.: 11.04 %

Dead Time: 0.0 %

Tracer Amount: 18.976 DPM.

Acquisition: 512 Channels

Efficiency: 29.02%

Analysis: Relative Region-Of-Interest

Original: 2,995 + 10.3385 * Chn + -0.00140 * Chn **2.

Spectrum Calibration: 2,995 + 10.5406 * Chn + -0.00140 * Chn **2.

Cal File:

Spectrum File: C:\User\Alpha\ALPHA\UZ424112.SPC

Background File: C:\USER\ALPHA\BKGND\B4051819.SPC

Library File: C:\User\Alpha\ALPHAVIS.ALB

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	115.77	93	123	8.00	138.00	1,754.00	0.60	1753.40	52.96
2	172.77	152	180	10.00	133.00	1,669.00	0.30	1668.70	50.40
3	135.70	124	138	2.00	12.00	66.00	0.60	65.40	1.98
Tracer	227.40	211	236	8.00	58.00	631.00	2.70	628.30	18.98

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	U-238	4197.00	81.73	11.631	n/a	4.68 %
2	U-234	4774.80	100.57	11.069	n/a	4.80 %
3	U-235	4400.00	20.32	0.434	n/a	24.36 %
Tracer	U-232	5320.00	79.23	4.168	n/a	7.80 %

Totals

		% Total
Gross Count:	4,348.00	100.00
Net Area:	4,296.70	98.82
Background:	51.30	1.18
Composite Fit:	4,120.00	94.76
Residuals:	228.00	5.24

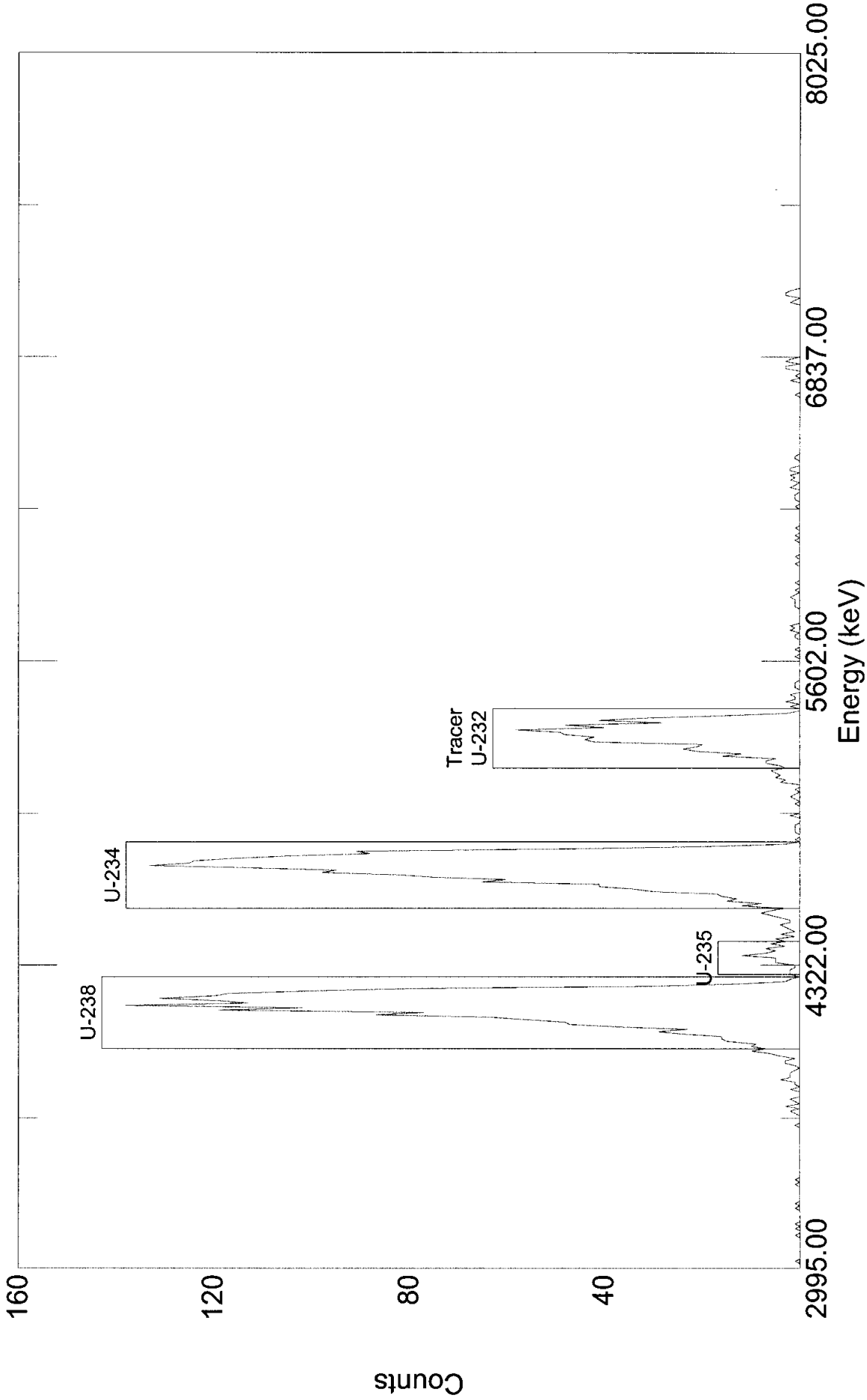
Analyzed By: Sm

Checked By: JP

000035

UZ424112

AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 14:14:55 on 19-May-2004

File: C:\User\Alpha\ALPHA\UZ424112.SPC

Sample: 0404241-12 UAS040428-5

Real Time: 18000.88 s. Live Time: 18000.00 s.

Detector: #19 MCB 3 Input 3

Type: Uranium Default

930000

Paragon Analytics

Alpha Spectroscopy Analysis

Report Printed:
5/11/04 4:14:39 PM

Para0327.rpt
rev 11/13/03 KVG

Sample Name: AS040428-5MB UAS040428-5

Analysis Type: Uranium Default

Detector: MCB 3 Input 7

Date/Time of Count: 5/10/04 2:39:38 PM

Sample Volume: 2.000 Total, 2.000 Aliquot.

Live Time: 300.00 Minutes

Chem. Yield: 69.55%

Real Time: 300.01 Minutes

Total Eff.: 19.75 %

Dead Time: 0.0 %

Tracer Amount: 18.976 DPM.

Acquisition: 512 Channels

Efficiency: 28.40%

Analysis: Relative Region-Of-Interest

Original: 3,010 + 10.0929 * Chn + -0.00080 * Chn **2.

Spectrum Calibration: 3,010 + 10.1640 * Chn + -0.00080 * Chn **2.

Cal File:

Spectrum File: C:\User\Alpha\ALPHA\U4285B.SPC

Background File: C:\USER\ALPHA\BKGND\B4050423.SPC

Library File: C:\User\Alpha\ALPHA\VIS.ALB

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	117.92	96	125	2.00	1.00	2.00	0.60	1.40	0.02
2	176.11	155	182	2.00	4.00	13.00	0.90	12.10	0.20
3	138.30	126	141	2.00	2.00	3.00	0.60	2.40	0.04
Tracer	231.53	215	241	6.00	126.00	1,128.00	3.60	1124.40	18.98

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	U-238	4197.00	19.95	0.005	n/a	200.64 %
2	U-234	4774.80	19.76	0.046	n/a	58.59 %
3	U-235	4400.00	19.89	0.009	n/a	142.72 %
Tracer	U-232	5320.00	58.76	4.274	n/a	5.84 %

Totals

% Total

Gross Count:	1,267.00	100.00
Net Area:	1,209.40	95.45
Background:	57.60	4.55
Composite Fit:	1,146.00	90.45
Residuals:	121.00	9.55

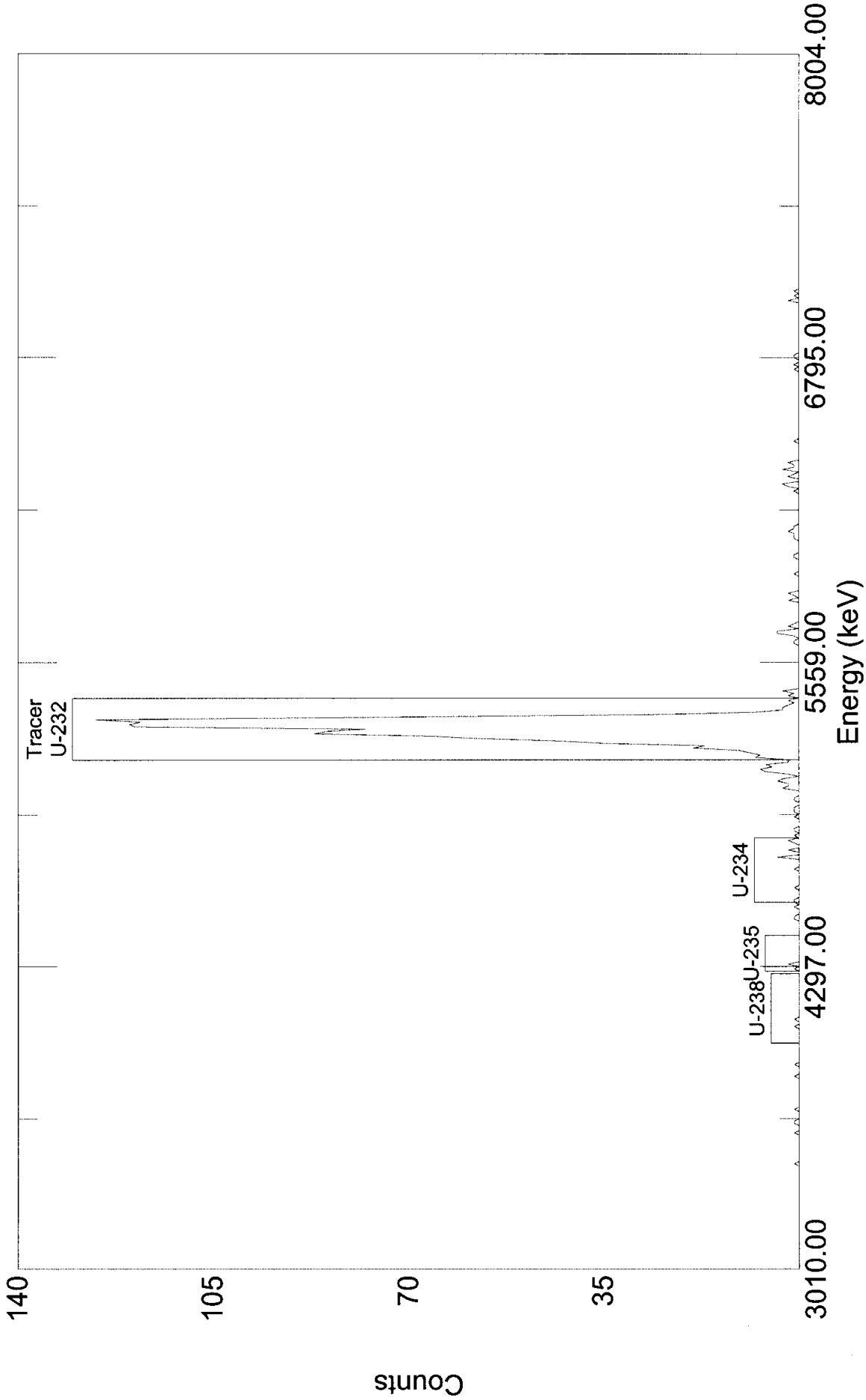
Analyzed By: _____ *SP JP*

Checked By: _____

000037

U4285B

AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 14:39:38 on 10-May-2004
File: C:\User\Alpha\ALPHA\U4285B.SPC
Sample: AS040428-5MB UAS040428-5

Real Time: 18000.88 s. Live Time: 18000.00 s.
Detector: #23 MCB 3 Input 7
Type: Uranium Default

830000

Paragon Analytics

Alpha Spectroscopy Analysis

Report Printed:
5/11/04 4:17:35 PM

Para0327.rpt
rev 11/13/03 KVG

Sample Name: AS040428-5LCS UAS040428-5

Analysis Type: Uranium Default

Detector: MCB 6 Input 2

Date/Time of Count: 5/10/04 2:40:03 PM

Sample Volume: 2.000 Total, 2.000 Aliquot.

Live Time: 300.00 Minutes

Chem. Yield: 76.38%

Real Time: 304.17 Minutes

Total Eff.: 24.41 %

Dead Time: 1.4 %

Tracer Amount: 18.976 DPM.

Acquisition: 512 Channels

Efficiency: 31.96%

Analysis: Relative Region-Of-Interest

Original: 2,978 + 10.2359 * Chn + -0.00075 * Chn **2.

Spectrum Calibration: 2,978 + 10.3151 * Chn + -0.00075 * Chn **2.

Cal File:

Spectrum File: C:\User\Alpha\ALPHA\U4285L.SPC

Background File: C:\USER\ALPHA\BKGND\B4050442.SPC

Library File: C:\User\Alpha\ALPHAVIS.ALB

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	119.22	99	126	6.00	148.00	1,468.00	0.00	1468.00	20.05
2	176.46	156	182	6.00	152.00	1,449.00	0.90	1448.10	19.77
3	139.27	127	144	8.00	9.00	71.00	0.00	71.00	0.97
Tracer	230.93	210	236	6.00	151.00	1,392.00	2.40	1389.60	18.98

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	U-238	4197.00	60.82	4.515	n/a	5.12 %
2	U-234	4774.80	60.30	4.454	n/a	5.15 %
3	U-235	4400.00	80.85	0.218	n/a	23.26 %
Tracer	U-232	5320.00	59.81	4.274	n/a	5.25 %

Totals

% Total

Gross Count:	4,641.00	100.00
Net Area:	4,578.30	98.65
Background:	62.70	1.35
Composite Fit:	4,380.00	94.38
Residuals:	261.00	5.62

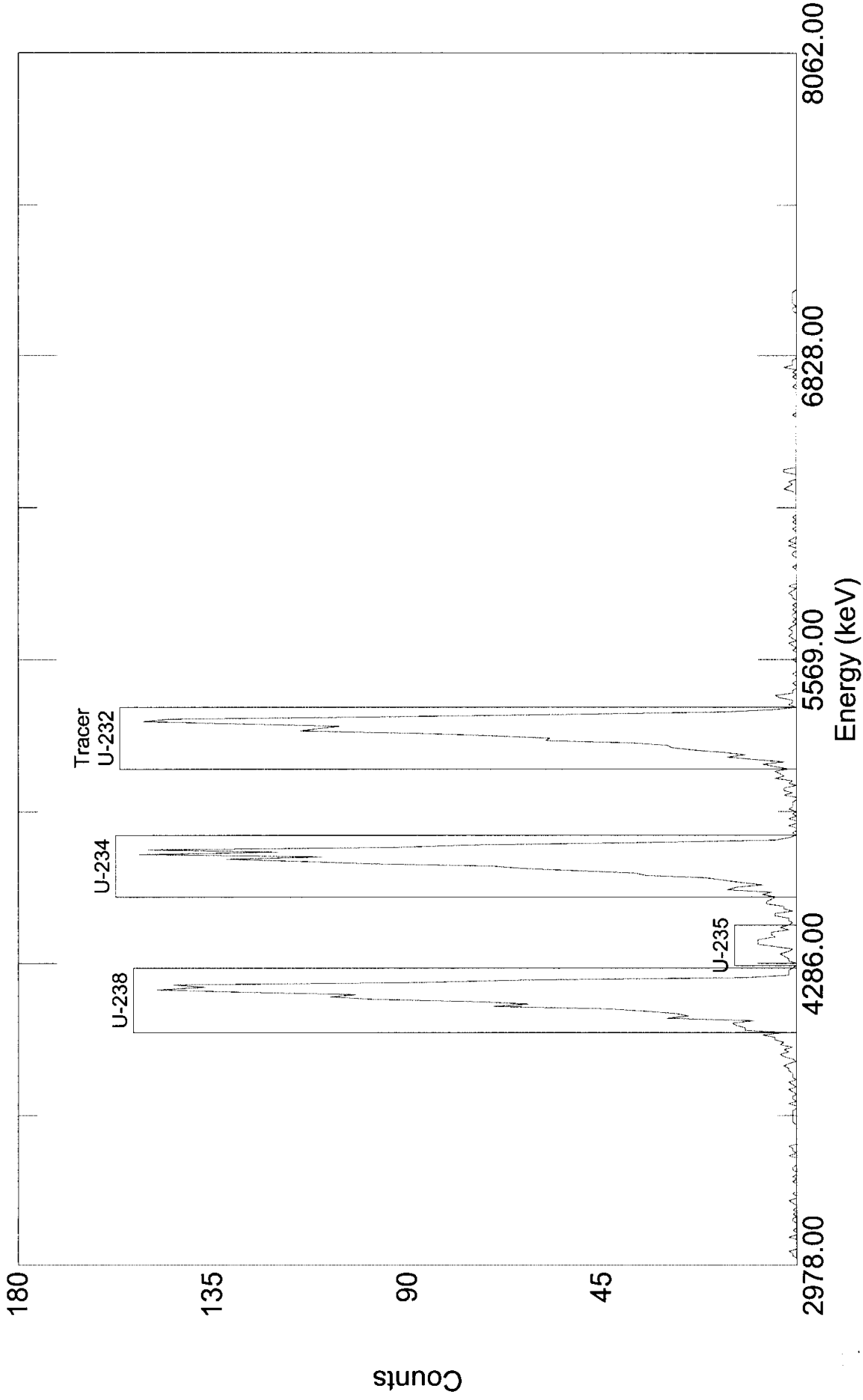
Analyzed By: Sm JP

Checked By: _____

000039

U4285L

AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 14:40:03 on 10-May-2004

File: C:\User\Alpha\ALPHA\U4285L.SPC

Sample: AS040428-5LCS UAS040428-5

Real Time: 18250.40 s. Live Time: 18000.00 s.

Detector: #42 MCB 6 Input 2

Type: Uranium Default

040000

Paragon Analytics

Alpha Spectrometer Instrument Run Log

Date: 5/10/04

FORM 746r6.xls (1/18/2000)

277715

Detector	Batch ID	Sample ID	IsoMatrix	Duration	Initial	File ID/Comm.
9	AS0404284	0404145-10	VIS	300	JP	UR414510
10	AS0404165	0404145-5	THS	300	JP	T41455
11		-6				6
12		-7				7
13		-8				8
15		-9				9
16		-10				10
17		-11				11
19		-12				12
21		-12D				12D
22		-13				13
23		-14				14
24		-15				15
42		-16				16
43		-17				17
44		-18				18
45		-19				19
47		-20				20
48	AS0404165					T4165B
57		LOS				L
58	AS0404286	0404241-3	THS	360	JP	T42413
59		-5				5
60		-7				7
61		-9				9

Detector	Batch ID	Sample ID	IsoMatrix	Duration	Initial	File ID/Comm.
62	AS0404286	0404241-9D	THS	360	JP	T42419D
63		-11				11
64		-12				12
9	AS0404165	0404145-15	THS	300	JP	TR414515
10		AS0404165-5MB				TR4165B
11	AS0404286	AS040428-6MB	THS	360	JP	T4286B
12		LOS				L
13	AS0404283	0404106-10	THS	330	JP	TR410610
15	AS0404285	0404241-3	VIS	300	JP	V42413
16		-5				5
17		-7				7
18		-7D				7D
19		-9				9
21		-11				11
22		-12				12
23		AS040428-5MB				U4285B
42		LOS				L
43	AS0404293	0404199-3	VIS	300	JP	V41993
44		-3D				3D
45		-4				4
47		-5				5
48		-6				6
57		-8				8
58		AS040429-3MB				V4293B
59		LOS				L

Notes:

Cont. on page 277715 JP 5/10/04

Reviewed by: JP
Date: 5/11/04

Paragon Analytics
Alpha Spectrometer Instrument Run Log

FORM 746r6.xls (11/8/2000)

277726

Date: 5/16/04

Detector	Batch ID	Sample ID	Iso/Matrix	Duration	Initial	File ID/Comm.
48	AS0405031	AS0405031.AMA	V/F	1000	JP	V1503/PB
57		↓	LOS*	↓	↓	↓ L
58		↓	LOS	↓	↓	↓ LD
59	AS0404285	C404241-9	V/S	300	JP	UC42419
60		↓	-11	↓	↓	↓ 11
61		↓	-12	↓	↓	↓ 12
62		↓	AS040428.5.MB	↓	↓	↓ UC4285B
63		↓	LOS	↓	↓	↓ L
64	AS0405105	C4041783	V/S	300	JP	UR41783

Detector	Batch ID	Sample ID	Iso/Matrix	Duration	Initial	File ID/Comm.
						JP 5/17/04

Notes:

Cont. from page 277725 JP 5/16/04

Reviewed by: JP
Date: 5/17/04

Paragon Analytics
Alpha Spectrometer Instrument Run Log

Date: 5/19/04

277729

Detector	Batch ID	Sample ID	Iso/Matrix	Duration	Initial	File ID/Comm.
9	AS040510-3	AS040510-3(LSD)	V/W	300	JP	VR5103LD
10	AS040510-4	0404248-8	T/W	300	JP	TR42488
11		0404313-1				T43131
12		↓ -2				↓ 2
13		0404314-1				T43141
15		↓ -4				↓ 4
16		↓ -5				↓ 5
17		↓ -8				↓ 8
18		↓ -23				↓ 23
19		↓ -24				↓ 24
21		AS040510-4(HMB)		420		T5104B
22		↓ LCS		300		↓ L
23		↓ LSD				↓ LD
24	AS040511-4	0404228-1	V/S	300	JP	U42281
42		↓ -2				↓ 2
43		↓ -3				↓ 3
44		↓ -4				↓ 4
45		↓ -5				↓ 5
46		↓ -6				↓ 6
47		↓ -7				↓ 7
48		↓ -8				↓ 8
57		↓ -8D				↓ 8D
58		↓ -9				↓ 9
59		↓ -10				↓ 10

Detector	Batch ID	Sample ID	Iso/Matrix	Duration	Initial	File ID/Comm.
60	AS040511-4	0404228-11	V/S	300	JP	U422811
61		↓ -12				↓ 12
62		↓ -13				↓ 13
63		↓ -14				↓ 14
64		↓ -15				↓ 15
2	PL040513-1	0404241-3	Pe/S	300	JP	042413
3		↓ -5				↓ 5
4		↓ -7				↓ 7
5		↓ -7D				↓ 7D
7		↓ -9				↓ 9
8		↓ -11				↓ 11
49		↓ -12				↓ 12
50		PL040513-1MB				05131B
51		↓ LCS				↓ L
9	AS040511-4	0404228-16	U/S	300	AM	U422816
10		↓ -17				↓ 17
11		↓ -18				↓ 18
12		↓ -18D				↓ 18D
13		↓ -19				↓ 19
15		↓ -20				↓ 20
16		↓ -4MB				U5114B
17		↓ -4LCS				U5114L
18	AS040511-4	0404241-9	U/S	300	AM	U42419
19		↓ -12				↓ U424112

Notes:

Cont. on page 277730. JP 5/19/04

Reviewed by: JD
Date: 5/19/04

000043
230000

PARAGON ANALYTICS
Radiochemistry Data Package

Section 5

**QUALITY ASSURANCE
SUMMARY REPORTS**

5

000044

NCR # ~~005663~~

CONTROLLED NON-CONFORMANCE REPORT

Paragon Analytics

Initiated by JP Date 5/13/04
Reason: Non-Conformance
 Client Inquiry
 Other

Method/Procedure Iso-U
Work Orders Affected 0404241
AS040428.5
Clients New Horizons

SECTION I TYPE OF EVENT (circle as appropriate)

1. LCS / Surrogate / IS (Tracer) or Chemical Yield Criteria Not Met

2. Calibration Criteria Not Met (ICAL, ICV, CCV)

3. Method Requirements Not Met (HTV, MB,)

4. Deviation from LQAP / SOP (i.e., PAI criteria not met)

5. Client Criteria Not Met (MDC, DER,)

6. Equipment Failure or Laboratory Incident / Error

7. Other Spectral Quality (Mass Attenuation)

Explanation: ① Samples 0404241-9 + -12 have chemical recoveries below the 30% LCL at 28.48% + 25.16% respectively. This is likely caused by high levels of native uranium present in the samples, causing mass attenuation.
② Samples 0404241-9, -11, + -12 have marginal to poor spectral quality caused by mass attenuation.

Actions to Prevent Recurrence (Retrain, etc.): N/A - see comments above

SECTION II NOTIFICATION

Client Contacted? (Y N) Name: _____ Date: _____ Time: _____

<p>SECTION III CORRECTIVE ACTIONS</p> <p><input checked="" type="checkbox"/> 1. Submit for Re-Prep. or <u>Clean-up</u></p> <p><input type="checkbox"/> 2. Re-analyze <u>9, 11, 12</u></p> <p><input type="checkbox"/> 3. Resubmit Data (hc, edd, narrative)</p> <p><input type="checkbox"/> 4. Document in Narrative</p> <p><input type="checkbox"/> 5. Other _____</p> <p>Approved by: <u>RG</u> DPM <u>D</u> PM <u>5/21/04</u> <u>5/13/04</u></p>	<p>SECTION IV REQUEST FOR REWORK</p> <p>Initial Batch ID: <u>AS040428.5</u> Date: <u>4/28/04</u></p> <p>Reworked Batch ID: <u>AS040428.5</u> Date: <u>4/28/04</u></p> <p>Outcome: <u>Clean-up improved spectral quality. Quantification of requested analytes is now possible. However, chemical recovery for samples</u></p> <p>Approved by: <u>RG</u> <u>5/21/04</u> (cont. below)</p> <p>Matrix Effect or Elevated / Sample Activity Suspected? (circle applicable)</p>
--	---

SECTION V DISPOSITION

Use as is	<input checked="" type="checkbox"/> Repair	Reject
-----------	--	--------

SECTION VI COMMENTS 0404241-9 + -11 is below the 30% LCL at 26.76% and 28.68% respectively. Chemical recovery for sample 0404241-12 is now above the 30% at 38.03% (no more attenuation). Spectral quality for all samples is acceptable for accurate quantification. Document in Narrative per SOP 714 & 715. RG 5/21/04.

SECTION VII APPROVAL SIGNATURES

Project Manager (PM) Debbie Fazio Date 5/21/04

Department Manager (DPM) [Signature] Date 5/21/04 (Verification of Disposition)

QA Manager [Signature] Date 5/21/04

SECTION VIII DISTRIBUTION DJF PM DCE Dept. Manager [Signature] Lab Director Rpt. Group or Rad 000045

RG

QUALITY ASSURANCE SUMMARY SHEET

268168

PAI W.O. # / BATCH FOR ALL Clean-Ups
TEST ACTINIDES
METHOD Prep
SOP/REV (PREP) N/A
SOP/REV (ANAL) _____

Briefly document any QA or other problems or deviations associated with the analysis of samples. Problems could result from: log-in, color, odor, dilution, consistency, scheduling, equipment, or instrumentation, or may include documentation of minor deviations necessary due to unique DQO's or sample characteristics.

okm 5/3/04

The following procedure was implemented for all samples designated for "clean-up":

1. Filter was peeled from the planchet using forceps and placed in a labeled plastic cup.
2. 2g Boric acid was added with 20mL of concentrated nitric acid.
3. Cup was placed on steambath for at least 1 hour with the filter completely submerged in the acid the entire time.
4. The cup was then rinsed with approximately 100mL DI water into a labeled centrifuge bottle. (leaving the filter behind)
5. 1mL iron carrier was added and precipitated with ammonium hydroxide and centrifuged at 3500rpm for 15 minutes.
6. Sample(s) were taken to micro precipitation where the appropriate SOP was followed.

okm 5/3/04

okm 5/3/04

okm 5/3/04

okm 5/3/04

TECHNICIAN/ANALYST Chirona Cavagna

DATE 5/3/04

DEPARTMENT MANAGER Chad Wright

DATE 5/3/04

QUALITY ASSURANCE SUMMARY SHEET

PAI W.O. # / BATCH For aluminum batches

208110

TEST U-isc

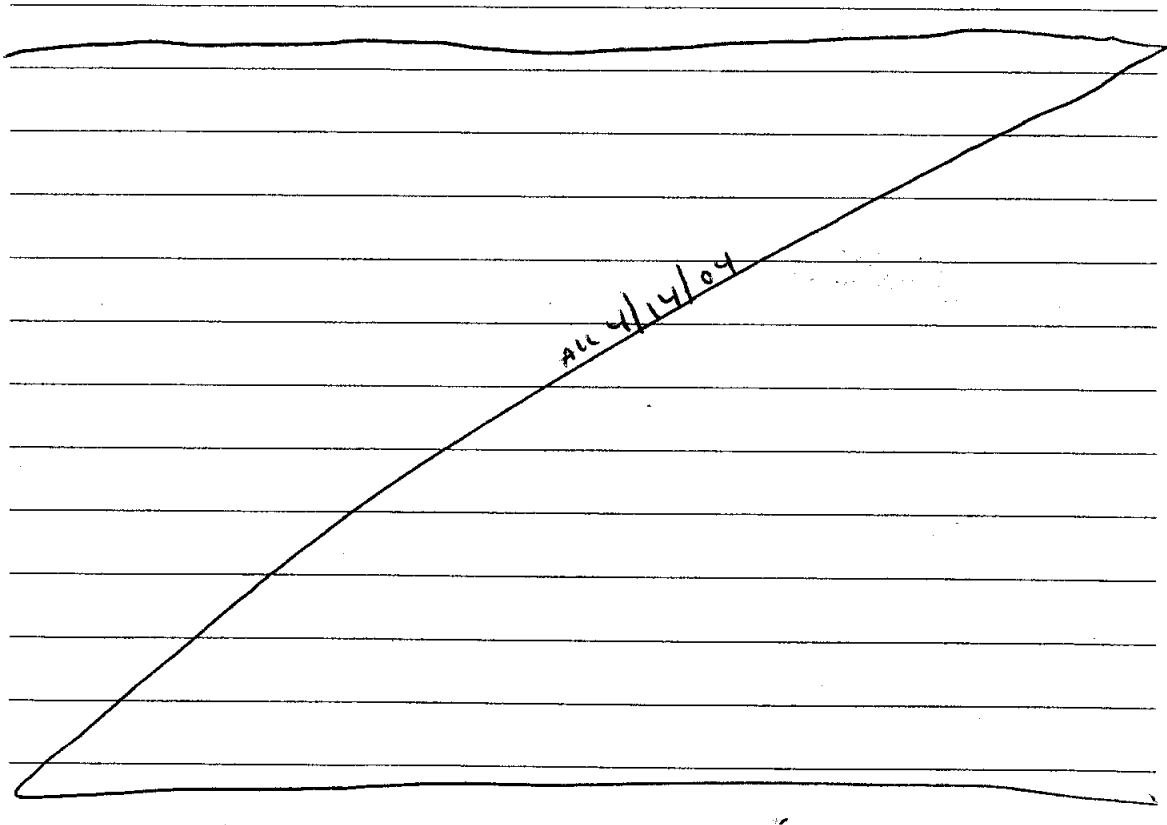
METHOD Prep

SOP/REV (PREP) 778 ~~128~~ R9 2/24/11/04

SOP/REV (ANAL) _____

Briefly document any QA or other problems or deviations associated with the analysis of samples. Problems could result from: log-in, color, odor, dilution, consistency, scheduling, equipment, or instrumentation, or may include documentation of minor deviations necessary due to unique DQO's or sample characteristics.

1. A consistent 20-25 ml of ammonium hydroxide was used per sample in order to form the ferric hydroxide precipitate prior to running a chloride column. ^{acc 4/14/04} _{acc 4/14/04}



TECHNICIAN/ANALYST A. Dawson

DATE 4/14/04

DEPARTMENT MANAGER Kan - nye

DATE 4/14/04

PARAGON ANALYTICS
Radiochemistry Data Package

Section 6

**LABORATORY
BENCH SHEETS**

6

000048

Radiochemistry Instrument Worksheet

Paragon Analytics

Prep Batch: AS040428-5

Prep Procedure: UISO

Analytical QASS (NCR?) **Y** N 5663

Prep Num	LabID	QC Type	Init Alq	Fin Alq	Units	Cnt 1 File	Cnt 1 Inst/Det	Cnt 1 Pos Chk By	Cnt 2 File	Cnt 2 Inst/Det	Cnt 2 Pos Chk By	Cnt 3 File	Cnt 3 Inst/Det	Cnt 3 Pos Chk By	Notes
1	0404241-3	SMP	2.1285	2.1285	g	V-42413	15	JP	-42413			-42413			
1	0404241-5	SMP	2.0345	2.0345	g	-42415	16		-42415			-42415			
1	0404241-7	SMP	2.0602	2.0602	g	-42417	17		-42417			-42417			
1	0404241-7	DUP	2.0693	2.0693	g	-42417D	18		-42417D			-42417D			
1	0404241-9	SMP	2.0559	2.0559	g	-42419	19		-42419			-42419			
1	0404241-11	SMP	2.016	2.016	g	-42411	21		-42411			-42411			
1	0404241-12	SMP	2.051	2.051	g	-42412	22		-42412			-42412			
1	AS040428-5	MB	2	2	g	-4285B	23		-4285B			-4285B			
1	AS040428-5	LCS	2	2	g	-4285L	42		-4285L			-4285L			SD 5/21/04

Tracer/Carrier Solution Information					
Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date
T1	U-232	511.2613.26	37.952	DPM/ml	04/28/04

Spike Solution Information					
Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date
S1	U-234	643.2382.44	38.522	DPM/ml	04/28/04
S1	U-238	643.2382.44	39.994	DPM/ml	04/28/04

00004

Radiochemistry Instrument Worksheet

Prep Batch: AS040428-5

Prep Batch: AS040428-5

Prep Procedure: UISO

Analytical QASS / NCR? Y N 5663

Prep Num	QC Type	Init Alq	Fin Alq	Units	Cnt 1 File	Cnt 1 Inst/Det	Cnt 1 Pos Chk By	Cnt 2 File	Cnt 2 Inst/Det	Cnt 2 Pos Chk By	Cnt 3 File	Cnt 3 Inst/Det	Cnt 3 Pos Chk By	Notes
1	SMP	2.1285	2.1285	g	42413			42413			42413			
1	SMP	2.0345	2.0345	g	42415			42415			42415			
1	SMP	2.0602	2.0602	g	42417			42417			42417			
1	DUP	2.0693	2.0693	g	42417D			42417D			42417D			
1	SMP	2.0559	2.0559	g	42419	UZ 59 JP	UZ 18 JP	42419			42419			* Tracer FWHM > 100, Calib. correction out 5/19/04
1	SMP	2.016	2.016	g	42411	60		42411			42411			
1	SMP	2.051	2.051	g	42412	61	UZ 19 JP	42412			42412			* Tracer FWHM > 100 & m05/19/04
1	MB	2	2	g	4285B	62		4285B			4285B			
1	LCS	2	2	g	4285L	63		4285L			4285L			Z-cuts: SD 5/21/04

Tracer/Carrier Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
T1	U-232	511.2613.26	37.952	DPM/ml	04/28/04	0.5	ml	AW004

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	U-234	643.2382.44	38.522	DPM/ml	04/28/04	0.5	ml	AW004
S1	U-235	643.2382.44	1.841	DPM/ml	04/28/04	0.5	ml	AW004
S1	U-238	643.2382.44	39.994	DPM/ml	04/28/04	0.5	ml	AW004

0000

Radiochemistry Prep Worksheet

Prep Batch: AS040428-5

Prep Batch: AS040428-5

Prep Procedure: UIISO

Reviewed By: CDM 5/3/04

Review Date: 5/3/04

Non-Routine Pre-Treatment? Y / N Batch: See Comments Re-Prep? Y / N Batch: N/A Prep QASS / NCR? Y / N 268/10

Prep SOP: PAI 778 Rev: 9

Prep Analyst: Carissa Moncavage

Balance: 23

Prep Date: 4/28/04

Balance: N/A

Matrix Class: solid

Prep Dept: AP

Samp Num	Prep Num	LabID	QC Type	Dish No.	Init Alq g	Fin Alq g	Prep Basis	Micro Init	Micro Date	Standards	Prep Notes
1	1	0404241-3	SMP		2.1285	2.1285	Dry Weight	CDM	5/1/04	T1	
2	1	0404241-5	SMP		2.0345	2.0345	Dry Weight			T1	
3	1	0404241-7	SMP		2.0602	2.0602	Dry Weight			T1	
4	1	0404241-7	DUP		2.0693	2.0693	Dry Weight			T1	
5	1	0404241-9	SMP		2.0559	2.0559	Dry Weight			T1	
6	1	0404241-11	SMP		2.016	2.016	Dry Weight			T1	
7	1	0404241-12	SMP		2.051	2.051	Dry Weight			T1	
8	1	AS040428-5	MB		2	2	Dry Weight			T1,S1	
9	1	AS040428-5	LCS		2	2	Dry Weight			T1,S1	

Spiked By: Carissa Moncavage Date: 4/29/04
 Witnessed By: Grace Campagnola Date: 4/29/04

Relinquished By: CDM
 Date: 5/4/04
 Received By: SD
 Date: 5/5/04

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
T1	U-232	511.2613.26	37.952	DPM/ml	04/28/04	0.5	ml	AW004

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	U-234	643.2382.44	38.522	DPM/ml	04/28/04	0.5	ml	AW004
S1	U-238	643.2382.44	39.994	DPM/ml	04/28/04	0.5	ml	AW004

Comments

ALL SAMPLES WERE MUFFLED. ALL SAMPLES RECEIVED PEG TREATMENT.

Radiochemistry Prep Worksheet

Prep Batch: AS040428-5

Prep Batch: AS040428-5

Prep Procedure: UISO

Reviewed By: CDM *CDM* 5/16/04 Review Date: 5/3/04

Non-Routine Pre-Treatment: YN Batch: Clean-up Re-Prep? Y / N Batch: _____

Prep SOP: PAI 778 Rev: 9
 Prep SOP: NONE
 Matrix Class: solid
 Prep Analyst: Carissa Moncavage
 Prep Date: 4/28/04
 Prep Dept: AP
 Balance: 23
 Balance: N/A

Sample Num	Prep Num	LabID	QC Type	Dish No.	Init Alq g	Fin Alq g	Prep Basis	Micro Init	Micro Date	Standards	Prep Notes
1	1	0404241-3	SMP		2.1285	2.1285	Dry Weight			T1	
2	1	0404241-5	SMP		2.0345	2.0345	Dry Weight			T1	
3	1	0404241-7	SMP		2.0602	2.0602	Dry Weight			T1	
4	1	0404241-7	DUP		2.0693	2.0693	Dry Weight			T1	
5	1	0404241-9	SMP		2.0559	2.0559	Dry Weight			T1	
6	1	0404241-11	SMP		2.016	2.016	Dry Weight			T1	
7	1	0404241-12	SMP		2.051	2.051	Dry Weight			T1	
8	1	AS040428-5	MB		2	2	Dry Weight			T1	
9	1	AS040428-5	LCS		2	2	Dry Weight			T1,S1	

Spiked By: Carissa Moncavage Date: 4/29/04
 Witnessed By: Grace Campagnola Date: 4/29/04

Reinquired By: *CDM*
 Date: 5/16/04
 Received By: *SP*
 Date: 5/16/04

Tracer/Carrier Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
T1	U-232	511.2613.26	37.952	DPM/ml	04/28/04	0.5	ml	AW004

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	U-234	643.2382.44	38.522	DPM/ml	04/28/04	0.5	ml	AW004
S1	U-235	643.2382.44	1.841	DPM/ml	04/28/04	0.5	ml	AW004
S1	U-238	643.2382.44	39.994	DPM/ml	04/28/04	0.5	ml	AW004

Comments
 ALL SAMPLES WERE MUFFLED. ALL SAMPLES RECEIVED PEG TREATMENT.

Radiochemistry Prep Worksheet

Paragon Analytics

Prep Batch: AS040428-5

Prep Procedure: UI50

Prep Batch Not Validated!!!

Reviewed By: _____ Review Date: _____

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

Prep SOP: PAI 778 Rev: 9 Prep Analyst: Carissa Moncavage Balance: _____
 Prep SOP: NONE Prep Date: 4/28/04 Balance: _____
 Matrix Class: solid Prep Dept: AP

Samp Num	Prep Num	LabID	QC Type	Dish No.	Init Alq	Fin Alq	Prep Basis	Micro Init	Micro Date	Standards	Prep Notes
30	1	0404241-3	SMP	2	2	2	Dry Weight	578	2-1285	T1	
20	2	0404241-5	SMP	2	2	2	Dry Weight	493	2-0345	T1	
4	3	0404241-7	SMP	2	2	2	Dry Weight	504	2-0602	T1	
1	4	0404241-7	DUP	2	2	2	Dry Weight	603	2-0693	T1	
2	5	0404241-9	SMP	2	2	2	Dry Weight	308	2-0589	T1	
8	6	0404241-11	SMP	2	2	2	Dry Weight	556	2-0160	T1	
2	7	0404241-12	SMP	2	2	2	Dry Weight	431	2-0570	T1	
3	8	AS040428-5	MB	2	2	2	Dry Weight	1043	2-10	T1	
2	9	AS040428-5	LCS	2	2	2	Dry Weight	501	2-0	T1,S1	

Spiked By: CPM Date: 4/29/04
 Witnessed By: AC Date: 4/29/04

Reinquished By: _____ Date: _____
 Received By: _____ Date: _____

Tracer/Carrier Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
1	U-232	5112613-26	37.947	DPM/ml	04/28/04	0.5	ml	AW004

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	U-234	643.2382.44	38.522	DPM/ml	04/28/04	0.5	ml	AW004
S1	U-238	643.2382.44	39.994	DPM/ml	04/28/04	0.5	ml	AW004

CPM 8/8/04 exp 4/29/04
 U-232 5112613-26 4000 dpm/ml 0.5 mL AW004
 exp 10/8/04

exp 11/1/04

0000 Comments

SAMPLE CONDITION FORM (SOLIDS)

ANALYST: *COM*

ANALYSIS DATE: *4/28/04* METHOD: *Prup*

WORK ORDER	SAMPLE ID	SAMPLE CONDITION		
		Dry/Wet	TEXTURE	Remarks
<i>0404241</i>	<i>3</i>	<i>dry</i>	<i>ground</i>	<i>empty</i>
	<i>5</i>			
	<i>7</i>			
	<i>9</i>			
	<i>10</i>			
↓	<i>12</i>	↓	↓	↓
<div style="position: absolute; top: 50%; left: 50%; transform: translate(-50%, -50%); opacity: 0.5;"> <p><i>COM</i> <i>4/28/04</i></p> </div>				

4/28/04 W.O. # 04-04-241 / (Pb^{ISO}, Th^{ISO}, U^{ISO}, Pb 210L)

in oven - 4/27 @ 1100
out oven - 4/28 @ 1100

S.O.P. - 721-R10
balance # 15, oven # 1
5 balls, shake 15 min.

<u>Sample #</u>	<u>sample / can / balls (g)</u>	<u>can / balls (g)</u>	<u>ground sample (g)</u>	<u>TYPE sample</u>
04-04-241-3	126.6	96.4	30.2	SOIL
-5	126.5	96.3	30.2	
-7	126.8	96.4	30.4	
-9	127.0	96.9	30.1	
-11	127.1	96.7	30.4	
-12	125.7	96.5	29.2	

C.O. - 4/28/04

Continued on Page _____

Read and Understood By

Carson B. O'Dell 4/28/04

[Signature]

4/28/04

000055

Signed

Date

Signed

Date

PARAGON ANALYTICS
Radiochemistry Data Package

Section 7

**STANDARDS
TRACEABILITY
DOCUMENTS**

7

000056

U-232 Working level dilution
Prepare a working level dilution of U-232 at 20 dpm/ml
by diluting 511.1572.82 with 2N HCL.

1) Determine the density of 2N HCL Lot# 43174

Mass of 100 ml class A Volumetric flask	68.2958 g
Mass of flask and 100 ml 2N HCL	171.2432 g
Net mass of 2N HCL	102.9474
	$\rho = 1.0295 \text{ g/ml}$

2) Transfer U-232 (511.1572.82) to a 1L Nalgene bottle

Mass of bottle without std	75.5713 g
Mass of bottle and standard	92.8770 g
Net mass of standard transferred	17.3057 g

3) Dilute to final volume with 2N HCL

Mass of bottle without lid (from above)	75.5713 g
Mass of bottle, standard, 2N HCL	930.75 g
Net mass of standard	855.13 g

4) Final Activity Calculation

$$\frac{(19.20 \text{ dpm/g}) (17.3057 \text{ g}) (1.0295 \text{ g/ml})}{855.13 \text{ g}} = 40.00 \text{ dpm/ml}$$

SD 10/22/03
Std ID: 511.2613.26

Description: U-232
 Expiration: 10/8/04
 Activity: 40.00 dpm/mL
 2s Uncertainty: 2.00 dpm/mL
 Ref. Date: 2/4/99
 Ref Time: N/A
 Prep Date: 9/11/03 Prep by: CDM
 Matrix/Comp. 2N HCL
 Half Life (y): 6.98E+01

Std ID: 511.2613.26
 Description: U-232
 Expiration: 9/21/04
 Activity: 40.00 dpm/mL
 2s Uncertainty: 2.00 dpm/mL
 Ref. Date: 2/4/99
 Ref Time: N/A
 Prep Date: 9/11/03 Prep by: CDM
 Matrix/Comp. 2N HCL
 Half Life (y): 6.98E+01

-Requires NCR for IGPT Work!

Read and Understood By SD 9/22/03

Choncajage
Signed

9/11/03
Date

[Signature]
Signed

9/23/03
000057

SD 10/22/03

SD 10/22/03

SD 10/22/03

SD 10/22/03

SD 10/22/03

SD 10/22/03

Transfer U^{232} standard RSD # 511 to a 1 liter Nalgene bottle.

	w/ lid	balance 12
empty bottle:	59.2300 g	
full bottle (w/ lid):	594.60 g	balance 21
	535.37 g	total amt + standard

Activity of standard (data from calibration sheet for RSD # 511)

$$(17170 \text{ dps}) (60 \text{ sec/min}) = 1,030,200 \text{ dpm}$$

$$1,030,200 \text{ dpm} / 536.56 \text{ g} = 1920.61 \text{ dpm/g}$$

ref date: 2/4/99

$$t_{1/2} = 69.8 \text{ yr}$$

Subsequent Dilutions to be verified.

This was a direct transfer, w/o dilution.

Continued on Page _____

[Signature]
Signed

3/3/99
Date

Read and Understood By
[Signature]
Signed

4/28/99
Date

000058

PAID 10/5/11
Rec'd 2-10-99

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

57106-307

U-232 500 mL Liquid in Flame Sealed Bottle

This standard radionuclide source was prepared using an aliquot measured gravimetrically from a master radionuclide solution standard. The master radionuclide solution standard was calibrated by the Department Des Applications Et De La Metrologie Des Rayonnements Ionisants (DAMRI), Paris, France, as Number 23236.

Radionuclide purity and calibration were checked using a germanium gamma spectrometer system. The nuclear decay rate and assay date for this source are given below.

ANALYTICS maintains traceability to the National Institute of Standards and Technology through Measurements Assurance Programs as described in USNRC Reg. Guide 4.15, Revision 1.


ISOTOPE:	U-232
ACTIVITY (dps):	1.717 E+04
CALIBRATION DATE:	February 4, 1999 12:00 EST
HALF-LIFE:	69.8 years
TOTAL UNCERTAINTY:	5.0%

536.56 grams of solution 2M HNO₃.

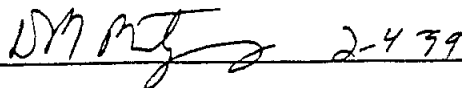
Impurities detected: U-233 <50 dps/bottle, Am-241 <25 dps/bottle on above referenced date.

P O NUMBER 22055, Item 1

SOURCE PREPARED BY:


E. A. Taskaev, Radiochemist

Q A APPROVED:

 2-4-99

000053

U-238 Working dilution

CDM 10-18-02

prepare a working dilution of U-238 643.2382.4443 to 40 dpm/ml by diluting w/ 1N HNO₃ (Lot #42207)

Copied from 643.2382

1) Determine the density of 1N HNO₃ (Lot #42207)

mass of 100 ml vol flask	64.6667 g (Bal 12)
mass of vol flask + 1N HNO ₃	107.4861 g
Net mass of std	102.819 g
	ρ = 1.028 g/ml

2) Transfer approx 20g ^{CDM 10-18-02} of U-238 (643.2382.44) to 1L wide mouth bottle

mass of wide mouth bottle w/o lid	74.1463 g (Bal 12)
- mass of bottle + std	92.0243 g 74.1463 g (Bal 12)
Net mass of std transferred	17.878 g

3) Dilute to final vol w/ 1N HNO₃

mass of wide mouth (from above)	74.1463 g (Bal 12)
mass of wide mouth + std + 1N HNO ₃	953.3 g (Bal 20)
Net mass of std	879.2 g

4) Final Activity Calculation

$$\frac{(1913.24 \text{ dpm/g})(17.878 \text{ g})(1.028 \text{ g/ml})}{879.2 \text{ g}} = \frac{210.00}{39.99} \text{ dpm/ml}$$

Standard reverified 11/25/03. SD 11/26/03
New expiration date 11/1/04.

Std ID: 643.2382.44
 Description: U-238
 Activity: 39.99 dpm/ml
 2s Uncertainty: 0.24 dpm/ml
 Ref. Date: 8/1/97
 Ref Time: na 11/18/02
 Prep Date: 11/16/03 Prep by: CM/DCB
 Expiration: 11/1/04
 Matrix/Comp: 1.0N HNO₃
 Half Life (y): 4.47E+09
 11/10/02

Read and Understood By

CDM [Signature] Signed

10-18-02 Date

[Signature] Signed

11/10/02 Date 000060

U-238 primary dilution

Prepare a primary dilution of U-238 (NIST SRM 4321c)

1) Transfer ampule to a 40 ml VOA Vial

mass of empty 50 ml beaker

29.3895 g (Bal 12)

mass of beaker + ampule

38.0584 g ↓

~~Net mass of std transferred~~

~~8.6689 g~~

mass of beaker + empty ampule: 33.9475g (Bal 12) Net mass of std transferred: 5.1109g

2) Dilute to final volume w/ 1N HNO₃

mass of empty VOA Vial

22.0308 g (Bal 12)

mass of VOA vial + std + 1N HNO₃

60.8186 g ↓

Net mass of diluted std

38.7878 g

HNO₃
12/21/02

3) Final activity calculation

$$\frac{1242.10 \frac{dpm}{g} \times 60 \frac{dpm}{g} \times 5.1109g}{38.7878g} \times \left(\frac{1.028g/ml}{8.6689g} \right) \times \left(\frac{1.028g/ml}{1.028g/ml} \right)$$

from 642.2382.42

$$= 19166.808 \frac{dpm}{ml}$$

$$= 3336.02 \frac{dpm}{ml} \times \frac{10^{-18}}{10^{-18}}$$

$$= 1913.24 \frac{dpm}{g}$$

$$= 3429.43 \frac{dpm}{g} \times \frac{10^{-18}}{10^{-18}}$$

Continued on Page _____

Read and Understood By

CDM/DOS
Signed

10-18-02
Date

Bene Volleys
Signed

11/10/02
Date 000061

Certificate

PAI ID 06913
10-18-02

Standard Reference Material 4321C
Natural Uranium Radioactivity Standard

This Standard Reference Material (SRM) consists of radioactive natural uranium nitrate and nitric acid dissolved in 5 mL of distilled water. The solution is contained in a flame-sealed NIST borosilicate-glass ampoule. The SRM is intended for the calibration of alpha-particle counting instruments and for the monitoring of radiochemical procedures.

Radiological Hazard

The SRM ampoule contains uranium-238, uranium-235, and uranium-234 with a total activity of approximately 2600 Bq. Uranium decays by alpha-particle emission. The progeny of uranium-238, uranium-235, and uranium-234 have a total activity of approximately 2600 Bq and decay by alpha- and beta-particle emission. None of the alpha or beta particles escape from the SRM ampoule. During the decay process X-rays and gamma rays with energies from 11 keV to 2.0 MeV are also emitted. Most of these photons escape from the SRM ampoule but their intensities are so small that they do not represent a radiation hazard. Approximate unshielded dose rates at several distances (as of the reference time) are given in note [a]*. The SRM should be used only by persons qualified to handle radioactive material.

Chemical Hazard

The SRM ampoule contains nitric acid (HNO_3) with a concentration of 1 mole per liter of water. The solution is corrosive and represents a health hazard if it comes in contact with eyes or skin. If the ampoule is to be opened to transfer the solution, the recommended procedure is given on page 2. The ampoule should be opened only by persons qualified to handle both radioactive material and strong acid solution.

Storage and Handling

The SRM should be stored and used at a temperature between 5 and 65 °C. The solution in an unopened ampoule should remain stable and homogeneous until at least August 2007.

The ampoule (or any subsequent container) should always be clearly marked as containing radioactive material. If the ampoule is transported it should be packed, marked, labeled, and shipped in accordance with the applicable national, international, and carrier regulations. The solution in the ampoule is a dangerous good (hazardous material) both because of the radioactivity and because of the strong acid.

Preparation

This Standard Reference Material was prepared in the Physics Laboratory, Ionizing Radiation Division, Radioactivity Group, J.M.R. Hutchinson, Group Leader. The overall technical direction and physical measurements leading to certification were provided by L.L. Lucas of the Radioactivity Group.

The support aspects involved in the preparation, certification, and issuance of this SRM were coordinated through the Standard Reference Materials Program by N.M. Trahey.

Gaithersburg, Maryland 20899
November 1997

Thomas E. Gills, Chief
Standard Reference Materials Program

Recommended Procedure for Opening the SRM Ampoule

If the SRM solution is to be diluted, it is recommended that the diluting solution have a composition comparable to that of the SRM solution.

- 1) Wear eye protection, gloves, and protective clothing and work over a tray with absorbent paper in it. Work in a fume hood. In addition to the radioactive material, the solution contains strong acid and is corrosive.
- 2) Shake the ampoule to wet all of the inside surface of the ampoule. Return the ampoule to the upright position.
- 3) Check that all of the liquid has drained out of the neck of the ampoule. If necessary, gently tap the neck to speed the process.
- 4) Holding the ampoule upright, score the narrowest part of the neck with a scribe or diamond pencil.
- 5) Lightly wet the scored line. This reduces the crack propagation velocity and makes for a cleaner break.
- 6) Hold the ampoule upright with a paper towel, a wiper, or a support jig. Position the scored line away from you. Using a paper towel or wiper to avoid contamination, snap off the top of the ampoule by pressing the narrowest part of the neck away from you while pulling the tip of the ampoule towards you.
- 7) Transfer the solution from the ampoule using a pycnometer or a pipet with dispenser handle.
NEVER PIPETTE BY MOUTH.
- 8) Seal any unused SRM solution in a flame-sealed glass ampoule, if possible, to minimize the evaporation loss.

See also reference [4]*.

PROPERTIES OF SRM 4321C
(Certified values are shown in bold type)

Source identification number	NIST SRM 4321C		
Physical Properties:			
Source description	Liquid in flame-sealed NIST borosilicate-glass ampoule		
Ampoule specifications	Body outside diameter	(16.5 ± 0.5) mm	
	Wall Thickness	(0.60 ± 0.04) mm	
	Barium content	Less than 2.5%	
	Lead-oxide content	Less than 0.02%	
	Other heavy elements	Trace quantities	
Solution density	(1.053 ± 0.001) g·mL ⁻¹ at 21.4 °C [b]*		
Solution mass	(5.258 ± 0.002) g [b]		
Chemical Properties:			
Solution composition	Chemical Formula	Concentration (mol·L ⁻¹)	Mass Fraction (g·g ⁻¹)
	H ₂ O	53	0.91
	HNO ₃	1.0	0.06
	UO ₂ (NO ₃) ₂	0.09	0.03
Radiological Properties:			
Radionuclide	Natural Uranium (Mixture of U-238, U-235, and U-234)		
Reference time	1200 EST, 1 August 1997		
Massic activity of the solution [c]	U-238: 242.0 Bq·g ⁻¹ U-235: 11.14 Bq·g ⁻¹ U-234: 233.1 Bq·g ⁻¹		
Relative expanded uncertainty (k=2)	U-238: 0.60% [d] [e] U-235: 0.62% [d] [e] U-234: 0.98% [d] [e]		
Mass fraction of uranium	(0.01960 ± 0.00010) g·g ⁻¹ [b]		
Photon-emitting impurities	None detected [f]		
Half lives used	Uranium-238: (4.468 ± 0.003) × 10 ⁹ a [g] Uranium-235: (7.038 ± 0.005) × 10 ⁸ a [g] Uranium-234: (2.455 ± 0.006) × 10 ⁵ a [g]		
Measuring instruments	Mass spectrometer, silicon surface-barrier detector, and 4π(α+β) liquid-scintillation counting systems.		

*Notes and references are on pages 5 and 6.

EVALUATION OF THE UNCERTAINTY OF THE MASSIC ACTIVITY [d]*

Input Quantity x_i , the source of uncertainty (and individual uncertainty components where appropriate)	Method Used To Evaluate $u(x_i)$, the standard uncertainty of x_i (A) denotes evaluation by statistical methods (B) denotes evaluation by other methods	Relative Uncertainty Of Input Quantity, $u(x_i)/x_i$, (%) [h]	Relative Sensitivity Factor, $ \partial y/\partial x_i \cdot$ (x_i/y) [i]	Relative Uncertainty Of Output Quantity, $u_i(y)/y$, (%) [j]
Isotopic uranium atom fraction in SRM 960	Standard deviation of the mean for repeated mass-spectrometric measurements (A)	U-238: 0.001 U-235: 0.07 U-234: 0.31	1.0 1.0 1.0	0.001 0.07 0.31
Half life	Standard uncertainty of the half life (A)	U-238: 0.07 U-235: 0.07 U-234: 0.25	1.0 1.0 1.0	0.07 0.07 0.25
Uranium mass fraction in SRM 960	Certificate value (B)	0.003	1.0	0.003
Quantitative dissolution	Estimated (B)	0.25	1.0	0.25
Gravimetric measurements	Estimated (B)	0.10	1.0	0.10
Photon-emitting impurities	Limit of detection (B) [k]	100.	0.001	0.10
Relative Combined Standard Uncertainty of the Output Quantity, $u_c(y)/y$, (%)			U-238: U-235: U-234:	0.30 0.31 0.49
Coverage Factor, k				<u>2</u>
Relative Expanded Uncertainty of the Output Quantity, U/y , (%)			U-238: U-235: U-234:	0.60 0.62 0.98

NOTES

- [a] The Sievert is the SI unit for dose equivalent. See reference [1]. One μSv is equal to 0.1 mrem.
 Distance from Ampoule (cm): 1 30 100
 Approximate Dose Rate ($\mu\text{Sv/h}$): <0.1
- [b] The stated uncertainty is two times the standard uncertainty.
- [c] Massic activity is the preferred name for the quantity activity divided by the total mass of the sample.
 See reference [1].
- [d] The reported value, y , of massic activity (activity per unit mass) at the reference time was not measured directly but was derived from measurements and calculations of other quantities. This can be expressed as $y = f(x_1, x_2, x_3, \dots, x_n)$, where f is a mathematical function derived from the assumed model of the measurement process.
- The value, x_i , used for each input quantity i has a standard uncertainty, $u(x_i)$, that generates a corresponding uncertainty in y , $u_i(y) = |\partial y / \partial x_i| \cdot u(x_i)$, called a component of combined standard uncertainty of y .
- The combined standard uncertainty of y , $u_c(y)$, is the positive square root of the sum of the squares of the components of combined standard uncertainty.
- The combined standard uncertainty is multiplied by a coverage factor of $k = 2$ to obtain U , the expanded uncertainty of y .
- Since it can be assumed that the possible estimated values of the massic activity are approximately normally distributed with approximate standard deviation $u_c(y)$, the unknown value of the massic activity is believed to lie in the interval $y \pm U$ with a level of confidence of approximately 95 percent.
- For further information on the expression of uncertainties, see references [2] and [3].
- [e] The value of each standard uncertainty component, and hence the value of the expanded uncertainty itself, is a best estimate based upon all available information, but is only approximately known. That is to say, the "uncertainty of the uncertainty" is large and not well known. This is true for uncertainties evaluated by statistical methods (e.g., the relative standard deviation of the standard deviation of the mean for the massic count rate is approximately 50%) and for uncertainties evaluated by other methods (which could easily be over estimated or under estimated by substantial amounts). The unknown value of the expanded uncertainty is believed to lie in the interval $U/2$ to $2U$ (i.e., within a factor of 2 of the estimated value).
- [f] Estimated limits of detection for photon-emitting impurities are:
 1.4 $\gamma \cdot \text{s}^{-1} \cdot \text{g}^{-1}$ for energies between 8 and 59 keV,
 1.1 $\gamma \cdot \text{s}^{-1} \cdot \text{g}^{-1}$ for energies between 67 and 88 keV,
 0.5 $\gamma \cdot \text{s}^{-1} \cdot \text{g}^{-1}$ for energies between 102 and 197 keV,
 0.3 $\gamma \cdot \text{s}^{-1} \cdot \text{g}^{-1}$ for energies between 205 and 762 keV,
 0.2 $\gamma \cdot \text{s}^{-1} \cdot \text{g}^{-1}$ for energies between 770 and 996 keV, and
 0.1 $\gamma \cdot \text{s}^{-1} \cdot \text{g}^{-1}$ for energies between 1006 and 1900 keV,
 provided that the photons are separated in energy by 4 keV or more from photons emitted in the decay of uranium-238, uranium-235, uranium-234, or their progeny.
- [g] The stated uncertainty is the standard uncertainty. See reference [5].

Relative standard uncertainty of the input quantity x_i .

The relative change in the output quantity y divided by the relative change in the input quantity x_i . If $|\partial y/\partial x_i| \cdot (x_i/y) = 1.0$, then a 1% change in x_i results in a 1% change in y . If $|\partial y/\partial x_i| \cdot (x_i/y) = 0.05$, then a 1% change in x_i results in a 0.05% change in y .

Relative component of combined standard uncertainty of output quantity y , rounded to two significant figures or less. The relative component of combined standard uncertainty of y is given by $u_i(y)/y = |\partial y/\partial x_i| \cdot u(x_i)/y = |\partial y/\partial x_i| \cdot (x_i/y) \cdot u(x_i)/x_i$. The numerical values of $u(x_i)/x_i$, $|\partial y/\partial x_i| \cdot (x_i/y)$, and $u_i(y)/y$, all dimensionless quantities, are listed in columns 3, 4, and 5, respectively. Thus, the value in column 5 is equal to the value in column 4 multiplied by the value in column 3. The input quantities are independent, or very nearly so. Hence the covariances are zero or negligible.

The standard uncertainty for each undetected impurity that might reasonably be expected to be present is estimated to be equal to the estimated limit of detection for that impurity, i.e. $u(x_i)/x_i = 100\%$. $|\partial y/\partial x_i| \cdot (x_i/y) = \{(\text{response per Bq of impurity})/(\text{response per Bq of U-238})\} \cdot \{(\text{Bq of impurity})/(\text{Bq of U-238})\}$. Thus $u_i(y)/y$ is the relative change in y if the impurity were present with a massic activity equal to the estimated limit of detection.

REFERENCES

- [1] International Organization for Standardization (ISO), *ISO Standards Handbook - Quantities and Units*, 1993. Available from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036, U.S.A. 1-212-642-4900.
- [2] International Organization for Standardization (ISO), *Guide to the Expression of Uncertainty in Measurement*, 1993. Available from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036, U.S.A. 1-212-642-4900. (Listed under ISO miscellaneous publications as "ISO Guide to the Expression 1993".)
- [3] B. N. Taylor and C. E. Kuyatt, *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*, NIST Technical Note 1297, 1994. Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20407, U.S.A.
- [4] National Council on Radiation Protection and Measurements Report No. 58, *A Handbook of Radioactivity Measurements Procedures*, Second Edition, 1985. Available from the National Council on Radiation Protection and Measurements, 7910 Woodmont Avenue, Bethesda, MD 20814 U.S.A.
- [5] Evaluated Nuclear Structure Data File (ENSDF), August 1997.

PARAGON ANALYTICS
Radiochemistry Data Package

Section 8

CHAIN OF CUSTODY

8

000068

Paragon Analytics

Sample Number(s) Cross-Reference Table

Paragon OrderNum: 0404241

Client Name: New Horizons

Client Project Name: CSMRI

Client Project Number: 2135

Client PO Number:

Client Sample	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
BB04	0404241-1		SOIL	16-Apr-04	13:10
BI17	0404241-2		SOIL	19-Apr-04	11:00
BI17	0404241-3		SOIL	19-Apr-04	11:00
BI37	0404241-4		SOIL	19-Apr-04	14:15
BI37	0404241-5		SOIL	19-Apr-04	14:15
BI42	0404241-6		SOIL	19-Apr-04	15:15
BI42	0404241-7		SOIL	19-Apr-04	15:15
H07	0404241-8		SOIL	22-Apr-04	13:00
H07	0404241-9		SOIL	22-Apr-04	13:00
H07S	0404241-10		SOIL	22-Apr-04	13:05
H07S	0404241-11		SOIL	22-Apr-04	13:05
BB04	0404241-12		SOIL	16-Apr-04	13:10
H07	0404241-13		LEACHAT	22-Apr-04	13:00
H07S	0404241-14		LEACHAT	22-Apr-04	13:05



225 Commerce Drive Fort Collins, CO 80524
800-443-1511 or (970) 490-1511 (970) 490-1522 Fax

Paragon Analyticals, Inc.

Accession Number (LAB ID) 0404241

Chain-of-Custody Date 4/23/04 Page 1 of 1

Project Name / No.: CSRI/2135 Sampler(s): * see container (circle one) Turnaround: Standard or Rush Due Dispose or Return to Client

Report To: Sally Cuffin
Phone: 303 995-3590
Fax: 303-973-8906 (cell first)
Company: NHEC
Address: 21 Dawn Heath Drive
Littleton, CO 80127

circle method or specify under comments

Sample ID	Date	Time	Lab ID	Matrix	No. of Containers
BB04	4/16/04	1310	1	S	1
BT17	4/16/04	1100	2/3	S	2
BT37	↓	1415	4/5	S	2
BT42	↓	1515	6/7	S	2
H07	4/23/04	1300	8/9	S	2
H07S	↓	1305	10/11	S	2

Comments:

* Drew Pitzer
Efrain Aquita
Cathy Tripp
Cung

* * Rush gamma screen - then do alpha specific isotopic Th, U, Pb-210, Po-210
* Perform TCLP metals - arsenic, cadmium, chromium, lead, selenium, silver, vanadium, zinc, mercury, molybdenum - use alpha spec substrate
Form 2024-XIS (1/3/01)

Relinquished By: Signature _____

Printed Name Sally M. Cuffin

Date 4/23/04

Time 11:00

Company NHEC

Received By: Signature _____

Printed Name Amy Wolf

Date 4/23/04

Time 1530

Company Paragon Analyticals

Relinquished By: Signature _____

Printed Name _____

Date _____

Time _____

Company _____

Received By: Signature _____

Printed Name _____

Date _____

Time _____

Company _____

070000

CONDITION OF SAMPLE UPON RECEIPT FORM

CLIENT: New Horizons WORKORDER NO: 0404241

PROJECT MANAGER: Deb Fazio INITIALS: DF DATE: 4/23/04

1. Does this project require any special handling in addition to standard Paragon procedures? IS PRE-SCREENING REQUIRED? (radiochemistry, DOE, etc.)		Yes	<input checked="" type="radio"/> No
2. Are custody seals on shipping containers intact? How many custody seals are provided? _____	<input checked="" type="radio"/> N/A	Yes	<input checked="" type="radio"/> No
3. Are the custody seals on sample containers intact?	<input checked="" type="radio"/> N/A	Yes	No
4. Is there a Chain-of-Custody (COC) or other representative documents, letters, or shipping memos?		<input checked="" type="radio"/> Yes	No
5. Is the COC complete? Relinquished: Yes <input checked="" type="checkbox"/> No <input checked="" type="checkbox"/> Analyses Requested: Yes <input checked="" type="checkbox"/> No <input checked="" type="checkbox"/>	N/A	<input checked="" type="radio"/> Yes	No
6. Is the COC in agreement with the samples received? No. of Samples: Yes <input checked="" type="checkbox"/> No <input checked="" type="checkbox"/> Sample ID's: Yes <input checked="" type="checkbox"/> No <input checked="" type="checkbox"/> Matrix: Yes <input checked="" type="checkbox"/> No <input checked="" type="checkbox"/> No. of Containers: Yes <input checked="" type="checkbox"/> No <input checked="" type="checkbox"/>	N/A	<input checked="" type="radio"/> Yes	No
7. Were COC (if applicable) and sample labels legible?		<input checked="" type="radio"/> Yes	No
8. Were airbills present and/or removable?	<input checked="" type="radio"/> N/A	Yes	No
9. Are all aqueous samples requiring chemical preservation preserved correctly (excluding volatile organics)? Are all aqueous non-preserved samples at the correct pH?	<input checked="" type="radio"/> N/A	Yes	No
10. Is there enough sample for requested analyses? If so, were samples placed in the proper containers?		<input checked="" type="radio"/> Yes	No
11. Are all samples within holding times for the requested analyses?		<input checked="" type="radio"/> Yes	No
12. Were all sample containers received intact? (not broken or leaking, etc.)		<input checked="" type="radio"/> Yes	No
13. Are samples requiring no headspace (volatiles, reactive cyanide/sulfide, radon), headspace free? Size of bubble: ___ < green pea; ___ > green pea (List sample IDs and affected containers on Page 2)	<input checked="" type="radio"/> N/A	Yes	No
14. Were samples checked for and free from the presence of residual chlorine?	<input checked="" type="radio"/> N/A	Yes	No
15. Were the sample(s) shipped on ice?	<input checked="" type="radio"/> N/A	Yes	No
16. Were cooler temperatures measured at 0.1 - 6 °C? IR Gun Used*: 1 2	<input checked="" type="radio"/> N/A	Yes	No
17. Were all samples cooled that should have been cooled?	<input checked="" type="radio"/> N/A	Yes	No

Cooler #'s 1
 Temperature Ambient °C
 Project Manager Signature / Date: Debbu Fazio 4/26/04

A NO RESPONSE TO ANY QUESTION EXCEPT # 1 REQUIRES THE COMPLETION OF PAGE 2 OF THIS FORM

* IR Gun #1 (original): Raytek, SN SC-PM3/T29403
 IR Gun #2 (newer): Oakton, SN 2SCIR1201

PARAGON ANALYTICS
Radiochemistry Data Package

Section 9

**ADDITIONAL
SUPPORTING
DOCUMENTATION**

9

000072

Calibration Data Summary

Laboratory Name: Paragon Analytics
 PAI Work Order: 0404241

Prep SOP: PAI 778
 Analytical SOP: PAI 714

Reported on: Friday, May 21, 2004
 9:49:38 AM

Lab Sample ID Spectrum Analysis Date	QC Type	Batch ID Analysis Run	Test Name	Detector Id	Eff Spectrum Bkg Spectrum Egy Spectrum	Eff Date Bkg Date Egy Date	RESULTS %Efficiency Bkg CPM Energy keV	FLAGS Efficiency Background Energy	LCL %Efficiency Bkg CPM Energy keV	LWL %Efficiency Bkg CPM Energy keV	UWL %Efficiency Bkg CPM Energy keV	UCL %Efficiency Bkg CPM Energy keV
0404241-3 U42413 5/10/2004	SMP	AS040428-5 AS040428-5A	UIISO	15	C4050415 B4050415 C4050415	5/4/2004 5/5/2004 5/4/2004	29.99 0.4370 5537.2	Pass Warning Warning	28.43 0.0000 5538.0	28.94 0.0500 5538.0	30.83 0.4000 5550.0	31.43 0.5000 5553.0
0404241-5 U42415 5/10/2004	SMP	AS040428-5 AS040428-5A	UIISO	16	C4050416 B4050416 C4050416	5/4/2004 5/5/2004 5/4/2004	29.04 0.2570 5549.5	Pass Pass Pass	27.77 0.0000 5506.9	28.27 0.0500 5516.9	30.11 0.4000 5596.9	30.69 0.5000 5606.9
0404241-7 U42417 5/10/2004	SMP	AS040428-5 AS040428-5A	UIISO	17	C4050417 B4050417 C4050417	5/4/2004 5/5/2004 5/4/2004	30.21 0.4030 5530.3	Pass Warning Pass	29.36 0.0000 5483.4	29.88 0.0500 5483.4	31.83 0.4000 5573.4	32.45 0.5000 5583.4
0404241-7 U42417D 5/10/2004	DUP	AS040428-5 AS040428-5A	UIISO	18	C4051018 B4050418 C4051018	5/10/2004 5/5/2004 5/10/2004	29.54 0.3180 5545.6	Pass Pass Pass	28.80 0.0000 5499.6	29.32 0.0500 5509.6	31.23 0.4000 5589.6	31.84 0.5000 5599.6
0404241-9 U42419 5/19/2004	SMP	AS040428-5 AS040428-5A	UIISO	18	C4051818 B4051818 C4051818	5/18/2004 5/19/2004 5/18/2004	31.08 0.2650 5532.2	Pass Pass Pass	28.80 0.0000 5499.6	29.32 0.0500 5509.6	31.23 0.4000 5589.6	31.84 0.5000 5599.6
0404241-11 UC424111 5/16/2004	SMP	AS040428-5 AS040428-5A	UIISO	60	C4051160 B4051160 C4051160	5/11/2004 5/12/2004 5/11/2004	25.75 0.1050 5537.8	Pass Pass Pass	24.46 0.0000 5489.5	24.90 0.0500 5499.5	26.60 0.4000 5579.5	27.04 0.5000 5589.5
0404241-12 UZ424112 5/19/2004	SMP	AS040428-5 AS040428-5A	UIISO	19	C4051819 B4051819 C4051819	5/18/2004 5/19/2004 5/18/2004	29.02 0.1710 5550.4	Pass Pass Pass	27.15 0.0000 5492.2	27.64 0.0500 5502.2	29.44 0.4000 5582.2	30.01 0.5000 5592.2
AS040428-5 U4285B 5/10/2004	MB	AS040428-5 AS040428-5A	UIISO	23	C4050423 B4050423 C4050423	5/4/2004 5/5/2004 5/4/2004	28.40 0.1920 5541.0	Pass Pass Pass	27.21 0.0000 5490.3	27.72 0.0500 5500.3	29.53 0.4000 5580.3	30.10 0.5000 5590.3
AS040428-5 U4285L 5/10/2004	LCS	AS040428-5 AS040428-5A	UIISO	42	C4050442 B4050442 C4050442	5/4/2004 5/5/2004 5/4/2004	31.96 0.2090 5549.1	Pass Pass Pass	29.74 0.0000 5494.2	30.28 0.0500 5504.2	32.25 0.4000 5584.2	32.88 0.5000 5594.2

Data Package ID: U0404241-1

Abbreviations:	Eff - Efficiency	Bkg - Background	LCL - Lower Control Limit	UWL - Upper Warning Limit
	Egy - Energy	CPM - Counts per Minute	LWL - Lower Warning Limit	UCL - Upper Control Limit
				CI - The Analysis Date exceeds the Calibration Date by more than 7 days.

Date Printed: Friday, May 21, 2004

Paragon Analytics

LIMS Version: 5.018A

000073

Alpha Spectroscopy

Quality Control Data

Weekly Background, Energy, and
Efficiency Calibrations

Alpha Spec Calibration Source Re-Certification

R:\INSTAL\PHAC\CR7304.XLS

Primary Certified Source

Source PAI ID 190 was recalibrated by isotope Products Laboratories on 03-01-2003 and received by PAI on 03-04-2003.

Source ID: 92MIX223027; PAI ID 190 (Labled #9)
 Total Activity: 3754 dpm
 Ref. Date: 3/1/03
 Count Date: 3/22/04

U-234 Activity: 79.08% = 2967.90 dpm (decay corrected)
 Am-241 Activity: 19.20% = 719.56 dpm (decay corrected)
 Combined Activity: = 3687.46 dpm (decay corrected)

Detector 13 Efficiency Determination

Source Serial #	PAI ID	Sequential #	Count Date	Am-241 net cts	U-234 net cts	count dur (s)	Combined Known cpm	Known dpm	detector efficiency
92MIX223027	190	97-19-103-09	3/22/04	7824.65	32919.75	2100	1164.126	3687.46	31.57%

Sources 1 through 8 activity determination

Source Serial #	PAI ID	Sequential #	Count Date	Am-241 net cts	U-234 net cts	count dur (s)	detector efficiency	Am-241 dpm	U-234 dpm	combined dpm
92MIX2203026	182	97-19-103-01	3/22/04	13674.65	81078.76	2100	31.57%	1237.59	7337.81	8575.40
92MIX2203028	183	97-19-103-02	3/22/04	15497.65	153089.76	2100	31.57%	1402.67	13864.97	15257.54
92MIX2203024	184	97-19-103-03	3/22/04	72039.65	74346.76	2100	31.57%	6519.75	6728.55	13248.30
92MIX2203021	185	97-19-103-04	3/22/04	22309.65	63564.76	2100	31.57%	2019.07	5762.75	7771.83
92MIX2203025	186	97-19-103-05	3/22/04	102504.65	126055.76	2100	31.57%	9276.90	11408.33	20685.23
92MIX2203022	187	97-19-103-06	3/22/04	77656.69	83352.76	2100	31.57%	7028.11	7643.61	14571.72
92MIX2203023	188	97-19-103-07	3/22/04	46378.65	70580.76	2100	31.57%	4197.37	6387.72	10585.09
92MIX2203029	189	97-19-103-08	3/22/04	34881.65	219992.76	2100	31.57%	3156.87	19909.84	23066.71

Detector 13 Efficiency Verification

Source Serial #	PAI ID	Sequential #	Count Date	Am-241 net cts	U-234 net cts	count dur (s)	Combined Known cpm	Known dpm	detector efficiency	% difference from 1st count
92MIX223027	190	97-19-103-09	3/22/04	7546.69	32241.76	2100	1136.813	3687.46	30.83%	2.35%

Sources 1 through 8 activity re-verification

Source Serial #	PAI ID	Sequential #	Combined Observed dpm	Combined Certified dpm*	Percent Difference %	Within 5% of Certified value Yes/No
92MIX2203026	182	97-19-103-01	8575.40	8730.07	1.77%	Yes
92MIX2203028	183	97-19-103-02	15257.54	15767.93	3.24%	Yes
92MIX2203024	184	97-19-103-03	13248.30	13517.34	1.99%	Yes
92MIX2203021	185	97-19-103-04	7771.83	8130.72	4.41%	Yes
92MIX2203025	186	97-19-103-05	20685.23	20951.62	1.27%	Yes
92MIX2203022	187	97-19-103-06	14571.72	15242.25	4.40%	Yes
92MIX2203023	188	97-19-103-07	10585.09	10755.77	1.59%	Yes
92MIX2203029	189	97-19-103-08	23066.71	23263.22	0.84%	Yes

*Sources 185, 186, 187, & 188 decay corrected to 04/01/03.
 *Sources 182, 183, 184, & 189 decay corrected to 05/01/03.

OK - RG
 EXP 3/22/05

000075



**Isotope Products
Laboratories**

An Eckert & Ziegler Company

24937 Avenue Tibbitts
Valencia, California 91355

Tel 661-309-1010
Fax 661-257-8303

α 1

PAI 187
recalibrated 4-15-03

CERTIFICATE OF CALIBRATION MIXED ALPHA STANDARD SOURCE

Radionuclide A: U-234
Radionuclide B: U-235
Radionuclide C: Am-241
Half Life (U-234): $(2.454 \pm 0.006)E+05$ years
Half Life (U-235): $(7.037 \pm 0.011)E+08$ years
Half Life (Am-241): 432.17 ± 0.66 years

Customer: PARAGON ANALYTICS, INC.
P.O. No.: EW040203/R2193
Catalog No.: MISC-STD
Reference Date: 1-May-03 12:00 PST
Source No.: 92MIX2203026

Contained Radioactivity:			
U-234:	3.354 nCi (124.1 Bq)	Am-241:	0.6793 nCi (21.43 Bq)
U-235:	0.06566 nCi (2.429 Bq)	Total Activity:	3.998 nCi (148.0 Bq)

Physical description:

A. Capsule type:	Disk (22 mm OD X 0.79 mm THK)
B. Nature of active deposit:	Electrodeposited and diffusion bonded oxides
C. Active Diameter:	19 mm
D. Backing:	Stainless steel
E. Cover:	None

Radioimpurities: Not determined

Method of Calibration:
This source was assayed using a windowless internal gas flow proportional counter for total alpha activity. Individual nuclide ratios were taken from those determined in Mar 1998.

Uncertainty of Measurement:

A. Type A (random) uncertainty:	$\pm 0.7\%$
B. Type B (systematic) uncertainty:	$\pm 3.0\%$
C. Uncertainty in aliquot weighing:	$\pm 0.0\%$
D. Total uncertainty at the 99% confidence level:	$\pm 3.1\%$

- Notes:
- See reverse side for leak test(s) performed on this source.
 - IPL participates in a NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay (and later NIST certification) of Standard Reference Materials (As in NRC Regulatory Guide 4.15).
 - Nuclear data was taken from "Table of Radioactive Isotopes", edited by Virginia Shirley, 1986.
 - This source has a working life of 2 years.
 - This source had a total alpha surface emission rate of 4483 α /min in 2π on 11 Apr 03.

Donald James Lee Dalison
Quality Control

15-May-03
Date Signed

IPL Ref. No.: 987-7

000076



**Isotope Products
Laboratories**

An Eckert & Ziegler Company

24937 Avenue Tibbitts
Valencia, California 91355

Tel 661-309-1010
Fax 661-257-8303

α 2

PAI 183
Recalibrated 4-15-03

CERTIFICATE OF CALIBRATION MIXED ALPHA STANDARD SOURCE

Radionuclide A: U-234
Radionuclide B: U-235
Radionuclide C: Am-241
Half Life (U-234): $(2.454 \pm 0.006)E+05$ years
Half Life (U-235): $(7.037 \pm 0.011)E+08$ years
Half Life (Am-241): 432.17 ± 0.66 years

Customer: PARAGON ANALYTICS, INC.
P.O. No.: EW040203/R2193
Catalog No.: MISC-STD
Reference Date: 1-May-03 12:00 PST
Source No.: 92MIX2203028

Contained Radionctivity:

U-234:	6.467 nCi (239.3 Bq)	Am-241:	0.6366 nCi (23.55 Bq)
U-235:	0.1136 nCi (4.200 Bq)	Total Activity:	7.217 nCi (267.1 Bq)

Physical description:

- | | |
|------------------------------|--|
| A. Capsule type: | Disk (22 mm OD X 0.79 mm THK) |
| B. Nature of active deposit: | Electrodeposited and diffusion bonded oxides |
| C. Active Diameter: | 19 mm |
| D. Backing: | Stainless steel |
| E. Cover: | None |

Radioimpurities:

Not determined

Method of Calibration:

This source was assayed using a windowless internal gas flow proportional counter for total alpha activity. Individual nuclide ratios were taken from those determined in Aug 1992.

Uncertainty of Measurement:

- | | |
|---|--------|
| A. Type A (random) uncertainty: | ± 0.7% |
| B. Type B (systematic) uncertainty: | ± 3.0% |
| C. Uncertainty in aliquot weighing: | ± 0.0% |
| D. Total uncertainty at the 99% confidence level: | ± 3.1% |

Notes:

- See reverse side for leak test(s) performed on this source.
- IPL participates in a NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay (and later NIST certification) of Standard Reference Materials (As in NRC Regulatory Guide 4.15).
- Nuclear data was taken from "Table of Radioactive Isotopes", edited by Virginia Shirley, 1986.
- This source has a working life of 2 years.
- This source had a total alpha surface emission rate of 8091 α/min in 2π on 11 Apr 03.

David James Van Dusen
Quality Control

15-May-03
Date Signed

IPL Ref. No.: 987-7

ISO 9001 CERTIFIED

Medical Imaging Laboratory
24937 Avenue Tibbitts Valencia, California 91355

Industrial Gauging Laboratory
1800 North Keystone Street Burbank, California 91504

000077



Isotope Products Laboratories

An Eckert & Ziegler Company

24937 Avenue Tibbitts
Valencia, California 91355

Tel 661-309-1010
Fax 661-257-8303

$\alpha 3$

*PAI I.D 184
recalibrated 4-15-03*

CERTIFICATE OF CALIBRATION MIXED ALPHA STANDARD SOURCE

Radionuclide A: U-234
 Radionuclide B: U-235
 Radionuclide C: Am-241
 Half Life (U-234): $(2.454 \pm 0.006)E+05$ years
 Half Life (U-235): $(7.037 \pm 0.011)E+08$ years
 Half Life (Am-241): 432.17 ± 0.66 years

Customer: PARAGON ANALYTICS, INC.
 P.O. No.: EW040203/R2193
 Catalog No.: MISC-STD
 Reference Date: 1-May-03 12:00 PST
 Source No.: 92MIX2203024

Contained Radioactivity:

U-234:	3.227 nCi (119.4 Bq)	Am-241:	2.866 nCi (106.0 Bq)
U-235:	0.05205 nCi (1.926 Bq)	Total Activity:	6.145 nCi (227.3 Bq)

Physical description:

- A. Capsule type: Disk (22 mm OD, X 0.79 mm THK)
- B. Nature of active deposit: Electrodeposited and diffusion bonded oxides
- C. Active Diameter: 19 mm
- D. Backing: Stainless steel
- E. Cover: None

Radioimpurities:

Not determined

Method of Calibration:

This source was assayed using a windowless internal gas flow proportional counter for total alpha activity. Individual nuclide ratios were taken from those determined in Aug 1992.

Uncertainty of Measurement:

- A. Type A (random) uncertainty: $\pm 0.6\%$
- B. Type B (systematic) uncertainty: $\pm 3.0\%$
- C. Uncertainty in aliquot weighing: $\pm 0.0\%$
- D. Total uncertainty at the 99% confidence level: $\pm 3.1\%$

Notes:

- See reverse side for leak test(s) performed on this source.
- IPL participates in a NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay (and later NIST certification) of Standard Reference Materials (As in NRC Regulatory Guide 4.15).
- Nuclear data was taken from "Table of Radioactive Isotopes", edited by Virginia Shirley, 1986.
- This source has a working life of 2 years.
- This source had a total alpha surface emission rate of 6889 α /min in 2 π on 11 Apr 03.

Daniel James Van Dellen
Quality Control

15-4-03
Date Signed

IPL Ref. No.: 987-7

ISO 9001 CERTIFIED

Medical Imaging Laboratory
24937 Avenue Tibbitts, Valencia, California 91355

Industrial Gauging Laboratory
1800 North Keystone Street, Burbank, California 91504

000078



**Isotope Products
Laboratories**

An Eckert & Ziegler Company

24937 Avenue Tibbitts
Valencia, California 91355

Tel 661-309-1010
Fax 661-257-8303

24

PAI 40 0125
Rec'd from recalibrator
3-25-03

CERTIFICATE OF CALIBRATION ALPHA STANDARD SOURCE

Radionuclide A: U-234
Radionuclide B: U-235
Radionuclide C: Am-241
Half Life (U-234): $(2.454 \pm 0.006)E+05$ years
Half Life (U-235): $(7.037 \pm 0.011)E+08$ years
Half Life (Am-241): 432.17 ± 0.66 years

Customer: PARAGON ANALYTICS, INC.
P.O. No.: EW030603/R2155
Catalog No.: MISC-STD
Reference Date: 1-Apr-03 12:00 PST
Source No.: 92MIX2203021

Continued Radioactivity:

U-234:	2.731 nCi (101.0 Bq)	Am-241:	0.9825 nCi (34.50 Bq)
U-235:	0.03416 nCi (1.264 Bq)	Total Activity:	3.698 nCi (136.8 Bq)

Physical description:

A. Capsule type:	Disk (22 mm OD X 0.79 mm THK)
B. Nature of active deposit:	Electrodeposited and diffusion bonded oxides
C. Active Diameter:	19 mm
D. Backing:	Stainless steel
E. Cover:	None

Radioimpurities:

Not determined

Method of Calibration:

This source was assayed using a windowless internal gas flow proportional counter for total alpha activity. Individual nuclide ratios were taken from those determined in Aug 1992.

Uncertainty of Measurement:

A. Type A (random) uncertainty:	$\pm 0.8\%$
B. Type B (systematic) uncertainty:	$\pm 3.1\%$
C. Uncertainty in aliquot weighing:	$\pm 0.0\%$
D. Total uncertainty at the 99% confidence level:	$\pm 3.2\%$

Notes:

- See reverse side for leak test(s) performed on this source.
- IPL participates in a NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay (and later NIST certification) of Standard Reference Materials (As in NRC Regulatory Guide 4.15).
- Nuclear data was taken from "Table of Radioactive Isotopes", edited by Virginia Shirley, 1986.
- This source has a working life of 2 years.
- This source had a total alpha surface emission rate of 4145 α /min in 2 π on 18 Mar 03.

Daniel Thomas Van Dorem
Quality Control

19-Mar-03
Date Signed

IPL Ref. No.: 987-2

ISO 9001 CERTIFIED

Medical Imaging Laboratory
1937 Avenue Tibbitts Valencia, California 91355

Industrial Gauging Laboratory
1800 North Keystone Street Burbank, California 91504

000075



Isotope Products
Laboratories

An Eckert & Ziegler Company

24937 Avenue Tibbitts
Valencia, California 91355

Tel 661-309-1010
Fax 661-257-8303

25

PAID 06-186
Specification
received 196
3-28-03

CERTIFICATE OF CALIBRATION ALPHA STANDARD SOURCE

Radionuclide A: U-234
Radionuclide B: U-235
Radionuclide C: Am-241
Half Life (U-234): $(2.454 \pm 0.006)E+05$ years
Half Life (U-235): $(7.037 \pm 0.011)E+08$ years
Half Life (Am-241): 432.17 ± 0.66 years

Customer: PARAGON ANALYTICS, INC.
P.O. No.: EW030603/R2155
Catalog No.: MISC-STD
Reference Date: 1-Apr-03 12:00 PST
Source No.: 92MIX2203025

Contained Radioactivity:			
U-234:	5.486 nCi (203.0 Bq)	Am-241:	3.958 nCi (146.4 Bq)
U-235:	0.09221 nCi (3.412 Bq)	Total Activity:	9.536 nCi (352.8 Bq)

Physical description:

A. Capsule type:	Disk (22 mm OD X 0.79 mm THK)
B. Nature of active deposit:	Electrodeposited and diffusion bonded oxides
C. Active Diameter:	19 mm
D. Backing:	Stainless steel
E. Cover:	None

Radioimpurities: Not determined

Method of Calibration:
This source was assayed using a windowless internal gas flow proportional counter for total alpha activity. Individual nuclide ratios were taken from those determined in Aug 1992.

Uncertainty of Measurement:

A. Type A (random) uncertainty:	$\pm 0.8\%$
B. Type B (systematic) uncertainty:	$\pm 3.1\%$
C. Uncertainty in aliquot weighing:	$\pm 0.0\%$
D. Total uncertainty at the 99% confidence level:	$\pm 3.2\%$

- Notes:
- See reverse side for leak test(s) performed on this source.
 - IPL participates in a NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay (and later NIST certification) of Standard Reference Materials (As in NRC Regulatory Guide 4.15).
 - Nuclear data was taken from "Table of Radioactive Isotopes", edited by Virginia Shirley, 1986.
 - This source has a working life of 2 years.
 - This source had a total alpha surface emission rate of 10690 α /min in 2π on 18 Mar 03.

Daniel Kenneth Dalson
Quality Control

19-Mar-03
Date Signed

IPL Ref. No.: 987-2

000080



Isotope Products Laboratories

An Eckert & Ziegler Company

24937 Avenue Tibbitts
Valencia, California 91355

Tel 661-309-1010
Fax 661-257-8303

26

DATE, 03-18-03
level for recalibrate
3-25-03

CERTIFICATE OF CALIBRATION ALPHA STANDARD SOURCE

Radionuclide A: U-234
Radionuclide B: U-235
Radionuclide C: Am-241
Half Life (U-234): $(2.454 \pm 0.006)E+05$ years
Half Life (U-235): $(7.037 \pm 0.011)E+08$ years
Half Life (Am-241): 432.17 ± 0.66 years

Customer: PARAGON ANALYTICS, INC.
P.O. No.: EW030603/R2155
Catalog No.: MISC-STD
Reference Date: 1-Apr-03 12:00 PST
Source No.: 92MIX2203022

Contained Radioactivity:

U-234: 3.592 nCi (132.9 Bq)
U-235: 0.08556 nCi (3.166 Bq)

Am-241: 3.279 nCi (121.3 Bq)
Total Activity: 6.957 nCi (257.4 Bq)

Physical description:

- | | |
|------------------------------|--|
| A. Capsule type: | Disk (22 mm OD X 0.79 mm THK) |
| B. Nature of active deposit: | Electrodeposited and diffusion bonded oxides |
| C. Active Diameter: | 19 mm |
| D. Backing: | Stainless steel |
| E. Cover: | None |

Radioimpurities:

Not determined

Method of Calibration:

This source was assayed using a windowless internal gas flow proportional counter for total alpha activity. Individual nuclide ratios were taken from those determined in Aug 1992.

Uncertainty of Measurement:

- | | |
|---|--------|
| A. Type A (random) uncertainty: | ± 0.8% |
| B. Type B (systematic) uncertainty: | ± 3.1% |
| C. Uncertainty in aliquot weighing: | ± 0.0% |
| D. Total uncertainty at the 99% confidence level: | ± 3.2% |

Notes:

- See reverse side for leak test(s) performed on this source.
- IPL participates in a NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay (and later NIST certification) of Standard Reference Materials (As in NRC Regulatory Guide 4.15).
- Nuclear data was taken from "Table of Radioactive Isotopes", edited by Virginia Shirley, 1986.
- This source has a working life of 2 years.
- This source had a total alpha surface emission rate of 7799 α /min in 2π on 18 Mar 03.

Daniel James Van Der Kolk
Quality Control

19-Mar-03
Date Signed

IPL Ref. No.: 987-2

ISO 9001 CERTIFIED

Medical Imaging Laboratory
24937 Avenue Tibbitts Valencia, California 91355

Industrial Gauging Laboratory
200 North Keystone Street Burbank, California 91304

000081



**Isotope Products
Laboratories**

An Eckert & Ziegler Company

24937 Avenue Tibbitts
Valencia, California 91355

Tel 661-309-1010
Fax 661-257-8303

27

PAID 188
Spec for recalibration
3-28-03

**CERTIFICATE OF CALIBRATION
ALPHA STANDARD SOURCE**

Radionuclide A: U-234
Radionuclide B: U-235
Radionuclide C: Am-241
Half Life (U-234): (2.454 ± 0.006)E+05 years
Half Life (U-235): (7.037 ± 0.011)E+08 years
Half Life (Am-241): 432.17 ± 0.66 years

Customer: PARAGON ANALYTICS, INC.
P.O. No.: EW030603/R2155
Catalog No.: MISC-STD
Reference Date: 1-Apr-03 12:00 PST
Source No.: 92MIX2203023

Contained Radioactivity:

U-234: 2.895 nCi (107.1 Bq)
U-235: 0.02502 nCi (0.9257 Bq)

Am-241: 1.953 nCi (72.26 Bq)
Total Activity: 4.873 nCi (180.3 Bq)

Physical description:

- A. Capsule type: Disk (22 mm OD X 0.79 mm THK)
- B. Nature of active deposit: Electrodeposited and diffusion bonded oxides
- C. Active Diameter: 19 mm
- D. Backing: Stainless steel
- E. Cover: None

Radioimpurities:

Not determined

Method of Calibration:

This source was assayed using a windowless internal gas flow proportional counter for total alpha activity. Individual nuclide ratios were taken from those determined in Aug 1992.

Uncertainty of Measurement:

- A. Type A (random) uncertainty: ± 0.8%
- B. Type B (systematic) uncertainty: ± 3.1%
- C. Uncertainty in aliquot weighing: ± 0.0%
- D. Total uncertainty at the 99% confidence level: ± 3.2%

Notes:

- See reverse side for leak test(s) performed on this source.
- IPL participates in a NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay (and later NIST certification) of Standard Reference Materials (As in NRC Regulatory Guide 4.15).
- Nuclear data was taken from "Table of Radioactive Isotopes", edited by Virginia Shirley, 1986.
- This source has a working life of 2 years.
- This source had a total alpha surface emission rate of 5463 c/min in 2π on 18 Mar 03.

David James Van Dalen
Quality Control

19-Mar-03
Date Signed

IPL Ref. No.: 987-2

ISO 9001 CERTIFIED

Medical Imaging Laboratory
24937 Avenue Tibbitts Valencia, California 91355

Industrial Gauging Laboratory
1800 North Keystone Street Burbank, California 91504

000082



**Isotope Products
Laboratories**

An Eckert & Ziegler Company

14937 Avenue Tibblitts
Valencia, California 91355

Tel 661-309-1010
Fax 661-257-8303

28

PAI ID 189
rec'd 4-21-03
recalibrated 4-15-03

CERTIFICATE OF CALIBRATION MIXED ALPHA STANDARD SOURCE

Radionuclide A:	U-234	Customer:	PARAGON ANALYTICS, INC.
Radionuclide B:	U-235	P.O. No.:	EW040203/R2193
Radionuclide C:	Am-241	Catalog No.:	MISC-STD
Half Life (U-234):	(2.454 ± 0.006)E+05 years	Reference Date:	1-May-03 12:00 PST
Half Life (U-235):	(7.037 ± 0.011)E+08 years	Source No.:	92MIX2203029
Half Life (Am-241):	432.17 ± 0.66 years		

Contained Radioactivity:		Am-241:	1.433 nCi (53.02 Bq)
U-234:	9.048 nCi (334.8 Bq)	Total Activity:	10.66 nCi (394.4 Bq)
U-235:	0.1771 nCi (6.553 Bq)		

Physical description:

A. Capsule type:	Disk (22 mm OD X 0.79 mm THK)
B. Nature of active deposit:	Electrodeposited and diffusion bonded oxides
C. Active Diameter:	19 mm
D. Backing:	Stainless steel
E. Cover:	None

Radioimpurities: Not determined

Method of Calibration:
This source was assayed using a windowless internal gas flow proportional counter for total alpha activity. Individual nuclide ratios were taken from those determined in Mar 1998.

Uncertainty of Measurement:

A. Type A (random) uncertainty:	± 0.5%
B. Type B (systematic) uncertainty:	± 3.0%
C. Uncertainty in aliquot weighing:	± 0.0%
D. Total uncertainty at the 99% confidence level:	± 3.0%

- Notes:
- See reverse side for leak test(s) performed on this source.
 - IPL participates in a NIST measurement assurance program to establish and maintain implicit traceability for a number of nuclides, based on the blind assay (and later NIST certification) of Standard Reference Materials (As in NRC Regulatory Guide 4.15).
 - Nuclear data was taken from "Table of Radioactive Isotopes", edited by Virginia Shirley, 1986.
 - This source has a working life of 2 years.
 - This source had a total alpha surface emission rate of 11950 α/min in 2π on 11 Apr 03.

Daniel James Gordon Dalton
Quality Control

15-APR-03
Date Signed

IPL Ref. No.: 987-7

000083