Paragon Analytics
Radiochemistry Case Narrative
Isotopic Thorium

Kent & Sullivan Inc.

Ross Adams

PA WO 0405096

1. This report consists of the analytical results for 28 samples received by Paragon on 05/11/04.

2. These samples were prepared according to Paragon Analytics procedures PA SOP773R8, PA SOP777R7, and PA SOP721R10. Modifications were made to the method as described on QASS 268111.

3. The samples were analyzed for the presence of isotopic thorium according to Paragon Analytics procedure PA SOP714R8 and R9. The analyses were completed on 07/28/04.

4. The isotopic analysis results for these samples are reported on a dry weight basis in units of pCi/gram.

5. In order to meet the requirements for a different client's samples that were prepared in the same batch (AS040720-4), a duplicate Laboratory Control Sample was prepared and analyzed. The results for this additional QA measure are submitted in this report.

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. Samples MSED-08 and MSED-10 (PA ID 0405096-8 and 0405096-10) were initially prepared in batch AS040603-3 on 06/03/04. Due to high levels of native thorium present in these samples, spectral quality was inadequate for accurate quantification. The samples were re-prepared in batch AS040611-2 on 06/11/04 at a reduced aliquot. Spectral quality of sample MSED-10 improved and was adequate for accurate quantification. However after analysis, sample MSED-08 still exhibited poor spectral quality, making quantification of the data inaccurate. Therefore, the sample and the

associated batch QC (AS040611-2MB and –2LCS) was submitted to the preparatory lab for a clean-up procedure, described on QASS 268168. The sample was re-analyzed as the same batch ID on 06/07/04. The clean-up procedure was successful in that spectral quality was improved, providing accurate quantification of the data. The results of the clean-up data are submitted in this report. Please refer to NCR 5725 and 5840 in Section 5 of this report.

8. Samples MSED-08 and SSED-08 (PA ID's 0405096-8 and 0405096-18) spectrum exhibits tailing of Th-228 into the Th-229 region of interest. This could potentially bias the chemical yield high, which in turn could result in biasing the reported results of these samples low. The data is submitted without further qualification, with the exception of this written warning.

9. Due to elevated activity, some samples were prepared at a reduced aliquot. Method blanks AS040603-4MB and AS040611-2MB associated with these samples were also prepared at a similar reduced aliquot to facilitate an accurate comparison with the samples. Consequently, the requested MDC (0.1 pCi/gram) was not met for these method blanks. They were only given a 300-minute count, but the achieved MDC values of the method blanks are less than one fifth the activity measured in the associated samples. Data quality is not affected by this shorter analysis time.

10. The requested MDC (0.1 pCi/g) was not met for many of the samples in this work order. However, the reported activities of these samples are greater than the achieved MDC values. They are identified with an "M3" flag on the final reports.

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

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

Sharon Muller — 7-30-04
Sharon Muller — Date
Radiochemistry Instrumentation

John Petro — 7/30/04
Radiochemistry Final Data Review — Date

1

PARAGON ANALYTICS
Radiochemistry Data Package

Section 1

SAMPLE RESULTS SUMMARY

Isotopic Thorium By Alpha Spectroscopy Sample Results Summary

Client Name: Kent & Sullivan Inc.
Client Project Name: Ross Adams
Client Project Number:

Laboratory Name: Paragon Analytics
PAI Work Order: 0405096

Reported on: Thursday, July 29, 2004 5:15:11 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0405096-1	MSED-01	Sample	Th-228	0.065 +/- 0.056	0.093	pCi/g	SOIL	AS040603-3	6/23/2004	U
0405096-1	MSED-01	Sample	Th-230	0.211 +/- 0.090	0.099	pCi/g	SOIL	AS040603-3	6/23/2004	
0405096-1	MSED-01	Sample	Th-232	0.133 +/- 0.062	0.042	pCi/g	SOIL	AS040603-3	6/23/2004	
0405096-2	MSED-02	Sample	Th-228	0.157 +/- 0.077	0.103	pCi/g	SOIL	AS040603-3	6/10/2004	M3
0405096-2	MSED-02	Sample	Th-230	0.284 +/- 0.098	0.092	pCi/g	SOIL	AS040603-3	6/10/2004	
0405096-2	MSED-02	Sample	Th-232	0.137 +/- 0.058	0.014	pCi/g	SOIL	AS040603-3	6/10/2004	
0405096-3	MSED-03	Sample	Th-228	0.140 +/- 0.070	0.083	pCi/g	SOIL	AS040603-3	6/10/2004	
0405096-3	MSED-03	Sample	Th-230	0.30 +/- 0.11	0.10	pCi/g	SOIL	AS040603-3	6/10/2004	
0405096-3	MSED-03	Sample	Th-232	0.180 +/- 0.072	0.044	pCi/g	SOIL	AS040603-3	6/10/2004	

Comments:

Data Package ID: *th0405096-1*

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

000004

Isotopic Thorium By Alpha Spectroscopy Sample Results Summary

Client Name: Kent & Sullivan Inc.
Client Project Name: Ross Adams
Client Project Number:

Laboratory Name: Paragon Analytics
PAI Work Order: 0405096

Reported on: Thursday, July 29, 2004 5:15:11 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0405096-5	MSED-05	Sample	Th-228	2.72 +/- 0.53	0.08	pCi/g	SOIL	AS040603-3	6/10/2004	
0405096-5	MSED-05	Sample	Th-230	6.2 +/- 1.1	0.1	pCi/g	SOIL	AS040603-3	6/10/2004	
0405096-5	MSED-05	Sample	Th-232	4.32 +/- 0.80	0.03	pCi/g	SOIL	AS040603-3	6/10/2004	
0405096-6	MSED-06	Sample	Th-228	0.75 +/- 0.22	0.14	pCi/g	SOIL	AS040720-4	7/27/2004	M3
0405096-6	MSED-06	Sample	Th-230	0.91 +/- 0.25	0.17	pCi/g	SOIL	AS040720-4	7/27/2004	M3
0405096-6	MSED-06	Sample	Th-232	1.11 +/- 0.28	0.02	pCi/g	SOIL	AS040720-4	7/27/2004	
0405096-7	MSED-07	Sample	Th-228	75 +/- 13	1	pCi/g	SOIL	AS040603-4	6/10/2004	M3
0405096-7	MSED-07	Sample	Th-230	149 +/- 26	1	pCi/g	SOIL	AS040603-4	6/10/2004	M3
0405096-7	MSED-07	Sample	Th-232	79 +/- 14	0	pCi/g	SOIL	AS040603-4	6/10/2004	M3

Comments:

Data Package ID: *th0405096-1*

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

00005

Isotopic Thorium By Alpha Spectroscopy Sample Results Summary

Client Name: Kent & Sullivan Inc.
Client Project Name: Ross Adams
Client Project Number:

Laboratory Name: Paragon Analytics
PAI Work Order: 0405096

Reported on: Thursday, July 29, 2004 5:15:11 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0405096-8	MSED-08	Sample	Th-228	123 +/- 21	0	pCi/g	SOIL	AS040611-2	7/28/2004	M3
0405096-8	MSED-08	Sample	Th-230	222 +/- 39	0	pCi/g	SOIL	AS040611-2	7/28/2004	M3
0405096-8	MSED-08	Sample	Th-232	117 +/- 20	0	pCi/g	SOIL	AS040611-2	7/28/2004	M3
0405096-9	MSED-09	Sample	Th-228	17.1 +/- 3.0	0.2	pCi/g	SOIL	AS040603-4	6/10/2004	M3
0405096-9	MSED-09	Sample	Th-230	33.7 +/- 5.8	0.2	pCi/g	SOIL	AS040603-4	6/10/2004	M3
0405096-9	MSED-09	Sample	Th-232	20.2 +/- 3.5	0.1	pCi/g	SOIL	AS040603-4	6/10/2004	
0405096-10	MSED-10	Sample	Th-228	30.0 +/- 5.1	0.3	pCi/g	SOIL	AS040611-2	6/18/2004	M3
0405096-10	MSED-10	Sample	Th-230	64 +/- 11	0	pCi/g	SOIL	AS040611-2	6/18/2004	M3
0405096-10	MSED-10	Sample	Th-232	34.6 +/- 5.9	0.1	pCi/g	SOIL	AS040611-2	6/18/2004	

Comments:

Data Package ID: *th0405096-1*

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

00005

Isotopic Thorium By Alpha Spectroscopy Sample Results Summary

Client Name: Kent & Sullivan Inc.
Client Project Name: Ross Adams
Client Project Number:

Laboratory Name: Paragon Analytics
PAI Work Order: 0405096

Reported on: Thursday, July 29, 2004 5:15:11 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0405096-11	SSED-01	Sample	Th-228	1.32 +/- 0.27	0.07	pCi/g	SOIL	AS040603-3	6/10/2004	
0405096-11	SSED-01	Sample	Th-230	1.85 +/- 0.35	0.08	pCi/g	SOIL	AS040603-3	6/10/2004	
0405096-11	SSED-01	Sample	Th-232	1.30 +/- 0.26	0.04	pCi/g	SOIL	AS040603-3	6/10/2004	
0405096-12	SSED-02	Sample	Th-228	1.00 +/- 0.21	0.11	pCi/g	SOIL	AS040603-3	6/10/2004	M3
0405096-12	SSED-02	Sample	Th-230	1.65 +/- 0.32	0.08	pCi/g	SOIL	AS040603-3	6/10/2004	
0405096-12	SSED-02	Sample	Th-232	1.83 +/- 0.35	0.03	pCi/g	SOIL	AS040603-3	6/10/2004	
0405096-13	SSED-03	Sample	Th-228	0.83 +/- 0.20	0.10	pCi/g	SOIL	AS040603-3	6/10/2004	M3
0405096-13	SSED-03	Sample	Th-230	4.63 +/- 0.85	0.09	pCi/g	SOIL	AS040603-3	6/10/2004	
0405096-13	SSED-03	Sample	Th-232	0.75 +/- 0.18	0.04	pCi/g	SOIL	AS040603-3	6/10/2004	

Comments:

Data Package ID: *th0405096-1*

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

0007

Isotopic Thorium By Alpha Spectroscopy Sample Results Summary

Client Name: Kent & Sullivan Inc.
Client Project Name: Ross Adams
Client Project Number:

Laboratory Name: Paragon Analytics
PAI Work Order: 0405096

Reported on: Thursday, July 29, 2004 5:15:11 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0405096-14	SSED-04	Sample	Th-228	0.88 +/- 0.19	0.06	pCi/g	SOIL	AS040603-3	6/10/2004	
0405096-14	SSED-04	Sample	Th-230	0.96 +/- 0.20	0.08	pCi/g	SOIL	AS040603-3	6/10/2004	
0405096-14	SSED-04	Sample	Th-232	0.59 +/- 0.13	0.02	pCi/g	SOIL	AS040603-3	6/10/2004	
0405096-15	SSED-05	Sample	Th-228	2.36 +/- 0.45	0.05	pCi/g	SOIL	AS040603-3	6/10/2004	
0405096-15	SSED-05	Sample	Th-230	4.04 +/- 0.74	0.09	pCi/g	SOIL	AS040603-3	6/10/2004	
0405096-15	SSED-05	Sample	Th-232	2.23 +/- 0.43	0.05	pCi/g	SOIL	AS040603-3	6/10/2004	
0405096-16	SSED-06	Sample	Th-228	1.09 +/- 0.23	0.06	pCi/g	SOIL	AS040603-3	6/10/2004	
0405096-16	SSED-06	Sample	Th-230	0.98 +/- 0.21	0.08	pCi/g	SOIL	AS040603-3	6/10/2004	
0405096-16	SSED-06	Sample	Th-232	0.74 +/- 0.17	0.03	pCi/g	SOIL	AS040603-3	6/10/2004	

Comments:

Data Package ID: *th0405096-1*

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

Isotopic Thorium By Alpha Spectroscopy Sample Results Summary

Client Name: Kent & Sullivan Inc.
Client Project Name: Ross Adams
Client Project Number:

Laboratory Name: Paragon Analytics
PAI Work Order: 0405096

Reported on: Thursday, July 29, 2004 5:15:12 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0405096-17	SSED-07	Sample	Th-228	1.60 +/- 0.32	0.10	pCi/g	SOIL	AS040603-3	6/10/2004	
0405096-17	SSED-07	Sample	Th-230	1.99 +/- 0.39	0.08	pCi/g	SOIL	AS040603-3	6/10/2004	
0405096-17	SSED-07	Sample	Th-232	1.25 +/- 0.26	0.04	pCi/g	SOIL	AS040603-3	6/10/2004	
0405096-18	SSED-08	Sample	Th-228	26.9 +/- 4.5	0.1	pCi/g	SOIL	AS040603-4	6/12/2004	M3
0405096-18	SSED-08	Sample	Th-230	70 +/- 12	0	pCi/g	SOIL	AS040603-4	6/12/2004	M3
0405096-18	SSED-08	Sample	Th-232	33.2 +/- 5.6	0.1	pCi/g	SOIL	AS040603-4	6/12/2004	
0405096-19	SSED-09	Sample	Th-228	4.16 +/- 0.74	0.07	pCi/g	SOIL	AS040603-3	6/10/2004	
0405096-19	SSED-09	Sample	Th-230	11.0 +/- 1.9	0.1	pCi/g	SOIL	AS040603-3	6/10/2004	
0405096-19	SSED-09	Sample	Th-232	6.0 +/- 1.0	0	pCi/g	SOIL	AS040603-3	6/10/2004	

Comments:

Data Package ID: *th0405096-1*

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

000009

Isotopic Thorium By Alpha Spectroscopy Sample Results Summary

Client Name: Kent & Sullivan Inc.
Client Project Name: Ross Adams
Client Project Number:

Laboratory Name: Paragon Analytics
PAI Work Order: 0405096

Reported on: Thursday, July 29, 2004 5:15:12 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0405096-20	SSED-10	Sample	Th-228	5.7 +/- 1.0	0.1	pCi/g	SOIL	AS040603-3	6/10/2004	
0405096-20	SSED-10	Sample	Th-230	7.8 +/- 1.4	0.1	pCi/g	SOIL	AS040603-3	6/10/2004	
0405096-20	SSED-10	Sample	Th-232	5.20 +/- 0.95	0.02	pCi/g	SOIL	AS040603-3	6/10/2004	
0405096-22	GEN-02	Sample	Th-228	4.41 +/- 0.83	0.16	pCi/g	SOIL	AS040603-3	6/10/2004	M3
0405096-22	GEN-02	Sample	Th-230	9.0 +/- 1.6	0.2	pCi/g	SOIL	AS040603-3	6/10/2004	M3
0405096-22	GEN-02	Sample	Th-232	4.38 +/- 0.81	0.05	pCi/g	SOIL	AS040603-3	6/10/2004	
0405096-25	SOIL-01	Sample	Th-228	15.2 +/- 2.7	0.1	pCi/g	SOIL	AS040603-3	6/10/2004	M3
0405096-25	SOIL-01	Sample	Th-230	28.1 +/- 4.9	0.2	pCi/g	SOIL	AS040603-3	6/10/2004	M3
0405096-25	SOIL-01	Sample	Th-232	18.0 +/- 3.2	0.1	pCi/g	SOIL	AS040603-3	6/10/2004	

Comments:

Data Package ID: *th0405096-1*

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

0010

Isotopic Thorium By Alpha Spectroscopy Sample Results Summary

Client Name: Kent & Sullivan Inc.
Client Project Name: Ross Adams
Client Project Number:

Laboratory Name: Paragon Analytics
PAI Work Order: 0405096

Reported on: Thursday, July 29, 2004 5:15:12 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0405096-26	SOIL-02	Sample	Th-228	10.5 +/- 1.8	0.1	pCi/g	SOIL	AS040603-3	6/10/2004	M3
0405096-26	SOIL-02	Sample	Th-230	18.2 +/- 3.1	0.1	pCi/g	SOIL	AS040603-3	6/10/2004	M3
0405096-26	SOIL-02	Sample	Th-232	11.1 +/- 1.9	0	pCi/g	SOIL	AS040603-3	6/10/2004	
0405096-27	SOIL-04	Sample	Th-228	100 +/- 17	1	pCi/g	SOIL	AS040603-4	6/10/2004	M3
0405096-27	SOIL-04	Sample	Th-230	223 +/- 38	1	pCi/g	SOIL	AS040603-4	6/10/2004	M3
0405096-27	SOIL-04	Sample	Th-232	84 +/- 15	0	pCi/g	SOIL	AS040603-4	6/10/2004	M3
0405096-28	SOIL-05	Sample	Th-228	24.3 +/- 4.4	0.4	pCi/g	SOIL	AS040603-4	6/10/2004	M3
0405096-28	SOIL-05	Sample	Th-230	30.9 +/- 5.5	0.7	pCi/g	SOIL	AS040603-4	6/10/2004	M3
0405096-28	SOIL-05	Sample	Th-232	20.3 +/- 3.7	0.2	pCi/g	SOIL	AS040603-4	6/10/2004	M3

Comments:

Data Package ID: *th0405096-1*

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

00011

Isotopic Thorium By Alpha Spectroscopy Sample Results Summary

Client Name: Kent & Sullivan Inc.
Client Project Name: Ross Adams
Client Project Number:

Laboratory Name: Paragon Analytics
PAI Work Order: 0405096

Reported on: Thursday, July 29, 2004 5:15:12 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0405096-29	SOIL-07	Sample	Th-228	9.6 +/- 1.7	0.2	pCi/g	SOIL	AS040603-4	6/10/2004	M3
0405096-29	SOIL-07	Sample	Th-230	5.6 +/- 1.0	0.2	pCi/g	SOIL	AS040603-4	6/10/2004	M3
0405096-29	SOIL-07	Sample	Th-232	8.3 +/- 1.5	0.1	pCi/g	SOIL	AS040603-4	6/10/2004	
0405096-30	SOIL-08	Sample	Th-228	71 +/- 12	1	pCi/g	SOIL	AS040603-4	6/10/2004	M3
0405096-30	SOIL-08	Sample	Th-230	138 +/- 24	1	pCi/g	SOIL	AS040603-4	6/10/2004	M3
0405096-30	SOIL-08	Sample	Th-232	68 +/- 12	0	pCi/g	SOIL	AS040603-4	6/10/2004	M3
0405096-31	SOIL-09	Sample	Th-228	8.2 +/- 1.4	0.1	pCi/g	SOIL	AS040603-3	6/10/2004	M3
0405096-31	SOIL-09	Sample	Th-230	5.08 +/- 0.93	0.15	pCi/g	SOIL	AS040603-3	6/10/2004	M3
0405096-31	SOIL-09	Sample	Th-232	6.9 +/- 1.2	0	pCi/g	SOIL	AS040603-3	6/10/2004	

Comments:

Data Package ID: *th0405096-1*

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

00012

Isotopic Thorium By Alpha Spectroscopy Sample Results Summary

Client Name: Kent & Sullivan Inc.
Client Project Name: Ross Adams
Client Project Number:

Laboratory Name: Paragon Analytics
PAI Work Order: 0405096

Reported on: Thursday, July 29, 2004 5:15:12 PM

Lab Sample ID	Client Sample ID	Sample Type	Nuclide	Result +/- 2 s TPU	MDC	Units	Matrix	Prep Batch	Date Analyzed	Flags
0405096-32	SOIL-10	Sample	Th-228	111 +/- 20	2	pCi/g	SOIL	AS040603-4	6/10/2004	M3
0405096-32	SOIL-10	Sample	Th-230	240 +/- 41	2	pCi/g	SOIL	AS040603-4	6/10/2004	M3
0405096-32	SOIL-10	Sample	Th-232	120 +/- 21	1	pCi/g	SOIL	AS040603-4	6/10/2004	M3

Comments:

Data Package ID: *th0405096-1*

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

00013

2

PARAGON ANALYTICS

Radiochemistry Data Package

Section 2

QC RESULTS SUMMARY

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 9

Method Blank Results

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Lab ID: AS040611-2MB

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 11-Jun-04
Date Prepared: 11-Jun-04
Date Analyzed: 23-Jun-04

Prep Batch: AS040611-2
QCBatchID: AS040611-2-2
Run ID: AS040611-2D
Count Time: 600 minutes

Final Aliquot: 1.00 g
Result Units: pCi/g
File Name: TR6112B

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	0.001 +/- 0.033	0.070	U
14269-63-7	Th-230	-0.065 +/- 0.044	0.106	U,M
7440-29-1	Th-232	0.003 +/- 0.020	0.044	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	4.618	3.31	pCi/g	71.7	30 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

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: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 8

Method Blank Results

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Lab ID: AS040603-3MB

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 03-Jun-04
Date Prepared: 03-Jun-04
Date Analyzed: 10-Jun-04

Prep Batch: AS040603-3
QCBatchID: AS040603-3-1
Run ID: AS040603-3a
Count Time: 330 minutes

Final Aliquot: 2.00 g
Result Units: pCi/g
File Name: T6033B

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	0.012 +/- 0.033	0.070	U
14269-63-7	Th-230	0.023 +/- 0.035	0.071	U
7440-29-1	Th-232	0.007 +/- 0.013	0.026	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	2.252	1.76	pCi/g	78.2	30 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

Abbreviations:

TPU - Total Propagated Uncertainty (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: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 9

Method Blank Results

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Lab ID: AS040603-4MB

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 03-Jun-04
Date Prepared: 03-Jun-04
Date Analyzed: 10-Jun-04

Prep Batch: AS040603-4
QCBatchID: AS040603-4-1
Run ID: AS040603-4A
Count Time: 300 minutes

Final Aliquot: 0.300 g
Result Units: pCi/g
File Name: T6034B

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	0.05 +/- 0.16	0.36	U,M
14269-63-7	Th-230	0.24 +/- 0.26	0.50	U,M
7440-29-1	Th-232	0.056 +/- 0.084	0.144	U,M

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	15.01	11.1	pCi/g	73.7	30 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

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: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 9

Method Blank Results

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Lab ID: AS040720-4MB

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 20-Jul-04
Date Prepared: 20-Jul-04
Date Analyzed: 27-Jul-04

Prep Batch: AS040720-4
QCBatchID: AS040720-4-2
Run ID: AS040720-4A
Count Time: 300 minutes

Final Aliquot: 2.00 g
Result Units: pCi/g
File Name: T7204B

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	0.033 +/- 0.030	0.051	U
14269-63-7	Th-230	0.012 +/- 0.037	0.080	U
7440-29-1	Th-232	0.010 +/- 0.017	0.034	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	2.252	1.56	pCi/g	69.1	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.

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: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 8

Laboratory Control Sample(s)

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Lab ID: AS040603-3LCS

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 03-Jun-04
Date Prepared: 03-Jun-04
Date Analyzed: 10-Jun-04

Prep Batch: AS040603-3
QCBatchID: AS040603-3-1
Run ID: AS040603-3a
Count Time: 330 minutes

Final Aliquot: 2.00 g
Result Units: pCi/g
File Name: T6033L

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
14269-63-7	Th-230	2.35 +/- 0.42	0.07	2.30	102	85 - 121	P

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	2.252	1.69	pCi/g	75.1	30 - 110 %	

Comments:

Qualifiers/Flags:

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

Abbreviations:

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

Data Package ID: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 9

Laboratory Control Sample(s)

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Lab ID: AS040603-4LCS

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 03-Jun-04
Date Prepared: 03-Jun-04
Date Analyzed: 10-Jun-04

Prep Batch: AS040603-4
QCBatchID: AS040603-4-1
Run ID: AS040603-4A
Count Time: 300 minutes

Final Aliquot: 0.300 g
Result Units: pCi/g
File Name: T6034L

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
14269-63-7	Th-230	16.6 +/- 3.0	0.5	15.3	108	85 - 121	P,M3

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	15.01	11.2	pCi/g	74.8	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: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 9

Laboratory Control Sample(s)

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Lab ID: AS040611-2LCS

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 11-Jun-04
Date Prepared: 11-Jun-04
Date Analyzed: 18-Jun-04

Prep Batch: AS040611-2
QCBatchID: AS040611-2-2
Run ID: AS040611-2D
Count Time: 300 minutes

Final Aliquot: 1.00 g
Result Units: pCi/g
File Name: T6112L

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
14269-63-7	Th-230	4.60 +/- 0.84	0.15	4.59	100	85 - 121	P,M3

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	4.618	3.29	pCi/g	71.3	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: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 9

Laboratory Control Sample(s)

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Lab ID: AS040720-4LCS

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 20-Jul-04
Date Prepared: 20-Jul-04
Date Analyzed: 28-Jul-04

Prep Batch: AS040720-4
QCBatchID: AS040720-4-2
Run ID: AS040720-4A
Count Time: 210 minutes

Final Aliquot: 2.00 g
Result Units: pCi/g
File Name: TR7204L

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
14269-63-7	Th-230	2.23 +/- 0.44	0.10	2.25	98.9	85 - 121	P

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	2.252	1.58	pCi/g	70.3	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: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 9

Laboratory Control Sample(s)

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Lab ID: AS040720-4LCSD

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 20-Jul-04
Date Prepared: 20-Jul-04
Date Analyzed: 27-Jul-04

Prep Batch: AS040720-4
QCBatchID: AS040720-4-2
Run ID: AS040720-4A
Count Time: 300 minutes

Final Aliquot: 2.00 g
Result Units: pCi/g
File Name: T7204LD

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
14269-63-7	Th-230	2.68 +/- 0.49	0.08	2.25	119	85 - 121	P

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	2.252	1.45	pCi/g	64.3	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: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 8

Duplicate Sample Results (DER)

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID:	MSED-02
Lab ID:	0405096-2DUP

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 06-May-04
Date Prepared: 03-Jun-04
Date Analyzed: 10-Jun-04

Prep Batch: AS040603-3
QCBatchID: AS040603-3-1
Run ID: AS040603-3a
Count Time: 300 minutes

Final Aliquot: 2.00 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: T50962D

CASNO	Analyte	Sample Result +/- 2 s TPU	Duplicate Result +/- 2 s TPU	DER	Control Limit	Lab Qualifiers
14274-82-9	Th-228	0.157 +/- 0.077	0.168 +/- 0.085	0.10	2.13	M3
14269-63-7	Th-230	0.284 +/- 0.098	0.34 +/- 0.11	0.38	2.13	
7440-29-1	Th-232	0.137 +/- 0.058	0.131 +/- 0.060	0.07	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: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 9

Duplicate Sample Results (DER)

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID: MSED-09
Lab ID: 0405096-9DUP

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 07-May-04
Date Prepared: 03-Jun-04
Date Analyzed: 10-Jun-04

Prep Batch: AS040603-4
QCBatchID: AS040603-4-1
Run ID: AS040603-4A
Count Time: 300 minutes

Final Aliquot: 1.01 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: T50969D

CASNO	Analyte	Sample Result +/- 2 s TPU	Duplicate Result +/- 2 s TPU	DER	Control Limit	Lab Qualifiers
14274-82-9	Th-228	17.1 +/- 3.0	15.9 +/- 2.8	0.27	2.13	M3
14269-63-7	Th-230	33.7 +/- 5.8	32.3 +/- 5.5	0.18	2.13	M3
7440-29-1	Th-232	20.2 +/- 3.5	19.5 +/- 3.4	0.15	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: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 8

Duplicate Sample Results (DER)

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID: SSED-03
Lab ID: 0405096-13DUP

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 04-May-04
Date Prepared: 03-Jun-04
Date Analyzed: 10-Jun-04

Prep Batch: AS040603-3
QCBatchID: AS040603-3-1
Run ID: AS040603-3a
Count Time: 300 minutes

Final Aliquot: 2.01 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: T509613D

CASNO	Analyte	Sample Result +/- 2 s TPU	Duplicate Result +/- 2 s TPU	DER	Control Limit	Lab Qualifiers
14274-82-9	Th-228	0.83 +/- 0.20	0.79 +/- 0.18	0.13	2.13	
14269-63-7	Th-230	4.63 +/- 0.85	4.37 +/- 0.78	0.23	2.13	
7440-29-1	Th-232	0.75 +/- 0.18	0.67 +/- 0.15	0.37	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: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 9

Duplicate Sample Results (DER)

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID:
Lab ID: AS040720-4LCSD

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 20-Jul-04
Date Prepared: 20-Jul-04
Date Analyzed: 27-Jul-04

Prep Batch: AS040720-4
QCBatchID: AS040720-4-2
Run ID: AS040720-4A
Count Time: 300 minutes

Final Aliquot: 2.00 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: T7204LD

CASNO	Analyte	Sample Result +/- 2 s TPU	Duplicate Result +/- 2 s TPU	DER	Control Limit	Lab Qualifiers
14269-63-7	Th-230	2.23 +/- 0.44	2.68 +/- 0.49	0.34	2.13	P

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: *TH0405096-1*

PARAGON ANALYTICS
Radiochemistry Data Package

3

Section 3

INDIVIDUAL SAMPLE RESULTS

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID: MSED-01
Lab ID: 0405096-1

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 06-May-04
Date Prepared: 03-Jun-04
Date Analyzed: 23-Jun-04

Prep Batch: AS040603-3
QCBatchID: AS040603-3-1
Run ID: AS040603-3a
Count Time: 330 minutes
Report Basis: Dry Weight

Final Aliquot: 2.00 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: TR50961

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	0.065 +/- 0.056	0.093	U
14269-63-7	Th-230	0.211 +/- 0.090	0.099	
7440-29-1	Th-232	0.133 +/- 0.062	0.042	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	2.247	0.91	pCi/g	40.3	30 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Data Package ID: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID:	MSED-02
Lab ID:	0405096-2

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 06-May-04
Date Prepared: 03-Jun-04
Date Analyzed: 10-Jun-04

Prep Batch: AS040603-3
QCBatchID: AS040603-3-1
Run ID: AS040603-3a
Count Time: 300 minutes
Report Basis: Dry Weight

Final Aliquot: 2.00 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: T50962

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	0.157 +/- 0.077	0.103	M3
14269-63-7	Th-230	0.284 +/- 0.098	0.092	
7440-29-1	Th-232	0.137 +/- 0.058	0.014	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	2.248	1.15	pCi/g	51.0	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: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 8

Sample Duplicate Results

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID: MSED-02
Lab ID: 0405096-2DUP

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 06-May-04
Date Prepared: 03-Jun-04
Date Analyzed: 10-Jun-04

Prep Batch: AS040603-3
QCBatchID: AS040603-3-1
Run ID: AS040603-3a
Count Time: 300 minutes
Report Basis: Dry Weight

Final Aliquot: 2.00 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: T50962D

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	0.168 +/- 0.085	0.120	M3
14269-63-7	Th-230	0.34 +/- 0.11	0.10	
7440-29-1	Th-232	0.131 +/- 0.060	0.045	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	2.249	1.06	pCi/g	47.0	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: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID: MSED-03
Lab ID: 0405096-3

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 06-May-04
Date Prepared: 03-Jun-04
Date Analyzed: 10-Jun-04

Prep Batch: AS040603-3
QCBatchID: AS040603-3-1
Run ID: AS040603-3a
Count Time: 330 minutes
Report Basis: Dry Weight

Final Aliquot: 2.02 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: T50963

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	0.140 +/- 0.070	0.083	
14269-63-7	Th-230	0.30 +/- 0.11	0.10	
7440-29-1	Th-232	0.180 +/- 0.072	0.044	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	2.233	0.96	pCi/g	43.2	30 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

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: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID: MSED-05
Lab ID: 0405096-5

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 06-May-04
Date Prepared: 03-Jun-04
Date Analyzed: 10-Jun-04

Prep Batch: AS040603-3
QCBatchID: AS040603-3-1
Run ID: AS040603-3a
Count Time: 300 minutes
Report Basis: Dry Weight

Final Aliquot: 2.02 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: T50965

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	2.72 +/- 0.53	0.08	
14269-63-7	Th-230	6.2 +/- 1.1	0.1	
7440-29-1	Th-232	4.32 +/- 0.80	0.03	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	2.227	1.19	pCi/g	53.3	30 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Data Package ID: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 9

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID: MSED-06
Lab ID: 0405096-6

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 07-May-04
Date Prepared: 20-Jul-04
Date Analyzed: 27-Jul-04

Prep Batch: AS040720-4
QCBatchID: AS040720-4-2
Run ID: AS040720-4A
Count Time: 300 minutes
Report Basis: Dry Weight

Final Aliquot: 1.01 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: T50966

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	0.75 +/- 0.22	0.14	M3
14269-63-7	Th-230	0.91 +/- 0.25	0.17	M3
7440-29-1	Th-232	1.11 +/- 0.28	0.02	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	4.444	2.34	pCi/g	52.6	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: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 9

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID: MSED-07
Lab ID: 0405096-7

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 07-May-04
Date Prepared: 03-Jun-04
Date Analyzed: 10-Jun-04

Prep Batch: AS040603-4
QCBatchID: AS040603-4-1
Run ID: AS040603-4A
Count Time: 300 minutes
Report Basis: Dry Weight

Final Aliquot: 0.301 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: T50967

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	75 +/- 13	1	M3
14269-63-7	Th-230	149 +/- 26	1	M3
7440-29-1	Th-232	79 +/- 14	0	M3

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	14.98	8.9	pCi/g	59.5	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: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 9

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID: MSED-08
Lab ID: 0405096-8

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 07-May-04
Date Prepared: 11-Jun-04
Date Analyzed: 28-Jul-04

Prep Batch: AS040611-2
QCBatchID: AS040611-2-2
Run ID: AS040611-2D
Count Time: 300 minutes
Report Basis: Dry Weight

Final Aliquot: 0.505 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: TC50968

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	123 +/- 21	0	M3
14269-63-7	Th-230	222 +/- 39	0	M3
7440-29-1	Th-232	117 +/- 20	0	M3

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	9.145	4.84	pCi/g	53.0	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: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 9

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID: MSED-09
Lab ID: 0405096-9

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 07-May-04
Date Prepared: 03-Jun-04
Date Analyzed: 10-Jun-04

Prep Batch: AS040603-4
QCBatchID: AS040603-4-1
Run ID: AS040603-4A
Count Time: 300 minutes
Report Basis: Dry Weight

Final Aliquot: 1.01 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: T50969

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	17.1 +/- 3.0	0.2	M3
14269-63-7	Th-230	33.7 +/- 5.8	0.2	M3
7440-29-1	Th-232	20.2 +/- 3.5	0.1	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	4.474	2.57	pCi/g	57.4	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: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 9

Sample Duplicate Results

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID: MSED-09
Lab ID: 0405096-9DUP

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 07-May-04
Date Prepared: 03-Jun-04
Date Analyzed: 10-Jun-04

Prep Batch: AS040603-4
QCBatchID: AS040603-4-1
Run ID: AS040603-4A
Count Time: 300 minutes
Report Basis: Dry Weight

Final Aliquot: 1.01 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: T50969D

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	15.9 +/- 2.8	0.1	M3
14269-63-7	Th-230	32.3 +/- 5.5	0.2	M3
7440-29-1	Th-232	19.5 +/- 3.4	0	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	4.456	2.74	pCi/g	61.5	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: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 9

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID: MSED-10
Lab ID: 0405096-10

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 07-May-04
Date Prepared: 11-Jun-04
Date Analyzed: 18-Jun-04

Prep Batch: AS040611-2
QCBatchID: AS040611-2-2
Run ID: AS040611-2D
Count Time: 300 minutes
Report Basis: Dry Weight

Final Aliquot: 0.508 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: TX509610

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	30.0 +/- 5.1	0.3	M3
14269-63-7	Th-230	64 +/- 11	0	M3
7440-29-1	Th-232	34.6 +/- 5.9	0.1	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	9.095	6.4	pCi/g	70.3	30 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Data Package ID: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID: SSED-01
Lab ID: 0405096-11

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 05-May-04
Date Prepared: 03-Jun-04
Date Analyzed: 10-Jun-04

Prep Batch: AS040603-3
QCBatchID: AS040603-3-1
Run ID: AS040603-3a
Count Time: 300 minutes
Report Basis: Dry Weight

Final Aliquot: 2.02 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: T509611

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	1.32 +/- 0.27	0.07	
14269-63-7	Th-230	1.85 +/- 0.35	0.08	
7440-29-1	Th-232	1.30 +/- 0.26	0.04	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	2.230	1.33	pCi/g	59.8	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: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID:	SSED-02
Lab ID:	0405096-12

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 05-May-04
Date Prepared: 03-Jun-04
Date Analyzed: 10-Jun-04

Prep Batch: AS040603-3
QCBatchID: AS040603-3-1
Run ID: AS040603-3a
Count Time: 300 minutes
Report Basis: Dry Weight

Final Aliquot: 2.01 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: T509612

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	1.00 +/- 0.21	0.11	M3
14269-63-7	Th-230	1.65 +/- 0.32	0.08	
7440-29-1	Th-232	1.83 +/- 0.35	0.03	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	2.245	1.38	pCi/g	61.4	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: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID: SSED-03
Lab ID: 0405096-13

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 04-May-04
Date Prepared: 03-Jun-04
Date Analyzed: 10-Jun-04

Prep Batch: AS040603-3
QCBatchID: AS040603-3-1
Run ID: AS040603-3a
Count Time: 300 minutes
Report Basis: Dry Weight

Final Aliquot: 2.02 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: T509613

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	0.83 +/- 0.20	0.10	M3
14269-63-7	Th-230	4.63 +/- 0.85	0.09	
7440-29-1	Th-232	0.75 +/- 0.18	0.04	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	2.227	1.09	pCi/g	48.9	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: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 8

Sample Duplicate Results

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID: SSED-03
Lab ID: 0405096-13DUP

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 04-May-04
Date Prepared: 03-Jun-04
Date Analyzed: 10-Jun-04

Prep Batch: AS040603-3
QCBatchID: AS040603-3-1
Run ID: AS040603-3a
Count Time: 300 minutes
Report Basis: Dry Weight

Final Aliquot: 2.01 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: T509613D

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	0.79 +/- 0.18	0.04	
14269-63-7	Th-230	4.37 +/- 0.78	0.08	
7440-29-1	Th-232	0.67 +/- 0.15	0.03	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	2.236	1.36	pCi/g	60.7	30 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.
Y2 - Chemical Yield outside default limits.
LT - Result is less than Requested MDC, greater than sample specific MDC.
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: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID: SSED-04
Lab ID: 0405096-14

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 04-May-04
Date Prepared: 03-Jun-04
Date Analyzed: 10-Jun-04

Prep Batch: AS040603-3
QCBatchID: AS040603-3-1
Run ID: AS040603-3a
Count Time: 300 minutes
Report Basis: Dry Weight

Final Aliquot: 2.00 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: T509614

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	0.88 +/- 0.19	0.06	
14269-63-7	Th-230	0.96 +/- 0.20	0.08	
7440-29-1	Th-232	0.59 +/- 0.13	0.02	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	2.247	1.53	pCi/g	68.2	30 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

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: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID: SSED-05
Lab ID: 0405096-15

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 04-May-04
Date Prepared: 03-Jun-04
Date Analyzed: 10-Jun-04

Prep Batch: AS040603-3
QCBatchID: AS040603-3-1
Run ID: AS040603-3a
Count Time: 300 minutes
Report Basis: Dry Weight

Final Aliquot: 2.01 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: T509615

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	2.36 +/- 0.45	0.05	
14269-63-7	Th-230	4.04 +/- 0.74	0.09	
7440-29-1	Th-232	2.23 +/- 0.43	0.05	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	2.243	1.24	pCi/g	55.1	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: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID:	SSED-06
Lab ID:	0405096-16

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 04-May-04
Date Prepared: 03-Jun-04
Date Analyzed: 10-Jun-04

Prep Batch: AS040603-3
QCBatchID: AS040603-3-1
Run ID: AS040603-3a
Count Time: 300 minutes
Report Basis: Dry Weight

Final Aliquot: 2.04 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: T509616

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	1.09 +/- 0.23	0.06	
14269-63-7	Th-230	0.98 +/- 0.21	0.08	
7440-29-1	Th-232	0.74 +/- 0.17	0.03	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	2.210	1.37	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: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID: SSED-07
Lab ID: 0405096-17

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 04-May-04
Date Prepared: 03-Jun-04
Date Analyzed: 10-Jun-04

Prep Batch: AS040603-3
QCBatchID: AS040603-3-1
Run ID: AS040603-3a
Count Time: 300 minutes
Report Basis: Dry Weight

Final Aliquot: 2.02 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: T509617

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	1.60 +/- 0.32	0.10	
14269-63-7	Th-230	1.99 +/- 0.39	0.08	
7440-29-1	Th-232	1.25 +/- 0.26	0.04	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	2.233	1.23	pCi/g	55.3	30 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Data Package ID: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 9

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID: SSED-08
Lab ID: 0405096-18

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 05-May-04
Date Prepared: 03-Jun-04
Date Analyzed: 12-Jun-04

Prep Batch: AS040603-4
QCBatchID: AS040603-4-1
Run ID: AS040603-4A
Count Time: 300 minutes
Report Basis: Dry Weight

Final Aliquot: 1.00 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: TR509618

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	26.9 +/- 4.5	0.1	M3
14269-63-7	Th-230	70 +/- 12	0	M3
7440-29-1	Th-232	33.2 +/- 5.6	0.1	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	4.497	3.13	pCi/g	69.5	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: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID: SSED-09
Lab ID: 0405096-19

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 05-May-04
Date Prepared: 03-Jun-04
Date Analyzed: 10-Jun-04

Prep Batch: AS040603-3
QCBatchID: AS040603-3-1
Run ID: AS040603-3a
Count Time: 300 minutes
Report Basis: Dry Weight

Final Aliquot: 2.01 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: T509619

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	4.16 +/- 0.74	0.07	
14269-63-7	Th-230	11.0 +/- 1.9	0.1	
7440-29-1	Th-232	6.0 +/- 1.0	0	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	2.242	1.43	pCi/g	63.7	30 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Data Package ID: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID: SSED-10
Lab ID: 0405096-20

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 04-May-04
Date Prepared: 03-Jun-04
Date Analyzed: 10-Jun-04

Prep Batch: AS040603-3
QCBatchID: AS040603-3-1
Run ID: AS040603-3a
Count Time: 300 minutes
Report Basis: Dry Weight

Final Aliquot: 2.02 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: T509620

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	5.7 +/- 1.0	0.1	
14269-63-7	Th-230	7.8 +/- 1.4	0.1	
7440-29-1	Th-232	5.20 +/- 0.95	0.02	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	2.232	1.44	pCi/g	64.7	30 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Data Package ID: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID: GEN-02
Lab ID: 0405096-22

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 07-May-04
Date Prepared: 03-Jun-04
Date Analyzed: 10-Jun-04

Prep Batch: AS040603-3
QCBatchID: AS040603-3-1
Run ID: AS040603-3a
Count Time: 300 minutes
Report Basis: Dry Weight

Final Aliquot: 1.01 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: T509622

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	4.41 +/- 0.83	0.16	M3
14269-63-7	Th-230	9.0 +/- 1.6	0.2	M3
7440-29-1	Th-232	4.38 +/- 0.81	0.05	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	4.457	2.91	pCi/g	65.3	30 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Data Package ID: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID:	SOIL-01
Lab ID:	0405096-25

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 06-May-04
Date Prepared: 03-Jun-04
Date Analyzed: 10-Jun-04

Prep Batch: AS040603-3
QCBatchID: AS040603-3-1
Run ID: AS040603-3a
Count Time: 300 minutes
Report Basis: Dry Weight

Final Aliquot: 1.00 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: T509625

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	15.2 +/- 2.7	0.1	M3
14269-63-7	Th-230	28.1 +/- 4.9	0.2	M3
7440-29-1	Th-232	18.0 +/- 3.2	0.1	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	4.494	2.61	pCi/g	58.1	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: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID:	SOIL-02
Lab ID:	0405096-26

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 06-May-04
Date Prepared: 03-Jun-04
Date Analyzed: 10-Jun-04

Prep Batch: AS040603-3
QCBatchID: AS040603-3-1
Run ID: AS040603-3a
Count Time: 300 minutes
Report Basis: Dry Weight

Final Aliquot: 1.01 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: T509626

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	10.5 +/- 1.8	0.1	M3
14269-63-7	Th-230	18.2 +/- 3.1	0.1	M3
7440-29-1	Th-232	11.1 +/- 1.9	0	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	4.466	3.09	pCi/g	69.1	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: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 9

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID: SOIL-04
Lab ID: 0405096-27

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 06-May-04
Date Prepared: 03-Jun-04
Date Analyzed: 10-Jun-04

Prep Batch: AS040603-4
QCBatchID: AS040603-4-1
Run ID: AS040603-4A
Count Time: 300 minutes
Report Basis: Dry Weight

Final Aliquot: 0.100 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: T509627

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	100 +/- 17	1	M3
14269-63-7	Th-230	223 +/- 38	1	M3
7440-29-1	Th-232	84 +/- 15	0	M3

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	44.90	34.2	pCi/g	76.2	30 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

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: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 9

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID:	SOIL-05
Lab ID:	0405096-28

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 06-May-04
Date Prepared: 03-Jun-04
Date Analyzed: 10-Jun-04

Prep Batch: AS040603-4
QCBatchID: AS040603-4-1
Run ID: AS040603-4A
Count Time: 300 minutes
Report Basis: Dry Weight

Final Aliquot: 0.202 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: T509628

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	24.3 +/- 4.4	0.4	M3
14269-63-7	Th-230	30.9 +/- 5.5	0.7	M3
7440-29-1	Th-232	20.3 +/- 3.7	0.2	M3

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	22.35	18.1	pCi/g	81.2	30 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

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: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 9

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID: SOIL-07
Lab ID: 0405096-29

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 07-May-04
Date Prepared: 03-Jun-04
Date Analyzed: 10-Jun-04

Prep Batch: AS040603-4
QCBatchID: AS040603-4-1
Run ID: AS040603-4A
Count Time: 300 minutes
Report Basis: Dry Weight

Final Aliquot: 1.00 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: T509629

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	9.6 +/- 1.7	0.2	M3
14269-63-7	Th-230	5.6 +/- 1.0	0.2	M3
7440-29-1	Th-232	8.3 +/- 1.5	0.1	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	4.490	3.14	pCi/g	69.9	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: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 9

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID:	SOIL-08
Lab ID:	0405096-30

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 07-May-04
Date Prepared: 03-Jun-04
Date Analyzed: 10-Jun-04

Prep Batch: AS040603-4
QCBatchID: AS040603-4-1
Run ID: AS040603-4A
Count Time: 300 minutes
Report Basis: Dry Weight

Final Aliquot: 0.109 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: T509630

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	71 +/- 12	1	M3
14269-63-7	Th-230	138 +/- 24	1	M3
7440-29-1	Th-232	68 +/- 12	0	M3

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	41.32	28.6	pCi/g	69.2	30 - 110 %	

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

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: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 8

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID: SOIL-09
Lab ID: 0405096-31

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 07-May-04
Date Prepared: 03-Jun-04
Date Analyzed: 10-Jun-04

Prep Batch: AS040603-3
QCBatchID: AS040603-3-1
Run ID: AS040603-3a
Count Time: 330 minutes
Report Basis: Dry Weight

Final Aliquot: 1.01 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: T509631

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	8.2 +/- 1.4	0.1	M3
14269-63-7	Th-230	5.08 +/- 0.93	0.15	M3
7440-29-1	Th-232	6.9 +/- 1.2	0	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	4.474	3.03	pCi/g	67.6	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: *TH0405096-1*

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 9

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0405096
Client Name: Kent & Sullivan Inc.
ClientProject ID: Ross Adams

Field ID:	SOIL-10
Lab ID:	0405096-32

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 07-May-04
Date Prepared: 03-Jun-04
Date Analyzed: 10-Jun-04

Prep Batch: AS040603-4
QCBatchID: AS040603-4-1
Run ID: AS040603-4A
Count Time: 300 minutes
Report Basis: Dry Weight

Final Aliquot: 0.102 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: T509632

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	111 +/- 20	2	M3
14269-63-7	Th-230	240 +/- 41	2	M3
7440-29-1	Th-232	120 +/- 21	1	M3

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	44.16	27.3	pCi/g	61.9	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: *TH0405096-1*

PARAGON ANALYTICS
Radiochemistry Data Package

4

Section 4

RAW DATA

Isotopic Thorium By Alpha Spectroscopy Raw Data Report

Laboratory Name: Paragon Analytics
PAI Work Order: 0405096

Prep SOP: PAI 777
Analytical SOP: PAI 714

Reported on: Thursday, July 29, 2004
10:40:30 AM

Sample ID QC Type	Nuclide Type	Sample Date/Time	Prep Batch QCBatchID	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)	CntDur(min) Yield	Activity +/- 2 s TPU	MDC DecLev	ReportUnits ReportBasis	DER RPD	%Spk. Recov Flags
0405096-1	Th-228	5/6/2004	AS040603-3	NA	NA	SOIL	2 g	Alpha Spec	AS040603-3a	6/23/2004	10.740	29.16%	330	0.065	0.093	pCi/g	NA	
SMP	Trg. Analyte	1:00:00 PM	AS040603-3-1	NA	NA	NA	2 g	10	TR50961	6:47 AM	22.000	1000	40.3%	0.056	NA	Dry Weight	NA	U
0405096-1	Th-229	5/6/2004	AS040603-3	NA	NA	SOIL	2 g	Alpha Spec	AS040603-3a	6/23/2004	387.680	29.16%	330	0.91	0.02	pCi/g	NA	
SMP	Tracer	1:00:00 PM	AS040603-3-1	NA	NA	NA	2 g	10	TR50961	6:47 AM	4.000	1000	40.3%	0.16	NA	Dry Weight	NA	
0405096-1	Th-230	5/6/2004	AS040603-3	NA	NA	SOIL	2 g	Alpha Spec	AS040603-3a	6/23/2004	36.386	29.16%	330	0.211	0.099	pCi/g	NA	
SMP	Trg. Analyte	1:00:00 PM	AS040603-3-1	NA	NA	NA	2 g	10	TR50961	6:47 AM	29.135	1000	40.3%	0.090	NA	Dry Weight	NA	
0405096-1	Th-232	5/6/2004	AS040603-3	NA	NA	SOIL	2 g	Alpha Spec	AS040603-3a	6/23/2004	23.010	29.16%	330	0.133	0.042	pCi/g	NA	
SMP	Trg. Analyte	1:00:00 PM	AS040603-3-1	NA	NA	NA	2 g	10	TR50961	6:47 AM	3.000	1000	40.3%	0.062	NA	Dry Weight	NA	
0405096-2	Th-228	5/6/2004	AS040603-3	NA	NA	SOIL	2 g	Alpha Spec	AS040603-3a	6/10/2004	29.893	28.96%	300	0.157	0.103	pCi/g	NA	
SMP	Trg. Analyte	1:40:00 PM	AS040603-3-1	NA	NA	NA	2 g	19	T50962	12:53 PM	43.689	1000	51.0%	0.077	NA	Dry Weight	NA	M3
0405096-2	Th-229	5/6/2004	AS040603-3	NA	NA	SOIL	2 g	Alpha Spec	AS040603-3a	6/10/2004	443.417	28.96%	300	1.15	0.02	pCi/g	NA	
SMP	Tracer	1:40:00 PM	AS040603-3-1	NA	NA	NA	2 g	19	T50962	12:53 PM	1.942	1000	51.0%	0.20	NA	Dry Weight	NA	
0405096-2	Th-230	5/6/2004	AS040603-3	NA	NA	SOIL	2 g	Alpha Spec	AS040603-3a	6/10/2004	56.003	28.96%	300	0.284	0.092	pCi/g	NA	
SMP	Trg. Analyte	1:40:00 PM	AS040603-3-1	NA	NA	NA	2 g	19	T50962	12:53 PM	36.656	1000	51.0%	0.098	NA	Dry Weight	NA	
0405096-2	Th-232	5/6/2004	AS040603-3	NA	NA	SOIL	2 g	Alpha Spec	AS040603-3a	6/10/2004	27.000	28.96%	300	0.137	0.014	pCi/g	NA	
SMP	Trg. Analyte	1:40:00 PM	AS040603-3-1	NA	NA	NA	2 g	19	T50962	12:53 PM	0.000	1000	51.0%	0.058	NA	Dry Weight	NA	
0405096-2	Th-228	5/6/2004	AS040603-3	NA	NA	SOIL	2 g	Alpha Spec	AS040603-3a	6/10/2004	30.398	29.86%	300	0.168	0.120	pCi/g	0.10	
DUP	Trg. Analyte	1:40:00 PM	AS040603-3-1	NA	NA	NA	2 g	21	T50962D	12:53 PM	55.340	1000	47.0%	0.085	NA	Dry Weight	NA	M3
0405096-2	Th-229	5/6/2004	AS040603-3	NA	NA	SOIL	2 g	Alpha Spec	AS040603-3a	6/10/2004	420.670	29.86%	300	1.06	0.02	pCi/g	NA	
DUP	Tracer	1:40:00 PM	AS040603-3-1	NA	NA	NA	2 g	21	T50962D	12:53 PM	7.767	1000	47.0%	0.19	NA	Dry Weight	NA	
0405096-2	Th-230	5/6/2004	AS040603-3	NA	NA	SOIL	2 g	Alpha Spec	AS040603-3a	6/10/2004	63.694	29.86%	300	0.34	0.10	pCi/g	0.38	
DUP	Trg. Analyte	1:40:00 PM	AS040603-3-1	NA	NA	NA	2 g	21	T50962D	12:53 PM	37.688	1000	47.0%	0.11	NA	Dry Weight	NA	

Comments:

Data Package ID: *th0405096-1*

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 Recieved' while the Report Basis is 'Dry Weight'.
# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Recieved'.

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 Thorium By Alpha Spectroscopy Raw Data Report

Laboratory Name: Paragon Analytics
PAI Work Order: 0405096

Prep SOP: PAI 777
Analytical SOP: PAI 714

Reported on: Thursday, July 29, 2004
10:40:30 AM

Sample ID QC Type	Nuclide Type	Sample Date/Time	Prep Batch QCBatchID	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)	CntDur(min) Yield	Activity +/- 2 s TPU	MDC DecLev	ReportUnits ReportBasis	DER RPD	%Spk. Recov Flags
0405096-2	Th-232	5/6/2004	AS040603-3	NA	NA	SOIL	2 g	Alpha Spec	AS040603-3a	6/10/2004	24.544	29.86%	300	0.131	0.045	pCi/g	0.07	
DUP	Trg. Analyte	1:40:00 PM	AS040603-3-1	NA	NA	NA	2 g	21	T50962D	12:53 PM	4.854	1000	47.0%	0.060	NA	Dry Weight	NA	
0405096-3	Th-228	5/6/2004	AS040603-3	NA	NA	SOIL	2.02 g	Alpha Spec	AS040603-3a	6/10/2004	24.592	28.41%	330	0.140	0.083	pCi/g	NA	
SMP	Trg. Analyte	2:00:00 PM	AS040603-3-1	NA	NA	NA	2.02 g	22	T50963	7:10 PM	19.417	1000	43.2%	0.070	NA	Dry Weight	NA	
0405096-3	Th-229	5/6/2004	AS040603-3	NA	NA	SOIL	2.02 g	Alpha Spec	AS040603-3a	6/10/2004	405.039	28.41%	330	0.96	0.02	pCi/g	NA	
SMP	Tracer	2:00:00 PM	AS040603-3-1	NA	NA	NA	2.02 g	22	T50963	7:10 PM	2.913	1000	43.2%	0.17	NA	Dry Weight	NA	
0405096-3	Th-230	5/6/2004	AS040603-3	NA	NA	SOIL	2.02 g	Alpha Spec	AS040603-3a	6/10/2004	54.314	28.41%	330	0.30	0.10	pCi/g	NA	
SMP	Trg. Analyte	2:00:00 PM	AS040603-3-1	NA	NA	NA	2.02 g	22	T50963	7:10 PM	32.381	1000	43.2%	0.11	NA	Dry Weight	NA	
0405096-3	Th-232	5/6/2004	AS040603-3	NA	NA	SOIL	2.02 g	Alpha Spec	AS040603-3a	6/10/2004	32.718	28.41%	330	0.180	0.044	pCi/g	NA	
SMP	Trg. Analyte	2:00:00 PM	AS040603-3-1	NA	NA	NA	2.02 g	22	T50963	7:10 PM	3.883	1000	43.2%	0.072	NA	Dry Weight	NA	
0405096-5	Th-228	5/6/2004	AS040603-3	NA	NA	SOIL	2.02 g	Alpha Spec	AS040603-3a	6/10/2004	543.136	28.77%	300	2.72	0.08	pCi/g	NA	
SMP	Trg. Analyte	9:20:00 AM	AS040603-3-1	NA	NA	NA	2.02 g	23	T50965	12:54 PM	26.214	1000	53.3%	0.53	NA	Dry Weight	NA	
0405096-5	Th-229	5/6/2004	AS040603-3	NA	NA	SOIL	2.02 g	Alpha Spec	AS040603-3a	6/10/2004	459.835	28.77%	300	1.19	0.02	pCi/g	NA	
SMP	Tracer	9:20:00 AM	AS040603-3-1	NA	NA	NA	2.02 g	23	T50965	12:54 PM	3.883	1000	53.3%	0.21	NA	Dry Weight	NA	
0405096-5	Th-230	5/6/2004	AS040603-3	NA	NA	SOIL	2.02 g	Alpha Spec	AS040603-3a	6/10/2004	1284.596	28.77%	300	6.2	0.1	pCi/g	NA	
SMP	Trg. Analyte	9:20:00 AM	AS040603-3-1	NA	NA	NA	2.02 g	23	T50965	12:54 PM	38.013	1000	53.3%	1.1	NA	Dry Weight	NA	
0405096-5	Th-232	5/6/2004	AS040603-3	NA	NA	SOIL	2.02 g	Alpha Spec	AS040603-3a	6/10/2004	891.126	28.77%	300	4.32	0.03	pCi/g	NA	
SMP	Trg. Analyte	9:20:00 AM	AS040603-3-1	NA	NA	NA	2.02 g	23	T50965	12:54 PM	2.913	1000	53.3%	0.80	NA	Dry Weight	NA	
0405096-6	Th-228	5/7/2004	AS040720-4	NA	NA	SOIL	1.01 g	Alpha Spec	AS040720-4A	7/27/2004	77.100	31.55%	300	0.75	0.14	pCi/g	NA	
SMP	Trg. Analyte	8:30:00 AM	AS040720-4-2	NA	NA	NA	1.01 g	42	T50966	10:35 AM	23.000	1000	52.6%	0.22	NA	Dry Weight	NA	M3
0405096-6	Th-229	5/7/2004	AS040720-4	NA	NA	SOIL	1.01 g	Alpha Spec	AS040720-4A	7/27/2004	497.700	31.55%	300	2.34	0.02	pCi/g	NA	
SMP	Tracer	8:30:00 AM	AS040720-4-2	NA	NA	NA	1.01 g	42	T50966	10:35 AM	1.000	1000	52.6%	0.40	NA	Dry Weight	NA	

Comments:

Data Package ID: *th0405096-1*

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 Recieved' while the Report Basis is 'Dry Weight'.
# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Recieved'.

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 Thorium By Alpha Spectroscopy Raw Data Report

Laboratory Name: Paragon Analytics
PAI Work Order: 0405096

Prep SOP: PAI 777
Analytical SOP: PAI 714

Reported on: Thursday, July 29, 2004
3:30:41 PM

Sample ID QC Type	Nuclide Type	Sample Date/Time	Prep Batch QCBatchID	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)	CntDur(min) Yield	Activity +/- 2 s TPU	MDC DecLev	ReportUnits ReportBasis	DER RPD	%Spk. Recov Flags
0405096-6	Th-230	5/7/2004	AS040720-4	NA	NA	SOIL	1.01 g	Alpha Spec	AS040720-4A	7/27/2004	102.057	31.55%	300	0.91	0.17	pCi/g	NA	
SMP	Trg. Analyte	8:30:00 AM	AS040720-4-2	NA	NA	NA	1.01 g	42	T50966	10:35 AM	43.143	1000	52.6%	0.25	NA	Dry Weight	NA	M3
0405096-6	Th-232	5/7/2004	AS040720-4	NA	NA	SOIL	1.01 g	Alpha Spec	AS040720-4A	7/27/2004	124.000	31.55%	300	1.11	0.02	pCi/g	NA	
SMP	Trg. Analyte	8:30:00 AM	AS040720-4-2	NA	NA	NA	1.01 g	42	T50966	10:35 AM	0.000	1000	52.6%	0.28	NA	Dry Weight	NA	
0405096-7	Th-228	5/7/2004	AS040603-4	NA	NA	SOIL	0.301 g	Alpha Spec	AS040603-4A	6/10/2004	2144.553	24.87%	300	75	1	pCi/g	NA	
SMP	Trg. Analyte	9:00:00 AM	AS040603-4-1	NA	NA	NA	0.301 g	60	T50967	6:52 AM	28.155	1000	59.5%	13	NA	Dry Weight	NA	M3
0405096-7	Th-229	5/7/2004	AS040603-4	NA	NA	SOIL	0.301 g	Alpha Spec	AS040603-4A	6/10/2004	443.544	24.87%	300	8.9	0.2	pCi/g	NA	
SMP	Tracer	9:00:00 AM	AS040603-4-1	NA	NA	NA	0.301 g	60	T50967	6:52 AM	4.854	1000	59.5%	1.6	NA	Dry Weight	NA	
0405096-7	Th-230	5/7/2004	AS040603-4	NA	NA	SOIL	0.301 g	Alpha Spec	AS040603-4A	6/10/2004	4421.709	24.87%	300	149	1	pCi/g	NA	
SMP	Trg. Analyte	9:00:00 AM	AS040603-4-1	NA	NA	NA	0.301 g	60	T50967	6:52 AM	37.637	1000	59.5%	26	NA	Dry Weight	NA	M3
0405096-7	Th-232	5/7/2004	AS040603-4	NA	NA	SOIL	0.301 g	Alpha Spec	AS040603-4A	6/10/2004	2336.709	24.87%	300	79	0	pCi/g	NA	
SMP	Trg. Analyte	9:00:00 AM	AS040603-4-1	NA	NA	NA	0.301 g	60	T50967	6:52 AM	0.971	1000	59.5%	14	NA	Dry Weight	NA	M3
0405096-8	Th-228	5/7/2004	AS040611-2	NA	NA	SOIL	0.505 g	Alpha Spec	AS040611-2D	7/28/2004	5895.300	29.22%	300	123	0	pCi/g	NA	
SMP	Trg. Analyte	9:15:00 AM	AS040611-2-2	NA	NA	NA	0.505 g	9	TC50968	6:39 PM	29.000	1000	53.0%	21	NA	Dry Weight	NA	M3
0405096-8	Th-229	5/7/2004	AS040611-2	NA	NA	SOIL	0.505 g	Alpha Spec	AS040611-2D	7/28/2004	476.100	29.22%	300	4.84	0.15	pCi/g	NA	
SMP	Tracer	9:15:00 AM	AS040611-2-2	NA	NA	NA	0.505 g	9	TC50968	6:39 PM	23.000	1000	53.0%	0.84	NA	Dry Weight	NA	
0405096-8	Th-230	5/7/2004	AS040611-2	NA	NA	SOIL	0.505 g	Alpha Spec	AS040611-2D	7/28/2004	11540.090	29.22%	300	222	0	pCi/g	NA	
SMP	Trg. Analyte	9:15:00 AM	AS040611-2-2	NA	NA	NA	0.505 g	9	TC50968	6:39 PM	46.358	1000	53.0%	39	NA	Dry Weight	NA	M3
0405096-8	Th-232	5/7/2004	AS040611-2	NA	NA	SOIL	0.505 g	Alpha Spec	AS040611-2D	7/28/2004	6070.900	29.22%	300	117	0	pCi/g	NA	
SMP	Trg. Analyte	9:15:00 AM	AS040611-2-2	NA	NA	NA	0.505 g	9	TC50968	6:39 PM	7.000	1000	53.0%	20	NA	Dry Weight	NA	M3
0405096-9	Th-228	5/7/2004	AS040603-4	NA	NA	SOIL	1.01 g	Alpha Spec	AS040603-4A	6/10/2004	1972.689	31.05%	300	17.1	0.2	pCi/g	NA	
SMP	Trg. Analyte	9:20:00 AM	AS040603-4-1	NA	NA	NA	1.01 g	61	T50969	6:52 AM	54.369	1000	57.4%	3.0	NA	Dry Weight	NA	M3

Comments:

Data Package ID: *th0405096-1*

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 Recieved' while the Report Basis is 'Dry Weight'.
# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Recieved'.

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

00063

Isotopic Thorium By Alpha Spectroscopy Raw Data Report

Laboratory Name: Paragon Analytics
PAI Work Order: 0405096

Prep SOP: PAI 777
Analytical SOP: PAI 714

Reported on: Thursday, July 29, 2004
3:44:34 PM

Sample ID QC Type	Nuclide Type	Sample Date/Time	Prep Batch QCBatchID	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)	CntDur(min) Yield	Activity +/- 2 s TPU	MDC DecLev	ReportUnits ReportBasis	DER RPD	%Spk. Recov Flags
0405096-9	Th-229	5/7/2004	AS040603-4	NA	NA	SOIL	1.01 g	Alpha Spec	AS040603-4A	6/10/2004	534.961	31.05%	300	2.57	0.04	pCi/g	NA	
SMP	Tracer	9:20:00 AM	AS040603-4-1	NA	NA	NA	1.01 g	61	T50969	6:52 AM	6.796	1000	57.4%	0.44	NA	Dry Weight	NA	
0405096-9	Th-230	5/7/2004	AS040603-4	NA	NA	SOIL	1.01 g	Alpha Spec	AS040603-4A	6/10/2004	4035.150	31.05%	300	33.7	0.2	pCi/g	NA	
SMP	Trg. Analyte	9:20:00 AM	AS040603-4-1	NA	NA	NA	1.01 g	61	T50969	6:52 AM	46.165	1000	57.4%	5.8	NA	Dry Weight	NA	M3
0405096-9	Th-232	5/7/2004	AS040603-4	NA	NA	SOIL	1.01 g	Alpha Spec	AS040603-4A	6/10/2004	2411.126	31.05%	300	20.2	0.1	pCi/g	NA	
SMP	Trg. Analyte	9:20:00 AM	AS040603-4-1	NA	NA	NA	1.01 g	61	T50969	6:52 AM	2.913	1000	57.4%	3.5	NA	Dry Weight	NA	
0405096-9	Th-228	5/7/2004	AS040603-4	NA	NA	SOIL	1.01 g	Alpha Spec	AS040603-4A	6/10/2004	1951.175	30.58%	300	15.9	0.1	pCi/g	0.27	
DUP	Trg. Analyte	9:20:00 AM	AS040603-4-1	NA	NA	NA	1.01 g	62	T50969D	6:52 AM	19.417	1000	61.5%	2.8	NA	Dry Weight	NA	M3
0405096-9	Th-229	5/7/2004	AS040603-4	NA	NA	SOIL	1.01 g	Alpha Spec	AS040603-4A	6/10/2004	564.126	30.58%	300	2.74	0.03	pCi/g	NA	
DUP	Tracer	9:20:00 AM	AS040603-4-1	NA	NA	NA	1.01 g	62	T50969D	6:52 AM	2.913	1000	61.5%	0.46	NA	Dry Weight	NA	
0405096-9	Th-230	5/7/2004	AS040603-4	NA	NA	SOIL	1.01 g	Alpha Spec	AS040603-4A	6/10/2004	4089.427	30.58%	300	32.3	0.2	pCi/g	0.18	
DUP	Trg. Analyte	9:20:00 AM	AS040603-4-1	NA	NA	NA	1.01 g	62	T50969D	6:52 AM	48.576	1000	61.5%	5.5	NA	Dry Weight	NA	M3
0405096-9	Th-232	5/7/2004	AS040603-4	NA	NA	SOIL	1.01 g	Alpha Spec	AS040603-4A	6/10/2004	2458.417	30.58%	300	19.5	0	pCi/g	0.15	
DUP	Trg. Analyte	9:20:00 AM	AS040603-4-1	NA	NA	NA	1.01 g	62	T50969D	6:52 AM	1.942	1000	61.5%	3.4	NA	Dry Weight	NA	
0405096-10	Th-228	5/7/2004	AS040611-2	NA	NA	SOIL	0.508 g	Alpha Spec	AS040611-2D	6/18/2004	2162.000	31.63%	300	30.0	0.3	pCi/g	NA	
SMP	Trg. Analyte	10:10:00 AM	AS040611-2-2	NA	NA	NA	0.508 g	61	TX509610	9:45 PM	60.000	1000	70.3%	5.1	NA	Dry Weight	NA	M3
0405096-10	Th-229	5/7/2004	AS040611-2	NA	NA	SOIL	0.508 g	Alpha Spec	AS040611-2D	6/18/2004	684.400	31.63%	300	6.4	0.1	pCi/g	NA	
SMP	Tracer	10:10:00 AM	AS040611-2-2	NA	NA	NA	0.508 g	61	TX509610	9:45 PM	2.000	1000	70.3%	1.1	NA	Dry Weight	NA	
0405096-10	Th-230	5/7/2004	AS040611-2	NA	NA	SOIL	0.508 g	Alpha Spec	AS040611-2D	6/18/2004	4793.427	31.63%	300	64	0	pCi/g	NA	
SMP	Trg. Analyte	10:10:00 AM	AS040611-2-2	NA	NA	NA	0.508 g	61	TX509610	9:45 PM	58.577	1000	70.3%	11	NA	Dry Weight	NA	M3
0405096-10	Th-232	5/7/2004	AS040611-2	NA	NA	SOIL	0.508 g	Alpha Spec	AS040611-2D	6/18/2004	2596.100	31.63%	300	34.6	0.1	pCi/g	NA	
SMP	Trg. Analyte	10:10:00 AM	AS040611-2-2	NA	NA	NA	0.508 g	61	TX509610	9:45 PM	3.000	1000	70.3%	5.9	NA	Dry Weight	NA	

Comments:

Data Package ID: *th0405096-1*

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 Recieved' while the Report Basis is 'Dry Weight'.

- Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Recieved'.

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 Thorium By Alpha Spectroscopy Raw Data Report

Laboratory Name: Paragon Analytics
PAI Work Order: 0405096

Prep SOP: PAI 777
Analytical SOP: PAI 714

Reported on: Thursday, July 29, 2004 10:40:30 AM

Sample ID QC Type	Nuclide Type	Sample Date/Time	Prep Batch QCBatchID	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)	CntDur(min) Yield	Activity +/- 2 s TPU	MDC DecLev	ReportUnits ReportBasis	DER RPD	%Spk. Recov Flags
0405096-11	Th-228	5/5/2004	AS040603-3	NA	NA	SOIL	2.02 g	Alpha Spec	AS040603-3a	6/10/2004	328.641	32.16%	300	1.32	0.07	pCi/g	NA	
SMP	Trg. Analyte	4:15:00 PM	AS040603-3-1	NA	NA	NA	2.02 g	43	T509611	12:55 PM	37.864	1000	59.8%	0.27	NA	Dry Weight	NA	
0405096-11	Th-229	5/5/2004	AS040603-3	NA	NA	SOIL	2.02 g	Alpha Spec	AS040603-3a	6/10/2004	576.544	32.16%	300	1.33	0.02	pCi/g	NA	
SMP	Tracer	4:15:00 PM	AS040603-3-1	NA	NA	NA	2.02 g	43	T509611	12:55 PM	4.854	1000	59.8%	0.22	NA	Dry Weight	NA	
0405096-11	Th-230	5/5/2004	AS040603-3	NA	NA	SOIL	2.02 g	Alpha Spec	AS040603-3a	6/10/2004	477.410	32.16%	300	1.85	0.08	pCi/g	NA	
SMP	Trg. Analyte	4:15:00 PM	AS040603-3-1	NA	NA	NA	2.02 g	43	T509611	12:55 PM	48.632	1000	59.8%	0.35	NA	Dry Weight	NA	
0405096-11	Th-232	5/5/2004	AS040603-3	NA	NA	SOIL	2.02 g	Alpha Spec	AS040603-3a	6/10/2004	336.670	32.16%	300	1.30	0.04	pCi/g	NA	
SMP	Trg. Analyte	4:15:00 PM	AS040603-3-1	NA	NA	NA	2.02 g	43	T509611	12:55 PM	7.767	1000	59.8%	0.26	NA	Dry Weight	NA	
0405096-12	Th-228	5/5/2004	AS040603-3	NA	NA	SOIL	2.01 g	Alpha Spec	AS040603-3a	6/10/2004	254.204	32.03%	300	1.00	0.11	pCi/g	NA	
SMP	Trg. Analyte	5:05:00 PM	AS040603-3-1	NA	NA	NA	2.01 g	44	T509612	12:56 PM	89.320	1000	61.4%	0.21	NA	Dry Weight	NA	M3
0405096-12	Th-229	5/5/2004	AS040603-3	NA	NA	SOIL	2.01 g	Alpha Spec	AS040603-3a	6/10/2004	589.961	32.03%	300	1.38	0.02	pCi/g	NA	
SMP	Tracer	5:05:00 PM	AS040603-3-1	NA	NA	NA	2.01 g	44	T509612	12:56 PM	6.796	1000	61.4%	0.23	NA	Dry Weight	NA	
0405096-12	Th-230	5/5/2004	AS040603-3	NA	NA	SOIL	2.01 g	Alpha Spec	AS040603-3a	6/10/2004	432.456	32.03%	300	1.65	0.08	pCi/g	NA	
SMP	Trg. Analyte	5:05:00 PM	AS040603-3-1	NA	NA	NA	2.01 g	44	T509612	12:56 PM	58.479	1000	61.4%	0.32	NA	Dry Weight	NA	
0405096-12	Th-232	5/5/2004	AS040603-3	NA	NA	SOIL	2.01 g	Alpha Spec	AS040603-3a	6/10/2004	480.544	32.03%	300	1.83	0.03	pCi/g	NA	
SMP	Trg. Analyte	5:05:00 PM	AS040603-3-1	NA	NA	NA	2.01 g	44	T509612	12:56 PM	4.854	1000	61.4%	0.35	NA	Dry Weight	NA	
0405096-13	Th-228	5/4/2004	AS040603-3	NA	NA	SOIL	2.02 g	Alpha Spec	AS040603-3a	6/10/2004	171.689	32.74%	300	0.83	0.10	pCi/g	NA	
SMP	Trg. Analyte	6:10:00 PM	AS040603-3-1	NA	NA	NA	2.02 g	45	T509613	12:56 PM	54.369	1000	48.9%	0.20	NA	Dry Weight	NA	M3
0405096-13	Th-229	5/4/2004	AS040603-3	NA	NA	SOIL	2.02 g	Alpha Spec	AS040603-3a	6/10/2004	480.466	32.74%	300	1.09	0.03	pCi/g	NA	
SMP	Tracer	6:10:00 PM	AS040603-3-1	NA	NA	NA	2.02 g	45	T509613	12:56 PM	18.447	1000	48.9%	0.19	NA	Dry Weight	NA	
0405096-13	Th-230	5/4/2004	AS040603-3	NA	NA	SOIL	2.02 g	Alpha Spec	AS040603-3a	6/10/2004	999.628	32.74%	300	4.63	0.09	pCi/g	NA	
SMP	Trg. Analyte	6:10:00 PM	AS040603-3-1	NA	NA	NA	2.02 g	45	T509613	12:56 PM	44.573	1000	48.9%	0.85	NA	Dry Weight	NA	

Comments:

Data Package ID: *th0405096-1*

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 Recieved' while the Report Basis is 'Dry Weight'.

- Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Recieved'.

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

000095

Isotopic Thorium By Alpha Spectroscopy Raw Data Report

Laboratory Name: Paragon Analytics
PAI Work Order: 0405096

Prep SOP: PAI 777
Analytical SOP: PAI 714

Reported on: Thursday, July 29, 2004
10:40:30 AM

Sample ID QC Type	Nuclide Type	Sample Date/Time	Prep Batch QCBatchID	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)	CntDur(min) Yield	Activity +/- 2 s TPU	MDC DecLev	ReportUnits ReportBasis	DER RPD	%Spk. Recov Flags
0405096-13	Th-232	5/4/2004	AS040603-3	NA	NA	SOIL	2.02 g	Alpha Spec	AS040603-3a	6/10/2004	161.835	32.74%	300	0.75	0.04	pCi/g	NA	
SMP	Trg. Analyte	6:10:00 PM	AS040603-3-1	NA	NA	NA	2.02 g	45	T509613	12:56 PM	3.883	1000	48.9%	0.18	NA	Dry Weight	NA	
0405096-13	Th-228	5/4/2004	AS040603-3	NA	NA	SOIL	2.01 g	Alpha Spec	AS040603-3a	6/10/2004	197.796	31.78%	300	0.79	0.04	pCi/g	0.13	
DUP	Trg. Analyte	6:10:00 PM	AS040603-3-1	NA	NA	NA	2.01 g	46	T509613D	12:57 PM	10.680	1000	60.7%	0.18	NA	Dry Weight	NA	
0405096-13	Th-229	5/4/2004	AS040603-3	NA	NA	SOIL	2.01 g	Alpha Spec	AS040603-3a	6/10/2004	578.718	31.78%	300	1.36	0.04	pCi/g	NA	
DUP	Tracer	6:10:00 PM	AS040603-3-1	NA	NA	NA	2.01 g	46	T509613D	12:57 PM	24.272	1000	60.7%	0.23	NA	Dry Weight	NA	
0405096-13	Th-230	5/4/2004	AS040603-3	NA	NA	SOIL	2.01 g	Alpha Spec	AS040603-3a	6/10/2004	1130.318	31.78%	300	4.37	0.08	pCi/g	0.23	
DUP	Trg. Analyte	6:10:00 PM	AS040603-3-1	NA	NA	NA	2.01 g	46	T509613D	12:57 PM	55.608	1000	60.7%	0.78	NA	Dry Weight	NA	
0405096-13	Th-232	5/4/2004	AS040603-3	NA	NA	SOIL	2.01 g	Alpha Spec	AS040603-3a	6/10/2004	172.126	31.78%	300	0.67	0.03	pCi/g	0.37	
DUP	Trg. Analyte	6:10:00 PM	AS040603-3-1	NA	NA	NA	2.01 g	46	T509613D	12:57 PM	2.913	1000	60.7%	0.15	NA	Dry Weight	NA	
0405096-14	Th-228	5/4/2004	AS040603-3	NA	NA	SOIL	2 g	Alpha Spec	AS040603-3a	6/10/2004	236.301	30.51%	300	0.88	0.06	pCi/g	NA	
SMP	Trg. Analyte	5:00:00 PM	AS040603-3-1	NA	NA	NA	2 g	47	T509614	12:57 PM	22.330	1000	68.2%	0.19	NA	Dry Weight	NA	
0405096-14	Th-229	5/4/2004	AS040603-3	NA	NA	SOIL	2 g	Alpha Spec	AS040603-3a	6/10/2004	624.126	30.51%	300	1.53	0.02	pCi/g	NA	
SMP	Tracer	5:00:00 PM	AS040603-3-1	NA	NA	NA	2 g	47	T509614	12:57 PM	2.913	1000	68.2%	0.26	NA	Dry Weight	NA	
0405096-14	Th-230	5/4/2004	AS040603-3	NA	NA	SOIL	2 g	Alpha Spec	AS040603-3a	6/10/2004	266.357	30.51%	300	0.96	0.08	pCi/g	NA	
SMP	Trg. Analyte	5:00:00 PM	AS040603-3-1	NA	NA	NA	2 g	47	T509614	12:57 PM	55.478	1000	68.2%	0.20	NA	Dry Weight	NA	
0405096-14	Th-232	5/4/2004	AS040603-3	NA	NA	SOIL	2 g	Alpha Spec	AS040603-3a	6/10/2004	163.709	30.51%	300	0.59	0.02	pCi/g	NA	
SMP	Trg. Analyte	5:00:00 PM	AS040603-3-1	NA	NA	NA	2 g	47	T509614	12:57 PM	0.971	1000	68.2%	0.13	NA	Dry Weight	NA	
0405096-15	Th-228	5/4/2004	AS040603-3	NA	NA	SOIL	2.01 g	Alpha Spec	AS040603-3a	6/10/2004	533.379	31.86%	300	2.36	0.05	pCi/g	NA	
SMP	Trg. Analyte	3:59:00 PM	AS040603-3-1	NA	NA	NA	2.01 g	48	T509615	12:58 PM	8.738	1000	55.1%	0.45	NA	Dry Weight	NA	
0405096-15	Th-229	5/4/2004	AS040603-3	NA	NA	SOIL	2.01 g	Alpha Spec	AS040603-3a	6/10/2004	526.262	31.86%	300	1.24	0.04	pCi/g	NA	
SMP	Tracer	3:59:00 PM	AS040603-3-1	NA	NA	NA	2.01 g	48	T509615	12:58 PM	29.126	1000	55.1%	0.21	NA	Dry Weight	NA	

Comments:

Data Package ID: *th0405096-1*

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 Recieved' while the Report Basis is 'Dry Weight'.
# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Recieved'.

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 Thorium By Alpha Spectroscopy Raw Data Report

Laboratory Name: Paragon Analytics
PAI Work Order: 0405096

Prep SOP: PAI 777
Analytical SOP: PAI 714

Reported on: Thursday, July 29, 2004
10:40:30 AM

Sample ID QC Type	Nuclide Type	Sample Date/Time	Prep Batch QCBatchID	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)	CntDur(min) Yield	Activity +/- 2 s TPU	MDC DecLev	ReportUnits ReportBasis	DER RPD	%Spk. Recov Flags
0405096-15	Th-230	5/4/2004	AS040603-3	NA	NA	SOIL	2.01 g	Alpha Spec	AS040603-3a	6/10/2004	948.871	31.86%	300	4.04	0.09	pCi/g	NA	
SMP	Trg. Analyte	3:59:00 PM	AS040603-3-1	NA	NA	NA	2.01 g	48	T509615	12:58 PM	57.097	1000	55.1%	0.74	NA	Dry Weight	NA	
0405096-15	Th-232	5/4/2004	AS040603-3	NA	NA	SOIL	2.01 g	Alpha Spec	AS040603-3a	6/10/2004	522.087	31.86%	300	2.23	0.05	pCi/g	NA	
SMP	Trg. Analyte	3:59:00 PM	AS040603-3-1	NA	NA	NA	2.01 g	48	T509615	12:58 PM	9.709	1000	55.1%	0.43	NA	Dry Weight	NA	
0405096-16	Th-228	5/4/2004	AS040603-3	NA	NA	SOIL	2.04 g	Alpha Spec	AS040603-3a	6/10/2004	255.175	28.95%	300	1.09	0.06	pCi/g	NA	
SMP	Trg. Analyte	3:03:00 PM	AS040603-3-1	NA	NA	NA	2.04 g	57	T509616	12:58 PM	19.417	1000	62.1%	0.23	NA	Dry Weight	NA	
0405096-16	Th-229	5/4/2004	AS040603-3	NA	NA	SOIL	2.04 g	Alpha Spec	AS040603-3a	6/10/2004	539.126	28.95%	300	1.37	0.02	pCi/g	NA	
SMP	Tracer	3:03:00 PM	AS040603-3-1	NA	NA	NA	2.04 g	57	T509616	12:58 PM	2.913	1000	62.1%	0.23	NA	Dry Weight	NA	
0405096-16	Th-230	5/4/2004	AS040603-3	NA	NA	SOIL	2.04 g	Alpha Spec	AS040603-3a	6/10/2004	238.756	28.95%	300	0.98	0.08	pCi/g	NA	
SMP	Trg. Analyte	3:03:00 PM	AS040603-3-1	NA	NA	NA	2.04 g	57	T509616	12:58 PM	47.480	1000	62.1%	0.21	NA	Dry Weight	NA	
0405096-16	Th-232	5/4/2004	AS040603-3	NA	NA	SOIL	2.04 g	Alpha Spec	AS040603-3a	6/10/2004	179.417	28.95%	300	0.74	0.03	pCi/g	NA	
SMP	Trg. Analyte	3:03:00 PM	AS040603-3-1	NA	NA	NA	2.04 g	57	T509616	12:58 PM	1.942	1000	62.1%	0.17	NA	Dry Weight	NA	
0405096-17	Th-228	5/4/2004	AS040603-3	NA	NA	SOIL	2.02 g	Alpha Spec	AS040603-3a	6/10/2004	369.524	32.26%	300	1.60	0.10	pCi/g	NA	
SMP	Trg. Analyte	2:00:00 PM	AS040603-3-1	NA	NA	NA	2.02 g	58	T509617	12:59 PM	58.252	1000	55.3%	0.32	NA	Dry Weight	NA	
0405096-17	Th-229	5/4/2004	AS040603-3	NA	NA	SOIL	2.02 g	Alpha Spec	AS040603-3a	6/10/2004	534.796	32.26%	300	1.23	0.03	pCi/g	NA	
SMP	Tracer	2:00:00 PM	AS040603-3-1	NA	NA	NA	2.02 g	58	T509617	12:59 PM	10.680	1000	55.3%	0.21	NA	Dry Weight	NA	
0405096-17	Th-230	5/4/2004	AS040603-3	NA	NA	SOIL	2.02 g	Alpha Spec	AS040603-3a	6/10/2004	477.155	32.26%	300	1.99	0.08	pCi/g	NA	
SMP	Trg. Analyte	2:00:00 PM	AS040603-3-1	NA	NA	NA	2.02 g	58	T509617	12:59 PM	46.152	1000	55.3%	0.39	NA	Dry Weight	NA	
0405096-17	Th-232	5/4/2004	AS040603-3	NA	NA	SOIL	2.02 g	Alpha Spec	AS040603-3a	6/10/2004	298.379	32.26%	300	1.25	0.04	pCi/g	NA	
SMP	Trg. Analyte	2:00:00 PM	AS040603-3-1	NA	NA	NA	2.02 g	58	T509617	12:59 PM	8.738	1000	55.3%	0.26	NA	Dry Weight	NA	
0405096-18	Th-228	5/5/2004	AS040603-4	NA	NA	SOIL	1 g	Alpha Spec	AS040603-4A	6/12/2004	3698.437	30.80%	300	26.9	0.1	pCi/g	NA	
SMP	Trg. Analyte	12:40:00 PM	AS040603-4-1	NA	NA	NA	1 g	18	TR509618	9:26 AM	48.544	1000	69.5%	4.5	NA	Dry Weight	NA	M3

Comments:

Data Package ID: *th0405096-1*

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 Recieved' while the Report Basis is 'Dry Weight'.

- Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Recieved'.

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 Thorium By Alpha Spectroscopy Raw Data Report

Laboratory Name: Paragon Analytics
PAI Work Order: 0405096

Prep SOP: PAI 777
Analytical SOP: PAI 714

Reported on: Thursday, July 29, 2004
3:44:34 PM

Sample ID QC Type	Nuclide Type	Sample Date/Time	Prep Batch QCBatchID	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)	CntDur(min) Yield	Activity +/- 2 s TPU	MDC DecLev	ReportUnits ReportBasis	DER RPD	%Spk. Recov Flags
0405096-18	Th-229	5/5/2004	AS040603-4	NA	NA	SOIL	1 g	Alpha Spec	AS040603-4A	6/12/2004	642.544	30.80%	300	3.13	0.04	pCi/g	NA	
SMP	Tracer	12:40:00 PM	AS040603-4-1	NA	NA	NA	1 g	18	TR509618	9:26 AM	4.854	1000	69.5%	0.52	NA	Dry Weight	NA	
0405096-18	Th-230	5/5/2004	AS040603-4	NA	NA	SOIL	1 g	Alpha Spec	AS040603-4A	6/12/2004	10053.190	30.80%	300	70	0	pCi/g	NA	
SMP	Trg. Analyte	12:40:00 PM	AS040603-4-1	NA	NA	NA	1 g	18	TR509618	9:26 AM	56.030	1000	69.5%	12	NA	Dry Weight	NA	M3
0405096-18	Th-232	5/5/2004	AS040603-4	NA	NA	SOIL	1 g	Alpha Spec	AS040603-4A	6/12/2004	4732.835	30.80%	300	33.2	0.1	pCi/g	NA	
SMP	Trg. Analyte	12:40:00 PM	AS040603-4-1	NA	NA	NA	1 g	18	TR509618	9:26 AM	3.883	1000	69.5%	5.6	NA	Dry Weight	NA	
0405096-19	Th-228	5/5/2004	AS040603-3	NA	NA	SOIL	2.01 g	Alpha Spec	AS040603-3a	6/10/2004	1099.515	32.10%	300	4.16	0.07	pCi/g	NA	
SMP	Trg. Analyte	3:20:00 PM	AS040603-3-1	NA	NA	NA	2.01 g	59	T509619	12:59 PM	34.951	1000	63.7%	0.74	NA	Dry Weight	NA	
0405096-19	Th-229	5/5/2004	AS040603-3	NA	NA	SOIL	2.01 g	Alpha Spec	AS040603-3a	6/10/2004	613.835	32.10%	300	1.43	0.02	pCi/g	NA	
SMP	Tracer	3:20:00 PM	AS040603-3-1	NA	NA	NA	2.01 g	59	T509619	12:59 PM	3.883	1000	63.7%	0.24	NA	Dry Weight	NA	
0405096-19	Th-230	5/5/2004	AS040603-3	NA	NA	SOIL	2.01 g	Alpha Spec	AS040603-3a	6/10/2004	3013.903	32.10%	300	11.0	0.1	pCi/g	NA	
SMP	Trg. Analyte	3:20:00 PM	AS040603-3-1	NA	NA	NA	2.01 g	59	T509619	12:59 PM	53.656	1000	63.7%	1.9	NA	Dry Weight	NA	
0405096-19	Th-232	5/5/2004	AS040603-3	NA	NA	SOIL	2.01 g	Alpha Spec	AS040603-3a	6/10/2004	1641.961	32.10%	300	6.0	0	pCi/g	NA	
SMP	Trg. Analyte	3:20:00 PM	AS040603-3-1	NA	NA	NA	2.01 g	59	T509619	12:59 PM	6.796	1000	63.7%	1.0	NA	Dry Weight	NA	
0405096-20	Th-228	5/4/2004	AS040603-3	NA	NA	SOIL	2.02 g	Alpha Spec	AS040603-3a	6/10/2004	1194.553	24.87%	300	5.7	0.1	pCi/g	NA	
SMP	Trg. Analyte	7:05:00 PM	AS040603-3-1	NA	NA	NA	2.02 g	60	T509620	1:00 PM	28.155	1000	64.7%	1.0	NA	Dry Weight	NA	
0405096-20	Th-229	5/4/2004	AS040603-3	NA	NA	SOIL	2.02 g	Alpha Spec	AS040603-3a	6/10/2004	482.544	24.87%	300	1.44	0.02	pCi/g	NA	
SMP	Tracer	7:05:00 PM	AS040603-3-1	NA	NA	NA	2.02 g	60	T509620	1:00 PM	4.854	1000	64.7%	0.25	NA	Dry Weight	NA	
0405096-20	Th-230	5/4/2004	AS040603-3	NA	NA	SOIL	2.02 g	Alpha Spec	AS040603-3a	6/10/2004	1683.742	24.87%	300	7.8	0.1	pCi/g	NA	
SMP	Trg. Analyte	7:05:00 PM	AS040603-3-1	NA	NA	NA	2.02 g	60	T509620	1:00 PM	40.861	1000	64.7%	1.4	NA	Dry Weight	NA	
0405096-20	Th-232	5/4/2004	AS040603-3	NA	NA	SOIL	2.02 g	Alpha Spec	AS040603-3a	6/10/2004	1122.709	24.87%	300	5.20	0.02	pCi/g	NA	
SMP	Trg. Analyte	7:05:00 PM	AS040603-3-1	NA	NA	NA	2.02 g	60	T509620	1:00 PM	0.971	1000	64.7%	0.95	NA	Dry Weight	NA	

Comments:

Data Package ID: *th0405096-1*

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 Recieved' while the Report Basis is 'Dry Weight'.

- Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Recieved'.

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

000038

Isotopic Thorium By Alpha Spectroscopy Raw Data Report

Laboratory Name: Paragon Analytics
PAI Work Order: 0405096

Prep SOP: PAI 777
Analytical SOP: PAI 714

Reported on: Thursday, July 29, 2004
10:40:30 AM

Sample ID QC Type	Nuclide Type	Sample Date/Time	Prep Batch QCBatchID	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)	CntDur(min) Yield	Activity +/- 2 s TPU	MDC DecLev	ReportUnits ReportBasis	DER RPD	%Spk. Recov Flags
0405096-22	Th-228	5/7/2004	AS040603-3	NA	NA	SOIL	1.01 g	Alpha Spec	AS040603-3a	6/10/2004	581.398	31.05%	300	4.41	0.16	pCi/g	NA	
SMP	Trg. Analyte	12:35:00 PM	AS040603-3-1	NA	NA	NA	1.01 g	61	T509622	1:00 PM	55.340	1000	65.3%	0.83	NA	Dry Weight	NA	M3
0405096-22	Th-229	5/7/2004	AS040603-3	NA	NA	SOIL	1.01 g	Alpha Spec	AS040603-3a	6/10/2004	607.961	31.05%	300	2.91	0.04	pCi/g	NA	
SMP	Tracer	12:35:00 PM	AS040603-3-1	NA	NA	NA	1.01 g	61	T509622	1:00 PM	6.796	1000	65.3%	0.49	NA	Dry Weight	NA	
0405096-22	Th-230	5/7/2004	AS040603-3	NA	NA	SOIL	1.01 g	Alpha Spec	AS040603-3a	6/10/2004	1227.340	31.05%	300	9.0	0.2	pCi/g	NA	
SMP	Trg. Analyte	12:35:00 PM	AS040603-3-1	NA	NA	NA	1.01 g	61	T509622	1:00 PM	52.200	1000	65.3%	1.6	NA	Dry Weight	NA	M3
0405096-22	Th-232	5/7/2004	AS040603-3	NA	NA	SOIL	1.01 g	Alpha Spec	AS040603-3a	6/10/2004	596.126	31.05%	300	4.38	0.05	pCi/g	NA	
SMP	Trg. Analyte	12:35:00 PM	AS040603-3-1	NA	NA	NA	1.01 g	61	T509622	1:00 PM	2.913	1000	65.3%	0.81	NA	Dry Weight	NA	
0405096-25	Th-228	5/6/2004	AS040603-3	NA	NA	SOIL	1 g	Alpha Spec	AS040603-3a	6/10/2004	1747.175	30.58%	300	15.2	0.1	pCi/g	NA	
SMP	Trg. Analyte	4:00:00 PM	AS040603-3-1	NA	NA	NA	1 g	62	T509625	1:01 PM	19.417	1000	58.1%	2.7	NA	Dry Weight	NA	M3
0405096-25	Th-229	5/6/2004	AS040603-3	NA	NA	SOIL	1 g	Alpha Spec	AS040603-3a	6/10/2004	533.126	30.58%	300	2.61	0.03	pCi/g	NA	
SMP	Tracer	4:00:00 PM	AS040603-3-1	NA	NA	NA	1 g	62	T509625	1:01 PM	2.913	1000	58.1%	0.44	NA	Dry Weight	NA	
0405096-25	Th-230	5/6/2004	AS040603-3	NA	NA	SOIL	1 g	Alpha Spec	AS040603-3a	6/10/2004	3337.196	30.58%	300	28.1	0.2	pCi/g	NA	
SMP	Trg. Analyte	4:00:00 PM	AS040603-3-1	NA	NA	NA	1 g	62	T509625	1:01 PM	46.014	1000	58.1%	4.9	NA	Dry Weight	NA	M3
0405096-25	Th-232	5/6/2004	AS040603-3	NA	NA	SOIL	1 g	Alpha Spec	AS040603-3a	6/10/2004	2134.126	30.58%	300	18.0	0.1	pCi/g	NA	
SMP	Trg. Analyte	4:00:00 PM	AS040603-3-1	NA	NA	NA	1 g	62	T509625	1:01 PM	2.913	1000	58.1%	3.2	NA	Dry Weight	NA	
0405096-26	Th-228	5/6/2004	AS040603-3	NA	NA	SOIL	1.01 g	Alpha Spec	AS040603-3a	6/10/2004	1441.185	30.72%	300	10.5	0.1	pCi/g	NA	
SMP	Trg. Analyte	3:40:00 PM	AS040603-3-1	NA	NA	NA	1.01 g	64	T509626	1:01 PM	42.718	1000	69.1%	1.8	NA	Dry Weight	NA	M3
0405096-26	Th-229	5/6/2004	AS040603-3	NA	NA	SOIL	1.01 g	Alpha Spec	AS040603-3a	6/10/2004	636.961	30.72%	300	3.09	0.05	pCi/g	NA	
SMP	Tracer	3:40:00 PM	AS040603-3-1	NA	NA	NA	1.01 g	64	T509626	1:01 PM	6.796	1000	69.1%	0.51	NA	Dry Weight	NA	
0405096-26	Th-230	5/6/2004	AS040603-3	NA	NA	SOIL	1.01 g	Alpha Spec	AS040603-3a	6/10/2004	2590.912	30.72%	300	18.2	0.1	pCi/g	NA	
SMP	Trg. Analyte	3:40:00 PM	AS040603-3-1	NA	NA	NA	1.01 g	64	T509626	1:01 PM	53.626	1000	69.1%	3.1	NA	Dry Weight	NA	M3

Comments:

Data Package ID: *th0405096-1*

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 Recieved' while the Report Basis is 'Dry Weight'.
- Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Recieved'.

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 Thorium By Alpha Spectroscopy Raw Data Report

Laboratory Name: Paragon Analytics
PAI Work Order: 0405096

Prep SOP: PAI 777
Analytical SOP: PAI 714

Reported on: Thursday, July 29, 2004 10:40:30 AM

Sample ID QC Type	Nuclide Type	Sample Date/Time	Prep Batch QCBatchID	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)	CntDur(min) Yield	Activity +/- 2 s TPU	MDC DecLev	ReportUnits ReportBasis	DER RPD	%Spk. Recov Flags
0405096-26	Th-232	5/6/2004	AS040603-3	NA	NA	SOIL	1.01 g	Alpha Spec	AS040603-3a	6/10/2004	1581.418	30.72%	300	11.1	0	pCi/g	NA	
SMP	Trg. Analyte	3:40:00 PM	AS040603-3-1	NA	NA	NA	1.01 g	64	T509626	1:01 PM	1.942	1000	69.1%	1.9	NA	Dry Weight	NA	
0405096-27	Th-228	5/6/2004	AS040603-4	NA	NA	SOIL	0.1 g	Alpha Spec	AS040603-4A	6/10/2004	1417.884	28.95%	300	100	1	pCi/g	NA	
SMP	Trg. Analyte	3:04:00 PM	AS040603-4-1	NA	NA	NA	0.1 g	10	T509627	12:50 PM	20.388	1000	76.2%	17	NA	Dry Weight	NA	M3
0405096-27	Th-229	5/6/2004	AS040603-4	NA	NA	SOIL	0.1 g	Alpha Spec	AS040603-4A	6/10/2004	661.835	28.95%	300	34.2	0.4	pCi/g	NA	
SMP	Tracer	3:04:00 PM	AS040603-4-1	NA	NA	NA	0.1 g	10	T509627	12:50 PM	3.883	1000	76.2%	5.7	NA	Dry Weight	NA	
0405096-27	Th-230	5/6/2004	AS040603-4	NA	NA	SOIL	0.1 g	Alpha Spec	AS040603-4A	6/10/2004	3280.295	28.95%	300	223	1	pCi/g	NA	
SMP	Trg. Analyte	3:04:00 PM	AS040603-4-1	NA	NA	NA	0.1 g	10	T509627	12:50 PM	55.683	1000	76.2%	38	NA	Dry Weight	NA	M3
0405096-27	Th-232	5/6/2004	AS040603-4	NA	NA	SOIL	0.1 g	Alpha Spec	AS040603-4A	6/10/2004	1231.709	28.95%	300	84	0	pCi/g	NA	
SMP	Trg. Analyte	3:04:00 PM	AS040603-4-1	NA	NA	NA	0.1 g	10	T509627	12:50 PM	0.971	1000	76.2%	15	NA	Dry Weight	NA	M3
0405096-28	Th-228	5/6/2004	AS040603-4	NA	NA	SOIL	0.202 g	Alpha Spec	AS040603-4A	6/10/2004	729.757	28.56%	300	24.3	0.4	pCi/g	NA	
SMP	Trg. Analyte	3:10:00 PM	AS040603-4-1	NA	NA	NA	0.202 g	11	T509628	12:50 PM	17.476	1000	81.2%	4.4	NA	Dry Weight	NA	M3
0405096-28	Th-229	5/6/2004	AS040603-4	NA	NA	SOIL	0.202 g	Alpha Spec	AS040603-4A	6/10/2004	695.417	28.56%	300	18.1	0.2	pCi/g	NA	
SMP	Tracer	3:10:00 PM	AS040603-4-1	NA	NA	NA	0.202 g	11	T509628	12:50 PM	1.942	1000	81.2%	3.0	NA	Dry Weight	NA	
0405096-28	Th-230	5/6/2004	AS040603-4	NA	NA	SOIL	0.202 g	Alpha Spec	AS040603-4A	6/10/2004	960.462	28.56%	300	30.9	0.7	pCi/g	NA	
SMP	Trg. Analyte	3:10:00 PM	AS040603-4-1	NA	NA	NA	0.202 g	11	T509628	12:50 PM	58.459	1000	81.2%	5.5	NA	Dry Weight	NA	M3
0405096-28	Th-232	5/6/2004	AS040603-4	NA	NA	SOIL	0.202 g	Alpha Spec	AS040603-4A	6/10/2004	631.417	28.56%	300	20.3	0.2	pCi/g	NA	
SMP	Trg. Analyte	3:10:00 PM	AS040603-4-1	NA	NA	NA	0.202 g	11	T509628	12:50 PM	1.942	1000	81.2%	3.7	NA	Dry Weight	NA	M3
0405096-29	Th-228	5/7/2004	AS040603-4	NA	NA	SOIL	1 g	Alpha Spec	AS040603-4A	6/10/2004	1275.233	29.31%	300	9.6	0.2	pCi/g	NA	
SMP	Trg. Analyte	1:50:00 PM	AS040603-4-1	NA	NA	NA	1 g	12	T509629	12:50 PM	59.223	1000	69.9%	1.7	NA	Dry Weight	NA	M3
0405096-29	Th-229	5/7/2004	AS040603-4	NA	NA	SOIL	1 g	Alpha Spec	AS040603-4A	6/10/2004	614.835	29.31%	300	3.14	0.04	pCi/g	NA	
SMP	Tracer	1:50:00 PM	AS040603-4-1	NA	NA	NA	1 g	12	T509629	12:50 PM	3.883	1000	69.9%	0.52	NA	Dry Weight	NA	

Comments:

Data Package ID: *th0405096-1*

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 Recieved' while the Report Basis is 'Dry Weight'.

- Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Recieved'.

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

000070

Isotopic Thorium By Alpha Spectroscopy Raw Data Report

Laboratory Name: Paragon Analytics
PAI Work Order: 0405096

Prep SOP: PAI 777
Analytical SOP: PAI 714

Reported on: Thursday, July 29, 2004
3:44:34 PM

Sample ID QC Type	Nuclide Type	Sample Date/Time	Prep Batch QCBatchID	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)	CntDur(min) Yield	Activity +/- 2 s TPU	MDC DecLev	ReportUnits ReportBasis	DER RPD	%Spk. Recov Flags
0405096-29	Th-230	5/7/2004	AS040603-4	NA	NA	SOIL	1 g	Alpha Spec	AS040603-4A	6/10/2004	762.005	29.31%	300	5.6	0.2	pCi/g	NA	
SMP	Trg. Analyte	1:50:00 PM	AS040603-4-1	NA	NA	NA	1 g	12	T509629	12:50 PM	56.652	1000	69.9%	1.0	NA	Dry Weight	NA	M3
0405096-29	Th-232	5/7/2004	AS040603-4	NA	NA	SOIL	1 g	Alpha Spec	AS040603-4A	6/10/2004	1138.544	29.31%	300	8.3	0.1	pCi/g	NA	
SMP	Trg. Analyte	1:50:00 PM	AS040603-4-1	NA	NA	NA	1 g	12	T509629	12:50 PM	4.854	1000	69.9%	1.5	NA	Dry Weight	NA	
0405096-30	Th-228	5/7/2004	AS040603-4	NA	NA	SOIL	0.109 g	Alpha Spec	AS040603-4A	6/10/2004	1087.719	31.73%	300	71	1	pCi/g	NA	
SMP	Trg. Analyte	4:15:00 PM	AS040603-4-1	NA	NA	NA	0.109 g	13	T509630	12:51 PM	24.272	1000	69.2%	12	NA	Dry Weight	NA	M3
0405096-30	Th-229	5/7/2004	AS040603-4	NA	NA	SOIL	0.109 g	Alpha Spec	AS040603-4A	6/10/2004	658.922	31.73%	300	28.6	0.5	pCi/g	NA	
SMP	Tracer	4:15:00 PM	AS040603-4-1	NA	NA	NA	0.109 g	13	T509630	12:51 PM	13.592	1000	69.2%	4.7	NA	Dry Weight	NA	
0405096-30	Th-230	5/7/2004	AS040603-4	NA	NA	SOIL	0.109 g	Alpha Spec	AS040603-4A	6/10/2004	2196.494	31.73%	300	138	1	pCi/g	NA	
SMP	Trg. Analyte	4:15:00 PM	AS040603-4-1	NA	NA	NA	0.109 g	13	T509630	12:51 PM	58.354	1000	69.2%	24	NA	Dry Weight	NA	M3
0405096-30	Th-232	5/7/2004	AS040603-4	NA	NA	SOIL	0.109 g	Alpha Spec	AS040603-4A	6/10/2004	1083.126	31.73%	300	68	0	pCi/g	NA	
SMP	Trg. Analyte	4:15:00 PM	AS040603-4-1	NA	NA	NA	0.109 g	13	T509630	12:51 PM	2.913	1000	69.2%	12	NA	Dry Weight	NA	M3
0405096-31	Th-228	5/7/2004	AS040603-3	NA	NA	SOIL	1.01 g	Alpha Spec	AS040603-3a	6/10/2004	1124.233	28.56%	330	8.2	0.1	pCi/g	NA	
SMP	Trg. Analyte	2:10:00 PM	AS040603-3-1	NA	NA	NA	1.01 g	11	T509631	7:37 PM	17.476	1000	67.6%	1.4	NA	Dry Weight	NA	M3
0405096-31	Th-229	5/7/2004	AS040603-3	NA	NA	SOIL	1.01 g	Alpha Spec	AS040603-3a	6/10/2004	637.359	28.56%	330	3.03	0.03	pCi/g	NA	
SMP	Tracer	2:10:00 PM	AS040603-3-1	NA	NA	NA	1.01 g	11	T509631	7:37 PM	1.942	1000	67.6%	0.50	NA	Dry Weight	NA	
0405096-31	Th-230	5/7/2004	AS040603-3	NA	NA	SOIL	1.01 g	Alpha Spec	AS040603-3a	6/10/2004	723.873	28.56%	330	5.08	0.15	pCi/g	NA	
SMP	Trg. Analyte	2:10:00 PM	AS040603-3-1	NA	NA	NA	1.01 g	11	T509631	7:37 PM	48.869	1000	67.6%	0.93	NA	Dry Weight	NA	M3
0405096-31	Th-232	5/7/2004	AS040603-3	NA	NA	SOIL	1.01 g	Alpha Spec	AS040603-3a	6/10/2004	977.359	28.56%	330	6.9	0	pCi/g	NA	
SMP	Trg. Analyte	2:10:00 PM	AS040603-3-1	NA	NA	NA	1.01 g	11	T509631	7:37 PM	1.942	1000	67.6%	1.2	NA	Dry Weight	NA	
0405096-32	Th-228	5/7/2004	AS040603-4	NA	NA	SOIL	0.102 g	Alpha Spec	AS040603-4A	6/10/2004	1357.651	30.14%	300	111	2	pCi/g	NA	
SMP	Trg. Analyte	4:40:00 PM	AS040603-4-1	NA	NA	NA	0.102 g	15	T509632	12:51 PM	61.165	1000	61.9%	20	NA	Dry Weight	NA	M3

Comments:

Data Package ID: *th0405096-1*

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 Recieved' while the Report Basis is 'Dry Weight'.

@ - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Recieved'.

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 Thorium By Alpha Spectroscopy Raw Data Report

Laboratory Name: Paragon Analytics
PAI Work Order: 0405096

Prep SOP: PAI 777
Analytical SOP: PAI 714

Reported on: Thursday, July 29, 2004
3:44:34 PM

Sample ID QC Type	Nuclide Type	Sample Date/Time	Prep Batch QCBatchID	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)	CntDur(min) Yield	Activity +/- 2 s TPU	MDC DecLev	ReportUnits ReportBasis	DER RPD	%Spk. Recov Flags
0405096-32	Th-229	5/7/2004	AS040603-4	NA	NA	SOIL	0.102 g	Alpha Spec	AS040603-4A	6/10/2004	559.631	30.14%	300	27.3	0.6	pCi/g	NA	
SMP	Tracer	4:40:00 PM	AS040603-4-1	NA	NA	NA	0.102 g	15	T509632	12:51 PM	14.563	1000	61.9%	4.6	NA	Dry Weight	NA	
0405096-32	Th-230	5/7/2004	AS040603-4	NA	NA	SOIL	0.102 g	Alpha Spec	AS040603-4A	6/10/2004	3035.956	30.14%	300	240	2	pCi/g	NA	
SMP	Trg. Analyte	4:40:00 PM	AS040603-4-1	NA	NA	NA	0.102 g	15	T509632	12:51 PM	50.146	1000	61.9%	41	NA	Dry Weight	NA	M3
0405096-32	Th-232	5/7/2004	AS040603-4	NA	NA	SOIL	0.102 g	Alpha Spec	AS040603-4A	6/10/2004	1518.544	30.14%	300	120	1	pCi/g	NA	
SMP	Trg. Analyte	4:40:00 PM	AS040603-4-1	NA	NA	NA	0.102 g	15	T509632	12:51 PM	4.854	1000	61.9%	21	NA	Dry Weight	NA	M3
AS040603-3	Th-228	6/3/2004	AS040603-3	NA	NA	SOIL	2 g	Alpha Spec	AS040603-3a	6/10/2004	4.136	29.31%	330	0.012	0.070	pCi/g	NA	
MB	Trg. Analyte	9:41:17 AM	AS040603-3-1	NA	NA	NA	2 g	12	T6033B	7:37 PM	60.194	1000	78.2%	0.033	NA	Dry Weight	NA	U
AS040603-3	Th-229	6/3/2004	AS040603-3	NA	NA	SOIL	2 g	Alpha Spec	AS040603-3a	6/10/2004	756.718	29.31%	330	1.76	0.02	pCi/g	NA	
MB	Tracer	9:41:17 AM	AS040603-3-1	NA	NA	NA	2 g	12	T6033B	7:37 PM	3.883	1000	78.2%	0.29	NA	Dry Weight	NA	
AS040603-3	Th-230	6/3/2004	AS040603-3	NA	NA	SOIL	2 g	Alpha Spec	AS040603-3a	6/10/2004	7.631	29.31%	330	0.023	0.071	pCi/g	NA	
MB	Trg. Analyte	9:41:17 AM	AS040603-3-1	NA	NA	NA	2 g	12	T6033B	7:37 PM	61.723	1000	78.2%	0.035	NA	Dry Weight	NA	U
AS040603-3	Th-232	6/3/2004	AS040603-3	NA	NA	SOIL	2 g	Alpha Spec	AS040603-3a	6/10/2004	2.398	29.31%	330	0.007	0.026	pCi/g	NA	
MB	Trg. Analyte	9:41:17 AM	AS040603-3-1	NA	NA	NA	2 g	12	T6033B	7:37 PM	4.854	1000	78.2%	0.013	NA	Dry Weight	NA	U
AS040603-3	Th-229	6/3/2004	AS040603-3	NA	NA	SOIL	2 g	Alpha Spec	AS040603-3a	6/10/2004	786.515	31.73%	330	1.69	0.03	pCi/g	NA	
LCS	Tracer	9:41:17 AM	AS040603-3-1	NA	NA	NA	2 g	13	T6033L	7:37 PM	13.592	1000	75.1%	0.28	NA	Dry Weight	NA	
AS040603-3	Th-230	6/3/2004	AS040603-3	NA	NA	SOIL	2 g	Alpha Spec	AS040603-3a	6/10/2004	819.213	31.73%	330	2.35	0.07	pCi/g	NA	102
LCS	Trg. Analyte	9:41:17 AM	AS040603-3-1	NA	NA	NA	2 g	13	T6033L	7:37 PM	62.991	1000	75.1%	0.42	NA	Dry Weight	NA	P
AS040603-4	Th-228	6/3/2004	AS040603-4	NA	NA	SOIL	0.3 g	Alpha Spec	AS040603-4A	6/10/2004	2.136	29.58%	300	0.05	0.36	pCi/g	NA	
MB	Trg. Analyte	10:05:58 AM	AS040603-4-1	NA	NA	NA	0.3 g	16	T6034B	12:51 PM	26.214	1000	73.7%	0.16	NA	Dry Weight	NA	U,M
AS040603-4	Th-229	6/3/2004	AS040603-4	NA	NA	SOIL	0.3 g	Alpha Spec	AS040603-4A	6/10/2004	653.835	29.58%	300	11.1	0.1	pCi/g	NA	
MB	Tracer	10:05:58 AM	AS040603-4-1	NA	NA	NA	0.3 g	16	T6034B	12:51 PM	3.883	1000	73.7%	1.8	NA	Dry Weight	NA	

Comments:

Data Package ID: *th0405096-1*

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 Recieved' while the Report Basis is 'Dry Weight'.

- Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Recieved'.

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

000072

Isotopic Thorium By Alpha Spectroscopy Raw Data Report

Laboratory Name: Paragon Analytics
PAI Work Order: 0405096

Prep SOP: PAI 777
Analytical SOP: PAI 714

Reported on: Thursday, July 29, 2004
3:44:34 PM

Sample ID QC Type	Nuclide Type	Sample Date/Time	Prep Batch QCBatchID	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)	CntDur(min) Yield	Activity +/- 2 s TPU	MDC DecLev	ReportUnits ReportBasis	DER RPD	%Spk. Recov Flags
AS040603-4	Th-230	6/3/2004	AS040603-4	NA	NA	SOIL	0.3 g	Alpha Spec	AS040603-4A	6/10/2004	10.494	29.58%	300	0.24	0.50	pCi/g	NA	
MB	Trg. Analyte	10:05:58 AM	AS040603-4-1	NA	NA	NA	0.3 g	16	T6034B	12:51 PM	55.021	1000	73.7%	0.26	NA	Dry Weight	NA	U,M
AS040603-4	Th-232	6/3/2004	AS040603-4	NA	NA	SOIL	0.3 g	Alpha Spec	AS040603-4A	6/10/2004	2.417	29.58%	300	0.056	0.144	pCi/g	NA	
MB	Trg. Analyte	10:05:58 AM	AS040603-4-1	NA	NA	NA	0.3 g	16	T6034B	12:51 PM	1.942	1000	73.7%	0.084	NA	Dry Weight	NA	U,M
AS040603-4	Th-229	6/3/2004	AS040603-4	NA	NA	SOIL	0.3 g	Alpha Spec	AS040603-4A	6/10/2004	688.379	30.69%	300	11.2	0.2	pCi/g	NA	
LCS	Tracer	10:05:58 AM	AS040603-4-1	NA	NA	NA	0.3 g	17	T6034L	12:52 PM	8.738	1000	74.8%	1.8	NA	Dry Weight	NA	
AS040603-4	Th-230	6/3/2004	AS040603-4	NA	NA	SOIL	0.3 g	Alpha Spec	AS040603-4A	6/10/2004	761.054	30.69%	300	16.6	0.5	pCi/g	NA	108
LCS	Trg. Analyte	10:05:58 AM	AS040603-4-1	NA	NA	NA	0.3 g	17	T6034L	12:52 PM	59.819	1000	74.8%	3.0	NA	Dry Weight	NA	P,M3
AS040611-2	Th-228	6/11/2004	AS040611-2	NA	NA	SOIL	1 g	Alpha Spec	AS040611-2D	6/23/2004	0.400	29.03%	600	0.001	0.070	pCi/g	NA	
MB	Trg. Analyte	9:14:47 AM	AS040611-2-2	NA	NA	NA	1 g	9	TR6112B	12:36 PM	21.000	1000	71.7%	0.033	NA	Dry Weight	NA	U
AS040611-2	Th-229	6/11/2004	AS040611-2	NA	NA	SOIL	1 g	Alpha Spec	AS040611-2D	6/23/2004	1280.600	29.03%	600	3.31	0.06	pCi/g	NA	
MB	Tracer	9:14:47 AM	AS040611-2-2	NA	NA	NA	1 g	9	TR6112B	12:36 PM	34.000	1000	71.7%	0.52	NA	Dry Weight	NA	
AS040611-2	Th-230	6/11/2004	AS040611-2	NA	NA	SOIL	1 g	Alpha Spec	AS040611-2D	6/23/2004	-17.959	29.03%	600	-0.065	0.106	pCi/g	NA	
MB	Trg. Analyte	9:14:47 AM	AS040611-2-2	NA	NA	NA	1 g	9	TR6112B	12:36 PM	54.931	1000	71.7%	0.044	NA	Dry Weight	NA	U,M
AS040611-2	Th-232	6/11/2004	AS040611-2	NA	NA	SOIL	1 g	Alpha Spec	AS040611-2D	6/23/2004	0.800	29.03%	600	0.003	0.044	pCi/g	NA	
MB	Trg. Analyte	9:14:47 AM	AS040611-2-2	NA	NA	NA	1 g	9	TR6112B	12:36 PM	7.000	1000	71.7%	0.020	NA	Dry Weight	NA	U
AS040611-2	Th-229	6/11/2004	AS040611-2	NA	NA	SOIL	1 g	Alpha Spec	AS040611-2D	6/18/2004	666.400	30.38%	300	3.29	0.03	pCi/g	NA	
LCS	Tracer	9:14:47 AM	AS040611-2-2	NA	NA	NA	1 g	63	T6112L	9:46 PM	2.000	1000	71.3%	0.54	NA	Dry Weight	NA	
AS040611-2	Th-230	6/11/2004	AS040611-2	NA	NA	SOIL	1 g	Alpha Spec	AS040611-2D	6/18/2004	664.173	30.38%	300	4.60	0.15	pCi/g	NA	100
LCS	Trg. Analyte	9:14:47 AM	AS040611-2-2	NA	NA	NA	1 g	63	T6112L	9:46 PM	56.089	1000	71.3%	0.84	NA	Dry Weight	NA	P,M3
AS040720-4	Th-228	7/20/2004	AS040720-4	NA	NA	SOIL	2 g	Alpha Spec	AS040720-4A	7/27/2004	9.000	30.13%	300	0.033	0.051	pCi/g	NA	
MB	Trg. Analyte	12:09:21 PM	AS040720-4-2	NA	NA	NA	2 g	46	T7204B	10:37 AM	20.000	1000	69.1%	0.030	NA	Dry Weight	NA	U

Comments:

Data Package ID: *th0405096-1*

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 Recieved' while the Report Basis is 'Dry Weight'.
# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Recieved'.

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

00073

Isotopic Thorium By Alpha Spectroscopy Raw Data Report

Laboratory Name: Paragon Analytics
PAI Work Order: 0405096

Prep SOP: PAI 777
Analytical SOP: PAI 714

Reported on: Thursday, July 29, 2004
3:30:41 PM

Sample ID QC Type	Nuclide Type	Sample Date/Time	Prep Batch QCBatchID	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)	CntDur(min) Yield	Activity +/- 2 s TPU	MDC DecLev	ReportUnits ReportBasis	DER RPD	%Spk. Recov Flags
AS040720-4	Th-229	7/20/2004	AS040720-4	NA	NA	SOIL	2 g	Alpha Spec	AS040720-4A	7/27/2004	624.800	30.13%	300	1.56	0.04	pCi/g	NA	
MB	Tracer	12:09:21 PM	AS040720-4-2	NA	NA	NA	2 g	46	T7204B	10:37 AM	24.000	1000	69.1%	0.26	NA	Dry Weight	NA	
AS040720-4	Th-230	7/20/2004	AS040720-4	NA	NA	SOIL	2 g	Alpha Spec	AS040720-4A	7/27/2004	3.405	30.13%	300	0.012	0.080	pCi/g	NA	
MB	Trg. Analyte	12:09:21 PM	AS040720-4-2	NA	NA	NA	2 g	46	T7204B	10:37 AM	58.650	1000	69.1%	0.037	NA	Dry Weight	NA	U
AS040720-4	Th-232	7/20/2004	AS040720-4	NA	NA	SOIL	2 g	Alpha Spec	AS040720-4A	7/27/2004	2.900	30.13%	300	0.010	0.034	pCi/g	NA	
MB	Trg. Analyte	12:09:21 PM	AS040720-4-2	NA	NA	NA	2 g	46	T7204B	10:37 AM	7.000	1000	69.1%	0.017	NA	Dry Weight	NA	U
AS040720-4	Th-229	7/20/2004	AS040720-4	NA	NA	SOIL	2 g	Alpha Spec	AS040720-4A	7/28/2004	445.160	30.16%	210	1.58	0.02	pCi/g	NA	
LCS	Tracer	12:09:21 PM	AS040720-4-2	NA	NA	NA	2 g	10	TR7204L	10:14 AM	4.000	1000	70.3%	0.28	NA	Dry Weight	NA	
AS040720-4	Th-230	7/20/2004	AS040720-4	NA	NA	SOIL	2 g	Alpha Spec	AS040720-4A	7/28/2004	440.490	30.16%	210	2.23	0.10	pCi/g	NA	98.9
LCS	Trg. Analyte	12:09:21 PM	AS040720-4-2	NA	NA	NA	2 g	10	TR7204L	10:14 AM	59.571	1000	70.3%	0.44	NA	Dry Weight	NA	P
AS040720-4	Th-229	7/20/2004	AS040720-4	NA	NA	SOIL	2 g	Alpha Spec	AS040720-4A	7/27/2004	622.300	32.28%	300	1.45	0.04	pCi/g	NA	
LCSD	Tracer	12:09:21 PM	AS040720-4-2	NA	NA	NA	2 g	48	T7204LD	10:38 AM	29.000	1000	64.3%	0.24	NA	Dry Weight	NA	
AS040720-4	Th-230	7/20/2004	AS040720-4	NA	NA	SOIL	2 g	Alpha Spec	AS040720-4A	7/27/2004	740.467	32.28%	300	2.68	0.08	pCi/g	0.34	119
LCSD	Trg. Analyte	12:09:21 PM	AS040720-4-2	NA	NA	NA	2 g	48	T7204LD	10:38 AM	58.443	1000	64.3%	0.49	NA	Dry Weight	NA	P

Comments:

Data Package ID: *th0405096-1*

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 Recieved' while the Report Basis is 'Dry Weight'.
# - Aliquot Basis is 'Dry Weight' while the Report Basis is 'As Recieved'.

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

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
6/23/04 1:10:31 PM
Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0405096-1 TAS040603-3

Analysis Type: Thorium

Detector: MCB 2 Input 2

Date/Time of Count: 6/23/04 6:47:06 AM

Sample Volume: 2.000 Total, 2.000 Aliquot.

Live Time: **330.00 Minutes**

Chem. Yield: **40.29%**

Real Time: 330.00 Minutes

Total Eff.: 11.75 %

Dead Time: 0.0 %

Tracer Amount: 10.000 DPM, With Contamina

Acquisition: 512 Channels

Efficiency: 29.16%

Analysis: Relative Region-Of-Interest

Original: 3,014 + 10.1008 * Chn + -0.00079 * Chn **2.

Spectrum Calibration: 3,014 + 10.1118 * Chn + -0.00079 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\TR50961.SPC**

Background File: **C:\USER\ALPHA\BKGND\B4062210.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	167.71	147	170	6.00	6.00	46.00	0.00	36.39	0.94
2	243.55	223	248	2.00	4.00	18.00	7.26	10.74	0.28
3	99.56	76	107	4.00	4.00	24.00	0.99	23.01	0.59
Tracer	183.70	171	210	6.00	34.00	389.00	1.32	387.68	10.00

SK SD 6/24/04

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-230	4687.70	59.08	0.211	n/a	36.53 %
2	Th-228	5430.00	19.45	0.062	n/a	79.11 %
3	Th-232	4013.00	39.82	0.134	n/a	41.82 %
Tracer	Th-229	4845.00	58.93	2.252	n/a	9.94 %

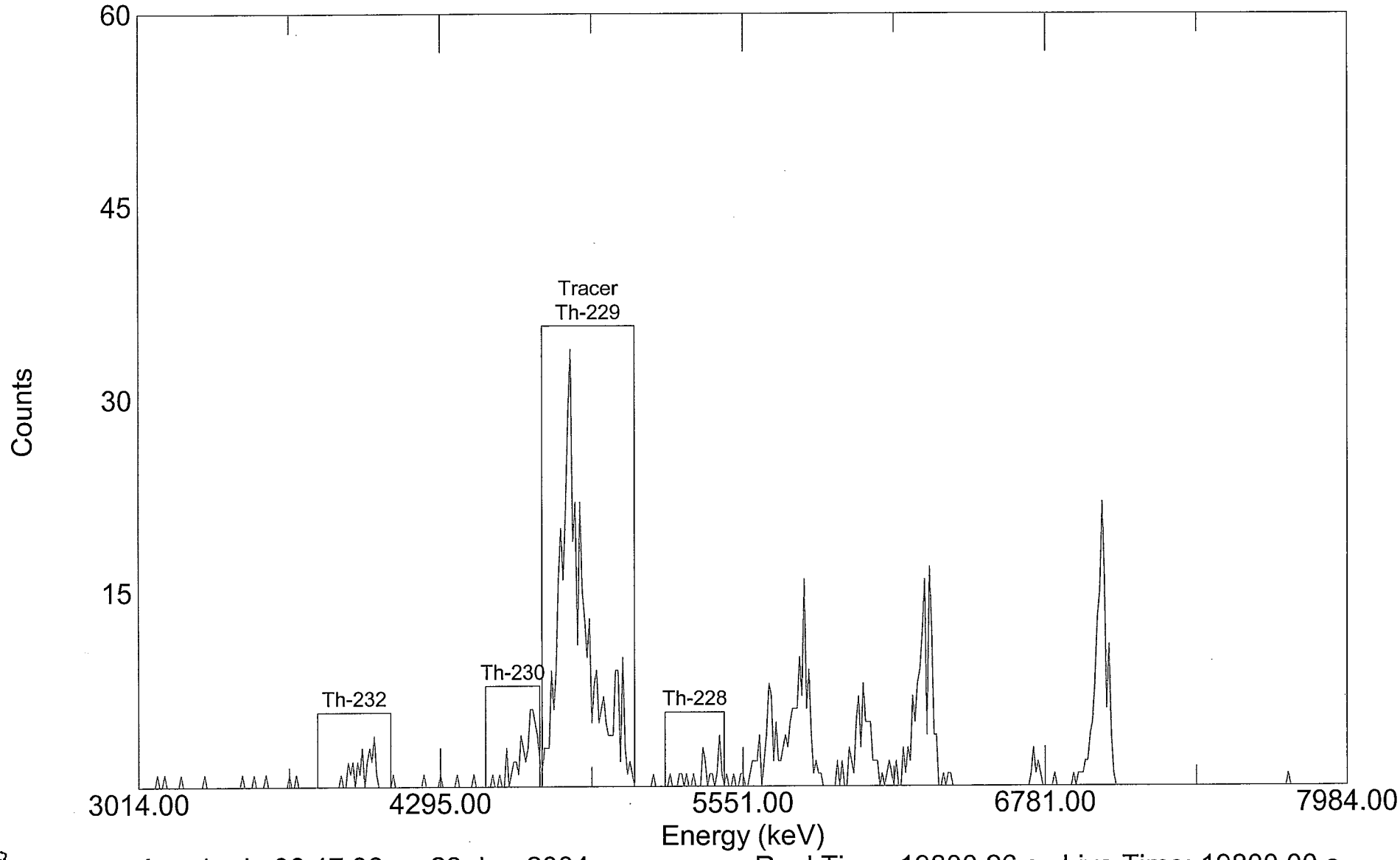
Totals

		% Total
Gross Count:	923.00	100.00
Net Area:	848.42	91.92
Background:	74.58	8.08
Composite Fit:	477.00	51.68
Residuals:	446.00	48.32

Analyzed By: Sm

Checked By: SD

TR50961 AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 06:47:06 on 23-Jun-2004
File: C:\User\Alpha\ALPHA\TR50961.SPC
Sample: 0405096-1 TAS040603-3

Real Time: 19800.26 s. Live Time: 19800.00 s.
Detector: #10 MCB 2 Input 2
Type: Thorium

000075

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
6/22/04 2:46:51 PM

Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0405096-2 TAS040603-3

Analysis Type: Thorium

Detector: MCB 3 Input 3

Date/Time of Count: 6/10/04 12:53:18 PM

Sample Volume: 2.000 Total, 2.000 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: **51.04%**

Real Time: 300.03 Minutes

Total Eff.: 14.78 %

Dead Time: 0.0 %

Tracer Amount: 9.999 DPM, With Contaminate

Acquisition: 512 Channels

Efficiency: 28.96%

Analysis: Relative Region-Of-Interest

Original: 3,012 + 10.1582 * Chn + -0.00093 * Chn **2.

Spectrum Calibration: 3,012 + 10.1972 * Chn + -0.00093 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\T50962.SPC**

Background File: **C:\User\Alpha\ALPHA\B4060819.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	166.84	147	170	4.00	9.00	67.00	0.00	56.00	1.26
2	242.45	222	247	4.00	9.00	43.00	13.11	29.89	0.67
3	99.04	75	106	2.00	4.00	27.00	0.00	27.00	0.61
Tracer	182.78	171	208	8.00	40.00	444.00	0.58	443.42	10.00

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-230	4687.70	39.55	0.284	n/a	28.65 %
2	Th-228	5430.00	38.99	0.152	n/a	43.55 %
3	Th-232	4013.00	20.03	0.137	n/a	37.72 %
Tracer	Th-229	4845.00	78.87	2.252	n/a	9.30 %

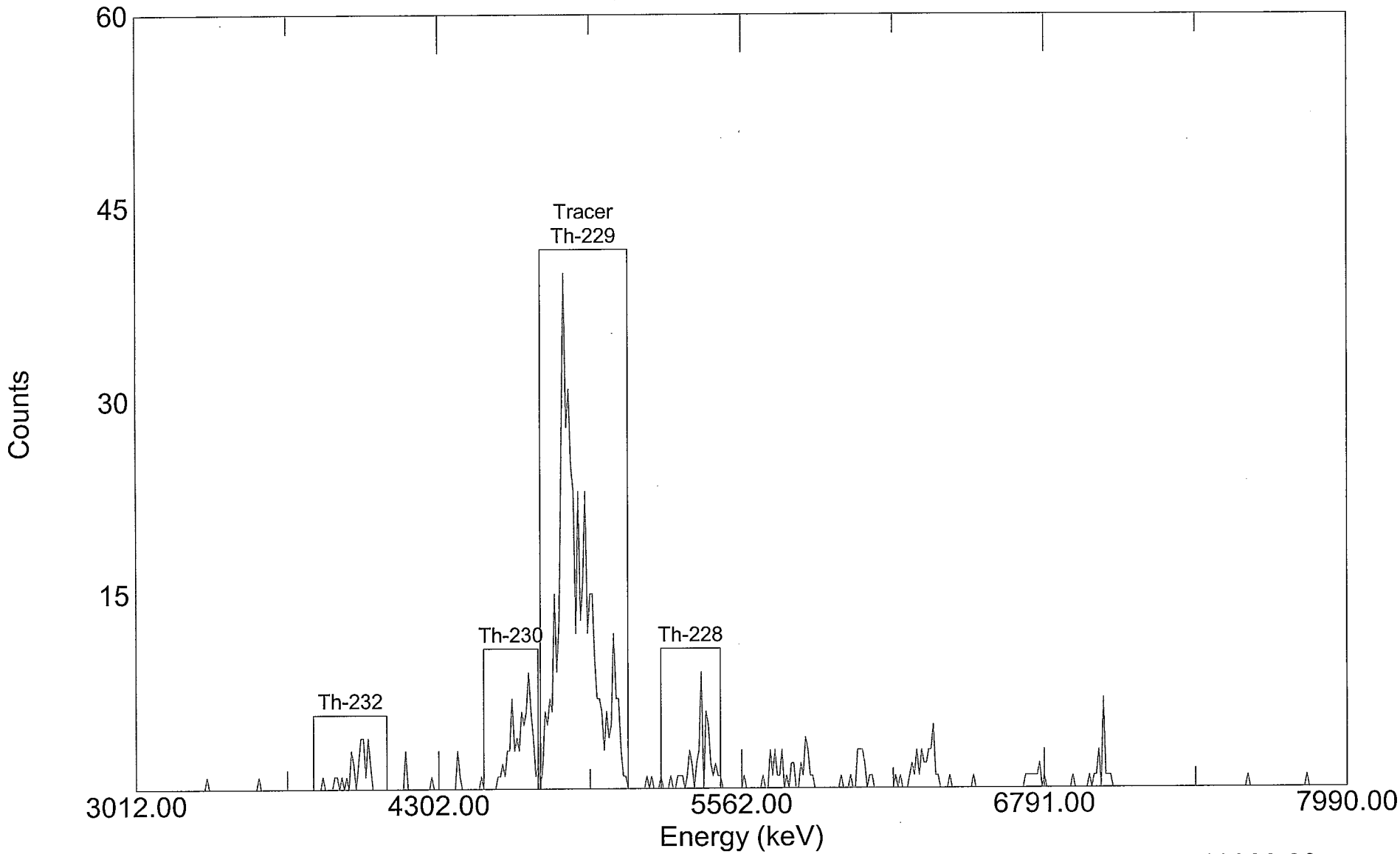
Totals

		% Total
Gross Count:	700.00	100.00
Net Area:	629.81	89.97
Background:	70.19	10.03
Composite Fit:	581.00	83.00
Residuals:	119.00	17.00

Analyzed By: Sm

Checked By: [illegible]

T50962 AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 12:53:18 on 10-Jun-2004
File: C:\User\Alpha\ALPHA\T50962.SPC
Sample: 0405096-2 TAS040603-3

Real Time: 18002.02 s. Live Time: 18000.00 s.
Detector: #19 MCB 3 Input 3
Type: Thorium

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
6/22/04 2:48:45 PM
Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0405096-2D TAS040603-3

Analysis Type: Thorium

Detector: MCB 3 Input 5

Date/Time of Count: 6/10/04 12:53:46 PM

Sample Volume: 2.000 Total, 2.000 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: **46.96%**

Real Time: 300.03 Minutes

Total Eff.: 14.02 %

Dead Time: 0.0 %

Tracer Amount: 9.999 DPM, With Contaminate

Acquisition: 512 Channels

Efficiency: 29.86%

Analysis: Relative Region-Of-Interest

Original: 3,035 + 10.1035 * Chn + -0.00096 * Chn **2.

Spectrum Calibration: 3,035 + 9.9778 * Chn + -0.00096 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\T50962D.SPC**

Background File: **C:\User\Alpha\ALPHA\B4060821.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	168.32	147	171	2.00	8.00	75.00	0.87	63.69	1.51
2	245.79	224	249	2.00	7.00	47.00	16.60	30.40	0.72
3	98.92	74	105	6.00	3.00	26.00	1.46	24.54	0.58
Tracer	184.63	172	208	10.00	30.00	423.00	2.33	420.67	10.00

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-230	4687.70	19.31	0.341	n/a	26.66 %
2	Th-228	5430.00	19.02	0.163	n/a	44.86 %
3	Th-232	4013.00	58.73	0.131	n/a	40.82 %
Tracer	Th-229	4845.00	96.25	2.252	n/a	9.53 %

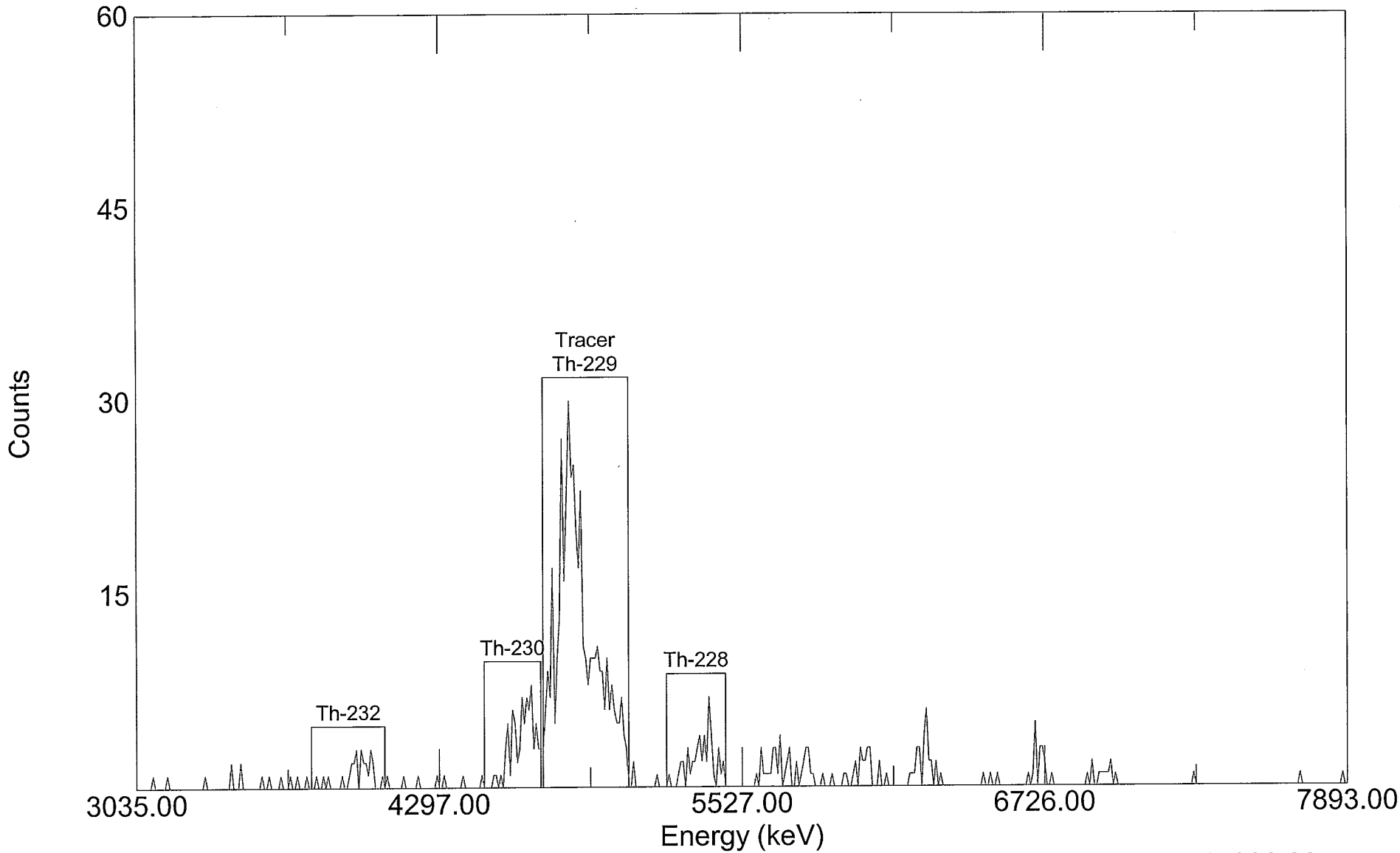
Totals

		% Total
Gross Count:	714.00	100.00
Net Area:	617.88	86.54
Background:	96.12	13.46
Composite Fit:	571.00	79.97
Residuals:	143.00	20.03

Analyzed By: Sm

Checked By: SD

T50962D AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 12:53:46 on 10-Jun-2004
File: C:\User\Alpha\ALPHA\T50962D.SPC
Sample: 0405096-2D TAS040603-3

Real Time: 18002.04 s. Live Time: 18000.00 s.
Detector: #21 MCB 3 Input 5
Type: Thorium

000030

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
6/10/04 7:30:33 PM
Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0405096-3 TAS040603-3

Analysis Type: Thorium

Detector: MCB 3 Input 6

Date/Time of Count: 6/10/04 7:10:40 PM

Sample Volume: 2.000 Total, 2.000 Aliquot.

Live Time: **330.00 Minutes**

Chem. Yield: **43.21%**

Real Time: 330.36 Minutes

Total Eff.: 12.28 %

Dead Time: 0.1 %

Tracer Amount: 9.999 DPM, With Contaminate

Acquisition: 512 Channels

Efficiency: 28.41%

Analysis: Relative Region-Of-Interest

Original: 3,042 + 9.9010 * Chn + -0.00036 * Chn **2.

Spectrum Calibration: 3,042 + 9.8854 * Chn + -0.00036 * Chn **2.

Cal File:

Spectrum File: **C:\USER\ALPHA\ALPHA\T50963.SPC**

Background File: **C:\USER\ALPHA\BKGND\B4060822.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	167.55	146	169	2.00	11.00	65.00	0.64	54.31	1.34
2	243.80	222	247	2.00	7.00	31.00	6.41	24.59	0.61
3	98.63	75	106	4.00	4.00	34.00	1.28	32.72	0.81
Tracer	183.67	170	209	4.00	35.00	406.00	0.96	405.04	10.00

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-230	4687.70	19.53	0.302	n/a	29.11 %
2	Th-228	5430.00	19.42	0.137	n/a	44.84 %
3	Th-232	4013.00	39.26	0.182	n/a	35.00 %
Tracer	Th-229	4845.00	39.01	2.252	n/a	9.73 %

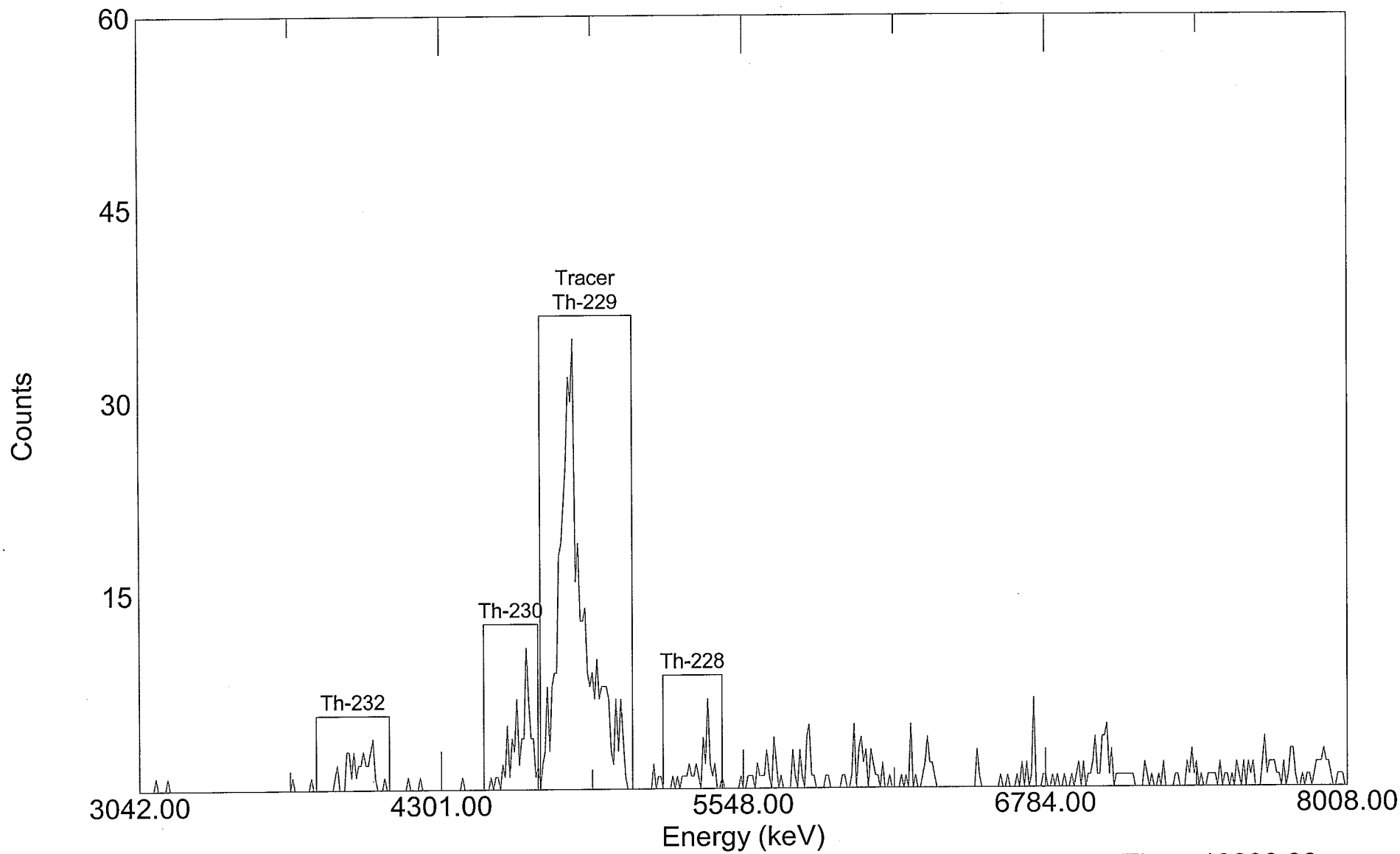
Totals

		% Total
Gross Count:	787.00	100.00
Net Area:	720.04	91.49
Background:	66.96	8.51
Composite Fit:	536.00	68.11
Residuals:	251.00	31.89

Analyzed By: Sm

Checked By: CD

T50963 AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 19:10:40 on 10-Jun-2004
File: C:\USER\ALPHA\ALPHA\T50963.SPC
Sample: 0405096-3 TAS040603-3

Real Time: 19821.32 s. Live Time: 19800.00 s.
Detector: #22 MCB 3 Input 6
Type: Thorium

000082

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
6/22/04 2:52:03 PM
Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0405096-5 TAS040603-3

Analysis Type: Thorium

Detector: MCB 3 Input 7

Date/Time of Count: 6/10/04 12:54:21 PM

Sample Volume: 2.000 Total, 2.000 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: **53.28%**

Real Time: 300.03 Minutes

Total Eff.: 15.33 %

Dead Time: 0.0 %

Tracer Amount: 9.999 DPM, With Contaminate

Acquisition: 512 Channels

Efficiency: 28.77%

Analysis: Relative Region-Of-Interest

Original: 3,009 + 10.0884 * Chn + -0.00083 * Chn **2.

Spectrum Calibration: 3,009 + 10.0908 * Chn + -0.00083 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\T50965.SPC**

Background File: **C:\User\Alpha\ALPHA\B4060823.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	168.75	148	171	2.00	171.00	1,296.00	0.00	1284.60	27.93
2	244.92	223	248	2.00	74.00	551.00	7.86	543.14	11.81
3	100.37	75	106	4.00	113.00	892.00	0.87	891.13	19.38
Tracer	184.81	172	211	8.00	46.00	461.00	1.17	459.83	10.00

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-230	4687.70	19.62	6.291	n/a	5.49 %
2	Th-228	5430.00	19.36	2.660	n/a	8.48 %
3	Th-232	4013.00	39.69	4.364	n/a	6.57 %
Tracer	Th-229	4845.00	78.26	2.252	n/a	9.13 %

Totals

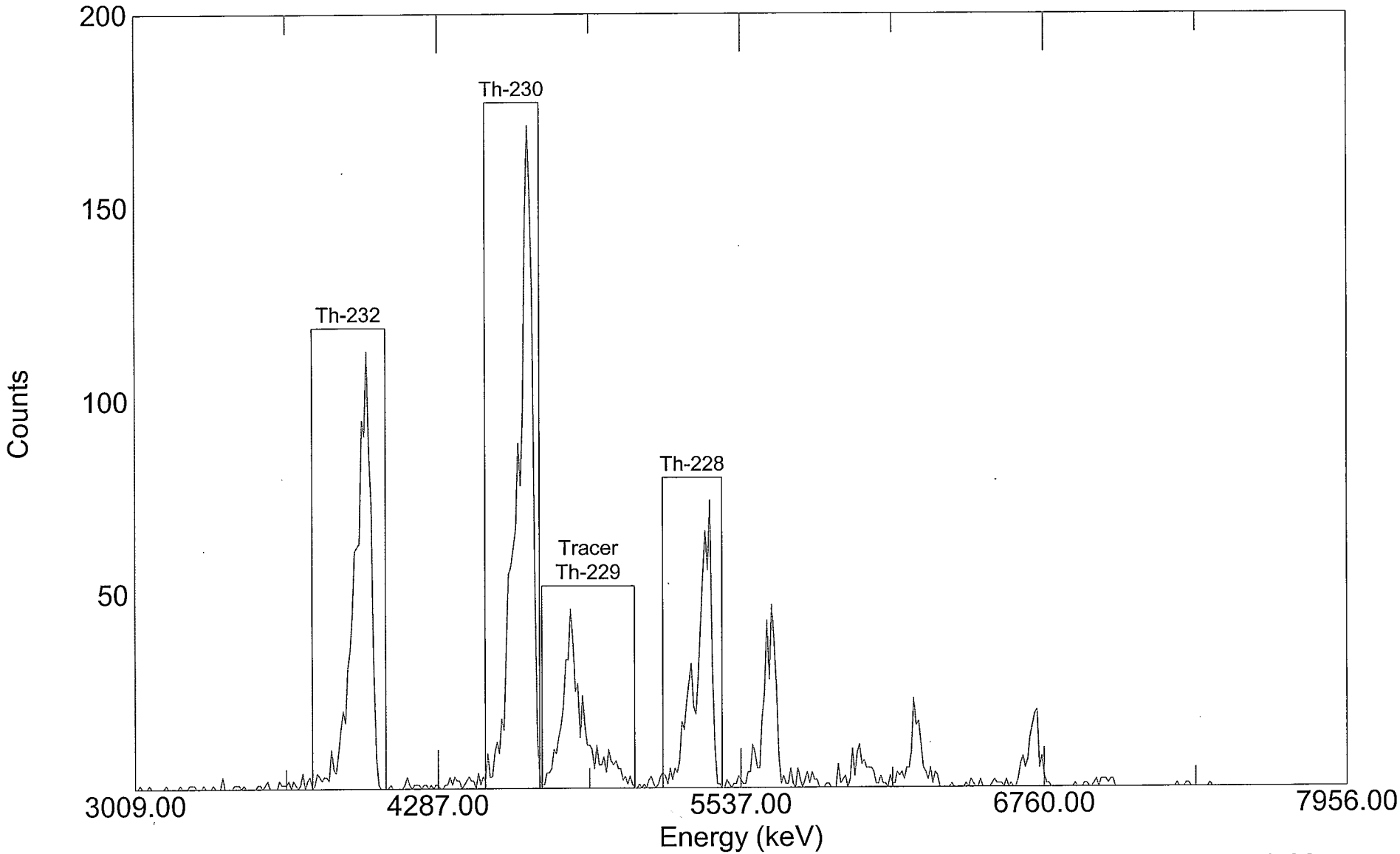
		% Total
Gross Count:	3,981.00	100.00
Net Area:	3,911.39	98.25
Background:	69.61	1.75
Composite Fit:	3,200.00	80.38
Residuals:	781.00	19.62

Analyzed By: Sm

Checked By: GD

000083

T50965 AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 12:54:21 on 10-Jun-2004
File: C:\User\Alpha\ALPHA\T50965.SPC
Sample: 0405096-5 TAS040603-3

Real Time: 18002.04 s. Live Time: 18000.00 s.
Detector: #23 MCB 3 Input 7
Type: Thorium

000084

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
7/28/04 8:15:33 AM
Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0405096-6 TAS040720-4

Analysis Type: Thorium

Detector: MCB 6 Input 2

Date/Time of Count: 7/27/04 10:35:36 AM

Sample Volume: 1.000 Total, 1.000 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: **52.59%**

Real Time: 300.01 Minutes

Total Eff.: 16.59 %

Dead Time: 0.0 %

Tracer Amount: 9.999 DPM, With Contaminate

Acquisition: 512 Channels

Efficiency: 31.55%

Analysis: Relative Region-Of-Interest

Original: 2,963 + 10.3033 * Chn + -0.00097 * Chn **2.

Spectrum Calibration: 2,963 + 10.2185 * Chn + -0.00097 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\T50966.SPC**

Background File: **C:\USER\ALPHA\BKGND\B4072642.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	247.17	224	249	2.00	13.00	84.00	6.90	77.10	1.55
2	171.53	152	174	2.00	16.00	115.00	0.60	102.06	2.05
3	103.74	80	111	2.00	18.00	124.00	0.00	124.00	2.49
Tracer	187.47	175	212	8.00	39.00	498.00	0.30	497.70	10.00

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-228	5430.00	19.48	0.698	n/a	23.39 %
2	Th-230	4687.70	19.77	0.924	n/a	20.60 %
3	Th-232	4013.00	20.04	1.122	n/a	17.60 %
Tracer	Th-229	4845.00	78.85	4.504	n/a	8.78 %

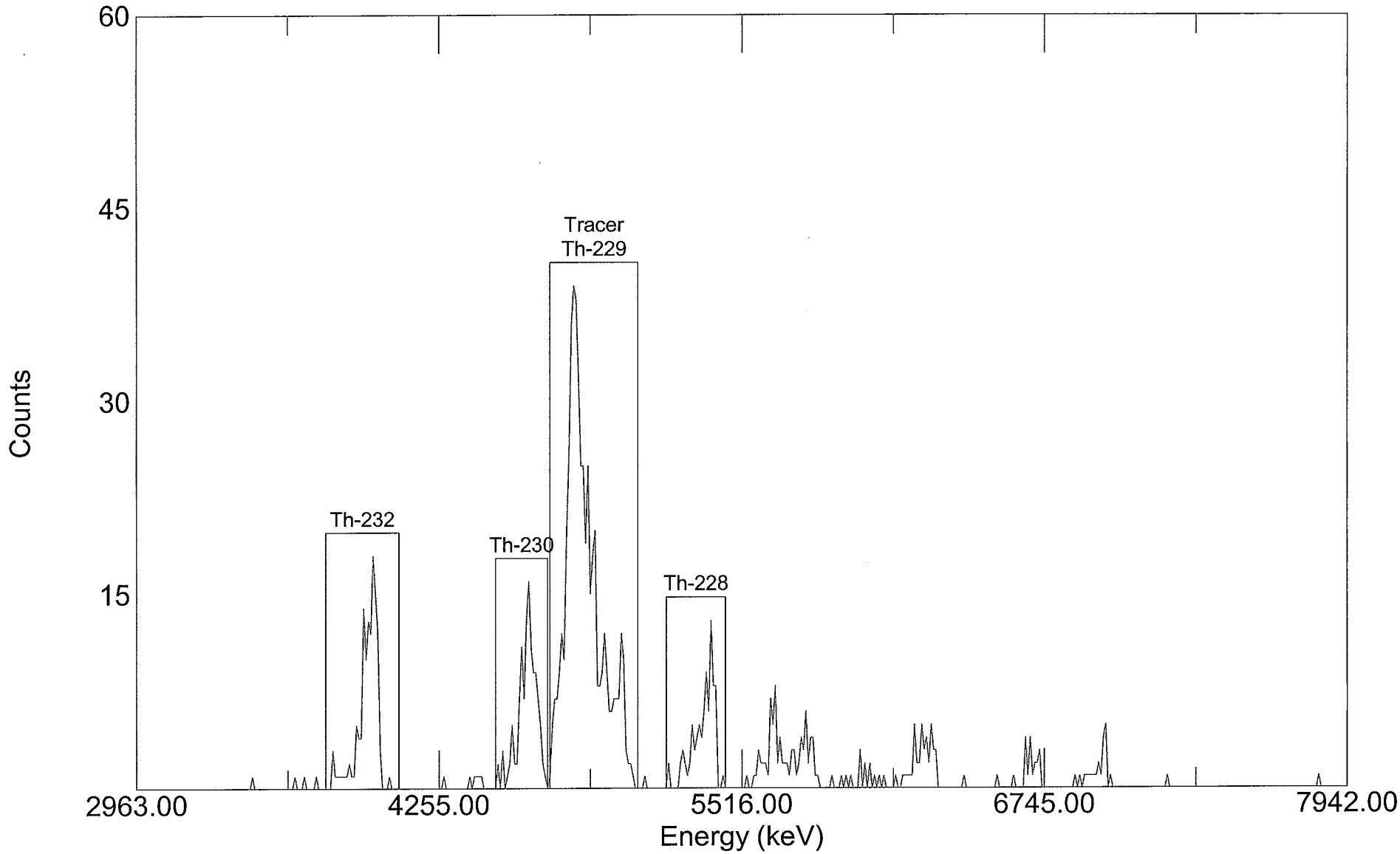
Totals

		% Total
Gross Count:	1,009.00	100.00
Net Area:	944.80	93.64
Background:	64.20	6.36
Composite Fit:	821.00	81.37
Residuals:	188.00	18.63

Analyzed By: Sm

Checked By: JP

T50966 AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 10:35:36 on 27-Jul-2004
File: C:\User\Alpha\ALPHA\T50966.SPC
Sample: 0405096-6 TAS040720-4

Real Time: 18000.60 s. Live Time: 18000.00 s.
Detector: #42 MCB 6 Input 2
Type: Thorium

000085

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
6/11/04 1:53:16 PM
Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0405096-7 TAS040603-4

Analysis Type: Thorium

Detector: MCB 8 Input 4

Date/Time of Count: 6/10/04 6:52:14 AM

Sample Volume: 0.300 Total, 0.300 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: **57.98%**

Real Time: 300.03 Minutes

Total Eff.: 14.42 %

Dead Time: 0.0 %

Tracer Amount: 10.253 DPM, With Contamina

Acquisition: 512 Channels

Efficiency: 24.87%

Analysis: Relative Region-Of-Interest

Original: 3,023 + 10.0483 * Chn + -0.00093 * Chn **2.

Spectrum Calibration: 3,023 + 10.1134 * Chn + -0.00093 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\T50967.SPC**

Background File: **C:\USER\ALPHA\BKGND\B4060860.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	167.13	150	173	6.00	437.00	4,433.00	0.29	4421.71	102.21
2	243.40	225	250	6.00	233.00	2,153.00	8.45	2144.55	49.57
3	98.75	75	106	4.00	226.00	2,337.00	0.29	2336.71	54.02
Tracer	183.20	174	212	10.00	33.00	445.00	1.46	443.54	10.25

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-230	4687.70	58.82	153.472	n/a	2.95 %
2	Th-228	5430.00	57.98	74.435	n/a	4.24 %
3	Th-232	4013.00	39.72	81.104	n/a	4.05 %
Tracer	Th-229	4845.00	97.74	15.395	n/a	9.29 %

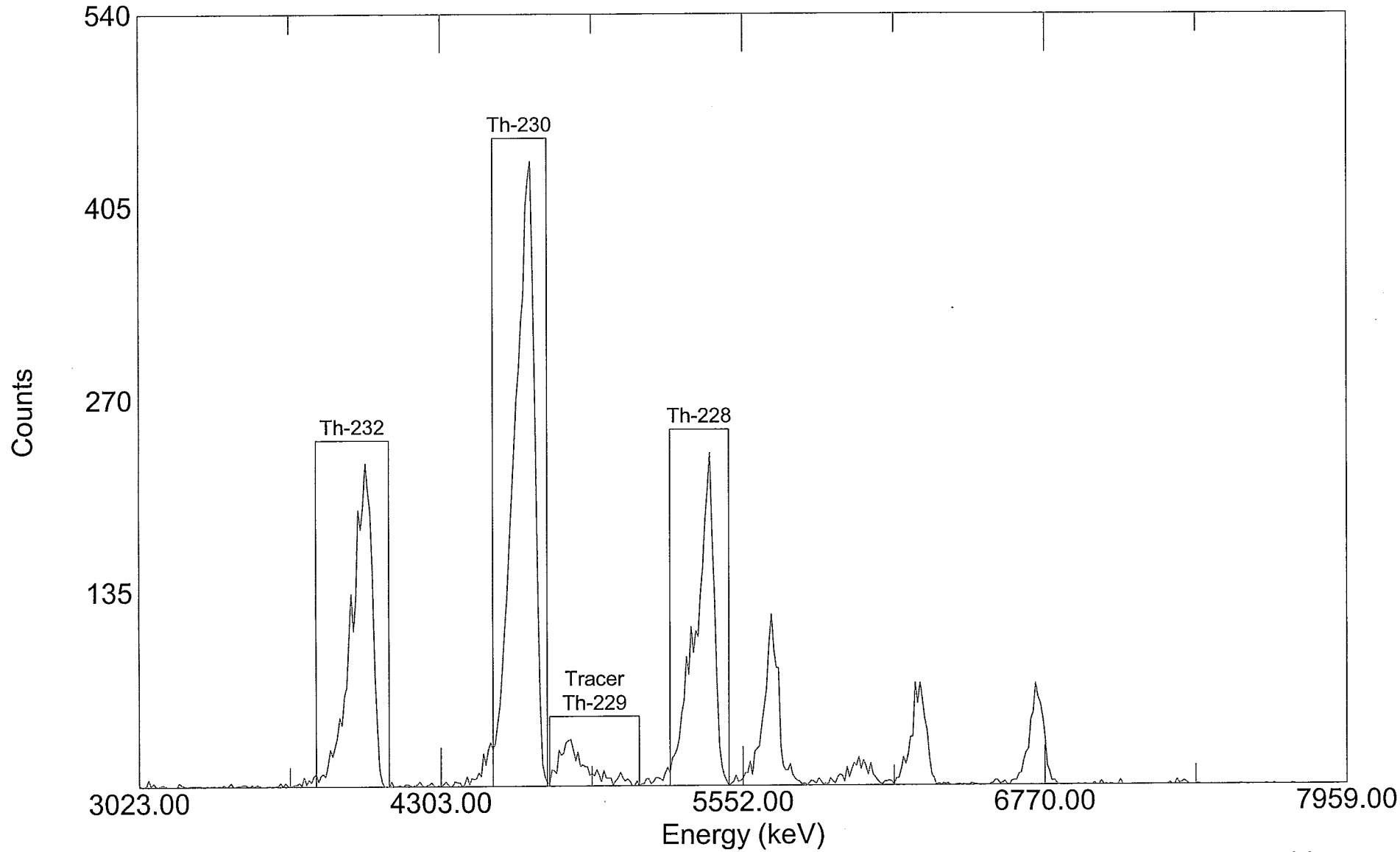
Totals

		% Total
Gross Count:	11,931.00	100.00
Net Area:	11,874.20	99.52
Background:	56.80	0.48
Composite Fit:	9,368.00	78.52
Residuals:	2,563.00	21.48

Analyzed By: Sm

Checked By: LD

T50967 AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 06:52:14 on 10-Jun-2004
File: C:\User\Alpha\ALPHA\T50967.SPC
Sample: 0405096-7 TAS040603-4

Real Time: 18001.82 s. Live Time: 18000.00 s.
Detector: #60 MCB 8 Input 4
Type: Thorium

000089

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
7/29/04 8:27:46 AM
Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0405096-8 TAS040611-2

Analysis Type: Thorium

Detector: MCB 2 Input 1

Date/Time of Count: 7/28/04 6:39:14 PM

Sample Volume: 0.505 Total, 0.505 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: **52.97%**

Real Time: 300.02 Minutes

Total Eff.: 15.48 %

Dead Time: 0.0 %

Tracer Amount: 10.253 DPM, With Contamina

Acquisition: 512 Channels

Efficiency: 29.22%

Analysis: Relative Region-Of-Interest

Original: 3,027 + 9.9441 * Chn + -0.00050 * Chn **2.

Spectrum Calibration: 3,027 + 9.4415 * Chn + -0.00050 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\TC50968.SPC**

Background File: **C:\USER\ALPHA\BKGND\B4072609.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	258.03	212	246	2.00	400.00	5,904.00	8.70	5895.30	126.96
2	177.54	143	170	2.00	777.00	11,554.00	2.10	11540.09	248.52
3	104.99	69	102	2.00	380.00	6,073.00	2.10	6070.90	130.74
Tracer	194.54	171	199	2.00	32.00	483.00	6.90	476.10	10.25

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-228	5430.00	18.36	113.244	n/a	2.55 %
2	Th-230	4687.70	18.53	221.676	n/a	1.83 %
3	Th-232	4013.00	18.67	116.617	n/a	2.52 %
Tracer	Th-229	4845.00	18.49	9.145	n/a	8.92 %

Totals

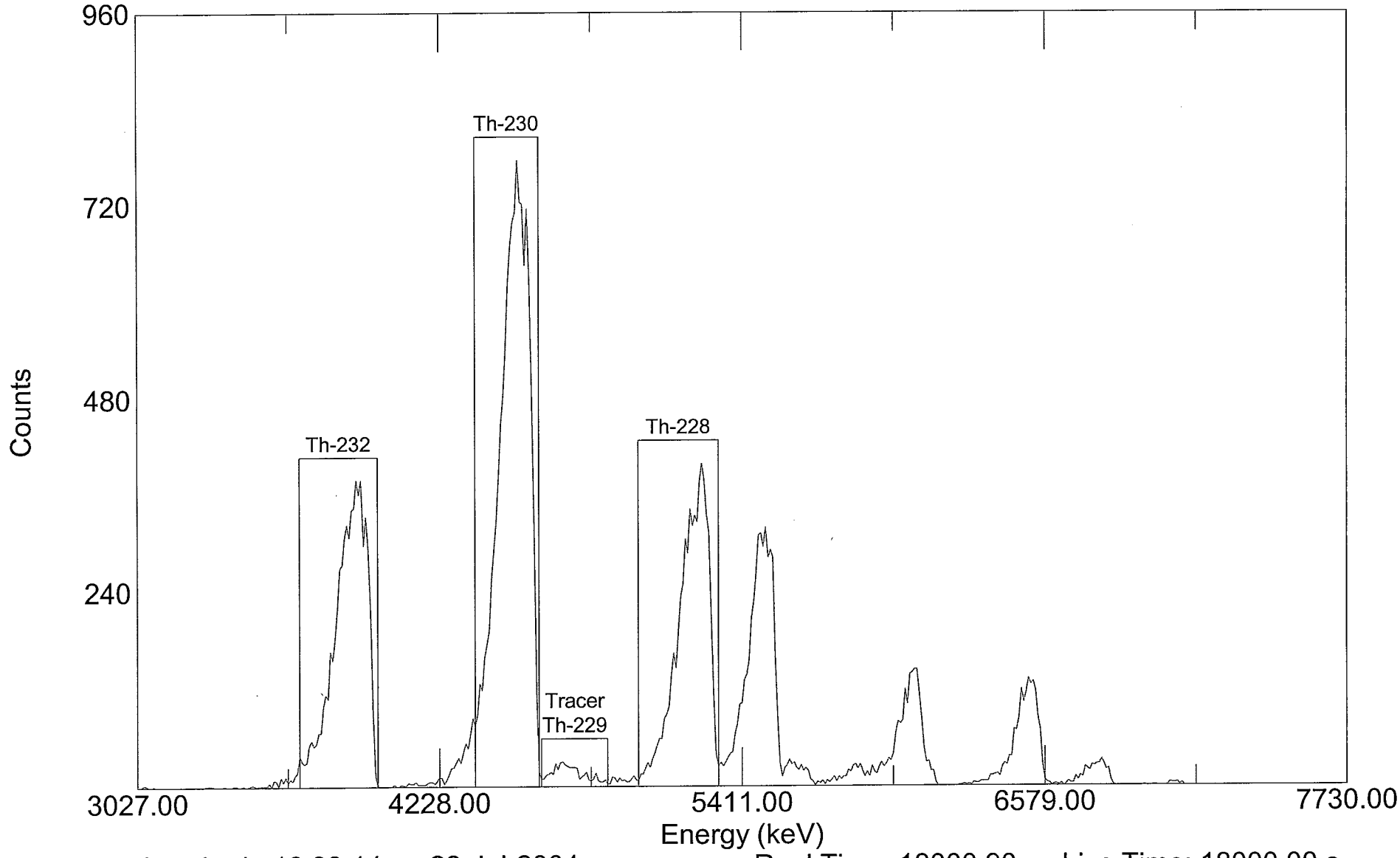
		% Total
Gross Count:	33,243.00	100.00
Net Area:	33,160.80	99.75
Background:	82.20	0.25
Composite Fit:	24,014.00	72.24
Residuals:	9,229.00	27.76

Analyzed By: Sm

Checked By: JP

000089

TC50968 AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 18:39:14 on 28-Jul-2004
File: C:\User\Alpha\ALPHA\TC50968.SPC
Sample: 0405096-8 TAS040611-2

Real Time: 18000.90 s. Live Time: 18000.00 s.
Detector: #9 MCB 2 Input 1
Type: Thorium

000030

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
6/11/04 1:54:26 PM
Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0405096-9 TAS040603-4

Analysis Type: Thorium

Detector: MCB 8 Input 5

Date/Time of Count: 6/10/04 6:52:28 AM

Sample Volume: 1.000 Total, 1.000 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: **56.01%**

Real Time: 300.03 Minutes

Total Eff.: 17.39 %

Dead Time: 0.0 %

Tracer Amount: 10.253 DPM, With Contamina

Acquisition: 512 Channels

Efficiency: 31.05%

Analysis: Relative Region-Of-Interest

Original: 3,077 + 9.7539 * Chn + -0.00026 * Chn **2.

Spectrum Calibration: 3,077 + 9.8251 * Chn + -0.00026 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\T50969.SPC**

Background File: **C:\USER\ALPHA\BKGND\B4060861.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	164.64	147	170	4.00	430.00	4,049.00	0.58	4035.15	77.34
2	241.00	223	248	6.00	232.00	1,989.00	16.31	1972.69	37.81
3	95.50	70	101	4.00	258.00	2,412.00	0.87	2411.13	46.21
Tracer	180.80	171	210	12.00	45.00	537.00	2.04	534.96	10.25

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-230	4687.70	38.96	34.837	n/a	3.09 %
2	Th-228	5430.00	58.21	17.031	n/a	4.43 %
3	Th-232	4013.00	39.11	20.816	n/a	3.99 %
Tracer	Th-229	4845.00	116.79	4.618	n/a	8.46 %

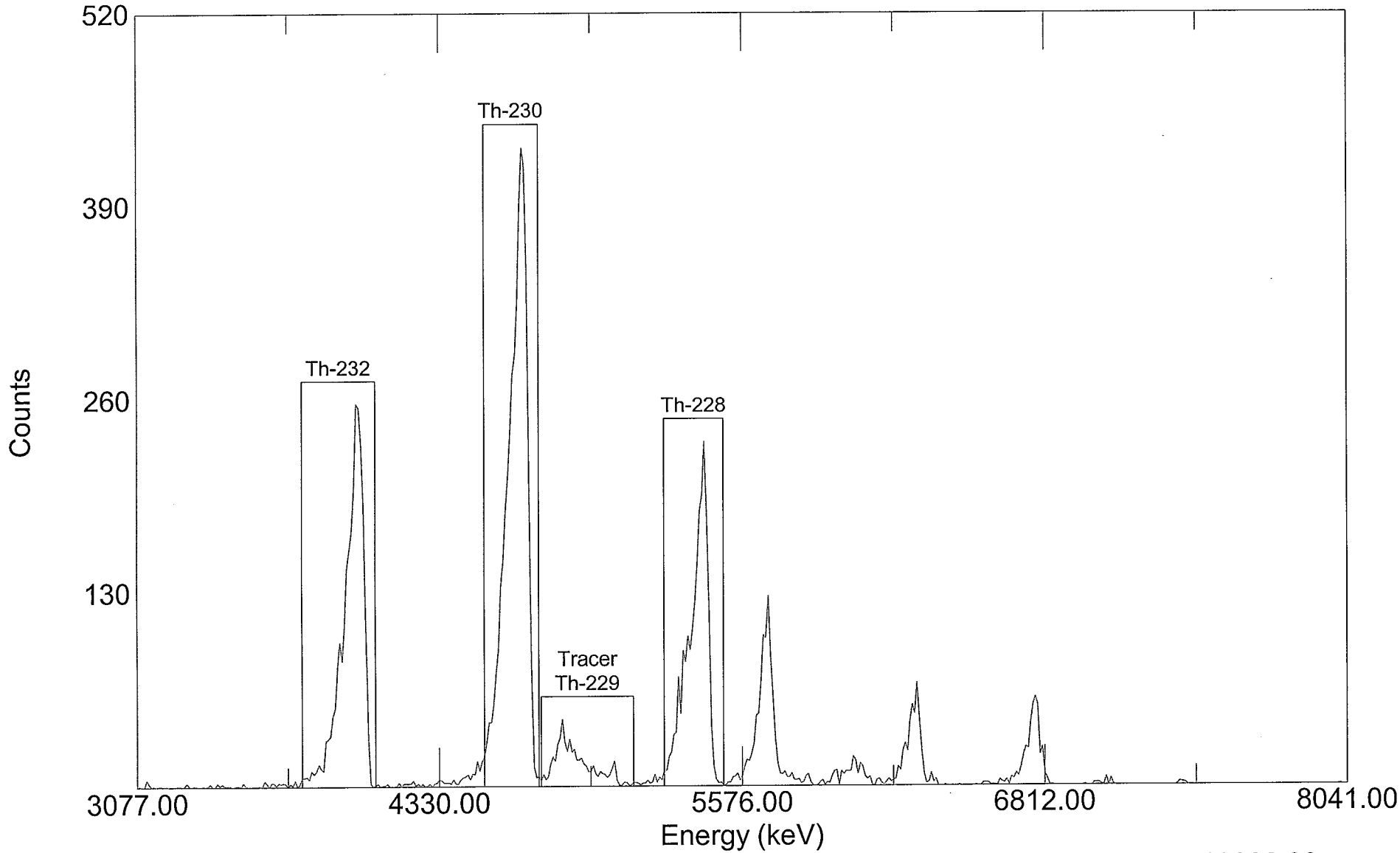
Totals

		% Total
Gross Count:	11,251.00	100.00
Net Area:	11,132.17	98.94
Background:	118.84	1.06
Composite Fit:	8,987.00	79.88
Residuals:	2,264.00	20.12

Analyzed By: Sm

Checked By: SD

T50969 AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 06:52:28 on 10-Jun-2004
File: C:\User\Alpha\ALPHA\T50969.SPC
Sample: 0405096-9 TAS040603-4

Real Time: 18001.80 s. Live Time: 18000.00 s.
Detector: #61 MCB 8 Input 5
Type: Thorium

000092

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
6/11/04 1:55:51 PM
Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0405096-9D TAS040603-4

Analysis Type: Thorium

Detector: MCB 8 Input 6

Date/Time of Count: 6/10/04 6:52:37 AM

Sample Volume: 1.000 Total, 1.000 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: **59.97%**

Real Time: 300.03 Minutes

Total Eff.: 18.34 %

Dead Time: 0.0 %

Tracer Amount: 10.253 DPM, With Contamina

Acquisition: 512 Channels

Efficiency: 30.58%

Analysis: Relative Region-Of-Interest

Original: 3,050 + 9.9060 * Chn + -0.00063 * Chn **2.

Spectrum Calibration: 3,050 + 9.8603 * Chn + -0.00063 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\T50969D.SPC**

Background File: **C:\USER\ALPHA\BKGND\B4060862.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	167.89	149	172	2.00	440.00	4,104.00	0.58	4089.43	74.33
2	245.21	222	247	2.00	212.00	1,957.00	5.83	1951.17	35.46
3	98.29	73	104	2.00	244.00	2,459.00	0.58	2458.42	44.68
Tracer	184.21	173	210	8.00	37.00	565.00	0.87	564.13	10.25

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-230	4687.70	19.30	33.480	n/a	3.07 %
2	Th-228	5430.00	19.11	15.974	n/a	4.44 %
3	Th-232	4013.00	19.47	20.127	n/a	3.95 %
Tracer	Th-229	4845.00	77.03	4.618	n/a	8.25 %

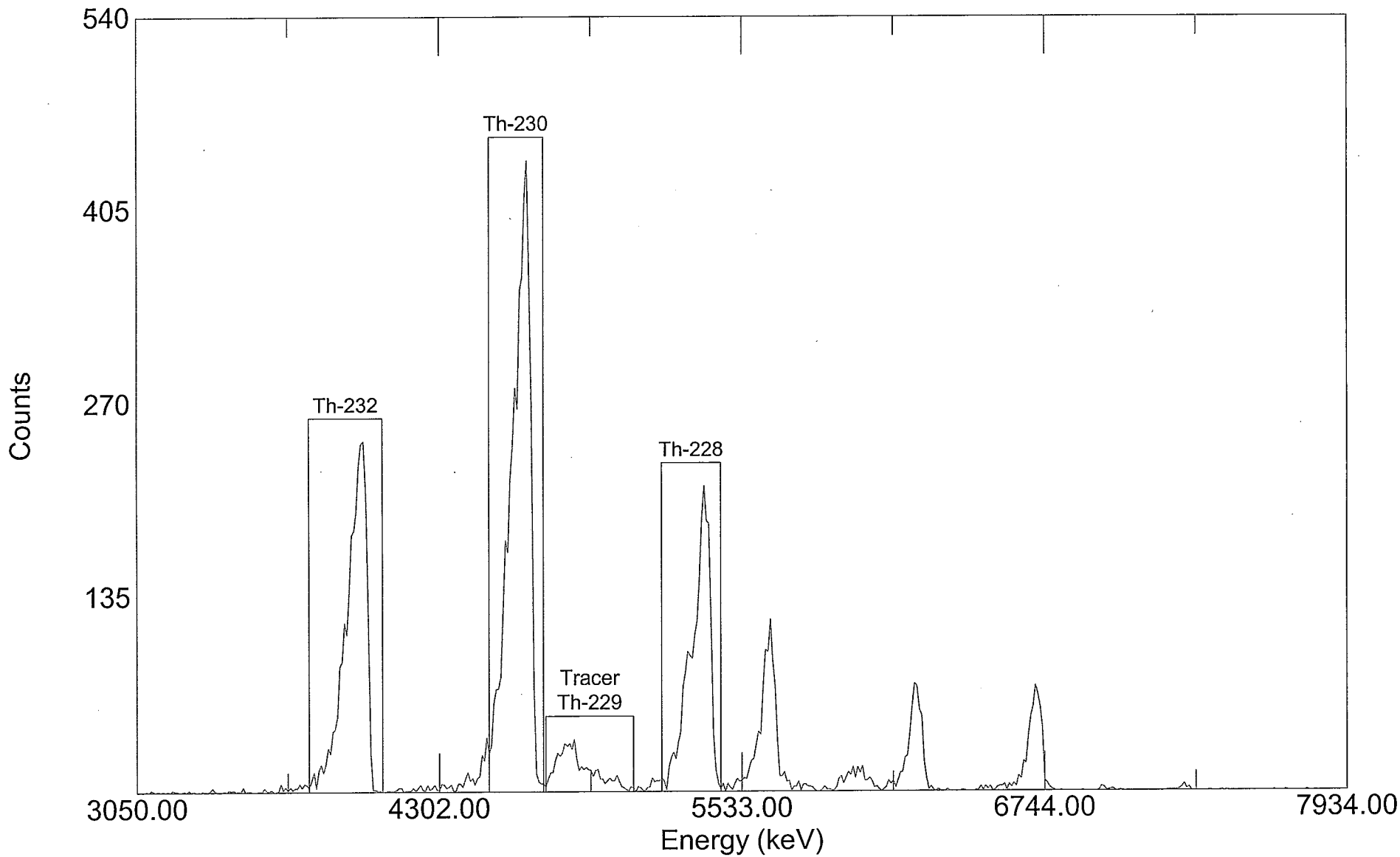
Totals

		% Total
Gross Count:	11,668.00	100.00
Net Area:	11,596.64	99.39
Background:	71.36	0.61
Composite Fit:	9,085.00	77.86
Residuals:	2,583.00	22.14

Analyzed By: Sm

Checked By: SD

T50969D AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 06:52:37 on 10-Jun-2004
File: C:\User\Alpha\ALPHA\T50969D.SPC
Sample: 0405096-9D TAS040603-4

Real Time: 18001.80 s. Live Time: 18000.00 s.
Detector: #62 MCB 8 Input 6
Type: Thorium

000094

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
6/21/04 10:14:04 AM
Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0405096-10 TAS040611-2

Analysis Type: Thorium

Detector: MCB 8 Input 5

Date/Time of Count: 6/18/04 9:45:01 PM

Sample Volume: 0.500 Total, 0.500 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: **70.35%**

Real Time: 300.03 Minutes

Total Eff.: 22.25 %

Dead Time: 0.0 %

Tracer Amount: 10.253 DPM, With Contamina

Acquisition: 512 Channels

Efficiency: 31.63%

Analysis: Relative Region-Of-Interest

Original: 3,065 + 9.8990 * Chn + -0.00060 * Chn **2.

Spectrum Calibration: 3,065 + 9.9084 * Chn + -0.00060 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\TX509610.SPC**

Background File: **C:\USER\ALPHA\BKGND\B4061661.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	165.49	145	169	4.00	465.00	4,811.00	0.60	4793.43	71.81
2	242.31	221	246	4.00	233.00	2,180.00	18.00	2162.00	32.39
3	96.29	72	103	4.00	256.00	2,597.00	0.90	2596.10	38.89
Tracer	181.71	170	207	10.00	47.00	685.00	0.60	684.40	10.25

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-230	4687.70	38.83	64.694	n/a	2.84 %
2	Th-228	5430.00	38.46	29.179	n/a	4.23 %
3	Th-232	4013.00	39.17	35.038	n/a	3.85 %
Tracer	Th-229	4845.00	96.89	9.237	n/a	7.49 %

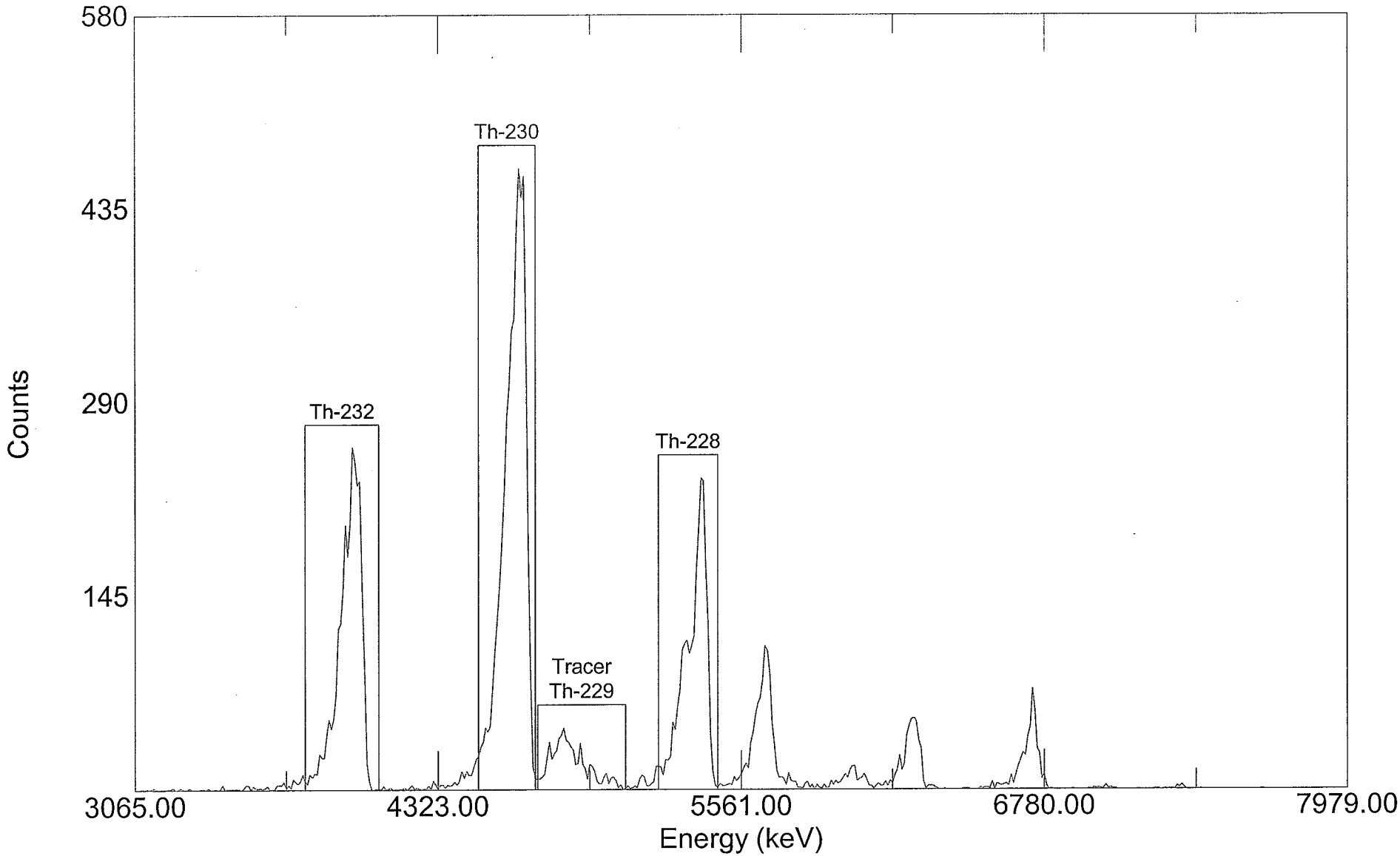
Totals

		% Total
Gross Count:	12,727.00	100.00
Net Area:	12,618.40	99.15
Background:	108.60	0.85
Composite Fit:	10,273.00	80.72
Residuals:	2,454.00	19.28

Analyzed By: Sm

Checked By: SD

TX509610 AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 21:45:01 on 18-Jun-2004
File: C:\User\Alpha\ALPHA\TX509610.SPC
Sample: 0405096-10 TAS040611-2

Real Time: 18001.54 s. Live Time: 18000.00 s.
Detector: #61 MCB 8 Input 5
Type: Thorium

000095

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
6/22/04 2:55:50 PM
Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0405096-11 TAS040603-3

Analysis Type: Thorium

Detector: MCB 6 Input 3

Date/Time of Count: 6/10/04 12:55:58 PM

Sample Volume: 2.000 Total, 2.000 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: **59.76%**

Real Time: 300.03 Minutes

Total Eff.: 19.22 %

Dead Time: 0.0 %

Tracer Amount: 9.999 DPM, With Contaminate

Acquisition: 512 Channels

Efficiency: 32.16%

Analysis: Relative Region-Of-Interest

Original: 3,018 + 10.0001 * Chn + -0.00035 * Chn **2.

Spectrum Calibration: 3,018 + 9.9584 * Chn + -0.00035 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\T509611.SPC**

Background File: **C:\User\Alpha\ALPHA\B4060843.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	168.67	149	172	2.00	58.00	492.00	0.29	477.41	8.28
2	244.30	223	247	2.00	37.00	340.00	11.36	328.64	5.70
3	100.28	76	107	4.00	40.00	339.00	2.33	336.67	5.84
Tracer	184.67	173	209	4.00	42.00	578.00	1.46	576.54	10.00

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-230	4687.70	19.68	1.865	n/a	9.11 %
2	Th-228	5430.00	19.58	1.284	n/a	11.01 %
3	Th-232	4013.00	39.56	1.315	n/a	10.72 %
Tracer	Th-229	4845.00	39.32	2.252	n/a	8.15 %

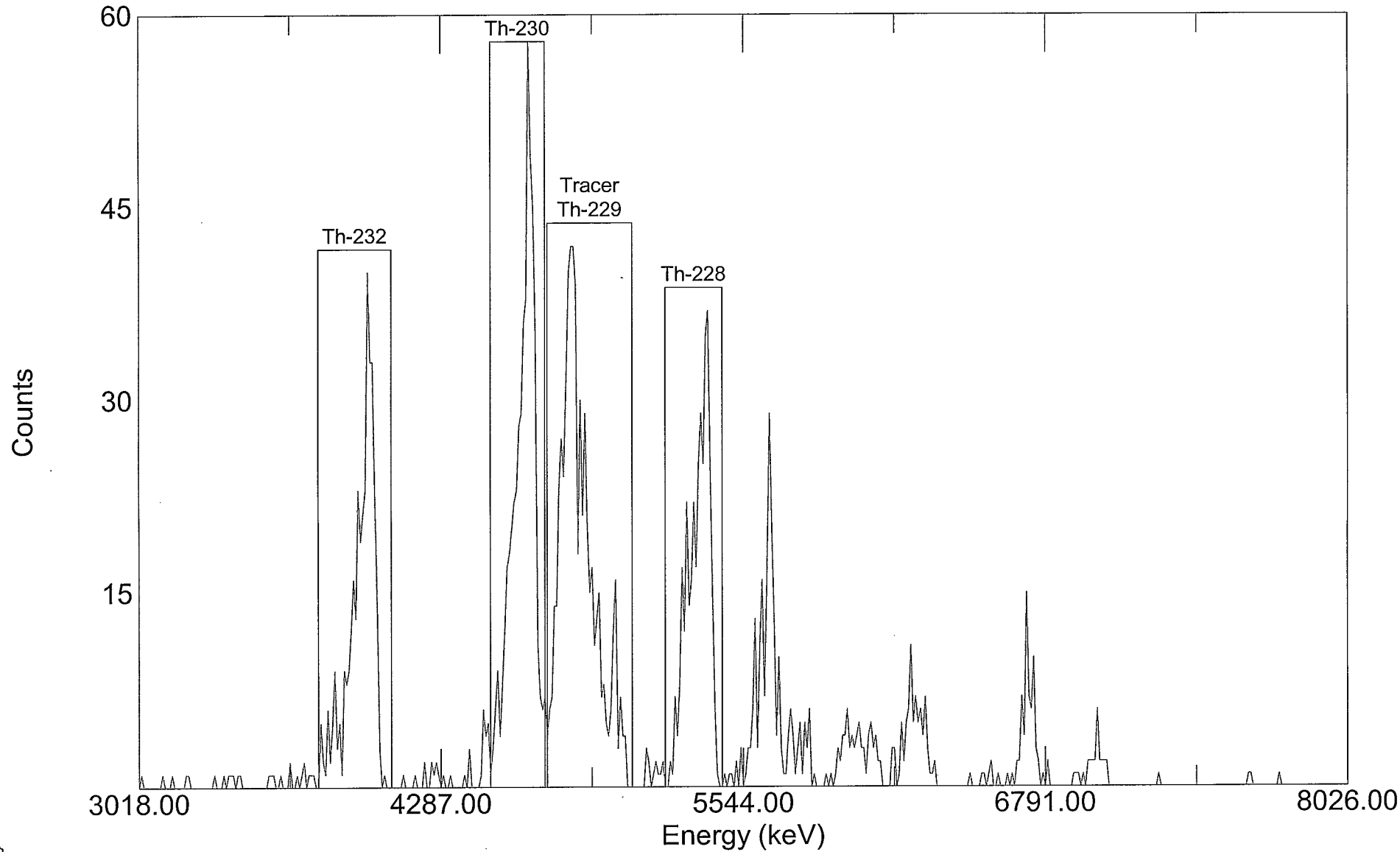
Totals

		% Total
Gross Count:	2,270.00	100.00
Net Area:	2,187.28	96.36
Background:	82.72	3.64
Composite Fit:	1,749.00	77.05
Residuals:	521.00	22.95

Analyzed By: Sm

Checked By: SD

T509611 AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 12:55:58 on 10-Jun-2004
File: C:\User\Alpha\ALPHA\T509611.SPC
Sample: 0405096-11 TAS040603-3

Real Time: 18001.62 s. Live Time: 18000.00 s.
Detector: #43 MCB 6 Input 3
Type: Thorium

000038

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
6/22/04 2:57:26 PM
Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0405096-12 TAS040603-3

Analysis Type: Thorium

Detector: MCB 6 Input 4

Date/Time of Count: 6/10/04 12:56:29 PM

Sample Volume: 2.000 Total, 2.000 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: **61.40%**

Real Time: 300.03 Minutes

Total Eff.: 19.67 %

Dead Time: 0.0 %

Tracer Amount: 9.999 DPM, With Contaminate

Acquisition: 512 Channels

Efficiency: 32.03%

Analysis: Relative Region-Of-Interest

Original: 3,013 + 10.0214 * Chn + -0.00045 * Chn **2.

Spectrum Calibration: 3,013 + 9.9769 * Chn + -0.00045 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\T509612.SPC**

Background File: **C:\User\Alpha\ALPHA\B4060844.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	169.13	149	172	2.00	45.00	450.00	2.91	432.46	7.33
2	244.94	224	248	2.00	28.00	281.00	26.80	254.20	4.31
3	100.68	77	108	4.00	50.00	482.00	1.46	480.54	8.14
Tracer	185.15	173	210	4.00	56.00	592.00	2.04	589.96	10.00

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-230	4687.70	19.65	1.651	n/a	9.62 %
2	Th-228	5430.00	19.52	0.970	n/a	12.98 %
3	Th-232	4013.00	39.55	1.834	n/a	8.96 %
Tracer	Th-229	4845.00	39.25	2.252	n/a	8.06 %

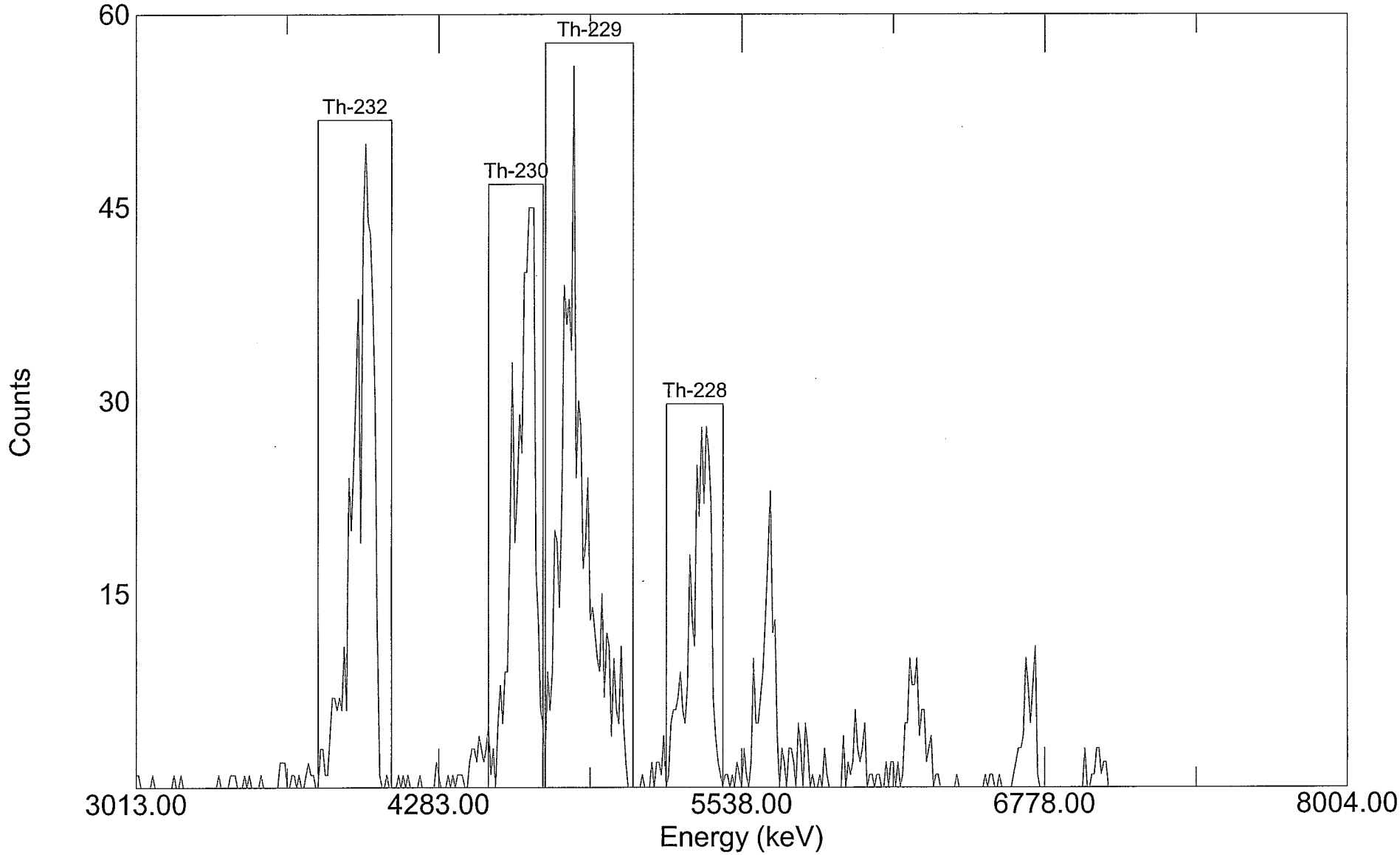
Totals

		% Total
Gross Count:	2,234.00	100.00
Net Area:	2,097.11	93.87
Background:	136.89	6.13
Composite Fit:	1,805.00	80.80
Residuals:	429.00	19.20

Analyzed By: Sm

Checked By: GD

T509612 AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 12:56:29 on 10-Jun-2004
File: C:\User\Alpha\ALPHA\T509612.SPC
Sample: 0405096-12 TAS040603-3

Real Time: 18001.64 s. Live Time: 18000.00 s.
Detector: #44 MCB 6 Input 4
Type: Thorium

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
6/22/04 2:58:54 PM
Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0405096-13 TAS040603-3

Analysis Type: Thorium

Detector: MCB 6 Input 5

Date/Time of Count: 6/10/04 12:56:59 PM

Sample Volume: 2.000 Total, 2.000 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: **48.92%**

Real Time: 300.03 Minutes

Total Eff.: 16.02 %

Dead Time: 0.0 %

Tracer Amount: 9.999 DPM, With Contaminate

Acquisition: 512 Channels

Efficiency: 32.74%

Analysis: Relative Region-Of-Interest

Original: 2,991 + 10.2773 * Chn + -0.00096 * Chn **2.

Spectrum Calibration: 2,991 + 10.4228 * Chn + -0.00096 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\T509613.SPC**

Background File: **C:\User\Alpha\ALPHA\B4060845.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	165.31	146	169	4.00	121.00	1,013.00	1.46	999.63	20.80
2	239.28	218	244	4.00	24.00	188.00	16.31	171.69	3.57
3	98.97	76	107	2.00	18.00	163.00	1.17	161.83	3.37
Tracer	180.90	170	207	10.00	33.00	486.00	5.53	480.47	10.00

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-230	4687.70	40.43	4.685	n/a	6.24 %
2	Th-228	5430.00	39.86	0.805	n/a	15.71 %
3	Th-232	4013.00	20.47	0.759	n/a	15.47 %
Tracer	Th-229	4845.00	100.77	2.252	n/a	8.89 %

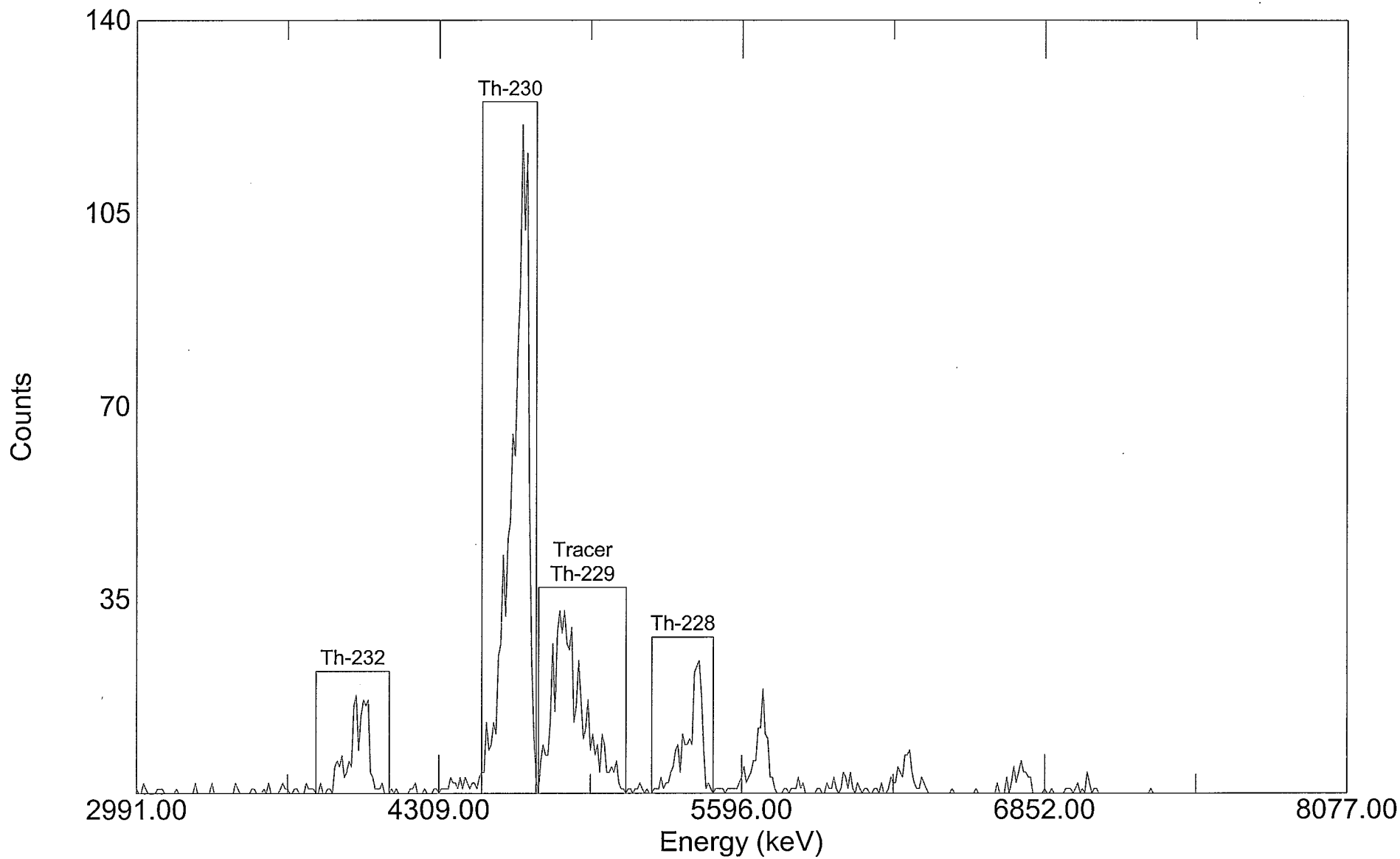
Totals

		% Total
Gross Count:	2,198.00	100.00
Net Area:	2,087.61	94.98
Background:	110.39	5.02
Composite Fit:	1,850.00	84.17
Residuals:	348.00	15.83

Analyzed By: Sm

Checked By: SD

T509613 AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 12:56:59 on 10-Jun-2004
File: C:\User\Alpha\ALPHA\T509613.SPC
Sample: 0405096-13 TAS040603-3

Real Time: 18001.64 s. Live Time: 18000.00 s.
Detector: #45 MCB 6 Input 5
Type: Thorium

000102

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
6/22/04 3:00:05 PM

Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0405096-13D TAS040603-3

Analysis Type: Thorium

Detector: MCB 6 Input 6

Date/Time of Count: 6/10/04 12:57:26 PM

Sample Volume: 2.000 Total, 2.000 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: **60.71%**

Real Time: 300.03 Minutes

Total Eff.: 19.29 %

Dead Time: 0.0 %

Tracer Amount: 9.999 DPM, With Contaminate

Acquisition: 512 Channels

Efficiency: 31.78%

Analysis: Relative Region-Of-Interest

Original: 2,976 + 10.2610 * Chn + -0.00100 * Chn **2.

Spectrum Calibration: 2,976 + 10.2971 * Chn + -0.00100 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\T509613D.SPC**

Background File: **C:\User\Alpha\ALPHA\B4060846.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	168.99	150	173	4.00	149.00	1,147.00	2.33	1130.32	19.53
2	244.09	223	248	2.00	31.00	201.00	3.20	197.80	3.42
3	101.70	78	109	2.00	21.00	173.00	0.87	172.13	2.97
Tracer	184.81	174	210	6.00	51.00	586.00	7.28	578.72	10.00

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-230	4687.70	39.84	4.399	n/a	5.87 %
2	Th-228	5430.00	19.62	0.770	n/a	14.06 %
3	Th-232	4013.00	20.19	0.670	n/a	14.98 %
Tracer	Th-229	4845.00	59.57	2.252	n/a	8.10 %

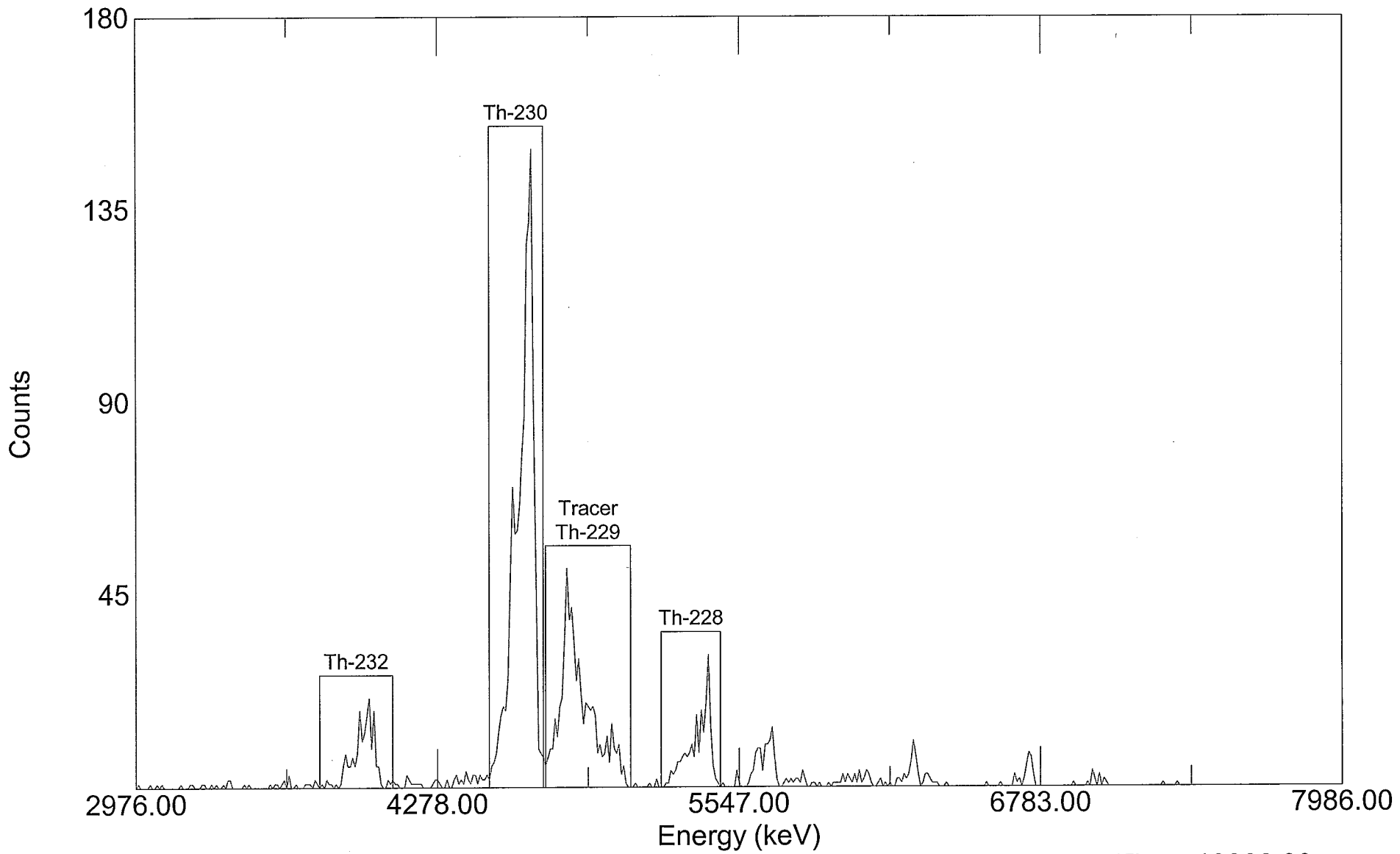
Totals

		% Total
Gross Count:	2,458.00	100.00
Net Area:	2,414.60	98.23
Background:	43.40	1.77
Composite Fit:	2,107.00	85.72
Residuals:	351.00	14.28

Analyzed By: Sm

Checked By: SD

T509613D AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 12:57:26 on 10-Jun-2004
File: C:\User\Alpha\ALPHA\T509613D.SPC
Sample: 0405096-13D TAS040603-3

Real Time: 18001.62 s. Live Time: 18000.00 s.
Detector: #46 MCB 6 Input 6
Type: Thorium

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
6/22/04 3:01:18 PM
Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0405096-14 TAS040603-3

Analysis Type: Thorium

Detector: MCB 6 Input 7

Date/Time of Count: 6/10/04 12:57:53 PM

Sample Volume: 2.000 Total, 2.000 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: **68.19%**

Real Time: 300.03 Minutes

Total Eff.: 20.81 %

Dead Time: 0.0 %

Tracer Amount: 9.999 DPM, With Contaminate

Acquisition: 512 Channels

Efficiency: 30.51%

Analysis: Relative Region-Of-Interest

Original: 2,954 + 10.5228 * Chn + -0.00140 * Chn **2.

Spectrum Calibration: 2,954 + 10.4811 * Chn + -0.00140 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\T509614.SPC**

Background File: **C:\User\Alpha\ALPHA\B4060847.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	169.20	149	172	2.00	37.00	283.00	1.17	266.36	4.27
2	244.16	221	247	2.00	38.00	243.00	6.70	236.30	3.79
3	102.40	78	109	2.00	23.00	164.00	0.29	163.71	2.62
Tracer	184.95	173	209	6.00	51.00	625.00	0.87	624.13	10.00

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-230	4687.70	20.01	0.961	n/a	12.38 %
2	Th-228	5430.00	19.60	0.853	n/a	12.94 %
3	Th-232	4013.00	20.39	0.591	n/a	15.33 %
Tracer	Th-229	4845.00	59.78	2.252	n/a	7.84 %

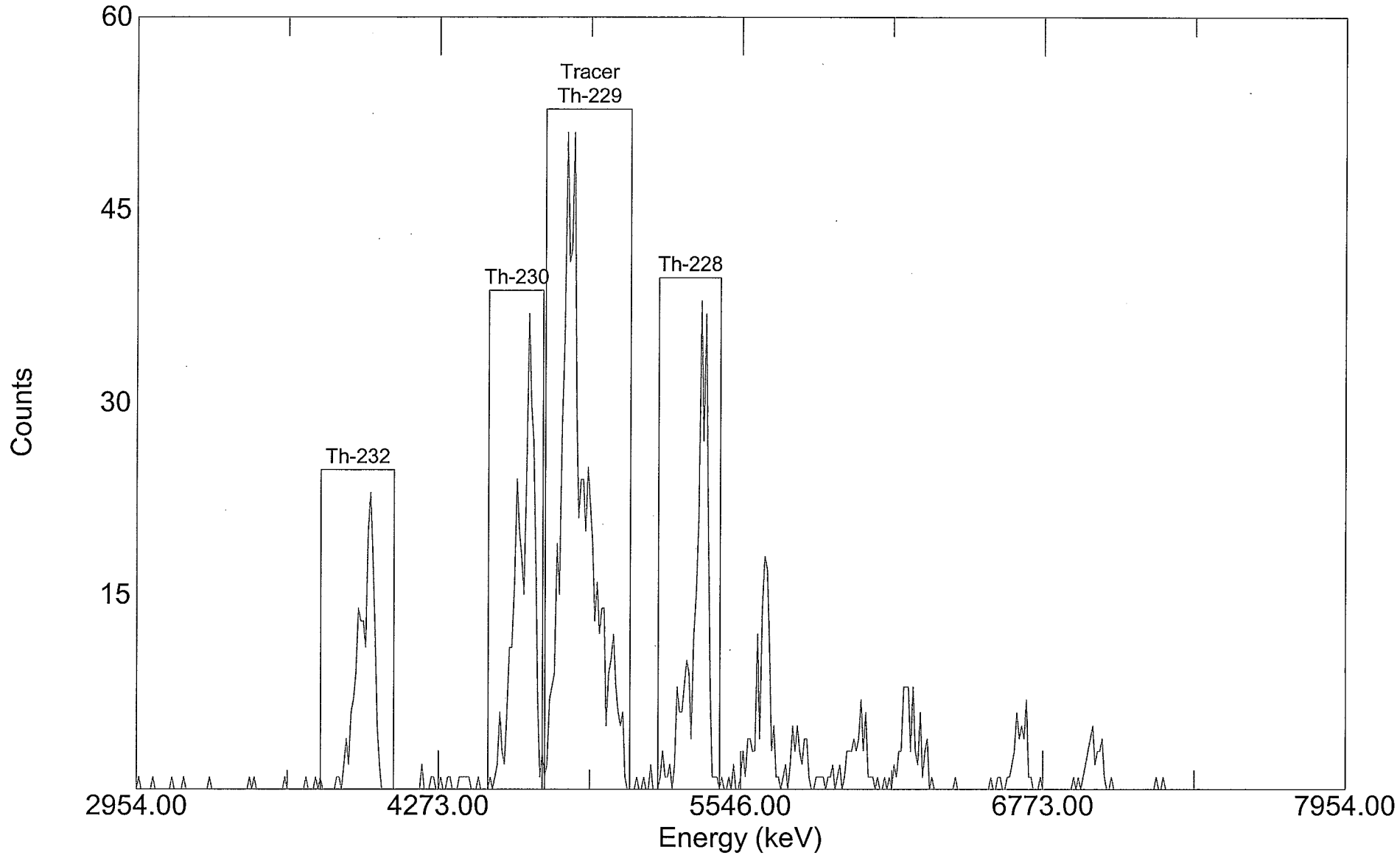
Totals

		% Total
Gross Count:	1,674.00	100.00
Net Area:	1,590.41	95.01
Background:	83.59	4.99
Composite Fit:	1,315.00	78.55
Residuals:	359.00	21.45

Analyzed By: Sm

Checked By: SD

T509614 AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 12:57:53 on 10-Jun-2004 Real Time: 18001.62 s. Live Time: 18000.00 s.
File: C:\User\Alpha\ALPHA\T509614.SPC Detector: #47 MCB 6 Input 7
Sample: 0405096-14 TAS040603-3 Type: Thorium

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
6/22/04 3:03:20 PM
Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0405096-15 TAS040603-3

Analysis Type: Thorium

Detector: MCB 6 Input 8

Date/Time of Count: 6/10/04 12:58:27 PM

Sample Volume: 2.000 Total, 2.000 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: **55.07%**

Real Time: 300.03 Minutes

Total Eff.: 17.54 %

Dead Time: 0.0 %

Tracer Amount: 9.999 DPM, With Contaminate

Acquisition: 512 Channels

Efficiency: 31.86%

Analysis: Relative Region-Of-Interest

Original: 3,029 + 10.0115 * Chn + -0.00065 * Chn **2.

Spectrum Calibration: 3,029 + 9.9388 * Chn + -0.00065 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\T509615.SPC**

Background File: **C:\User\Alpha\ALPHA\B4060848.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	168.72	148	171	2.00	113.00	966.00	4.08	948.87	18.03
2	245.49	223	248	2.00	63.00	536.00	2.62	533.38	10.13
3	99.62	75	106	2.00	55.00	525.00	2.91	522.09	9.92
Tracer	184.92	172	208	6.00	46.00	535.00	8.74	526.26	10.00

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-230	4687.70	19.44	4.060	n/a	6.42 %
2	Th-228	5430.00	19.24	2.282	n/a	8.51 %
3	Th-232	4013.00	19.62	2.234	n/a	8.60 %
Tracer	Th-229	4845.00	58.19	2.252	n/a	8.47 %

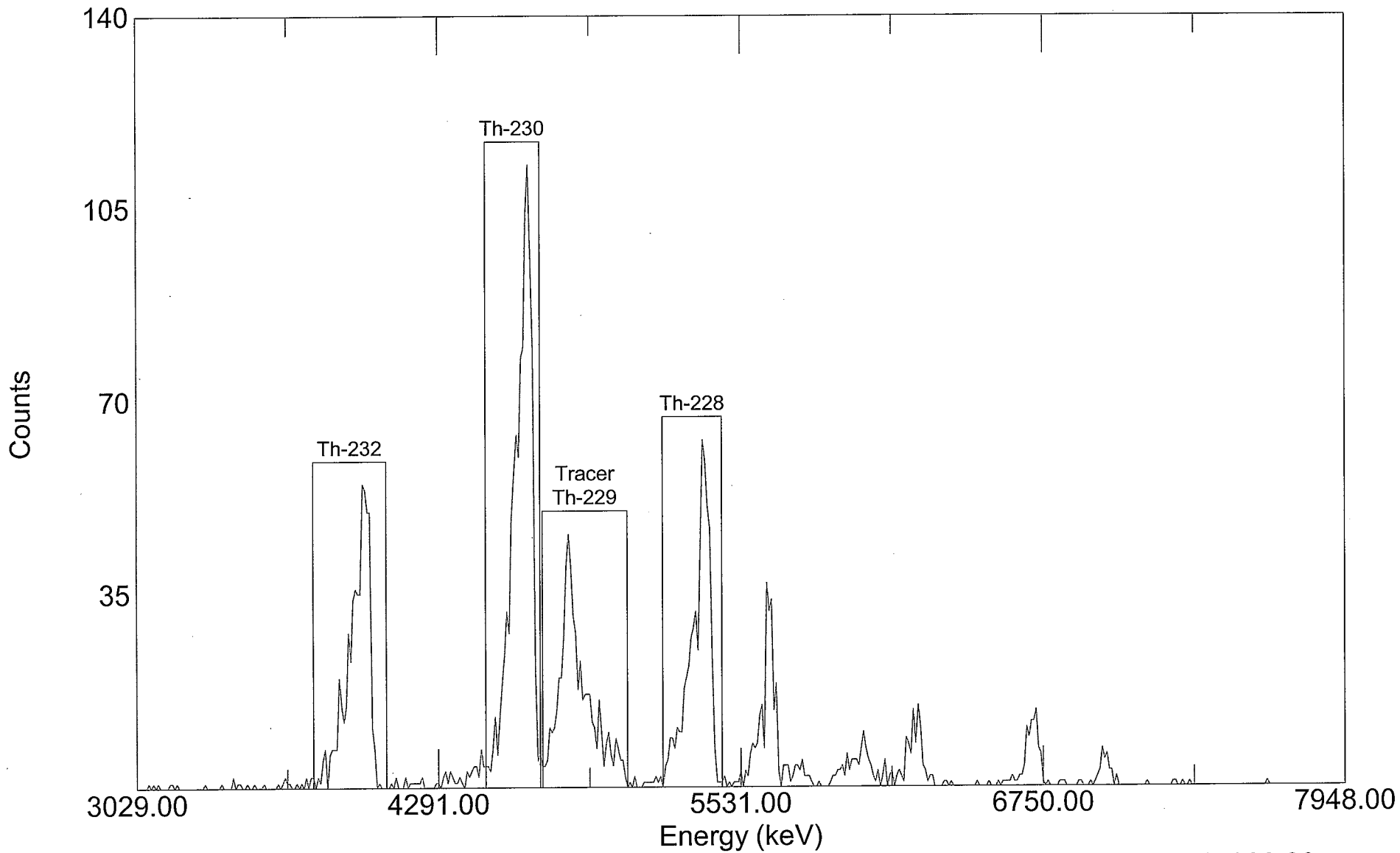
Totals

		% Total
Gross Count:	3,243.00	100.00
Net Area:	3,174.85	97.90
Background:	68.16	2.10
Composite Fit:	2,562.00	79.00
Residuals:	681.00	21.00

Analyzed By: Sm

Checked By: 4D

T509615 AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 12:58:27 on 10-Jun-2004
File: C:\User\Alpha\ALPHA\T509615.SPC
Sample: 0405096-15 TAS040603-3

Real Time: 18001.62 s. Live Time: 18000.00 s.
Detector: #48 MCB 6 Input 8
Type: Thorium

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
6/10/04 5:59:17 PM
Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0405096-16 TAS040603-3

Analysis Type: Thorium

Detector: MCB 8 Input 1

Date/Time of Count: 6/10/04 12:58:58 PM

Sample Volume: 2.000 Total, 2.000 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: **62.08%**

Real Time: 300.02 Minutes

Total Eff.: 17.97 %

Dead Time: 0.0 %

Tracer Amount: 9.999 DPM, With Contaminate

Acquisition: 512 Channels

Efficiency: 28.95%

Analysis: Relative Region-Of-Interest

Original: 3,052 + 9.7782 * Chn + -0.00026 * Chn **2.

Spectrum Calibration: 3,052 + 9.7788 * Chn + -0.00026 * Chn **2.

Cal File:

Spectrum File: **C:\USER\ALPHA\ALPHA\T509616.SPC**

Background File: **C:\USER\ALPHA\BKGND\B4060857.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	167.99	146	169	2.00	37.00	253.00	0.87	238.76	4.43
2	244.74	223	248	2.00	34.00	261.00	5.83	255.17	4.73
3	98.51	75	106	2.00	26.00	180.00	0.58	179.42	3.33
Tracer	184.23	170	209	8.00	45.00	540.00	0.87	539.13	10.00

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-230	4687.70	19.38	0.997	n/a	13.06 %
2	Th-228	5430.00	19.30	1.066	n/a	12.42 %
3	Th-232	4013.00	19.46	0.749	n/a	14.66 %
Tracer	Th-229	4845.00	77.47	2.252	n/a	8.43 %

Totals

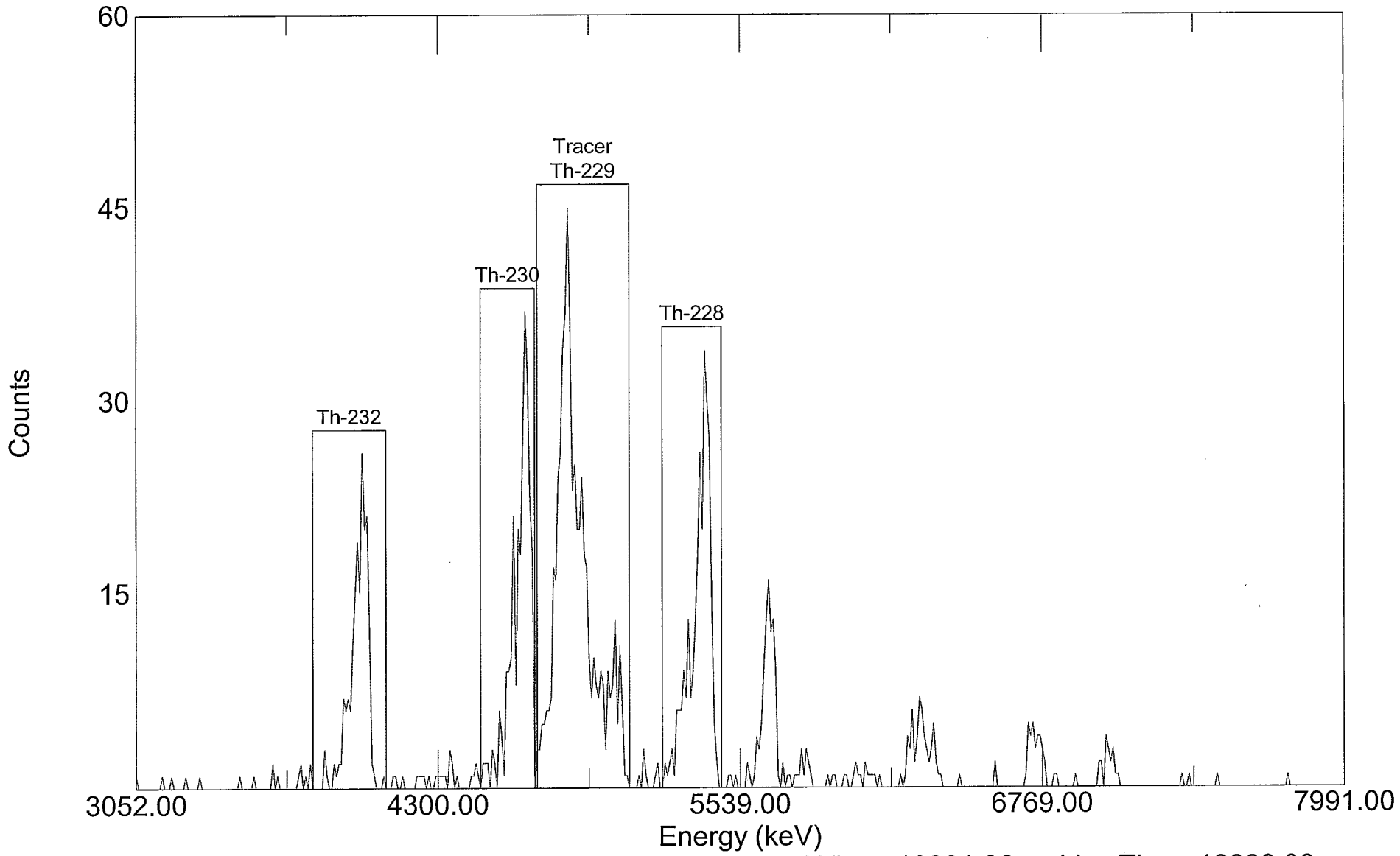
		% Total
Gross Count:	1,522.00	100.00
Net Area:	1,454.43	95.56
Background:	67.57	4.44
Composite Fit:	1,234.00	81.08
Residuals:	288.00	18.92

Analyzed By: Sm

Checked By: SD

000109

T509616 AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 12:58:58 on 10-Jun-2004
File: C:\USER\ALPHA\ALPHA\T509616.SPC
Sample: 0405096-16 TAS040603-3

Real Time: 18001.06 s. Live Time: 18000.00 s.
Detector: #57 MCB 8 Input 1
Type: Thorium

000110

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
6/22/04 3:05:05 PM
Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0405096-17 TAS040603-3

Analysis Type: Thorium

Detector: MCB 8 Input 2

Date/Time of Count: 6/10/04 12:59:27 PM

Sample Volume: 2.000 Total, 2.000 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: **55.26%**

Real Time: 300.02 Minutes

Total Eff.: 17.83 %

Dead Time: 0.0 %

Tracer Amount: 9.999 DPM, With Contaminate

Acquisition: 512 Channels

Efficiency: 32.26%

Analysis: Relative Region-Of-Interest

Original: 3,079 + 9.6415 * Chn + -0.00008 * Chn **2.

Spectrum Calibration: 3,079 + 9.5987 * Chn + -0.00008 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\T509617.SPC**

Background File: **C:\User\Alpha\ALPHA\B4060858.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	167.86	146	169	2.00	50.00	491.00	0.58	477.15	8.92
2	245.46	225	250	2.00	39.00	387.00	17.48	369.52	6.91
3	97.41	73	104	4.00	40.00	301.00	2.62	298.38	5.58
Tracer	184.29	170	209	16.00	34.00	538.00	3.20	534.80	10.00

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-230	4687.70	19.14	2.009	n/a	9.10 %
2	Th-228	5430.00	19.12	1.556	n/a	10.45 %
3	Th-232	4013.00	38.33	1.256	n/a	11.40 %
Tracer	Th-229	4845.00	153.10	2.252	n/a	8.45 %

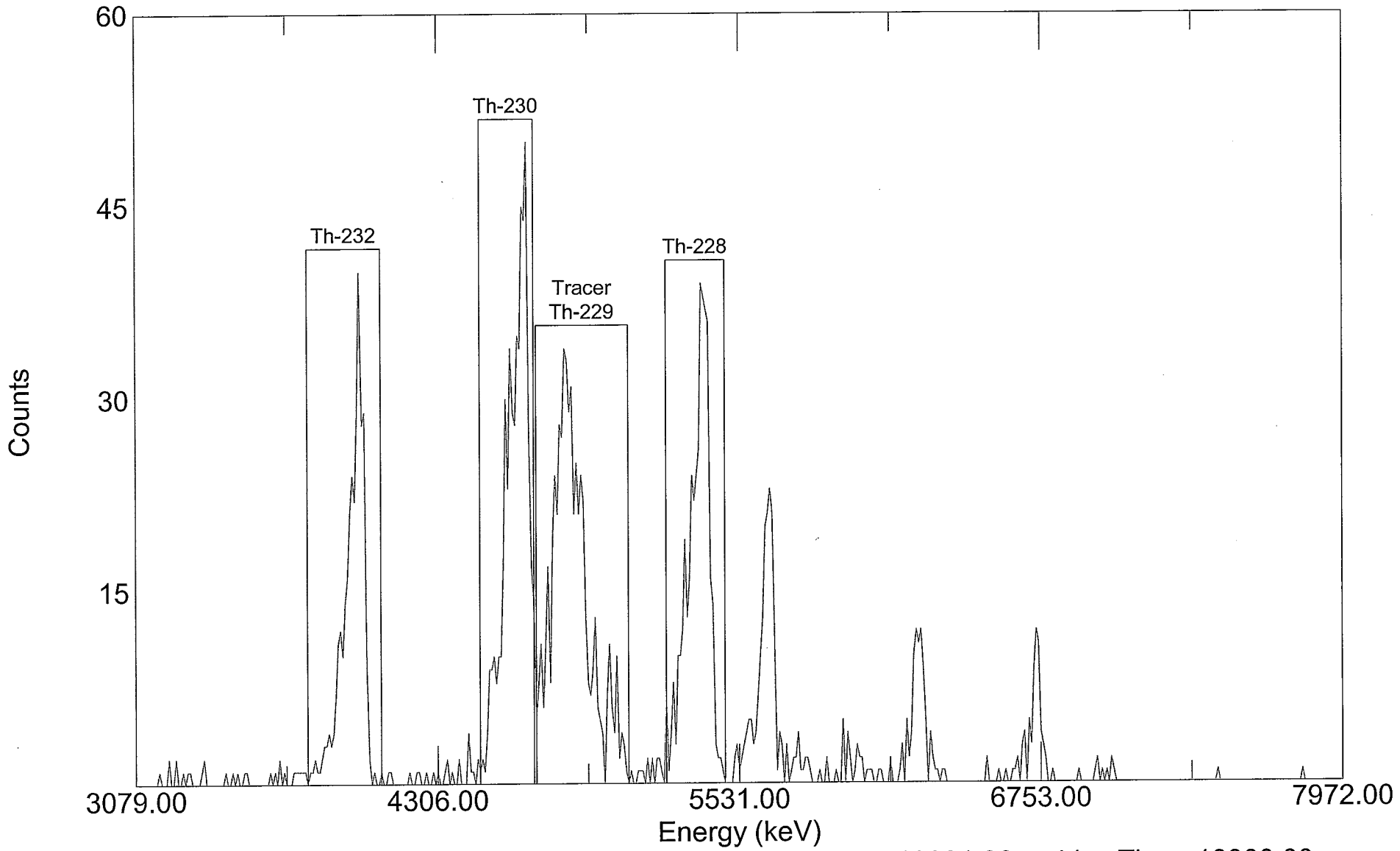
Totals

		% Total
Gross Count:	2,154.00	100.00
Net Area:	2,060.21	95.65
Background:	93.79	4.35
Composite Fit:	1,717.00	79.71
Residuals:	437.00	20.29

Analyzed By: Sm

Checked By: SD

T509617 AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 12:59:27 on 10-Jun-2004
File: C:\User\Alpha\ALPHA\T509617.SPC
Sample: 0405096-17 TAS040603-3

Real Time: 18001.06 s. Live Time: 18000.00 s.
Detector: #58 MCB 8 Input 2
Type: Thorium

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
6/16/04 1:23:04 PM
Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0405096-18 TAS040603-4

Analysis Type: Thorium

Detector: MCB 3 Input 2

Date/Time of Count: 6/12/04 9:26:54 AM

Sample Volume: 1.000 Total, 1.000 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: **69.55%**

Real Time: 300.02 Minutes

Total Eff.: 21.42 %

Dead Time: 0.0 %

Tracer Amount: 9.999 DPM, With Contaminate

Acquisition: 512 Channels

Efficiency: 30.80%

Analysis: Relative Region-Of-Interest

Original: 3,042 + 9.8460 * Chn + -0.00042 * Chn **2.

Spectrum Calibration: 3,042 + 9.9712 * Chn + -0.00042 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\TR509618.SPC**

Background File: **C:\User\Alpha\ALPHA\B4060818.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	166.16	144	171	6.00	608.00	10,070.00	0.87	10053.19	156.44
2	241.89	220	248	4.00	239.00	3,713.00	14.56	3698.44	57.55
3	97.75	72	102	4.00	276.00	4,734.00	1.17	4732.83	73.65
Tracer	182.17	172	207	16.00	30.00	644.00	1.46	642.54	10.00

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-230	4687.70	59.00	70.470	n/a	1.96 %
2	Th-228	5430.00	39.08	25.925	n/a	3.23 %
3	Th-232	4013.00	39.56	33.176	n/a	2.85 %
Tracer	Th-229	4845.00	157.12	4.504	n/a	7.72 %

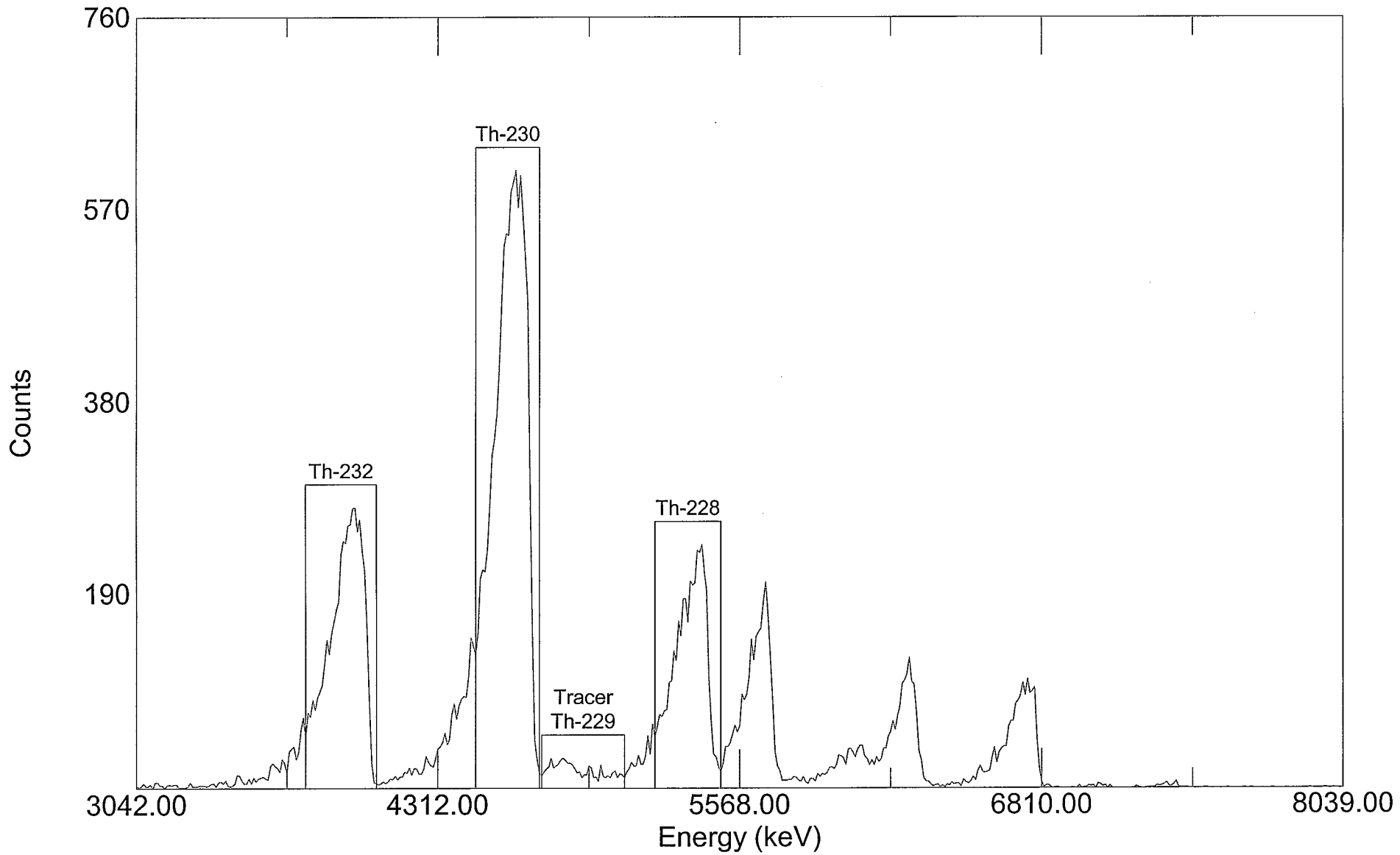
Totals

		% Total
Gross Count:	28,086.00	100.00
Net Area:	28,001.83	99.70
Background:	84.17	0.30
Composite Fit:	19,161.00	68.22
Residuals:	8,925.00	31.78

Analyzed By: Sm

Checked By: SD

TR509618 AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 09:26:54 on 12-Jun-2004 Real Time: 18000.92 s. Live Time: 18000.00 s.
File: C:\User\Alpha\ALPHA\TR509618.SPC Detector: #18 MCB 3 Input 2
Sample: 0405096-18 TAS040603-4 Type: Thorium

000114

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
6/22/04 3:06:26 PM
Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0405096-19 TAS040603-3

Analysis Type: Thorium

Detector: MCB 8 Input 3

Date/Time of Count: 6/10/04 12:59:54 PM

Sample Volume: 2.000 Total, 2.000 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: **63.75%**

Real Time: 300.02 Minutes

Total Eff.: 20.46 %

Dead Time: 0.0 %

Tracer Amount: 9.999 DPM, With Contaminate

Acquisition: 512 Channels

Efficiency: 32.10%

Analysis: Relative Region-Of-Interest

Original: 3,044 + 9.9538 * Chn + -0.00088 * Chn **2.

Spectrum Calibration: 3,044 + 9.8954 * Chn + -0.00088 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\T509619.SPC**

Background File: **C:\User\Alpha\ALPHA\B4060859.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	168.65	148	171	2.00	301.00	3,030.00	0.87	3013.90	49.09
2	246.54	225	250	2.00	117.00	1,110.00	10.49	1099.51	17.91
3	98.81	74	105	2.00	142.00	1,644.00	2.04	1641.96	26.75
Tracer	185.06	172	210	6.00	42.00	615.00	1.17	613.83	10.00

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-230	4687.70	19.20	11.057	n/a	3.58 %
2	Th-228	5430.00	18.92	4.034	n/a	5.94 %
3	Th-232	4013.00	19.44	6.024	n/a	4.84 %
Tracer	Th-229	4845.00	57.42	2.252	n/a	7.90 %

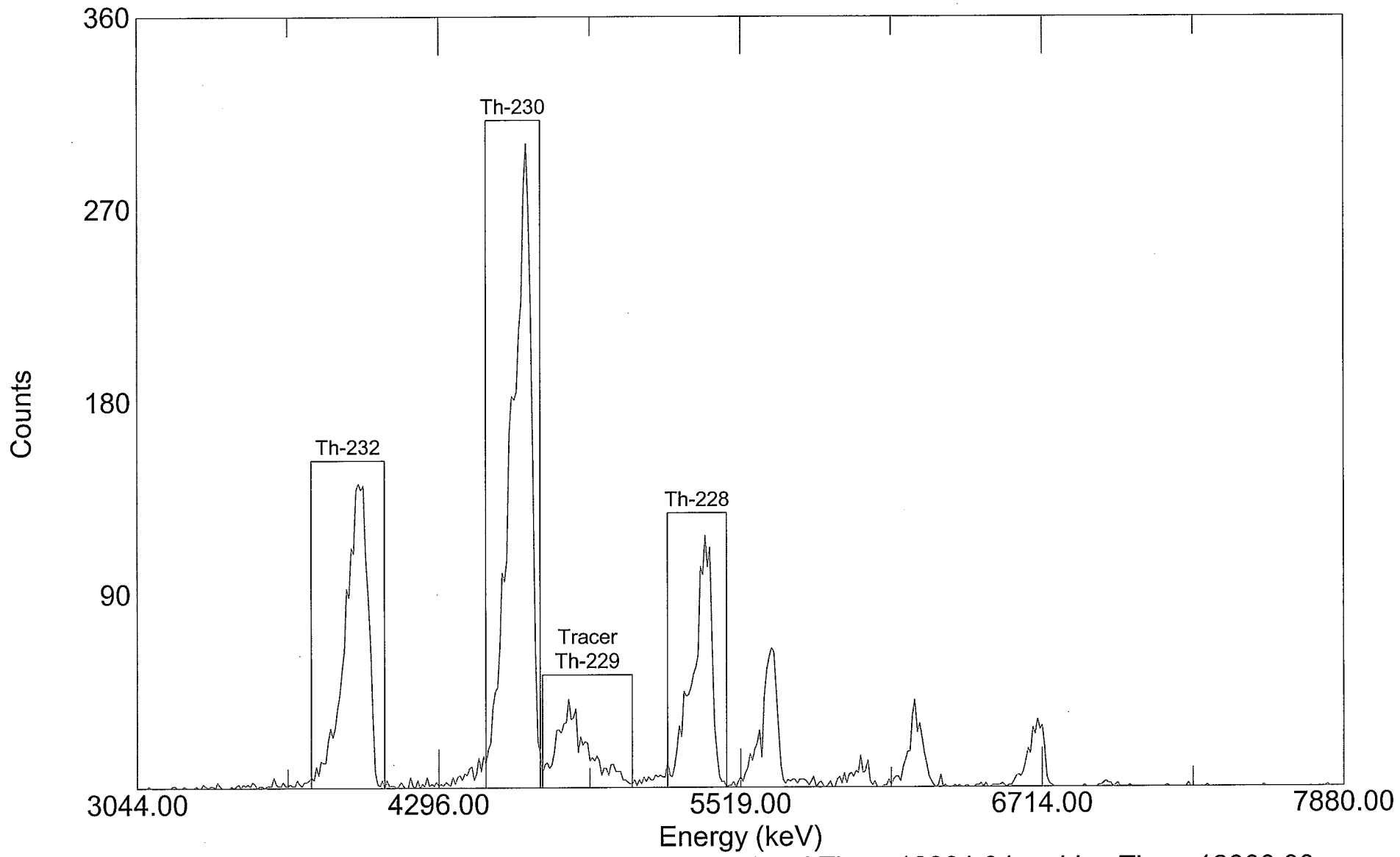
Totals

		% Total
Gross Count:	7,908.00	100.00
Net Area:	7,822.37	98.92
Background:	85.63	1.08
Composite Fit:	6,399.00	80.92
Residuals:	1,509.00	19.08

Analyzed By: Sm

Checked By: SD

T509619 AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 12:59:54 on 10-Jun-2004
File: C:\User\Alpha\ALPHA\T509619.SPC
Sample: 0405096-19 TAS040603-3

Real Time: 18001.04 s. Live Time: 18000.00 s.
Detector: #59 MCB 8 Input 3
Type: Thorium

001116

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
6/22/04 3:07:54 PM

Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0405096-20 TAS040603-3

Analysis Type: Thorium

Detector: MCB 8 Input 4

Date/Time of Count: 6/10/04 1:00:16 PM

Sample Volume: 2.000 Total, 2.000 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: **64.68%**

Real Time: 300.02 Minutes

Total Eff.: 16.09 %

Dead Time: 0.0 %

Tracer Amount: 9.999 DPM, With Contaminate

Acquisition: 512 Channels

Efficiency: 24.87%

Analysis: Relative Region-Of-Interest

Original: 3,023 + 10.0483 * Chn + -0.00093 * Chn **2.

Spectrum Calibration: 3,023 + 10.0337 * Chn + -0.00093 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\T509620.SPC**

Background File: **C:\User\Alpha\ALPHA\B4060860.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	168.50	149	172	2.00	187.00	1,696.00	0.29	1683.74	34.89
2	245.42	226	251	2.00	133.00	1,203.00	8.45	1194.55	24.75
3	99.55	76	107	2.00	144.00	1,123.00	0.29	1122.71	23.26
Tracer	184.71	173	210	8.00	45.00	484.00	1.46	482.54	10.00

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-230	4687.70	19.44	7.858	n/a	4.79 %
2	Th-228	5430.00	19.16	5.575	n/a	5.69 %
3	Th-232	4013.00	19.70	5.240	n/a	5.85 %
Tracer	Th-229	4845.00	77.53	2.252	n/a	8.91 %

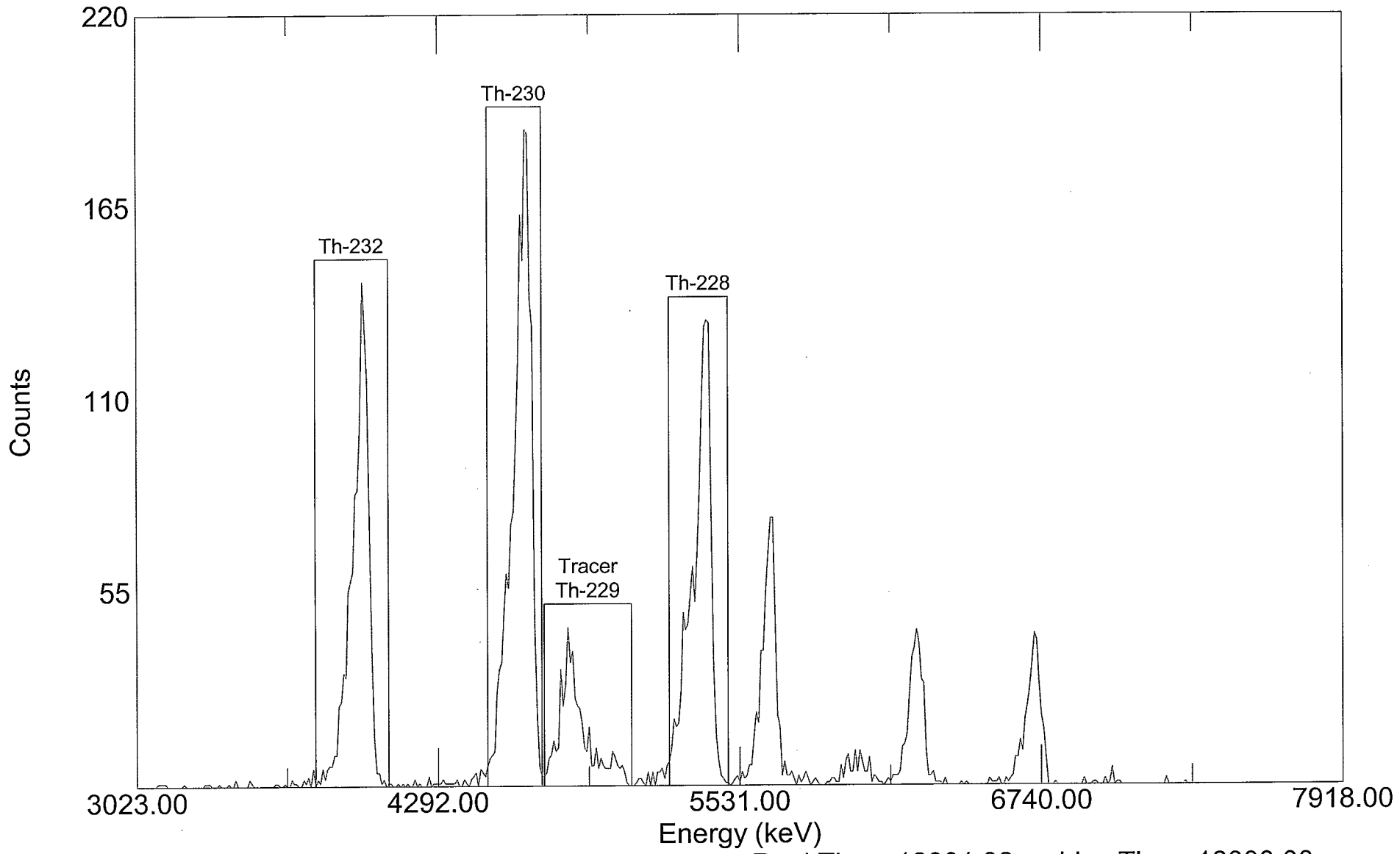
Totals

		% Total
Gross Count:	5,929.00	100.00
Net Area:	5,872.20	99.04
Background:	56.80	0.96
Composite Fit:	4,506.00	76.00
Residuals:	1,423.00	24.00

Analyzed By: Sm

Checked By: SD

T509620 AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 13:00:16 on 10-Jun-2004
File: C:\User\Alpha\ALPHA\T509620.SPC
Sample: 0405096-20 TAS040603-3

Real Time: 18001.08 s. Live Time: 18000.00 s.
Detector: #60 MCB 8 Input 4
Type: Thorium

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
6/22/04 3:09:24 PM
Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0405096-22 TAS040603-3

Analysis Type: Thorium

Detector: MCB 8 Input 5

Date/Time of Count: 6/10/04 1:00:53 PM

Sample Volume: 1.000 Total, 1.000 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: **65.27%**

Real Time: 300.02 Minutes

Total Eff.: 20.27 %

Dead Time: 0.0 %

Tracer Amount: 9.999 DPM, With Contaminate

Acquisition: 512 Channels

Efficiency: 31.05%

Analysis: Relative Region-Of-Interest

Original: 3,077 + 9.7539 * Chn + -0.00026 * Chn **2.

Spectrum Calibration: 3,077 + 9.8283 * Chn + -0.00026 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\T509622.SPC**

Background File: **C:\User\Alpha\ALPHA\B4060861.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	164.59	145	168	4.00	157.00	1,243.00	0.58	1227.34	20.19
2	240.92	222	247	6.00	69.00	598.00	16.60	581.40	9.56
3	95.47	71	102	6.00	68.00	597.00	0.87	596.13	9.80
Tracer	180.74	169	208	16.00	42.00	610.00	2.04	607.96	10.00

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-230	4687.70	38.98	9.093	n/a	5.63 %
2	Th-228	5430.00	58.23	4.307	n/a	8.25 %
3	Th-232	4013.00	58.68	4.416	n/a	8.03 %
Tracer	Th-229	4845.00	155.78	4.504	n/a	7.94 %

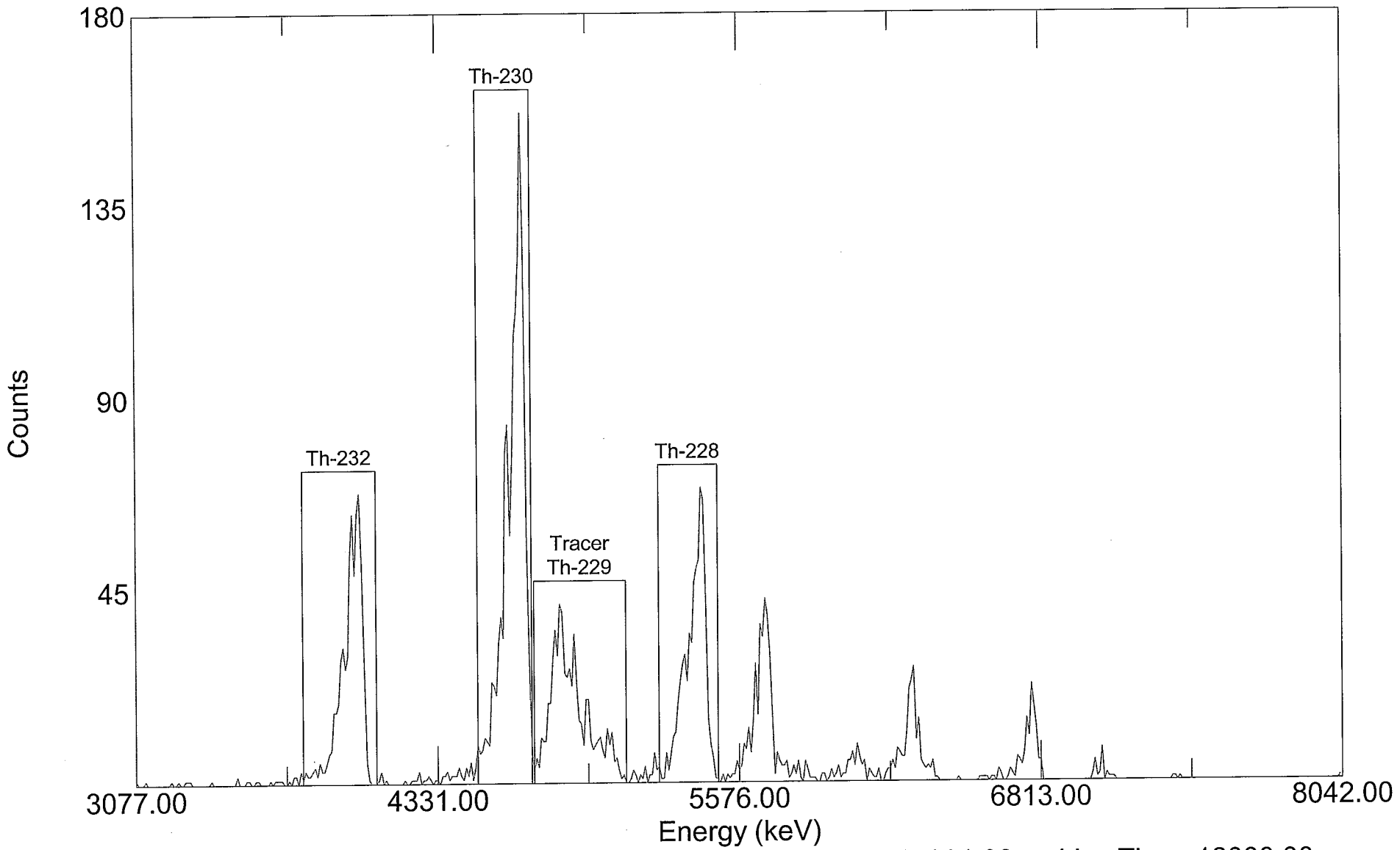
Totals

		% Total
Gross Count:	3,939.00	100.00
Net Area:	3,820.17	96.98
Background:	118.84	3.02
Composite Fit:	3,048.00	77.38
Residuals:	891.00	22.62

Analyzed By: Sm

Checked By: SD

T509622 AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 13:00:53 on 10-Jun-2004
File: C:\User\Alpha\ALPHA\T509622.SPC
Sample: 0405096-22 TAS040603-3

Real Time: 18001.08 s. Live Time: 18000.00 s.
Detector: #61 MCB 8 Input 5
Type: Thorium

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
6/22/04 3:10:57 PM
Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0405096-25 TAS040603-3

Analysis Type: Thorium

Detector: MCB 8 Input 6

Date/Time of Count: 6/10/04 1:01:20 PM

Sample Volume: 1.000 Total, 1.000 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: **58.12%**

Real Time: 300.02 Minutes

Total Eff.: 17.77 %

Dead Time: 0.0 %

Tracer Amount: 9.999 DPM, With Contaminate

Acquisition: 512 Channels

Efficiency: 30.58%

Analysis: Relative Region-Of-Interest

Original: 3,050 + 9.9060 * Chn + -0.00063 * Chn **2.

Spectrum Calibration: 3,050 + 9.9639 * Chn + -0.00063 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\T509625.SPC**

Background File: **C:\User\Alpha\ALPHA\B4060862.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	166.11	147	170	4.00	396.00	3,351.00	0.58	3337.20	62.59
2	242.57	222	247	4.00	205.00	1,753.00	5.83	1747.17	32.77
3	97.25	71	102	4.00	234.00	2,135.00	0.87	2134.13	40.03
Tracer	182.25	171	208	12.00	42.00	534.00	0.87	533.13	10.00

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-230	4687.70	39.02	28.194	n/a	3.40 %
2	Th-228	5430.00	38.64	14.761	n/a	4.70 %
3	Th-232	4013.00	39.37	18.030	n/a	4.24 %
Tracer	Th-229	4845.00	116.82	4.504	n/a	8.48 %

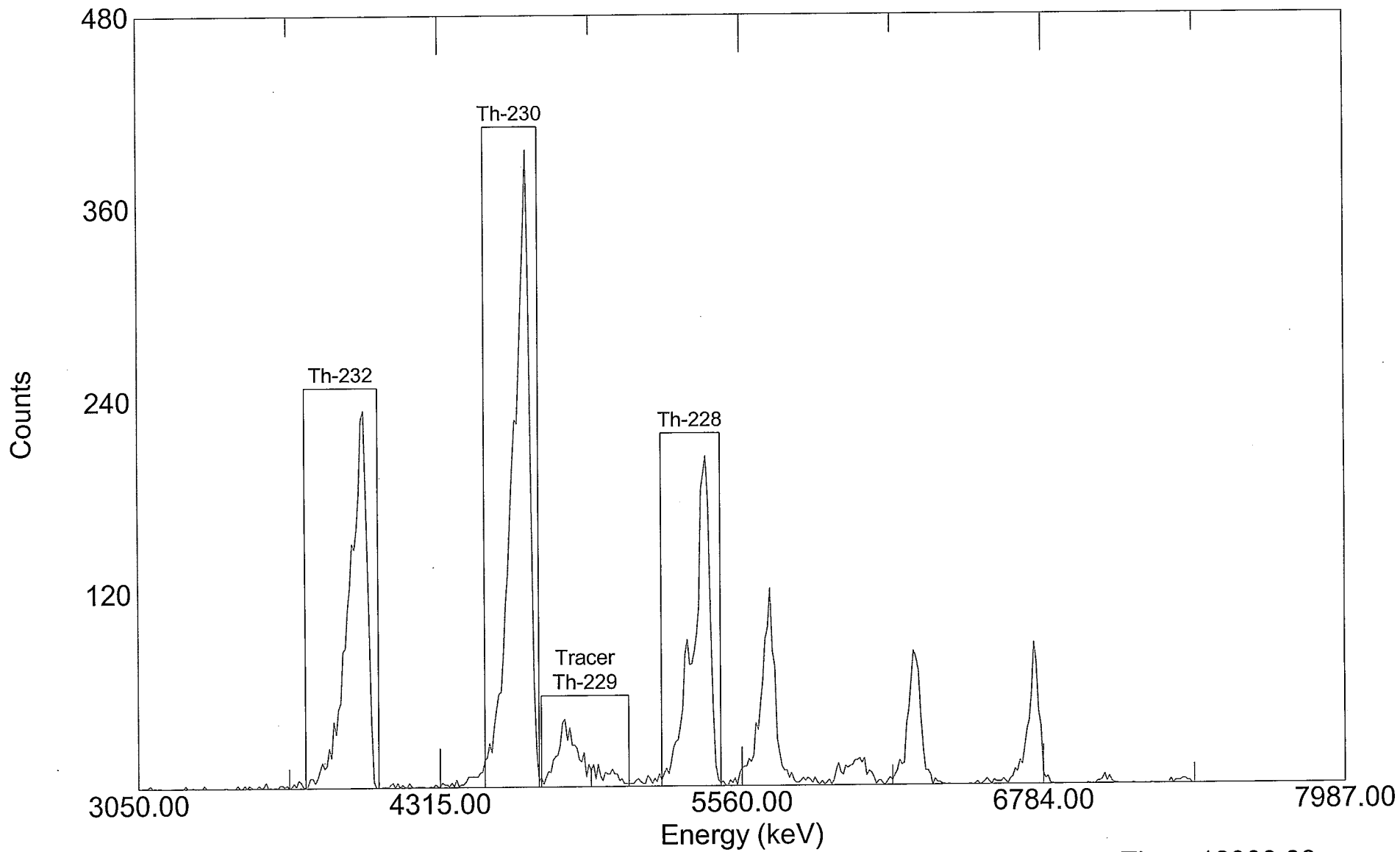
Totals

		% Total
Gross Count:	10,203.00	100.00
Net Area:	10,131.64	99.30
Background:	71.36	0.70
Composite Fit:	7,773.00	76.18
Residuals:	2,430.00	23.82

Analyzed By: _____

Checked By: _____

T509625 AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 13:01:20 on 10-Jun-2004
File: C:\User\Alpha\ALPHA\T509625.SPC
Sample: 0405096-25 TAS040603-3

Real Time: 18001.06 s. Live Time: 18000.00 s.
Detector: #62 MCB 8 Input 6
Type: Thorium

000122

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
6/22/04 3:12:48 PM

Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0405096-26 TAS040603-3

Analysis Type: Thorium

Detector: MCB 8 Input 8

Date/Time of Count: 6/10/04 1:01:49 PM

Sample Volume: 1.000 Total, 1.000 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: **69.12%**

Real Time: 300.02 Minutes

Total Eff.: 21.23 %

Dead Time: 0.0 %

Tracer Amount: 9.999 DPM, With Contaminate

Acquisition: 512 Channels

Efficiency: 30.72%

Analysis: Relative Region-Of-Interest

Original: 3,023 + 10.2209 * Chn + -0.00130 * Chn **2.

Spectrum Calibration: 3,023 + 10.2230 * Chn + -0.00130 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\T509626.SPC**

Background File: **C:\User\Alpha\ALPHA\B4060864.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	166.34	147	171	6.00	257.00	2,607.00	0.29	2590.91	40.67
2	242.94	222	247	4.00	144.00	1,454.00	12.82	1441.18	22.62
3	98.05	74	105	4.00	174.00	1,582.00	0.58	1581.42	24.83
Tracer	182.44	172	208	10.00	44.00	639.00	2.04	636.96	10.00

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-230	4687.70	58.74	18.321	n/a	3.86 %
2	Th-228	5430.00	38.37	10.191	n/a	5.19 %
3	Th-232	4013.00	39.87	11.182	n/a	4.93 %
Tracer	Th-229	4845.00	97.49	4.504	n/a	7.75 %

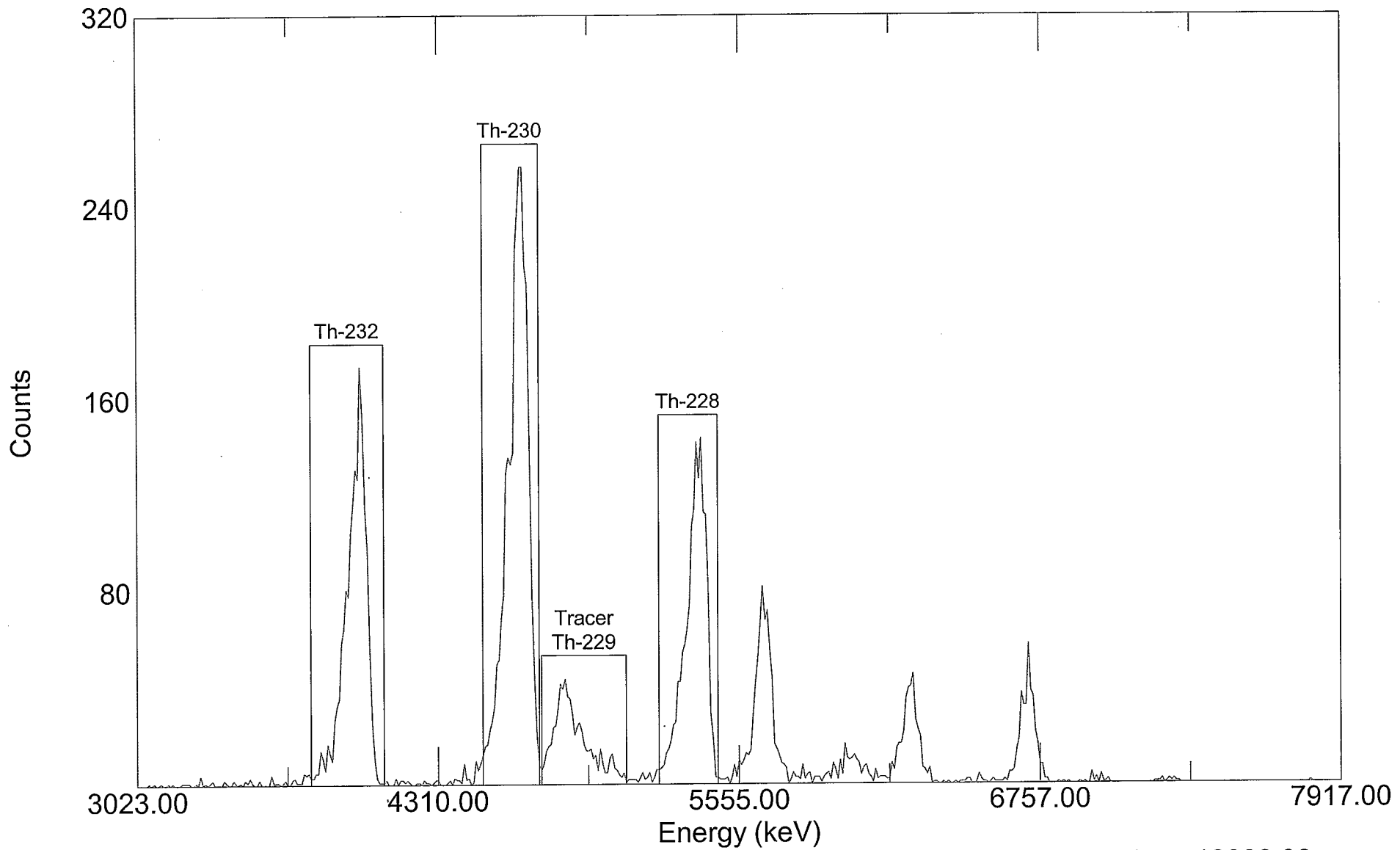
Totals

		% Total
Gross Count:	8,103.00	100.00
Net Area:	8,034.26	99.15
Background:	68.74	0.85
Composite Fit:	6,282.00	77.53
Residuals:	1,821.00	22.47

Analyzed By: Sm

Checked By: SD

T509626 AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 13:01:49 on 10-Jun-2004
File: C:\User\Alpha\ALPHA\T509626.SPC
Sample: 0405096-26 TAS040603-3

Real Time: 18001.06 s. Live Time: 18000.00 s.
Detector: #64 MCB 8 Input 8
Type: Thorium

000124

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
6/11/04 2:07:53 PM
Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0405096-27 TAS040603-4

Analysis Type: Thorium

Detector: MCB 2 Input 2

Date/Time of Count: 6/10/04 12:50:05 PM

Sample Volume: 0.100 Total, 0.100 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: **76.21%**

Real Time: 300.01 Minutes

Total Eff.: 22.06 %

Dead Time: 0.0 %

Tracer Amount: 9.999 DPM, With Contaminate

Acquisition: 512 Channels

Efficiency: 28.95%

Analysis: Relative Region-Of-Interest

Original: 3,010 + 10.1605 * Chn + -0.00091 * Chn **2.

Spectrum Calibration: 3,010 + 10.1526 * Chn + -0.00091 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\T509627.SPC**

Background File: **C:\USER\ALPHA\BKGND\B4060810.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	167.72	148	171	2.00	388.00	3,297.00	0.29	3280.30	49.56
2	243.63	223	248	2.00	156.00	1,424.00	6.12	1417.88	21.42
3	99.64	76	107	2.00	137.00	1,232.00	0.29	1231.71	18.61
Tracer	183.72	172	209	12.00	53.00	663.00	1.17	661.83	10.00

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-230	4687.70	19.70	222.570	n/a	3.43 %
2	Th-228	5430.00	19.42	96.204	n/a	5.22 %
3	Th-232	4013.00	19.94	83.572	n/a	5.59 %
Tracer	Th-229	4845.00	117.82	44.906	n/a	7.61 %

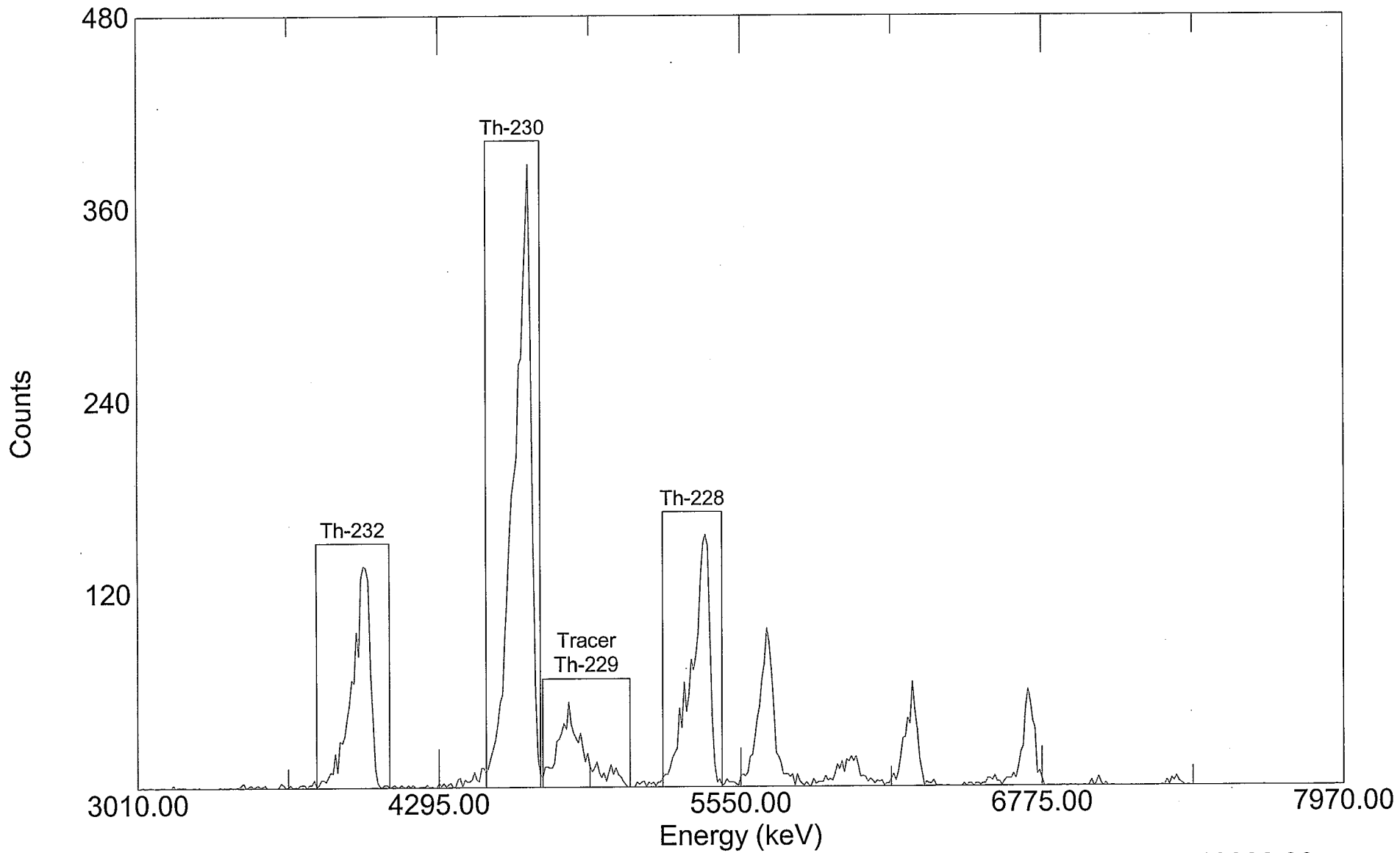
Totals

		% Total
Gross Count:	8,650.00	100.00
Net Area:	8,600.49	99.43
Background:	49.51	0.57
Composite Fit:	6,616.00	76.49
Residuals:	2,034.00	23.51

Analyzed By: Sm

Checked By: SD

T509627 AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 12:50:05 on 10-Jun-2004
File: C:\User\Alpha\ALPHA\T509627.SPC
Sample: 0405096-27 TAS040603-4

Real Time: 18000.78 s. Live Time: 18000.00 s.
Detector: #10 MCB 2 Input 2
Type: Thorium

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
6/11/04 2:09:02 PM
Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0405096-28 TAS040603-4

Analysis Type: Thorium

Detector: MCB 2 Input 3

Date/Time of Count: 6/10/04 12:50:25 PM

Sample Volume: 0.202 Total, 0.202 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: **81.17%**

Real Time: 300.01 Minutes

Total Eff.: 23.18 %

Dead Time: 0.0 %

Tracer Amount: 9.999 DPM, With Contaminate

Acquisition: 512 Channels

Efficiency: 28.56%

Analysis: Relative Region-Of-Interest

Original: 2,997 + 10.0999 * Chn + -0.00076 * Chn **2.

Spectrum Calibration: 2,997 + 10.0735 * Chn + -0.00076 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\T509628.SPC**

Background File: **C:\USER\ALPHA\BKGND\B4060811.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	170.06	149	172	2.00	124.00	978.00	0.29	960.46	13.81
2	246.14	223	248	2.00	96.00	735.00	5.24	729.76	10.49
3	101.68	78	109	2.00	81.00	632.00	0.58	631.42	9.08
Tracer	186.11	173	211	8.00	53.00	696.00	0.58	695.42	10.00

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-230	4687.70	19.63	30.872	n/a	6.38 %
2	Th-228	5430.00	19.40	23.456	n/a	7.28 %
3	Th-232	4013.00	19.84	20.295	n/a	7.80 %
Tracer	Th-229	4845.00	78.32	22.353	n/a	7.43 %

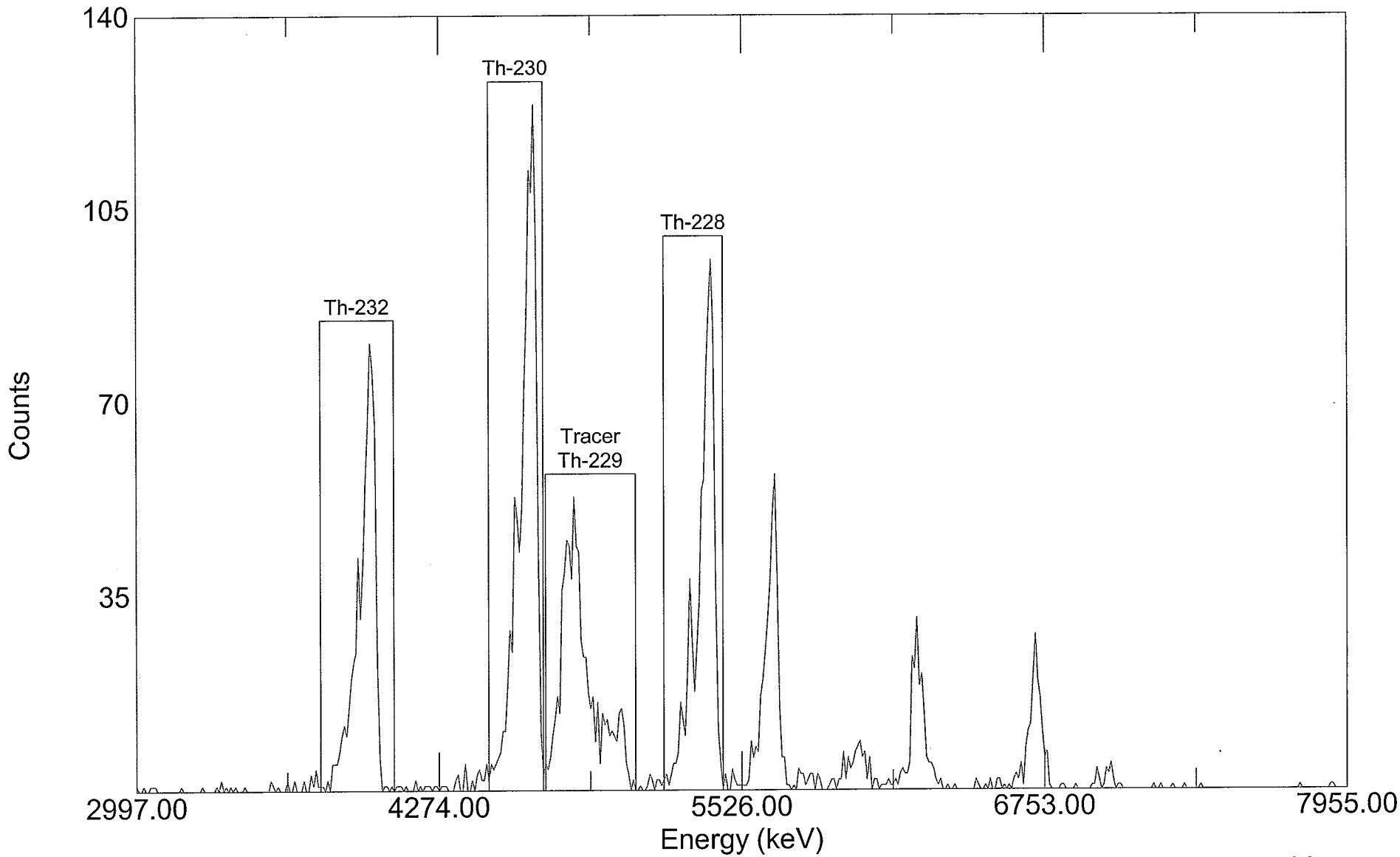
Totals

		% Total
Gross Count:	3,975.00	100.00
Net Area:	3,927.82	98.81
Background:	47.18	1.19
Composite Fit:	3,041.00	76.50
Residuals:	934.00	23.50

Analyzed By: Sm

Checked By: SD

T509628 AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 12:50:25 on 10-Jun-2004
File: C:\User\Alpha\ALPHA\T509628.SPC
Sample: 0405096-28 TAS040603-4

Real Time: 18000.76 s. Live Time: 18000.00 s.
Detector: #11 MCB 2 Input 3
Type: Thorium

000428

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
6/11/04 2:10:23 PM
Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0405096-29 TAS040603-4

Analysis Type: Thorium

Detector: MCB 2 Input 4

Date/Time of Count: 6/10/04 12:50:46 PM

Sample Volume: 1.000 Total, 1.000 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: **69.93%**

Real Time: 300.01 Minutes

Total Eff.: 20.50 %

Dead Time: 0.0 %

Tracer Amount: 9.999 DPM, With Contaminate

Acquisition: 512 Channels

Efficiency: 29.31%

Analysis: Relative Region-Of-Interest

Original: 3,050 + 9.7185 * Chn + -0.00000 * Chn **2.

Spectrum Calibration: 3,050 + 9.6942 * Chn + -0.00000 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\T509629.SPC**

Background File: **C:\USER\ALPHA\BKGND\B4060812.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	168.94	146	171	4.00	80.00	779.00	1.75	762.00	12.39
2	245.51	226	251	2.00	134.00	1,293.00	17.77	1275.23	20.74
3	99.34	75	106	6.00	123.00	1,140.00	1.46	1138.54	18.52
Tracer	185.16	172	210	6.00	52.00	616.00	1.17	614.83	10.00

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-230	4687.70	38.78	5.582	n/a	7.18 %
2	Th-228	5430.00	19.39	9.342	n/a	5.53 %
3	Th-232	4013.00	58.17	8.341	n/a	5.81 %
Tracer	Th-229	4845.00	58.17	4.504	n/a	7.90 %

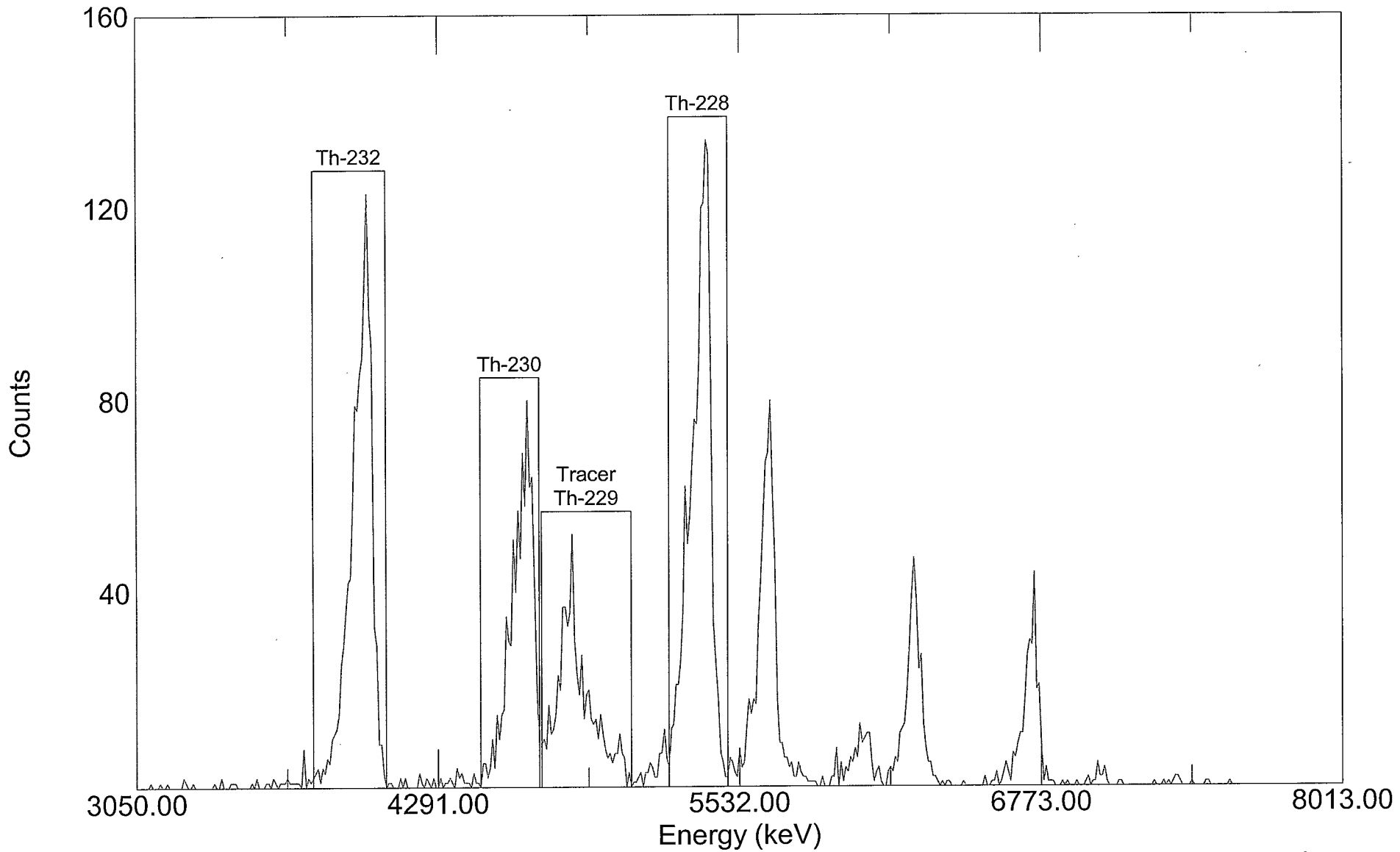
Totals

		% Total
Gross Count:	5,355.00	100.00
Net Area:	5,251.02	98.06
Background:	103.98	1.94
Composite Fit:	3,828.00	71.48
Residuals:	1,527.00	28.52

Analyzed By: Sm

Checked By: SD

T509629 AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 12:50:46 on 10-Jun-2004
File: C:\User\Alpha\ALPHA\T509629.SPC
Sample: 0405096-29 TAS040603-4

Real Time: 18000.76 s. Live Time: 18000.00 s.
Detector: #12 MCB 2 Input 4
Type: Thorium

000139

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
6/11/04 2:11:32 PM
Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0405096-30 TAS040603-4

Analysis Type: Thorium

Detector: MCB 2 Input 5

Date/Time of Count: 6/10/04 12:51:11 PM

Sample Volume: 0.109 Total, 0.109 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: **69.23%**

Real Time: 300.01 Minutes

Total Eff.: 21.97 %

Dead Time: 0.0 %

Tracer Amount: 9.999 DPM, With Contaminate

Acquisition: 512 Channels

Efficiency: 31.73%

Analysis: Relative Region-Of-Interest

Original: 3,042 + 9.8766 * Chn + -0.00035 * Chn **2.

Spectrum Calibration: 3,042 + 9.8670 * Chn + -0.00035 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\T509630.SPC**

Background File: **C:\USER\ALPHA\BKGND\B4060813.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	167.78	146	170	4.00	251.00	2,214.00	1.17	2196.49	33.33
2	244.12	221	246	2.00	143.00	1,095.00	7.28	1087.72	16.51
3	98.75	75	106	4.00	140.00	1,084.00	0.87	1083.13	16.44
Tracer	183.92	171	209	6.00	53.00	663.00	4.08	658.92	10.00

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-230	4687.70	39.00	137.744	n/a	4.20 %
2	Th-228	5430.00	19.39	68.212	n/a	5.96 %
3	Th-232	4013.00	39.19	67.924	n/a	5.96 %
Tracer	Th-229	4845.00	58.43	41.322	n/a	7.61 %

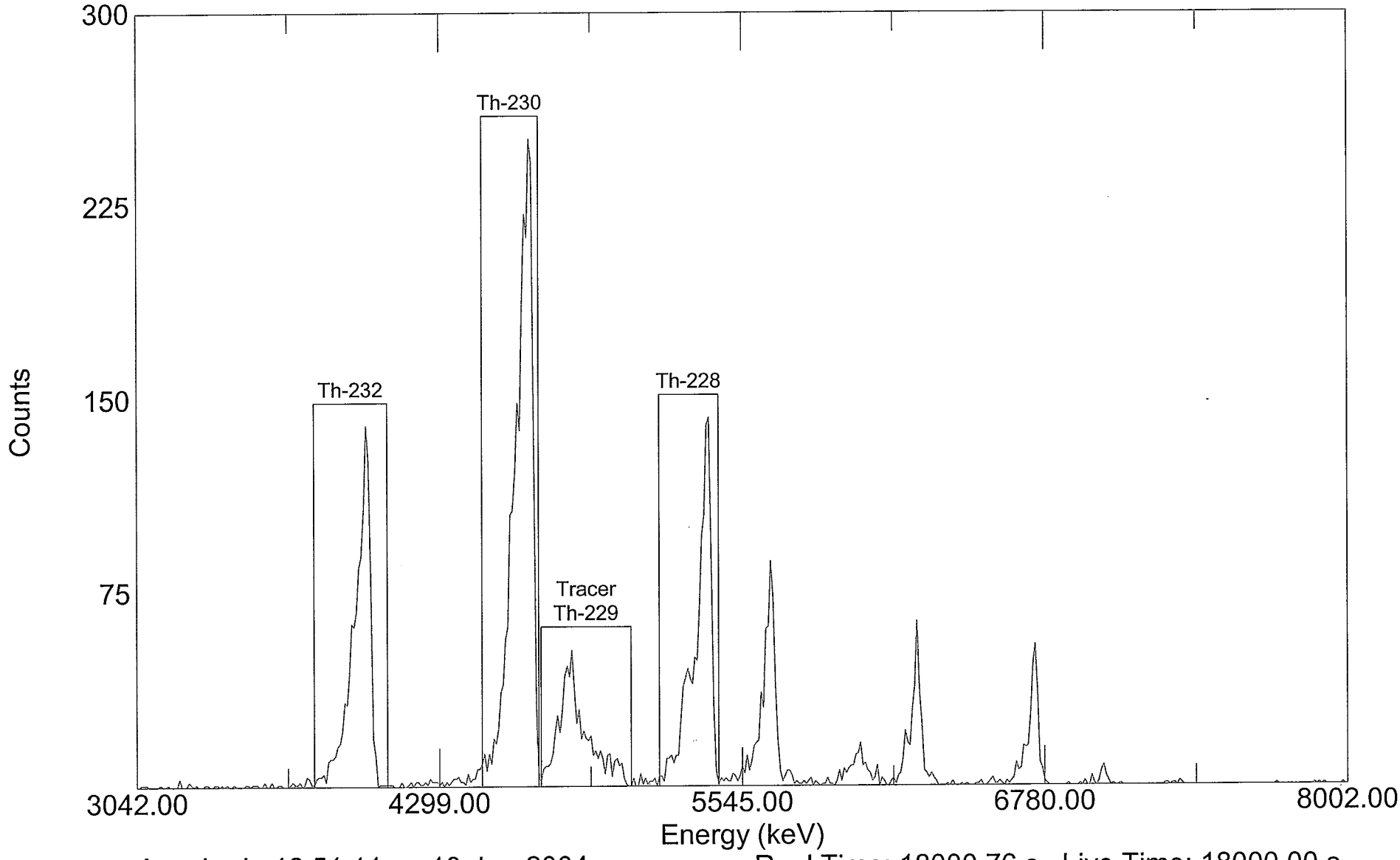
Totals

		% Total
Gross Count:	6,534.00	100.00
Net Area:	6,463.22	98.92
Background:	70.78	1.08
Composite Fit:	5,056.00	77.38
Residuals:	1,478.00	22.62

Analyzed By: Sm

Checked By: SD

T509630 AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 12:51:11 on 10-Jun-2004
File: C:\User\Alpha\ALPHA\T509630.SPC
Sample: 0405096-30 TAS040603-4

Real Time: 18000.76 s. Live Time: 18000.00 s.
Detector: #13 MCB 2 Input 5
Type: Thorium

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
6/22/04 3:14:51 PM
Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0405096-31 TAS040603-3

Analysis Type: Thorium

Detector: MCB 2 Input 3

Date/Time of Count: 6/10/04 7:37:00 PM

Sample Volume: 1.000 Total, 1.000 Aliquot.

Live Time: **330.00 Minutes**

Chem. Yield: **67.63%**

Real Time: 330.05 Minutes

Total Eff.: 19.32 %

Dead Time: 0.0 %

Tracer Amount: 9.999 DPM, With Contaminate

Acquisition: 512 Channels

Efficiency: 28.56%

Analysis: Relative Region-Of-Interest

Original: 2,997 + 10.0999 * Chn + -0.00076 * Chn **2.

Spectrum Calibration: 2,997 + 10.1580 * Chn + -0.00076 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\T509631.SPC**

Background File: **C:\User\Alpha\ALPHA\B4060811.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	168.61	149	173	4.00	93.00	740.00	0.32	723.87	11.36
2	244.02	223	248	4.00	136.00	1,130.00	5.77	1124.23	17.64
3	100.82	77	108	4.00	100.00	978.00	0.64	977.36	15.33
Tracer	184.52	174	210	10.00	50.00	638.00	0.64	637.36	10.00

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-230	4687.70	39.61	5.115	n/a	7.37 %
2	Th-228	5430.00	39.15	7.945	n/a	5.86 %
3	Th-232	4013.00	40.02	6.907	n/a	6.27 %
Tracer	Th-229	4845.00	98.77	4.504	n/a	7.76 %

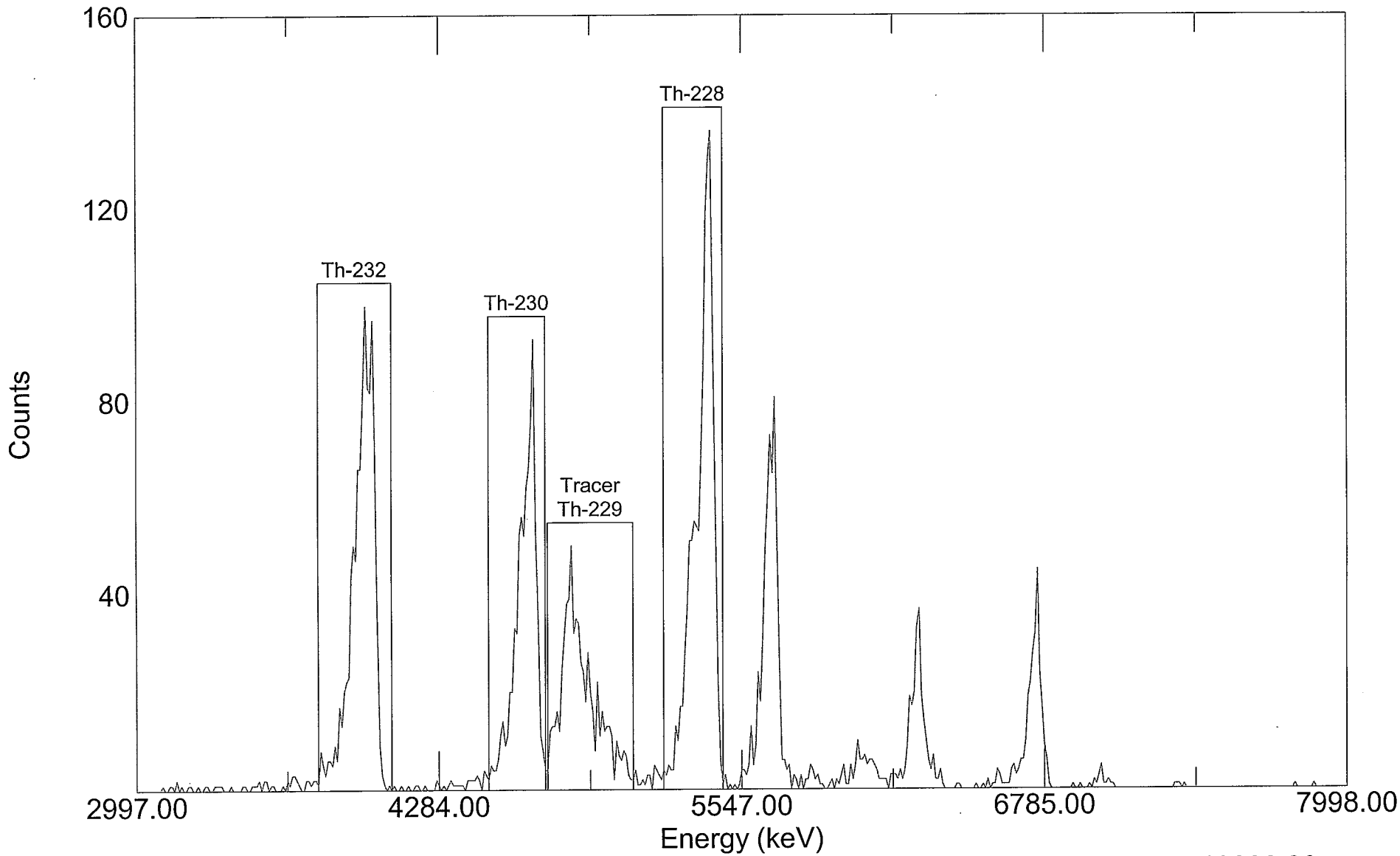
Totals

		% Total
Gross Count:	4,780.00	100.00
Net Area:	4,728.10	98.91
Background:	51.90	1.09
Composite Fit:	3,486.00	72.93
Residuals:	1,294.00	27.07

Analyzed By: Sm

Checked By: SD

T509631 AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 19:37:00 on 10-Jun-2004
File: C:\User\Alpha\ALPHA\T509631.SPC
Sample: 0405096-31 TAS040603-3

Real Time: 19803.00 s. Live Time: 19800.00 s.
Detector: #11 MCB 2 Input 3
Type: Thorium

00034

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
6/11/04 2:12:39 PM
Para0327.rpt
rev 11/13/03 KVG

Sample Name: 0405096-32 TAS040603-4

Analysis Type: Thorium

Detector: MCB 2 Input 7

Date/Time of Count: 6/10/04 12:51:31 PM

Sample Volume: 0.102 Total, 0.102 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: **61.90%**

Real Time: 300.01 Minutes

Total Eff.: 18.66 %

Dead Time: 0.0 %

Tracer Amount: 9.999 DPM, With Contaminate

Acquisition: 512 Channels

Efficiency: 30.14%

Analysis: Relative Region-Of-Interest

Original: 3,022 + 10.0160 * Chn + -0.00072 * Chn **2.

Spectrum Calibration: 3,022 + 9.9687 * Chn + -0.00072 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\T509632.SPC**

Background File: **C:\USER\ALPHA\BKGND\B4060815.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	169.21	148	171	2.00	324.00	3,051.00	1.17	3035.96	54.24
2	245.98	223	248	2.00	159.00	1,376.00	18.35	1357.65	24.26
3	100.19	76	107	2.00	172.00	1,520.00	1.46	1518.54	27.13
Tracer	185.41	172	210	8.00	45.00	564.00	4.37	559.63	10.00

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-230	4687.70	19.45	239.550	n/a	3.57 %
2	Th-228	5430.00	19.23	107.125	n/a	5.36 %
3	Th-232	4013.00	19.65	119.820	n/a	5.03 %
Tracer	Th-229	4845.00	77.61	44.157	n/a	8.25 %

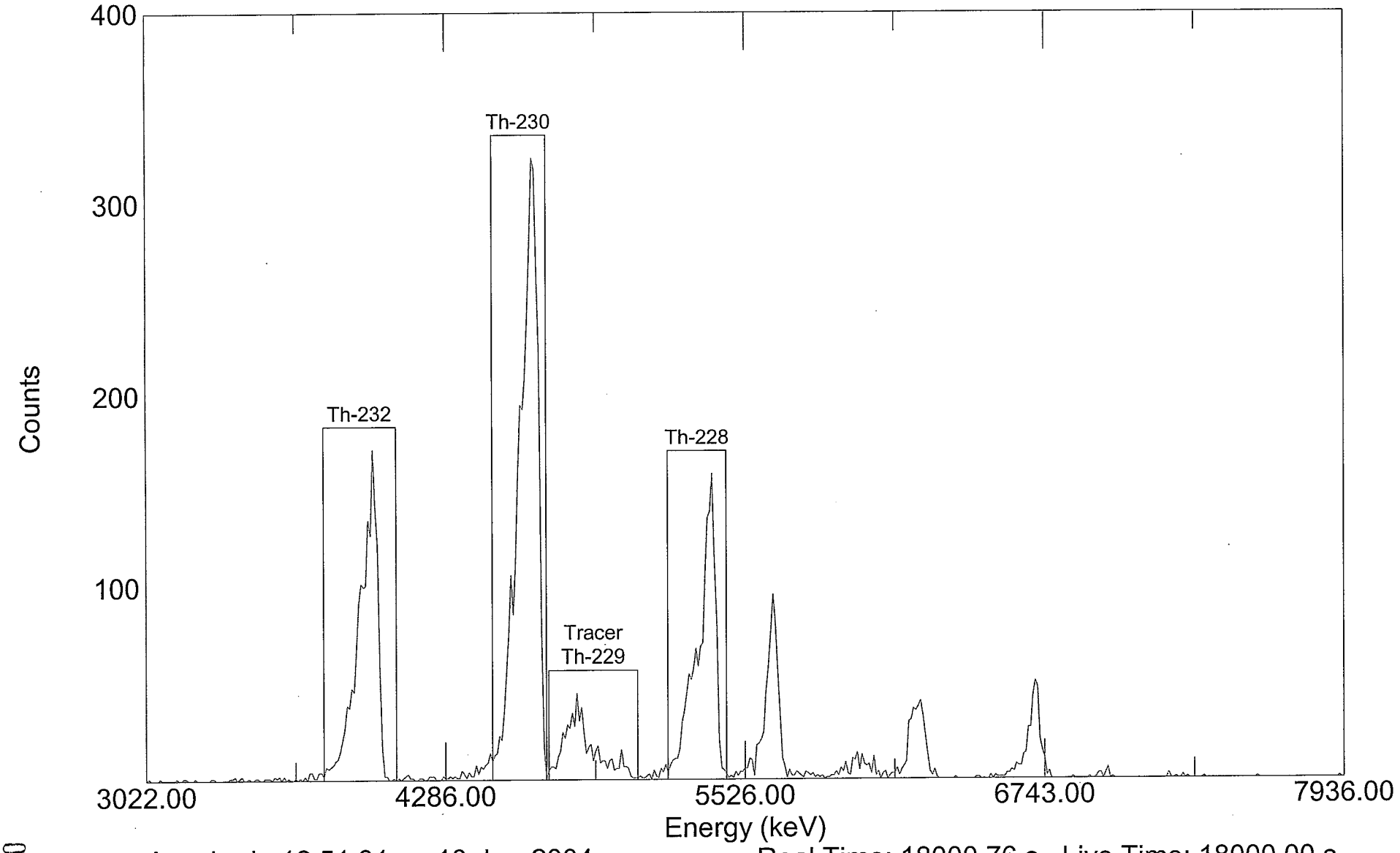
Totals

		% Total
Gross Count:	8,162.00	100.00
Net Area:	8,036.76	98.47
Background:	125.24	1.53
Composite Fit:	6,511.00	79.77
Residuals:	1,651.00	20.23

Analyzed By: Sm

Checked By: SD

T509632 AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 12:51:31 on 10-Jun-2004
File: C:\User\Alpha\ALPHA\T509632.SPC
Sample: 0405096-32 TAS040603-4

Real Time: 18000.76 s. Live Time: 18000.00 s.
Detector: #15 MCB 2 Input 7
Type: Thorium

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
6/22/04 3:18:27 PM
Para0327.rpt
rev 11/13/03 KVG

Sample Name: AS040603-3MB TAS040603-3

Analysis Type: Thorium

Detector: MCB 2 Input 4

Date/Time of Count: 6/10/04 7:37:22 PM

Sample Volume: 2.000 Total, 2.000 Aliquot.

Live Time: **330.00 Minutes**

Chem. Yield: **78.24%**

Real Time: 330.05 Minutes

Total Eff.: 22.93 %

Dead Time: 0.0 %

Tracer Amount: 9.999 DPM, With Contaminate

Acquisition: 512 Channels

Efficiency: 29.31%

Analysis: Relative Region-Of-Interest

Original: 3,050 + 9.7185 * Chn + -0.00000 * Chn **2.

Spectrum Calibration: 3,050 + 9.6626 * Chn + -0.00000 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\T6033B.SPC**

Background File: **C:\User\Alpha\ALPHA\B4060812.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	169.49	147	170	8.00	4.00	28.00	1.60	7.63	0.10
2	246.31	223	248	2.00	7.00	24.00	19.86	4.14	0.05
3	99.66	75	106	2.00	1.00	4.00	1.60	2.40	0.03
Tracer	185.77	171	210	10.00	58.00	758.00	1.28	756.72	10.00

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-230	4687.70	77.30	0.023	n/a	136.30 %
2	Th-228	5430.00	19.33	0.012	n/a	241.82 %
3	Th-232	4013.00	19.33	0.007	n/a	166.79 %
Tracer	Th-229	4845.00	96.63	2.252	n/a	7.12 %

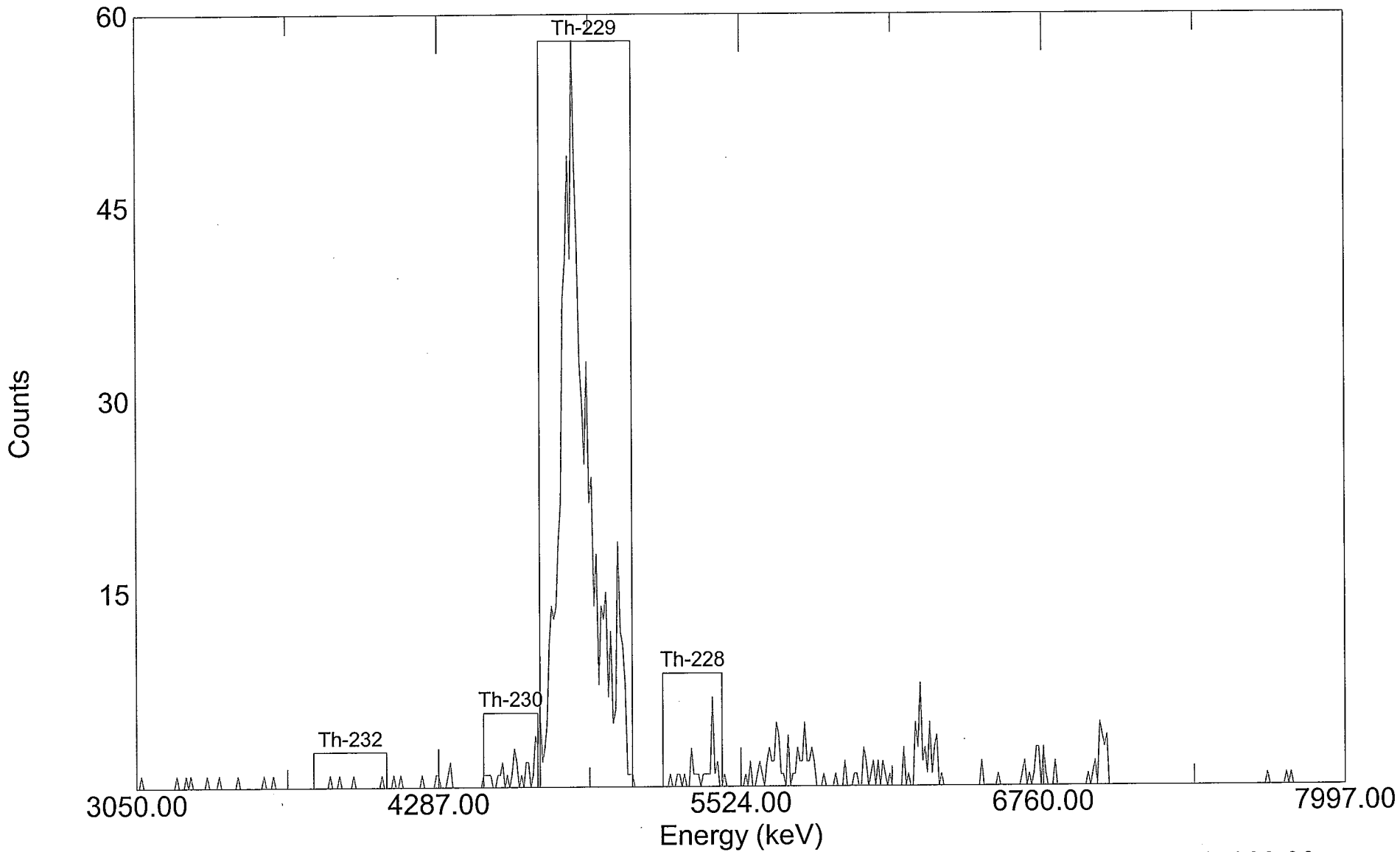
Totals

		% Total
Gross Count:	989.00	100.00
Net Area:	874.62	88.43
Background:	114.38	11.57
Composite Fit:	814.00	82.31
Residuals:	175.00	17.69

Analyzed By: Sm

Checked By: SD

T6033B AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 19:37:22 on 10-Jun-2004
File: C:\User\Alpha\ALPHA\T6033B.SPC
Sample: AS040603-3MB TAS040603-3

Real Time: 19803.00 s. Live Time: 19800.00 s.
Detector: #12 MCB 2 Input 4
Type: Thorium

000138

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
6/22/04 3:17:17 PM

Para0327.rpt
rev 11/13/03 KVG

Sample Name: AS040603-3LCS TAS040603-3

Analysis Type: Thorium

Detector: MCB 2 Input 5

Date/Time of Count: 6/10/04 7:37:47 PM

Sample Volume: 2.000 Total, 2.000 Aliquot.

Live Time: **330.00 Minutes**

Chem. Yield: **75.12%**

Real Time: 330.05 Minutes

Total Eff.: 23.84 %

Dead Time: 0.0 %

Tracer Amount: 9.999 DPM, With Contaminate

Acquisition: 512 Channels

Efficiency: 31.73%

Analysis: Relative Region-Of-Interest

Original: 3,042 + 9.8766 * Chn + -0.00035 * Chn **2.

Spectrum Calibration: 3,042 + 9.8561 * Chn + -0.00035 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\T6033L.SPC**

Background File: **C:\User\Alpha\ALPHA\B4060813.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	167.96	146	169	2.00	101.00	840.00	1.28	819.21	10.41
2	244.39	222	247	2.00	3.00	14.00	7.69	6.31	0.08
3	98.86	75	106	2.00	2.00	10.00	0.96	9.04	0.11
Tracer	184.13	170	209	12.00	61.00	791.00	4.49	786.51	10.00

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-230	4687.70	19.48	2.346	n/a	6.93 %
2	Th-228	5430.00	19.37	0.018	n/a	119.44 %
3	Th-232	4013.00	19.57	0.026	n/a	68.91 %
Tracer	Th-229	4845.00	116.73	2.252	n/a	6.97 %

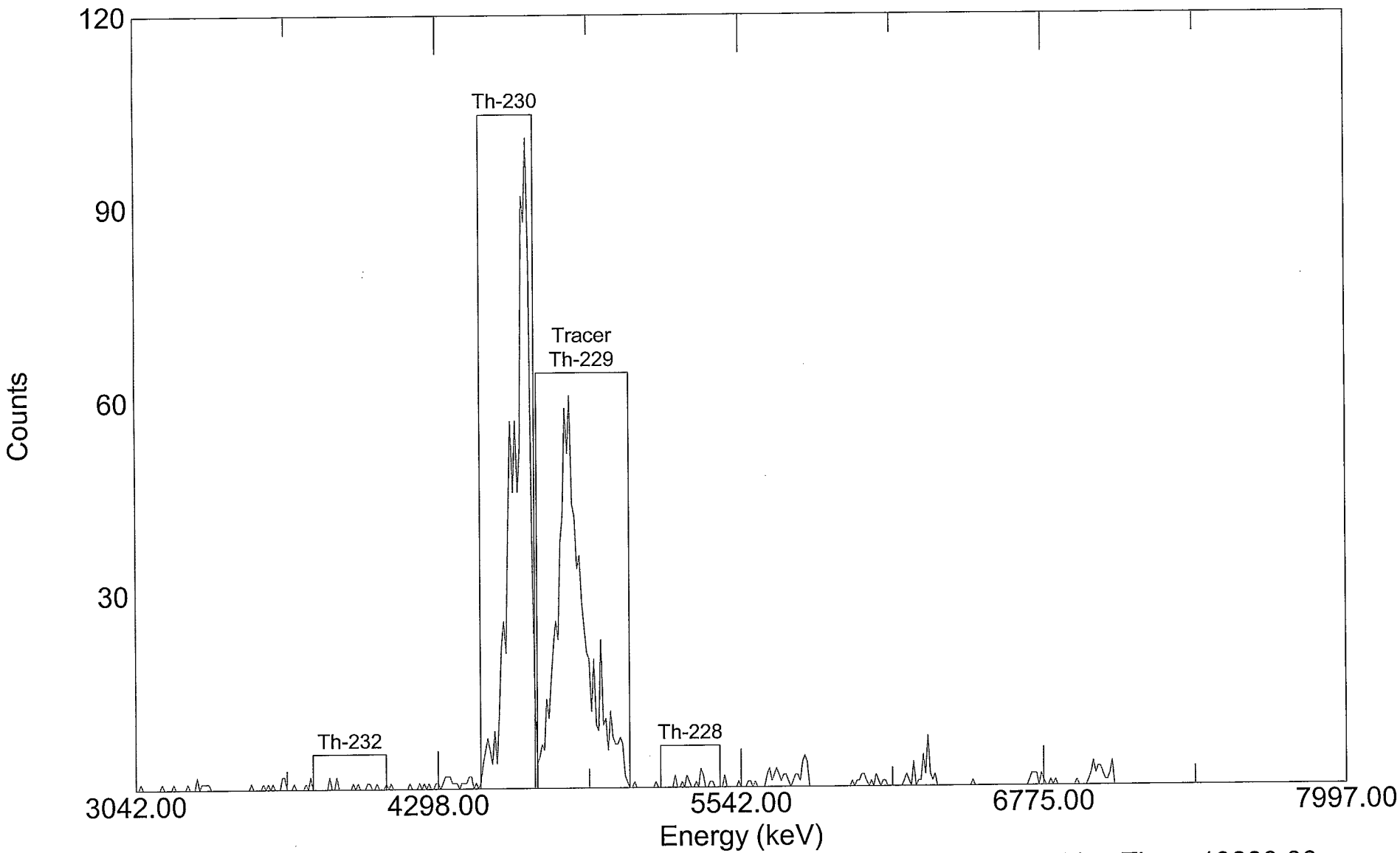
Totals

		% Total
Gross Count:	1,831.00	100.00
Net Area:	1,753.15	95.75
Background:	77.85	4.25
Composite Fit:	1,655.00	90.39
Residuals:	176.00	9.61

Analyzed By: Sm

Checked By: SD

T6033L AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 19:37:47 on 10-Jun-2004
File: C:\User\Alpha\ALPHA\T6033L.SPC
Sample: AS040603-3LCS TAS040603-3

Real Time: 19803.02 s. Live Time: 19800.00 s.
Detector: #13 MCB 2 Input 5
Type: Thorium

000140

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
6/11/04 2:16:54 PM
Para0327.rpt
rev 11/13/03 KVG

Sample Name: AS040603-4MB TAS040603-4

Analysis Type: Thorium

Detector: MCB 2 Input 8

Date/Time of Count: 6/10/04 12:51:56 PM

Sample Volume: 0.300 Total, 0.300 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: **73.69%**

Real Time: 300.01 Minutes

Total Eff.: 21.80 %

Dead Time: 0.0 %

Tracer Amount: 9.999 DPM, With Contaminate

Acquisition: 512 Channels

Efficiency: 29.58%

Analysis: Relative Region-Of-Interest

Original: 3,019 + 9.9439 * Chn + -0.00045 * Chn **2.

Spectrum Calibration: 3,019 + 9.9008 * Chn + -0.00045 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\T6034B.SPC**

Background File: **C:\USER\ALPHA\BKGND\B4060816.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	169.83	151	174	4.00	4.00	27.00	0.29	10.49	0.16
2	246.27	223	248	2.00	4.00	10.00	7.86	2.14	0.03
3	100.83	76	107	2.00	1.00	3.00	0.58	2.42	0.04
Tracer	185.98	175	210	6.00	65.00	655.00	1.17	653.83	10.00

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-230	4687.70	38.99	0.241	n/a	97.10 %
2	Th-228	5430.00	19.35	0.049	n/a	299.71 %
3	Th-232	4013.00	19.62	0.056	n/a	141.58 %
Tracer	Th-229	4845.00	58.39	15.014	n/a	7.66 %

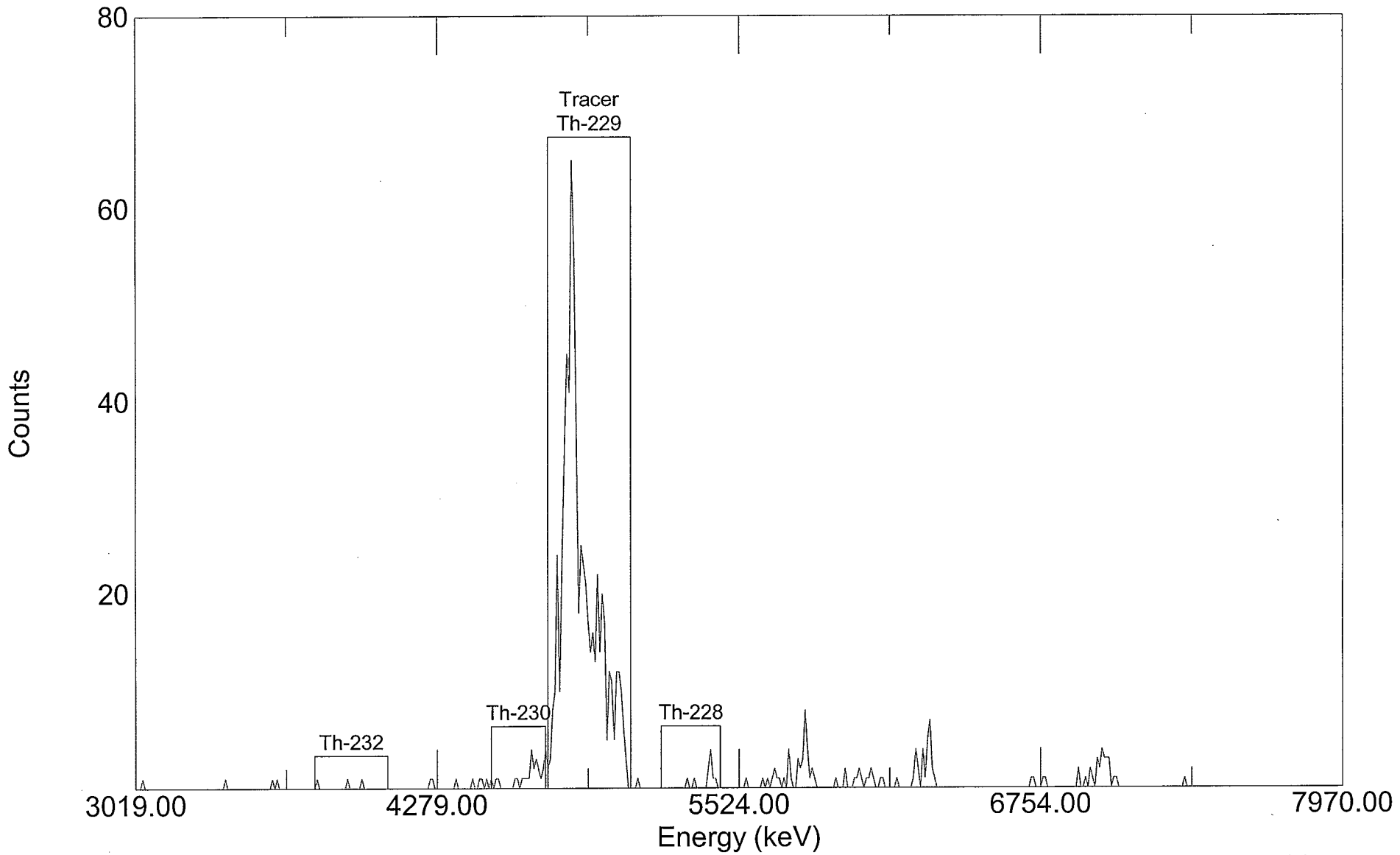
Totals

		% Total
Gross Count:	819.00	100.00
Net Area:	757.84	92.53
Background:	61.17	7.47
Composite Fit:	695.00	84.86
Residuals:	124.00	15.14

Analyzed By: Sm

Checked By: GD

T6034B AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 12:51:56 on 10-Jun-2004
File: C:\User\Alpha\ALPHA\T6034B.SPC
Sample: AS040603-4MB TAS040603-4

Real Time: 18000.76 s. Live Time: 18000.00 s.
Detector: #16 MCB 2 Input 8
Type: Thorium

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
6/11/04 2:14:43 PM

Para0327.rpt
rev 11/13/03 KVG

Sample Name: AS040603-4LCS TAS040603-4

Analysis Type: Thorium

Detector: MCB 3 Input 1

Date/Time of Count: 6/10/04 12:52:20 PM

Sample Volume: 0.300 Total, 0.300 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: **74.77%**

Real Time: 300.03 Minutes

Total Eff.: 22.95 %

Dead Time: 0.0 %

Tracer Amount: 9.999 DPM, With Contaminate

Acquisition: 512 Channels

Efficiency: 30.69%

Analysis: Relative Region-Of-Interest

Original: 3,031 + 10.0591 * Chn + -0.00088 * Chn **2.

Spectrum Calibration: 3,031 + 10.1944 * Chn + -0.00088 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\T6034L.SPC**

Background File: **C:\USER\ALPHA\BKGND\B4060817.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	164.84	145	169	4.00	71.00	779.00	0.87	761.05	11.05
2	240.29	218	243	2.00	2.00	16.00	17.77	-1.77	-0.03
3	97.13	74	105	2.00	2.00	10.00	0.87	9.13	0.13
Tracer	180.75	170	208	14.00	50.00	691.00	2.62	688.38	10.00

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-230	4687.70	39.62	16.599	n/a	7.19 %
2	Th-228	5430.00	19.54	-0.039	n/a	-464.12 %
3	Th-232	4013.00	20.05	0.199	n/a	68.17 %
Tracer	Th-229	4845.00	138.27	15.014	n/a	7.46 %

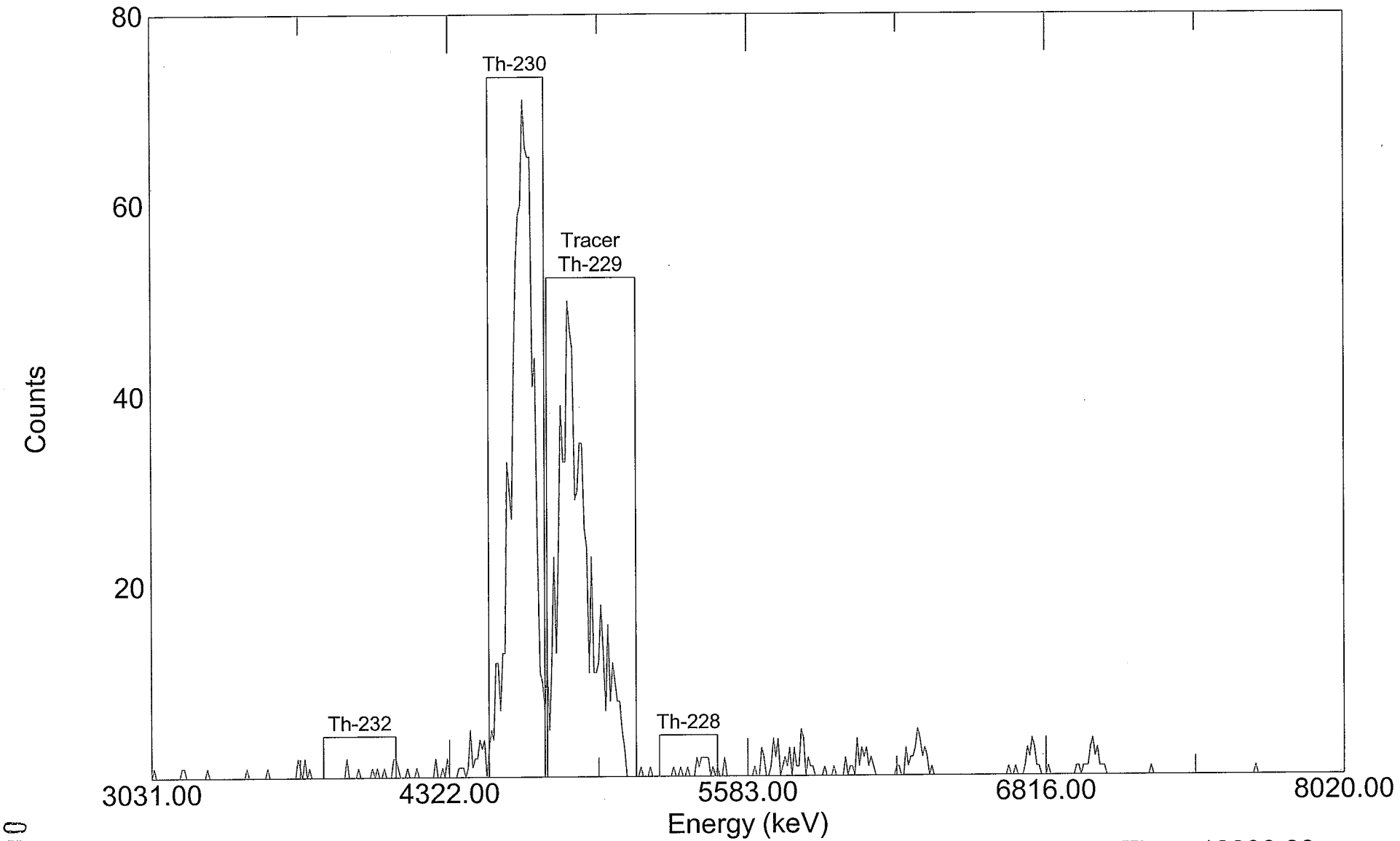
Totals

		% Total
Gross Count:	1,680.00	100.00
Net Area:	1,570.49	93.48
Background:	109.51	6.52
Composite Fit:	1,496.00	89.05
Residuals:	184.00	10.95

Analyzed By: Sm

Checked By: SD

T6034L AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 12:52:20 on 10-Jun-2004
File: C:\User\Alpha\ALPHA\T6034L.SPC
Sample: AS040603-4LCS TAS040603-4

Real Time: 18002.02 s. Live Time: 18000.00 s.
Detector: #17 MCB 3 Input 1
Type: Thorium

000144

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
6/25/04 5:41:38 AM
Para0327.rpt
rev 11/13/03 KVG

Sample Name: AS040611-2MB TAS040611-2

Analysis Type: Thorium

Detector: MCB 2 Input 1

Date/Time of Count: 6/23/04 12:36:59 PM

Sample Volume: 1.000 Total, 1.000 Aliquot.

Live Time: **600.00 Minutes**

Chem. Yield: **71.71%**

Real Time: 600.01 Minutes

Total Eff.: 20.82 %

Dead Time: 0.0 %

Tracer Amount: 10.253 DPM, With Contamina

Acquisition: 512 Channels

Efficiency: 29.03%

Analysis: Relative Region-Of-Interest

Original: 3,045 + 9.7273 * Chn + -0.00001 * Chn **2.

Spectrum Calibration: 3,045 + 9.7138 * Chn + -0.00001 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\TR6112B.SPC**

Background File: **C:\USER\ALPHA\BKGND\B4062209.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	169.18	140	161	2.00	3.00	15.00	1.20	-17.96	-0.14
2	245.61	223	248	2.00	2.00	13.00	12.60	0.40	0.00
3	99.71	76	107	2.00	1.00	5.00	4.20	0.80	0.01
Tracer	185.37	162	210	8.00	118.00	1,301.00	20.40	1280.60	10.25

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-230	4687.70	19.42	-0.065	n/a	-42.87 %
2	Th-228	5430.00	19.42	0.001	n/a	2,051.92%
3	Th-232	4013.00	19.43	0.003	n/a	625.21 %
Tracer	Th-229	4845.00	77.70	4.618	n/a	5.43 %

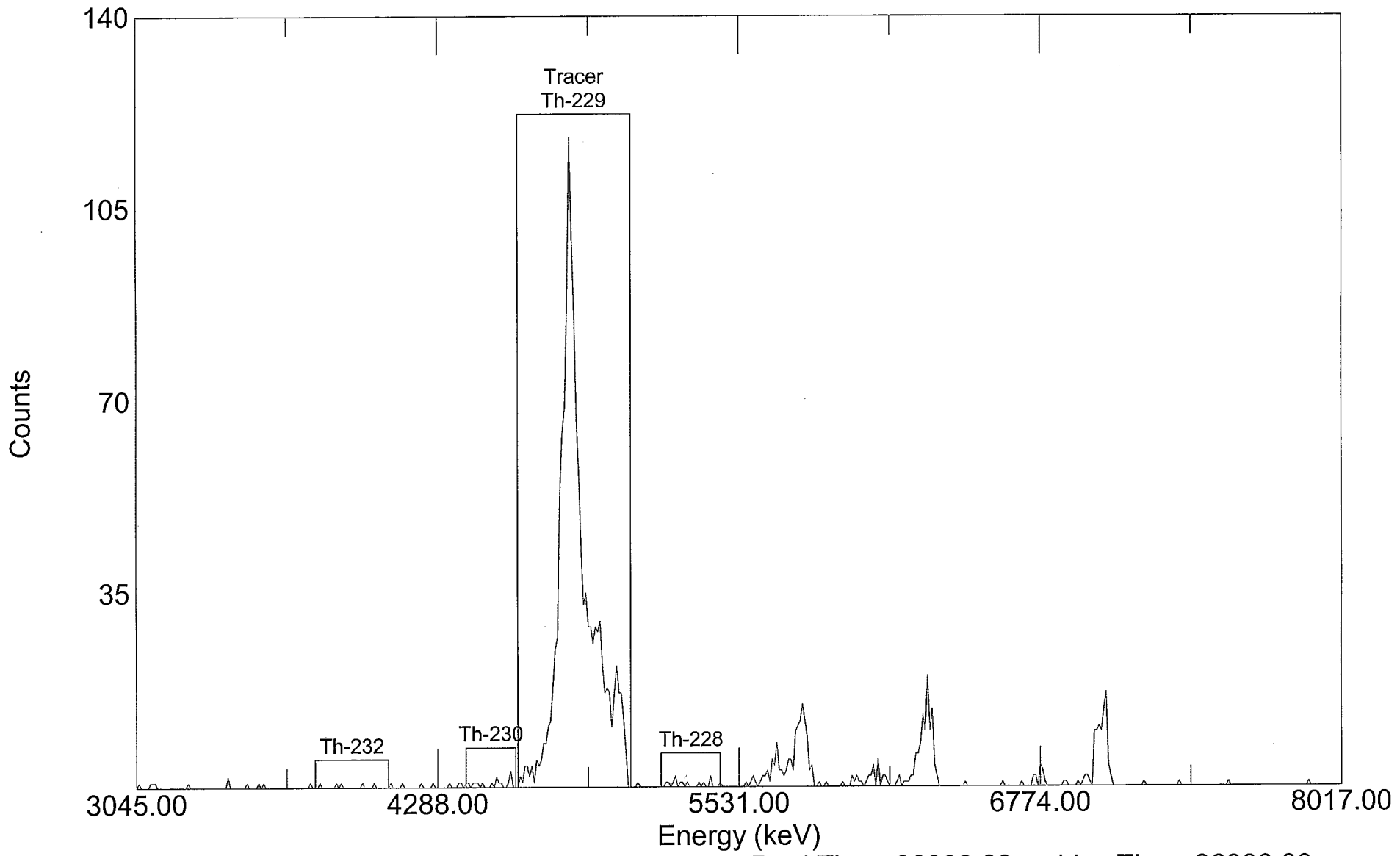
Totals

		% Total
Gross Count:	1,722.00	100.00
Net Area:	1,588.20	92.23
Background:	133.80	7.77
Composite Fit:	1,334.00	77.47
Residuals:	388.00	22.53

Analyzed By: SD

Checked By: Sm

TR6112B AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 12:36:59 on 23-Jun-2004
File: C:\User\Alpha\ALPHA\TR6112B.SPC
Sample: AS040611-2MB TAS040611-2

Real Time: 36000.82 s. Live Time: 36000.00 s.
Detector: #9 MCB 2 Input 1
Type: Thorium

000146

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
6/21/04 10:15:01 AM

Para0327.rpt
rev 11/13/03 KVG

Sample Name: AS040611-2LCS TAS040611-2

Analysis Type: Thorium

Detector: MCB 8 Input 7

Date/Time of Count: 6/18/04 9:46:01 PM

Sample Volume: 1.000 Total, 1.000 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: **71.31%**

Real Time: 300.03 Minutes

Total Eff.: 21.67 %

Dead Time: 0.0 %

Tracer Amount: 10.253 DPM, With Contamina

Acquisition: 512 Channels

Efficiency: 30.38%

Analysis: Relative Region-Of-Interest

Original: 3,010 + 10.1413 * Chn + -0.00120 * Chn **2.

Spectrum Calibration: 3,010 + 10.1224 * Chn + -0.00120 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\T6112L.SPC**

Background File: **C:\USER\ALPHA\BKGND\B4061663.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	169.10	148	171	2.00	123.00	681.00	0.30	664.17	10.22
2	246.23	224	249	2.00	2.00	14.00	7.50	6.50	0.10
3	100.25	76	107	2.00	1.00	4.00	1.20	2.80	0.04
Tracer	185.33	172	210	6.00	70.00	667.00	0.60	666.40	10.25

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-230	4687.70	19.43	4.603	n/a	7.70 %
2	Th-228	5430.00	19.06	0.045	n/a	115.51 %
3	Th-232	4013.00	19.76	0.019	n/a	141.88 %
Tracer	Th-229	4845.00	58.07	4.618	n/a	7.59 %

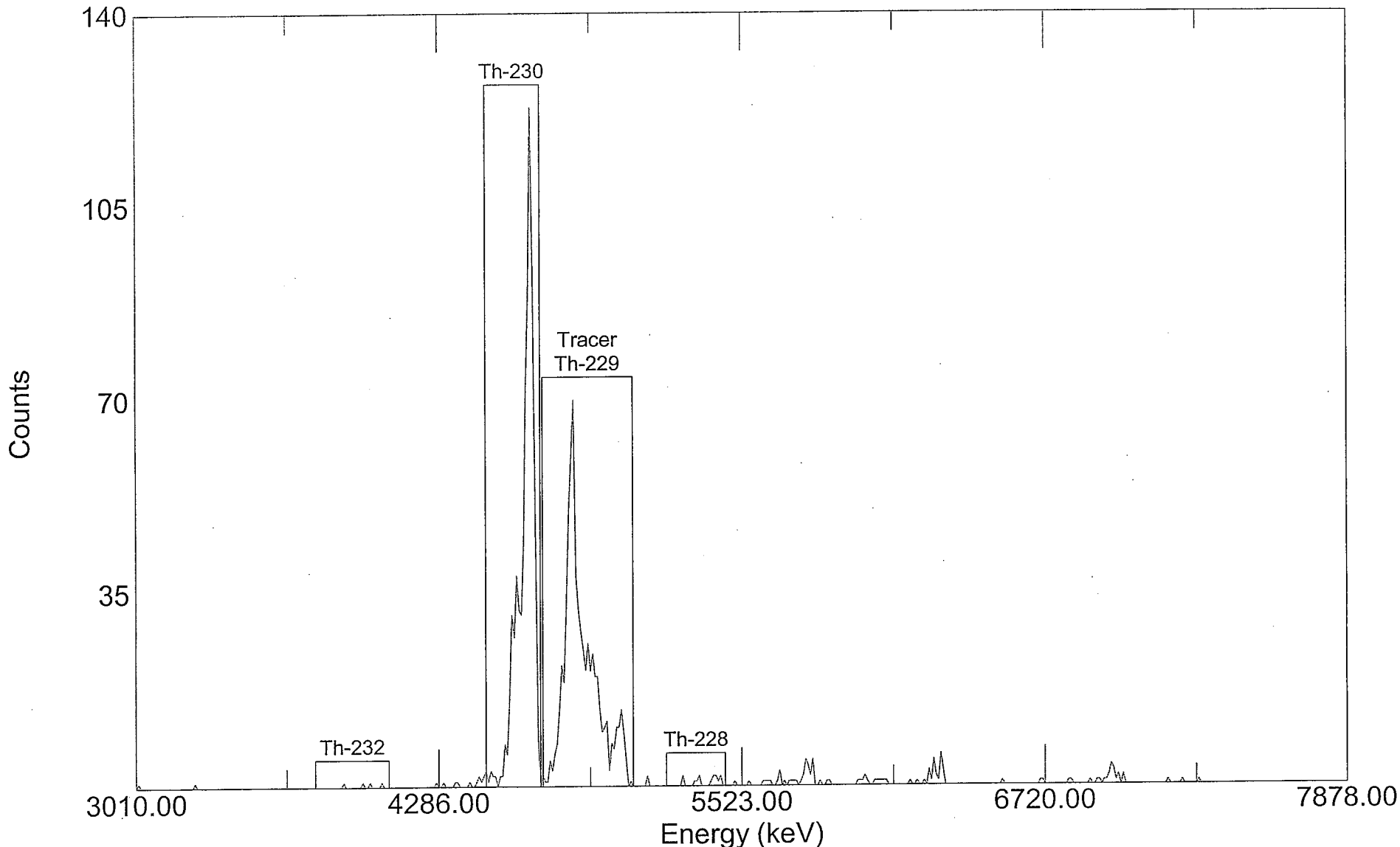
Totals

		% Total
Gross Count:	1,481.00	100.00
Net Area:	1,405.70	94.92
Background:	75.30	5.08
Composite Fit:	1,366.00	92.23
Residuals:	115.00	7.77

Analyzed By: Sm

Checked By: SD

T6112L AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 21:46:01 on 18-Jun-2004
File: C:\User\Alpha\ALPHA\T6112L.SPC
Sample: AS040611-2LCS TAS040611-2

Real Time: 18001.54 s. Live Time: 18000.00 s.
Detector: #63 MCB 8 Input 7
Type: Thorium

000148

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
7/27/04 3:38:10 PM

Para0327.rpt
rev 11/13/03 KVG

Sample Name: AS040720-4MB TAS040720-4

Analysis Type: Thorium

Detector: MCB 6 Input 6

Date/Time of Count: 7/27/04 10:37:59 AM

Sample Volume: 2.000 Total, 2.000 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: **69.13%**

Real Time: 300.01 Minutes

Total Eff.: 20.83 %

Dead Time: 0.0 %

Tracer Amount: 9.999 DPM, With Contaminate

Acquisition: 512 Channels

Efficiency: 30.13%

Analysis: Relative Region-Of-Interest

Original: 3,002 + 10.0294 * Chn + -0.00046 * Chn **2.

Spectrum Calibration: 3,002 + 9.9955 * Chn + -0.00046 * Chn **2.

Cal File:

Spectrum File: **C:\USER\ALPHA\ALPHA\T7204B.SPC**

Background File: **C:\USER\ALPHA\BKGND\B4072646.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	245.74	224	249	2.00	4.00	15.00	6.00	9.00	0.14
2	170.02	148	171	4.00	3.00	21.00	2.10	3.40	0.05
3	101.66	78	109	2.00	1.00	5.00	2.10	2.90	0.05
Tracer	186.02	172	211	4.00	56.00	632.00	7.20	624.80	10.00

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-228	5430.00	19.54	0.032	n/a	85.85 %
2	Th-230	4687.70	39.35	0.012	n/a	264.97 %
3	Th-232	4013.00	19.80	0.010	n/a	153.96 %
Tracer	Th-229	4845.00	39.29	2.252	n/a	7.80 %

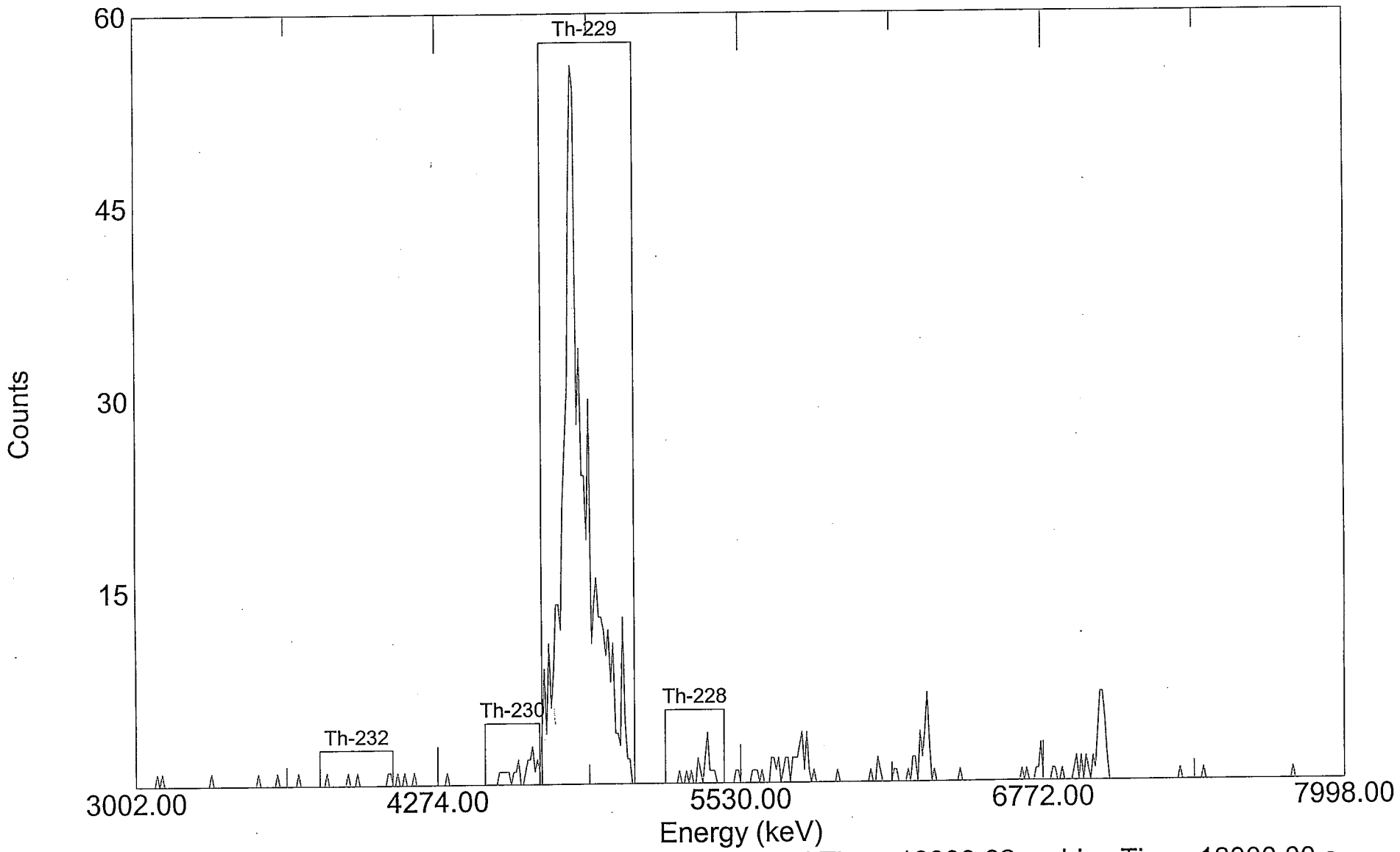
Totals

		% Total
Gross Count:	804.00	100.00
Net Area:	731.10	90.93
Background:	72.90	9.07
Composite Fit:	673.00	83.71
Residuals:	131.00	16.29

Analyzed By: Sm

Checked By: JP

T7204B AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 10:37:59 on 27-Jul-2004
File: C:\USER\ALPHA\ALPHA\T7204B.SPC
Sample: AS040720-4MB TAS040720-4

Real Time: 18000.62 s. Live Time: 18000.00 s.
Detector: #46 MCB 6 Input 6
Type: Thorium

000150

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
7/28/04 10:43:34 AM
Para0327.rpt
rev 11/13/03 KVG

Sample Name: AS040720-4LCS TAS040720-4

Analysis Type: Thorium

Detector: MCB 2 Input 2

Date/Time of Count: 7/28/04 10:14:07 AM

Sample Volume: 2.000 Total, 2.000 Aliquot.

Live Time: **210.00 Minutes**

Chem. Yield: **70.30%**

Real Time: 210.01 Minutes

Total Eff.: 21.20 %

Dead Time: 0.0 %

Tracer Amount: 9.999 DPM, With Contaminate

Acquisition: 512 Channels

Efficiency: 30.16%

Analysis: Relative Region-Of-Interest

Original: 3,024 + 9.9696 * Chn + -0.00053 * Chn **2.

Spectrum Calibration: 3,024 + 9.9534 * Chn + -0.00053 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\TR7204L.SPC**

Background File: **C:\USER\ALPHA\BKGND\B4072610.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	244.87	224	249	4.00	2.00	5.00	4.83	0.17	0.00
2	168.62	148	172	2.00	76.00	453.00	1.47	440.49	9.89
3	99.85	76	107	2.00	1.00	2.00	0.21	1.79	0.04
Tracer	184.72	173	210	6.00	40.00	446.00	0.84	445.16	10.00

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-228	5430.00	38.78	0.001	n/a	2,632.40%
2	Th-230	4687.70	19.55	2.228	n/a	9.47 %
3	Th-232	4013.00	19.70	0.009	n/a	155.21 %
Tracer	Th-229	4845.00	58.55	2.252	n/a	9.28 %

Totals

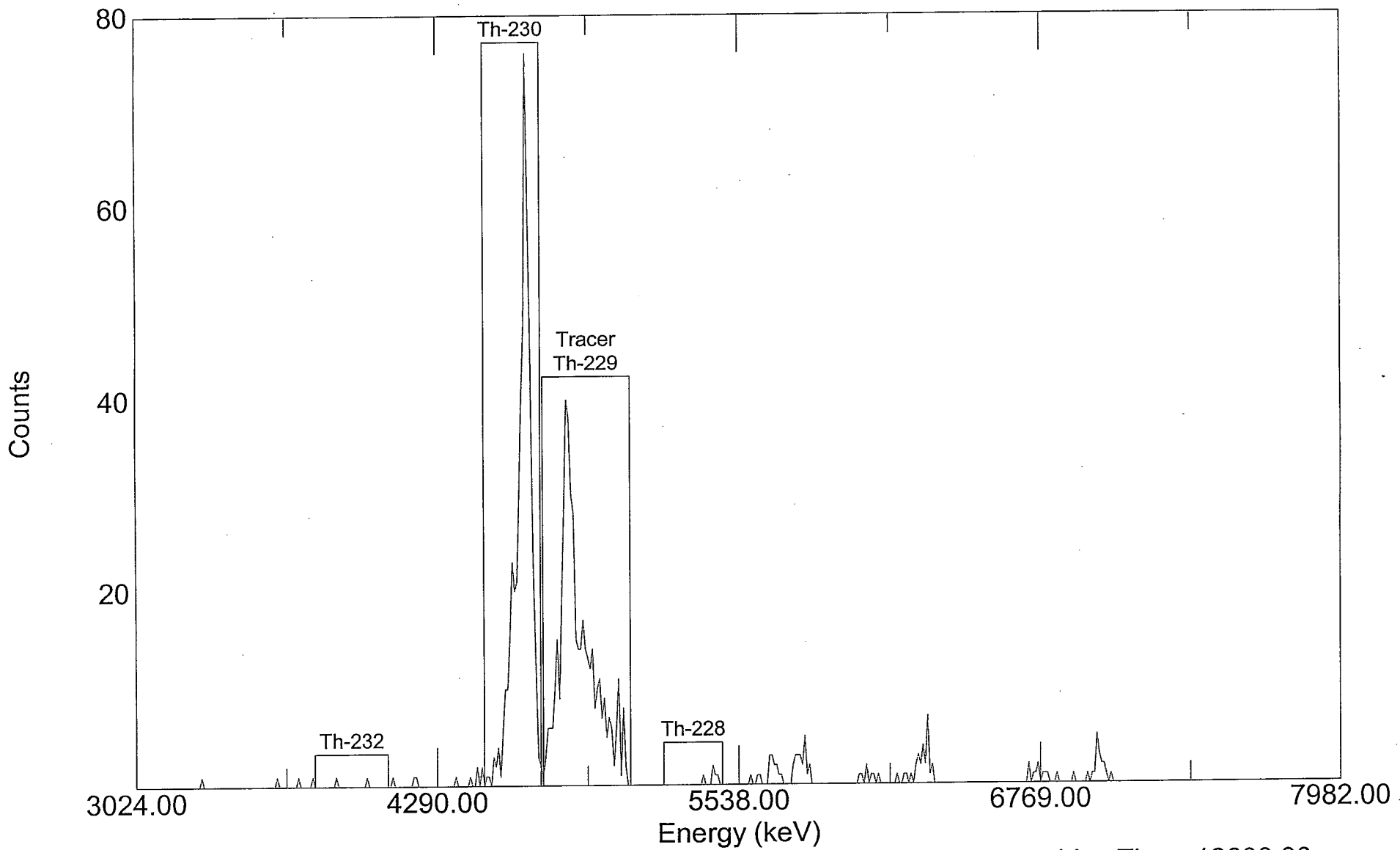
		% Total
Gross Count:	1,017.00	100.00
Net Area:	971.64	95.54
Background:	45.36	4.46
Composite Fit:	906.00	89.09
Residuals:	111.00	10.91

Analyzed By: Sm

Checked By: JP

TR7204L

AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 10:14:07 on 28-Jul-2004
File: C:\User\Alpha\ALPHA\TR7204L.SPC
Sample: AS040720-4LCS TAS040720-4

Real Time: 12600.32 s. Live Time: 12600.00 s.
Detector: #10 MCB 2 Input 2
Type: Thorium

000152

Paragon Analytics
Alpha Spectroscopy Analysis

Report Printed:
7/28/04 8:21:06 AM
Para0327.rpt
rev 11/13/03 KVG

Sample Name: AS040720-4LCSD TAS040720-4

Analysis Type: Thorium

Detector: MCB 6 Input 8

Date/Time of Count: 7/27/04 10:38:57 AM

Sample Volume: 2.000 Total, 2.000 Aliquot.

Live Time: **300.00 Minutes**

Chem. Yield: **64.27%**

Real Time: 300.01 Minutes

Total Eff.: 20.75 %

Dead Time: 0.0 %

Tracer Amount: 9.999 DPM, With Contaminate

Acquisition: 512 Channels

Efficiency: 32.28%

Analysis: Relative Region-Of-Interest

Original: 3,014 + 10.1700 * Chn + -0.00120 * Chn **2.

Spectrum Calibration: 3,014 + 10.0596 * Chn + -0.00120 * Chn **2.

Cal File:

Spectrum File: **C:\User\Alpha\ALPHA\T7204LD.SPC**

Background File: **C:\USER\ALPHA\BKGND\B4072648.SPC**

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

Peaks

Peak	Channel	Start	End	FWHM	Height	Gross Cts	Bkg Cts	Net Area	DPM
1	247.50	223	248	2.00	2.00	5.00	6.30	-1.30	-0.02
2	169.84	148	172	2.00	105.00	758.00	2.10	740.47	11.90
3	100.54	75	106	4.00	1.00	4.00	2.70	1.30	0.02
Tracer	186.17	173	212	8.00	55.00	631.00	8.70	622.30	10.00

Analysis Results

Peak	Nuclide	Energy (keV)	Width (keV)	Aliquot pCi	MDA pCi	% Error
1	Th-228	5430.00	18.93	-0.005	n/a	-355.73 %
2	Th-230	4687.70	19.30	2.680	n/a	7.29 %
3	Th-232	4013.00	39.27	0.005	n/a	310.56 %
Tracer	Th-229	4845.00	76.90	2.252	n/a	7.80 %

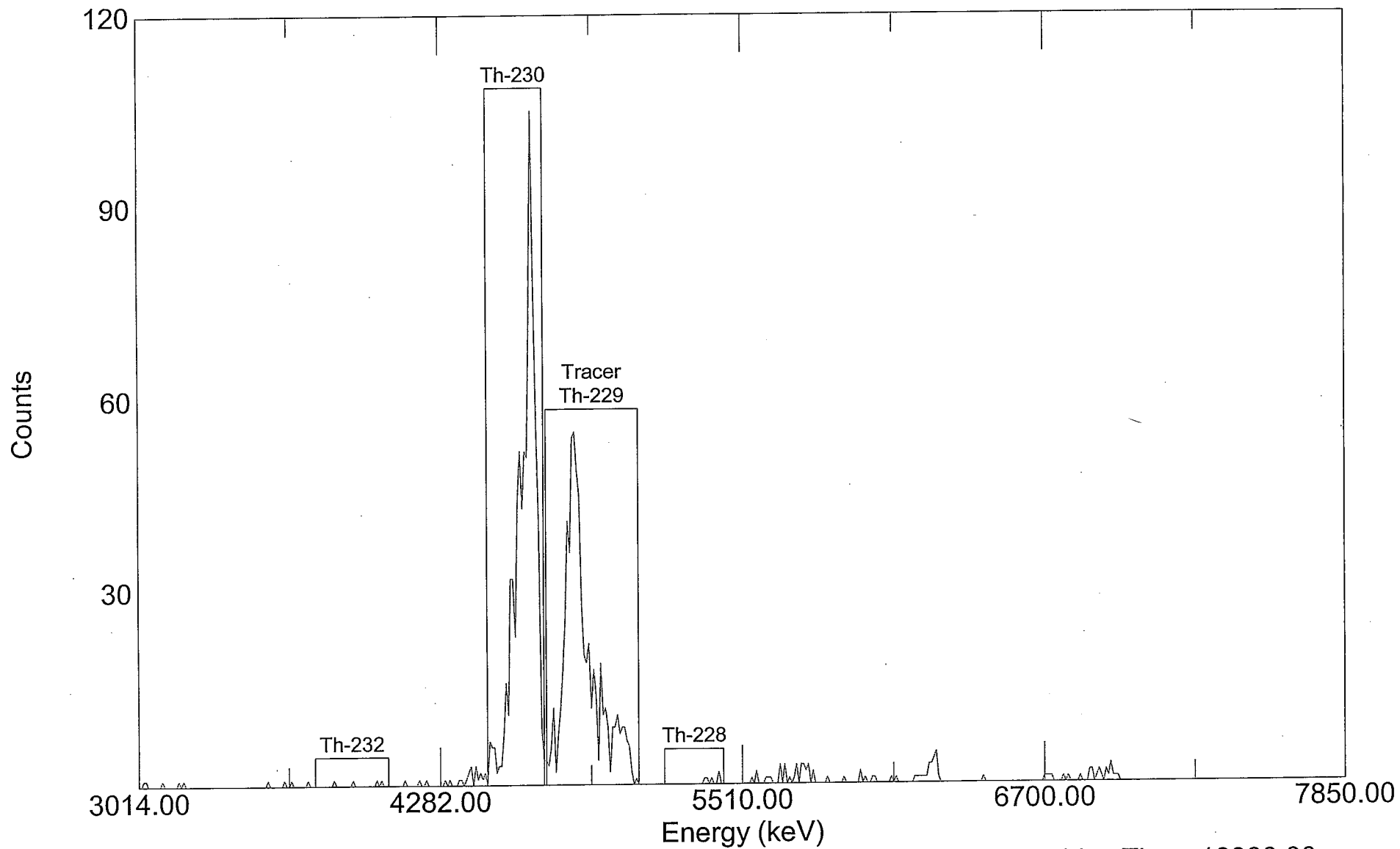
Totals

		% Total
Gross Count:	1,515.00	100.00
Net Area:	1,450.80	95.76
Background:	64.20	4.24
Composite Fit:	1,398.00	92.28
Residuals:	117.00	7.72

Analyzed By: SM

Checked By: JP

T7204LD AlphaVision Relative Region-Of-Interest (Slope Recalibration)



Acquired: 10:38:57 on 27-Jul-2004
File: C:\User\Alpha\ALPHA\T7204LD.SPC
Sample: AS040720-4LCSD TAS040720-4

Real Time: 18000.60 s. Live Time: 18000.00 s.
Detector: #48 MCB 6 Input 8
Type: Thorium

000154

Paragon Analytics

FORM 746r6.xls (11/8/2000) 277769

Alpha Spectrometer Instrument Run Log

Date: 6/10/04

Detector	Batch ID	Sample ID	Iso/Matrix	Duration	Initial	File ID/Comm.
1	AS040601-4	0404219-5	Am/S	1000	SD	AR42195
2	↓	↓ 4D	Pu/S	↓	↓	PR42194D
9	AS040604-4	0404257-4	Th/S	300		TR42574
10		5				T42575
11		6				6
12		7				7
13		8				8
15		9				9
16		10				10
17		10D				10D
18		11				11
19		12				12
21		13				13
22		AS040604-4MB				T6044B
23		↓ LCS				↓ L
24	AS040603-2	0405096-7	U/S	300		U50967
42		9				9
43		18				18
44		18D				18D
45		27				27
46		28				28
47		29				29
48		30				30
57		32				32

Detector	Batch ID	Sample ID	Iso/Matrix	Duration	Initial	File ID/Comm.
58	AS040603-2	AS040603-2MB	U/S	300	SD	U6032B
59	↓	↓ LCS	↓	↓	↓	↓ L
60	AS040603-4	0405096-7	Th/S	300		T50967
61		9				9
62		9D				Sm 6/7/04 ~~18~~ 9D
64		18		220		Sm 6/7/04 ~~18D~~ 18
9	AS040604-4	0404257-11	Th/S	300	Sm	TR42511
10	AS040603-4	0405096-27	Th/S	300	Sm	T50962 7
11		-28				28
12		-29				29
13		Sm 6/10/04 -30				30
15		~~AS~~ -32				32
16		AS040603-4MB				T6034B
17		-4LCS				L
18	AS040603-3	0405096-1	Th/S	330	Sm	T50961
19		2		300 ~~Sm~~ Sm 6/10/04		2
21		2D				2D
22		3		330		3
23		5		Sm 6/10/04 ~~X~~ 300		5
24		8				8
42		10				10
43		11				11
44		12				12
45		13				13

Notes: Cont. on page 277770 Sm 6-10-04

Reviewed by: Sm

Date: 6/10/04

000155

Paragon Analytics

FORM 746r6.xls (11/8/2000) 277770

Alpha Spectrometer Instrument Run Log

Date: 6/10/04

Detector	Batch ID	Sample ID	Iso/Matrix	Duration	Initial	File ID/Comm.
46	AS040603-3	0405096-13D	Th/S	300	Sm	T509613D
47		14				14
48		15				15
57		16				16
58		17				17
59		19				19
60		20				20
61		22				22
62		25				25
64		26				26
9	AS040603-3	0405096-8	Th/S	330	Sm	TR50968
10		-10				10
11		-31				T509631
12		AS040603-3MB				T6033B
13		-3LCS				L
15	AS040604-1	0404255-1	~~Th~~ U/S 6/10/04	300	Sm	U42551
16		-2				2
17		-3				3
19		-4				4
21		-4D				4D
23		-5				5
24		-6				6
42		-7				7
43		-8				8

Detector	Batch ID	Sample ID	Iso/Matrix	Duration	Initial	File ID/Comm.
44	AS040604-1	0404255-9	U/S	300	Sm	U42559
45		-10				10
46		-11				11
47		-12				12
48		-13				13
57		-14				14
58		-14D				14D
59		-15				15
60		-16				16
61		-17				17
62		-18				18
64		-19				19
18	AS040604-1	AS040604-1MB	U/S		Sm	U6041B
22		-1LCS				L

Sm 6/10/04

Notes: Cont. from page 277769 Sm 6/10/04

Reviewed by: Sm

Date: 6-11-04

331000

Paragon Analytics

FORM 746r6.xls (11/8/2000) 277773

Alpha Spectrometer Instrument Run Log

Date: 6/12/04

Detector	Batch ID	Sample ID	Iso/Matrix	Duration	Initial	File ID/Comm.
1	PL040609-1	0405169-2	Po210/S	300	JP	051692
2		-4				4
3		-6				6
4		-8				8
5		-8D				8D
7		-10				10
8		-12				12
49		-13				13
50		0405215-1				052151
51		-2				2
52		-3				3
53		PL040609-1MB				040601B
54		LCS				L
9	AS040609-12	0406054-5	U/S	300	JP	U60545
10		-5D				5D
11		-6				6
12		-8				8
13		AS040609-12MB				U60912B
15		LCS				L
16	AS040604-2	0404255-8	Th/S	300	JP	TR42558
17		AS040604-2LCS				T6042L
18	AS040603-4	0405096-18	Th/S	300	JP	TR509618
19	AS040606-2	0404256-1	Th/S	300	JP	T42561
21		-2				2

Detector	Batch ID	Sample ID	Iso/Matrix	Duration	Initial	File ID/Comm.
22	AS040606-2	0404256-3	Th/S	300	JP	T42563
23		-4				4
24		-5				5
42		-6				6
43		-6D				6D
44		-7				7
45		-8				8
46		-9				9
47		-10				10
48		-11				11
57		-12				12
58		-13				13
59		-14				14
60		-15				15
61		-16				16
62		-16D				16D
63		-17				17
64		-18				18
1	PL040609-1	0405169-10	Po210/S	300	JP	DR51610
2		PL040609-1LCS				OR40601L
9	AS040606-2	0404256-8	Th/S	300	JP	TR42568
10		-19				T42619
11		AS040606-2MB				T6062B
12		LCS				L

Notes: Cont. on page 277774. JP 6/12/04

Reviewed by: JP
Date: 6/13/04

000157

Paragon Analytics

FORM 746r6.xls (11/8/2000) 277785

Alpha Spectrometer Instrument Run Log

Date: 6-18-04

Detector	Batch ID	Sample ID	Iso/Matrix	Duration	Initial	File ID/Comm.
34	AS040614-1	AS040614-1LCS	Pu/S	300	sm	P61414
9	AS040610-1	0405008-5D	U/S			1150085D
11		0405169-6				UR51696
12		AS040610-1MB				UR61018
13	Prof Demo	0418010-S1	U/W			UR180101
15	AS040611-2	0404260-1	Th/S			T42601
16		-2				2
17		-3				3
18		-4				4
19		-5				5
21		-6				6
22		-6D				6D
23		-7				7
24		-8				8
42		-9				9
43		-10				10
44		-11				11
45		-12				12
46		-13				13
47		-14				14
48		-15				15
57		-16				16
58		-16D				16D
59		-17				17

Detector	Batch ID	Sample ID	Iso/Matrix	Duration	Initial	File ID/Comm.
60	AS040611-2	sm 6/18/04 ~~0404260~~ *	Th/S	300	sm	TX50968
61		0405096-10				10
62		AS040611-2MB				T6112B
63		-2LCS				L
64	Prof Demo	0418014-S2	Th/W			T180142

sm 6-19-04

Notes: * ~~Batch~~ Sample Id 0405096-8 sm 6/18/04
SD 6/22/04
Cont. from page 277784 sm 6/18/04

Reviewed by: sm
Date: 6-19-04

000158

Paragon Analytics

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

Alpha Spectrometer Instrument Run Log

Date: 6-19-04

277786

Detector	Batch ID	Sample ID.	Iso/Matrix	Duration	Initial	File ID/Comm.
2	AS040615-3	P 0405241-2 Sm 6/19/04	Pu/S	300	Sm	P52412
3		0405241-3				3
5		-4				4
7		-5				5
8		-6				6
49		-8				8
50		-9				9
51		-9D				9D
52		-10				10
53		-11				11
54		-13				13
56		-14				14
26		0405242-1				P52421
27		-1D				1D
28		-2				2
30		-3				3
31		-4				4
32		-5				5
33		-7				7
34		-8				8
37		AS040615-3MB				P6153B
38		-3LCS				L
9	AS040611-2	0404260-10	Th/S		Sm	TR426010

Sm 6/19/04

Detector	Batch ID	Sample ID	Iso/Matrix	Duration	Initial	File ID/Comm.
11	276523	0418014-S3	Th/W	300	Sm	T180143
12		-S4				4
13		-S5				5
15		-S6				6
16	AS040615-6	0404291-2	U/S			UX42912
17		-2MS				2M
18		-2MSD				2N
19		-6				6
21		-6MS				6M
22		-6MSD				6N
23		0404314-2				UX43142
24		-2MS				2M
42		-2MSD				2N
44		0405002-13				UX500213
45		-13MS				13M
46		-13MSD				13N
47		0405018-11				UX501811
48		-11MS				11M
57		-11MSD				11N
58		0405050-4				UX50504
59		-4MS				4M
60		-4MSD				4N
43		0405228-1				U52281
64		0406005-7				U60057

Notes: Cont. on page 277787 Sm 6/19/04

Reviewed by: Sm

Date: 6/19/04

000159

Paragon Analytics

FORM 746r6.xls (11/8/2000) 277792

Alpha Spectrometer Instrument Run Log

Date: 6/23/04

Detector	Batch ID	Sample ID	Iso/Matrix	Duration	Initial	File ID/Comm.
9	AS040611-2	AS040611-2MB	Th/S	600	SD	TR6112B
10	AS040603-3	0405096-1	↓	330	↓	TR50961
11	AS040614-2	0405222-1	U/W	300		U52221
12		2				2
13		11				11
SD 6/23/04 18/16		0405243-1				U52431
17		2				2
18		3				3
19		4				4
21		5				5
22		5D				5D
23		6				6
24		7				7
42		8				8
43		9				9
44		10				10
45		11				11
46		12				12
26	AS040617-2	0406025-1	Pu/W			P60251
27		2				2
28		2D				2D
29		AS040617-2MB				P6172B
30		LCS				L
4	AS040617-3	0406005-1	U/W		SD	U60051

Detector	Batch ID	Sample ID	Iso/Matrix	Duration	Initial	File ID/Comm.
47	AS040615-4	0405009-15	Th/S	300	SD	TS00915
48		16				16
57		17				17
58		17D				17D
59		18				18
60		19				19
62		20				20
63		AS040615-4MB				T6154B
64		LCS				L 2
49	276521	0418012-1	Pu/V			P180121
50		2				2
51		3				3
52		4				4
4	AS040617-4	0406005-1	Th/W		SD	T60051
10	AS040614-3	0405243-1	Th/W		SD	TR52431
11	↓	2	↓		↓	2
12	AS040614-2	0405243-2	U/W			UR52432
13	↓	3	↓		↓	3
9	AS040618-1	0405096-18	U/S	300	↓	U4509618
62	AS040617-3	0406020-1	U/W			U60201
63		039-1				0391
64		051-1				0511
4		055-1				0551
						SD 6/24/04

Notes:

cont'd on page 277793

Reviewed by: SD

Date: 6/24/04

000160

Paragon Analytics

FORM 746r6.xls (11/8/2000) 279242

Alpha Spectrometer Instrument Run Log

Date: 7/27/04

Detector	Batch ID	Sample ID	Iso/Matrix	Duration	Initial	File ID/Comm.
9	AS040720-3	0405096-6	U/S	300	TE	U50966
10		0407041-3				U70413
11		3D				3D
13		4				4
16		0407126-7				U71267
17		8				8
18		8D				8D
19		16				16
21		22				22
22		AS040720-3MB				U7203B
23		LCS				L
24		LCS-D				LD
42	AS040720-4	0405096-6	Th/S			T50966
43		0407041-3				T70413
44		3D				3D
45		4				4
46		AS040720-4MB				T7204B
47		LCS				L
48		LCS-D				LD
57	AS040719-1	0407071-1	U/W			U70711
58		2				2
59		3				3
60		4				4
61		5				5

Detector	Batch ID	Sample ID	Iso/Matrix	Duration	Initial	File ID/Comm.
62	AS040719-1	0407071-7	U/W	300	TE	U70717
63		7D				7D
64		8				8

Sm 7/27/04

Notes:

Reviewed by: SM

Date: 7/27/04

000161

Paragon Analytics

Alpha Spectrometer Instrument Run Log

Date: 7-28-04

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

279243

Detector	Batch ID	Sample ID	Iso/Matrix	Duration	Initial	File ID/Comm.
9	AS040720-3	0407126-22	U/S	300	Sm	UR 712622
10	AS040720-4	AS040720-4LCS	Th/S	210		TR 72044L
11	AS040719-1	0407071-7D	U/W	300		UR 70717D
13		-89				U70719
16		-11				111
17		-12				112
18		0407090-2				U70902
19		0407100-1				U71001
22		0407103-2				32
23		-2D				32D
24		0407112-1				U71121
42		-2				2
43		-3				3
44		0407116-2				62
45		0407125-4				U71254
46		-4D				4D
48		0407127-2				72
57		0407142-2				U71422
58		AS040719-1MB				U7191B
59		-1LCS				L
60		-1LCSD				LD
9	AS040603-1	0405096-13	U/S	120	Sm	U509613
63	AS040720-2	0407091-19	Th/F	1000		TR709119
64		AS040720-2LCSD				TR7202LD

Detector	Batch ID	Sample ID	Iso/Matrix	Duration	Initial	File ID/Comm.
61	AS040719-2	0407071-1	Th/W	300	Sm	T70711
62		-2				2
63		-3				3
64		-4				4
1	AS040721-1	0407013-1	Pu/S	300	Sm	P70131
2		-1D				1D
3		-2				2
4		AS040721-1MB				P7211B
5		-1LCS				L
13	AS040721-1	0407013-1	U/S	300	Sm	U70131
16		-1D				1D
17		-2				2
18		AS040721-1MB				U7211B
19		-1LCS				L
9	AS040611-2	0405096-8	Th/S	300	Sm	TC50968
10		AS040611-2MB				TC6112B
11		-2LCS				L
17	AS040721-1	0407013-1	U/S	300	Sm	UR70131
18		-2				2
22	AS040719-2	0407071-5	Th/W	300	Sm	T70715
23		-7				7
24		-7D				7D
10		0407142-2				T71422
11		AS040719-2MB				T7192B

Notes: Cont. on page 279244 Sm 7/28/04

Reviewed by: Sm

Date: 7/29/04

000162

PARAGON ANALYTICS
Radiochemistry Data Package

Section 5

QUALITY ASSURANCE SUMMARY REPORTS

5

NCR # 005725

CONTROLLED
NON-CONFORMANCE REPORT

Paragon Analytics

Initiated by Sm Date 6-11-04

Reason: X Non-Conformance
___ Client Inquiry
___ Other _____

Method/Procedure IsoTh

Work Orders Affected 0405096
AS040603

Clients _____

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
X 7. Other Spectral quality

Explanation: Sample 0405096-8 and ~~-10~~ Sm 6-11-04 exhibits poor spectral quality due to mass attenuation making accurate quantification difficult. Suggest re-prep at a reduced aliquot. Sample 0405096-10 has high levels of native Thorium causing tailing of Th-228 and Th-230 into the Th-229 ROI. Suggest reprep at a reduced aliquot.

Actions to Prevent Recurrence (Retrain, etc.): N/A - sample matrix characteristics

SECTION II NOTIFICATION

Client Contacted? (Y) N) Name: Sue Kent Date: 6/11/04 Time: email

SECTION III CORRECTIVE ACTIONS

X 1. Submit for Re-Prep. or Clean-up
___ 2. Re-analyze
___ 3. Resubmit Data (hc, edd, narrative)
___ 4. Document in Narrative
___ 5. Other _____

Approved by: RG DPM 6/11/04 PM

SECTION IV REQUEST FOR REWORK

Initial Batch ID: AS040603-3 Date: 6/3/04

Reworked Batch ID: AS040611-2R Sm 7/28/04 Date: 6/11/04

Outcome: Sample 0405096-8 re-extracted and re-aliquoted exhibits mass attenuation. Suggest a clean-up*. Sample 0405096-10 rexextracted and * *Please see NCR 5840.

Approved by: RG 7/29/04

Matrix Effect or Elevated / Sample Activity Suspected? (circle applicable)

SECTION V DISPOSITION **Use as is** **Repair** **Reject**

SECTION VI COMMENTS *reduced aliquoted exhibits good spectral quality and all QC parameters are met. Report sample 0405096-10 from batch AS040611-2. RG 7/29/04.

SECTION VII APPROVAL SIGNATURES

Project Manager (PM) Debbie Frio Date 6/11/04

Department Manager (DPM) Renee Williams Date 7/29/04 (Verification of Disposition)

QA Manager [signature] Date 7/29/04

SECTION VIII DISTRIBUTION DJF PM RG Dept. Manager KR Lab Director ____ Rpt.Group or ✓ Rad

DCB

FORM 313r14.doc (3/8/04)

NCR # 005840

CONTROLLED

NON-CONFORMANCE REPORT

Sm 7/28/04

Paragon Analytics

Initiated by Sm Date 7-28-04

Reason: X Non-Conformance
___ Client Inquiry
___ Other _____

Method/Procedure ~~Iso Th~~ IsoTh

Work Orders Affected 0405096-8
AS040611-2

Clients Kent + Sullivan

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
X 7. Other Spectral quality

Explanation: Sample 0405096-8 was re-prepared at a reduced aliquot due to mass attenuation in the original analysis most likely due to high levels of native thorium (NCR 5725). The re-prep'd sample still exhibits poor spectral quality due to mass attenuation. Suggest a clean-up procedure.

Actions to Prevent Recurrence (Retrain, etc.): N/A - sample matrix characteristics

SECTION II NOTIFICATION

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

SECTION III CORRECTIVE ACTIONS

X 1. Submit for Re-Prep. or Clean-up
___ 2. Re-analyze
___ 3. Resubmit Data (hc, edd, narrative)
___ 4. Document in Narrative
___ 5. Other _____

Approved by: RG DPM _____ PM
7/29/04

SECTION IV REQUEST FOR REWORK

Initial Batch ID: AS040611-2 Date: 6/11/04

Reworked Batch ID: AS040611-2 Date: 7/28/04

Outcome: The clean-up procedure improved the resolution and spectral quality is adequate for quantification. Report results.

Approved by: RG 7/29/04

Matrix Effect or Elevated / Sample Activity Suspected? (circle applicable)

SECTION V DISPOSITION **Use as is** **Repair** **Reject**

SECTION VI COMMENTS Report results for sample 0405096-8 from clean up batch AS040611-2. RG 7/29/04

SECTION VII APPROVAL SIGNATURES

Project Manager (PM) Debbie Pozzo Date 7/29/04

Department Manager (DPM) [signature] Date 7/29/04 (Verification of Disposition)

QA Manager [signature] Date 7/29/04

SECTION VIII DISTRIBUTION DJF PM RC Dept. Manager KC Lab Director ___ Rpt.Group or ✓ Rad
DCB

FORM 313r14.doc (3/8/04)

Paragon Analytics, Inc.

QUALITY ASSURANCE SUMMARY SHEET

PAI W.O. # / BATCH For all thorium batches
TEST Th-iso
METHOD 777/275
SOP/REV (PREP) Prep F
SOP/REV (ANAL)

268111

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.

AU 4/14/04

AU 4/14/04 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~~ nitrate column. AU 4/14/04

AU 4/14/04

AU 4/14/04

TECHNICIAN/ANALYST A. Lawson DATE 4/14/04

DEPARTMENT MANAGER Kim Nye DATE 4/14/04

FORM 302r5.FRM (04/30/01)

Paragon Analytics, Inc.

QUALITY ASSURANCE SUMMARY SHEET

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

268168

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.

amm 5/3/04

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

amm 5/3/04

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.

amm 5/3/04

amm 5/3/04

amm 5/3/04

TECHNICIAN/ANALYST [signature] DATE 5/3/04
DEPARTMENT MANAGER [signature] DATE 5/3/04

FORM 302r5.FRM (04/30/01)

Paragon Analytics, Inc.

QUALITY ASSURANCE SUMMARY SHEET

PAI W.O. # / BATCH 0405096
TEST U^{ISO}, Th^{ISO}
METHOD Prep
SOP/REV (PREP)
SOP/REV (ANAL)

-- 270462

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.

Reduced aliquots were taken for some samples in work order 0405096 due to elevated alpha activity seen in pre-screen data. Aliquot sizes are noted on the ~~Benchsheet~~ GC 6/8/04 Benchsheet.

6/8/04

TECHNICIAN/ANALYST Grace Campa DATE 6/8/04

DEPARTMENT MANAGER DATE 6/8/04

FORM 302r5.FRM (04/30/01)

Paragon Analytics

QUALITY ASSURANCE SUMMARY SHEET

PAI W.O. # / BATCH AS040720-3,4
TEST Uiso Thisa
METHOD Prep
SOP/REV (PREP) 778/777
SOP/REV (ANAL)

277663

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.

A reduced aliquot of approximately 1 gram (batch AS040720-4) and 0.5 grams (batch AS040720-3) was taken for sample 0405096-6 due to elevated pre-screen data.

7/26/04

TECHNICIAN/ANALYST [signature] 7/26/04 DATE 7/26/04

DEPARTMENT MANAGER [signature] DATE 7/26/04

FORM 302r6.doc (4/22/04)

PARAGON ANALYTICS
Radiochemistry Data Package

Section 6

LABORATORY BENCH SHEETS

6

Radiochemistry Instrument Worksheet

Paragon Analytics

Prep Batch: AS040603-3

Prep Procedure: ThISO

Analytical QASS NCR? Y / N 5725

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	0405096-1	SMP	2.0044	2.0044	g	T_50961	18	Sm	TR_50961 Δ	10	SD	_50961			Δ MDC not met. Sm 6/22/04
1	0405096-2	SMP	2.0033	2.0033	g	_50962	19	Sm	_50962			_50962			
1	0405096-2	DUP	2.0024	2.0024	g	_50962D	21	↓	_50962D			_50962D			
1	0405096-3	SMP	2.0167	2.0167	g	_50963	22	Sm	_50963			_50963			
1	0405096-5	SMP	2.0225	2.0225	g	_50965	23	Sm	_50965			50965			Sm 7/30/04
1	0405096-8	SMP	2.0205	2.0205	g	_50968	24	↓	TR_50968 ☆	9	Sm	_50968			☆ Peak shift Sm 6/10/04
1	0405096-10	SMP	2.0264	2.0264	g	_509610	42	↓	TR_509610 ☆	10	Sm	_509610			☆ Peak shift Sm 6/10/04
1	0405096-11	SMP	2.0201	2.0201	g	_509611	43	Sm	_509611			_509611			
1	0405096-12	SMP	2.0065	2.0065	g	_509612	44		_509612			_509612			
1	0405096-13	SMP	2.0228	2.0228	g	_509613	45		_509613			_509613			
1	0405096-13	DUP	2.0147	2.0147	g	_509613D	46		_509613D			_509613D			
1	0405096-14	SMP	2.0041	2.0041	g	_509614	47		_509614			_509614			
1	0405096-15	SMP	2.0078	2.0078	g	_509615	48		_509615			_509615			
1	0405096-16	SMP	2.0376	2.0376	g	_509616	57		_509616			_509616			
1	0405096-17	SMP	2.0168	2.0168	g	_509617	58		_509617			_509617			
1	0405096-19	SMP	2.0093	2.0093	g	_509619	59		_509619			_509619			
1	0405096-20	SMP	2.0177	2.0177	g	_509620	60		_509620			_509620			
1	0405096-22	SMP	1.0106	1.0106	g	_509622	61		_509622			_509622			
1	0405096-25	SMP	1.0023	1.0023	g	_509625	62		_509625			509625			
1	0405096-26	SMP	1.0085	1.0085	g	_509626	64	↓	_509626			_509626			
1	0405096-31	SMP	1.0067	1.0067	g	_509631	11	Sm	_509631			_509631			
1	AS040603-3	MB	2	2	g	_6033B	12		_6033B			_6033B			
1	AS040603-3	LCS	2	2	g	_6033L	13	↓	_6033L			_6033L			Sm 7/30/04

Tracer/Carrier Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
T1	TH-229	630.2613.03	19.998	DPM/ml	06/03/04	0.5	ml	AW009

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	TH-230	581.2613.24	20.381	DPM/ml	06/03/04	0.5	ml	AW009

000171

Radiochemistry Prep Worksheet

Paragon Analytics

Prep Batch: AS040603-3

Prep Procedure: ThISO

Reviewed By: cdm cdm 6/9/04 **Review Date:** 6/9/04

Non-Routine Pre-Treatment? (Y) / N **Batch:** See Comments **Re-Prep?** Y / (N) **Batch:** NA **Prep QASS / NCR?** (Y) / N 270462, 268111

Prep SOP: PAI 777 **Rev:** 7
Prep SOP: NONE
Matrix Class: solid

Prep Analyst: Carissa Moncavage
Prep Date: 6/3/04
Prep Dept: AP

Balance: 23
Balance: N/A

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	0405096-1	SMP		2.0044	2.0044	Dry Weight	cdm	6/8/04	T1	
2	1	0405096-2	SMP		2.0033	2.0033	Dry Weight			T1	
3	1	0405096-2	DUP		2.0024	2.0024	Dry Weight			T1	
4	1	0405096-3	SMP		2.0167	2.0167	Dry Weight			T1	
5	1	0405096-5	SMP		2.0225	2.0225	Dry Weight			T1	
6	1	0405096-8	SMP		2.0205	2.0205	Dry Weight			T1	
7	1	0405096-10	SMP		2.0264	2.0264	Dry Weight			T1	
8	1	0405096-11	SMP		2.0201	2.0201	Dry Weight			T1	
9	1	0405096-12	SMP		2.0065	2.0065	Dry Weight			T1	
10	1	0405096-13	SMP		2.0228	2.0228	Dry Weight			T1	
11	1	0405096-13	DUP		2.0147	2.0147	Dry Weight			T1	
12	1	0405096-14	SMP		2.0041	2.0041	Dry Weight			T1	
13	1	0405096-15	SMP		2.0078	2.0078	Dry Weight			T1	
14	1	0405096-16	SMP		2.0376	2.0376	Dry Weight			T1	
15	1	0405096-17	SMP		2.0168	2.0168	Dry Weight			T1	
16	1	0405096-19	SMP		2.0093	2.0093	Dry Weight			T1	
17	1	0405096-20	SMP		2.0177	2.0177	Dry Weight			T1	
18	1	0405096-22	SMP		1.0106	1.0106	Dry Weight			T1	
19	1	0405096-25	SMP		1.0023	1.0023	Dry Weight			T1	
20	1	0405096-26	SMP		1.0085	1.0085	Dry Weight			T1	
21	1	0405096-31	SMP		1.0067	1.0067	Dry Weight			T1	
22	1	AS040603-3	MB		2	2	Dry Weight			T1	
23	1	AS040603-3	LCS		2	2	Dry Weight			S1,T1	

cdm 6/9/04

Spiked By: Grace Campagnola **Date:** 6/3/04

Witnessed By: Carissa Moncavage **Date:** 6/3/04

Relinquished By: CM
Date: 6/9/04
Received By: [illegible]
Date: 06-09-04

Tracer/Carrier Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
T1	TH-229	630.2613.03	19.998	DPM/ml	06/03/04	0.5	ml	AW009

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	TH-230	581.2613.24	20.381	DPM/ml	06/03/04	0.5	ml	AW009

000172

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

Supersedes: 6/3/04 10:05

Radiochemistry Prep Worksheet

Paragon Analytics

Prep Batch: AS040603-3

Prep Procedure: ThISO

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 777 **Rev:** 7
Prep SOP: NONE
Matrix Class: solid

Prep Analyst: Carissa Moncavage CM
Prep Date: 6/3/04
Prep Dept: AP

Balance:
Balance:

	Samp Num	Prep Num	LabID	QC Type	Dish No.	Init Alq g	Fin Alq g	Prep Basis	Decay Date/Time	Micro Init	Micro Date	Standards	Prep Notes
21	1	1	0405096-1	SMP	1052	2.0044	2	Dry Weight				T1	
4	2	1	0405096-2	SMP	436	2.0033	2	Dry Weight				T1	
29	3	1	0405096-2	DUP	600	2.0024	2	Dry Weight				T1	
22	4	1	0405096-3	SMP	300	2.0167	2	Dry Weight				T1	
3	5	1	0405096-5	SMP	1020	2.0225	2	Dry Weight				T1	
9	6	1	0405096-8	SMP	466	2.0205	2	Dry Weight				T1	
20	7	1	0405096-10	SMP	585	2.0264	2	Dry Weight				T1	
16	8	1	0405096-11	SMP	493	2.0201	2	Dry Weight				T1	
30	9	1	0405096-12	SMP	469	2.0065	2	Dry Weight				T1	
4	10	1	0405096-13	SMP	1053	2.0228	2	Dry Weight				T1	
16	11	1	0405096-13	DUP	471	2.0147	2	Dry Weight				T1	
3	12	1	0405096-14	SMP	305	2.0041	2	Dry Weight				T1	
23	13	1	0405096-15	SMP	456	2.0078	2	Dry Weight				T1	
21	14	1	0405096-16	SMP	562	2.0376	2	Dry Weight				T1	
37	15	1	0405096-17	SMP	304	2.0168	2	Dry Weight				T1	
36	16	1	0405096-19	SMP	478	2.0093	2	Dry Weight				T1	
34	17	1	0405096-20	SMP	1145	2.0177	2	Dry Weight				T1	
39	18	1	0405096-22	SMP	319	1.0106	1	Dry Weight				T1	
35	19	1	0405096-25	SMP	597	1.0023	1	Dry Weight				T1	
40	20	1	0405096-26	SMP	563	1.0085	1	Dry Weight				T1	
38	21	1	0405096-31	SMP	595	1.0067	2	Dry Weight				T1	
41	22	1	AS040603-3	MB	1084	2	2	Dry Weight				T1	
20	23	1	AS040603-3	LCS	499	2	2	Dry Weight				S1,T1	

Spiked By: SK **Date:** 6/3/04
Witnessed By: CM **Date:** 6/3/04

Relinquished By: _____
Date: _____
Received By: _____
Date: _____

Tracer/Carrier Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
T1	TH-229	630.2613.03	19.998	DPM/ml	06/03/04	0.5	ml	AW009

exp 6/25/04

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	TH-230	581.2613.24	20.381	DPM/ml	06/03/04	0.5	ml	AW009

exp 9/26/04

Comments

Supersedes: NA

0001173

Radiochemistry Instrument Worksheet

Paragon Analytics

Prep Batch: AS040603-4

Prep Procedure: ThISO

Analytical QASS / NCR? Y / (N)

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	0405096-7	SMP	0.3007	0.3007	g	T _50967	60	Sm	_50967			_50967			
1	0405096-9	SMP	1.0068	1.0068	g	_50969	61		_50969			_50969			
1	0405096-9	DUP	1.0108	1.0108	g	_50969D	62		_50969D			_50969D			Sm 7/30/04
1	0405096-18	SMP	1.0015	1.0015	g	_509618	64		TR _509618 * 18 JP			_509618			* File overwritten Sm 6-11-04
1	0405096-27	SMP	0.1003	0.1003	g	_509627	10	Sm	_509627			509627			
1	0405096-28	SMP	0.2015	0.2015	g	_509628	11		_509628			_509628			
1	0405096-29	SMP	1.003	1.003	g	_509629	12		_509629			_509629			
1	0405096-30	SMP	0.109	0.109	g	_509630	13		_509630			_509630			
1	0405096-32	SMP	0.102	0.102	g	_509632	15		_509632			_509632			
1	AS040603-4	MB	0.3	0.3	g	_6034B	16		_6034B			_6034B			
1	AS040603-4	LCS	0.3	0.3	g	_6034L	17		_6034L			_6034L			

Sm 7/30/04

Tracer/Carrier Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
T1	TH-229	630.2613.03	19.998	DPM/ml	06/03/04	0.5	ml	AW009

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	TH-230	581.2613.24	20.381	DPM/ml	06/03/04	0.5	ml	AW009

000174

Supersedes: NA

Radiochemistry Prep Worksheet

Paragon Analytics

Prep Batch: AS040603-4

Prep Procedure: ThISO

Reviewed By: cdm cdm 6/9/04 **Review Date:** 6/9/04

Non-Routine Pre-Treatment? (Y) / N **Batch:** See Comments **Re-Prep?** Y / (N) **Batch:** NA **Prep QA$$ / NCR?** (Y) / N 270462, 268111

Prep SOP: PAI 777 **Rev:** 7
Prep SOP: NONE
Matrix Class: solid

Prep Analyst: Carissa Moncavage
Prep Date: 6/3/04
Prep Dept: AP

Balance: 23
Balance: N/A

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	0405096-7	SMP		0.3007	0.3007	Dry Weight	cdm	6/8/04	T1	
2	1	0405096-9	SMP		1.0068	1.0068	Dry Weight			T1	
3	1	0405096-9	DUP		1.0108	1.0108	Dry Weight			T1	
4	1	0405096-18	SMP		1.0015	1.0015	Dry Weight			T1	
5	1	0405096-27	SMP		0.1003	0.1003	Dry Weight			T1	
6	1	0405096-28	SMP		0.2015	0.2015	Dry Weight			T1	
7	1	0405096-29	SMP		1.003	1.003	Dry Weight			T1	
8	1	0405096-30	SMP		0.109	0.109	Dry Weight			T1	
9	1	0405096-32	SMP		0.102	0.102	Dry Weight			T1	
10	1	AS040603-4	MB		0.3	0.3	Dry Weight			T1	
11	1	AS040603-4	LCS		0.3	0.3	Dry Weight			S1,T1	

cdm 6/9/04

Spiked By: Grace Campagnola **Date:** 6/3/04
Witnessed By: Carissa Moncavage **Date:** 6/3/04

Relinquished By: CW
Date: 6/9/04
Received By: [illegible]
Date: 6-9-04

Tracer/Carrier Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
T1	TH-229	630.2613.03	19.998	DPM/ml	06/03/04	0.5	ml	AW009

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	TH-230	581.2613.24	20.381	DPM/ml	06/03/04	0.5	ml	AW009

000175

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

Radiochemistry Prep Worksheet

Paragon Analytics

Prep Batch: AS040603-4

Prep Procedure: ThISO

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 777 **Rev:** 7
Prep SOP: NONE
Matrix Class: solid

Prep Analyst: Carissa Moncavage CBM
Prep Date: 6/3/04
Prep Dept: AP

Balance:
Balance:

	Samp Num	Prep Num	LabID	QC Type	Dish No.	Init Alq g	Fin Alq g	Prep Basis	Micro Init	Micro Date	Standards	Prep Notes
H12	1	1	0405096-7	SMP	H1168	0.3007	0.3	Dry Weight			T1	
H19	2	1	0405096-9	SMP	H4163	1.00681		Dry Weight	— or H1163		T1	
H13	3	1	0405096-9	DUP	H444	1.01081		Dry Weight			T1	
H17	4	1	0405096-18	SMP	H324	1.0015	1	Dry Weight			T1	
H9	5	1	0405096-27	SMP	H455	0.1003	0.1	Dry Weight			T1	
H19	6	1	0405096-28	SMP	H326	0.2015	0.2	Dry Weight			T1	
H11	7	1	0405096-29	SMP	H905	1.0030	1	Dry Weight			T1	
H3	8	1	0405096-30	SMP	H423	0.1090	0.1	Dry Weight			T1	
H7	9	1	0405096-32	SMP	H438	0.1020	0.1	Dry Weight			T1	
H10	10	1	AS040603-4	MB	H1062	0.3	0.3	Dry Weight			T1	
H5	11	1	AS040603-4	LCS	H400	0.3	0.3	Dry Weight			S1,T1	

Spiked By: DC **Date:** 6/3/04
Witnessed By: CBM **Date:** 6/3/04

Relinquished By: _____
Date: _____
Received By: _____
Date: _____

Tracer/Carrier Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
T1	TH-229	630.2613.03	19.998	DPM/ml	06/03/04	0.5	ml	AW009

exp 6/25/04

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	TH-230	581.2613.24	20.381	DPM/ml	06/03/04	0.5	ml	AW009

exp 9/26/04

000175

Comments

Supersedes: NA

Radiochemistry Instrument Worksheet

Paragon Analytics

Prep Batch: AS040611-2

Prep Procedure: ThISO

Analytical QASS / NCR? Y / N 5840

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	0404260-1	SMP	1.0085	1.0085	g	T _42601	15	Sm	_42601			_42601			
1	0404260-2	SMP	1.0461	1.0461	g	_42602	16		_42602			_42602			
1	0404260-3	SMP	1.036	1.036	g	_42603	17		_42603			_42603			
1	0404260-4	SMP	1.0384	1.0384	g	_42604	18		_42604			_42604			
1	0404260-5	SMP	1.0171	1.0171	g	_42605	19		_42605			_42605			
1	0404260-6	SMP	1.009	1.009	g	_42606	21		_42606			_42606			
1	0404260-6	DUP	1.034	1.034	g	_42606D	22		_42606D			_42606D			
1	0404260-7	SMP	1.0067	1.0067	g	_42607	23		_42607			_42607			
1	0404260-8	SMP	1.0314	1.0314	g	_42608	24		_42608			_42608			
1	0404260-9	SMP	1.0334	1.0334	g	_42609	42		_42609			_42609			Sm 7/30/04
1	0404260-10	SMP	1.0385	1.0385	g	_426010	43		TR _426010 9 Sm			_426010			Peak Shift Sm 6-19-04
1	0404260-11	SMP	1.0174	1.0174	g	_426011	44		_426011			_426011			
1	0404260-12	SMP	1.0179	1.0179	g	_426012	45		_426012			_426012			
1	0404260-13	SMP	1.0143	1.0143	g	_426013	46		_426013			_426013			
1	0404260-14	SMP	1.0385	1.0385	g	_426014	47		_426014			_426014			
1	0404260-15	SMP	1.0226	1.0226	g	_426015	48		_426015			_426015			
1	0404260-16	SMP	1.0012	1.0012	g	_426016	57		_426016			_426016			
1	0404260-16	DUP	1.0172	1.0172	g	_426016D	58		_426016D			_426016D			
1	0404260-17	SMP	1.0015	1.0015	g	_426017	59		_426017			_426017			
1	0405096-8	SMP	0.505	0.505	g	Tx _50968	60		_50968			_50968			
1	0405096-10	SMP	0.5078	0.5078	g	Tx _509610	61		_509610			_509610			Sm 7/30/04
1	AS040611-2	MB	1	1	g	_6112B	62		TR _6112B 9 SD			_6112B			— MDC not met SD 6/22/04
1	AS040611-2	LCS	1	1	g	_6112L	63		_6112L			_6112L			

Sm 7/30/04

Tracer/Carrier Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
T1	TH-229	630.2382.62	20.506	DPM/ml	06/11/04	0.5	ml	AW004

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	TH-230	581.2613.24	20.381	DPM/ml	06/11/04	0.5	ml	AW004

000177

Radiochemistry Prep Worksheet

Prep Batch: AS040611-2

Paragon Analytics

Prep Procedure: ThISO

Reviewed By: all (All) Review Date: 6/17/04

Non-Routine Pre-Treatment? (Y) / N Batch: See comments Re-Prep? (Y) / N Batch: AS040603 / 0405096 Prep QA(SS) / NCR? (Y) N 268137

Prep SOP: PAI 777 Rev: 7 Prep Analyst: Amber Lawson (All) Balance: 23

Prep SOP: NONE Prep Date: 6/11/04 Balance:

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	0404260-1	SMP		1.0085	1.0085	Dry Weight	AC	6/16/04	T1	
2	1	0404260-2	SMP		1.0461	1.0461	Dry Weight			T1	
3	1	0404260-3	SMP		1.036	1.036	Dry Weight			T1	
4	1	0404260-4	SMP		1.0384	1.0384	Dry Weight			T1	
5	1	0404260-5	SMP		1.0171	1.0171	Dry Weight			T1	
6	1	0404260-6	SMP		1.009	1.009	Dry Weight			T1	
7	1	0404260-6	DUP		1.034	1.034	Dry Weight			T1	
8	1	0404260-7	SMP		1.0067	1.0067	Dry Weight			T1	
9	1	0404260-8	SMP		1.0314	1.0314	Dry Weight			T1	
10	1	0404260-9	SMP		1.0334	1.0334	Dry Weight			T1	
11	1	0404260-10	SMP		1.0385	1.0385	Dry Weight			T1	
12	1	0404260-11	SMP		1.0174	1.0174	Dry Weight			T1	
13	1	0404260-12	SMP		1.0179	1.0179	Dry Weight			T1	
14	1	0404260-13	SMP		1.0143	1.0143	Dry Weight			T1	
15	1	0404260-14	SMP		1.0385	1.0385	Dry Weight			T1	
16	1	0404260-15	SMP		1.0226	1.0226	Dry Weight			T1	
17	1	0404260-16	SMP		1.0012	1.0012	Dry Weight			T1	
18	1	0404260-16	DUP		1.0172	1.0172	Dry Weight			T1	
19	1	0404260-17	SMP		1.0015	1.0015	Dry Weight			T1	
20	1	0405096-8	SMP		0.505	0.505	Dry Weight			T1	
21	1	0405096-10	SMP		0.5078	0.5078	Dry Weight			T1	
22	1	AS040611-2	MB		1	1	Dry Weight			T1	
23	1	AS040611-2	LCS		1	1	Dry Weight			S1,T1	

All 6/17/04

Spiked By: Tambrae Elhart Date: 6/11/04

Witnessed By: Carissa Moncavage Date: 6/11/04

Relinquished By: [illegible] Date: 6/17/04

Received By: SRD Date: 6/17/04

Tracer/Carrier Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
T1	TH-229	630.2382.62	20.506	DPM/ml	06/11/04	0.5	ml	AW004

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	TH-230	581.2613.24	20.381	DPM/ml	06/11/04	0.5	ml	AW004

Comments

All samples were muffled. A peg treatment was performed.

000178

Supersedes: 6/11/04 10:29

Radiochemistry Prep Worksheet

Paragon Analytics

Prep Batch: AS040611-2

Prep Procedure: ThISO

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 777 **Rev:** 7
Prep SOP: NONE
Matrix Class: solid

Prep Analyst: Amber Lawson
Prep Date: 6/11/04
Prep Dept: AP

Balance: 23
Balance:

Samp Num	Prep Num	LabID	QC Type	Dish No.	Init Alq g	Fin Alq g	Prep Basis	Micro Init	Micro Date	Standards	Prep Notes Funnel #
1	1	0404260-1	SMP		1	1	Dry Weight	F17	1.0085	T1	39
2	1	0404260-2	SMP		1	1	Dry Weight	531	1.0461	T1	41
3	1	0404260-3	SMP		1	1	Dry Weight	550	1.036	T1	34
4	1	0404260-4	SMP		1	1	Dry Weight	991106	1.0384	T1	21
5	1	0404260-5	SMP		1	1	Dry Weight	991098	1.0171	T1	9
6	1	0404260-6	SMP		1	1	Dry Weight	991122	1.0090	T1	30
7	1	0404260-6	DUP		1	1	Dry Weight	1118	1.0340	T1	4
8	1	0404260-7	SMP		1	1	Dry Weight	912	1.0067	T1	24
9	1	0404260-8	SMP		1	1	Dry Weight	527	1.0314	T1	16
10	1	0404260-9	SMP		1	1	Dry Weight	1103	1.0334	T1	23
11	1	0404260-10	SMP		1	1	Dry Weight	1131	1.0385	T1	25
12	1	0404260-11	SMP		1	1	Dry Weight	532	1.0174	T1	9
13	1	0404260-12	SMP		1	1	Dry Weight	544	1.0179	T1	29
14	1	0404260-13	SMP		1	1	Dry Weight	522	1.0143	T1	3
15	1	0404260-14	SMP		1	1	Dry Weight	539	1.0385	T1	31
16	1	0404260-15	SMP		1	1	Dry Weight	536	1.0226	T1	28
17	1	0404260-16	SMP		1	1	Dry Weight	1109	1.0012	T1	22
18	1	0404260-16	DUP		1	1	Dry Weight	F4	1.0172	T1	33
19	1	0404260-17	SMP		1	1	Dry Weight	91113	1.0015	T1	40
20	1	AS040611-2	MB		1	1		1130	1.0001	T1	6
21	1	AS040611-2	LCS		1	1		542	1.0000	S1,T1	2

Spiked By: TE **Date:** 6/11/04
Witnessed By: Clm **Date:** 6/11/04

Relinquished By: _____
Date: _____
Received By: _____
Date: _____

Tracer/Carrier Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
T1	TH-229	630.2382.62	20.506	DPM/ml	06/11/04	0.5	ml	AW004

Exp 4/10/04

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	TH-230	581.2613.24	20.381	DPM/ml	06/11/04	0.5	ml	AW004

0405096-8 ~~04/04~~ 6/11/04	.5g	~~499~~ 563	.5050	Funnel # 38	9/26/04
0405096-10	.5g	499	0.5078	39	

Comments

Paragon Analytics
LIMS Version: 5.030A

Supersedes: N/A

00079

Radiochemistry Instrument Worksheet

Paragon Analytics

Prep Batch: AS040611-2

Prep Procedure: ThISO

Analytical QASS / NCR? (Y) / N ~~5840~~ No QASS or NCR Sm 7/29/04

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	0404260-1	SMP	1.0085	1.0085	g	_42601			_42601			42601			
1	0404260-2	SMP	1.0461	1.0461	g	_42602			_42602			_42602			
1	0404260-3	SMP	1.036	1.036	g	_42603			_42603			_42603			
1	0404260-4	SMP	1.0384	1.0384	g	_42604			_42604			_42604			
1	0404260-5	SMP	1.0171	1.0171	g	_42605			_42605			_42605			
1	0404260-6	SMP	1.009	1.009	g	_42606			_42606			_42606			
1	0404260-6	DUP	1.034	1.034	g	_42606D			_42606D			_42606D			
1	0404260-7	SMP	1.0067	1.0067	g	_42607			_42607			_42607			
1	0404260-8	SMP	1.0314	1.0314	g	_42608			_42608			_42608			
1	0404260-9	SMP	1.0334	1.0334	g	_42609			_42609			_42609			
1	0404260-10	SMP	1.0385	1.0385	g	_426010			_426010			_426010			
1	0404260-11	SMP	1.0174	1.0174	g	_426011			_426011			_426011			
1	0404260-12	SMP	1.0179	1.0179	g	_426012			_426012			_426012			
1	0404260-13	SMP	1.0143	1.0143	g	_426013			_426013			_426013			
1	0404260-14	SMP	1.0385	1.0385	g	_426014			_426014			_426014			
1	0404260-15	SMP	1.0226	1.0226	g	_426015			_426015			_426015			
1	0404260-16	SMP	1.0012	1.0012	g	_426016			_426016			_426016			
1	0404260-16	DUP	1.0172	1.0172	g	_426016D			_426016D			_426016D			
1	0404260-17	SMP	1.0015	1.0015	g	_426017			_426017			_426017			
1	0405096-8	SMP	0.505	0.505	g	TC _50968	9	Sm	_50968			_50968			
1	0405096-10	SMP	0.5078	0.5078	g	_509610			_509610			_509610			
1	AS040611-2	MB	1	1	g	TC _6112B	10	Sm	_6112B			_6112B			
1	AS040611-2	LCS	1	1	g	TC _6112L	11	↓	_6112L			_6112L			Sm 7/30/04

Tracer/Carrier Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
T1	TH-229	630.2382.62	20.506	DPM/ml	06/11/04	0.5	ml	AW004

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	TH-230	581.2613.24	20.381	DPM/ml	06/11/04	0.5	ml	AW004

000180

Supersedes: NA

Radiochemistry Prep Worksheet

Paragon Analytics

Prep Batch: AS040611-2

Prep Procedure: ThISO

Reviewed By: all cbm for ALL **Review Date:** 6/17/04

Non-Routine Pre-Treatment? Y / N **Batch:** _____ **Re-Prep? Y / (N)** **Batch:** clean-up **Prep (QASS) / NCR? (Y) / N** 268168

Prep SOP: PAI 777 **Rev:** 7
Prep SOP: NONE
Matrix Class: solid

Prep Analyst: Amber Lawson
Prep Date: 6/11/04
Prep Dept: AP

Balance: 23
Balance:

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	0404260-1	SMP		1.0085	1.0085	Dry Weight			T1	
2	1	0404260-2	SMP		1.0461	1.0461	Dry Weight			T1	
3	1	0404260-3	SMP		1.036	1.036	Dry Weight			T1	
4	1	0404260-4	SMP		1.0384	1.0384	Dry Weight			T1	
5	1	0404260-5	SMP		1.0171	1.0171	Dry Weight			T1	
6	1	0404260-6	SMP		1.009	1.009	Dry Weight			T1	
7	1	0404260-6	DUP		1.034	1.034	Dry Weight			T1	
8	1	0404260-7	SMP		1.0067	1.0067	Dry Weight			T1	
9	1	0404260-8	SMP		1.0314	1.0314	Dry Weight			T1	
10	1	0404260-9	SMP		1.0334	1.0334	Dry Weight			T1	
11	1	0404260-10	SMP		1.0385	1.0385	Dry Weight			T1	
12	1	0404260-11	SMP		1.0174	1.0174	Dry Weight			T1	
13	1	0404260-12	SMP		1.0179	1.0179	Dry Weight			T1	
14	1	0404260-13	SMP		1.0143	1.0143	Dry Weight			T1	
15	1	0404260-14	SMP		1.0385	1.0385	Dry Weight			T1	
16	1	0404260-15	SMP		1.0226	1.0226	Dry Weight			T1	
17	1	0404260-16	SMP		1.0012	1.0012	Dry Weight			T1	
18	1	0404260-16	DUP		1.0172	1.0172	Dry Weight			T1	
19	1	0404260-17	SMP		1.0015	1.0015	Dry Weight			T1	
20	1	0405096-8	SMP		0.505	0.505	Dry Weight	cbm	7/28/04	T1	
21	1	0405096-10	SMP		0.5078	0.5078	Dry Weight			T1 cbm 7/28/04	
22	1	AS040611-2	MB		1	1	Dry Weight	cbm	7/28/04	T1	
23	1	AS040611-2	LCS		1	1	Dry Weight	↓	↓	S1,T1	

cbm 7/28/04

cbm 7/28/04

Spiked By: Tambrae Elhart **Date:** 6/11/04

Witnessed By: Carissa Moncavage **Date:** 6/11/04

Relinquished By: cbm
Date: 7/28/04
Received By: Sm
Date: 7-28-04

Tracer/Carrier Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
T1	TH-229	630.2382.62	20.506	DPM/ml	06/11/04	0.5	ml	AW004

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	TH-230	581.2613.24	20.381	DPM/ml	06/11/04	0.5	ml	AW004

0001181

Comments
All samples were muffled. A peg treatment was performed.

Supersedes: NA

Radiochemistry Instrument Worksheet

Paragon Analytics

Prep Batch: AS040720-4

Prep Procedure: ThISO

Analytical QASS / NCR? Y / N

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	0405096-6	SMP	1.0135	1.0135	g	T _50966	42	Sm	50966			50966			
1	0407041-3	SMP	2.1067	2.1067	g	_70413	43		_70413			_70413			
1	0407041-3	DUP	2.0731	2.0731	g	_70413D	44		_70413D			_70413D			
1	0407041-4	SMP	2.161	2.161	g	_70414	45		_70414			_70414			
1	AS040720-4	MB	2	2	g	_7204B	46		_7204B			_7204B			Sm 7/30/04
1	AS040720-4	LCS	2	2	g	_7204L	47	TR	_7204L	10		_7204L			Calibration equation Sm 7/27/04
1	AS040720-4	LCSD	2	2	g	_7204LD	48		7204LD			7204LD			Sm 7/30/04

Tracer/Carrier Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
T1	TH-229	630.2613.45	19.997	DPM/ml	07/20/04	0.5	ml	AW004

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	TH-230	581.2382.60	20.003	DPM/ml	07/20/04	0.5	ml	AW004

001182

Radiochemistry Prep Worksheet

Paragon Analytics

Prep Batch: AS040720-4

Prep Procedure: ThISO

Reviewed By: JLO JLO 7/26/04 Review Date: 7/26/04

Non-Routine Pre-Treatment? (Y) N Batch: See Comments Re-Prep? Y / (N) Batch: N/A Prep QASS / NCR? (Y) / N 268111/277668

Prep SOP: PAI 777 Rev: 7
Prep SOP: NONE
Matrix Class: solid

Prep Analyst: Jimi Oldenburg
Prep Date: 7/20/04
Prep Dept: AP

Balance: 23
Balance:

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	0405096-6	SMP		1.0135	1.0135	Dry Weight	JLO	7/26/04	T1	
2	1	0407041-3	SMP		2.1067	2.1067	Dry Weight			T1	
3	1	0407041-3	DUP		2.0731	2.0731	Dry Weight			T1	
4	1	0407041-4	SMP		2.161	2.161	Dry Weight			T1	
5	1	AS040720-4	MB		2	2	Dry Weight			T1	
6	1	AS040720-4	LCS		2	2	Dry Weight			S1,T1	
7	1	AS040720-4	LCSD		2	2	Dry Weight			S1,T1	

JLO 7/26/04

Spiked By: Jimi Oldenburg Date: 7/20/04

Witnessed By: Grace Campagnola Date: 7/20/04

Relinquished By: CMM
Date: 7/26/04
Received By: TR
Date: 7/27/04

Tracer/Carrier Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
T1	TH-229	630.2613.45	19.997	DPM/ml	07/20/04	0.5	ml	AW004

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	TH-230	581.2382.60	20.003	DPM/ml	07/20/04	0.5	ml	AW004

000183

Comments
All samples were muffled at 600 C. PEG treatment was performed on all samples.

Supersedes: 7/20/04 16:05

Radiochemistry Prep Worksheet

Paragon Analytics

Prep Batch: AS040720-4

Prep Procedure: ThISO

Prep Batch Not Validated!!!

Reviewed By: **Review Date:**

Non-Routine Pre-Treatment? Y / (N) **Batch:** N/A **Re-Prep?** Y / (N) **Batch:** N/A **Prep QASS / NCR?** (Y) / N 268111

Prep SOP: PAI 777 **Rev:** 7
Prep SOP: NONE
Matrix Class: solid

Prep Analyst: Jimi Oldenburg JLO
Prep Date: 7/20/04
Prep Dept: AP

Balance: 23
Balance:

	Samp Num	Prep Num	LabID	QC Type	Dish No.	Init Alq g	Fin Alq g	Prep Basis	Micro Init	Micro Date	Standards	Prep Notes
31	1	1	0405096-6	SMP	573	1.0135	2	Dry Weight	JLO	7/26/04	T1	
21	2	1	0407041-3	SMP	467	2.1067	2	Dry Weight			T1	
6	3	1	0407041-3	DUP	458	2.0731	2	Dry Weight			T1	
25	4	1	0407041-4	SMP	1086	2.1610	2	Dry Weight			T1	
28	5	1	AS040720-4	MB	577	2	2	Dry Weight			T1	JLO 7/26/04
4	6	1	AS040720-4	LCS	300	2	2	Dry Weight			S1,T1	
3	7	1	AS040720-4	LCSD	1021	2	2	Dry Weight			S1,T1	

Spiked By: JLO **Date:** 7/20/04
Witnessed By: JC **Date:** 7/20/04

Relinquished By:
Date:
Received By:
Date:

Tracer/Carrier Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
T1	TH-229	630.2613.45	19.997	DPM/ml	07/20/04	0.5	ml	

exp 5/10/05

Spike Solution Information

Soln #	Nuclide	SolnID	Prep Conc	Units	Prep Date	Aliquot	Units	Pipet ID
S1	TH-230	581.2382.60	20.003	DPM/ml	07/20/04	0.5	ml	AW004

exp 2/10/05

0001817

Comments

Supersedes: N/A

SAMPLE CONDITION FORM (SOLIDS)

ANALYST: Cbm

ANALYSIS DATE: 6/3/04 METHOD: Prep

WORK ORDER	SAMPLE ID	SAMPLE CONDITION		
		Dry/Wet	TEXTURE	Remarks
0405096	1	dry	ground	none
	2			
	3			
	5			
	8			
	10			
	11			
	12			
	13			
	14			
	15			
	16			
	17			
	19			
	20			
	22			
	25			
	26			
	31			
				cbm 6/9/04

SAMPLE CONDITION FORM (SOLIDS)

ANALYST: CDM

ANALYSIS DATE: 6/3/04 METHOD: Prep

WORK ORDER	SAMPLE ID	SAMPLE CONDITION		
		Dry/Wet	TEXTURE	Remarks
0405096	7	dry	ground	none
	9			
	18			
	27			
	28			
	29			
	30			
	32			

CDM
6/9/04

000186

SAMPLE CONDITION FORM (SOLIDS)

ANALYST: All

ANALYSIS DATE: 6/13/04 METHOD: Prep

WORK ORDER	SAMPLE ID	SAMPLE CONDITION		
		Dry/Wet	TEXTURE	Remarks
0404260	1	dry	ground	none
	2			
	3			
	4			
	5			
	6			
	7			
	8			
	9			
	10			
	11			
	12			
	13			
	14			
	15			
	16			
	17			
0405096	8			
	10			
				AL 6/13/04

SAMPLE CONDITION FORM (SOLIDS)

ANALYST: JLO

ANALYSIS DATE: 7/20/04 METHOD: Th-iso

WORK ORDER	SAMPLE ID	SAMPLE CONDITION		
		Dry/Wet	TEXTURE	Remarks
0405096	6	Dry	ground	None
0407041	3	↓	↓	↓
↓	4	↓	↓	↓

7/20/04

JLO

PROJECT KENT & SULLIVAN

Notebook No. 2770

Continued From Page

6/2/04 W.O. # 04-05-096 / (Th^{I50}, U^{I50}, RA226(903.1))

in oven - 5/28 @ 1740
OUT oven - 6/1 @ 1430

S.O.P. - 721 - R11
balance #15, oven #1
5 balls, shake 15 min.

Sample #	Sample/can/balls (g)	can/balls (g)	ground sample (g)	TYPE sample
04-05-096 - 1	127.0	96.6	30.4	SOIL
- 2	128.1	97.4	30.7	
- 3	127.1	96.5	30.6	
- 4	127.7	97.4	30.3	
- 5	127.7	97.3	30.4	
- 7	127.5	97.0	30.5	
- 8	126.8	96.8	30.0	
- 9	127.3	97.0	30.3	
- 10	127.2	97.1	30.1	
- 11	127.6	97.3	30.3	
- 12	127.8	97.3	30.5	
- 13	127.8	97.4	30.4	
- 14	127.6	97.2	30.4	
- 15	128.0	97.8	30.2	
- 16	127.8	97.4	30.4	
- 17	127.7	97.2	30.5	

C.O. - 6/2/04

Continued on Page 51

Read and Understood By

Carson R. O'Dell 6/2/04 — Signed, Date

T. Elhart 6/2/04 — Signed, Date

6/2/04 W.O. #04-05-096 / (Th^{I-50}, U^{I-50}, $RA226(903.1)$)

in oven - 5/28 @ 1740
OUT oven - 6/1 @ 1430

S.O.P. - 721 - R11
balance #15, oven #1
5 balls, shake 15 min.

Sample #	sample/can/balls (g)	can/balls (g)	ground sample (g)	Type sample
04-05-096-18	128.3	97.4	30.9	SOIL
-19	127.4	97.3	30.1	
-20	127.7	97.4	30.3	
-21	128.1	97.4	30.7	
-22	126.9	96.4	30.5	
-23	124.3	96.9	27.4	
-24	127.5	97.0	30.5	
-25	127.8	97.7	30.1	
-26	127.5	96.9	30.6	
-27	124.8	97.4	27.4	
-28	120.9	96.8	24.1	
-29	128.0	97.3	30.7	
-30	128.4	97.3	31.1	
-31	127.4	97.3	30.1	
-32	128.4	97.5	30.9	

C.O. - 6/2/04

Continued on Page

Read and Understood By

Carson R. O'Dell 6/2/04 — Signed, Date
T Elhart 6/2/04 — Signed, Date

PARAGON ANALYTICS
Radiochemistry Data Package

Section 7

STANDARDS TRACEABILITY DOCUMENTS

7

Th-229

Prepare a working level dilution of Th-229 630.2382.28 to 20 dpm/ml by diluting with 0.5M HNO_3 Lot K2966590 183

1) Determine the density of 0.5M HNO_3

mass of 100 ml Class A volumetric flask	64.6096 g	bal 12
mass of flask and 100ml 0.5M HNO_3	165.7905 g	✓
net mass of 0.5M HNO_3	101.1809 g	

ρ = 1.0118 g/ml

2) Transfer approx 10g Th-229 (630.2382.28) into a 1L nalgene bottle

mass of 1L nalgene bottle without lid	74.9310 g	bal 12
mass of nalgene bottle + standard	85.5237 g	✓
net mass of standard transferred	10.5927 g	

3) Dilute to final volume with 0.5M HNO_3

mass of 1L nalgene bottle w/o lid from above	74.9310 g	
mass of nalgene bottle, standard, 0.5M HNO_3	957.6 g	bal 26
net mass of standard	882.67 g	

4) Final activity calculation:

$$\frac{(1{,}647.2\ \text{dpm/g})(10.5927\ \text{g})(1.0118\ \text{g/ml})}{882.67\ \text{g}} = 20.00\ \text{dpm/ml}$$

SD 6/26/03

Stnd ID: 630.2613.03

Description: Th-229
Activity: 20.00 dpm/ml
2s Uncertainty: 0.47 dpm/ml
Ref. Date: 7/17/02
Ref Time: na
Prep Date: 6/3/03 Prep by: CDM
Expiration: 6/25/04
Matrix/Comp. 0.5M HNO3
Half Life (y): 7.34E+03

SD 6/26/03

Continued on Page

Read and Understood By

Chuncavage 6/3/03 — Signed, Date

[signature] 6/26/03 — Signed, Date

Prepare a 1° dilution of Analytics 64206-307 by transferring contents of the ampule to a ~~40 ml~~ 08/15/02 VOA 250 ml Nalgene bottle & diluting to approx 150 ml w/ 0.5 N HNO_3. (Lot # K2933836 0.5 N)

1) Transfer contents of ampule to 250 ml bottle

Mass of empty Nalgene bottle (w/ lid)	23.9862 g (Bal 12)
Mass of opened ampule + 50 ml beaker	37.8941 g
Mass of empty ampule + beaker	33.1523 g
Net mass of std. transferred	4.7388 g

2) Dilute std in Nalgene bottle

Mass of empty bottle (from above)	23.9862 g
Mass of bottle + std + 0.5 N HNO_3	170.5635 g (Bal 12)
Net mass of std.	146.5773 g

3) Final Activity Calculation

$$\left(\frac{4.258 \times 10^7 \text{ dps}}{5.0424 \text{ g}}\right)\left(\frac{4.7388 \text{ g}}{146.5773 \text{ g}}\right)(60 \text{ s/m}) = 1647.2 \text{ dpm/g}$$

RG 9/16/02

Continued on Page ~~1~~

Read and Understood By

[signature]	8/15/02	[signature]	9/16/02
Signed	Date	Signed	Date

ANALYTICS

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

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

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

PAID 00630
rec'd 7-19-02

64206-307

Th-229 5 mL Liquid in Flame Sealed Vial

This standard radionuclide source was prepared gravimetrically from a calibrated master solution. The master solution was calibrated by liquid scintillation counting.

Radionuclide purity and calibration were checked by germanium gamma-ray spectrometry and liquid scintillation counting. 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:	Th-229
ACTIVITY (dps):	4.258 E3
HALF-LIFE:	7340 years
CALIBRATION DATE:	July 17, 2002 12:00 EST
TOTAL UNCERTAINTY*:	3.5%
SYSTEMATIC:	2.6%
RANDOM:	0.9%

*99% confidence level.

Impurities:	Th-228	26.9 dps
	Th-230	26.5 dps
	Th-232	1.8 dps

5.01424 grams 0.5M HNO3 solution.

P O NUMBER 001620, Item 1

SOURCE PREPARED BY: M. D. Currie
M. D. Currie, Radiochemist

Q A APPROVED: 7-18-02

U.S. DEPARTMENT OF COMMERCE
National Institute of Standards & Technology
Gaithersburg, MD 20899

Certificate of Participation

Analytics, Incorporated
Atlanta, Georgia

is a participant for the period January 1, 2002, through December 31, 2002, in a radioactivity measurements assurance program conducted by the National Institute of Standards and Technology, in cooperation with the Nuclear Energy Institute. Continued participation is evidenced by dated Reports of Traceability issued for particular radionuclides, which indicate the deviation of the participant's reported value from that measured by the National Institute of Standards and Technology. The significance of these Reports is addressed below.*

For the Director,

Bert M. Coursey

Bert M. Coursey, Acting Group Leader
Radioactivity Group
Physics Laboratory

*As guidance for the proper use of Reports of Traceability, it should be emphasized that the National Institute of Standards and Technology is concerned only with fostering good measurements capability and consistency with the national measurements system. The assurance of the proper application of that capability to the ultimate consumer products is the responsibility of each manufacturer of these products and of the Federal regulatory agencies.

A continuing traceability program in radioactivity demonstrates, to the degree established by the periodic assays of calibrated radioactivity samples, a continuing competence to maintain the methods and standards necessary for accurate measurement. Such a program cannot, however, endorse each and every measurement nor the final product, any more than a spot check can vouch for every unchecked item. Care should be taken, therefore, not to imply such endorsement. The proper use of this Report is governed by section 200.114 of Title 15 of the Code of Federal Regulations. These regulations may be met if Reports are quoted only in their entirety. Excerpts out of context may be misleading.

62
PROJECT Th-229 630.2382.62

Notebook No. 2382
Continued From Page

Th-229

Prepare a working level dilution of Th-229 (630.2382.28) to 20 dpm/ml by diluting w/ 0.5 M HNO_3 (lot # K29665901-133)

1) Determine the density of 0.5M HNO_3

mass of 100 ml empty vol. flask	68.2991 g (Bal 12)
mass of flask & 0.5M HNO_3	169.5114 g ↓
Net mass of 0.5M HNO_3	101.2123 g
	ρ = 1.012 g/ml

2) Transfer approx 11g of Th-229 (630.2382.28) into a 1L nalgene bottle (wide mouth)

mass of nalgene bottle w/o lid	74.1637 g (Bal 12)
mass of bottle & standard	85.4230 g ↓
Net mass of standard transferred	11.2593 g

3) Dilute to final volume w/ 0.5 M HNO_3

mass of widemouth w/o lid (from above)	74.1637 g (Bal 12)
mass of bottle, std & 0.5M HNO_3	989.3 g (Bal 26)
Net mass of standard	915.13 g

4) Final Activity Calc

$$\frac{(1647.2\ dpm/g)(11.2593\ g)(1.012\ g/ml)}{915.13\ g} = 20.51\ dpm/ml$$

RG 4/3/03

Stnd ID: **630.2382.62**

Description:	Th-229	
Activity:	20.51	dpm/ml
2s Uncertainty:	0.48	dpm/ml
Ref. Date:	7/17/02	
Ref Time:	na	
Prep Date:	2/3/03	Prep by: CDM
Expiration:	3/26/04	
Matrix/Comp.	0.5M HNO3	
Half Life (y):	7.34E+03	

RG 4/3/03

RG 4/3/03

Th-228,Th-230,Th-232 impurities. See Certificate
RG 4/3/03

Continued on Page

Read and Understood By

C. Moncavage — Signed — 2/3/03 Date

Renee Allen — Signed — RG 4/3/03 Date

Prepare a 1° dilution of Analytics 64206-307 by transferring contents of the ampule to a ~~40 ml~~ 0.5 8/10/02
8/10/02 VOA 250 ml Nalgene bottle & diluting to approx 150 ml w/ 0.5 N HNO_3. (Lot # K2933831 8/13 8/10/02)

1) Transfer contents of ampule to 250 ml bottle

Mass of empty Nalgene bottle (4/0 Rad)	23.9862 g	(Bal 12)
Mass of opened ampule + 50 ml beaker	37.8921 g	
Mass of empty ampule + beaker.	33.1523 g	
Net mass of std. transferred	4.7388 g	

2) Dilute std in Nalgene bottle

Mass of empty bottle (from above)	23.9862 g	
Mass of bottle + std + .5 N HNO_3	170.5635 g	(Bal 12)
Net mass of std	146.5773 g	

3) Final Activity Calculation

$$\left(\frac{4.258 \times 10^3 \text{ dps}}{5.0142 \text{ g}}\right)\left(\frac{4.7388 \text{ g}}{146.5773 \text{ g}}\right)(60 \text{ s/m}) = 1647.2 \text{ dpm/g}$$

BG 9/16/02

Continued on Page ____

Read and Understood By

Signed 8/15/02 Date

Signed 9/16/02 Date

ANALYTICS

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

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

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

PAID 00630
rec'd 7-19-02

64206-307

Th-229 5 mL Liquid in Flame Sealed Vial

This standard radionuclide source was prepared gravimetrically from a calibrated master solution. The master solution was calibrated by liquid scintillation counting.

Radionuclide purity and calibration were checked by germanium gamma-ray spectrometry and liquid scintillation counting. 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:	Th-229
ACTIVITY (dps):	4.258 E3
HALF-LIFE:	7340 years
CALIBRATION DATE:	July 17, 2002 12:00 EST
TOTAL UNCERTAINTY*:	3.5%
SYSTEMATIC:	2.6%
RANDOM:	0.9%

*99% confidence level.

Impurities:	Th-228	26.9 dps	0.63%
	Th-230	26.5 dps	0.62%
	Th-232	1.8 dps	0.04%

5.01424 grams 0.5M HNO3 solution.

P O NUMBER 001620, Item 1

SOURCE PREPARED BY: M. D. Currie
M. D. Currie, Radiochemist

Q A APPROVED: 7-18-02

PROJECT Th-229 630.2613.45

Th-229
Prepare a working level dilution of Th-229 (630.2382.28) at 20.00 dpm/mL by diluting with 0.5 M HNO_3 → Lot # 43059

1) Determine the density of 0.5 M HNO_3

Mass of empty 100 mL Class A volumetric flask	68.3266 g (bal 12)
Mass of flask + 100 mL of 0.5 M HNO_3	169.4627 g
Net mass of 0.5 M HNO_3	101.1361 g

ρ = .0114 g/mL

2) Add/transfer approx 10.0 g of Th-229 (630.2382.28) to a 1L nalgene bottle

Mass of empty nalgene bottle without lid	(bal 12) 74.1499 g
Mass of nalgene bottle + standard	84.3850 g
net mass of standard transferred	10.2351 g

3) Dilute to final volume with 1.0 M HNO_3

Mass of empty nalgene bottle w/out lid (from above)	74.1499 g
Mass of bottle, standard + 1.0 M HNO_3	926.7 g (bal 12)
Net mass of standard	852.5501 g

4) Final Activity Calculation

$$\frac{(1647.2\ dpm/g)(10.2351\ g)(.0114\ g/mL)}{852.5501\ g} = 20.00\ dpm/mL$$

SD 5/27/04

Std ID: 630.2613.45
Description: Th-229
Expiration: 5/10/2005
Activity: 20.00 dpm/mL
2s Uncertainty: 2.33 dpm/mL
Ref. Date: 7/17/2002
Ref Time: N/A
Prep Date: 5/2/2004 Prep by: CDM
Matrix/Comp. 0.5 M HNO3
Half Life (y): 7.34E+03
Th-228, Th-230, Th-232 impurities
SD 5/27/04

SD 5/27/04

SD 5/27/04

Continued on Page

Read and Understood By

Chron Cavage 5/2/04 — Signed, Date
[signature] 5/27/04 — Signed, Date

Prepare a 1° dilution of Analytics 64206-307 by transferring contents of the ampule to a ~~40 ml~~ 9/16/02 ~~VOA~~ 250 ml Nalgene bottle & diluting to approx 150 ml w/ 0.5 N HNO_3. (Lot #1 K2933 8301 8013 9/16/02)

1) Transfer contents of ampule to 250 ml bottle

Mass of empty Nalgene bottle (w/ lid)	23.9862 g	(Bal 12)
Mass of opened ampule + 50 ml beaker	37.8911 g	
Mass of empty ampule + beaker	33.1523 g	
Net mass of std. transferred	4.7388 g	

2) Dilute std in Nalgene bottle

Mass of empty bottle (from above)	23.9862 g	
Mass of bottle + std + .5 N HNO_3	170.5635 g	(Bal 12)
Net mass of std	146.5773 g	

3) Final Activity Calculation

$$\left(\frac{4.258 \times 10^3 \text{ dps}}{5.0142 \text{ g}}\right)\left(\frac{4.7388 \text{ g}}{146.5773 \text{ g}}\right)(60 \text{ s/m}) = 1647.2 \text{ dpm/g}$$

RG 9/16/02

Continued on Page ~~1~~

Read and Understood By

Signed 8/15/02 Date

Signed 9/16/02 Date

000200

ANALYTICS

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

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

CERTIFICATE OF CALIBRATION

Standard Radionuclide Source

PAID 00630
rec'd 7-19-02

64206-307

Th-229 5 mL Liquid in Flame Sealed Vial

This standard radionuclide source was prepared gravimetrically from a calibrated master solution. The master solution was calibrated by liquid scintillation counting.

Radionuclide purity and calibration were checked by germanium gamma-ray spectrometry and liquid scintillation counting. 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:	Th-229
ACTIVITY (dps):	4.258 E3
HALF-LIFE:	7340 years
CALIBRATION DATE:	July 17, 2002 12:00 EST
TOTAL UNCERTAINTY*:	3.5%
SYSTEMATIC:	2.6%
RANDOM:	0.9%

*99% confidence level.

Impurities: Th-228 26.9 dps
Th-230 26.5 dps
Th-232 1.8 dps

5.01424 grams 0.5M HNO3 solution.

P O NUMBER 001620, Item 1

SOURCE PREPARED BY: M. D. Currie
M. D. Currie, Radiochemist

Q A APPROVED: 7-18-02

OJECT Th-230 working dilution 581.2613.24

Th-230
prepare a working level dilution of 581.1808.65 to 20dpm/ml
by diluting with 0.1M HNO_3

1) Determine the density of 0.1M HNO_3 Lot # K296 65901 133
mass of 100ml Class A Volumetric flask — 67.7976 g (bal 12)
mass of flask + 100ml 0.1M HNO_3 — 167.6696 g
Net mass of 0.1M HNO_3 — 99.8720 g
ρ = 0.99872 g/ml

2) Transfer Th-230 std (581.1808.65) to a clean nalgene bottle.
Mass of nalgene bottle without lid — 74.9174 g bal 12
Mass of bottle and standard — 90.9270 g
Net mass of standard — 16.0096 g

3) Dilute to final volume with 0.1M HNO_3
Mass of nalgene bottle w/o lid from above — 74.9174 g
Mass of bottle, standard, 0.1M HNO_3 — 986.9 g bal 26
Net mass of standard — 911.9826 g

4) Final Activity Calculation

$$\frac{(1162.06\ dpm/ml)(16.0096\ g)}{911.9826\ g} = 20.40\ dpm/ml$$

SD 10/7/03

Stnd ID: 581.2613.24

Description: Th-230
Expiration: 9/26/04
Activity: 20.40 dpm/mL
2s Uncertainty: 0.44 dpm/mL
Ref. Date: 5/15/01
Ref Time: N/A
Prep Date: 9/11/03 Prep by: CDM
Matrix/Comp. 0.1 M HNO3
Half Life (y): 7.54E+04

SD 10/7/03

SD 10/7/03

SD 10/7/03

Continued on Page

Read and Understood By

Chrome Page — Signed — 9/11/03 — Date
Signed — 10/7/03 — Date

NOTEBOOK NO. _____

Continued From Page _____

JECT 581.1808.65 Th-230 Calibration Std.

10/01 Prepare a 1000 dpm/mL solution of Th-230 by diluting RSD # 581 with 0.1 M HNO_3

1) Determine density of 0.1 M HNO_3 (6.25 mL conc. HNO_3 diluted to 1L with DI H_2O)

Mass of 100 mL volumetric flask	64.6110 g (balance #12)
Mass of flask + 0.1 M HNO_3	164.5707 g
Net mass of 0.1 M HNO_3	99.9597 g

ρ = .99916 g/mL

2) Directly transfer approximately 40 mL to VOA vial
No dilution

3) Transfer remaining standard in ampule to 500 mL poly

Mass of 500 mL poly minus lid	32.5073 g (balance #12)
Mass of 500 mL poly + standard	43.0529 g
Mass of Standard	10.5456 g

4) Bring Standard to final dilution with 0.1 M HNO_3

Mass of empty bottle (from above)	32.5073 g (balance #12)
Mass of bottle + Standard + 0.1 M HNO_3	233.16 g (balance #12)
Net mass of std (diluted)	200.65 g

5) Final Activity Calculation:

$$\frac{(18,390\ Bq)(60\ dpm/Bq)(0.99916\ g/mL)(10.5456\ g)}{(49.8843\ g)(233.16\ g - 32.5073\ g)} = 1162.06\ dpm/mL$$

Stnd ID: 581.1808.65

Reverified 8/12/03
New exp date = 8/7/04.
SD 8/13/03

Description: Th-230
Activity: 1162.00 dpm/ml
Uncertainty: 37.000 dpm/ml
Ref. Date: 5/15/01
Ref Time: na
Prep Date: 5/10/01 Prep by: RLF
Expiration: 5/22/03
Matrix/Comp. 0.1 M HNO3
Half Life (y): 7.54E+04

Read on Page

Read and Understood By

R Fell — Signed — 5/10/01 Date

Signed — 5/10/01 Date

000203

Isotope Products Laboratories
An Eckert & Ziegler Company

24937 Avenue Tibbitts
Valencia, California 91355

Tel 661·309·1010
Fax 661·257·8303

PAID 00581
Rec'd 5-02-01

CERTIFICATE OF CALIBRATION
ALPHA STANDARD SOLUTION

.dionuclide:	Th-230	Customer:	PARAGON ANALYTICS, INC.
ılf-life:	(7.54 ± 0.03)E+04 years	P.O. No.:	001295
ıtalog No.:	7230	Reference Date:	15-May-01 12:00 PST
urce No.:	758-93	Contained Radioactivity: (Th-230 only)	0.4969 µCi 18.39 kBq

ıysical Description:

A. Mass of solution: 49.88438 g in 50 mL flame-sealed ampoule
B. Chemical form: $Th(NO_3)_4$ in 0.1M HNO_3
C. Carrier content: 10 µg Th/mL of solution
D. Density: 1.0016 g/mL @ 20°C.

.adioimpurities:

Am-241 = 0.110%; Ra-226 daughter = 0.400% on 15 May 01

:adionuclide Concentration: 0.009961 µCi/g, 0.3686 kBq/g

Method of Calibration:

This source was prepared from a weighed aliquot of solution whose activity in µCi/g was determined using a liquid scintillation counter.

Uncertainty of Measurement:

A. Type A (random) uncertainty: ± 1.2 %
B. Type B (systematic) uncertainty: ± 3.0 %
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 solution has a working life of 5 years.

Daniel James Van Dalsen — Quality Control
26-Apr-01 — Date Signed
IPL Ref. No.: 758-93

Th-230

Prepare a working level dilution of Th-230 (581.1808.65) to 20 dpm/ml by diluting w/ 0.1M HNO_3 (Lot #42270)

1) Determine the density of 0.1M HNO_3

mass of empty 100 ml volumetric flask	64.6140 g (Bal 12)
mass of flask + 0.1M HNO_3	164.5730 g ↓
net mass of 0.1M HNO_3	99.959 g
	ρ = 0.9996 g/ml

2) Transfer approx 17g of Th-230 (581.1808.65) to a 1L Nalgene bottle

mass of empty 1L nalgene bottle w/o lid	74.4414 g (Bal 12)
mass of bottle + std	91.5530 g ↓
net mass of std transferred	17.1116 g

3) Dilute to final volume w/ 0.1M HNO_3

mass of empty 1L nalgene bottle (from above)	74.4414 g
mass of bottle + std + 0.1M HNO_3	1068.5 g (Bal 26)
net mass of std	994.06 g

4) Final activity calc

$$\frac{(1162.00\ dpm/mL)(17.1116\ g)}{994.06\ g} = 20.00\ dpm/ml$$

RG 2/11/03

Stnd ID: 581.2382.60

Description: Th-230
Activity: 20.00 dpm/ml
2s Uncertainty: 0.427 ~~0.64~~ RG 2/11/03 dpm/ml
Ref. Date: 5/15/01
Ref Time: na
Prep Date: 2/2/03 Prep by: CDM
Expiration: 2/5/04
Matrix/Comp. 0.1M HNO3
Half Life (y): 7.54E+04

RG 2/11/03

RG 2/11/03

Reverification of std: SD 3/5/04

Stnd ID: 581.2382.60 SD 3/5/04

Description: Th-230
Expiration: 2/10/05
Activity: 20.00 dpm/mL
2s Uncertainty: 0.43 dpm/mL
Ref. Date: 5/15/01
Ref Time: N/A
Prep Date: 1/20/03 Prep by: CDM
Matrix/Comp. 0.1 M HNO3
Half Life (y): 7.54E+04

SD 3/5/04

SD 3/5/04

Continued on Page

Read and Understood By

Carissa Moncavage 1/20/03 Signed Date

Renee Gallegos 1/30/03 Signed Date

PROJECT 581.1808.65 Th-230 Calibration Std. Continued From Page

5/10/01 Prepare a 1000 dpm/mL Solution of Th-230 by diluting RSD # 581 with 0.1 M HNO_3

1) Determine density of 0.1 M HNO_3 (6.25 mL conc. HNO_3 diluted to 1L with DI H_2O)

Mass of 100 mL volumetric flask	64.6110 g (balance #12)
Mass of flask + 0.1 M HNO_3	164.5707 g
Net mass of 0.1 M HNO_3	99.9597 g

ρ = .9996 g/mL

2) Directly transfer approximately 40 mL to VOA vial – No dilution

3) Transfer remaining standard in ampoule to 500 mL poly

Mass of 500 mL poly minus lid	32.5073 g (balance #12)
Mass of 500 mL poly + standard	43.0529 g
Mass of Standard	10.5456 g

4) Bring Standard to final dilution with 0.1 M HNO_3

Mass of empty bottle (from above)	32.5073 g (balance #12)
Mass of bottle + Standard + 0.1 M HNO_3	233.16 g (balance #26)
Net mass of std (diluted)	200.65 g DCS 5/10/01

5) Final Activity Calculation:

$$\frac{(18390\ Bq)(60\ dpm/Bq)(0.9996\ g/mL)(10.5456\ g)}{(49.88438\ g)(233.16\ g - 32.5073\ g)} = \cancel{1000.03}\ dpm/mL$$

DCS 5/10/01

1162.06 dpm/mL

200.65 g DCS 5/10/01

Stnd ID: 581.1808.65

Description: Th-230
Activity: 1162.00 dpm/ml
Uncertainty: 37.000 dpm/ml
Ref. Date: 5/15/01
Ref Time: na
Prep Date: 5/10/01 Prep by: RLF
Expiration: 5/22/03
Matrix/Comp. 0.1 M HNO3
Half Life (y): 7.54E+04

DCS 5/15/01

DCS 5/15/01

Continued on Page

Read and Understood By

R Fall — Signed — 5/10/01 Date

D. [illegible] — Signed — 5/10/01 Date

Isotope Products Laboratories
An Eckert & Ziegler Company

24937 Avenue Tibbitts
Valencia, California 91355

Tel 661·309·1010
Fax 661·257·8303

PAID 00581
Recd 5-02-01

CERTIFICATE OF CALIBRATION
ALPHA STANDARD SOLUTION

Radionuclide: Th-230
Half-life: (7.54 ± 0.03)E+04 years
Catalog No.: 7230
Source No.: 758-93

Customer: PARAGON ANALYTICS, INC.
P.O. No.: 001295
Reference Date: 15-May-01 12:00 PST
Contained Radioactivity: 0.4969 µCi 18.39 kBq
(Th-230 only)

Physical Description:

A. Mass of solution: 49.88438 g in 50 mL flame-sealed ampoule
B. Chemical form: $Th(NO_3)_4$ in 0.1M HNO_3
C. Carrier content: 10 µg Th/mL of solution
D. Density: 1.0016 g/mL @ 20°C.

Radioimpurities:

Am-241 = 0.110%; Ra-226 daughter = 0.400% on 15 May 01

Radionuclide Concentration: 0.009961 µCi/g, 0.3686 kBq/g

Method of Calibration:

This source was prepared from a weighed aliquot of solution whose activity in µCi/g was determined using a liquid scintillation counter.

Uncertainty of Measurement:

A. Type A (random) uncertainty: ± 1.2 %
B. Type B (systematic) uncertainty: ± 3.0 %
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 solution has a working life of 5 years.

Daniel James Van Dalsen — Quality Control
26-Apr-01 — Date Signed
IPL Ref. No.: 758-93

PARAGON ANALYTICS
Radiochemistry Data Package

Section 8

CHAIN OF CUSTODY

8

Paragon Analytics

Sample Number(s) Cross-Reference Table

Paragon OrderNum: 0405096
Client Name: Kent & Sullivan Inc.
Client Project Name: Ross Adams
Client Project Number:
Client PO Number:

Client Sample	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
MSED-01	0405096-1		SOIL	06-May-04	13:00
MSED-02	0405096-2		SOIL	06-May-04	13:40
MSED-03	0405096-3		SOIL	06-May-04	14:00
MSED-04	0405096-4		SOIL	06-May-04	9:10
MSED-05	0405096-5		SOIL	06-May-04	9:20
MSED-06	0405096-6		SOIL	07-May-04	8:30
MSED-07	0405096-7		SOIL	07-May-04	9:00
MSED-08	0405096-8		SOIL	07-May-04	9:15
MSED-09	0405096-9		SOIL	07-May-04	9:20
MSED-10	0405096-10		SOIL	07-May-04	10:10
SSED-01	0405096-11		SOIL	05-May-04	16:15
SSED-02	0405096-12		SOIL	05-May-04	17:05
SSED-03	0405096-13		SOIL	04-May-04	18:10
SSED-04	0405096-14		SOIL	04-May-04	17:00
SSED-05	0405096-15		SOIL	04-May-04	15:59
SSED-06	0405096-16		SOIL	04-May-04	15:03
SSED-07	0405096-17		SOIL	04-May-04	14:00
SSED-08	0405096-18		SOIL	05-May-04	12:40
SSED-09	0405096-19		SOIL	05-May-04	15:20
SSED-10	0405096-20		SOIL	04-May-04	19:05
GEN-01	0405096-21		SOIL	07-May-04	12:40
GEN-02	0405096-22		SOIL	07-May-04	12:35
GEN-03	0405096-23		SOIL	07-May-04	12:50
GEN-04	0405096-24		SOIL	07-May-04	13:06
SOIL-01	0405096-25		SOIL	06-May-04	16:00
SOIL-02	0405096-26		SOIL	06-May-04	15:40
SOIL-04	0405096-27		SOIL	06-May-04	15:04
SOIL-05	0405096-28		SOIL	06-May-04	15:10
SOIL-07	0405096-29		SOIL	07-May-04	13:50
SOIL-08	0405096-30		SOIL	07-May-04	16:15
SOIL-09	0405096-31		SOIL	07-May-04	14:10
SOIL-10	0405096-32		SOIL	07-May-04	16:40

Paragon Analytics, Inc.

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

Accession Number (LAB ID) 0405096

Chain-of-Custody

Date _____ Page 2 of 9

Project Name / No.: _____ Sampler(s): _____ (circle one) Turnaround: Standard or Rush (Due _____) Dispose or Return to Client

Report To:
Phone:
Fax:
Company:
Address: See page 1

circle method or specify under comments

Sample ID	Date 2004	Time *	Lab ID	Matrix	No. of Containers	VOCs SW8260B E624 E524.2 OLMO__	BTEX (only) SW8021B	SVOCs SW8270C E625 E525 OLMO__	OC Pesticides SW8081A E608 E508 OLMO__	PCBs SW8082 E608 E508 OLMO__	OP Pesticides SW8141A E614	Herbicides SW8151A E615	TCLP Organics SW1311 8260B 8270C 8081A 8151A	TCLP Metals SW 1311 6010B 7471	Total Metals SW6010B 7470 7471 E200 ILMO__	Dissolved Metals SW6010B 7470 E200 ILMO__	Reactive CN / S SW846 Chapter 7	Hexavalent Chromium SW7196A Alkaline Digest? Y / N	Inorganic Anions ** SW9056 E300.0	pH SW9040B 9045C	Oil & Grease SW9071A E413.2	TPH GRO DRO SW8015B (both)	TOX SW9020B	Gross Alpha / Beta SW9310 E900.0	Actinides by PAI SOP (circle): Pu / U / Am / Th / Cm	Uranium by ~~[illegible]~~ Isotopic	Tritium E906.0	Total Alpha-Emitting Radium SW9315 E903.0	Radium 226 SW9315 E903.0 Radium 228 SW9320 E904.0	Strontium 89 D5811-95 Strontium 90 D5811-95	Gamma Isotopes ** E901.1	Th-isotopic	Ac 227 - Po 231 - Pb 210
(X) FR-01	5-6-04	0800		W	2										(B)									X									
(X) FR-02	↓	0810		W	2										(B)									X									
MSED-01	5-6	1300	1	SED	2										(C)											X			X			X	
MSED-02	5-6	1312	2		3										(C)											X			X			X	
MSED-03	5-6	1400	3		2/4										(C)											X			X			X	
MSED-04	5-6	0910	4		3										(C)											X			X			X	X
MSED-05	5-6	0920	5		3										(C)											X			X			X	
MSED-06	5-7	0930	6		3										(C)											X			X			X	
MSED-07	5-7	0900	7	↓	3										(C)											X			X			X	

Comments:
(B) Hold analyses pending metals analyses from samples SW-05 and SW-07.
(C) Hold analyses pending metals results from samples OSA-01, 700-01, and 900-01.
(X) on WO # 0405095 AW 5/12/04

Form 202r4.xls (1/3/01)

Relinquished By: (1)	Relinquished By: (2)
Signature Gerald Warrick	Signature
Printed Name Gerald Warrick	Printed Name
Date 5-10-04 Time 10:00	Date Time
Company Kent + Sullivan	Company

Received By: (1)	Received By: (2)
Signature Amy Wolf	Signature
Printed Name Amy Wolf	Printed Name
Date 5/11/04 Time 11:45	Date Time
Company Paragon Analytics	Company

* Time Zone (circle one): EST CST MST PST ** Indicate specific analytes under comments. Distribution: white / yellow (Paragon); pink retained by originator.

000210

Paragon Analytics, Inc.

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

Chain-of-Custody

Accession Number (LAB ID) 0405096

Date _____ Page 3 of 9

Project Name / No.: _____ Sampler(s): _____ (circle one) Turnaround: Standard or Rush (Due _____) Dispose or Return to Client

Report To:
Phone:
Fax:
Company:
Address:

See pg 1

circle method or specify under comments

Sample ID	Date 2004	Time *	Lab ID	Matrix	No. of Containers	VOCs SW8260B E624 E524.2 OLMO__	BTEX (only) SW8021B	SVOCs SW8270C E625 E525 OLMO__	OC Pesticides SW8081A E608 E508 OLMO__	PCBs SW8082 E608 E508 OLMO__	OP Pesticides SW8141A E614	Herbicides SW8151A E615	TCLP Organics SW1311 8260B 8270C 8081A 8151A	TCLP Metals SW 1311 6010B 7471	Total Metals SW6010B 7470 7471 E200 ILMO__	Dissolved Metals SW6010B 7470 E200 ILMO__	Reactive CN / S SW846 Chapter 7	Hexavalent Chromium SW7196A Alkaline Digest? Y / N	Inorganic Anions ** SW9056 E300.0	pH SW9040B 9045C	Oil & Grease SW9071A E413.2	TPH GRO DRO SW8015B (both)	TOX SW9020B	Gross Alpha / Beta SW9310 E900.0	Actinides by PAI SOP (circle): Pu / U / Am / Th / Cm	~~Total~~ Uranium ~~by KPA~~ ~~D5174-91~~	Tritium E906.0	Total Alpha-Emitting Radium SW9315 E903.0	Radium 228 SW9320 E904.0	Radium 226 SW9315 E903.0	Strontium 90 D5811-95	Strontium 89 D5811-95	Gamma Isotopes ** E901.1	Th-isotopic	
MSED-08	5-4	0915	8	SED	3										(c)											X			X				X	
MSED-09	↓	0920	9	↓	3										(c)											X			X				X	
MSED-10	↓	1010	10	↓	3										(c)											X			X				X	
SSED-01	5-5	1615	11	SED	3										(c)											X			X				X	
SSED-02	5-5	1705	12	↓	3										(c)											X			X				X	
SSED-03	5-4	1810	13	↓	3										(c)											X			X				X	
SSED-04	↓	1700	14	↓	3										(c)											X			X				X	
SSED-05	↓	1559	15	↓	3										(c)											X			X				X	
SSED-06	↓	1503	16	↓	3										(c)											X			X				X	

Comments:
(c) Hold analyses pending metal results from samples 0501-01, 0700-01, and 900-01.

Relinquished By: (1)
Signature Gerald Warrick
Printed Name Gerald Warrick
Date 5-10-04 Time 1030
Company Kent & Sullivan

Relinquished By: (2)
Signature _____
Printed Name _____
Date _____ Time _____
Company _____

Received By (1)
Signature _____
Printed Name Amy Wolf
Date 5/11/04 Time 1645
Company Paragon Analytics

Received By: (2)
Signature _____
Printed Name _____
Date _____ Time _____
Company _____

Form 202r4.xls (1/3/01)

* Time Zone (circle one): EST CST MST PST

** Indicate specific analytes under comments.

Distribution: white / yellow (Paragon); pink retained by originator.

000211

Paragon Analytics, Inc.

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

Accession Number (LAB ID) 0405096

Chain-of-Custody

Date _____ Page 4 of 9

Project Name / No.: _____ Sampler(s): _____ (circle one) Turnaround: Standard or Rush (Due _____) Dispose or Return to Client

Report To:
Phone:
Fax:
Company:
Address:

See pg 1

circle method or specify under comments

Sample ID	Date 2004	Time *	Lab ID	Matrix	No. of Containers	VOCs SW8260B E624 E524.2 OLMO__	BTEX (only) SW8021B	SVOCs SW8270C E625 E525 OLMO__	OC Pesticides SW8081A E608 E508 OLMO__	PCBs SW8082 E608 E508 OLMO__	OP Pesticides SW8141A E614	Herbicides SW8151A E615	TCLP Organics SW1311 8260B 8270C 8081A 8151A	TCLP Metals SW 1311 6010B 7471	Total Metals SW6010B 7470 7471 E200 ILMO__	Dissolved Metals SW6010B 7470 E200 ILMO__	Reactive CN / S SW846 Chapter 7	Hexavalent Chromium SW7196A Alkaline Digest? Y / N	Inorganic Anions ** SW9056 E300.0	pH SW9040B 9045C	Oil & Grease SW9071A E413.2	TPH GRO (DRO) SW8015B (both) 4 RRO	~~TOX~~ TOC ~~SW9020B~~	Gross Alpha / Beta SW9310 E900.0	Actinides by PAI SOP (circle): Pu / U / Am / Th / Cm	~~Uranium by KPA D5174M91~~ Isotopic	Tritium E906.0	Total Alpha-Emitting Radium SW9315 E903.0	Radium 228 SW9320 E904.0	Radium 226 SW9315 E903.0	Strontium 90 D5811-95	Strontium 89 D5811-95	Gamma Isotopes ** E901.1	Th - isotopic
SSED-07	5-4	1400	17	SED	3										(c)											X			X				X	
SSED-08	5-5	1240	18	↓	3										(c)											X			X				X	
SSED-09	5-5	1520	19		3										(c)											X			X				X	
SSED-10	5-4	1905	20		3										(c)											X			X				X	
GEN-01	5-7	1240	21	SOIL	2																	X	X											
GEN-02	5-7	1235	22		5										(c)							X	X			X			X				X	
GEN-03	5-7	1250	23		2																	X	X											
GEN-04	5-7	1306	24	↓	2																	X	X											

Comments:
(c) Hold analyses pending metal results from samples OSA-01, 700-01, and 900-01.

Form 202r4.xls (1/3/01)

Relinquished By: (1)	Relinquished By: (2)
Signature Gerald Warrick	Signature
Printed Name Gerald Warrick	Printed Name
Date 5-10-04 Time 10:00	Date Time
Company Gerald Warrick	Company

Received By: (1)	Received By: (2)
Signature	Signature
Printed Name Amy Walt	Printed Name
Date 5/11/04 Time 11:45	Date Time
Company Paragon Analytics	Company

* Time Zone (circle one): EST CST MST PST

** Indicate specific analytes under comments.

Distribution: white / yellow (Paragon); pink retained by originator.

Paragon Analytics, Inc.

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

Accession Number (LAB ID) 0405096

Chain-of-Custody

Date _____ Page 5 of 9

Project Name / No.: _____ Sampler(s): _____ (circle one) Turnaround: Standard or Rush (Due _____) Dispose or Return to Client

Report To:
Phone:
Fax:
Company:
Address:

See pg 1

circle method or specify under comments

Sample ID	Date 2004	Time *	Lab ID	Matrix	No. of Containers	VOCs SW8260B E624 E524.2 OLMO__	BTEX (only) SW8021B	SVOCs SW8270C E625 E525 OLMO__	OC Pesticides SW8081A E608 E508 OLMO__	PCBs SW8082 E608 E508 OLMO__	OP Pesticides SW8141A E614	Herbicides SW8151A E615	TCLP Organics SW1311 8260B 8270C 8081A 8151A	TCLP Metals SW 1311 6010B 7471	Total Metals SW6010B 7470 7471 E200 ILMO__	Dissolved Metals SW6010B 7470 E200 ILMO__	Reactive CN / S SW846 Chapter 7	Hexavalent Chromium SW7196A Alkaline Digest? Y / N	Inorganic Anions ** SW9056 E300.0	pH SW9040B 9045C	Oil & Grease SW9071A E413.2	TPH GRO DRO SW8015B (both)	TOX SW9020B	Gross Alpha / Beta SW9310 E900.0	Actinides by PAI SOP (circle): Pu / U / Am / Th / Cm	Uranium by KPA D5174-91 Isotopic	Tritium E906.0	Total Alpha-Emitting Radium SW9315 E903.0	Radium 226 SW9315 E903.0 Radium 228 SW9320 E904.0	Strontium 89 D5811-95 Strontium 90 D5811-95	Gamma Isotopes ** E901.1	Th isotopic	
SOIL-01	5-6	1600	25	SOIL	3										C											X			X			X
SOIL-02	5-6	1540	26	SOIL	3										C											X			X			X
SOIL-04	5-6	1504	27	SOIL	3										C											X			X			X
SOIL-05	5-6	1510	28	SOIL	3										C											X			X			X
SOIL-07	5-7	1350	29	SOIL	3										C											X			X			X
SOIL-08	5-7	1615	30	SOIL	3										C											X			X			X
SOIL-09	5-7	1410	31	SOIL	3										C											X			X			X
SOIL-10	5-7	1640	32	SOIL	3										C											X			X			X
(X) HR-01	5-6	1900		RK	1										C											X			X			X

Comments:
(X) on WO # 0405097
AW 5/12/04

Relinquished By: (1)
Signature Gerald Warrick
Printed Name Gerald Warrick
Date 5-10-04 Time 10:00
Company Kent + Sullivan

Relinquished By: (2)
Signature _____
Printed Name _____
Date _____ Time _____
Company _____

Received By: (1)
Signature _____
Printed Name Amy Wolf
Date 5/11/04 Time 1615
Company Paragon Analytics

Received By: (2)
Signature _____
Printed Name _____
Date _____ Time _____
Company _____

Form 202r4.xls (1/3/01)

* Time Zone (circle one): EST CST MST PST ** Indicate specific analytes under comments.

Distribution: white / yellow (Paragon); pink retained by originator.

000213

Paragon Analytics, Inc. -- Fort Collins, Colorado

CONDITION OF SAMPLE UPON RECEIPT FORM

CLIENT: Kent + Sullivan WORKORDER NO: 0405096

PROJECT MANAGER: Debbie Fazio INITIALS: DW DATE: 5/12/04

1. Does this project require any special handling in addition to standard Paragon procedures?		Yes	No
IS PRE-SCREENING REQUIRED? (radiochemistry, DOE, etc.)		Yes	No
2. Are custody seals on shipping containers intact? How many custody seals are provided? 2 each	N/A	Yes	No
3. Are the custody seals on sample containers intact?	N/A	Yes	No
4. Is there a Chain-of-Custody (COC) or other representative documents, letters, or shipping memos?		Yes	No
5. Is the COC complete? Relinquished: Yes ✓ No___ Analyses Requested: Yes ✓ No___	N/A	Yes	No
6. Is the COC in agreement with the samples received? No. of Samples: Yes ✓ No___ Sample ID's: Yes ✓ No___ Matrix: Yes ✓ No___ No. of Containers: Yes ✓ No___	N/A	Yes	No
7. Were COC (if applicable) and sample labels legible?		Yes	No
8. Were airbills present and/or removable?	N/A	Yes	No
9. Are all aqueous samples requiring chemical preservation preserved correctly (excluding volatile organics)?	N/A	Yes	No
Are all aqueous **non-preserved** samples at the correct pH?		Yes	No
10. Is there enough sample for requested analyses? If so, were samples placed in the proper containers?		Yes	No
11. Are all samples within holding times for the requested analyses?		Yes	No
12. Were all sample containers received intact? (not broken or leaking, etc.)		~~Yes~~ DW 5/12/04	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)	N/A	Yes	No
14. Were samples checked for and free from the presence of residual chlorine?	N/A	Yes	No
15. Were the sample(s) shipped on ice?	N/A	Yes	No
16. Were cooler temperatures measured at 0.1 - 6 °C ? **IR Gun Used*:** 1 2	N/A	Yes	No
17. Were all samples cooled that should have been cooled?	N/A	Yes	No

Cooler #'s	924	898	897	749	868	22	
Temperature	10°	10°	9°	15°	12°	14°	°C

Project Manager Signature / Date: Debbie Fazio 5/14/04

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 2SCIR1204

Paragon Analytics, Inc. -- Fort Collins, Colorado

CONDITION OF SAMPLE UPON RECEIPT FORM

CLIENT: Kent + Sullivan WORKORDER NO: 0405096

PROJECT MANAGER: Debbie Fazio INITIALS: AW DATE: 5/12/04

- [ ] **Custody seals** broken (on outside of shipping container or on sample containers).
- [ ] No Chain-of-Custody (**COC**) present.
- [ ] **Number of samples** on the COC do not match the number of samples received.
- [ ] Aqueous samples **not preserved correctly** (see pH discussion below).
- [ ] SVOC samples contained **residual chlorine** (list sample IDs and affected containers below).
- [x] Samples received at **inappropriate temperature.**
- [ ] **Insufficient sample** to perform requested analyses.
- [ ] Extraction or analytical **holding times** expired in transit.
- [x] **Broken/leaking bottles** and intact bottles received in same cooler (list affected sample IDs below).
- [ ] **No analyses requested.**
- [ ] **Incorrect sample type** received.
- [ ] VOAs, reactive CN/S, radon not **headspace** free (list sample IDs and affected vials below).
- [ ] **Airbills** not present and/or removable (record applicable shipper's tracking number below).
- [ ] Other (describe below).

Describe discrepancy:

- All samples received between 9° - 15° C. Refer to page 1 for cooler temperatures and refer to DOT Survey pages for cooler contents. Insufficient ice packed with samples
- Sample #17 bottle 3: Container received with a small crack in lid, no loss of sample was apparent. Lid was replaced during sample check-in.

Was the client contacted? ___ No; ✓ Yes: Name Sue Kent Date/Time 5/14/04

Was the pH of any sample adjusted by the laboratory? ___ No; ___ Yes (see Table below):

NOTE: No pH adjustments shall be made without prior consent of Project Manager. After pH adjustment, hold metals and radchem samples ≥ 16 hr before analysis.

Sample ID	*Initial pH*	*Final pH (wait 30 min)*	*Type of Reagent Used*	*Lot No. of Reagent Used*	*Initials / Date / Time*

Was the laboratory directed to proceed with the analysis of any samples yielding the presence of residual chlorine? ___ No; ___ Yes (see notes above).

Project Manager Signature / Date: 5/14/04

000215

SAMPLE LOGIN / DOT SURVEY

Client: Kent & Sullivan

Workorder No: 0405096 & 0405097

Project Manager: Debbie Fazio

Initials: AW

Date: 05/12/04

COOLER #: 924

External Micro R Meter Reading (μ R/hr): 190

Paragon Sample ID:	Client Sample ID:	Micro R Meter Reading (μ R/hr):
0405096-1-1	MSED-01	< background
0405096-1-2	MSED-01	< background
0405096-2-1	MSED-02	< background
0405096-2-2	MSED-02	< background
0405096-2-3	MSED-02	< background
0405096-3-1	MSED-03	< background
0405096-3-2	MSED-03	< background
0405096-3-3	MSED-03	< background
0405096-7-1	MSED-07	< background
0405096-7-2	MSED-07	< background
0405096-7-3	MSED-07	35
0405096-8-1	MSED-08	75
0405096-8-2	MSED-08	< background
0405096-8-3	MSED-08	30
0405096-9-1	MSED-09	< background
0405096-9-2	MSED-09	< background
0405096-9-3	MSED-09	150
0405096-10-1	MSED-10	> background
0405096-10-2	MSED-10	30
0405096-10-3	MSED-10	40
0405096-16-1	SSED-06	< background
0405096-16-2	SSED-06	< background
0405096-16-3	SSED-06	< background
0405097-2-1	MR-01	70
0405097-2-2	MR-01	60
0405097-2-3	MR-01	80
0405097-3-1	MR-02	85
0405097-3-2	MR-02	85
0405097-3-3	MR-02	85
0405097-17-1	300-01	800

If applicable, was the client contacted? **YES** / **NO** / **NA** Client Rep. Name: Sue Kent Date/Time: 5/14/04

Project Manager Signature/ Date: 5/14/04

SAMPLE LOGIN / DOT SURVEY

Client: Kent & Sullivan Workorder No: 0405096 & 0405097

Project Manager: Debbie Fazio Initials: AW Date: 05/12/04

COOLER #: 898 External Micro R Meter Reading (μ R/hr): 140

Paragon Sample ID:	Client Sample ID:	Micro R Meter Reading (μ R/hr):
0405096-4-1	MSED-04	< background
0405096-4-2	MSED-04	< background
0405096-4-3	MSED-04	< background
0405096-11-1	SSED-01	< background
0405096-11-2	SSED-01	< background
0405096-11-3	SSED-01	< background
0405096-26-1	SOIL-02	< background
0405096-26-2	SOIL-02	< background
0405096-26-3	SOIL-02	< background
0405096-27-1	SOIL-04	< background
0405096-27-2	SOIL-04	40
0405096-27-3	SOIL-04	< background
0405096-28-1	SOIL-05	30
0405096-28-2	SOIL-05	< background
0405096-28-3	SOIL-05	< background
0405097-4-1	GR-01	< background
0405097-6-1	GR-03	< background
0405097-13-1	GR-10	< background
0405097-14-1	QM-01	< background
0405097-16-1	QM-03	< background
0405097-18-1	300-02	45
0405097-19-1	700-01	1000
0405097-19-2	700-01	950
0405097-19-3	700-01	1100

If applicable, was the client contacted? **YES / NO / NA** Client Rep. Name: Sue Kent Date/Time: 5/14/04

Project Manager Signature/ Date: DJ 5/14/04

SAMPLE LOGIN / DOT SURVEY

Client: Kent & Sullivan Workorder No: 0405096 & 0405097

Project Manager: Debbie Fazio Initials: AW Date: 05/12/04

COOLER #: 897 External Micro R Meter Reading (μ R/hr): 320

Paragon Sample ID:	Client Sample ID:	Micro R Meter Reading (μ R/hr):
0405096-5-1	MSED-05	< background
0405096-5-2	MSED-05	< background
0405096-5-3	MSED-05	< background
0405096-21-1	GEN-01	28
0405096-21-2	GEN-01	28
0405096-22-1	GEN-02	30
0405096-22-2	GEN-02	29
0405096-22-3	GEN-02	< background
0405096-22-4	GEN-02	< background
0405096-22-5	GEN-02	< background
0405096-23-1	GEN-03	< background
0405096-23-2	GEN-03	< background
0405096-24-1	GEN-04	< background
0405096-24-2	GEN-04	< background
0405097-9-1	GR-06	30
0405097-11-1	GR-08	< background
0405097-15-1	QM-02	< background
0405097-20-1	700-02	250
0405097-24-1	900-02	1500
0405097-25-1	900-03	300
0405097-27-1	900-05	100

If applicable, was the client contacted? **YES / NO / NA** Client Rep. Name: Sue Kent Date/Time: 5/14/04

Project Manager Signature/ Date: 5/14/04

SAMPLE LOGIN / DOT SURVEY

Client: Kent & Sullivan Workorder No: 0405096 & 0405097

Project Manager: Debbie Fazio Initials: AW Date: 05/12/04

COOLER #: 749 External Micro R Meter Reading (μ R/hr): 300

Paragon Sample ID:	Client Sample ID:	Micro R Meter Reading (μ R/hr):
0405096-6-1	MSED-06	40
0405096-12-1	SSED-02	40
0405096-12-2	SSED-02	< background
0405096-12-3	SSED-02	< background
0405096-18-1	SSED-08	< background
0405096-18-2	SSED-08	< background
0405096-18-3	SSED-08	30
0405096-19-1	SSED-09	< background
0405096-19-2	SSED-09	< background
0405096-19-3	SSED-09	< background
0405096-25-1	SOIL-01	< background
0405096-25-2	SOIL-01	< background
0405096-25-3	SOIL-01	< background
0405097-1-1	HR-01	140
0405097-5-1	GR-02	< background
0405097-7-1	GR-04	90
0405097-28-1	OSA-01	1200
0405097-28-2	OSA-01	1100
0405097-28-3	OSA-01	1200

If applicable, was the client contacted? **YES / NO / NA** Client Rep. Name: Sue Kent Date/Time: 5/14/04

Project Manager Signature/ Date: 5/14/04

SAMPLE LOGIN / DOT SURVEY

Client: Kent & Sullivan Workorder No: 0405096 & 0405097

Project Manager: Debbie Fazio Initials: AW Date: 05/12/04

COOLER #: 868 External Micro R Meter Reading (μ R/hr): 320

Paragon Sample ID:	Client Sample ID:	Micro R Meter Reading (μ R/hr):
0405096-13-1	SSED-03	< background
0405096-13-2	SSED-03	< background
0405096-13-3	SSED-03	< background
0405096-14-1	SSED-04	< background
0405096-14-2	SSED-04	< background
0405096-14-3	SSED-04	< background
0405096-15-1	SSED-05	< background
0405096-15-2	SSED-05	< background
0405096-15-3	SSED-05	< background
0405096-17-1	SSED-07	< background
0405096-17-2	SSED-07	< background
0405096-17-3	SSED-07	< background
0405096-20-1	SSED-10	< background
0405096-20-2	SSED-10	< background
0405096-20-3	SSED-10	< background
0405097-8-1	GR-05	< background
0405097-10-1	GR-07	< background
0405097-12-1	GR-09	< background
0405097-21-1	700-03	800
0405097-21-2	700-03	950
0405097-21-3	700-03	850
0405097-26-1	900-04	95
0405097-29-1	OSA-02	180
0405097-29-2	OSA-02	150
0405097-29-3	OSA-02	160
0405097-30-1	OSA-03	200
0405097-30-2	OSA-03	250
0405097-30-3	OSA-03	150

If applicable, was the client contacted? **YES / NO / NA** Client Rep. Name: Sue Kent Date/Time: 5/14/04

Project Manager Signature/ Date: 5/14/04

SAMPLE LOGIN / DOT SURVEY

Client: Kent & Sullivan Workorder No: 0405096 & 0405097

Project Manager: Debbie Fazio Initials: AW Date: 05/12/04

COOLER #: 22 External Micro R Meter Reading (μ R/hr): 260

Paragon Sample ID:	Client Sample ID:	Micro R Meter Reading (μ R/hr):
0405096-29-1	SOIL-07	< background
0405096-29-2	SOIL-07	< background
0405096-29-3	SOIL-07	< background
0405096-30-1	SOIL-08	45
0405096-30-2	SOIL-08	40
0405096-30-3	SOIL-08	40
0405096-31-1	SOIL-09	< background
0405096-31-2	SOIL-09	< background
0405096-31-3	SOIL-09	< background
0405096-32-1	SOIL-10	55
0405096-32-2	SOIL-10	50
0405096-32-3	SOIL-10	65
0405097-22-1	700-04	450
0405097-23-1	900-01	110
0405097-23-2	900-01	110
0405097-23-3	900-01	140

If applicable, was the client contacted? **YES / NO / NA** Client Rep. Name: Sue Kent Date/Time: 5/14/04

Project Manager Signature/ Date: 5/14/04

0405096
0405097

AirCargo
Alaska Airlines
1-800-2ALASKA

Airbill Number: 027 KTN 5436-6152 Box No. 0001
Destination: DEN
Pieces: 17 | Total Weight: 865 | Date: 10-MAY-04
14 RAIDOACTIVE COOLERS COOL
3 MT COOLERS
190
#924
2 seals
10°C
ARTIC 0-0410-3-1635

AirCargo
Alaska Airlines
1-800-2ALASKA

10°C

Airbill Number: 027 KTN 5436-6152 Box No. 0015
Destination: DEN
Pieces: 17 | Total Weight: 865 | Date: 10-MAY-04
14 RAIDOACTIVE COOLERS COOL
3 MT COOLERS
140
#898
2 Seals
ARTIC 0-0410-3-1635

AirCargo
Alaska Airlines
1-800-2ALASKA

Airbill Number: 027 KTN 5436-6152 Box No. 0011
Destination: DEN
Pieces: 17 | Total Weight: 865 | Date: 10-MAY-04
14 RAIDOACTIVE COOLERS COOL
3 MT COOLERS
320
9°C
#897
2 seals
ARTIC 0-0410-3-1635

AirCargo
Alaska Airlines
1-800-2ALASKA

Airbill Number: 027 KTN 5436-6152 Box No. 0002
Destination: DEN
Pieces: 17 | Total Weight: 865 | Date: 10-MAY-04
14 RAIDOACTIVE COOLERS COOL
3 MT COOLERS
300
15°C
#899
2 seals
ARTIC 0-0410-3-1635

0405096
0405097

Air Cargo
Alaska Airlines
1-800-2ALASKA

Airbill Number
027 KTN 5436-6152 Box No. 0006

Destination
DEN

Pieces	Total Weight	Date
17	865	10-MAY-04

14 RAIDOACTIVE COOLERS COOL
3 MT COOLERS

320

12.0

2 seals

ARTIC 0-0410-3-1635

Air Cargo
Alaska Airlines
1-800-2ALASKA

Airbill Number
027 KTN 5436-6152 Box No. 0010

Destination
DEN

Pieces	Total Weight	Date
17	865	10-MAY-04

14 RAIDOACTIVE COOLERS COOL
3 MT COOLERS

260

14.0

2 seals

ARTIC 0-0410-3-1635

0405096
0405097

AirCargo
Alaska Airlines
1-800-2ALASKA

Airbill Number: 027 KTN 5436-6152 Box No. 0001

Destination: DEN

Pieces	Total Weight	Date
17	865	10-MAY-04

14 RAIDOACTIVE COOLERS COOL
3 MT COOLERS

190

#924

2 seals

10°C

ARTIC 0-0410-3-1635

AirCargo
Alaska Airlines
1-800-2ALASKA

10°C

Airbill Number: 027 KTN 5436-6152 Box No. 0015

Destination: DEN

Pieces	Total Weight	Date
17	865	10-MAY-04

14 RAIDOACTIVE COOLERS COOL
3 MT COOLERS

140

#898

2 Seals

ARTIC 0-0410-3-1635

AirCargo
Alaska Airlines
1-800-2ALASKA

Airbill Number: 027 KTN 5436-6152 Box No. 0011

Destination: DEN

Pieces	Total Weight	Date
17	865	10-MAY-04

14 RAIDOACTIVE COOLERS COOL
3 MT COOLERS

320

9°C

#897

2 seals

ARTIC 0-0410-3-1635

AirCargo
Alaska Airlines
1-800-2ALASKA

Airbill Number: 027 KTN 5436-6152 Box No. 0002

Destination: DEN

Pieces	Total Weight	Date
17	865	10-MAY-04

14 RAIDOACTIVE COOLERS COOL
3 MT COOLERS

300

15°C

2 seals

ARTIC 0-0410-3-1635

0405096
0405097

Air Cargo
Alaska Airlines
1-800-2ALASKA

Airbill Number
027 KTN 5436-6152
Box No. 0006
Destination
DEN

Pieces	Total Weight	Date
17	865	10-MAY-04

14 RAIDOACTIVE COOLERS COOL
3 MT COOLERS
320
12°
2 seals
#908

ARTIC 0-0410-3-1635

Air Cargo
Alaska Airlines
1-800-2ALASKA

Airbill Number
027 KTN 5436-6152
Box No. 0010
Destination
DEN

Pieces	Total Weight	Date
17	865	10-MAY-04

14 RAIDOACTIVE COOLERS COOL
3 MT COOLERS
260
14°
2 seals
#22

ARTIC 0-0410-3-1635

PARAGON ANALYTICS
Radiochemistry Data Package

Section 9

ADDITIONAL SUPPORTING DOCUMENTATION

9

Th-229 contribution to Th-230 Region-Of-Interest

Expires 3/31/05

The "Tracer Amount" field on theThorium raw data printouts show the activity amount, and the words "With Contamination". This is not actual contamination; it is the contribution of Th-229 counts to the Th-230 ROI. Using method blank data acquired from other Thorium analyses, a calculated percentage contribution of Th-229 counts to the Th-230 ROI was established to be 2.48%, shown below. During Thorium analyses, 2.48% of the counts in the Th-229 ROI are subtracted from the Th-230 net counts and become Th-230 background counts. Therefore, on the raw data printouts, the sum of the calibrated background counts and the Th-230 net counts does not equal the Th-230 Gross Counts. Correctly calculating the Th-230 gross counts requires the sum of the calibrated Th-230 background counts, the net Th-230 counts, and the 2.48% of the Th-229 counts. Furthermore, the Th-230 total background counts used in calculations can be found on the raw data summary. Th-230 total background counts are equal to the sum of the calibrated background counts and the 2.48% of the Th-229 counts.

Sample ID		Th-230 Counts	Th-229 Counts	% Ratio
AS031203-4MB		11.400	439.400	2.59%
AS031210-4MB		32.440	1232.440	2.63%
AS031216-MMB		47.000	951.000	4.94%
AS031216-4PMB		30.000	865.000	3.47%
AS031218-2MB		19.800	537.900	3.68%
AS031218-3MMB		18.000	847.000	2.13%
AS031218-3PMB		8.000	778.000	1.03%
AS031221-2MB		14.800	574.800	2.57%
AS031222-1MB		31.000	992.800	3.12%
AS0312230-3MB		32.000	1949.000	1.64%
AS031229-2MB		34.000	1511.000	2.25%
AS040108-1MB		13.000	667.000	1.95%
AS040110-2MB		9.920	620.560	1.60%
AS040110-3MB		22.280	686.960	3.24%
AS040114-4MB		18.000	1023.000	1.76%
AS040207-2MB		17.000	906.000	1.88%
AS040111-3MB		29.000	795.020	3.65%
AS040110-3MB		17.380	964.140	1.80%
AS040325-2MB		14.740	717.960	2.05%
AS040319-3MB		18.200	943.600	1.93%
AS040319-1MB		20.320	682.220	2.98%
AS040311-3MB		27.470	972.390	2.82%
AS040312-2MB		7.400	554.400	1.33%
AS040305-3MB		23.000	707.000	3.25%
AS040302-2MB		28.580	730.220	3.91%
AS040217-2MB		12.640	806.640	1.57%
AS040210-2MB		17.400	1229.800	1.41%
AS040207-2MB		11.000	673.520	1.63%
AS040203-2MB		16.700	566.100	2.95%
			AVERAGE=	2.48%

Th-229 contribution factor updated in alphavis.alb by: JP

Date: 3/31/04

AlphaVision >> File >> Edit Nuclide Library... >> C:\User\Alpha\alphavis.alb
r:\forms\thcont.xls

Alpha Spectroscopy

Quality Control Data

Weekly Background, Energy, and Efficiency Calibrations

Calibration Data Summary

Laboratory Name: Paragon Analytics
PAI Work Order: 0405096

Prep SOP: PAI 777
Analytical SOP: PAI 714

Reported on: Thursday, July 29, 2004
10:40:30 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
0405096-1	SMP	AS040603-3	ThISO	10	C4062210	6/22/2004	29.16	Pass	28.38	28.88	30.86	31.36
TR50961		AS040603-3a			B4062210	6/23/2004	0.2260	Pass	0.0000	0.0500	0.4000	0.5000
6/23/2004					C4062210	6/22/2004	5548.1	Pass	5497.3	5507.3	5587.3	5597.3
0405096-2	SMP	AS040603-3	ThISO	19	C4060819	6/8/2004	28.96	Pass	27.15	27.64	29.44	30.01
T50962		AS040603-3a			B4060819	6/9/2004	0.2340	Pass	0.0000	0.0500	0.4000	0.5000
6/10/2004					C4060819	6/8/2004	5551.9	Pass	5492.2	5502.2	5582.2	5592.2
0405096-2	DUP	AS040603-3	ThISO	21	C4060821	6/8/2004	29.86	Pass	27.83	28.32	30.17	30.75
T50962D		AS040603-3a			B4060821	6/9/2004	0.3204	Pass	0.0000	0.0500	0.4000	0.5000
6/10/2004					C4060821	6/8/2004	5559.2	Pass	5491.1	5501.1	5581.1	5591.1
0405096-3	SMP	AS040603-3	ThISO	22	C4060822	6/8/2004	28.41	Pass	27.18	27.67	29.47	30.04
T50963		AS040603-3a			B4060822	6/9/2004	0.2029	Pass	0.0000	0.0500	0.4000	0.5000
6/10/2004					C4060822	6/8/2004	5552.4	Pass	5503.6	5513.6	5593.6	5603.6
0405096-5	SMP	AS040603-3	ThISO	23	C4060823	6/8/2004	28.77	Pass	27.21	27.72	29.53	30.10
T50965		AS040603-3a			B4060823	6/9/2004	0.2320	Pass	0.0000	0.0500	0.4000	0.5000
6/10/2004					C4060823	6/8/2004	5536.6	Pass	5490.3	5500.3	5580.3	5590.3
0405096-6	SMP	AS040720-4	ThISO	42	C4072642	7/27/2004	31.55	Pass	29.74	30.28	32.25	32.88
T50966		AS040720-4A			B4072642	7/27/2004	0.2140	Pass	0.0000	0.0500	0.4000	0.5000
7/27/2004					C4072642	7/27/2004	5537.6	Pass	5494.2	5504.2	5584.2	5594.2
0405096-7	SMP	AS040603-4	ThISO	60	C4060860	6/8/2004	24.87	Warning	24.46	24.90	26.60	27.04
T50967		AS040603-4A			B4060860	6/9/2004	0.1893	Pass	0.0000	0.0500	0.4000	0.5000
6/10/2004					C4060860	6/8/2004	5535.0	Pass	5489.5	5499.5	5579.5	5589.5
0405096-8	SMP	AS040611-2	ThISO	9	C4072609	7/26/2004	29.22	Pass	28.42	28.93	30.91	31.42
TC50968		AS040611-2D			B4072609	7/27/2004	0.2740	Pass	0.0000	0.0500	0.4000	0.5000
7/28/2004					C4072609	7/26/2004	5540.1	Pass	5477.6	5487.6	5567.6	5577.6
0405096-9	SMP	AS040603-4	ThISO	61	C4060861	6/8/2004	31.05	Pass	29.44	29.97	31.92	32.54
T50969		AS040603-4A			B4060861	6/9/2004	0.3961	Pass	0.0000	0.0500	0.4000	0.5000
6/10/2004					C4060861	6/8/2004	5557.3	Pass	5529.6	5535.6	5559.6	5565.6

Data Package ID: *th0405096-1*

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.

000229

Calibration Data Summary

Laboratory Name: Paragon Analytics
PAI Work Order: 0405096

Prep SOP: PAI 777
Analytical SOP: PAI 714

Reported on: Thursday, July 29, 2004
3:44:34 PM

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
0405096-9	DUP	AS040603-4	ThISO	62	C4060862	6/8/2004	30.58	Pass	28.57	29.08	31.06	31.57
T50969D		AS040603-4A			B4060862	6/9/2004	0.2379	Pass	0.0000	0.0500	0.4000	0.5000
6/10/2004					C4060862	6/8/2004	5544.8	Pass	5493.0	5503.0	5583.0	5593.0
0405096-10	SMP	AS040611-2	ThISO	61	C4061561	6/16/2004	31.63	Pass	29.44	29.97	31.92	32.54
TX509610		AS040611-2D			B4061661	6/17/2004	0.3620	Pass	0.0000	0.0500	0.4000	0.5000
6/18/2004					C4061561	6/16/2004	5559.1	Pass	5529.6	5535.6	5559.6	5565.6
0405096-11	SMP	AS040603-3	ThISO	43	C4060843	6/8/2004	32.16	Pass	29.78	30.29	32.20	32.80
T509611		AS040603-3a			B4060843	6/9/2004	0.2757	Pass	0.0000	0.0500	0.4000	0.5000
6/10/2004					C4060843	6/8/2004	5555.1	Pass	5476.5	5486.5	5566.5	5576.5
0405096-12	SMP	AS040603-3	ThISO	44	C4060844	6/8/2004	32.03	Warning	29.31	29.84	31.78	32.40
T509612		AS040603-3a			B4060844	6/9/2004	0.4563	Warning	0.0000	0.0500	0.4000	0.5000
6/10/2004					C4060844	6/8/2004	5549.3	Pass	5508.2	5518.2	5598.2	5608.2
0405096-13	SMP	AS040603-3	ThISO	45	C4060845	6/8/2004	32.74	Pass	31.07	31.62	33.68	34.34
T509613		AS040603-3a			B4060845	6/9/2004	0.3680	Pass	0.0000	0.0500	0.4000	0.5000
6/10/2004					C4060845	6/8/2004	5559.1	Pass	5497.4	5507.4	5587.4	5597.4
0405096-13	DUP	AS040603-3	ThISO	46	C4060846	6/8/2004	31.78	Pass	29.86	30.39	32.47	33.00
T509613D		AS040603-3a			B4060846	6/9/2004	0.1447	Pass	0.0000	0.0500	0.4000	0.5000
6/10/2004					C4060846	6/8/2004	5537.4	Pass	5485.1	5495.1	5575.1	5585.1
0405096-14	SMP	AS040603-3	ThISO	47	C4060847	6/8/2004	30.51	Pass	29.92	30.45	32.53	33.06
T509614		AS040603-3a			B4060847	6/9/2004	0.2786	Pass	0.0000	0.0500	0.4000	0.5000
6/10/2004					C4060847	6/8/2004	5556.5	Pass	5513.5	5523.5	5603.5	5613.3
0405096-15	SMP	AS040603-3	ThISO	48	C4060848	6/8/2004	31.86	Pass	30.08	30.62	32.70	33.24
T509615		AS040603-3a			B4060848	6/9/2004	0.2272	Pass	0.0000	0.0500	0.4000	0.5000
6/10/2004					C4060848	6/8/2004	5549.7	Pass	5480.8	5490.8	5570.8	5580.8
0405096-16	SMP	AS040603-3	ThISO	57	C4060857	6/8/2004	28.95	Warning	26.69	27.16	28.93	29.49
T509616		AS040603-3a			B4060857	6/9/2004	0.2252	Pass	0.0000	0.0500	0.4000	0.5000
6/10/2004					C4060857	6/8/2004	5538.5	Pass	5489.3	5499.3	5579.3	5589.3

Data Package ID: *th0405096-1*

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.

000230

Calibration Data Summary

Laboratory Name: Paragon Analytics
PAI Work Order: 0405096

Prep SOP: PAI 777
Analytical SOP: PAI 714

Reported on: Thursday, July 29, 2004
10:40:30 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
0405096-17	SMP	AS040603-3	ThISO	58	C4060858	6/8/2004	32.26	Pass	30.35	30.90	33.00	33.55
T509617		AS040603-3a			B4060858	6/9/2004	0.3126	Pass	0.0000	0.0500	0.4000	0.5000
6/10/2004					C4060858	6/8/2004	5541.7	Pass	5484.4	5494.4	5574.4	5584.4
0405096-18	SMP	AS040603-4	ThISO	18	C4060818	6/8/2004	30.80	Pass	28.80	29.32	31.23	31.84
TR509618		AS040603-4A			B4060818	6/9/2004	0.2806	Pass	0.0000	0.0500	0.4000	0.5000
6/12/2004					C4060818	6/8/2004	5535.7	Pass	5499.6	5509.6	5589.6	5599.6
0405096-19	SMP	AS040603-3	ThISO	59	C4060859	6/8/2004	32.10	Pass	30.37	30.91	32.93	33.57
T509619		AS040603-3a			B4060859	6/9/2004	0.2854	Pass	0.0000	0.0500	0.4000	0.5000
6/10/2004					C4060859	6/8/2004	5534.4	Pass	5487.7	5497.7	5577.7	5587.7
0405096-20	SMP	AS040603-3	ThISO	60	C4060860	6/8/2004	24.87	Warning	24.46	24.90	26.60	27.04
T509620		AS040603-3a			B4060860	6/9/2004	0.1893	Pass	0.0000	0.0500	0.4000	0.5000
6/10/2004					C4060860	6/8/2004	5535.0	Pass	5489.5	5499.5	5579.5	5589.5
0405096-22	SMP	AS040603-3	ThISO	61	C4060861	6/8/2004	31.05	Pass	29.44	29.97	31.92	32.54
T509622		AS040603-3a			B4060861	6/9/2004	0.3961	Pass	0.0000	0.0500	0.4000	0.5000
6/10/2004					C4060861	6/8/2004	5557.3	Pass	5529.6	5535.6	5559.6	5565.6
0405096-25	SMP	AS040603-3	ThISO	62	C4060862	6/8/2004	30.58	Pass	28.57	29.08	31.06	31.57
T509625		AS040603-3a			B4060862	6/9/2004	0.2379	Pass	0.0000	0.0500	0.4000	0.5000
6/10/2004					C4060862	6/8/2004	5544.8	Pass	5493.0	5503.0	5583.0	5593.0
0405096-26	SMP	AS040603-3	ThISO	64	C4060864	6/8/2004	30.72	Pass	29.04	29.56	31.49	32.10
T509626		AS040603-3a			B4060864	6/9/2004	0.2291	Pass	0.0000	0.0500	0.4000	0.5000
6/10/2004					C4060864	6/8/2004	5554.5	Pass	5520.0	5530.0	5610.0	5620.0
0405096-27	SMP	AS040603-4	ThISO	10	C4060810	6/8/2004	28.95	Pass	28.38	28.88	30.86	31.36
T509627		AS040603-4A			B4060810	6/9/2004	0.1650	Pass	0.0000	0.0500	0.4000	0.5000
6/10/2004					C4060810	6/8/2004	5552.0	Pass	5497.3	5507.3	5587.3	5597.3
0405096-28	SMP	AS040603-4	ThISO	11	C4060811	6/8/2004	28.56	Pass	26.79	27.27	29.13	29.61
T509628		AS040603-4A			B4060811	6/9/2004	0.1573	Pass	0.0000	0.0500	0.4000	0.5000
6/10/2004					C4060811	6/8/2004	5532.3	Pass	5484.4	5494.4	5574.4	5584.4

Data Package ID: *th0405096-1*

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.

Calibration Data Summary

Laboratory Name: Paragon Analytics
PAI Work Order: 0405096

Prep SOP: PAI 777
Analytical SOP: PAI 714

Reported on: Thursday, July 29, 2004
3:44:34 PM

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
0405096-29	SMP	AS040603-4	ThISO	12	C4060812	6/8/2004	29.31	Pass	27.56	28.05	29.97	30.46
T509629		AS040603-4A			B4060812	6/9/2004	0.3466	Pass	0.0000	0.0500	0.4000	0.5000
6/10/2004					C4060812	6/8/2004	5537.9	Pass	5493.9	5503.9	5583.9	5593.9
0405096-30	SMP	AS040603-4	ThISO	13	C4060813	6/8/2004	31.73	Pass	29.90	30.43	32.51	33.04
T509630		AS040603-4A			B4060813	6/9/2004	0.2359	Pass	0.0000	0.0500	0.4000	0.5000
6/10/2004					C4060813	6/8/2004	5547.6	Pass	5504.0	5514.0	5594.0	5604.0
0405096-31	SMP	AS040603-3	ThISO	11	C4060811	6/8/2004	28.56	Pass	26.79	27.27	29.13	29.61
T509631		AS040603-3a			B4060811	6/9/2004	0.1573	Pass	0.0000	0.0500	0.4000	0.5000
6/10/2004					C4060811	6/8/2004	5532.3	Pass	5484.4	5494.4	5574.4	5584.4
0405096-32	SMP	AS040603-4	ThISO	15	C4060815	6/8/2004	30.14	Pass	28.43	28.94	30.83	31.43
T509632		AS040603-4A			B4060815	6/9/2004	0.4175	Warning	0.0000	0.0500	0.4000	0.5000
6/10/2004					C4060815	6/8/2004	5538.3	Pass	5535.0	5538.0	5550.0	5553.0
AS040603-3	MB	AS040603-3	ThISO	12	C4060812	6/8/2004	29.31	Pass	27.56	28.05	29.97	30.46
T6033B		AS040603-3a			B4060812	6/9/2004	0.3466	Pass	0.0000	0.0500	0.4000	0.5000
6/10/2004					C4060812	6/8/2004	5537.9	Pass	5493.9	5503.9	5583.9	5593.9
AS040603-3	LCS	AS040603-3	ThISO	13	C4060813	6/8/2004	31.73	Pass	29.90	30.43	32.51	33.04
T6033L		AS040603-3a			B4060813	6/9/2004	0.2359	Pass	0.0000	0.0500	0.4000	0.5000
6/10/2004					C4060813	6/8/2004	5547.6	Pass	5504.0	5514.0	5594.0	5604.0
AS040603-4	MB	AS040603-4	ThISO	16	C4060816	6/8/2004	29.58	Pass	27.77	28.27	30.11	30.69
T6034B		AS040603-4A			B4060816	6/9/2004	0.2039	Pass	0.0000	0.0500	0.4000	0.5000
6/10/2004					C4060816	6/8/2004	5535.2	Pass	5506.9	5516.9	5596.9	5606.9
AS040603-4	LCS	AS040603-4	ThISO	17	C4060817	6/8/2004	30.69	Pass	29.36	29.88	31.83	32.45
T6034L		AS040603-4A			B4060817	6/9/2004	0.3650	Pass	0.0000	0.0500	0.4000	0.5000
6/10/2004					C4060817	6/8/2004	5548.6	Pass	5483.4	5493.4	5573.4	5583.4
AS040611-2	MB	AS040611-2	ThISO	9	C4062209	6/22/2004	29.03	Pass	28.42	28.93	30.91	31.42
TR6112B		AS040611-2D			B4062209	6/23/2004	0.2230	Pass	0.0000	0.0500	0.4000	0.5000
6/23/2004					C4062209	6/22/2004	5534.4	Pass	5477.6	5487.6	5567.6	5577.6

Data Package ID: *th0405096-1*

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.

Calibration Data Summary

Laboratory Name: Paragon Analytics
PAI Work Order: 0405096

Prep SOP: PAI 777
Analytical SOP: PAI 714

Reported on: Thursday, July 29, 2004
4:56:51 PM

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
AS040611-2	LCS	AS040611-2	ThISO	63	C4061563	6/16/2004	30.38	Pass	28.32	28.83	30.79	31.30
T6112L		AS040611-2D			B4061663	6/17/2004	0.2510	Pass	0.0000	0.0500	0.4000	0.5000
6/18/2004					C4061563	6/16/2004	5527.8	Pass	5488.0	5498.0	5578.0	5588.0
AS040720-4	MB	AS040720-4	ThISO	46	C4072646	7/27/2004	30.13	Pass	29.36	29.89	31.97	32.50
T7204B		AS040720-4A			B4072646	7/27/2004	0.2430	Pass	0.0000	0.0500	0.4000	0.5000
7/27/2004					C4072646	7/27/2004	5538.9	Pass	5485.1	5495.1	5575.1	5585.1
AS040720-4	LCS	AS040720-4	ThISO	10	C4072610	7/26/2004	30.16	Pass	28.38	28.88	30.86	31.36
TR7204L		AS040720-4A			B4072610	7/27/2004	0.2160	Pass	0.0000	0.0500	0.4000	0.5000
7/28/2004					C4072610	7/26/2004	5542.0	Pass	5497.3	5507.3	5587.3	5597.3
AS040720-4	LCSD	AS040720-4	ThISO	48	C4072648	7/27/2004	32.28	Pass	30.08	30.62	32.70	33.24
T7204LD		AS040720-4A			B4072648	7/27/2004	0.2140	Pass	0.0000	0.0500	0.4000	0.5000
7/27/2004					C4072648	7/27/2004	5538.6	Pass	5480.8	5490.8	5570.8	5580.8

Data Package ID: *th0405096-1*

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.

Alpha Spec Calibration Source Re-Certification

R:\INST\ALPHA\CLCRT304.XLS

Primary Certified Source
Source PAI ID 190 was recalibrated by Isotope Products Laboratories on 03-01-2003 and recieved 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:	79.06%	=	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	Seqential #	Count Date	Am-241 net cts	U-234 net cts	count dur (s)	Combined 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	Seqential #	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%	1402.57	13854.97	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	5752.75	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	7543.61	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	Seqential #	Count Date	Am-241 net cts	U-234 net cts	count dur (s)	Combined 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	Seqential #	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	20951.92	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

Isotope Products Laboratories
An Eckert & Ziegler Company

24937 Avenue Tibbitts
Valencia, California 91355

Tel 661·309·1010
Fax 661·257·8303

[α 1]

PAI 182
recalibrate 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.:**	92MIX2203026
Half Life (Am-241):	432.17 ± 0.66 years		

Contained Radioactivity:

U-234:	3.354	nCi	(124.1 Bq)	Am-241:	0.5793	nCi	(21.43 Bq)
U-235:	0.06566	nCi	(2.429 Bq)	Total Activity:	3.999	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: ± 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 4483 α/min in 2π on 11 Apr 03.

Daniel James Van Dalsem
Quality Control

15-Apr-03
Date Signed

IPL Ref. No.: 987-7

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	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.:	92MIX2203028
Half Life (Am-241):	432.17 ± 0.66 years		

Contained Radioactivity:

U-234:	6.467	nCi	(239.3 Bq)	Am-241:	0.6366	nCi	(23.55 Bq)
U-235:	0.1135	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.

Daniel James Van Dalsem
Quality Control

15-Apr-03
Date Signed

IPL Ref. No.: 987-7

Isotope Products Laboratories
An Eckert & Ziegler Company

24937 Avenue Tibbitts
Valencia, California 91355

Tel 661·309·1010
Fax 661·257·8303

α3

PAT I.D 184
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.:	92MIX2203024
Half Life (Am-241):	432.17 ± 0.66 years		

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:	± 0.6%
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 6889 α/min in 2π on 11 Apr 03.

Daniel James Van Delaan
Quality Control

15-Apr-03
Date Signed

IPL Ref. No.: 987-7

000237

Isotope Products Laboratories
An Eckert & Ziegler Company

24937 Avenue Tibbitts
Valencia, California 91355

Tel 661·309·1010
Fax 661·257·8303

α4

PAI ID: 00185
rec'd from recalibration
3-28-03

CERTIFICATE OF CALIBRATION
ALPHA STANDARD SOURCE

Radionuclide A:	U-234	Customer:	PARAGON ANALYTICS, INC.
Radionuclide B:	U-235	P.O. No.:	EW030603/R2155
Radionuclide C:	Am-241	Catalog No.:	MISC-STD
Half Life (U-234):	(2.454 ± 0.006)E+05 years	Reference Date:	1-Apr-03 12:00 PST
Half Life (U-235):	(7.037 ± 0.011)E+08 years	Source No.:	92MIX2203021
Half Life (Am-241):	432.17 ± 0.66 years		

Contained Radioactivity:

U-234:	2.731	nCi	(101.0 Bq)	Am-241:	0.9325	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:	± 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 4145 α/min in 2π on 18 Mar 03.

Daniel James Van Dalsem
Quality Control

19-Mar-03
Date Signed

IPL Ref. No.: 987-2

000238

Isotope Products Laboratories
An Eckert & Ziegler Company

24937 Avenue Tibbitts
Valencia, California 91355

Tel 661·309·1010
Fax 661·257·8303

α 5

PAI I-D 00186
recalibration
received ~~186~~
3-28-03

CERTIFICATE OF CALIBRATION
ALPHA STANDARD SOURCE

Radionuclide A:	U-234	Customer:	PARAGON ANALYTICS, INC.
Radionuclide B:	U-235	P.O. No.:	EW030603/R2155
Radionuclide C:	Am-241	Catalog No.:	MISC-STD
Half Life (U-234):	(2.454 ± 0.006)E+05 years	Reference Date:	1-Apr-03 12:00 PST
Half Life (U-235):	(7.037 ± 0.011)E+08 years	Source No.:	92MIX2203025
Half Life (Am-241):	432.17 ± 0.66 years		

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:	± 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 10690 α/min in 2π on 18 Mar 03.

Daniel Harmel Lin Dalsom
Quality Control

19-Mar-03
Date Signed

IPL Ref. No.: 987-2

00030

Isotope Products Laboratories
An Eckert & Ziegler Company

24937 Avenue Tibbitts
Valencia, California 91355

Tel 661·309·1010
Fax 661·257·8303

α 6

PAIIO, CC 187
recd for recalibration
3-28-03

CERTIFICATE OF CALIBRATION
ALPHA STANDARD SOURCE

Radionuclide A:	U-234	Customer:	PARAGON ANALYTICS, INC.
Radionuclide B:	U-235	P.O. No.:	EW030603/R2155
Radionuclide C:	Am-241	Catalog No.:	MISC-STD
Half Life (U-234):	(2.454 ± 0.006)E+05 years	Reference Date:	1-Apr-03 12:00 PST
Half Life (U-235):	(7.037 ± 0.011)E+08 years	Source No.:	92MIX2203022
Half Life (Am-241):	432.17 ± 0.66 years		

Contained Radioactivity:

U-234:	3.592	nCi	(132.9 Bq)	Am-241:	3.279	nCi	(121.3 Bq)
U-235:	0.08556	nCi	(3.166 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 Dalsem
Quality Control

19-Mar-03
Date Signed

IPL Ref. No.: 987-2

000240

Isotope Products Laboratories
An Eckert & Ziegler Company

24937 Avenue Tibbitts
Valencia, California 91355

Tel 661·309·1010
Fax 661·257·8303

[α 7]

PAIP 188
rec'd for recalibration
3-28-03

CERTIFICATE OF CALIBRATION
ALPHA STANDARD SOURCE

Radionuclide A:	U-234	Customer:	PARAGON ANALYTICS, INC.
Radionuclide B:	U-235	P.O. No.:	EW030603/R2155
Radionuclide C:	Am-241	Catalog No.:	MISC-STD
Half Life (U-234):	(2.454 ± 0.006)E+05 years	Reference Date:	1-Apr-03 12:00 PST
Half Life (U-235):	(7.037 ± 0.011)E+08 years	Source No.:	92MIX2203023
Half Life (Am-241):	432.17 ± 0.66 years		

Contained Radioactivity:

U-234:	2.895	nCi	(107.1 Bq)	Am-241:	1.953	nCi	(72.26 Bq)
U-235:	0.02502	nCi	(0.9257 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 α/min in 2π on 18 Mar 03.

Daniel Hamer Van DeAlsem
Quality Control

19-Mar-03
Date Signed

IPL Ref. No.: 987-2

000241

Isotope Products Laboratories
An Eckert & Ziegler Company

24937 Avenue Tibbitts
Valencia, California 91355

Tel 661·309·1010
Fax 661·257·8303

[α 8]

PAI ID 189
recd 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:

U-234:	9.048	nCi	(334.8 Bq)	Am-241:	1.433	nCi	(53.02 Bq)
U-235:	0.1771	nCi	(6.553 Bq)	Total Activity:	10.66	nCi	(394.4 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 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 Van Dalsem
Quality Control

15-Apr-03
Date Signed

IPL Ref. No.: 987-7

000242