# Paragon Analytics

## Radiochemistry Case Narrative
## Isotopic Uranium

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**Kent & Sullivan Inc.**

Ross Adams

PA WO 0405097

1. This report consists of the analytical results for 30 soil samples received by Paragon on 05/11/04. It is noted that Paragon Analytics did not perform the drying and grinding procedure. The samples were sent to Hazen for this procedure, and were returned to Paragon on 6/8/04.

2. These samples were prepared according to Paragon Analytics procedures PA SOP721R10, PA SOP773R8, and PA SOP778R9. Modifications were made to the method as described on QASS 270494, 277615, 277627, and 277650.

3. The samples were analyzed for the presence of isotopic uranium according to Paragon Analytics procedure PA SOP714R8 and R9. The analyses were completed on 07/16/04.

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

5. A duplicate laboratory control sample (LCSD) was prepared for batch AS040629-9 to meet another client's data quality objectives. The results of the LCSD are provided in this report as an additional quality assurance measure for this batch.

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

7. 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.

8. The requested MDC (0.1 pCi/g) was not met for many samples; 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.

9. Samples HR-01 (Paragon ID 0405097-1), 700-02 (Paragon ID 0405097-20), 900-04 (Paragon ID 0405097-26), and 900-05 (Paragon ID 0405097-27) were initially prepared in batch AS040629-9 on 06/29/04. The initial analyses exhibited poor spectral quality due to the presence of greatly elevated native uranium in the samples. The samples were reprepared in batch AS040712-5 at a reduced aliquot. All quality control criteria were achieved for the repreparation. The results of these samples are reported from AS040712-5 without further qualification. Please refer to NCR 5794 in Section 5 of this report.

10. The method blank associated with the above samples was also prepared at a reduced aliquot in order to provide results directly comparable to these samples. Therefore, the requested MDC of 0.1 pCi/g was not met, even after a maximum count time of 1000 minutes. Data quality is not believed to be affected, and the results are submitted without qualification.

11. Many of the samples in this work order were initially prepared at reduced aliquots due to elevated activity detected in gamma spectroscopic analyses of these samples. The method blank associated with these samples (AS040629-7MB) was also prepared at a similar reduced aliquot. Consequently, the requested MDC was not met for this method blank as well. It was only given a 300-minute count, but the achieved MDC values of this method blank are less than one fifth the activity measured in the associated samples, demonstrating that data quality is not affected by a shorter analysis time.

12. U-234 and U-238 activity is reported in method blank AS040629-7MB above the requested MDC value. The measured blank activity is less than one fifth the activity for associated samples. Results are acceptable according to PA SOP 715, and are submitted without further qualification.

13. 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 — 7-23-04
Sharon Muller
Radiochemistry Instrumentation
Date

Radiochemistry Final Data Review — 7/23/04
Date

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PARAGON ANALYTICS
Radiochemistry Data Package

Section 1

# SAMPLE RESULTS SUMMARY

# Isotopic Uranium 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:** 0405097


**Reported on:** Thursday, July 22, 2004 2:07:39 PM

| Lab Sample ID | Client Sample ID | Sample Type | Nuclide | Result +/- 2 s TPU | MDC | Units | Matrix | Prep Batch | Date Analyzed | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| 0405097-1 | HR-01 | Sample | U-234 | 196 +/- 31 | 1 | pCi/g | SOLID | AS040712-5 | 7/16/2004 | M3 |
| 0405097-1 | HR-01 | Sample | U-235 | 10.3 +/- 2.3 | 0.2 | pCi/g | SOLID | AS040712-5 | 7/16/2004 | M3 |
| 0405097-1 | HR-01 | Sample | U-238 | 207 +/- 33 | 0 | pCi/g | SOLID | AS040712-5 | 7/16/2004 | M3 |
| 0405097-2 | MR-01 | Sample | U-234 | 321 +/- 51 | 0 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | M3 |
| 0405097-2 | MR-01 | Sample | U-235 | 18.0 +/- 3.6 | 0.6 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | M3 |
| 0405097-2 | MR-01 | Sample | U-238 | 326 +/- 52 | 0 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | M3 |
| 0405097-3 | MR-02 | Sample | U-234 | 185 +/- 30 | 0 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | M3 |
| 0405097-3 | MR-02 | Sample | U-235 | 11.0 +/- 2.1 | 0.1 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | |
| 0405097-3 | MR-02 | Sample | U-238 | 190 +/- 31 | 0 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | |

**Comments:**

**Data Package ID:** *ur0405097-1*

**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



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# Isotopic Uranium By Alpha Spectroscopy Sample Results Summary

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**PAI Work Order:** 0405097


**Reported on:** Thursday, July 22, 2004 2:07:39 PM

| Lab Sample ID | Client Sample ID | Sample Type | Nuclide | Result +/- 2 s TPU | MDC | Units | Matrix | Prep Batch | Date Analyzed | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| 0405097-4 | GR-01 | Sample | U-234 | 4.75 +/- 0.81 | 0.05 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | |
| 0405097-4 | GR-01 | Sample | U-235 | 0.193 +/- 0.081 | 0.038 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | |
| 0405097-4 | GR-01 | Sample | U-238 | 5.00 +/- 0.85 | 0.03 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | |
| 0405097-5 | GR-02 | Sample | U-234 | 2.91 +/- 0.53 | 0.09 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | |
| 0405097-5 | GR-02 | Sample | U-235 | 0.163 +/- 0.077 | 0.055 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | |
| 0405097-5 | GR-02 | Sample | U-238 | 3.34 +/- 0.60 | 0.07 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | |
| 0405097-6 | GR-03 | Sample | U-234 | 1.22 +/- 0.25 | 0.04 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | |
| 0405097-6 | GR-03 | Sample | U-235 | 0.083 +/- 0.050 | 0.019 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | LT |
| 0405097-6 | GR-03 | Sample | U-238 | 1.44 +/- 0.29 | 0.02 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | |

**Comments:**

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0005

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**Client Project Number:**

**Laboratory Name:** Paragon Analytics
**PAI Work Order:** 0405097


**Reported on:** Thursday, July 22, 2004 2:07:39 PM

| Lab Sample ID | Client Sample ID | Sample Type | Nuclide | Result +/- 2 s TPU | MDC | Units | Matrix | Prep Batch | Date Analyzed | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| 0405097-7 | GR-04 | Sample | U-234 | 16.5 +/- 2.7 | 0.1 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | |
| 0405097-7 | GR-04 | Sample | U-235 | 0.94 +/- 0.23 | 0.04 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | |
| 0405097-7 | GR-04 | Sample | U-238 | 17.3 +/- 2.8 | 0 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | |
| 0405097-8 | GR-05 | Sample | U-234 | 1.35 +/- 0.27 | 0.07 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | |
| 0405097-8 | GR-05 | Sample | U-235 | 0.048 +/- 0.040 | 0.048 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | U |
| 0405097-8 | GR-05 | Sample | U-238 | 1.73 +/- 0.34 | 0.05 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | |
| 0405097-9 | GR-06 | Sample | U-234 | 2.09 +/- 0.40 | 0.04 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | |
| 0405097-9 | GR-06 | Sample | U-235 | 0.064 +/- 0.050 | 0.068 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | U |
| 0405097-9 | GR-06 | Sample | U-238 | 2.37 +/- 0.44 | 0.05 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | |

**Comments:**

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# Isotopic Uranium By Alpha Spectroscopy Sample Results Summary

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**Client Project Name:** Ross Adams
**Client Project Number:**

**Laboratory Name:** Paragon Analytics
**PAI Work Order:** 0405097


**Reported on:** Thursday, July 22, 2004 2:07:40 PM

| Lab Sample ID | Client Sample ID | Sample Type | Nuclide | Result +/- 2 s TPU | MDC | Units | Matrix | Prep Batch | Date Analyzed | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| 0405097-10 | GR-07 | Sample | U-234 | 1.16 +/- 0.25 | 0.03 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | |
| 0405097-10 | GR-07 | Sample | U-235 | 0.097 +/- 0.057 | 0.046 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | LT |
| 0405097-10 | GR-07 | Sample | U-238 | 1.40 +/- 0.29 | 0.04 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | |
| 0405097-11 | GR-08 | Sample | U-234 | 0.84 +/- 0.19 | 0.03 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | |
| 0405097-11 | GR-08 | Sample | U-235 | 0.067 +/- 0.044 | 0.040 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | LT |
| 0405097-11 | GR-08 | Sample | U-238 | 1.03 +/- 0.22 | 0.03 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | |
| 0405097-12 | GR-09 | Sample | U-234 | 1.68 +/- 0.33 | 0.05 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | |
| 0405097-12 | GR-09 | Sample | U-235 | 0.067 +/- 0.048 | 0.052 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | LT |
| 0405097-12 | GR-09 | Sample | U-238 | 1.98 +/- 0.38 | 0.05 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | |

**Comments:**

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| Lab Sample ID | Client Sample ID | Sample Type | Nuclide | Result +/- 2 s TPU | MDC | Units | Matrix | Prep Batch | Date Analyzed | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| 0405097-13 | GR-10 | Sample | U-234 | 1.99 +/- 0.38 | 0.04 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | |
| 0405097-13 | GR-10 | Sample | U-235 | 0.130 +/- 0.066 | 0.051 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | |
| 0405097-13 | GR-10 | Sample | U-238 | 2.71 +/- 0.49 | 0.04 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | |
| 0405097-14 | QM-01 | Sample | U-234 | 0.49 +/- 0.13 | 0.04 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | |
| 0405097-14 | QM-01 | Sample | U-235 | 0.025 +/- 0.028 | 0.036 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | U |
| 0405097-14 | QM-01 | Sample | U-238 | 0.42 +/- 0.12 | 0.04 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | |
| 0405097-15 | QM-02 | Sample | U-234 | 0.45 +/- 0.13 | 0.03 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | |
| 0405097-15 | QM-02 | Sample | U-235 | 0.017 +/- 0.026 | 0.045 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | U |
| 0405097-15 | QM-02 | Sample | U-238 | 0.44 +/- 0.12 | 0.04 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | |

**Comments:**

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| Lab Sample ID | Client Sample ID | Sample Type | Nuclide | Result +/- 2 s TPU | MDC | Units | Matrix | Prep Batch | Date Analyzed | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| 0405097-16 | QM-03 | Sample | U-234 | 0.49 +/- 0.13 | 0.02 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | |
| 0405097-16 | QM-03 | Sample | U-235 | 0.046 +/- 0.037 | 0.036 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | LT |
| 0405097-16 | QM-03 | Sample | U-238 | 0.43 +/- 0.12 | 0.02 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | |
| 0405097-17 | 300-01 | Sample | U-234 | 2280 +/- 370 | 0 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | M3 |
| 0405097-17 | 300-01 | Sample | U-235 | 117 +/- 23 | 3 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | M3 |
| 0405097-17 | 300-01 | Sample | U-238 | 2350 +/- 380 | 0 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | M3 |
| 0405097-18 | 300-02 | Sample | U-234 | 39.9 +/- 6.3 | 0 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | |
| 0405097-18 | 300-02 | Sample | U-235 | 1.92 +/- 0.39 | 0.02 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | |
| 0405097-18 | 300-02 | Sample | U-238 | 41.8 +/- 6.6 | 0.1 | pCi/g | SOLID | AS040629-9 | 7/8/2004 | |

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**Reported on:** Thursday, July 22, 2004 2:07:40 PM

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|---|---|---|---|---|---|---|---|---|---|---|
| 0405097-19 | 700-01 | Sample | U-234 | 3220 +/- 510 | 10 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | M3 |
| 0405097-19 | 700-01 | Sample | U-235 | 180 +/- 35 | 4 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | M3 |
| 0405097-19 | 700-01 | Sample | U-238 | 3220 +/- 510 | 0 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | M3 |
| 0405097-20 | 700-02 | Sample | U-234 | 422 +/- 67 | 1 | pCi/g | SOLID | AS040712-5 | 7/16/2004 | M3 |
| 0405097-20 | 700-02 | Sample | U-235 | 22.0 +/- 4.9 | 0.4 | pCi/g | SOLID | AS040712-5 | 7/16/2004 | M3 |
| 0405097-20 | 700-02 | Sample | U-238 | 420 +/- 67 | 1 | pCi/g | SOLID | AS040712-5 | 7/16/2004 | M3 |
| 0405097-21 | 700-03 | Sample | U-234 | 3390 +/- 550 | 0 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | M3 |
| 0405097-21 | 700-03 | Sample | U-235 | 184 +/- 36 | 5 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | M3 |
| 0405097-21 | 700-03 | Sample | U-238 | 3390 +/- 550 | 0 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | M3 |

**Comments:**

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0010

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| Lab Sample ID | Client Sample ID | Sample Type | Nuclide | Result +/- 2 s TPU | MDC | Units | Matrix | Prep Batch | Date Analyzed | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| 0405097-22 | 700-04 | Sample | U-234 | 650 +/- 100 | 0 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | M3 |
| 0405097-22 | 700-04 | Sample | U-235 | 37.3 +/- 7.2 | 0.6 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | M3 |
| 0405097-22 | 700-04 | Sample | U-238 | 660 +/- 100 | 0 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | M3 |
| 0405097-23 | 900-01 | Sample | U-234 | 415 +/- 67 | 0 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | M3 |
| 0405097-23 | 900-01 | Sample | U-235 | 21.7 +/- 4.3 | 0.2 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | M3 |
| 0405097-23 | 900-01 | Sample | U-238 | 452 +/- 73 | 0 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | M3 |
| 0405097-24 | 900-02 | Sample | U-234 | 2800 +/- 450 | 0 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | M3 |
| 0405097-24 | 900-02 | Sample | U-235 | 149 +/- 28 | 2 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | M3 |
| 0405097-24 | 900-02 | Sample | U-238 | 2880 +/- 460 | 0 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | M3 |

**Comments:**

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000011

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| Lab Sample ID | Client Sample ID | Sample Type | Nuclide | Result +/- 2 s TPU | MDC | Units | Matrix | Prep Batch | Date Analyzed | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| 0405097-25 | 900-03 | Sample | U-234 | 470 +/- 74 | 1 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | M3 |
| 0405097-25 | 900-03 | Sample | U-235 | 24.0 +/- 4.8 | 0.6 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | M3 |
| 0405097-25 | 900-03 | Sample | U-238 | 462 +/- 73 | 1 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | M3 |
| 0405097-26 | 900-04 | Sample | U-234 | 163 +/- 26 | 1 | pCi/g | SOLID | AS040712-5 | 7/16/2004 | M3 |
| 0405097-26 | 900-04 | Sample | U-235 | 9.0 +/- 2.1 | 0.3 | pCi/g | SOLID | AS040712-5 | 7/16/2004 | M3 |
| 0405097-26 | 900-04 | Sample | U-238 | 171 +/- 27 | 0 | pCi/g | SOLID | AS040712-5 | 7/16/2004 | M3 |
| 0405097-27 | 900-05 | Sample | U-234 | 137 +/- 22 | 0 | pCi/g | SOLID | AS040712-5 | 7/16/2004 | M3 |
| 0405097-27 | 900-05 | Sample | U-235 | 6.9 +/- 1.7 | 0.2 | pCi/g | SOLID | AS040712-5 | 7/16/2004 | M3 |
| 0405097-27 | 900-05 | Sample | U-238 | 138 +/- 22 | 0 | pCi/g | SOLID | AS040712-5 | 7/16/2004 | M3 |

**Comments:**

**Data Package ID:** *ur0405097-1*

**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



000012

# Isotopic Uranium 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:** 0405097


**Reported on:** Thursday, July 22, 2004 2:07:40 PM

| Lab Sample ID | Client Sample ID | Sample Type | Nuclide | Result +/- 2 s TPU | MDC | Units | Matrix | Prep Batch | Date Analyzed | Flags |
|---|---|---|---|---|---|---|---|---|---|---|
| 0405097-28 | OSA-01 | Sample | U-234 | 2370 +/- 380 | 0 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | M3 |
| 0405097-28 | OSA-01 | Sample | U-235 | 110 +/- 22 | 4 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | M3 |
| 0405097-28 | OSA-01 | Sample | U-238 | 2280 +/- 370 | 0 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | M3 |
| 0405097-29 | OSA-02 | Sample | U-234 | 650 +/- 100 | 0 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | M3 |
| 0405097-29 | OSA-02 | Sample | U-235 | 32.2 +/- 6.4 | 0.8 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | M3 |
| 0405097-29 | OSA-02 | Sample | U-238 | 670 +/- 110 | 0 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | M3 |
| 0405097-30 | OSA-03 | Sample | U-234 | 630 +/- 100 | 0 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | M3 |
| 0405097-30 | OSA-03 | Sample | U-235 | 33.3 +/- 6.4 | 0.7 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | M3 |
| 0405097-30 | OSA-03 | Sample | U-238 | 630 +/- 100 | 0 | pCi/g | SOLID | AS040629-7 | 7/9/2004 | M3 |

**Comments:**

**Data Package ID:** *ur0405097-1*

**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

PARAGON ANALYTICS

Radiochemistry Data Package

2

Section 2

# QC RESULTS SUMMARY

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Method Blank Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Lab ID:** AS040712-5MB

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 13-Jul-04
**Date Prepared:** 13-Jul-04
**Date Analyzed:** 16-Jul-04

**Prep Batch:** AS040712-5
**QCBatchID:** AS040712-5-1
**Run ID:** AS040712-5A
**Count Time:** 1000 minutes

**Final Aliquot:** 0.100 g
**Result Units:** pCi/g
**File Name:** U7125B

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 0.16 +/- 0.14 | 0.21 | U,M |
| 15117-96-1 | U-235 | 0.02 +/- 0.10 | 0.15 | U,M |
| 7440-61-1 | U-238 | 0.12 +/- 0.13 | 0.21 | U,M |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 85.27 | 77 | pCi/g | 89.7 | 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Method Blank Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Lab ID:** AS040629-7MB

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 30-Jun-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 09-Jul-04

**Prep Batch:** AS040629-7
**QCBatchID:** AS040629-7-1
**Run ID:** AS040629-7A
**Count Time:** 300 minutes

**Final Aliquot:** 0.0500 g
**Result Units:** pCi/g
**File Name:** U6297B

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 0.89 +/- 0.68 | 0.78 | B,M |
| 15117-96-1 | U-235 | 0.35 +/- 0.47 | 0.68 | U,M |
| 7440-61-1 | U-238 | 0.44 +/- 0.45 | 0.30 | B,M |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 170.6 | 146 | pCi/g | 85.5 | 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.

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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Method Blank Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Lab ID:** AS040629-9MB

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 30-Jun-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 08-Jul-04

**Prep Batch:** AS040629-9
**QCBatchID:** AS040629-9-1
**Run ID:** AS040629-9b
**Count Time:** 420 minutes

**Final Aliquot:** 2.00 g
**Result Units:** pCi/g
**File Name:** U6299B

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 0.0016 +/- 0.0082 | 0.0173 | U |
| 15117-96-1 | U-235 | 0.0034 +/- 0.0099 | 0.0224 | U |
| 7440-61-1 | U-238 | 0.004 +/- 0.011 | 0.025 | U |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 4.264 | 3.40 | pCi/g | 79.7 | 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Laboratory Control Sample(s)

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Lab ID:** AS040629-7LCS

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 30-Jun-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 09-Jul-04

**Prep Batch:** AS040629-7
**QCBatchID:** AS040629-7-1
**Run ID:** AS040629-7A
**Count Time:** 300 minutes

**Final Aliquot:** 0.0500 g
**Result Units:** pCi/g
**File Name:** U6297L

| CASNO | Target Nuclide | Results +/- 2s TPU | MDC | Spike Added | % Rec | Control Limits | Lab Qualifier |
|---|---|---|---|---|---|---|---|
| 13966-29-5 | U-234 | 175 +/- 29 | 1 | 174 | 101 | 82 - 122 | P,M3 |
| 7440-61-1 | U-238 | 184 +/- 30 | 1 | 180 | 102 | 82 - 122 | P,M3 |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 170.6 | 147 | pCi/g | 86.4 | 30 - 110 % | |

**Comments:**

**Qualifiers/Flags:**

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

Abbreviations:

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

**Data Package ID:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Laboratory Control Sample(s)

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Lab ID:** AS040629-9LCS

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 30-Jun-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 08-Jul-04

**Prep Batch:** AS040629-9
**QCBatchID:** AS040629-9-1
**Run ID:** AS040629-9b
**Count Time:** 300 minutes

**Final Aliquot:** 2.00 g
**Result Units:** pCi/g
**File Name:** U6299L

| CASNO | Target Nuclide | Results +/- 2s TPU | MDC | Spike Added | % Rec | Control Limits | Lab Qualifier |
|---|---|---|---|---|---|---|---|
| 13966-29-5 | U-234 | 4.45 +/- 0.73 | 0.03 | 4.34 | 103 | 82 - 122 | P |
| 7440-61-1 | U-238 | 4.66 +/- 0.76 | 0.03 | 4.50 | 103 | 82 - 122 | P |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 4.264 | 3.63 | pCi/g | 85.1 | 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Laboratory Control Sample(s)

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Lab ID:** AS040629-9LCSD

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 30-Jun-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 08-Jul-04

**Prep Batch:** AS040629-9
**QCBatchID:** AS040629-9-1
**Run ID:** AS040629-9b
**Count Time:** 300 minutes

**Final Aliquot:** 2.00 g
**Result Units:** pCi/g
**File Name:** U6299LD

| CASNO | Target Nuclide | Results +/- 2s TPU | MDC | Spike Added | % Rec | Control Limits | Lab Qualifier |
|---|---|---|---|---|---|---|---|
| 13966-29-5 | U-234 | 4.08 +/- 0.68 | 0.03 | 4.34 | 94.0 | 82 - 122 | P |
| 7440-61-1 | U-238 | 4.33 +/- 0.72 | 0.02 | 4.50 | 96.2 | 82 - 122 | P |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 4.264 | 3.48 | pCi/g | 81.6 | 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Laboratory Control Sample(s)

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Lab ID:** AS040712-5LCS

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 13-Jul-04
**Date Prepared:** 13-Jul-04
**Date Analyzed:** 16-Jul-04

**Prep Batch:** AS040712-5
**QCBatchID:** AS040712-5-1
**Run ID:** AS040712-5A
**Count Time:** 300 minutes

**Final Aliquot:** 0.100 g
**Result Units:** pCi/g
**File Name:** UR7125L

| CASNO | Target Nuclide | Results +/- 2s TPU | MDC | Spike Added | % Rec | Control Limits | Lab Qualifier |
|---|---|---|---|---|---|---|---|
| 13966-29-5 | U-234 | 86 +/- 14 | 1 | 86.8 | 99.5 | 82 - 122 | P,M3 |
| 7440-61-1 | U-238 | 97 +/- 16 | 0 | 90.1 | 108 | 82 - 122 | P,M3 |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 85.27 | 79 | pCi/g | 93.0 | 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Duplicate Sample Results (DER)

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** MR-01
**Lab ID:** 0405097-2DUP

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 07-May-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 09-Jul-04

**Prep Batch:** AS040629-7
**QCBatchID:** AS040629-7-1
**Run ID:** AS040629-7A
**Count Time:** 300 minutes

**Final Aliquot:** 0.141 g
**Prep Basis:** Dry Weight
**Moisture(%):** NA
**Result Units:** pCi/g
**File Name:** U50972D

| CASNO | Analyte | Sample Result +/- 2 s TPU | Duplicate Result +/- 2 s TPU | DER | Control Limit | Lab Qualifiers |
|---|---|---|---|---|---|---|
| 13966-29-5 | U-234 | 321 +/- 51 | 312 +/- 50 | 0.13 | 2.13 | M3 |
| 15117-96-1 | U-235 | 18.0 +/- 3.6 | 18.4 +/- 3.6 | 0.07 | 2.13 | M3 |
| 7440-61-1 | U-238 | 326 +/- 52 | 312 +/- 50 | 0.20 | 2.13 | M3 |

### 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Duplicate Sample Results (DER)

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** GR-02
**Lab ID:** 0405097-5DUP

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 07-May-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 08-Jul-04

**Prep Batch:** AS040629-9
**QCBatchID:** AS040629-9-1
**Run ID:** AS040629-9b
**Count Time:** 300 minutes

**Final Aliquot:** 1.01 g
**Prep Basis:** Dry Weight
**Moisture(%):** NA
**Result Units:** pCi/g
**File Name:** U50975D

| CASNO | Analyte | Sample Result +/- 2 s TPU | Duplicate Result +/- 2 s TPU | DER | Control Limit | Lab Qualifiers |
|---|---|---|---|---|---|---|
| 13966-29-5 | U-234 | 2.91 +/- 0.53 | 2.82 +/- 0.51 | 0.13 | 2.13 | |
| 15117-96-1 | U-235 | 0.163 +/- 0.077 | 0.159 +/- 0.073 | 0.03 | 2.13 | |
| 7440-61-1 | U-238 | 3.34 +/- 0.60 | 3.01 +/- 0.54 | 0.41 | 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Duplicate Sample Results (DER)

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** 700-02
**Lab ID:** 0405097-20DUP

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 07-May-04
**Date Prepared:** 13-Jul-04
**Date Analyzed:** 16-Jul-04

**Prep Batch:** AS040712-5
**QCBatchID:** AS040712-5-1
**Run ID:** AS040712-5A
**Count Time:** 300 minutes

**Final Aliquot:** 0.0503 g
**Prep Basis:** Dry Weight
**Moisture(%):** NA
**Result Units:** pCi/g
**File Name:** UX509720D

| CASNO | Analyte | Sample Result +/- 2 s TPU | Duplicate Result +/- 2 s TPU | DER | Control Limit | Lab Qualifiers |
|---|---|---|---|---|---|---|
| 13966-29-5 | U-234 | 422 +/- 67 | 423 +/- 67 | 0.01 | 2.13 | M3 |
| 15117-96-1 | U-235 | 22.0 +/- 4.9 | 20.6 +/- 4.6 | 0.22 | 2.13 | M3 |
| 7440-61-1 | U-238 | 420 +/- 67 | 451 +/- 72 | 0.32 | 2.13 | M3 |

### 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Duplicate Sample Results (DER)

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** 900-01
**Lab ID:** 0405097-23DUP

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 07-May-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 11-Jul-04

**Prep Batch:** AS040629-7
**QCBatchID:** AS040629-7-1
**Run ID:** AS040629-7A
**Count Time:** 300 minutes

**Final Aliquot:** 0.132 g
**Prep Basis:** Dry Weight
**Moisture(%):** NA
**Result Units:** pCi/g
**File Name:** UR509723D

| CASNO | Analyte | Sample Result +/- 2 s TPU | Duplicate Result +/- 2 s TPU | DER | Control Limit | Lab Qualifiers |
|---|---|---|---|---|---|---|
| 13966-29-5 | U-234 | 415 +/- 67 | 405 +/- 65 | 0.10 | 2.13 | M3 |
| 15117-96-1 | U-235 | 21.7 +/- 4.3 | 22.1 +/- 4.3 | 0.06 | 2.13 | M3 |
| 7440-61-1 | U-238 | 452 +/- 73 | 448 +/- 71 | 0.04 | 2.13 | M3 |

### 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Duplicate Sample Results (DER)

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:**
**Lab ID:** AS040629-9LCSD

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 30-Jun-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 08-Jul-04

**Prep Batch:** AS040629-9
**QCBatchID:** AS040629-9-1
**Run ID:** AS040629-9b
**Count Time:** 300 minutes

**Final Aliquot:** 2.00 g
**Prep Basis:** Dry Weight
**Moisture(%):** NA
**Result Units:** pCi/g
**File Name:** U6299LD

| CASNO | Analyte | Sample Result +/- 2 s TPU | Duplicate Result +/- 2 s TPU | DER | Control Limit | Lab Qualifiers |
|---|---|---|---|---|---|---|
| 13966-29-5 | U-234 | 4.45 +/- 0.73 | 4.08 +/- 0.68 | 0.38 | 2.13 | P |
| 7440-61-1 | U-238 | 4.66 +/- 0.76 | 4.33 +/- 0.72 | 0.31 | 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:** *UR0405097-1*

PARAGON ANALYTICS
Radiochemistry Data Package

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Section 3

# INDIVIDUAL SAMPLE RESULTS

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** HR-01
**Lab ID:** 0405097-1

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 06-May-04
**Date Prepared:** 13-Jul-04
**Date Analyzed:** 16-Jul-04

**Prep Batch:** AS040712-5
**QCBatchID:** AS040712-5-1
**Run ID:** AS040712-5A
**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:** UX50971

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 196 +/- 31 | 1 | M3 |
| 15117-96-1 | U-235 | 10.3 +/- 2.3 | 0.2 | M3 |
| 7440-61-1 | U-238 | 207 +/- 33 | 0 | M3 |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 85.18 | 70 | pCi/g | 82.5 | 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** MR-01
**Lab ID:** 0405097-2

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 07-May-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 09-Jul-04

**Prep Batch:** AS040629-7
**QCBatchID:** AS040629-7-1
**Run ID:** AS040629-7A
**Count Time:** 300 minutes
**Report Basis:** Dry Weight

**Final Aliquot:** 0.141 g
**Prep Basis:** Dry Weight
**Moisture(%):** NA
**Result Units:** pCi/g
**File Name:** U50972

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 321 +/- 51 | 0 | M3 |
| 15117-96-1 | U-235 | 18.0 +/- 3.6 | 0.6 | M3 |
| 7440-61-1 | U-238 | 326 +/- 52 | 0 | M3 |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 60.50 | 41.5 | pCi/g | 68.6 | 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Sample Duplicate Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** MR-01
**Lab ID:** 0405097-2DUP

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 07-May-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 09-Jul-04

**Prep Batch:** AS040629-7
**QCBatchID:** AS040629-7-1
**Run ID:** AS040629-7A
**Count Time:** 300 minutes
**Report Basis:** Dry Weight

**Final Aliquot:** 0.141 g
**Prep Basis:** Dry Weight
**Moisture(%):** NA
**Result Units:** pCi/g
**File Name:** U50972D

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 312 +/- 50 | 0 | M3 |
| 15117-96-1 | U-235 | 18.4 +/- 3.6 | 0.4 | M3 |
| 7440-61-1 | U-238 | 312 +/- 50 | 0 | M3 |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 60.50 | 42.9 | pCi/g | 70.8 | 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.

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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** MR-02
**Lab ID:** 0405097-3

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 07-May-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 09-Jul-04

**Prep Batch:** AS040629-7
**QCBatchID:** AS040629-7-1
**Run ID:** AS040629-7A
**Count Time:** 300 minutes
**Report Basis:** Dry Weight

**Final Aliquot:** 0.312 g
**Prep Basis:** Dry Weight
**Moisture(%):** NA
**Result Units:** pCi/g
**File Name:** UR50973

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 185 +/- 30 | 0 | M3 |
| 15117-96-1 | U-235 | 11.0 +/- 2.1 | 0.1 | |
| 7440-61-1 | U-238 | 190 +/- 31 | 0 | |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 27.34 | 16.6 | pCi/g | 60.8 | 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** GR-01
**Lab ID:** 0405097-4

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 07-May-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 08-Jul-04

**Prep Batch:** AS040629-9
**QCBatchID:** AS040629-9-1
**Run ID:** AS040629-9b
**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:** U50974

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 4.75 +/- 0.81 | 0.05 | |
| 15117-96-1 | U-235 | 0.193 +/- 0.081 | 0.038 | |
| 7440-61-1 | U-238 | 5.00 +/- 0.85 | 0.03 | |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 8.424 | 6.6 | pCi/g | 78.9 | 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** GR-02
**Lab ID:** 0405097-5

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 07-May-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 08-Jul-04

**Prep Batch:** AS040629-9
**QCBatchID:** AS040629-9-1
**Run ID:** AS040629-9b
**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:** U50975

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 2.91 +/- 0.53 | 0.09 | |
| 15117-96-1 | U-235 | 0.163 +/- 0.077 | 0.055 | |
| 7440-61-1 | U-238 | 3.34 +/- 0.60 | 0.07 | |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 8.489 | 6.6 | pCi/g | 77.8 | 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Sample Duplicate Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** GR-02
**Lab ID:** 0405097-5DUP

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 07-May-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 08-Jul-04

**Prep Batch:** AS040629-9
**QCBatchID:** AS040629-9-1
**Run ID:** AS040629-9b
**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:** U50975D

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 2.82 +/- 0.51 | 0.04 | |
| 15117-96-1 | U-235 | 0.159 +/- 0.073 | 0.039 | |
| 7440-61-1 | U-238 | 3.01 +/- 0.54 | 0.03 | |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 8.452 | 6.8 | pCi/g | 80.2 | 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.
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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** GR-03
**Lab ID:** 0405097-6

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 07-May-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 08-Jul-04

**Prep Batch:** AS040629-9
**QCBatchID:** AS040629-9-1
**Run ID:** AS040629-9b
**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:** U50976

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 1.22 +/- 0.25 | 0.04 | |
| 15117-96-1 | U-235 | 0.083 +/- 0.050 | 0.019 | LT |
| 7440-61-1 | U-238 | 1.44 +/- 0.29 | 0.02 | |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 8.477 | 7.4 | pCi/g | 87.5 | 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** GR-04
**Lab ID:** 0405097-7

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 07-May-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 08-Jul-04

**Prep Batch:** AS040629-9
**QCBatchID:** AS040629-9-1
**Run ID:** AS040629-9b
**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:** U50977

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 16.5 +/- 2.7 | 0.1 | |
| 15117-96-1 | U-235 | 0.94 +/- 0.23 | 0.04 | |
| 7440-61-1 | U-238 | 17.3 +/- 2.8 | 0 | |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 8.434 | 6.5 | pCi/g | 76.8 | 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** GR-05
**Lab ID:** 0405097-8

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 07-May-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 08-Jul-04

**Prep Batch:** AS040629-9
**QCBatchID:** AS040629-9-1
**Run ID:** AS040629-9b
**Count Time:** 300 minutes
**Report Basis:** Dry Weight

**Final Aliquot:** 1.04 g
**Prep Basis:** Dry Weight
**Moisture(%):** NA
**Result Units:** pCi/g
**File Name:** U50978

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 1.35 +/- 0.27 | 0.07 | |
| 15117-96-1 | U-235 | 0.048 +/- 0.040 | 0.048 | U |
| 7440-61-1 | U-238 | 1.73 +/- 0.34 | 0.05 | |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 8.203 | 6.6 | pCi/g | 80.2 | 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** GR-06
**Lab ID:** 0405097-9

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 07-May-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 08-Jul-04

**Prep Batch:** AS040629-9
**QCBatchID:** AS040629-9-1
**Run ID:** AS040629-9b
**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:** U50979

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 2.09 +/- 0.40 | 0.04 | |
| 15117-96-1 | U-235 | 0.064 +/- 0.050 | 0.068 | U |
| 7440-61-1 | U-238 | 2.37 +/- 0.44 | 0.05 | |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 8.456 | 7.0 | pCi/g | 82.8 | 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** GR-07
**Lab ID:** 0405097-10

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 07-May-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 08-Jul-04

**Prep Batch:** AS040629-9
**QCBatchID:** AS040629-9-1
**Run ID:** AS040629-9b
**Count Time:** 300 minutes
**Report Basis:** Dry Weight

**Final Aliquot:** 1.03 g
**Prep Basis:** Dry Weight
**Moisture(%):** NA
**Result Units:** pCi/g
**File Name:** U509710

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 1.16 +/- 0.25 | 0.03 | |
| 15117-96-1 | U-235 | 0.097 +/- 0.057 | 0.046 | LT |
| 7440-61-1 | U-238 | 1.40 +/- 0.29 | 0.04 | |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 8.294 | 6.8 | pCi/g | 81.7 | 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** GR-08
**Lab ID:** 0405097-11

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 07-May-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 08-Jul-04

**Prep Batch:** AS040629-9
**QCBatchID:** AS040629-9-1
**Run ID:** AS040629-9b
**Count Time:** 300 minutes
**Report Basis:** Dry Weight

**Final Aliquot:** 1.06 g
**Prep Basis:** Dry Weight
**Moisture(%):** NA
**Result Units:** pCi/g
**File Name:** U509711

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 0.84 +/- 0.19 | 0.03 | |
| 15117-96-1 | U-235 | 0.067 +/- 0.044 | 0.040 | LT |
| 7440-61-1 | U-238 | 1.03 +/- 0.22 | 0.03 | |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 8.068 | 6.9 | pCi/g | 85.9 | 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** GR-09
**Lab ID:** 0405097-12

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 07-May-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 08-Jul-04

**Prep Batch:** AS040629-9
**QCBatchID:** AS040629-9-1
**Run ID:** AS040629-9b
**Count Time:** 300 minutes
**Report Basis:** Dry Weight

**Final Aliquot:** 1.02 g
**Prep Basis:** Dry Weight
**Moisture(%):** NA
**Result Units:** pCi/g
**File Name:** U509712

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 1.68 +/- 0.33 | 0.05 | |
| 15117-96-1 | U-235 | 0.067 +/- 0.048 | 0.052 | LT |
| 7440-61-1 | U-238 | 1.98 +/- 0.38 | 0.05 | |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 8.357 | 6.6 | pCi/g | 78.7 | 30 - 110 % | |

### Comments:

**Qualifiers/Flags:**

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

**Data Package ID:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** GR-10
**Lab ID:** 0405097-13

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 07-May-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 08-Jul-04

**Prep Batch:** AS040629-9
**QCBatchID:** AS040629-9-1
**Run ID:** AS040629-9b
**Count Time:** 300 minutes
**Report Basis:** Dry Weight

**Final Aliquot:** 1.02 g
**Prep Basis:** Dry Weight
**Moisture(%):** NA
**Result Units:** pCi/g
**File Name:** U509713

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 1.99 +/- 0.38 | 0.04 | |
| 15117-96-1 | U-235 | 0.130 +/- 0.066 | 0.051 | |
| 7440-61-1 | U-238 | 2.71 +/- 0.49 | 0.04 | |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 8.321 | 6.8 | pCi/g | 81.5 | 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** QM-01
**Lab ID:** 0405097-14

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 03-May-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 08-Jul-04

**Prep Batch:** AS040629-9
**QCBatchID:** AS040629-9-1
**Run ID:** AS040629-9b
**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:** U509714

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 0.49 +/- 0.13 | 0.04 | |
| 15117-96-1 | U-235 | 0.025 +/- 0.028 | 0.036 | U |
| 7440-61-1 | U-238 | 0.42 +/- 0.12 | 0.04 | |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 8.481 | 7.6 | pCi/g | 90.0 | 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** QM-02
**Lab ID:** 0405097-15

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 03-May-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 08-Jul-04

**Prep Batch:** AS040629-9
**QCBatchID:** AS040629-9-1
**Run ID:** AS040629-9b
**Count Time:** 300 minutes
**Report Basis:** Dry Weight

**Final Aliquot:** 1.03 g
**Prep Basis:** Dry Weight
**Moisture(%):** NA
**Result Units:** pCi/g
**File Name:** U509715

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 0.45 +/- 0.13 | 0.03 | |
| 15117-96-1 | U-235 | 0.017 +/- 0.026 | 0.045 | U |
| 7440-61-1 | U-238 | 0.44 +/- 0.12 | 0.04 | |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 8.293 | 6.9 | pCi/g | 83.4 | 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** QM-03
**Lab ID:** 0405097-16

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 03-May-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 08-Jul-04

**Prep Batch:** AS040629-9
**QCBatchID:** AS040629-9-1
**Run ID:** AS040629-9b
**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:** U509716

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 0.49 +/- 0.13 | 0.02 | |
| 15117-96-1 | U-235 | 0.046 +/- 0.037 | 0.036 | LT |
| 7440-61-1 | U-238 | 0.43 +/- 0.12 | 0.02 | |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 8.485 | 6.8 | pCi/g | 80.7 | 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** 300-01
**Lab ID:** 0405097-17

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 04-May-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 09-Jul-04

**Prep Batch:** AS040629-7
**QCBatchID:** AS040629-7-1
**Run ID:** AS040629-7A
**Count Time:** 300 minutes
**Report Basis:** Dry Weight

**Final Aliquot:** 0.0260 g
**Prep Basis:** Dry Weight
**Moisture(%):** NA
**Result Units:** pCi/g
**File Name:** U509717

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 2280 +/- 370 | 0 | M3 |
| 15117-96-1 | U-235 | 117 +/- 23 | 3 | M3 |
| 7440-61-1 | U-238 | 2350 +/- 380 | 0 | M3 |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 327.4 | 189 | pCi/g | 57.8 | 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** 300-02
**Lab ID:** 0405097-18

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 07-May-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 08-Jul-04

**Prep Batch:** AS040629-9
**QCBatchID:** AS040629-9-1
**Run ID:** AS040629-9b
**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:** U509718

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 39.9 +/- 6.3 | 0 | |
| 15117-96-1 | U-235 | 1.92 +/- 0.39 | 0.02 | |
| 7440-61-1 | U-238 | 41.8 +/- 6.6 | 0.1 | |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 8.462 | 6.35 | pCi/g | 75.0 | 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** 700-01
**Lab ID:** 0405097-19

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 07-May-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 09-Jul-04

**Prep Batch:** AS040629-7
**QCBatchID:** AS040629-7-1
**Run ID:** AS040629-7A
**Count Time:** 300 minutes
**Report Basis:** Dry Weight

**Final Aliquot:** 0.0145 g
**Prep Basis:** Dry Weight
**Moisture(%):** NA
**Result Units:** pCi/g
**File Name:** UR509719

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 3220 +/- 510 | 10 | M3 |
| 15117-96-1 | U-235 | 180 +/- 35 | 4 | M3 |
| 7440-61-1 | U-238 | 3220 +/- 510 | 0 | M3 |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 589.8 | 405 | pCi/g | 68.7 | 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** 700-02
**Lab ID:** 0405097-20

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 07-May-04
**Date Prepared:** 13-Jul-04
**Date Analyzed:** 16-Jul-04

**Prep Batch:** AS040712-5
**QCBatchID:** AS040712-5-1
**Run ID:** AS040712-5A
**Count Time:** 300 minutes
**Report Basis:** Dry Weight

**Final Aliquot:** 0.0508 g
**Prep Basis:** Dry Weight
**Moisture(%):** NA
**Result Units:** pCi/g
**File Name:** UX509720

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 422 +/- 67 | 1 | M3 |
| 15117-96-1 | U-235 | 22.0 +/- 4.9 | 0.4 | M3 |
| 7440-61-1 | U-238 | 420 +/- 67 | 1 | M3 |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 167.9 | 148 | pCi/g | 88.0 | 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Sample Duplicate Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** 700-02
**Lab ID:** 0405097-20DUP

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 07-May-04
**Date Prepared:** 13-Jul-04
**Date Analyzed:** 16-Jul-04

**Prep Batch:** AS040712-5
**QCBatchID:** AS040712-5-1
**Run ID:** AS040712-5A
**Count Time:** 300 minutes
**Report Basis:** Dry Weight

**Final Aliquot:** 0.0503 g
**Prep Basis:** Dry Weight
**Moisture(%):** NA
**Result Units:** pCi/g
**File Name:** UX509720D

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 423 +/- 67 | 1 | M3 |
| 15117-96-1 | U-235 | 20.6 +/- 4.6 | 1.1 | M3 |
| 7440-61-1 | U-238 | 451 +/- 72 | 1 | M3 |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 169.6 | 150 | pCi/g | 88.4 | 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.
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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** 700-03
**Lab ID:** 0405097-21

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 07-May-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 09-Jul-04

**Prep Batch:** AS040629-7
**QCBatchID:** AS040629-7-1
**Run ID:** AS040629-7A
**Count Time:** 300 minutes
**Report Basis:** Dry Weight

**Final Aliquot:** 0.0208 g
**Prep Basis:** Dry Weight
**Moisture(%):** NA
**Result Units:** pCi/g
**File Name:** UR509721

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 3390 +/- 550 | 0 | M3 |
| 15117-96-1 | U-235 | 184 +/- 36 | 5 | M3 |
| 7440-61-1 | U-238 | 3390 +/- 550 | 0 | M3 |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 411.0 | 218 | 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** 700-04
**Lab ID:** 0405097-22

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 07-May-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 09-Jul-04

**Prep Batch:** AS040629-7
**QCBatchID:** AS040629-7-1
**Run ID:** AS040629-7A
**Count Time:** 300 minutes
**Report Basis:** Dry Weight

**Final Aliquot:** 0.0706 g
**Prep Basis:** Dry Weight
**Moisture(%):** NA
**Result Units:** pCi/g
**File Name:** U509722

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 650 +/- 100 | 0 | M3 |
| 15117-96-1 | U-235 | 37.3 +/- 7.2 | 0.6 | M3 |
| 7440-61-1 | U-238 | 660 +/- 100 | 0 | M3 |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 120.9 | 88 | pCi/g | 72.9 | 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** 900-01
**Lab ID:** 0405097-23

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 07-May-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 09-Jul-04

**Prep Batch:** AS040629-7
**QCBatchID:** AS040629-7-1
**Run ID:** AS040629-7A
**Count Time:** 300 minutes
**Report Basis:** Dry Weight

**Final Aliquot:** 0.132 g
**Prep Basis:** Dry Weight
**Moisture(%):** NA
**Result Units:** pCi/g
**File Name:** U509723

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 415 +/- 67 | 0 | M3 |
| 15117-96-1 | U-235 | 21.7 +/- 4.3 | 0.2 | M3 |
| 7440-61-1 | U-238 | 452 +/- 73 | 0 | M3 |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 64.40 | 40.2 | pCi/g | 62.4 | 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Sample Duplicate Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** 900-01
**Lab ID:** 0405097-23DUP

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 07-May-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 11-Jul-04

**Prep Batch:** AS040629-7
**QCBatchID:** AS040629-7-1
**Run ID:** AS040629-7A
**Count Time:** 300 minutes
**Report Basis:** Dry Weight

**Final Aliquot:** 0.132 g
**Prep Basis:** Dry Weight
**Moisture(%):** NA
**Result Units:** pCi/g
**File Name:** UR509723D

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 405 +/- 65 | 0 | M3 |
| 15117-96-1 | U-235 | 22.1 +/- 4.3 | 0.2 | M3 |
| 7440-61-1 | U-238 | 448 +/- 71 | 0 | M3 |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 64.40 | 40.6 | pCi/g | 63.1 | 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.
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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** 900-02
**Lab ID:** 0405097-24

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 07-May-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 09-Jul-04

**Prep Batch:** AS040629-7
**QCBatchID:** AS040629-7-1
**Run ID:** AS040629-7A
**Count Time:** 300 minutes
**Report Basis:** Dry Weight

**Final Aliquot:** 0.0251 g
**Prep Basis:** Dry Weight
**Moisture(%):** NA
**Result Units:** pCi/g
**File Name:** U509724

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 2800 +/- 450 | 0 | M3 |
| 15117-96-1 | U-235 | 149 +/- 28 | 2 | M3 |
| 7440-61-1 | U-238 | 2880 +/- 460 | 0 | M3 |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 339.7 | 182 | pCi/g | 53.5 | 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** 900-03
**Lab ID:** 0405097-25

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 07-May-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 09-Jul-04

**Prep Batch:** AS040629-7
**QCBatchID:** AS040629-7-1
**Run ID:** AS040629-7A
**Count Time:** 300 minutes
**Report Basis:** Dry Weight

**Final Aliquot:** 0.0826 g
**Prep Basis:** Dry Weight
**Moisture(%):** NA
**Result Units:** pCi/g
**File Name:** UR509725

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 470 +/- 74 | 1 | M3 |
| 15117-96-1 | U-235 | 24.0 +/- 4.8 | 0.6 | M3 |
| 7440-61-1 | U-238 | 462 +/- 73 | 1 | M3 |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 103.2 | 81 | pCi/g | 78.5 | 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** 900-04
**Lab ID:** 0405097-26

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 07-May-04
**Date Prepared:** 13-Jul-04
**Date Analyzed:** 16-Jul-04

**Prep Batch:** AS040712-5
**QCBatchID:** AS040712-5-1
**Run ID:** AS040712-5A
**Count Time:** 300 minutes
**Report Basis:** Dry Weight

**Final Aliquot:** 0.101 g
**Prep Basis:** Dry Weight
**Moisture(%):** NA
**Result Units:** pCi/g
**File Name:** UX509726

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 163 +/- 26 | 1 | M3 |
| 15117-96-1 | U-235 | 9.0 +/- 2.1 | 0.3 | M3 |
| 7440-61-1 | U-238 | 171 +/- 27 | 0 | M3 |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 84.01 | 73 | pCi/g | 87.4 | 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** 900-05
**Lab ID:** 0405097-27

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 07-May-04
**Date Prepared:** 13-Jul-04
**Date Analyzed:** 16-Jul-04

**Prep Batch:** AS040712-5
**QCBatchID:** AS040712-5-1
**Run ID:** AS040712-5A
**Count Time:** 300 minutes
**Report Basis:** Dry Weight

**Final Aliquot:** 0.101 g
**Prep Basis:** Dry Weight
**Moisture(%):** NA
**Result Units:** pCi/g
**File Name:** UX509727

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 137 +/- 22 | 0 | M3 |
| 15117-96-1 | U-235 | 6.9 +/- 1.7 | 0.2 | M3 |
| 7440-61-1 | U-238 | 138 +/- 22 | 0 | M3 |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 84.64 | 76 | pCi/g | 90.4 | 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** OSA-01
**Lab ID:** 0405097-28

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 06-May-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 09-Jul-04

**Prep Batch:** AS040629-7
**QCBatchID:** AS040629-7-1
**Run ID:** AS040629-7A
**Count Time:** 300 minutes
**Report Basis:** Dry Weight

**Final Aliquot:** 0.0274 g
**Prep Basis:** Dry Weight
**Moisture(%):** NA
**Result Units:** pCi/g
**File Name:** U509728

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 2370 +/- 380 | 0 | M3 |
| 15117-96-1 | U-235 | 110 +/- 22 | 4 | M3 |
| 7440-61-1 | U-238 | 2280 +/- 370 | 0 | M3 |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 310.7 | 174 | pCi/g | 56.1 | 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** OSA-02
**Lab ID:** 0405097-29

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 06-May-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 09-Jul-04

**Prep Batch:** AS040629-7
**QCBatchID:** AS040629-7-1
**Run ID:** AS040629-7A
**Count Time:** 300 minutes
**Report Basis:** Dry Weight

**Final Aliquot:** 0.0569 g
**Prep Basis:** Dry Weight
**Moisture(%):** NA
**Result Units:** pCi/g
**File Name:** UR509729

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 650 +/- 100 | 0 | M3 |
| 15117-96-1 | U-235 | 32.2 +/- 6.4 | 0.8 | M3 |
| 7440-61-1 | U-238 | 670 +/- 110 | 0 | M3 |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 149.9 | 121 | pCi/g | 80.6 | 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:** *UR0405097-1*

# Isotopic Uranium By Alpha Spectroscopy

## PAI 714 Rev 9

## Sample Results

**Lab Name:** Paragon Analytics
**Work Order Number:** 0405097
**Client Name:** Kent & Sullivan Inc.
**ClientProject ID:** Ross Adams

**Field ID:** OSA-03
**Lab ID:** 0405097-30

**Sample Matrix:** SOLID
**Prep SOP:** PAI 778 Rev 9
**Date Collected:** 06-May-04
**Date Prepared:** 30-Jun-04
**Date Analyzed:** 09-Jul-04

**Prep Batch:** AS040629-7
**QCBatchID:** AS040629-7-1
**Run ID:** AS040629-7A
**Count Time:** 300 minutes
**Report Basis:** Dry Weight

**Final Aliquot:** 0.0688 g
**Prep Basis:** Dry Weight
**Moisture(%):** NA
**Result Units:** pCi/g
**File Name:** U509730

| CASNO | Target Nuclide | Result +/- 2 s TPU | MDC | Lab Qualifier |
|---|---|---|---|---|
| 13966-29-5 | U-234 | 630 +/- 100 | 0 | M3 |
| 15117-96-1 | U-235 | 33.3 +/- 6.4 | 0.7 | M3 |
| 7440-61-1 | U-238 | 630 +/- 100 | 0 | M3 |

## Chemical Yield Summary

| Carrier/Tracer | Amount Added | Result | Units | Yield | Control Limits | Flag |
|---|---|---|---|---|---|---|
| U-232 | 124.0 | 102 | pCi/g | 82.3 | 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:** *UR0405097-1*

PARAGON ANALYTICS
Radiochemistry Data Package

4

Section 4

# RAW DATA

# Isotopic Uranium By Alpha Spectroscopy Raw Data Report

**Laboratory Name:** Paragon Analytics
**PAI Work Order:** 0405097

**Prep SOP:** PAI 778
**Analytical SOP:** PAI 714

**Reported on:** Thursday, July 22, 2004
1:34:49 PM

| Sample ID<br>QC Type | Nuclide<br>Type | Sample<br>Date/Time | Prep Batch<br>QCBatchID | Ingrowth<br>Date /Time | Decay<br>Date/Time | Matrix<br>%Moist. | Samp Alq<br>Analy Alq | Inst ID<br>Det ID | AnRunID<br>File Name | Count<br>Date/Time | Net Cnts<br>Bkg Cnts | BaseEff<br>Bkg(min) | CntDur(min)<br>Yield | Activity +/-<br>2 s TPU | MDC<br>DecLev | ReportUnits<br>ReportBasis | DER<br>RPD | %Spk. Recov<br>Flags |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0405097-1 | U-232 | 5/6/2004 | AS040712-5 | NA | NA | SOLID | 0.1 g | Alpha Spec | AS040712-5A | 7/16/2004 | 1424.900 | 30.42% | 300 | 70 | 0 | pCi/g | NA | |
| SMP | Tracer | 7:00:00 PM | AS040712-5-1 | NA | NA | NA | 0.1 g | 10 | UX50971 | 6:35 AM | 7.000 | 1000 | 82.5% | 11 | NA | Dry Weight | NA | |
| 0405097-1 | U-234 | 5/6/2004 | AS040712-5 | NA | NA | SOLID | 0.1 g | Alpha Spec | AS040712-5A | 7/16/2004 | 3276.500 | 30.42% | 300 | 196 | 1 | pCi/g | NA | |
| SMP | Trg. Analyte | 7:00:00 PM | AS040712-5-1 | NA | NA | NA | 0.1 g | 10 | UX50971 | 6:35 AM | 5.000 | 1000 | 82.5% | 31 | NA | Dry Weight | NA | M3 |
| 0405097-1 | U-235 | 5/6/2004 | AS040712-5 | NA | NA | SOLID | 0.1 g | Alpha Spec | AS040712-5A | 7/16/2004 | 147.000 | 30.42% | 300 | 10.3 | 0.2 | pCi/g | NA | |
| SMP | Trg. Analyte | 7:00:00 PM | AS040712-5-1 | NA | NA | NA | 0.1 g | 10 | UX50971 | 6:35 AM | 0.000 | 1000 | 82.5% | 2.3 | NA | Dry Weight | NA | M3 |
| 0405097-1 | U-238 | 5/6/2004 | AS040712-5 | NA | NA | SOLID | 0.1 g | Alpha Spec | AS040712-5A | 7/16/2004 | 3455.700 | 30.42% | 300 | 207 | 0 | pCi/g | NA | |
| SMP | Trg. Analyte | 7:00:00 PM | AS040712-5-1 | NA | NA | NA | 0.1 g | 10 | UX50971 | 6:35 AM | 1.000 | 1000 | 82.5% | 33 | NA | Dry Weight | NA | M3 |
| 0405097-2 | U-232 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.141 g | Alpha Spec | AS040629-7A | 7/9/2004 | 1140.700 | 29.29% | 300 | 41.5 | 0.7 | pCi/g | NA | |
| SMP | Tracer | 1:30:00 PM | AS040629-7-1 | NA | NA | NA | 0.141 g | 15 | U50972 | 7:26 AM | 41.000 | 1000 | 68.6% | 6.5 | NA | Dry Weight | NA | |
| 0405097-2 | U-234 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.141 g | Alpha Spec | AS040629-7A | 7/9/2004 | 6044.100 | 29.29% | 300 | 321 | 0 | pCi/g | NA | |
| SMP | Trg. Analyte | 1:30:00 PM | AS040629-7-1 | NA | NA | NA | 0.141 g | 15 | U50972 | 7:26 AM | 3.000 | 1000 | 68.6% | 51 | NA | Dry Weight | NA | M3 |
| 0405097-2 | U-235 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.141 g | Alpha Spec | AS040629-7A | 7/9/2004 | 288.900 | 29.29% | 300 | 18.0 | 0.6 | pCi/g | NA | |
| SMP | Trg. Analyte | 1:30:00 PM | AS040629-7-1 | NA | NA | NA | 0.141 g | 15 | U50972 | 7:26 AM | 7.000 | 1000 | 68.6% | 3.6 | NA | Dry Weight | NA | M3 |
| 0405097-2 | U-238 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.141 g | Alpha Spec | AS040629-7A | 7/9/2004 | 6152.800 | 29.29% | 300 | 326 | 0 | pCi/g | NA | |
| SMP | Trg. Analyte | 1:30:00 PM | AS040629-7-1 | NA | NA | NA | 0.141 g | 15 | U50972 | 7:26 AM | 4.000 | 1000 | 68.6% | 52 | NA | Dry Weight | NA | M3 |
| 0405097-2 | U-232 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.141 g | Alpha Spec | AS040629-7A | 7/9/2004 | 1165.600 | 28.97% | 300 | 42.9 | 0.4 | pCi/g | NA | |
| DUP | Tracer | 1:30:00 PM | AS040629-7-1 | NA | NA | NA | 0.141 g | 16 | U50972D | 7:26 AM | 8.000 | 1000 | 70.8% | 6.7 | NA | Dry Weight | NA | |
| 0405097-2 | U-234 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.141 g | Alpha Spec | AS040629-7A | 7/9/2004 | 6002.700 | 28.97% | 300 | 312 | 0 | pCi/g | 0.13 | |
| DUP | Trg. Analyte | 1:30:00 PM | AS040629-7-1 | NA | NA | NA | 0.141 g | 16 | U50972D | 7:26 AM | 1.000 | 1000 | 70.8% | 50 | NA | Dry Weight | NA | M3 |
| 0405097-2 | U-235 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.141 g | Alpha Spec | AS040629-7A | 7/9/2004 | 301.400 | 28.97% | 300 | 18.4 | 0.4 | pCi/g | 0.07 | |
| DUP | Trg. Analyte | 1:30:00 PM | AS040629-7-1 | NA | NA | NA | 0.141 g | 16 | U50972D | 7:26 AM | 2.000 | 1000 | 70.8% | 3.6 | NA | Dry Weight | NA | M3 |

**Comments:**

**Data Package ID:** *ur0405097-1*

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



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# Isotopic Uranium By Alpha Spectroscopy Raw Data Report

**Laboratory Name:** Paragon Analytics
**PAI Work Order:** 0405097

**Prep SOP:** PAI 778
**Analytical SOP:** PAI 714

**Reported on:** Thursday, July 22, 2004
1:36:21 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0405097-2 | U-238 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.141 g | Alpha Spec | AS040629-7A | 7/9/2004 | 6010.400 | 28.97% | 300 | 312 | 0 | pCi/g | 0.20 | |
| DUP | Trg. Analyte | 1:30:00 PM | AS040629-7-1 | NA | NA | NA | 0.141 g | 16 | U50972D | 7:26 AM | 2.000 | 1000 | 70.8% | 50 | NA | Dry Weight | NA | M3 |
| 0405097-3 | U-232 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.312 g | Alpha Spec | AS040629-7A | 7/9/2004 | 1001.800 | 29.00% | 300 | 16.6 | 0.1 | pCi/g | NA | |
| SMP | Tracer | 1:20:00 PM | AS040629-7-1 | NA | NA | NA | 0.312 g | 11 | UR50973 | 1:48 PM | 4.000 | 1000 | 60.8% | 2.6 | NA | Dry Weight | NA | |
| 0405097-3 | U-234 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.312 g | Alpha Spec | AS040629-7A | 7/9/2004 | 6780.399 | 29.00% | 300 | 185 | 0 | pCi/g | NA | |
| SMP | Trg. Analyte | 1:20:00 PM | AS040629-7-1 | NA | NA | NA | 0.312 g | 11 | UR50973 | 1:48 PM | 2.000 | 1000 | 60.8% | 30 | NA | Dry Weight | NA | M3 |
| 0405097-3 | U-235 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.312 g | Alpha Spec | AS040629-7A | 7/9/2004 | 344.000 | 29.00% | 300 | 11.0 | 0.1 | pCi/g | NA | |
| SMP | Trg. Analyte | 1:20:00 PM | AS040629-7-1 | NA | NA | NA | 0.312 g | 11 | UR50973 | 1:48 PM | 0.000 | 1000 | 60.8% | 2.1 | NA | Dry Weight | NA | |
| 0405097-3 | U-238 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.312 g | Alpha Spec | AS040629-7A | 7/9/2004 | 6955.000 | 29.00% | 300 | 190 | 0 | pCi/g | NA | |
| SMP | Trg. Analyte | 1:20:00 PM | AS040629-7-1 | NA | NA | NA | 0.312 g | 11 | UR50973 | 1:48 PM | 0.000 | 1000 | 60.8% | 31 | NA | Dry Weight | NA | |
| 0405097-4 | U-232 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.01 g | Alpha Spec | AS040629-9b | 7/8/2004 | 1374.300 | 30.68% | 300 | 6.6 | 0.1 | pCi/g | NA | |
| SMP | Tracer | 1:11:00 PM | AS040629-9-1 | NA | NA | NA | 1.01 g | 64 | U50974 | 6:51 AM | 9.000 | 1000 | 78.9% | 1.0 | NA | Dry Weight | NA | |
| 0405097-4 | U-234 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.01 g | Alpha Spec | AS040629-9b | 7/8/2004 | 775.500 | 30.68% | 300 | 4.75 | 0.05 | pCi/g | NA | |
| SMP | Trg. Analyte | 1:11:00 PM | AS040629-9-1 | NA | NA | NA | 1.01 g | 64 | U50974 | 6:51 AM | 5.000 | 1000 | 78.9% | 0.81 | NA | Dry Weight | NA | |
| 0405097-4 | U-235 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.01 g | Alpha Spec | AS040629-9b | 7/8/2004 | 26.700 | 30.68% | 300 | 0.193 | 0.038 | pCi/g | NA | |
| SMP | Trg. Analyte | 1:11:00 PM | AS040629-9-1 | NA | NA | NA | 1.01 g | 64 | U50974 | 6:51 AM | 1.000 | 1000 | 78.9% | 0.081 | NA | Dry Weight | NA | |
| 0405097-4 | U-238 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.01 g | Alpha Spec | AS040629-9b | 7/8/2004 | 815.700 | 30.68% | 300 | 5.00 | 0.03 | pCi/g | NA | |
| SMP | Trg. Analyte | 1:11:00 PM | AS040629-9-1 | NA | NA | NA | 1.01 g | 64 | U50974 | 6:51 AM | 1.000 | 1000 | 78.9% | 0.85 | NA | Dry Weight | NA | |
| 0405097-5 | U-232 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1 g | Alpha Spec | AS040629-9b | 7/8/2004 | 1293.900 | 29.27% | 300 | 6.6 | 0.1 | pCi/g | NA | |
| SMP | Tracer | 1:38:00 PM | AS040629-9-1 | NA | NA | NA | 1 g | 9 | U50975 | 12:59 PM | 17.000 | 1000 | 77.8% | 1.0 | NA | Dry Weight | NA | |
| 0405097-5 | U-234 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1 g | Alpha Spec | AS040629-9b | 7/8/2004 | 443.900 | 29.27% | 300 | 2.91 | 0.09 | pCi/g | NA | |
| SMP | Trg. Analyte | 1:38:00 PM | AS040629-9-1 | NA | NA | NA | 1 g | 9 | U50975 | 12:59 PM | 17.000 | 1000 | 77.8% | 0.53 | NA | Dry Weight | NA | |

**Comments:**

**Data Package ID:** *ur0405097-1*

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



000054

# Isotopic Uranium By Alpha Spectroscopy Raw Data Report

**Laboratory Name:** Paragon Analytics
**PAI Work Order:** 0405097

**Prep SOP:** PAI 778
**Analytical SOP:** PAI 714

**Reported on:** Thursday, July 22, 2004
1:35:59 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0405097-5 | U-235 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1 g | Alpha Spec | AS040629-9b | 7/8/2004 | 21.100 | 29.27% | 300 | 0.163 | 0.055 | pCi/g | NA | |
| SMP | Trg. Analyte | 1:38:00 PM | AS040629-9-1 | NA | NA | NA | 1 g | 9 | U50975 | 12:59 PM | 3.000 | 1000 | 77.8% | 0.077 | NA | Dry Weight | NA | |
| 0405097-5 | U-238 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1 g | Alpha Spec | AS040629-9b | 7/8/2004 | 509.600 | 29.27% | 300 | 3.34 | 0.07 | pCi/g | NA | |
| SMP | Trg. Analyte | 1:38:00 PM | AS040629-9-1 | NA | NA | NA | 1 g | 9 | U50975 | 12:59 PM | 8.000 | 1000 | 77.8% | 0.60 | NA | Dry Weight | NA | |
| 0405097-5 | U-232 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.01 g | Alpha Spec | AS040629-9b | 7/8/2004 | 1353.800 | 29.73% | 300 | 6.8 | 0.1 | pCi/g | NA | |
| DUP | Tracer | 1:38:00 PM | AS040629-9-1 | NA | NA | NA | 1.01 g | 10 | U50975D | 1:00 PM | 14.000 | 1000 | 80.2% | 1.1 | NA | Dry Weight | NA | |
| 0405097-5 | U-234 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.01 g | Alpha Spec | AS040629-9b | 7/8/2004 | 451.400 | 29.73% | 300 | 2.82 | 0.04 | pCi/g | 0.13 | |
| DUP | Trg. Analyte | 1:38:00 PM | AS040629-9-1 | NA | NA | NA | 1.01 g | 10 | U50975D | 1:00 PM | 2.000 | 1000 | 80.2% | 0.51 | NA | Dry Weight | NA | |
| 0405097-5 | U-235 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.01 g | Alpha Spec | AS040629-9b | 7/8/2004 | 21.700 | 29.73% | 300 | 0.159 | 0.039 | pCi/g | 0.03 | |
| DUP | Trg. Analyte | 1:38:00 PM | AS040629-9-1 | NA | NA | NA | 1.01 g | 10 | U50975D | 1:00 PM | 1.000 | 1000 | 80.2% | 0.073 | NA | Dry Weight | NA | |
| 0405097-5 | U-238 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.01 g | Alpha Spec | AS040629-9b | 7/8/2004 | 481.700 | 29.73% | 300 | 3.01 | 0.03 | pCi/g | 0.41 | |
| DUP | Trg. Analyte | 1:38:00 PM | AS040629-9-1 | NA | NA | NA | 1.01 g | 10 | U50975D | 1:00 PM | 1.000 | 1000 | 80.2% | 0.54 | NA | Dry Weight | NA | |
| 0405097-6 | U-232 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.01 g | Alpha Spec | AS040629-9b | 7/8/2004 | 1440.800 | 29.00% | 300 | 7.4 | 0 | pCi/g | NA | |
| SMP | Tracer | 2:00:00 PM | AS040629-9-1 | NA | NA | NA | 1.01 g | 11 | U50976 | 1:01 PM | 4.000 | 1000 | 87.5% | 1.2 | NA | Dry Weight | NA | |
| 0405097-6 | U-234 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.01 g | Alpha Spec | AS040629-9b | 7/8/2004 | 207.400 | 29.00% | 300 | 1.22 | 0.04 | pCi/g | NA | |
| SMP | Trg. Analyte | 2:00:00 PM | AS040629-9-1 | NA | NA | NA | 1.01 g | 11 | U50976 | 1:01 PM | 2.000 | 1000 | 87.5% | 0.25 | NA | Dry Weight | NA | |
| 0405097-6 | U-235 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.01 g | Alpha Spec | AS040629-9b | 7/8/2004 | 12.000 | 29.00% | 300 | 0.083 | 0.019 | pCi/g | NA | |
| SMP | Trg. Analyte | 2:00:00 PM | AS040629-9-1 | NA | NA | NA | 1.01 g | 11 | U50976 | 1:01 PM | 0.000 | 1000 | 87.5% | 0.050 | NA | Dry Weight | NA | LT |
| 0405097-6 | U-238 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.01 g | Alpha Spec | AS040629-9b | 7/8/2004 | 245.000 | 29.00% | 300 | 1.44 | 0.02 | pCi/g | NA | |
| SMP | Trg. Analyte | 2:00:00 PM | AS040629-9-1 | NA | NA | NA | 1.01 g | 11 | U50976 | 1:01 PM | 0.000 | 1000 | 87.5% | 0.29 | NA | Dry Weight | NA | |
| 0405097-7 | U-232 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.01 g | Alpha Spec | AS040629-9b | 7/8/2004 | 1285.000 | 29.45% | 300 | 6.5 | 0.1 | pCi/g | NA | |
| SMP | Tracer | 2:20:00 PM | AS040629-9-1 | NA | NA | NA | 1.01 g | 12 | U50977 | 1:02 PM | 30.000 | 1000 | 76.8% | 1.0 | NA | Dry Weight | NA | |

**Comments:**

**Data Package ID:** *ur0405097-1*

## 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



590065

# Isotopic Uranium By Alpha Spectroscopy Raw Data Report

**Laboratory Name:** Paragon Analytics
**PAI Work Order:** 0405097

**Prep SOP:** PAI 778
**Analytical SOP:** PAI 714

**Reported on:** Thursday, July 22, 2004
1:35:59 PM

| Sample ID<br>QC Type | Nuclide<br>Type | Sample<br>Date/Time | Prep Batch<br>QCBatchID | Ingrowth<br>Date /Time | Decay<br>Date/Time | Matrix<br>%Moist. | Samp Alq<br>Analy Alq | Inst ID<br>Det ID | AnRunID<br>File Name | Count<br>Date/Time | Net Cnts<br>Bkg Cnts | BaseEff<br>Bkg(min) | CntDur(min)<br>Yield | Activity +/-<br>2 s TPU | MDC<br>DecLev | ReportUnits<br>ReportBasis | DER<br>RPD | %Spk. Recov<br>Flags |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0405097-7 | U-234 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.01 g | Alpha Spec | AS040629-9b | 7/8/2004 | 2506.500 | 29.45% | 300 | 16.5 | 0.1 | pCi/g | NA | |
| SMP | Trg. Analyte | 2:20:00 PM | AS040629-9-1 | NA | NA | NA | 1.01 g | 12 | U50977 | 1:02 PM | 5.000 | 1000 | 76.8% | 2.7 | NA | Dry Weight | NA | |
| 0405097-7 | U-235 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.01 g | Alpha Spec | AS040629-9b | 7/8/2004 | 121.700 | 29.45% | 300 | 0.94 | 0.04 | pCi/g | NA | |
| SMP | Trg. Analyte | 2:20:00 PM | AS040629-9-1 | NA | NA | NA | 1.01 g | 12 | U50977 | 1:02 PM | 1.000 | 1000 | 76.8% | 0.23 | NA | Dry Weight | NA | |
| 0405097-7 | U-238 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.01 g | Alpha Spec | AS040629-9b | 7/8/2004 | 2632.100 | 29.45% | 300 | 17.3 | 0 | pCi/g | NA | |
| SMP | Trg. Analyte | 2:20:00 PM | AS040629-9-1 | NA | NA | NA | 1.01 g | 12 | U50977 | 1:02 PM | 3.000 | 1000 | 76.8% | 2.8 | NA | Dry Weight | NA | |
| 0405097-8 | U-232 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.04 g | Alpha Spec | AS040629-9b | 7/8/2004 | 1425.200 | 31.29% | 300 | 6.6 | 0.1 | pCi/g | NA | |
| SMP | Tracer | 2:38:00 PM | AS040629-9-1 | NA | NA | NA | 1.04 g | 13 | U50978 | 1:02 PM | 16.000 | 1000 | 80.2% | 1.0 | NA | Dry Weight | NA | |
| 0405097-8 | U-234 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.04 g | Alpha Spec | AS040629-9b | 7/8/2004 | 234.100 | 31.29% | 300 | 1.35 | 0.07 | pCi/g | NA | |
| SMP | Trg. Analyte | 2:38:00 PM | AS040629-9-1 | NA | NA | NA | 1.04 g | 13 | U50978 | 1:02 PM | 13.000 | 1000 | 80.2% | 0.27 | NA | Dry Weight | NA | |
| 0405097-8 | U-235 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.04 g | Alpha Spec | AS040629-9b | 7/8/2004 | 7.100 | 31.29% | 300 | 0.048 | 0.048 | pCi/g | NA | |
| SMP | Trg. Analyte | 2:38:00 PM | AS040629-9-1 | NA | NA | NA | 1.04 g | 13 | U50978 | 1:02 PM | 3.000 | 1000 | 80.2% | 0.040 | NA | Dry Weight | NA | U |
| 0405097-8 | U-238 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.04 g | Alpha Spec | AS040629-9b | 7/8/2004 | 300.900 | 31.29% | 300 | 1.73 | 0.05 | pCi/g | NA | |
| SMP | Trg. Analyte | 2:38:00 PM | AS040629-9-1 | NA | NA | NA | 1.04 g | 13 | U50978 | 1:02 PM | 7.000 | 1000 | 80.2% | 0.34 | NA | Dry Weight | NA | |
| 0405097-9 | U-232 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.01 g | Alpha Spec | AS040629-9b | 7/8/2004 | 1377.700 | 29.29% | 300 | 7.0 | 0.1 | pCi/g | NA | |
| SMP | Tracer | 2:58:00 PM | AS040629-9-1 | NA | NA | NA | 1.01 g | 15 | U50979 | 1:02 PM | 41.000 | 1000 | 82.8% | 1.1 | NA | Dry Weight | NA | |
| 0405097-9 | U-234 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.01 g | Alpha Spec | AS040629-9b | 7/8/2004 | 340.400 | 29.29% | 300 | 2.09 | 0.04 | pCi/g | NA | |
| SMP | Trg. Analyte | 2:58:00 PM | AS040629-9-1 | NA | NA | NA | 1.01 g | 15 | U50979 | 1:02 PM | 2.000 | 1000 | 82.8% | 0.40 | NA | Dry Weight | NA | |
| 0405097-9 | U-235 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.01 g | Alpha Spec | AS040629-9b | 7/8/2004 | 8.900 | 29.29% | 300 | 0.064 | 0.068 | pCi/g | NA | |
| SMP | Trg. Analyte | 2:58:00 PM | AS040629-9-1 | NA | NA | NA | 1.01 g | 15 | U50979 | 1:02 PM | 7.000 | 1000 | 82.8% | 0.050 | NA | Dry Weight | NA | U |
| 0405097-9 | U-238 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.01 g | Alpha Spec | AS040629-9b | 7/8/2004 | 386.800 | 29.29% | 300 | 2.37 | 0.05 | pCi/g | NA | |
| SMP | Trg. Analyte | 2:58:00 PM | AS040629-9-1 | NA | NA | NA | 1.01 g | 15 | U50979 | 1:02 PM | 4.000 | 1000 | 82.8% | 0.44 | NA | Dry Weight | NA | |

**Comments:**

**Data Package ID:** *ur0405097-1*

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.

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

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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



000065

# Isotopic Uranium By Alpha Spectroscopy Raw Data Report

**Laboratory Name:** **Paragon Analytics**
**PAI Work Order:** 0405097

**Prep SOP:** PAI 778
**Analytical SOP:** PAI 714

**Reported on:** Thursday, July 22, 2004
1:35:59 PM

| Sample ID<br>QC Type | Nuclide<br>Type | Sample<br>Date/Time | Prep Batch<br>QCBatchID | Ingrowth<br>Date /Time | Decay<br>Date/Time | Matrix<br>%Moist. | Samp Alq<br>Analy Alq | Inst ID<br>Det ID | AnRunID<br>File Name | Count<br>Date/Time | Net Cnts<br>Bkg Cnts | BaseEff<br>Bkg(min) | CntDur(min)<br>Yield | Activity +/-<br>2 s TPU | MDC<br>DecLev | ReportUnits<br>ReportBasis | DER<br>RPD | %Spk. Recov<br>Flags |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0405097-10 | U-232 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.03 g | Alpha Spec | AS040629-9b | 7/8/2004 | 1344.200 | 28.97% | 300 | 6.8 | 0 | pCi/g | NA | |
| SMP | Tracer | 3:10:00 PM | AS040629-9-1 | NA | NA | NA | 1.03 g | 16 | U509710 | 1:02 PM | 6.000 | 1000 | 81.7% | 1.1 | NA | Dry Weight | NA | |
| 0405097-10 | U-234 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.03 g | Alpha Spec | AS040629-9b | 7/8/2004 | 188.700 | 28.97% | 300 | 1.16 | 0.03 | pCi/g | NA | |
| SMP | Trg. Analyte | 3:10:00 PM | AS040629-9-1 | NA | NA | NA | 1.03 g | 16 | U509710 | 1:02 PM | 1.000 | 1000 | 81.7% | 0.25 | NA | Dry Weight | NA | |
| 0405097-10 | U-235 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.03 g | Alpha Spec | AS040629-9b | 7/8/2004 | 13.400 | 28.97% | 300 | 0.097 | 0.046 | pCi/g | NA | |
| SMP | Trg. Analyte | 3:10:00 PM | AS040629-9-1 | NA | NA | NA | 1.03 g | 16 | U509710 | 1:02 PM | 2.000 | 1000 | 81.7% | 0.057 | NA | Dry Weight | NA | LT |
| 0405097-10 | U-238 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.03 g | Alpha Spec | AS040629-9b | 7/8/2004 | 226.400 | 28.97% | 300 | 1.40 | 0.04 | pCi/g | NA | |
| SMP | Trg. Analyte | 3:10:00 PM | AS040629-9-1 | NA | NA | NA | 1.03 g | 16 | U509710 | 1:02 PM | 2.000 | 1000 | 81.7% | 0.29 | NA | Dry Weight | NA | |
| 0405097-11 | U-232 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.06 g | Alpha Spec | AS040629-9b | 7/8/2004 | 1484.400 | 30.43% | 300 | 6.9 | 0.1 | pCi/g | NA | |
| SMP | Tracer | 3:10:00 PM | AS040629-9-1 | NA | NA | NA | 1.06 g | 17 | U509711 | 1:02 PM | 22.000 | 1000 | 85.9% | 1.1 | NA | Dry Weight | NA | |
| 0405097-11 | U-234 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.06 g | Alpha Spec | AS040629-9b | 7/8/2004 | 155.400 | 30.43% | 300 | 0.84 | 0.03 | pCi/g | NA | |
| SMP | Trg. Analyte | 3:10:00 PM | AS040629-9-1 | NA | NA | NA | 1.06 g | 17 | U509711 | 1:02 PM | 2.000 | 1000 | 85.9% | 0.19 | NA | Dry Weight | NA | |
| 0405097-11 | U-235 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.06 g | Alpha Spec | AS040629-9b | 7/8/2004 | 10.400 | 30.43% | 300 | 0.067 | 0.040 | pCi/g | NA | |
| SMP | Trg. Analyte | 3:10:00 PM | AS040629-9-1 | NA | NA | NA | 1.06 g | 17 | U509711 | 1:02 PM | 2.000 | 1000 | 85.9% | 0.044 | NA | Dry Weight | NA | LT |
| 0405097-11 | U-238 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.06 g | Alpha Spec | AS040629-9b | 7/8/2004 | 189.400 | 30.43% | 300 | 1.03 | 0.03 | pCi/g | NA | |
| SMP | Trg. Analyte | 3:10:00 PM | AS040629-9-1 | NA | NA | NA | 1.06 g | 17 | U509711 | 1:02 PM | 2.000 | 1000 | 85.9% | 0.22 | NA | Dry Weight | NA | |
| 0405097-12 | U-232 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.02 g | Alpha Spec | AS040629-9b | 7/8/2004 | 1336.300 | 29.88% | 300 | 6.6 | 0.1 | pCi/g | NA | |
| SMP | Tracer | 3:20:00 PM | AS040629-9-1 | NA | NA | NA | 1.02 g | 18 | U509712 | 1:03 PM | 19.000 | 1000 | 78.7% | 1.0 | NA | Dry Weight | NA | |
| 0405097-12 | U-234 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.02 g | Alpha Spec | AS040629-9b | 7/8/2004 | 268.800 | 29.88% | 300 | 1.68 | 0.05 | pCi/g | NA | |
| SMP | Trg. Analyte | 3:20:00 PM | AS040629-9-1 | NA | NA | NA | 1.02 g | 18 | U509712 | 1:03 PM | 4.000 | 1000 | 78.7% | 0.33 | NA | Dry Weight | NA | |
| 0405097-12 | U-235 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.02 g | Alpha Spec | AS040629-9b | 7/8/2004 | 9.100 | 29.88% | 300 | 0.067 | 0.052 | pCi/g | NA | |
| SMP | Trg. Analyte | 3:20:00 PM | AS040629-9-1 | NA | NA | NA | 1.02 g | 18 | U509712 | 1:03 PM | 3.000 | 1000 | 78.7% | 0.048 | NA | Dry Weight | NA | LT |

**Comments:**

## Data Package ID: *ur0405097-1*

### 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



000067

# Isotopic Uranium By Alpha Spectroscopy Raw Data Report

**Laboratory Name:** Paragon Analytics
**PAI Work Order:** 0405097

**Prep SOP:** PAI 778
**Analytical SOP:** PAI 714

**Reported on:** Thursday, July 22, 2004
1:35:59 PM

| Sample ID<br>QC Type | Nuclide<br>Type | Sample<br>Date/Time | Prep Batch<br>QCBatchID | Ingrowth<br>Date /Time | Decay<br>Date/Time | Matrix<br>%Moist. | Samp Alq<br>Analy Alq | Inst ID<br>Det ID | AnRunID<br>File Name | Count<br>Date/Time | Net Cnts<br>Bkg Cnts | BaseEff<br>Bkg(min) | CntDur(min)<br>Yield | Activity +/-<br>2 s TPU | MDC<br>DecLev | ReportUnits<br>ReportBasis | DER<br>RPD | %Spk. Recov<br>Flags |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0405097-12 | U-238 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.02 g | Alpha Spec | AS040629-9b | 7/8/2004 | 315.800 | 29.88% | 300 | 1.98 | 0.05 | pCi/g | NA | |
| SMP | Trg. Analyte | 3:20:00 PM | AS040629-9-1 | NA | NA | NA | 1.02 g | 18 | U509712 | 1:03 PM | 4.000 | 1000 | 78.7% | 0.38 | NA | Dry Weight | NA | |
| 0405097-13 | U-232 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.02 g | Alpha Spec | AS040629-9b | 7/8/2004 | 1362.600 | 29.44% | 300 | 6.8 | 0 | pCi/g | NA | |
| SMP | Tracer | 3:35:00 PM | AS040629-9-1 | NA | NA | NA | 1.02 g | 19 | U509713 | 1:03 PM | 8.000 | 1000 | 81.5% | 1.1 | NA | Dry Weight | NA | |
| 0405097-13 | U-234 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.02 g | Alpha Spec | AS040629-9b | 7/8/2004 | 325.100 | 29.44% | 300 | 1.99 | 0.04 | pCi/g | NA | |
| SMP | Trg. Analyte | 3:35:00 PM | AS040629-9-1 | NA | NA | NA | 1.02 g | 19 | U509713 | 1:03 PM | 3.000 | 1000 | 81.5% | 0.38 | NA | Dry Weight | NA | |
| 0405097-13 | U-235 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.02 g | Alpha Spec | AS040629-9b | 7/8/2004 | 18.100 | 29.44% | 300 | 0.130 | 0.051 | pCi/g | NA | |
| SMP | Trg. Analyte | 3:35:00 PM | AS040629-9-1 | NA | NA | NA | 1.02 g | 19 | U509713 | 1:03 PM | 3.000 | 1000 | 81.5% | 0.066 | NA | Dry Weight | NA | |
| 0405097-13 | U-238 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.02 g | Alpha Spec | AS040629-9b | 7/8/2004 | 443.100 | 29.44% | 300 | 2.71 | 0.04 | pCi/g | NA | |
| SMP | Trg. Analyte | 3:35:00 PM | AS040629-9-1 | NA | NA | NA | 1.02 g | 19 | U509713 | 1:03 PM | 3.000 | 1000 | 81.5% | 0.49 | NA | Dry Weight | NA | |
| 0405097-14 | U-232 | 5/3/2004 | AS040629-9 | NA | NA | SOLID | 1.01 g | Alpha Spec | AS040629-9b | 7/8/2004 | 1474.000 | 28.83% | 300 | 7.6 | 0.1 | pCi/g | NA | |
| SMP | Tracer | 1:40:00 PM | AS040629-9-1 | NA | NA | NA | 1.01 g | 21 | U509714 | 1:03 PM | 30.000 | 1000 | 90.0% | 1.2 | NA | Dry Weight | NA | |
| 0405097-14 | U-234 | 5/3/2004 | AS040629-9 | NA | NA | SOLID | 1.01 g | Alpha Spec | AS040629-9b | 7/8/2004 | 84.800 | 28.83% | 300 | 0.49 | 0.04 | pCi/g | NA | |
| SMP | Trg. Analyte | 1:40:00 PM | AS040629-9-1 | NA | NA | NA | 1.01 g | 21 | U509714 | 1:03 PM | 4.000 | 1000 | 90.0% | 0.13 | NA | Dry Weight | NA | |
| 0405097-14 | U-235 | 5/3/2004 | AS040629-9 | NA | NA | SOLID | 1.01 g | Alpha Spec | AS040629-9b | 7/8/2004 | 3.700 | 28.83% | 300 | 0.025 | 0.036 | pCi/g | NA | |
| SMP | Trg. Analyte | 1:40:00 PM | AS040629-9-1 | NA | NA | NA | 1.01 g | 21 | U509714 | 1:03 PM | 1.000 | 1000 | 90.0% | 0.028 | NA | Dry Weight | NA | U |
| 0405097-14 | U-238 | 5/3/2004 | AS040629-9 | NA | NA | SOLID | 1.01 g | Alpha Spec | AS040629-9b | 7/8/2004 | 72.800 | 28.83% | 300 | 0.42 | 0.04 | pCi/g | NA | |
| SMP | Trg. Analyte | 1:40:00 PM | AS040629-9-1 | NA | NA | NA | 1.01 g | 21 | U509714 | 1:03 PM | 4.000 | 1000 | 90.0% | 0.12 | NA | Dry Weight | NA | |
| 0405097-15 | U-232 | 5/3/2004 | AS040629-9 | NA | NA | SOLID | 1.03 g | Alpha Spec | AS040629-9b | 7/8/2004 | 1363.600 | 28.78% | 300 | 6.9 | 0.1 | pCi/g | NA | |
| SMP | Tracer | 2:00:00 PM | AS040629-9-1 | NA | NA | NA | 1.03 g | 22 | U509715 | 1:03 PM | 8.000 | 1000 | 83.4% | 1.1 | NA | Dry Weight | NA | |
| 0405097-15 | U-234 | 5/3/2004 | AS040629-9 | NA | NA | SOLID | 1.03 g | Alpha Spec | AS040629-9b | 7/8/2004 | 74.700 | 28.78% | 300 | 0.45 | 0.03 | pCi/g | NA | |
| SMP | Trg. Analyte | 2:00:00 PM | AS040629-9-1 | NA | NA | NA | 1.03 g | 22 | U509715 | 1:03 PM | 1.000 | 1000 | 83.4% | 0.13 | NA | Dry Weight | NA | |

**Comments:**

**Data Package ID:** *ur0405097-1*

## 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 Uranium By Alpha Spectroscopy Raw Data Report

**Laboratory Name:** Paragon Analytics
**PAI Work Order:** 0405097

**Prep SOP:** PAI 778
**Analytical SOP:** PAI 714

**Reported on:** Thursday, July 22, 2004
1:35:59 PM

| Sample ID<br>QC Type | Nuclide<br>Type | Sample<br>Date/Time | Prep Batch<br>QCBatchID | Ingrowth<br>Date /Time | Decay<br>Date/Time | Matrix<br>%Moist. | Samp Alq<br>Analy Alq | Inst ID<br>Det ID | AnRunID<br>File Name | Count<br>Date/Time | Net Cnts<br>Bkg Cnts | BaseEff<br>Bkg(min) | CntDur(min)<br>Yield | Activity +/-<br>2 s TPU | MDC<br>DecLev | ReportUnits<br>ReportBasis | DER<br>RPD | %Spk. Recov<br>Flags |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0405097-15 | U-235 | 5/3/2004 | AS040629-9 | NA | NA | SOLID | 1.03 g | Alpha Spec | AS040629-9b | 7/8/2004 | 2.400 | 28.78% | 300 | 0.017 | 0.045 | pCi/g | NA | |
| SMP | Trg. Analyte | 2:00:00 PM | AS040629-9-1 | NA | NA | NA | 1.03 g | 22 | U509715 | 1:03 PM | 2.000 | 1000 | 83.4% | 0.026 | NA | Dry Weight | NA | U |
| 0405097-15 | U-238 | 5/3/2004 | AS040629-9 | NA | NA | SOLID | 1.03 g | Alpha Spec | AS040629-9b | 7/8/2004 | 72.400 | 28.78% | 300 | 0.44 | 0.04 | pCi/g | NA | |
| SMP | Trg. Analyte | 2:00:00 PM | AS040629-9-1 | NA | NA | NA | 1.03 g | 22 | U509715 | 1:03 PM | 2.000 | 1000 | 83.4% | 0.12 | NA | Dry Weight | NA | |
| 0405097-16 | U-232 | 5/3/2004 | AS040629-9 | NA | NA | SOLID | 1.01 g | Alpha Spec | AS040629-9b | 7/8/2004 | 1448.000 | 31.60% | 300 | 6.8 | 0.1 | pCi/g | NA | |
| SMP | Tracer | 2:20:00 PM | AS040629-9-1 | NA | NA | NA | 1.01 g | 42 | U509716 | 1:04 PM | 10.000 | 1000 | 80.7% | 1.1 | NA | Dry Weight | NA | |
| 0405097-16 | U-234 | 5/3/2004 | AS040629-9 | NA | NA | SOLID | 1.01 g | Alpha Spec | AS040629-9b | 7/8/2004 | 84.000 | 31.60% | 300 | 0.49 | 0.02 | pCi/g | NA | |
| SMP | Trg. Analyte | 2:20:00 PM | AS040629-9-1 | NA | NA | NA | 1.01 g | 42 | U509716 | 1:04 PM | 0.000 | 1000 | 80.7% | 0.13 | NA | Dry Weight | NA | |
| 0405097-16 | U-235 | 5/3/2004 | AS040629-9 | NA | NA | SOLID | 1.01 g | Alpha Spec | AS040629-9b | 7/8/2004 | 6.700 | 31.60% | 300 | 0.046 | 0.036 | pCi/g | NA | |
| SMP | Trg. Analyte | 2:20:00 PM | AS040629-9-1 | NA | NA | NA | 1.01 g | 42 | U509716 | 1:04 PM | 1.000 | 1000 | 80.7% | 0.037 | NA | Dry Weight | NA | LT |
| 0405097-16 | U-238 | 5/3/2004 | AS040629-9 | NA | NA | SOLID | 1.01 g | Alpha Spec | AS040629-9b | 7/8/2004 | 74.000 | 31.60% | 300 | 0.43 | 0.02 | pCi/g | NA | |
| SMP | Trg. Analyte | 2:20:00 PM | AS040629-9-1 | NA | NA | NA | 1.01 g | 42 | U509716 | 1:04 PM | 0.000 | 1000 | 80.7% | 0.12 | NA | Dry Weight | NA | |
| 0405097-17 | U-232 | 5/4/2004 | AS040629-7 | NA | NA | SOLID | 0.026 g | Alpha Spec | AS040629-7A | 7/9/2004 | 980.700 | 29.88% | 300 | 189 | 2 | pCi/g | NA | |
| SMP | Tracer | 9:50:00 AM | AS040629-7-1 | NA | NA | NA | 0.026 g | 18 | U509717 | 7:27 AM | 11.000 | 1000 | 57.8% | 30 | NA | Dry Weight | NA | |
| 0405097-17 | U-234 | 5/4/2004 | AS040629-7 | NA | NA | SOLID | 0.026 g | Alpha Spec | AS040629-7A | 7/9/2004 | 6824.800 | 29.88% | 300 | 2280 | 0 | pCi/g | NA | |
| SMP | Trg. Analyte | 9:50:00 AM | AS040629-7-1 | NA | NA | NA | 0.026 g | 18 | U509717 | 7:27 AM | 4.000 | 1000 | 57.8% | 370 | NA | Dry Weight | NA | M3 |
| 0405097-17 | U-235 | 5/4/2004 | AS040629-7 | NA | NA | SOLID | 0.026 g | Alpha Spec | AS040629-7A | 7/9/2004 | 299.100 | 29.88% | 300 | 117 | 3 | pCi/g | NA | |
| SMP | Trg. Analyte | 9:50:00 AM | AS040629-7-1 | NA | NA | NA | 0.026 g | 18 | U509717 | 7:27 AM | 3.000 | 1000 | 57.8% | 23 | NA | Dry Weight | NA | M3 |
| 0405097-17 | U-238 | 5/4/2004 | AS040629-7 | NA | NA | SOLID | 0.026 g | Alpha Spec | AS040629-7A | 7/9/2004 | 7039.800 | 29.88% | 300 | 2350 | 0 | pCi/g | NA | |
| SMP | Trg. Analyte | 9:50:00 AM | AS040629-7-1 | NA | NA | NA | 0.026 g | 18 | U509717 | 7:27 AM | 4.000 | 1000 | 57.8% | 380 | NA | Dry Weight | NA | M3 |
| 0405097-18 | U-232 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.01 g | Alpha Spec | AS040629-9b | 7/8/2004 | 1296.500 | 30.43% | 300 | 6.35 | 0.06 | pCi/g | NA | |
| SMP | Tracer | 4:30:00 PM | AS040629-9-1 | NA | NA | NA | 1.01 g | 43 | U509718 | 1:05 PM | 15.000 | 1000 | 75.0% | 0.99 | NA | Dry Weight | NA | |

**Comments:**

## Data Package ID: *ur0405097-1*

### 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

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# - 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.

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H - LCS Recovery above upper control limit.

P - LCS, Matrix Spike Recovery within control limits.

N - Matrix Spike Recovery outside control limits

NC - Not Calculated for duplicate results less than 5 times MDC

B - Analyte concentration greater than MDC.

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

### Notes:

1) The Tracer results are not yield corrected (i.e. activity measured not activity added).

2) Where sample time is not available, 12:00 PM (Mountain) is used for decay correction.

### Abbreviations:

TR- Tracer TA - Target Analyte

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

DER - Duplicate Error Ratio

BDL - Below Detection Limit

# Isotopic Uranium By Alpha Spectroscopy Raw Data Report

**Laboratory Name:** Paragon Analytics
**PAI Work Order:** 0405097

**Prep SOP:** PAI 778
**Analytical SOP:** PAI 714

**Reported on:** Thursday, July 22, 2004 1:35:59 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0405097-18 | U-234 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.01 g | Alpha Spec | AS040629-9b | 7/8/2004 | 6109.100 | 30.43% | 300 | 39.9 | 0 | pCi/g | NA | |
| SMP | Trg. Analyte | 4:30:00 PM | AS040629-9-1 | NA | NA | NA | 1.01 g | 43 | U509718 | 1:05 PM | 3.000 | 1000 | 75.0% | 6.3 | NA | Dry Weight | NA | |
| 0405097-18 | U-235 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.01 g | Alpha Spec | AS040629-9b | 7/8/2004 | 250.000 | 30.43% | 300 | 1.92 | 0.02 | pCi/g | NA | |
| SMP | Trg. Analyte | 4:30:00 PM | AS040629-9-1 | NA | NA | NA | 1.01 g | 43 | U509718 | 1:05 PM | 0.000 | 1000 | 75.0% | 0.39 | NA | Dry Weight | NA | |
| 0405097-18 | U-238 | 5/7/2004 | AS040629-9 | NA | NA | SOLID | 1.01 g | Alpha Spec | AS040629-9b | 7/8/2004 | 6400.900 | 30.43% | 300 | 41.8 | 0.1 | pCi/g | NA | |
| SMP | Trg. Analyte | 4:30:00 PM | AS040629-9-1 | NA | NA | NA | 1.01 g | 43 | U509718 | 1:05 PM | 7.000 | 1000 | 75.0% | 6.6 | NA | Dry Weight | NA | |
| 0405097-19 | U-232 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.0145 g | Alpha Spec | AS040629-7A | 7/9/2004 | 1220.200 | 31.29% | 300 | 405 | 4 | pCi/g | NA | |
| SMP | Tracer | 5:00:00 PM | AS040629-7-1 | NA | NA | NA | 0.0145 g | 13 | UR509719 | 1:48 PM | 16.000 | 1000 | 68.7% | 64 | NA | Dry Weight | NA | |
| 0405097-19 | U-234 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.0145 g | Alpha Spec | AS040629-7A | 7/9/2004 | 6654.100 | 31.29% | 300 | 3220 | 10 | pCi/g | NA | |
| SMP | Trg. Analyte | 5:00:00 PM | AS040629-7-1 | NA | NA | NA | 0.0145 g | 13 | UR509719 | 1:48 PM | 13.000 | 1000 | 68.7% | 510 | NA | Dry Weight | NA | M3 |
| 0405097-19 | U-235 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.0145 g | Alpha Spec | AS040629-7A | 7/9/2004 | 317.100 | 31.29% | 300 | 180 | 4 | pCi/g | NA | |
| SMP | Trg. Analyte | 5:00:00 PM | AS040629-7-1 | NA | NA | NA | 0.0145 g | 13 | UR509719 | 1:48 PM | 3.000 | 1000 | 68.7% | 35 | NA | Dry Weight | NA | M3 |
| 0405097-19 | U-238 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.0145 g | Alpha Spec | AS040629-7A | 7/9/2004 | 6654.500 | 31.29% | 300 | 3220 | 0 | pCi/g | NA | |
| SMP | Trg. Analyte | 5:00:00 PM | AS040629-7-1 | NA | NA | NA | 0.0145 g | 13 | UR509719 | 1:48 PM | 5.000 | 1000 | 68.7% | 510 | NA | Dry Weight | NA | M3 |
| 0405097-20 | U-232 | 5/7/2004 | AS040712-5 | NA | NA | SOLID | 0.0508 g | Alpha Spec | AS040712-5A | 7/16/2004 | 1451.800 | 29.04% | 300 | 148 | 1 | pCi/g | NA | |
| SMP | Tracer | 5:30:00 PM | AS040712-5-1 | NA | NA | NA | 0.0508 g | 11 | UX509720 | 6:35 AM | 4.000 | 1000 | 88.0% | 23 | NA | Dry Weight | NA | |
| 0405097-20 | U-234 | 5/7/2004 | AS040712-5 | NA | NA | SOLID | 0.0508 g | Alpha Spec | AS040712-5A | 7/16/2004 | 3644.800 | 29.04% | 300 | 422 | 1 | pCi/g | NA | |
| SMP | Trg. Analyte | 5:30:00 PM | AS040712-5-1 | NA | NA | NA | 0.0508 g | 11 | UX509720 | 6:35 AM | 4.000 | 1000 | 88.0% | 67 | NA | Dry Weight | NA | M3 |
| 0405097-20 | U-235 | 5/7/2004 | AS040712-5 | NA | NA | SOLID | 0.0508 g | Alpha Spec | AS040712-5A | 7/16/2004 | 162.000 | 29.04% | 300 | 22.0 | 0.4 | pCi/g | NA | |
| SMP | Trg. Analyte | 5:30:00 PM | AS040712-5-1 | NA | NA | NA | 0.0508 g | 11 | UX509720 | 6:35 AM | 0.000 | 1000 | 88.0% | 4.9 | NA | Dry Weight | NA | M3 |
| 0405097-20 | U-238 | 5/7/2004 | AS040712-5 | NA | NA | SOLID | 0.0508 g | Alpha Spec | AS040712-5A | 7/16/2004 | 3628.400 | 29.04% | 300 | 420 | 1 | pCi/g | NA | |
| SMP | Trg. Analyte | 5:30:00 PM | AS040712-5-1 | NA | NA | NA | 0.0508 g | 11 | UX509720 | 6:35 AM | 2.000 | 1000 | 88.0% | 67 | NA | Dry Weight | NA | M3 |

**Comments:**

**Data Package ID:** *ur0405097-1*

## 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



0070

# Isotopic Uranium By Alpha Spectroscopy Raw Data Report

**Laboratory Name:** Paragon Analytics
**PAI Work Order:** 0405097

**Prep SOP:** PAI 778
**Analytical SOP:** PAI 714

**Reported on:** Thursday, July 22, 2004
1:34:49 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0405097-20 | U-232 | 5/7/2004 | AS040712-5 | NA | NA | SOLID | 0.0503 g | Alpha Spec | AS040712-5A | 7/16/2004 | 1453.300 | 28.94% | 300 | 150 | 2 | pCi/g | NA | |
| DUP | Tracer | 5:30:00 PM | AS040712-5-1 | NA | NA | NA | 0.0503 g | 12 | UX509720D | 6:35 AM | 29.000 | 1000 | 88.4% | 23 | NA | Dry Weight | NA | |
| 0405097-20 | U-234 | 5/7/2004 | AS040712-5 | NA | NA | SOLID | 0.0503 g | Alpha Spec | AS040712-5A | 7/16/2004 | 3621.900 | 28.94% | 300 | 423 | 1 | pCi/g | 0.01 | |
| DUP | Trg. Analyte | 5:30:00 PM | AS040712-5-1 | NA | NA | NA | 0.0503 g | 12 | UX509720D | 6:35 AM | 7.000 | 1000 | 88.4% | 67 | NA | Dry Weight | NA | M3 |
| 0405097-20 | U-235 | 5/7/2004 | AS040712-5 | NA | NA | SOLID | 0.0503 g | Alpha Spec | AS040712-5A | 7/16/2004 | 149.800 | 28.94% | 300 | 20.6 | 1.1 | pCi/g | 0.22 | |
| DUP | Trg. Analyte | 5:30:00 PM | AS040712-5-1 | NA | NA | NA | 0.0503 g | 12 | UX509720D | 6:35 AM | 4.000 | 1000 | 88.4% | 4.6 | NA | Dry Weight | NA | M3 |
| 0405097-20 | U-238 | 5/7/2004 | AS040712-5 | NA | NA | SOLID | 0.0503 g | Alpha Spec | AS040712-5A | 7/16/2004 | 3867.800 | 28.94% | 300 | 451 | 1 | pCi/g | 0.32 | |
| DUP | Trg. Analyte | 5:30:00 PM | AS040712-5-1 | NA | NA | NA | 0.0503 g | 12 | UX509720D | 6:35 AM | 4.000 | 1000 | 88.4% | 72 | NA | Dry Weight | NA | M3 |
| 0405097-21 | U-232 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.0208 g | Alpha Spec | AS040629-7A | 7/9/2004 | 881.300 | 29.29% | 300 | 218 | 5 | pCi/g | NA | |
| SMP | Tracer | 5:20:00 PM | AS040629-7-1 | NA | NA | NA | 0.0208 g | 15 | UR509721 | 1:49 PM | 39.000 | 1000 | 53.0% | 35 | NA | Dry Weight | NA | |
| 0405097-21 | U-234 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.0208 g | Alpha Spec | AS040629-7A | 7/9/2004 | 7269.400 | 29.29% | 300 | 3390 | 0 | pCi/g | NA | |
| SMP | Trg. Analyte | 5:20:00 PM | AS040629-7-1 | NA | NA | NA | 0.0208 g | 15 | UR509721 | 1:49 PM | 2.000 | 1000 | 53.0% | 550 | NA | Dry Weight | NA | M3 |
| 0405097-21 | U-235 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.0208 g | Alpha Spec | AS040629-7A | 7/9/2004 | 334.900 | 29.29% | 300 | 184 | 5 | pCi/g | NA | |
| SMP | Trg. Analyte | 5:20:00 PM | AS040629-7-1 | NA | NA | NA | 0.0208 g | 15 | UR509721 | 1:49 PM | 7.000 | 1000 | 53.0% | 36 | NA | Dry Weight | NA | M3 |
| 0405097-21 | U-238 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.0208 g | Alpha Spec | AS040629-7A | 7/9/2004 | 7277.800 | 29.29% | 300 | 3390 | 0 | pCi/g | NA | |
| SMP | Trg. Analyte | 5:20:00 PM | AS040629-7-1 | NA | NA | NA | 0.0208 g | 15 | UR509721 | 1:49 PM | 4.000 | 1000 | 53.0% | 550 | NA | Dry Weight | NA | M3 |
| 0405097-22 | U-232 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.0706 g | Alpha Spec | AS040629-7A | 7/9/2004 | 1191.600 | 28.78% | 300 | 88 | 1 | pCi/g | NA | |
| SMP | Tracer | 6:00:00 PM | AS040629-7-1 | NA | NA | NA | 0.0706 g | 22 | U509722 | 7:28 AM | 8.000 | 1000 | 72.9% | 14 | NA | Dry Weight | NA | |
| 0405097-22 | U-234 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.0706 g | Alpha Spec | AS040629-7A | 7/9/2004 | 6423.700 | 28.78% | 300 | 650 | 0 | pCi/g | NA | |
| SMP | Trg. Analyte | 6:00:00 PM | AS040629-7-1 | NA | NA | NA | 0.0706 g | 22 | U509722 | 7:28 AM | 1.000 | 1000 | 72.9% | 100 | NA | Dry Weight | NA | M3 |
| 0405097-22 | U-235 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.0706 g | Alpha Spec | AS040629-7A | 7/9/2004 | 312.700 | 28.78% | 300 | 37.3 | 0.6 | pCi/g | NA | |
| SMP | Trg. Analyte | 6:00:00 PM | AS040629-7-1 | NA | NA | NA | 0.0706 g | 22 | U509722 | 7:28 AM | 1.000 | 1000 | 72.9% | 7.2 | NA | Dry Weight | NA | M3 |

**Comments:**

**Data Package ID:** *ur0405097-1*

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



00071

# Isotopic Uranium By Alpha Spectroscopy Raw Data Report

**Laboratory Name:** Paragon Analytics
**PAI Work Order:** 0405097

**Prep SOP:** PAI 778
**Analytical SOP:** PAI 714

**Reported on:** Thursday, July 22, 2004
1:36:21 PM

| Sample ID<br>QC Type | Nuclide<br>Type | Sample<br>Date/Time | Prep Batch<br>QCBatchID | Ingrowth<br>Date /Time | Decay<br>Date/Time | Matrix<br>%Moist. | Samp Alq<br>Analy Alq | Inst ID<br>Det ID | AnRunID<br>File Name | Count<br>Date/Time | Net Cnts<br>Bkg Cnts | BaseEff<br>Bkg(min) | CntDur(min)<br>Yield | Activity +/-<br>2 s TPU | MDC<br>DecLev | ReportUnits<br>ReportBasis | DER<br>RPD | %Spk. Recov<br>Flags |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0405097-22 | U-238 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.0706 g | Alpha Spec | AS040629-7A | 7/9/2004 | 6493.100 | 28.78% | 300 | 660 | 0 | pCi/g | NA | |
| SMP | Trg. Analyte | 6:00:00 PM | AS040629-7-1 | NA | NA | NA | 0.0706 g | 22 | U509722 | 7:28 AM | 3.000 | 1000 | 72.9% | 100 | NA | Dry Weight | NA | M3 |
| 0405097-23 | U-232 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.132 g | Alpha Spec | AS040629-7A | 7/9/2004 | 1012.500 | 28.56% | 300 | 40.2 | 0.5 | pCi/g | NA | |
| SMP | Tracer | 1:00:00 PM | AS040629-7-1 | NA | NA | NA | 0.132 g | 23 | U509723 | 7:29 AM | 15.000 | 1000 | 62.4% | 6.4 | NA | Dry Weight | NA | |
| 0405097-23 | U-234 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.132 g | Alpha Spec | AS040629-7A | 7/9/2004 | 6516.700 | 28.56% | 300 | 415 | 0 | pCi/g | NA | |
| SMP | Trg. Analyte | 1:00:00 PM | AS040629-7-1 | NA | NA | NA | 0.132 g | 23 | U509723 | 7:29 AM | 1.000 | 1000 | 62.4% | 67 | NA | Dry Weight | NA | M3 |
| 0405097-23 | U-235 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.132 g | Alpha Spec | AS040629-7A | 7/9/2004 | 290.000 | 28.56% | 300 | 21.7 | 0.2 | pCi/g | NA | |
| SMP | Trg. Analyte | 1:00:00 PM | AS040629-7-1 | NA | NA | NA | 0.132 g | 23 | U509723 | 7:29 AM | 0.000 | 1000 | 62.4% | 4.3 | NA | Dry Weight | NA | M3 |
| 0405097-23 | U-238 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.132 g | Alpha Spec | AS040629-7A | 7/9/2004 | 7112.700 | 28.56% | 300 | 452 | 0 | pCi/g | NA | |
| SMP | Trg. Analyte | 1:00:00 PM | AS040629-7-1 | NA | NA | NA | 0.132 g | 23 | U509723 | 7:29 AM | 1.000 | 1000 | 62.4% | 73 | NA | Dry Weight | NA | M3 |
| 0405097-23 | U-232 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.132 g | Alpha Spec | AS040629-7A | 7/11/2004 | 1099.000 | 30.67% | 300 | 40.6 | 0.4 | pCi/g | NA | |
| DUP | Tracer | 1:00:00 PM | AS040629-7-1 | NA | NA | NA | 0.132 g | 62 | UR509723D | 9:14 AM | 10.000 | 1000 | 63.1% | 6.4 | NA | Dry Weight | NA | |
| 0405097-23 | U-234 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.132 g | Alpha Spec | AS040629-7A | 7/11/2004 | 6913.000 | 30.67% | 300 | 405 | 0 | pCi/g | 0.10 | |
| DUP | Trg. Analyte | 1:00:00 PM | AS040629-7-1 | NA | NA | NA | 0.132 g | 62 | UR509723D | 9:14 AM | 0.000 | 1000 | 63.1% | 65 | NA | Dry Weight | NA | M3 |
| 0405097-23 | U-235 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.132 g | Alpha Spec | AS040629-7A | 7/11/2004 | 320.000 | 30.67% | 300 | 22.1 | 0.2 | pCi/g | 0.06 | |
| DUP | Trg. Analyte | 1:00:00 PM | AS040629-7-1 | NA | NA | NA | 0.132 g | 62 | UR509723D | 9:14 AM | 0.000 | 1000 | 63.1% | 4.3 | NA | Dry Weight | NA | M3 |
| 0405097-23 | U-238 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.132 g | Alpha Spec | AS040629-7A | 7/11/2004 | 7642.700 | 30.67% | 300 | 448 | 0 | pCi/g | 0.04 | |
| DUP | Trg. Analyte | 1:00:00 PM | AS040629-7-1 | NA | NA | NA | 0.132 g | 62 | UR509723D | 9:14 AM | 1.000 | 1000 | 63.1% | 71 | NA | Dry Weight | NA | M3 |
| 0405097-24 | U-232 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.0251 g | Alpha Spec | AS040629-7A | 7/9/2004 | 959.500 | 31.60% | 300 | 182 | 2 | pCi/g | NA | |
| SMP | Tracer | 12:10:00 PM | AS040629-7-1 | NA | NA | NA | 0.0251 g | 42 | U509724 | 7:30 AM | 5.000 | 1000 | 53.5% | 29 | NA | Dry Weight | NA | |
| 0405097-24 | U-234 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.0251 g | Alpha Spec | AS040629-7A | 7/9/2004 | 7917.000 | 31.60% | 300 | 2800 | 0 | pCi/g | NA | |
| SMP | Trg. Analyte | 12:10:00 PM | AS040629-7-1 | NA | NA | NA | 0.0251 g | 42 | U509724 | 7:30 AM | 0.000 | 1000 | 53.5% | 450 | NA | Dry Weight | NA | M3 |

**Comments:**

**Data Package ID:** *ur0405097-1*

## 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



00072

# Isotopic Uranium By Alpha Spectroscopy Raw Data Report

**Laboratory Name:** Paragon Analytics
**PAI Work Order:** 0405097

**Prep SOP:** PAI 778
**Analytical SOP:** PAI 714

**Reported on:** Thursday, July 22, 2004
1:36:21 PM

| Sample ID<br>QC Type | Nuclide<br>Type | Sample<br>Date/Time | Prep Batch<br>QCBatchID | Ingrowth<br>Date /Time | Decay<br>Date/Time | Matrix<br>%Moist. | Samp Alq<br>Analy Alq | Inst ID<br>Det ID | AnRunID<br>File Name | Count<br>Date/Time | Net Cnts<br>Bkg Cnts | BaseEff<br>Bkg(min) | CntDur(min)<br>Yield | Activity +/-<br>2 s TPU | MDC<br>DecLev | ReportUnits<br>ReportBasis | DER<br>RPD | %Spk. Recov<br>Flags |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0405097-24 | U-235 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.0251 g | Alpha Spec | AS040629-7A | 7/9/2004 | 356.700 | 31.60% | 300 | 149 | 2 | pCi/g | NA | |
| SMP | Trg. Analyte | 12:10:00 PM | AS040629-7-1 | NA | NA | NA | 0.0251 g | 42 | U509724 | 7:30 AM | 1.000 | 1000 | 53.5% | 28 | NA | Dry Weight | NA | M3 |
| 0405097-24 | U-238 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.0251 g | Alpha Spec | AS040629-7A | 7/9/2004 | 8130.000 | 31.60% | 300 | 2880 | 0 | pCi/g | NA | |
| SMP | Trg. Analyte | 12:10:00 PM | AS040629-7-1 | NA | NA | NA | 0.0251 g | 42 | U509724 | 7:30 AM | 0.000 | 1000 | 53.5% | 460 | NA | Dry Weight | NA | M3 |
| 0405097-25 | U-232 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.0826 g | Alpha Spec | AS040629-7A | 7/9/2004 | 1292.200 | 28.97% | 300 | 81 | 1 | pCi/g | NA | |
| SMP | Tracer | 12:30:00 PM | AS040629-7-1 | NA | NA | NA | 0.0826 g | 16 | UR509725 | 1:49 PM | 6.000 | 1000 | 78.5% | 13 | NA | Dry Weight | NA | |
| 0405097-25 | U-234 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.0826 g | Alpha Spec | AS040629-7A | 7/9/2004 | 5884.400 | 28.97% | 300 | 470 | 1 | pCi/g | NA | |
| SMP | Trg. Analyte | 12:30:00 PM | AS040629-7-1 | NA | NA | NA | 0.0826 g | 16 | UR509725 | 1:49 PM | 2.000 | 1000 | 78.5% | 74 | NA | Dry Weight | NA | M3 |
| 0405097-25 | U-235 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.0826 g | Alpha Spec | AS040629-7A | 7/9/2004 | 255.400 | 28.97% | 300 | 24.0 | 0.6 | pCi/g | NA | |
| SMP | Trg. Analyte | 12:30:00 PM | AS040629-7-1 | NA | NA | NA | 0.0826 g | 16 | UR509725 | 1:49 PM | 2.000 | 1000 | 78.5% | 4.8 | NA | Dry Weight | NA | M3 |
| 0405097-25 | U-238 | 5/7/2004 | AS040629-7 | NA | NA | SOLID | 0.0826 g | Alpha Spec | AS040629-7A | 7/9/2004 | 5784.399 | 28.97% | 300 | 462 | 1 | pCi/g | NA | |
| SMP | Trg. Analyte | 12:30:00 PM | AS040629-7-1 | NA | NA | NA | 0.0826 g | 16 | UR509725 | 1:49 PM | 2.000 | 1000 | 78.5% | 73 | NA | Dry Weight | NA | M3 |
| 0405097-26 | U-232 | 5/7/2004 | AS040712-5 | NA | NA | SOLID | 0.101 g | Alpha Spec | AS040712-5A | 7/16/2004 | 1558.600 | 31.40% | 300 | 73 | 1 | pCi/g | NA | |
| SMP | Tracer | 7:00:00 PM | AS040712-5-1 | NA | NA | NA | 0.101 g | 13 | UX509726 | 6:36 AM | 28.000 | 1000 | 87.4% | 11 | NA | Dry Weight | NA | |
| 0405097-26 | U-234 | 5/7/2004 | AS040712-5 | NA | NA | SOLID | 0.101 g | Alpha Spec | AS040712-5A | 7/16/2004 | 3015.400 | 31.40% | 300 | 163 | 1 | pCi/g | NA | |
| SMP | Trg. Analyte | 7:00:00 PM | AS040712-5-1 | NA | NA | NA | 0.101 g | 13 | UX509726 | 6:36 AM | 12.000 | 1000 | 87.4% | 26 | NA | Dry Weight | NA | M3 |
| 0405097-26 | U-235 | 5/7/2004 | AS040712-5 | NA | NA | SOLID | 0.101 g | Alpha Spec | AS040712-5A | 7/16/2004 | 142.700 | 31.40% | 300 | 9.0 | 0.3 | pCi/g | NA | |
| SMP | Trg. Analyte | 7:00:00 PM | AS040712-5-1 | NA | NA | NA | 0.101 g | 13 | UX509726 | 6:36 AM | 1.000 | 1000 | 87.4% | 2.1 | NA | Dry Weight | NA | M3 |
| 0405097-26 | U-238 | 5/7/2004 | AS040712-5 | NA | NA | SOLID | 0.101 g | Alpha Spec | AS040712-5A | 7/16/2004 | 3168.400 | 31.40% | 300 | 171 | 0 | pCi/g | NA | |
| SMP | Trg. Analyte | 7:00:00 PM | AS040712-5-1 | NA | NA | NA | 0.101 g | 13 | UX509726 | 6:36 AM | 2.000 | 1000 | 87.4% | 27 | NA | Dry Weight | NA | M3 |
| 0405097-27 | U-232 | 5/7/2004 | AS040712-5 | NA | NA | SOLID | 0.101 g | Alpha Spec | AS040712-5A | 7/16/2004 | 1514.100 | 29.50% | 300 | 76 | 1 | pCi/g | NA | |
| SMP | Tracer | 6:40:00 PM | AS040712-5-1 | NA | NA | NA | 0.101 g | 15 | UX509727 | 6:36 AM | 33.000 | 1000 | 90.4% | 12 | NA | Dry Weight | NA | |

**Comments:**

**Data Package ID:** *ur0405097-1*

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
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DER - Duplicate Error Ratio
BDL - Below Detection Limit



000073

# Isotopic Uranium By Alpha Spectroscopy Raw Data Report

**Laboratory Name:** Paragon Analytics
**PAI Work Order:** 0405097

**Prep SOP:** PAI 778
**Analytical SOP:** PAI 714

**Reported on:** Thursday, July 22, 2004
1:34:49 PM

| Sample ID<br>QC Type | Nuclide<br>Type | Sample<br>Date/Time | Prep Batch<br>QCBatchID | Ingrowth<br>Date /Time | Decay<br>Date/Time | Matrix<br>%Moist. | Samp Alq<br>Analy Alq | Inst ID<br>Det ID | AnRunID<br>File Name | Count<br>Date/Time | Net Cnts<br>Bkg Cnts | BaseEff<br>Bkg(min) | CntDur(min)<br>Yield | Activity +/-<br>2 s TPU | MDC<br>DecLev | ReportUnits<br>ReportBasis | DER<br>RPD | %Spk. Recov<br>Flags |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0405097-27 | U-234 | 5/7/2004 | AS040712-5 | NA | NA | SOLID | 0.101 g | Alpha Spec | AS040712-5A | 7/16/2004 | 2455.100 | 29.50% | 300 | 137 | 0 | pCi/g | NA | |
| SMP | Trg. Analyte | 6:40:00 PM | AS040712-5-1 | NA | NA | NA | 0.101 g | 15 | UX509727 | 6:36 AM | 3.000 | 1000 | 90.4% | 22 | NA | Dry Weight | NA | M3 |
| 0405097-27 | U-235 | 5/7/2004 | AS040712-5 | NA | NA | SOLID | 0.101 g | Alpha Spec | AS040712-5A | 7/16/2004 | 105.000 | 29.50% | 300 | 6.9 | 0.2 | pCi/g | NA | |
| SMP | Trg. Analyte | 6:40:00 PM | AS040712-5-1 | NA | NA | NA | 0.101 g | 15 | UX509727 | 6:36 AM | 0.000 | 1000 | 90.4% | 1.7 | NA | Dry Weight | NA | M3 |
| 0405097-27 | U-238 | 5/7/2004 | AS040712-5 | NA | NA | SOLID | 0.101 g | Alpha Spec | AS040712-5A | 7/16/2004 | 2466.400 | 29.50% | 300 | 138 | 0 | pCi/g | NA | |
| SMP | Trg. Analyte | 6:40:00 PM | AS040712-5-1 | NA | NA | NA | 0.101 g | 15 | UX509727 | 6:36 AM | 2.000 | 1000 | 90.4% | 22 | NA | Dry Weight | NA | M3 |
| 0405097-28 | U-232 | 5/6/2004 | AS040629-7 | NA | NA | SOLID | 0.0274 g | Alpha Spec | AS040629-7A | 7/9/2004 | 982.600 | 30.81% | 300 | 174 | 3 | pCi/g | NA | |
| SMP | Tracer | 2:00:00 PM | AS040629-7-1 | NA | NA | NA | 0.0274 g | 44 | U509728 | 7:31 AM | 28.000 | 1000 | 56.1% | 28 | NA | Dry Weight | NA | |
| 0405097-28 | U-234 | 5/6/2004 | AS040629-7 | NA | NA | SOLID | 0.0274 g | Alpha Spec | AS040629-7A | 7/9/2004 | 7498.399 | 30.81% | 300 | 2370 | 0 | pCi/g | NA | |
| SMP | Trg. Analyte | 2:00:00 PM | AS040629-7-1 | NA | NA | NA | 0.0274 g | 44 | U509728 | 7:31 AM | 2.000 | 1000 | 56.1% | 380 | NA | Dry Weight | NA | M3 |
| 0405097-28 | U-235 | 5/6/2004 | AS040629-7 | NA | NA | SOLID | 0.0274 g | Alpha Spec | AS040629-7A | 7/9/2004 | 294.900 | 30.81% | 300 | 110 | 4 | pCi/g | NA | |
| SMP | Trg. Analyte | 2:00:00 PM | AS040629-7-1 | NA | NA | NA | 0.0274 g | 44 | U509728 | 7:31 AM | 7.000 | 1000 | 56.1% | 22 | NA | Dry Weight | NA | M3 |
| 0405097-28 | U-238 | 5/6/2004 | AS040629-7 | NA | NA | SOLID | 0.0274 g | Alpha Spec | AS040629-7A | 7/9/2004 | 7194.100 | 30.81% | 300 | 2280 | 0 | pCi/g | NA | |
| SMP | Trg. Analyte | 2:00:00 PM | AS040629-7-1 | NA | NA | NA | 0.0274 g | 44 | U509728 | 7:31 AM | 3.000 | 1000 | 56.1% | 370 | NA | Dry Weight | NA | M3 |
| 0405097-29 | U-232 | 5/6/2004 | AS040629-7 | NA | NA | SOLID | 0.0569 g | Alpha Spec | AS040629-7A | 7/9/2004 | 1393.400 | 30.43% | 300 | 121 | 1 | pCi/g | NA | |
| SMP | Tracer | 7:00:00 PM | AS040629-7-1 | NA | NA | NA | 0.0569 g | 17 | UR509729 | 1:50 PM | 22.000 | 1000 | 80.6% | 19 | NA | Dry Weight | NA | |
| 0405097-29 | U-234 | 5/6/2004 | AS040629-7 | NA | NA | SOLID | 0.0569 g | Alpha Spec | AS040629-7A | 7/9/2004 | 6011.400 | 30.43% | 300 | 650 | 0 | pCi/g | NA | |
| SMP | Trg. Analyte | 7:00:00 PM | AS040629-7-1 | NA | NA | NA | 0.0569 g | 17 | UR509729 | 1:50 PM | 2.000 | 1000 | 80.6% | 100 | NA | Dry Weight | NA | M3 |
| 0405097-29 | U-235 | 5/6/2004 | AS040629-7 | NA | NA | SOLID | 0.0569 g | Alpha Spec | AS040629-7A | 7/9/2004 | 254.400 | 30.43% | 300 | 32.2 | 0.8 | pCi/g | NA | |
| SMP | Trg. Analyte | 7:00:00 PM | AS040629-7-1 | NA | NA | NA | 0.0569 g | 17 | UR509729 | 1:50 PM | 2.000 | 1000 | 80.6% | 6.4 | NA | Dry Weight | NA | M3 |
| 0405097-29 | U-238 | 5/6/2004 | AS040629-7 | NA | NA | SOLID | 0.0569 g | Alpha Spec | AS040629-7A | 7/9/2004 | 6256.400 | 30.43% | 300 | 670 | 0 | pCi/g | NA | |
| SMP | Trg. Analyte | 7:00:00 PM | AS040629-7-1 | NA | NA | NA | 0.0569 g | 17 | UR509729 | 1:50 PM | 2.000 | 1000 | 80.6% | 110 | NA | Dry Weight | NA | M3 |

**Comments:**

## Data Package ID: *ur0405097-1*

### 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 Uranium By Alpha Spectroscopy Raw Data Report

**Laboratory Name:** Paragon Analytics
**PAI Work Order:** 0405097

**Prep SOP:** PAI 778
**Analytical SOP:** PAI 714

**Reported on:** Thursday, July 22, 2004
1:36:21 PM

| Sample ID<br>QC Type | Nuclide<br>Type | Sample<br>Date/Time | Prep Batch<br>QCBatchID | Ingrowth<br>Date /Time | Decay<br>Date/Time | Matrix<br>%Moist. | Samp Alq<br>Analy Alq | Inst ID<br>Det ID | AnRunID<br>File Name | Count<br>Date/Time | Net Cnts<br>Bkg Cnts | BaseEff<br>Bkg(min) | CntDur(min)<br>Yield | Activity +/-<br>2 s TPU | MDC<br>DecLev | ReportUnits<br>ReportBasis | DER<br>RPD | %Spk. Recov<br>Flags |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0405097-30 | U-232 | 5/6/2004 | AS040629-7 | NA | NA | SOLID | 0.0688 g | Alpha Spec | AS040629-7A | 7/9/2004 | 1384.800 | 29.61% | 300 | 102 | 1 | pCi/g | NA | |
| SMP | Tracer | 5:00:00 PM | AS040629-7-1 | NA | NA | NA | 0.0688 g | 46 | U509730 | 7:32 AM | 14.000 | 1000 | 82.3% | 16 | NA | Dry Weight | NA | |
| 0405097-30 | U-234 | 5/6/2004 | AS040629-7 | NA | NA | SOLID | 0.0688 g | Alpha Spec | AS040629-7A | 7/9/2004 | 7077.400 | 29.61% | 300 | 630 | 0 | pCi/g | NA | |
| SMP | Trg. Analyte | 5:00:00 PM | AS040629-7-1 | NA | NA | NA | 0.0688 g | 46 | U509730 | 7:32 AM | 12.000 | 1000 | 82.3% | 100 | NA | Dry Weight | NA | M3 |
| 0405097-30 | U-235 | 5/6/2004 | AS040629-7 | NA | NA | SOLID | 0.0688 g | Alpha Spec | AS040629-7A | 7/9/2004 | 316.400 | 29.61% | 300 | 33.3 | 0.7 | pCi/g | NA | |
| SMP | Trg. Analyte | 5:00:00 PM | AS040629-7-1 | NA | NA | NA | 0.0688 g | 46 | U509730 | 7:32 AM | 2.000 | 1000 | 82.3% | 6.4 | NA | Dry Weight | NA | M3 |
| 0405097-30 | U-238 | 5/6/2004 | AS040629-7 | NA | NA | SOLID | 0.0688 g | Alpha Spec | AS040629-7A | 7/9/2004 | 7067.500 | 29.61% | 300 | 630 | 0 | pCi/g | NA | |
| SMP | Trg. Analyte | 5:00:00 PM | AS040629-7-1 | NA | NA | NA | 0.0688 g | 46 | U509730 | 7:32 AM | 5.000 | 1000 | 82.3% | 100 | NA | Dry Weight | NA | M3 |
| AS040629-7 | U-232 | 6/30/2004 | AS040629-7 | NA | NA | SOLID | 0.05 g | Alpha Spec | AS040629-7A | 7/9/2004 | 1548.400 | 31.87% | 300 | 146 | 1 | pCi/g | NA | |
| MB | Tracer | 1:40:32 PM | AS040629-7-1 | NA | NA | NA | 0.05 g | 47 | U6297B | 7:32 AM | 22.000 | 1000 | 85.5% | 23 | NA | Dry Weight | NA | |
| AS040629-7 | U-234 | 6/30/2004 | AS040629-7 | NA | NA | SOLID | 0.05 g | Alpha Spec | AS040629-7A | 7/9/2004 | 8.100 | 31.87% | 300 | 0.89 | 0.78 | pCi/g | NA | |
| MB | Trg. Analyte | 1:40:32 PM | AS040629-7-1 | NA | NA | NA | 0.05 g | 47 | U6297B | 7:32 AM | 3.000 | 1000 | 85.5% | 0.68 | NA | Dry Weight | NA | B,M |
| AS040629-7 | U-235 | 6/30/2004 | AS040629-7 | NA | NA | SOLID | 0.05 g | Alpha Spec | AS040629-7A | 7/9/2004 | 2.700 | 31.87% | 300 | 0.35 | 0.68 | pCi/g | NA | |
| MB | Trg. Analyte | 1:40:32 PM | AS040629-7-1 | NA | NA | NA | 0.05 g | 47 | U6297B | 7:32 AM | 1.000 | 1000 | 85.5% | 0.47 | NA | Dry Weight | NA | U,M |
| AS040629-7 | U-238 | 6/30/2004 | AS040629-7 | NA | NA | SOLID | 0.05 g | Alpha Spec | AS040629-7A | 7/9/2004 | 4.000 | 31.87% | 300 | 0.44 | 0.30 | pCi/g | NA | |
| MB | Trg. Analyte | 1:40:32 PM | AS040629-7-1 | NA | NA | NA | 0.05 g | 47 | U6297B | 7:32 AM | 0.000 | 1000 | 85.5% | 0.45 | NA | Dry Weight | NA | B,M |
| AS040629-7 | U-232 | 6/30/2004 | AS040629-7 | NA | NA | SOLID | 0.05 g | Alpha Spec | AS040629-7A | 7/9/2004 | 1457.100 | 29.70% | 300 | 147 | 1 | pCi/g | NA | |
| LCS | Tracer | 1:40:32 PM | AS040629-7-1 | NA | NA | NA | 0.05 g | 63 | U6297L | 7:33 AM | 3.000 | 1000 | 86.4% | 23 | NA | Dry Weight | NA | |
| AS040629-7 | U-234 | 6/30/2004 | AS040629-7 | NA | NA | SOLID | 0.05 g | Alpha Spec | AS040629-7A | 7/9/2004 | 1497.100 | 29.70% | 300 | 175 | 1 | pCi/g | NA | 101 |
| LCS | Trg. Analyte | 1:40:32 PM | AS040629-7-1 | NA | NA | NA | 0.05 g | 63 | U6297L | 7:33 AM | 3.000 | 1000 | 86.4% | 29 | NA | Dry Weight | NA | P,M3 |
| AS040629-7 | U-238 | 6/30/2004 | AS040629-7 | NA | NA | SOLID | 0.05 g | Alpha Spec | AS040629-7A | 7/9/2004 | 1568.700 | 29.70% | 300 | 184 | 1 | pCi/g | NA | 102 |
| LCS | Trg. Analyte | 1:40:32 PM | AS040629-7-1 | NA | NA | NA | 0.05 g | 63 | U6297L | 7:33 AM | 1.000 | 1000 | 86.4% | 30 | NA | Dry Weight | NA | P,M3 |

**Comments:**

**Data Package ID:** *ur0405097-1*

## Qualifiers/Flags:

U - Result is less than the sample specific MDC.
Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.
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H - LCS Recovery above upper control limit.
P - LCS, Matrix Spike Recovery within control limits.
N - Matrix Spike Recovery outside control limits
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DER - Duplicate Error Ratio
BDL - Below Detection Limit



000075

# Isotopic Uranium By Alpha Spectroscopy Raw Data Report

**Laboratory Name:** Paragon Analytics
**PAI Work Order:** 0405097

**Prep SOP:** PAI 778
**Analytical SOP:** PAI 714

**Reported on:** Thursday, July 22, 2004
1:35:59 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AS040629-9 | U-232 | 6/30/2004 | AS040629-9 | NA | NA | SOLID | 2 g | Alpha Spec | AS040629-9b | 7/8/2004 | 1953.560 | 30.84% | 420 | 3.40 | 0.03 | pCi/g | NA | |
| MB | Tracer | 2:11:37 PM | AS040629-9-1 | NA | NA | NA | 2 g | 58 | U6299B | 7:55 PM | 32.000 | 1000 | 79.7% | 0.52 | NA | Dry Weight | NA | |
| AS040629-9 | U-234 | 6/30/2004 | AS040629-9 | NA | NA | SOLID | 2 g | Alpha Spec | AS040629-9b | 7/8/2004 | 0.740 | 30.84% | 420 | 0.0016 | 0.0173 | pCi/g | NA | |
| MB | Trg. Analyte | 2:11:37 PM | AS040629-9-1 | NA | NA | NA | 2 g | 58 | U6299B | 7:55 PM | 3.000 | 1000 | 79.7% | 0.0082 | NA | Dry Weight | NA | U |
| AS040629-9 | U-235 | 6/30/2004 | AS040629-9 | NA | NA | SOLID | 2 g | Alpha Spec | AS040629-9b | 7/8/2004 | 1.320 | 30.84% | 420 | 0.0034 | 0.0224 | pCi/g | NA | |
| MB | Trg. Analyte | 2:11:37 PM | AS040629-9-1 | NA | NA | NA | 2 g | 58 | U6299B | 7:55 PM | 4.000 | 1000 | 79.7% | 0.0099 | NA | Dry Weight | NA | U |
| AS040629-9 | U-238 | 6/30/2004 | AS040629-9 | NA | NA | SOLID | 2 g | Alpha Spec | AS040629-9b | 7/8/2004 | 1.640 | 30.84% | 420 | 0.004 | 0.025 | pCi/g | NA | |
| MB | Trg. Analyte | 2:11:37 PM | AS040629-9-1 | NA | NA | NA | 2 g | 58 | U6299B | 7:55 PM | 8.000 | 1000 | 79.7% | 0.011 | NA | Dry Weight | NA | U |
| AS040629-9 | U-232 | 6/30/2004 | AS040629-9 | NA | NA | SOLID | 2 g | Alpha Spec | AS040629-9b | 7/8/2004 | 1480.400 | 30.61% | 300 | 3.63 | 0.04 | pCi/g | NA | |
| LCS | Tracer | 2:11:37 PM | AS040629-9-1 | NA | NA | NA | 2 g | 59 | U6299L | 1:06 PM | 22.000 | 1000 | 85.1% | 0.56 | NA | Dry Weight | NA | |
| AS040629-9 | U-234 | 6/30/2004 | AS040629-9 | NA | NA | SOLID | 2 g | Alpha Spec | AS040629-9b | 7/8/2004 | 1545.000 | 30.61% | 300 | 4.45 | 0.03 | pCi/g | NA | 103 |
| LCS | Trg. Analyte | 2:11:37 PM | AS040629-9-1 | NA | NA | NA | 2 g | 59 | U6299L | 1:06 PM | 10.000 | 1000 | 85.1% | 0.73 | NA | Dry Weight | NA | P |
| AS040629-9 | U-238 | 6/30/2004 | AS040629-9 | NA | NA | SOLID | 2 g | Alpha Spec | AS040629-9b | 7/8/2004 | 1616.200 | 30.61% | 300 | 4.66 | 0.03 | pCi/g | NA | 103 |
| LCS | Trg. Analyte | 2:11:37 PM | AS040629-9-1 | NA | NA | NA | 2 g | 59 | U6299L | 1:06 PM | 6.000 | 1000 | 85.1% | 0.76 | NA | Dry Weight | NA | P |
| AS040629-9 | U-232 | 6/30/2004 | AS040629-9 | NA | NA | SOLID | 2 g | Alpha Spec | AS040629-9b | 7/8/2004 | 1213.000 | 26.17% | 300 | 3.48 | 0.03 | pCi/g | NA | |
| LCSD | Tracer | 2:11:37 PM | AS040629-9-1 | NA | NA | NA | 2 g | 60 | U6299LD | 1:07 PM | 10.000 | 1000 | 81.6% | 0.55 | NA | Dry Weight | NA | |
| AS040629-9 | U-234 | 6/30/2004 | AS040629-9 | NA | NA | SOLID | 2 g | Alpha Spec | AS040629-9b | 7/8/2004 | 1159.500 | 26.17% | 300 | 4.08 | 0.03 | pCi/g | 0.38 | 94.0 |
| LCSD | Trg. Analyte | 2:11:37 PM | AS040629-9-1 | NA | NA | NA | 2 g | 60 | U6299LD | 1:07 PM | 5.000 | 1000 | 81.6% | 0.68 | NA | Dry Weight | NA | P |
| AS040629-9 | U-238 | 6/30/2004 | AS040629-9 | NA | NA | SOLID | 2 g | Alpha Spec | AS040629-9b | 7/8/2004 | 1232.400 | 26.17% | 300 | 4.33 | 0.02 | pCi/g | 0.31 | 96.2 |
| LCSD | Trg. Analyte | 2:11:37 PM | AS040629-9-1 | NA | NA | NA | 2 g | 60 | U6299LD | 1:07 PM | 2.000 | 1000 | 81.6% | 0.72 | NA | Dry Weight | NA | P |
| AS040712-5 | U-232 | 7/13/2004 | AS040712-5 | NA | NA | SOLID | 0.1 g | Alpha Spec | AS040712-5A | 7/16/2004 | 4941.000 | 29.09% | 1000 | 77 | 0 | pCi/g | NA | |
| MB | Tracer | 2:37:40 PM | AS040712-5-1 | NA | NA | NA | 0.1 g | 16 | U7125B | 1:05 PM | 13.000 | 1000 | 89.7% | 11 | NA | Dry Weight | NA | |

**Comments:**

**Data Package ID:** *ur0405097-1*

## 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.

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

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

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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.

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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



000075

# Isotopic Uranium By Alpha Spectroscopy Raw Data Report

**Laboratory Name:** Paragon Analytics
**PAI Work Order:** 0405097

**Prep SOP:** PAI 778
**Analytical SOP:** PAI 714

**Reported on:** Thursday, July 22, 2004
1:34:49 PM

| Sample ID<br>QC Type | Nuclide<br>Type | Sample<br>Date/Time | Prep Batch<br>QCBatchID | Ingrowth<br>Date /Time | Decay<br>Date/Time | Matrix<br>%Moist. | Samp Alq<br>Analy Alq | Inst ID<br>Det ID | AnRunID<br>File Name | Count<br>Date/Time | Net Cnts<br>Bkg Cnts | BaseEff<br>Bkg(min) | CntDur(min)<br>Yield | Activity +/-<br>2 s TPU | MDC<br>DecLev | ReportUnits<br>ReportBasis | DER<br>RPD | %Spk. Recov<br>Flags |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AS040712-5 | U-234 | 7/13/2004 | AS040712-5 | NA | NA | SOLID | 0.1 g | Alpha Spec | AS040712-5A | 7/16/2004 | 9.000 | 29.09% | 1000 | 0.16 | 0.21 | pCi/g | NA | |
| MB | Trg. Analyte | 2:37:40 PM | AS040712-5-1 | NA | NA | NA | 0.1 g | 16 | U7125B | 1:05 PM | 4.000 | 1000 | 89.7% | 0.14 | NA | Dry Weight | NA | U,M |
| AS040712-5 | U-235 | 7/13/2004 | AS040712-5 | NA | NA | SOLID | 0.1 g | Alpha Spec | AS040712-5A | 7/16/2004 | 1.000 | 29.09% | 1000 | 0.02 | 0.15 | pCi/g | NA | |
| MB | Trg. Analyte | 2:37:40 PM | AS040712-5-1 | NA | NA | NA | 0.1 g | 16 | U7125B | 1:05 PM | 1.000 | 1000 | 89.7% | 0.10 | NA | Dry Weight | NA | U,M |
| AS040712-5 | U-238 | 7/13/2004 | AS040712-5 | NA | NA | SOLID | 0.1 g | Alpha Spec | AS040712-5A | 7/16/2004 | 7.000 | 29.09% | 1000 | 0.12 | 0.21 | pCi/g | NA | |
| MB | Trg. Analyte | 2:37:40 PM | AS040712-5-1 | NA | NA | NA | 0.1 g | 16 | U7125B | 1:05 PM | 4.000 | 1000 | 89.7% | 0.13 | NA | Dry Weight | NA | U,M |
| AS040712-5 | U-232 | 7/13/2004 | AS040712-5 | NA | NA | SOLID | 0.1 g | Alpha Spec | AS040712-5A | 7/16/2004 | 1658.300 | 31.40% | 300 | 79 | 1 | pCi/g | NA | |
| LCS | Tracer | 2:37:40 PM | AS040712-5-1 | NA | NA | NA | 0.1 g | 13 | UR7125L | 1:06 PM | 29.000 | 1000 | 93.0% | 12 | NA | Dry Weight | NA | |
| AS040712-5 | U-234 | 7/13/2004 | AS040712-5 | NA | NA | SOLID | 0.1 g | Alpha Spec | AS040712-5A | 7/16/2004 | 1679.700 | 31.40% | 300 | 86 | 1 | pCi/g | NA | 99.5 |
| LCS | Trg. Analyte | 2:37:40 PM | AS040712-5-1 | NA | NA | NA | 0.1 g | 13 | UR7125L | 1:06 PM | 11.000 | 1000 | 93.0% | 14 | NA | Dry Weight | NA | P,M3 |
| AS040712-5 | U-238 | 7/13/2004 | AS040712-5 | NA | NA | SOLID | 0.1 g | Alpha Spec | AS040712-5A | 7/16/2004 | 1893.400 | 31.40% | 300 | 97 | 0 | pCi/g | NA | 108 |
| LCS | Trg. Analyte | 2:37:40 PM | AS040712-5-1 | NA | NA | NA | 0.1 g | 13 | UR7125L | 1:06 PM | 2.000 | 1000 | 93.0% | 16 | NA | Dry Weight | NA | P,M3 |

**Comments:**

**Data Package ID:** *ur0405097-1*

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



000077

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/17/04 3:12:06 PM
Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** 0405097-1 UAS040712-5

**Analysis Type:** Uranium Default

*Detector:* MCB 2 Input 2

*Date/Time of Count:* 7/16/04 6:35:33 AM

*Sample Volume:* 0.100 Total, 0.100 Aliquot.

*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **82.47%**

*Real Time:* 300.02 Minutes

*Total Eff.:* 25.09 %

*Dead Time:* 0.0 %

*Tracer Amount:* 18.932 DPM.

*Acquisition:* 512 Channels

*Efficiency:* 30.42%

*Analysis:* Relative Region-Of-Interest

*Original:* 3,009 + 10.1061 * Chn + -0.00083 * Chn **2.

*Spectrum Calibration:* 3,009 + 10.0075 * Chn + -0.00083 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\UX50971.SPC**

***Background File:*** **C:\USER\ALPHA\BKGND\B4071010.SPC**

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

## Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 140.68 | 127 | 146 | 6.00 | 21.00 | 147.00 | 0.00 | 147.00 | 1.95 |
| 2 | 119.94 | 100 | 126 | 8.00 | 351.00 | 3,456.00 | 0.30 | 3455.70 | 45.91 |
| 3 | 179.16 | 157 | 186 | 8.00 | 315.00 | 3,278.00 | 1.50 | 3276.50 | 43.53 |
| Tracer | 235.59 | 215 | 242 | 6.00 | 147.00 | 1,427.00 | 2.10 | 1424.90 | 18.93 |

## Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 58.64 | 8.798 | n/a | 16.17 % |
| 2 | U-238 | 4197.00 | 78.46 | 206.821 | n/a | 3.33 % |
| 3 | U-234 | 4774.80 | 77.67 | 196.096 | n/a | 3.42 % |
| Tracer | U-232 | 5320.00 | 57.69 | 85.279 | n/a | 5.19 % |

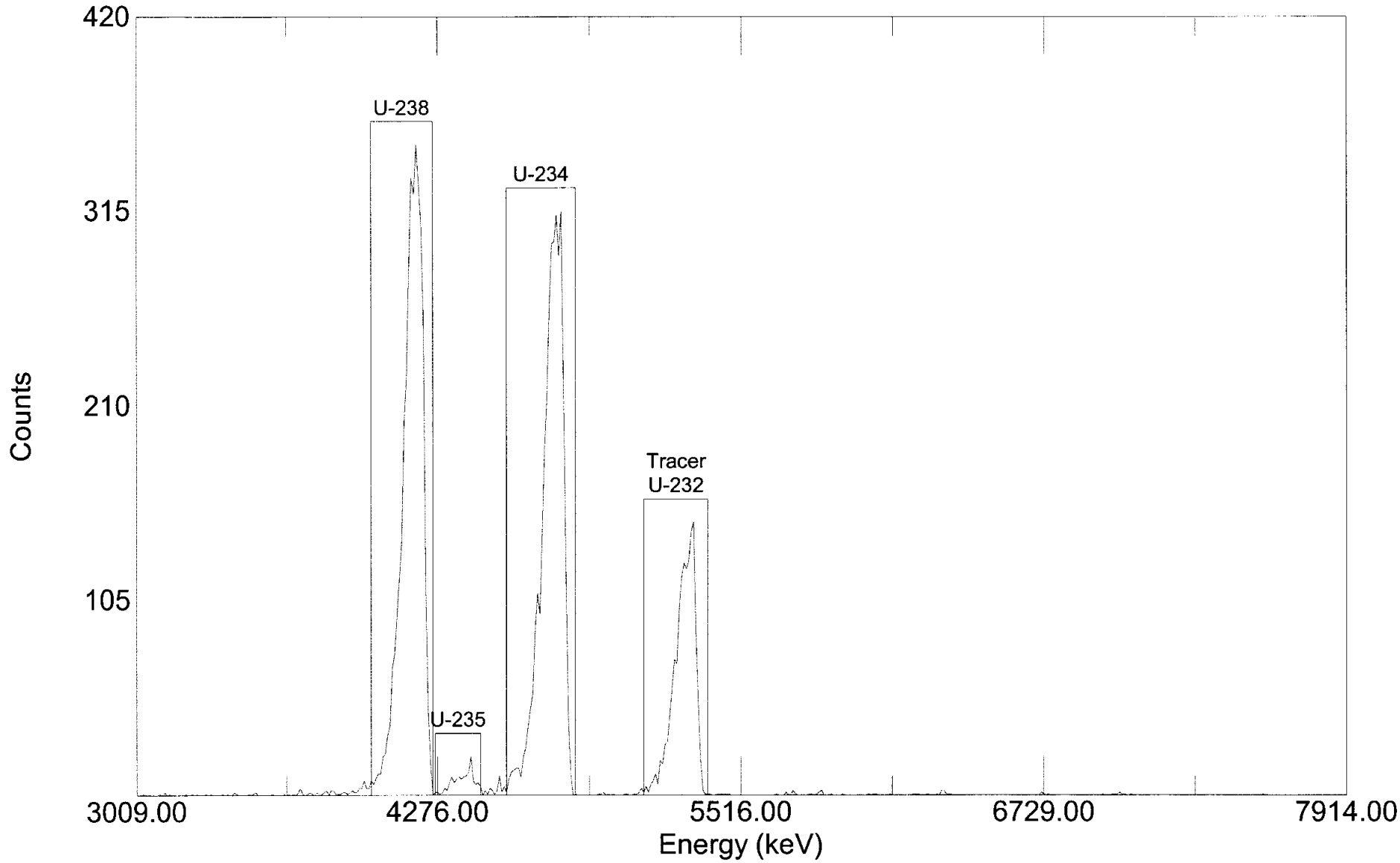
## Totals

| | | % Total |
|---|---|---|
| Gross Count: | 8,503.00 | 100.00 |
| Net Area: | 8,441.50 | 99.28 |
| Background: | 61.50 | 0.72 |
| Composite Fit: | 8,308.00 | 97.71 |
| Residuals: | 195.00 | 2.29 |

Analyzed By: JP

Checked By: Sm

UX50971 AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 06:35:33 on 16-Jul-2004 Real Time: 18000.94 s. Live Time: 18000.00 s.
File: C:\User\Alpha\ALPHA\UX50971.SPC Detector: #10 MCB 2 Input 2
Sample: 0405097-1 UAS040712-5 Type: Uranium Default

000079

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/14/04 6:48:11 PM
Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** 0405097-2 UAS040629-7

**Analysis Type:** Uranium Default

*Detector:* MCB 2 Input 7

*Date/Time of Count:* 7/9/04 7:26:03 AM

*Sample Volume:* 0.100 Total, 0.100 Aliquot.

*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **68.55%**

*Real Time:* 300.02 Minutes

*Total Eff.:* 20.08 %

*Dead Time:* 0.0 %

*Tracer Amount:* 18.939 DPM.

*Acquisition:* 512 Channels

*Efficiency:* 29.29%

*Analysis:* Relative Region-Of-Interest

*Original:* 3,037 + 9.8877 * Chn + -0.00041 * Chn **2.

*Spectrum Calibration:* 3,037 + 9.9749 * Chn + -0.00041 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\U50972.SPC**

***Background File:*** **C:\User\Alpha\ALPHA\B4070615.SPC**

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

### Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 137.44 | 123 | 142 | 8.00 | 25.00 | 291.00 | 2.10 | 288.90 | 4.80 |
| 2 | 175.50 | 155 | 182 | 6.00 | 542.00 | 6,045.00 | 0.90 | 6044.10 | 100.35 |
| 3 | 116.87 | 97 | 122 | 6.00 | 576.00 | 6,154.00 | 1.20 | 6152.80 | 102.15 |
| Tracer | 231.10 | 211 | 238 | 8.00 | 110.00 | 1,153.00 | 12.30 | 1140.70 | 18.94 |

### Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 78.89 | 21.606 | n/a | 11.58 % |
| 2 | U-234 | 4774.80 | 58.98 | 452.015 | n/a | 2.52 % |
| 3 | U-238 | 4197.00 | 59.27 | 460.144 | n/a | 2.50 % |
| Tracer | U-232 | 5320.00 | 78.27 | 85.309 | n/a | 5.77 % |

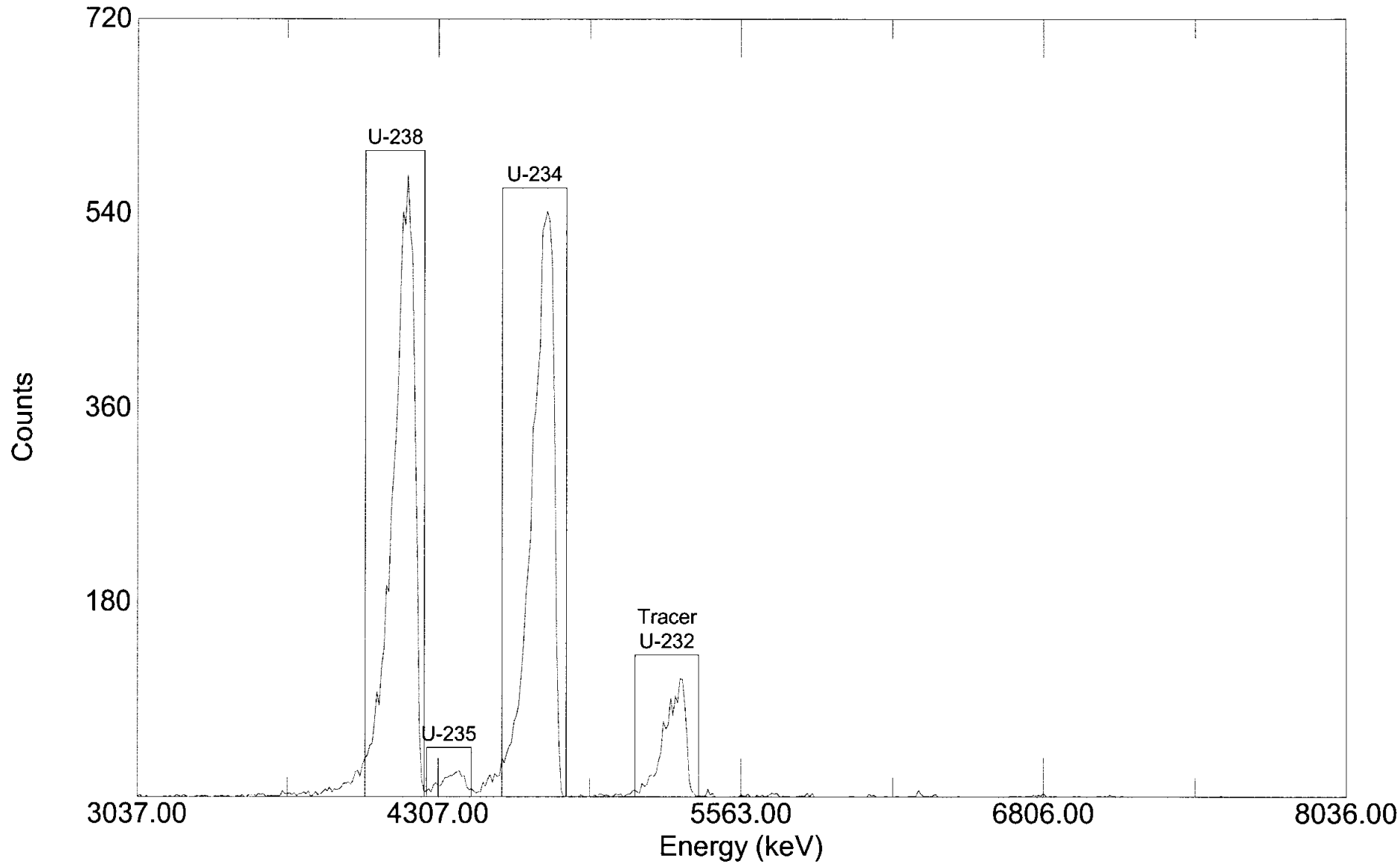
### Totals

| | | % Total |
|---|---|---|
| Gross Count: | 14,290.00 | 100.00 |
| Net Area: | 14,170.30 | 99.16 |
| Background: | 119.70 | 0.84 |
| Composite Fit: | 13,643.00 | 95.47 |
| Residuals: | 647.00 | 4.53 |

Analyzed By: Sm

Checked By: SD

U50972 AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 07:26:03 on 09-Jul-2004
File: C:\User\Alpha\ALPHA\U50972.SPC
Sample: 0405097-2 UAS040629-7

Real Time: 18001.32 s. Live Time: 18000.00 s.
Detector: #15 MCB 2 Input 7
Type: Uranium Default

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/14/04 6:49:53 PM
Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** 0405097-2D UAS040629-7

**Analysis Type:** Uranium Default

*Detector:* MCB 2 Input 8

*Date/Time of Count:* 7/9/04 7:26:26 AM

*Sample Volume:* 0.100 Total, 0.100 Aliquot.

*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **70.82%**

*Real Time:* 300.02 Minutes

*Total Eff.:* 20.52 %

*Dead Time:* 0.0 %

*Tracer Amount:* 18.939 DPM.

*Acquisition:* 512 Channels

*Efficiency:* 28.97%

*Analysis:* Relative Region-Of-Interest

*Original:* 3,020 + 9.9835 * Chn + -0.00052 * Chn **2.

*Spectrum Calibration:* 3,020 + 10.0318 * Chn + -0.00052 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\U50972D.SPC**

***Background File:*** **C:\User\Alpha\ALPHA\B4070616.SPC**

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

### Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 138.54 | 125 | 144 | 6.00 | 29.00 | 302.00 | 0.60 | 301.40 | 4.90 |
| 2 | 176.52 | 155 | 182 | 6.00 | 536.00 | 6,003.00 | 0.30 | 6002.70 | 97.53 |
| 3 | 118.03 | 98 | 124 | 8.00 | 544.00 | 6,011.00 | 0.60 | 6010.40 | 97.66 |
| Tracer | 232.04 | 211 | 238 | 8.00 | 106.00 | 1,168.00 | 2.40 | 1165.60 | 18.94 |

### Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 59.33 | 22.059 | n/a | 11.30 % |
| 2 | U-234 | 4774.80 | 59.09 | 439.329 | n/a | 2.53 % |
| 3 | U-238 | 4197.00 | 79.27 | 439.892 | n/a | 2.53 % |
| Tracer | U-232 | 5320.00 | 78.33 | 85.309 | n/a | 5.74 % |

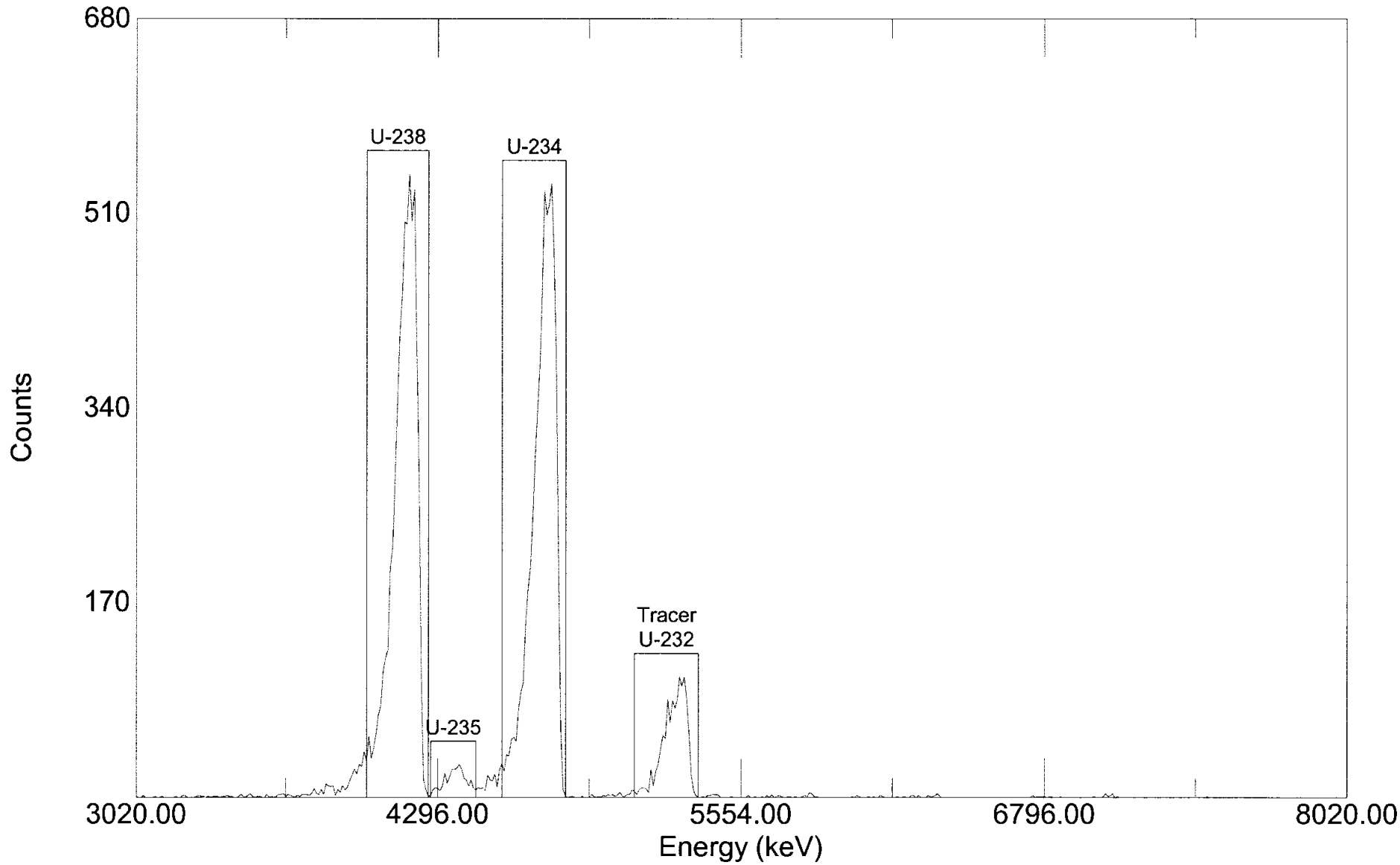
### Totals

| | | % Total |
|---|---|---|
| Gross Count: | 14,131.00 | 100.00 |
| Net Area: | 14,036.20 | 99.33 |
| Background: | 94.80 | 0.67 |
| Composite Fit: | 13,484.00 | 95.42 |
| Residuals: | 647.00 | 4.58 |

Analyzed By: Sm

Checked By: SD

**U50972D** AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 07:26:26 on 09-Jul-2004 Real Time: 18001.32 s. Live Time: 18000.00 s.
File: C:\User\Alpha\ALPHA\U50972D.SPC Detector: #16 MCB 2 Input 8
Sample: 0405097-2D UAS040629-7 Type: Uranium Default

000083

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/14/04 6:51:33 PM
Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** 0405097-3 UAS040629-7

**Analysis Type:** Uranium Default

*Detector:* MCB 2 Input 3

*Date/Time of Count:* 7/9/04 1:48:19 PM

*Sample Volume:* 0.300 Total, 0.300 Aliquot.

*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **60.80%**

*Real Time:* 300.02 Minutes

*Total Eff.:* 17.63 %

*Dead Time:* 0.0 %

*Tracer Amount:* 18.939 DPM.

*Acquisition:* 512 Channels

*Efficiency:* 29.00%

*Analysis:* Relative Region-Of-Interest

*Original:* 3,003 + 10.0610 * Chn + -0.00063 * Chn **2.

*Spectrum Calibration:* 3,003 + 10.1698 * Chn + -0.00063 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\UR50973.SPC**

***Background File:*** **C:\User\Alpha\ALPHA\B4070611.SPC**

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

## Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 138.56 | 126 | 145 | 4.00 | 38.00 | 344.00 | 0.00 | 344.00 | 6.50 |
| 2 | 176.15 | 155 | 182 | 8.00 | 649.00 | 6,781.00 | 0.60 | 6780.40 | 128.18 |
| 3 | 118.27 | 99 | 125 | 6.00 | 682.00 | 6,955.00 | 0.00 | 6955.00 | 131.48 |
| Tracer | 231.15 | 210 | 237 | 8.00 | 98.00 | 1,003.00 | 1.20 | 1001.80 | 18.94 |

## Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 39.98 | 9.764 | n/a | 10.57 % |
| 2 | U-234 | 4774.80 | 79.57 | 192.462 | n/a | 2.38 % |
| 3 | U-238 | 4197.00 | 60.12 | 197.418 | n/a | 2.35 % |
| Tracer | U-232 | 5320.00 | 79.02 | 28.436 | n/a | 6.19 % |

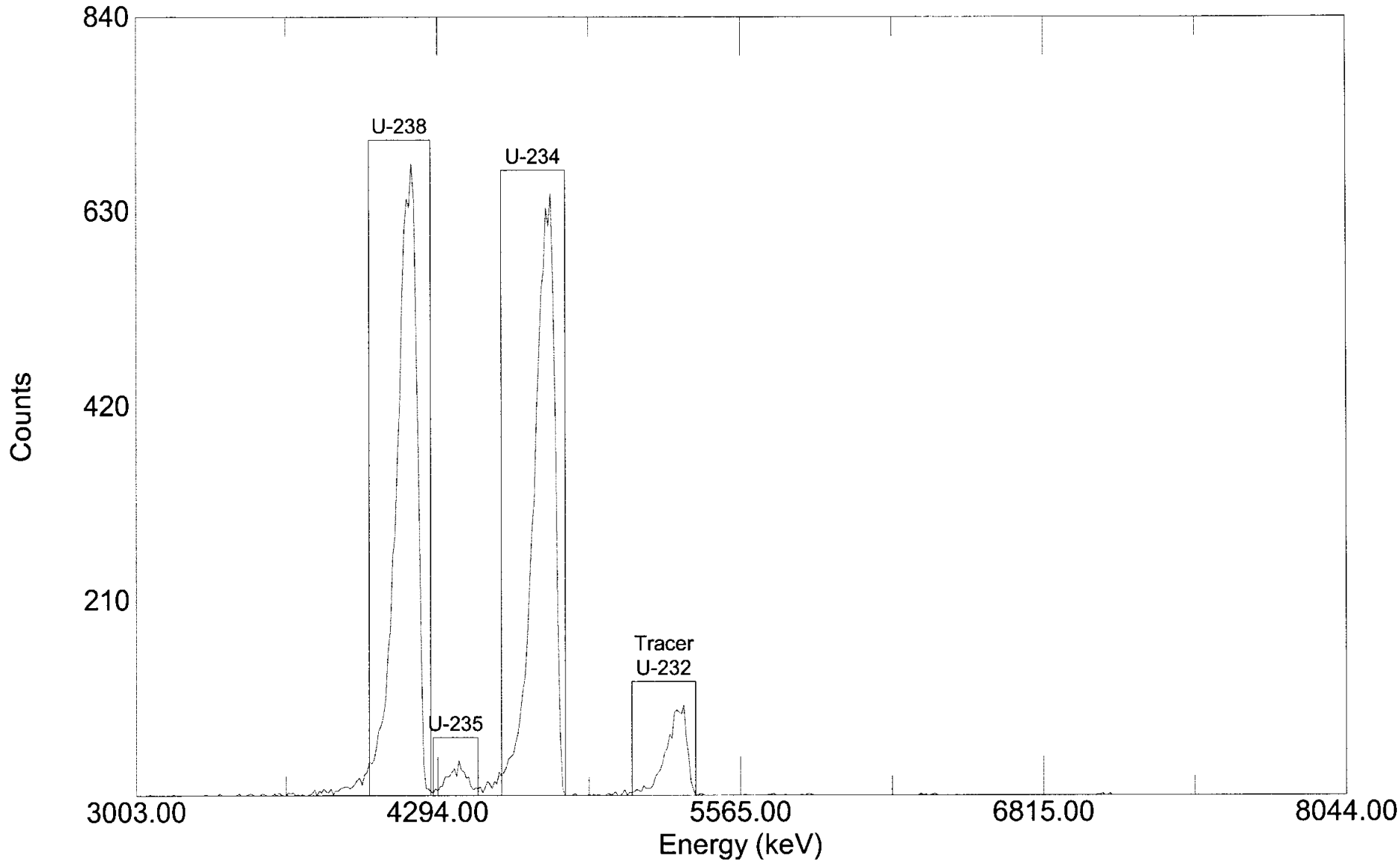
## Totals

| | | % Total |
|---|---|---|
| Gross Count: | 15,618.00 | 100.00 |
| Net Area: | 15,560.10 | 99.63 |
| Background: | 57.90 | 0.37 |
| Composite Fit: | 15,083.00 | 96.57 |
| Residuals: | 535.00 | 3.43 |

Analyzed By: Sm

Checked By: SD

UR50973 AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 13:48:19 on 09-Jul-2004
File: C:\User\Alpha\ALPHA\UR50973.SPC
Sample: 0405097-3 UAS040629-7

Real Time: 18001.28 s. Live Time: 18000.00 s.
Detector: #11 MCB 2 Input 3
Type: Uranium Default

000085

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/9/04 9:31:15 AM
Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** 0405097-4 UAS040629-9

**Analysis Type:** Uranium Default

*Detector:* MCB 8 Input 8

*Date/Time of Count:* 7/8/04 6:51:33 AM

*Sample Volume:* 1.000 Total, 1.000 Aliquot.

*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **78.84%**

*Real Time:* 300.02 Minutes

*Total Eff.:* 24.19 %

*Dead Time:* 0.0 %

*Tracer Amount:* 18.939 DPM.

*Acquisition:* 512 Channels

*Efficiency:* 30.68%

*Analysis:* Relative Region-Of-Interest

*Original:* 3,017 + 10.1750 * Chn + -0.00130 * Chn **2.

*Spectrum Calibration:* 3,017 + 10.2503 * Chn + -0.00130 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\U50974.SPC**

***Background File:*** **C:\USER\ALPHA\BKGND\B4070664.SPC**

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

### Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 137.32 | 125 | 140 | 2.00 | 4.00 | 27.00 | 0.30 | 26.70 | 0.37 |
| 2 | 116.85 | 95 | 124 | 6.00 | 92.00 | 816.00 | 0.30 | 815.70 | 11.24 |
| 3 | 175.39 | 158 | 185 | 10.00 | 77.00 | 777.00 | 1.50 | 775.50 | 10.69 |
| Tracer | 231.48 | 212 | 240 | 10.00 | 127.00 | 1,377.00 | 2.70 | 1374.30 | 18.94 |

### Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 19.79 | 0.166 | n/a | 38.16 % |
| 2 | U-238 | 4197.00 | 59.68 | 5.063 | n/a | 6.86 % |
| 3 | U-234 | 4774.80 | 97.94 | 4.814 | n/a | 7.05 % |
| Tracer | U-232 | 5320.00 | 96.48 | 8.531 | n/a | 5.28 % |

### Totals

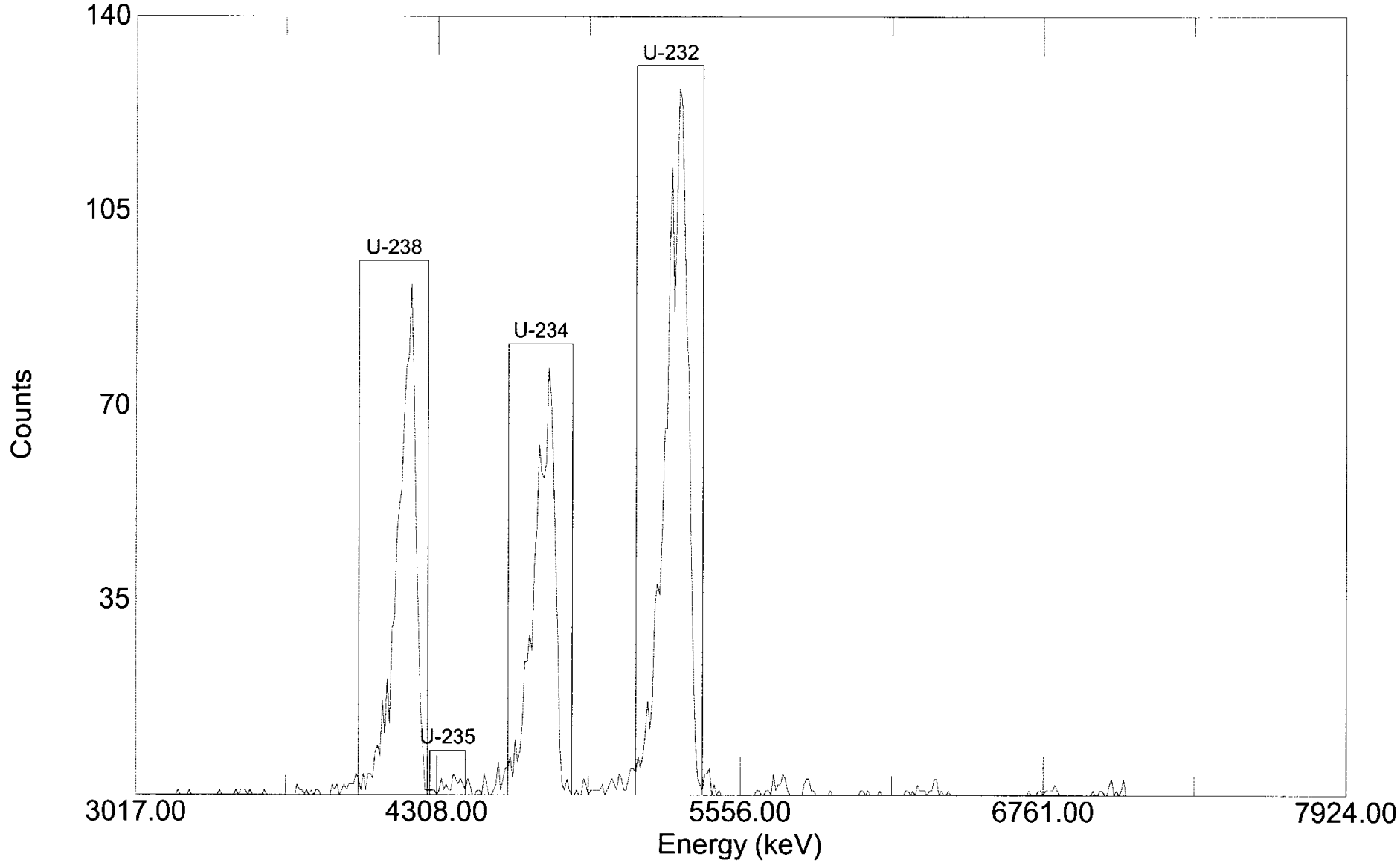
| | | % Total |
|---|---|---|
| Gross Count: | 3,201.00 | 100.00 |
| Net Area: | 3,114.30 | 97.29 |
| Background: | 86.70 | 2.71 |
| Composite Fit: | 2,997.00 | 93.63 |
| Residuals: | 204.00 | 6.37 |

Analyzed By: Sm

Checked By: SD

000086

U50974 AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 06:51:33 on 08-Jul-2004
File: C:\User\Alpha\ALPHA\U50974.SPC
Sample: 0405097-4 UAS040629-9

Real Time: 18001.28 s. Live Time: 18000.00 s.
Detector: #64 MCB 8 Input 8
Type: Uranium Default

000087

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/9/04 9:33:12 AM
Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** 0405097-5 UAS040629-9

**Analysis Type:** Uranium Default

*Detector:* MCB 2 Input 1

*Date/Time of Count:* 7/8/04 12:59:54 PM

*Sample Volume:* 1.000 Total, 1.000 Aliquot.

*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **77.81%**

*Real Time:* 300.01 Minutes

*Total Eff.:* 22.77 %

*Dead Time:* 0.0 %

*Tracer Amount:* 18.939 DPM.

*Acquisition:* 512 Channels

*Efficiency:* 29.27%

*Analysis:* Relative Region-Of-Interest

*Original:* 3,049 + 9.6939 * Chn + 0.00007 * Chn **2.

*Spectrum Calibration:* 3,049 + 9.6933 * Chn + 0.00007 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\U50975.SPC**

***Background File:*** **C:\USER\ALPHA\BKGND\B4070609.SPC**

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

## Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 139.21 | 125 | 141 | 2.00 | 4.00 | 22.00 | 0.90 | 21.10 | 0.31 |
| 2 | 118.30 | 95 | 124 | 8.00 | 53.00 | 512.00 | 2.40 | 509.60 | 7.46 |
| 3 | 177.78 | 155 | 182 | 6.00 | 46.00 | 449.00 | 5.10 | 443.90 | 6.50 |
| Tracer | 233.85 | 212 | 239 | 6.00 | 153.00 | 1,299.00 | 5.10 | 1293.90 | 18.94 |

## Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 19.43 | 0.139 | n/a | 43.65 % |
| 2 | U-238 | 4197.00 | 77.68 | 3.360 | n/a | 8.70 % |
| 3 | U-234 | 4774.80 | 58.32 | 2.927 | n/a | 9.36 % |
| Tracer | U-232 | 5320.00 | 58.36 | 8.531 | n/a | 5.44 % |

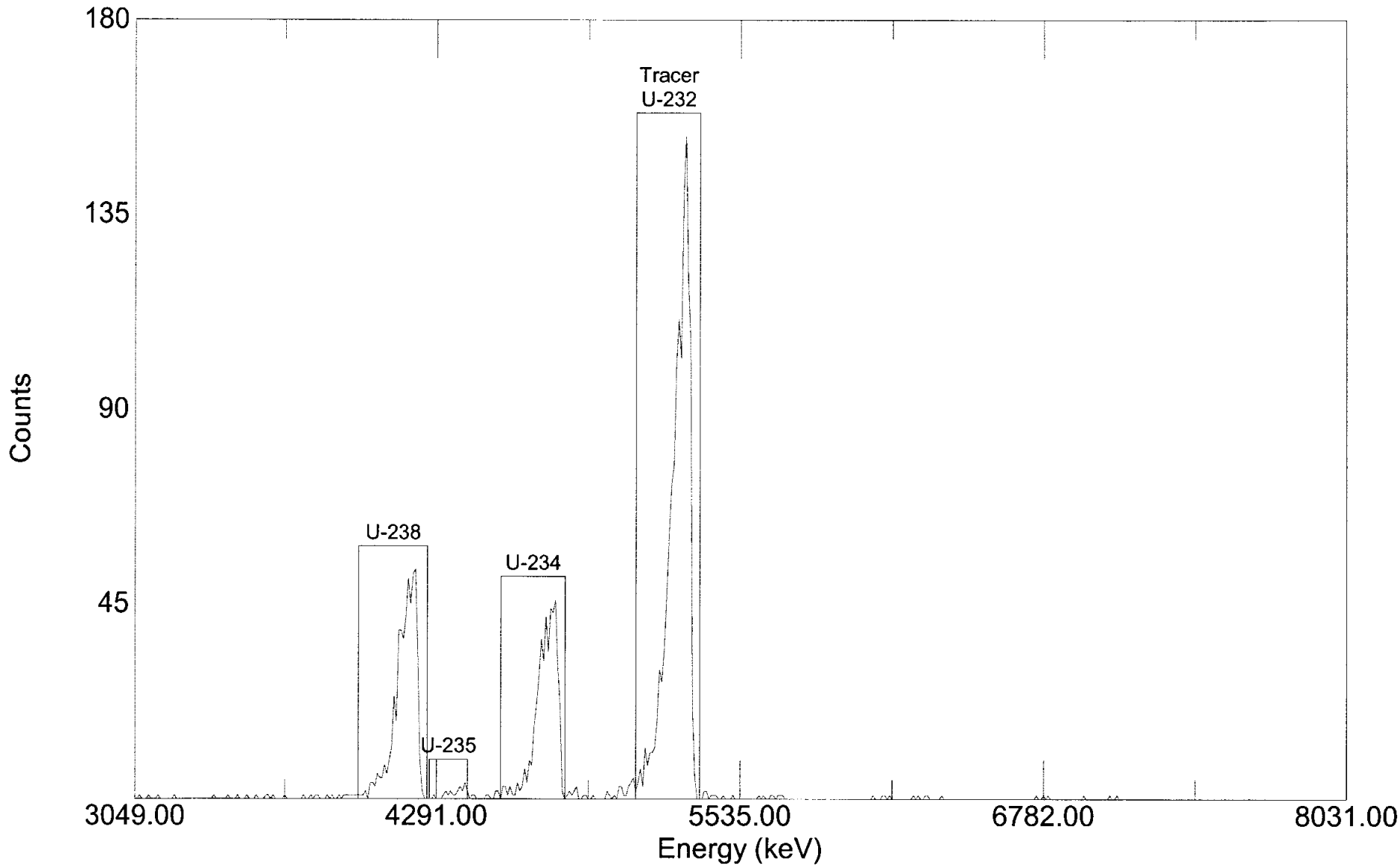
## Totals

| | | % Total |
|---|---|---|
| Gross Count: | 2,383.00 | 100.00 |
| Net Area: | 2,323.60 | 97.51 |
| Background: | 59.40 | 2.49 |
| Composite Fit: | 2,282.00 | 95.76 |
| Residuals: | 101.00 | 4.24 |

Analyzed By: Sm

Checked By: SD

U50975 AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 12:59:54 on 08-Jul-2004
File: C:\User\Alpha\ALPHA\U50975.SPC
Sample: 0405097-5 UAS040629-9

Real Time: 18000.46 s. Live Time: 18000.00 s.
Detector: #9 MCB 2 Input 1
Type: Uranium Default

000089

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/9/04 9:34:15 AM
Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** 0405097-5D UAS040629-9

**Analysis Type:** Uranium Default

*Detector:* MCB 2 Input 2

*Date/Time of Count:* 7/8/04 1:00:04 PM

*Sample Volume:* 1.000 Total, 1.000 Aliquot.

*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **80.15%**

*Real Time:* 300.01 Minutes

*Total Eff.:* 23.83 %

*Dead Time:* 0.0 %

*Tracer Amount:* 18.939 DPM.

*Acquisition:* 512 Channels

*Efficiency:* 29.73%

*Analysis:* Relative Region-Of-Interest

*Original:* 3,027 + 10.0130 * Chn + -0.00056 * Chn **2.

*Spectrum Calibration:* 3,027 + 10.0086 * Chn + -0.00056 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\U50975D.SPC**

***Background File:*** **C:\USER\ALPHA\BKGND\B4070610.SPC**

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

### Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 138.26 | 125 | 140 | 6.00 | 3.00 | 22.00 | 0.30 | 21.70 | 0.30 |
| 2 | 117.68 | 95 | 124 | 8.00 | 54.00 | 482.00 | 0.30 | 481.70 | 6.74 |
| 3 | 176.38 | 155 | 182 | 6.00 | 61.00 | 452.00 | 0.60 | 451.40 | 6.31 |
| Tracer | 232.13 | 212 | 239 | 8.00 | 140.00 | 1,358.00 | 4.20 | 1353.80 | 18.94 |

### Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 59.12 | 0.137 | n/a | 42.39 % |
| 2 | U-238 | 4197.00 | 79.01 | 3.035 | n/a | 8.93 % |
| 3 | U-234 | 4774.80 | 58.86 | 2.844 | n/a | 9.23 % |
| Tracer | U-232 | 5320.00 | 77.99 | 8.531 | n/a | 5.32 % |

### Totals

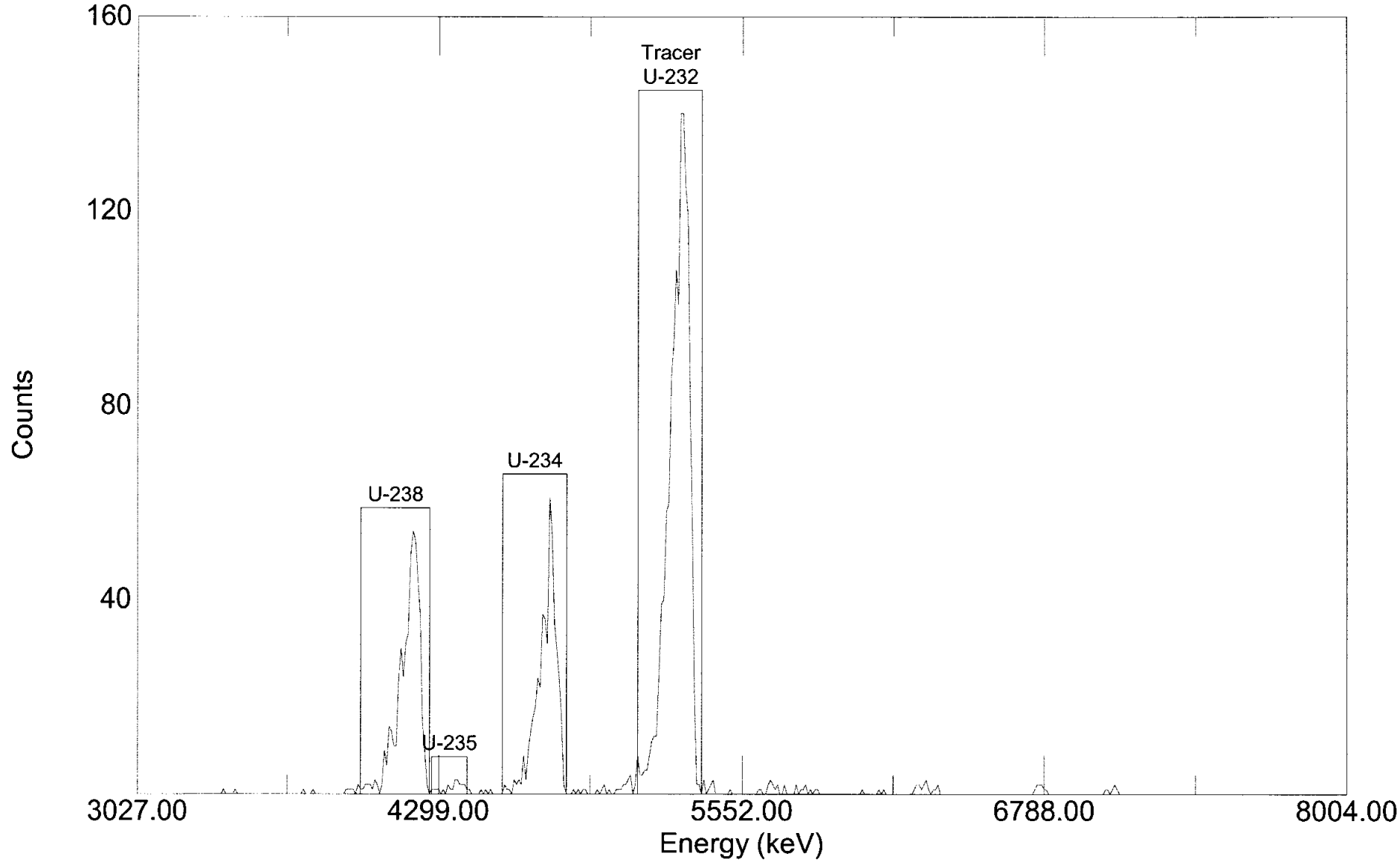
| | | % Total |
|---|---|---|
| Gross Count: | 2,420.00 | 100.00 |
| Net Area: | 2,351.30 | 97.16 |
| Background: | 68.70 | 2.84 |
| Composite Fit: | 2,314.00 | 95.62 |
| Residuals: | 106.00 | 4.38 |

Analyzed By: Sm

Checked By: SD

000090

U50975D AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 13:00:04 on 08-Jul-2004 Real Time: 18000.46 s. Live Time: 18000.00 s.
File: C:\User\Alpha\ALPHA\U50975D.SPC Detector: #10 MCB 2 Input 2
Sample: 0405097-5D UAS040629-9 Type: Uranium Default

000091

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/9/04 12:11:49 PM
Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** 0405097-6 UAS040629

**Analysis Type:** Uranium Default

*Detector:* MCB 2 Input 3

*Date/Time of Count:* 7/8/04 1:01:48 PM

*Sample Volume:* 1.000 Total, 1.000 Aliquot.

*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **87.45%**

*Real Time:* 300.01 Minutes

*Total Eff.:* 25.36 %

*Dead Time:* 0.0 %

*Tracer Amount:* 18.939 DPM.

*Acquisition:* 512 Channels

*Efficiency:* 29.00%

*Analysis:* Relative Region-Of-Interest

*Original:* 3,003 + 10.0610 * Chn + -0.00063 * Chn **2.

*Spectrum Calibration:* 3,003 + 10.1239 * Chn + -0.00063 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\U50976.SPC**

***Background File:*** **C:\USER\ALPHA\BKGND\B4070611.SPC**

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

## Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 139.20 | 126 | 141 | 2.00 | 3.00 | 12.00 | 0.00 | 12.00 | 0.16 |
| 2 | 118.82 | 96 | 125 | 6.00 | 29.00 | 245.00 | 0.00 | 245.00 | 3.22 |
| 3 | 176.97 | 155 | 182 | 6.00 | 24.00 | 208.00 | 0.60 | 207.40 | 2.73 |
| Tracer | 232.23 | 210 | 237 | 6.00 | 179.00 | 1,442.00 | 1.20 | 1440.80 | 18.94 |

## Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 19.90 | 0.071 | n/a | 56.58 % |
| 2 | U-238 | 4197.00 | 59.84 | 1.451 | n/a | 12.52 % |
| 3 | U-234 | 4774.80 | 59.40 | 1.228 | n/a | 13.63 % |
| Tracer | U-232 | 5320.00 | 58.98 | 8.531 | n/a | 5.16 % |

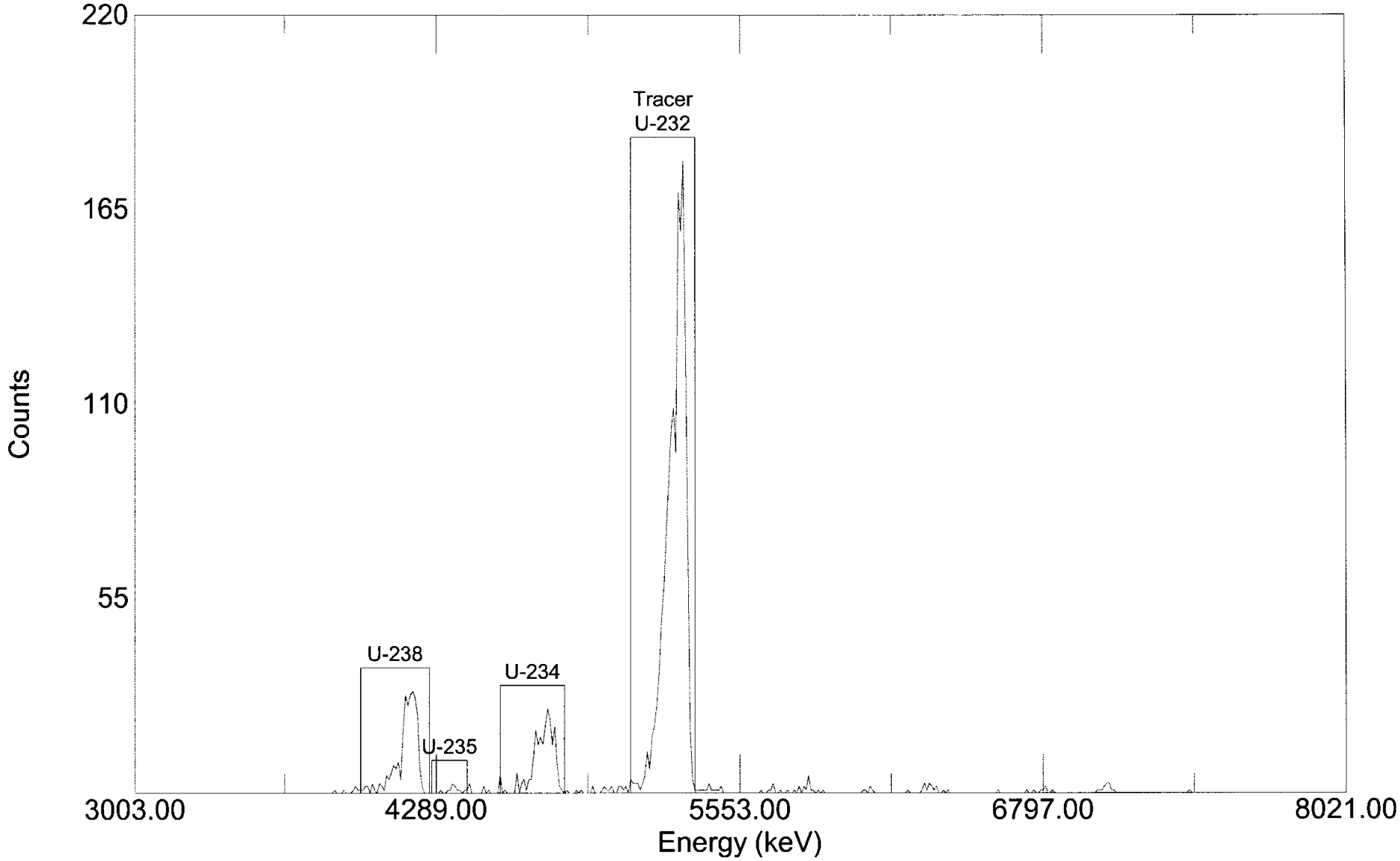
## Totals

| | | % Total |
|---|---|---|
| Gross Count: | 2,018.00 | 100.00 |
| Net Area: | 1,960.10 | 97.13 |
| Background: | 57.90 | 2.87 |
| Composite Fit: | 1,907.00 | 94.50 |
| Residuals: | 111.00 | 5.50 |

Analyzed By: Sm

Checked By: SD

U50976 AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 13:01:48 on 08-Jul-2004
File: C:\User\Alpha\ALPHA\U50976.SPC
Sample: 0405097-6 UAS040629

Real Time: 18000.44 s. Live Time: 18000.00 s.
Detector: #11 MCB 2 Input 3
Type: Uranium Default

000093

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/9/04 12:13:33 PM
Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** 0405097-7 UAS040629-9

**Analysis Type:** Uranium Default

*Detector:* MCB 2 Input 4

*Date/Time of Count:* 7/8/04 1:02:03 PM

*Sample Volume:* 1.000 Total, 1.000 Aliquot.

*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **76.80%**

*Real Time:* 300.01 Minutes

*Total Eff.:* 22.62 %

*Dead Time:* 0.0 %

*Tracer Amount:* 18.939 DPM.

*Acquisition:* 512 Channels

*Efficiency:* 29.45%

*Analysis:* Relative Region-Of-Interest

*Original:* 3,032 + 9.9735 * Chn + -0.00053 * Chn **2.

*Spectrum Calibration:* 3,032 + 10.0485 * Chn + -0.00053 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\U50977.SPC**

***Background File:*** **C:\User\Alpha\ALPHA\B4070612.SPC**

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

## Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 2 | 116.64 | 96 | 125 | 6.00 | 249.00 | 2,633.00 | 0.90 | 2632.10 | 38.79 |
| 3 | 175.03 | 157 | 184 | 8.00 | 234.00 | 2,508.00 | 1.50 | 2506.50 | 36.94 |
| Tracer | 230.47 | 212 | 239 | 10.00 | 115.00 | 1,294.00 | 9.00 | 1285.00 | 18.94 |
| 1 | 137.11 | 126 | 141 | 8.00 | 17.00 | 122.00 | 0.30 | 121.70 | 1.79 |

## Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 2 | U-238 | 4197.00 | 59.55 | 17.474 | n/a | 3.82 % |
| 3 | U-234 | 4774.80 | 78.91 | 16.640 | n/a | 3.92 % |
| Tracer | U-232 | 5320.00 | 98.05 | 8.531 | n/a | 5.45 % |
| 1 | U-235 | 4400.00 | 79.23 | 0.808 | n/a | 17.79 % |

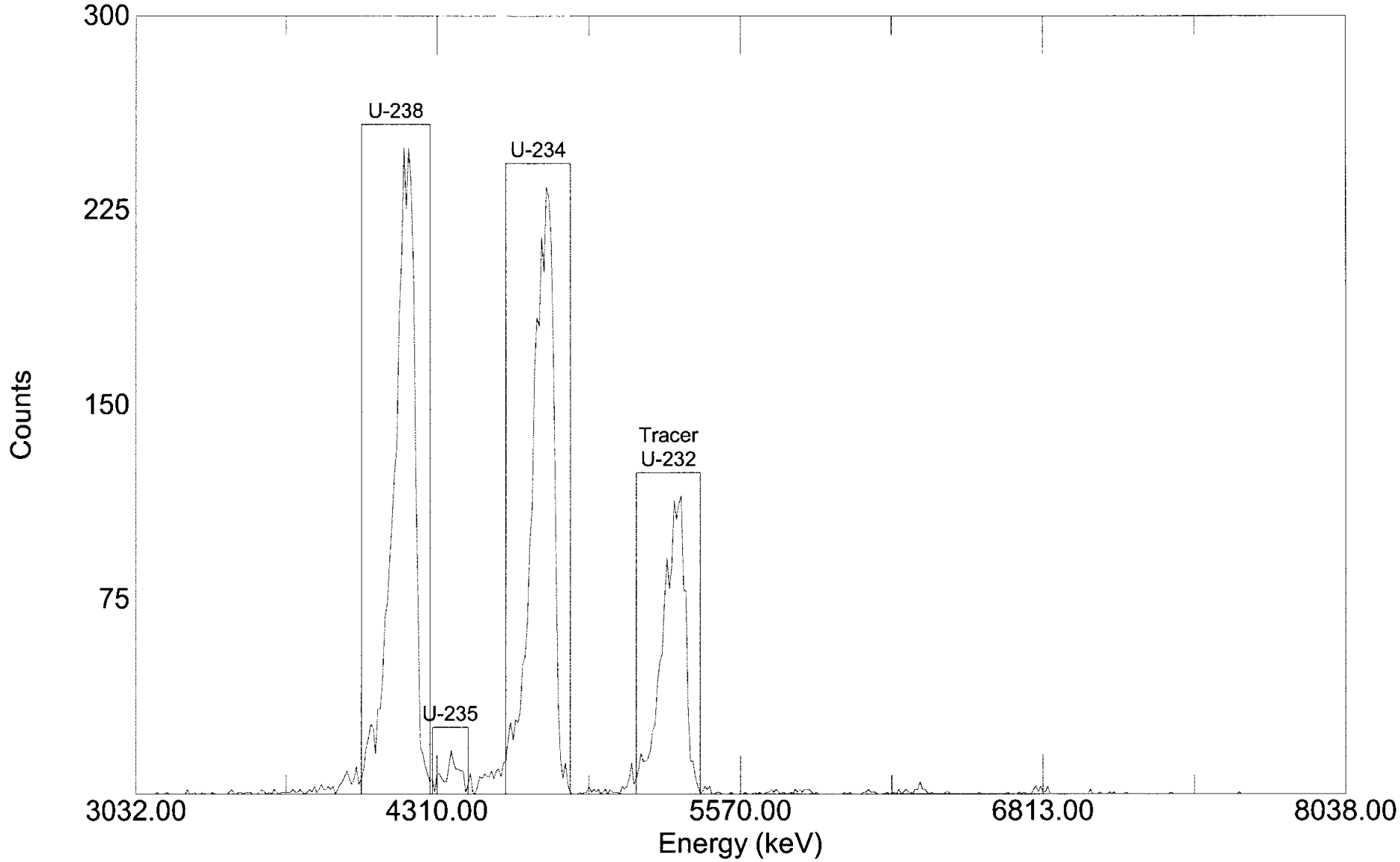
## Totals

| | | % Total |
|---|---|---|
| Gross Count: | 6,926.00 | 100.00 |
| Net Area: | 6,813.20 | 98.37 |
| Background: | 112.80 | 1.63 |
| Composite Fit: | 6,557.00 | 94.67 |
| Residuals: | 369.00 | 5.33 |

Analyzed By: Sm

Checked By: SD

U50977 AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 13:02:03 on 08-Jul-2004 Real Time: 18000.46 s. Live Time: 18000.00 s.
File: C:\User\Alpha\ALPHA\U50977.SPC Detector: #12 MCB 2 Input 4
Sample: 0405097-7 UAS040629-9 Type: Uranium Default

000095

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/9/04 9:37:06 AM
Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** 0405097-8 UAS040629-9
**Analysis Type:** Uranium Default

*Detector:* MCB 2 Input 5
*Date/Time of Count:* 7/8/04 1:02:17 PM

*Sample Volume:* 1.000 Total, 1.000 Aliquot.
*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **80.17%**
*Real Time:* 300.01 Minutes

*Total Eff.:* 25.08 %
*Dead Time:* 0.0 %

*Tracer Amount:* 18.939 DPM.
*Acquisition:* 512 Channels

*Efficiency:* 31.29%
*Analysis:* Relative Region-Of-Interest

*Original:* 3,042 + 9.9000 * Chn + -0.00035 * Chn **2.

*Spectrum Calibration:* 3,042 + 9.9734 * Chn + -0.00035 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\U50978.SPC**
***Background File:*** **C:\USER\ALPHA\BKGND\B4070613.SPC**
*Library File:* C:\User\Alpha\ALPHAVIS.ALB

### Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 136.80 | 122 | 138 | 2.00 | 2.00 | 8.00 | 0.90 | 7.10 | 0.09 |
| 2 | 116.26 | 92 | 121 | 8.00 | 34.00 | 303.00 | 2.10 | 300.90 | 4.00 |
| 3 | 174.79 | 154 | 181 | 4.00 | 36.00 | 238.00 | 3.90 | 234.10 | 3.11 |
| Tracer | 230.24 | 208 | 235 | 8.00 | 152.00 | 1,430.00 | 4.80 | 1425.20 | 18.94 |

### Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 19.76 | 0.042 | n/a | 78.47 % |
| 2 | U-238 | 4197.00 | 79.14 | 1.801 | n/a | 11.34 % |
| 3 | U-234 | 4774.80 | 39.41 | 1.401 | n/a | 12.93 % |
| Tracer | U-232 | 5320.00 | 78.51 | 8.531 | n/a | 5.18 % |

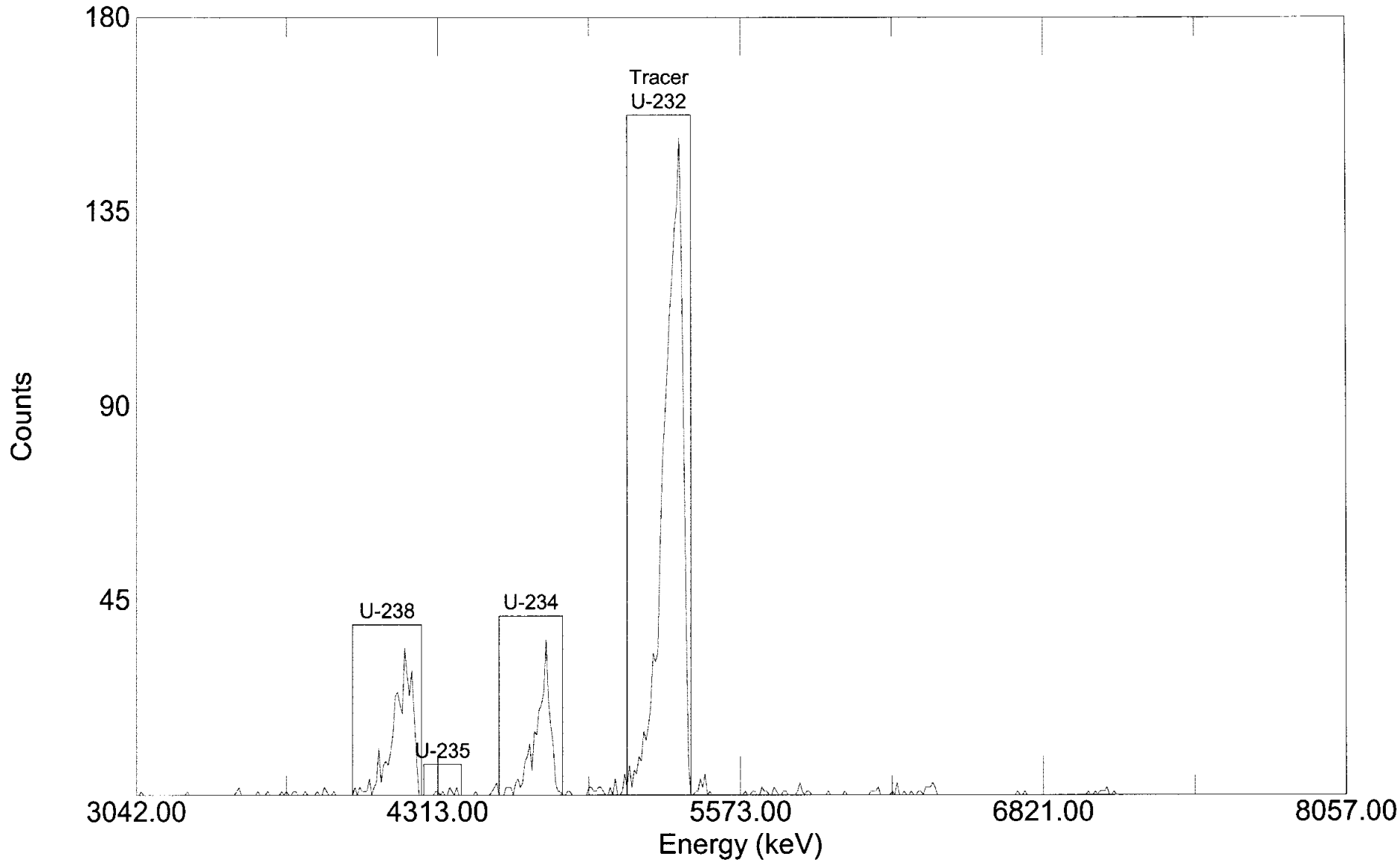
### Totals

| | | % Total |
|---|---|---|
| Gross Count: | 2,097.00 | 100.00 |
| Net Area: | 2,013.90 | 96.04 |
| Background: | 83.10 | 3.96 |
| Composite Fit: | 1,979.00 | 94.37 |
| Residuals: | 118.00 | 5.63 |

Analyzed By: Sm

Checked By: SP

U50978 AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 13:02:17 on 08-Jul-2004
File: C:\User\Alpha\ALPHA\U50978.SPC
Sample: 0405097-8 UAS040629-9

Real Time: 18000.46 s. Live Time: 18000.00 s.
Detector: #13 MCB 2 Input 5
Type: Uranium Default

000097

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/9/04 9:38:02 AM
Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** 0405097-9 UAS040629-9

**Analysis Type:** Uranium Default

*Detector:* MCB 2 Input 7

*Date/Time of Count:* 7/8/04 1:02:30 PM

*Sample Volume:* 1.000 Total, 1.000 Aliquot.

*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **82.79%**

*Real Time:* 300.01 Minutes

*Total Eff.:* 24.25 %

*Dead Time:* 0.0 %

*Tracer Amount:* 18.939 DPM.

*Acquisition:* 512 Channels

*Efficiency:* 29.29%

*Analysis:* Relative Region-Of-Interest

*Original:* 3,037 + 9.8877 * Chn + -0.00041 * Chn **2.

*Spectrum Calibration:* 3,037 + 9.9769 * Chn + -0.00041 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\U50979.SPC**

***Background File:*** **C:\USER\ALPHA\BKGND\B4070615.SPC**

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

### Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 137.41 | 122 | 141 | 2.00 | 3.00 | 11.00 | 2.10 | 8.90 | 0.12 |
| 2 | 116.84 | 92 | 121 | 6.00 | 41.00 | 388.00 | 1.20 | 386.80 | 5.32 |
| 3 | 175.47 | 153 | 180 | 8.00 | 36.00 | 341.00 | 0.60 | 340.40 | 4.68 |
| Tracer | 231.05 | 210 | 237 | 6.00 | 149.00 | 1,390.00 | 12.30 | 1377.70 | 18.94 |

### Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 19.73 | 0.055 | n/a | 73.67 % |
| 2 | U-238 | 4197.00 | 59.28 | 2.395 | n/a | 9.98 % |
| 3 | U-234 | 4774.80 | 78.66 | 2.108 | n/a | 10.63 % |
| Tracer | U-232 | 5320.00 | 58.72 | 8.531 | n/a | 5.26 % |

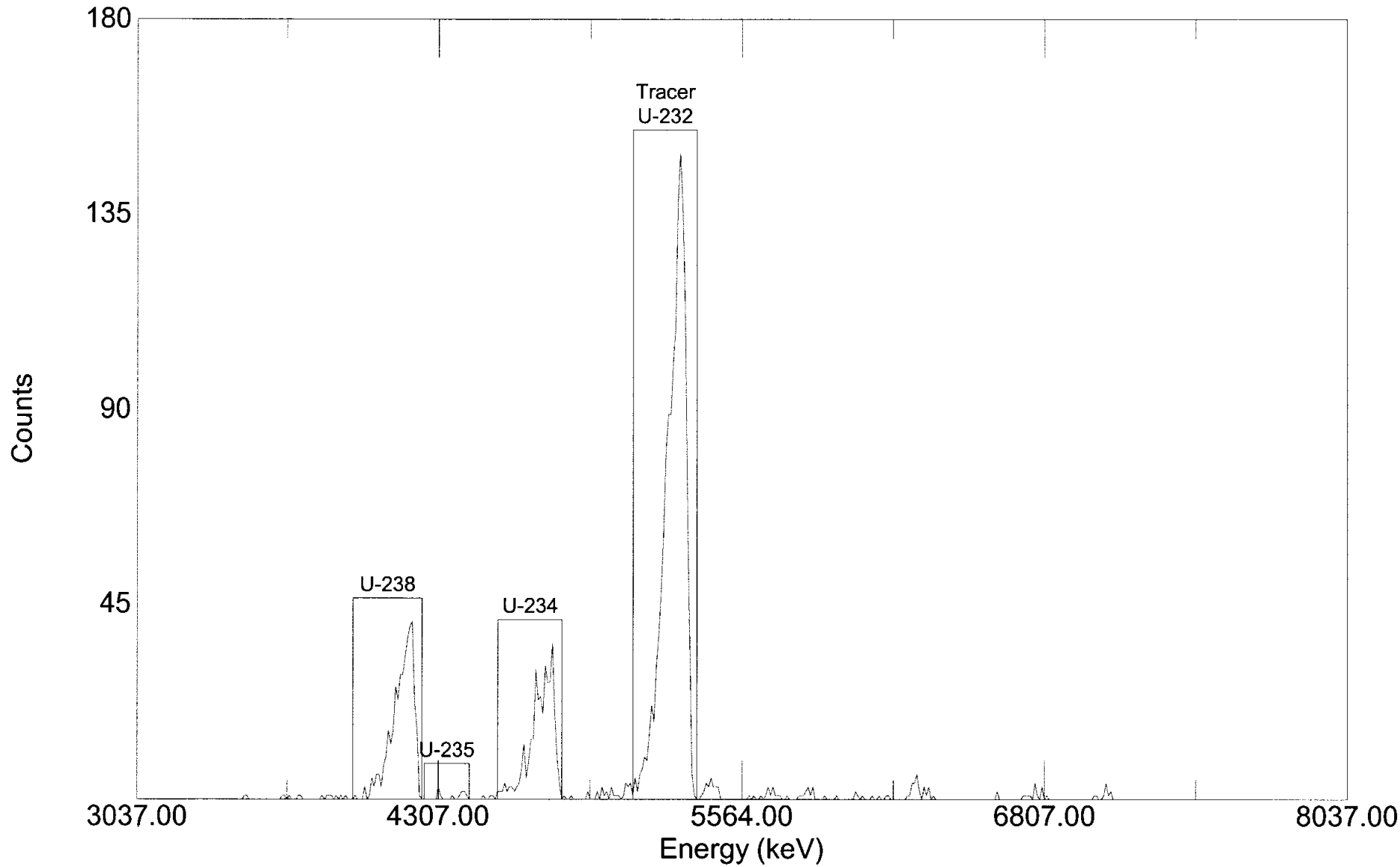
### Totals

| | | % Total |
|---|---|---|
| Gross Count: | 2,289.00 | 100.00 |
| Net Area: | 2,169.30 | 94.77 |
| Background: | 119.70 | 5.23 |
| Composite Fit: | 2,130.00 | 93.05 |
| Residuals: | 159.00 | 6.95 |

Analyzed By: Sm

Checked By: SD

U50979 AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 13:02:30 on 08-Jul-2004
File: C:\User\Alpha\ALPHA\U50979.SPC
Sample: 0405097-9 UAS040629-9

Real Time: 18000.48 s. Live Time: 18000.00 s.
Detector: #15 MCB 2 Input 7
Type: Uranium Default

000099

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/9/04 2:52:17 PM
Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** 0405097-10 UAS040629-9

**Analysis Type:** Uranium Default

*Detector:* MCB 2 Input 8

*Date/Time of Count:* 7/8/04 1:02:44 PM

*Sample Volume:* 1.000 Total, 1.000 Aliquot.

*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **81.67%**

*Real Time:* 300.01 Minutes

*Total Eff.:* 23.66 %

*Dead Time:* 0.0 %

*Tracer Amount:* 18.939 DPM.

*Acquisition:* 512 Channels

*Efficiency:* 28.97%

*Analysis:* Relative Region-Of-Interest

*Original:* 3,020 + 9.9835 * Chn + -0.00052 * Chn **2.

*Spectrum Calibration:* 3,020 + 10.0174 * Chn + -0.00052 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\U509710.SPC**

***Background File:*** **C:\USER\ALPHA\BKGND\B4070616.SPC**

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

### Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 138.74 | 125 | 141 | 4.00 | 4.00 | 14.00 | 0.60 | 13.40 | 0.19 |
| 2 | 118.20 | 95 | 124 | 6.00 | 28.00 | 227.00 | 0.60 | 226.40 | 3.19 |
| 3 | 176.77 | 155 | 182 | 6.00 | 24.00 | 189.00 | 0.30 | 188.70 | 2.66 |
| Tracer | 232.38 | 210 | 237 | 8.00 | 143.00 | 1,346.00 | 1.80 | 1344.20 | 18.94 |

### Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 39.49 | 0.085 | n/a | 54.83 % |
| 2 | U-238 | 4197.00 | 59.37 | 1.437 | n/a | 13.05 % |
| 3 | U-234 | 4774.80 | 59.00 | 1.198 | n/a | 14.28 % |
| Tracer | U-232 | 5320.00 | 78.21 | 8.531 | n/a | 5.34 % |

### Totals

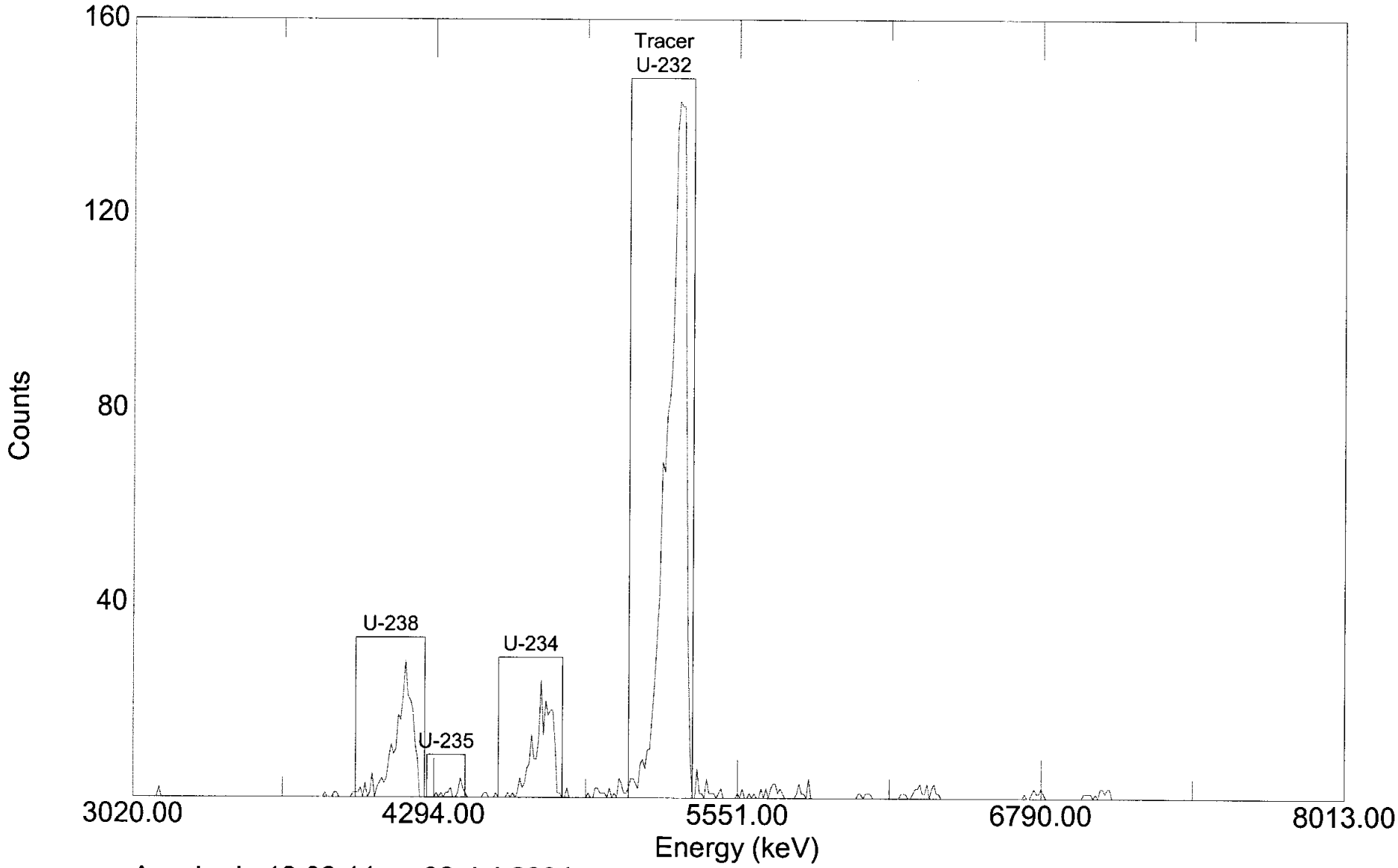
| | | % Total |
|---|---|---|
| Gross Count: | 1,907.00 | 100.00 |
| Net Area: | 1,812.20 | 95.03 |
| Background: | 94.80 | 4.97 |
| Composite Fit: | 1,776.00 | 93.13 |
| Residuals: | 131.00 | 6.87 |

Analyzed By: Sm

Checked By: SAD

000109

U509710 AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 13:02:44 on 08-Jul-2004
File: C:\User\Alpha\ALPHA\U509710.SPC
Sample: 0405097-10 UAS040629-9

Real Time: 18000.48 s. Live Time: 18000.00 s.
Detector: #16 MCB 2 Input 8
Type: Uranium Default

000101

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/9/04 9:42:05 AM
Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** 0405097-11 UAS040629-9

**Analysis Type:** Uranium Default

*Detector:* MCB 3 Input 1

*Date/Time of Count:* 7/8/04 1:02:58 PM

*Sample Volume:* 1.000 Total, 1.000 Aliquot.

*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **85.86%**

*Real Time:* 300.13 Minutes

*Total Eff.:* 26.13 %

*Dead Time:* 0.0 %

*Tracer Amount:* 18.939 DPM.

*Acquisition:* 512 Channels

*Efficiency:* 30.43%

*Analysis:* Relative Region-Of-Interest

*Original:* 2,993 + 10.3227 * Chn + -0.00160 * Chn **2.

*Spectrum Calibration:* 2,993 + 10.6336 * Chn + -0.00160 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\U509711.SPC**

***Background File:*** **C:\USER\ALPHA\BKGND\B4070617.SPC**

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

### Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 135.08 | 122 | 137 | 2.00 | 2.00 | 11.00 | 0.60 | 10.40 | 0.13 |
| 2 | 115.24 | 92 | 121 | 4.00 | 19.00 | 190.00 | 0.60 | 189.40 | 2.42 |
| 3 | 172.04 | 152 | 179 | 4.00 | 18.00 | 156.00 | 0.60 | 155.40 | 1.98 |
| Tracer | 226.58 | 209 | 236 | 10.00 | 134.00 | 1,491.00 | 6.60 | 1484.40 | 18.94 |

### Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 20.40 | 0.060 | n/a | 62.66 % |
| 2 | U-238 | 4197.00 | 41.06 | 1.088 | n/a | 14.27 % |
| 3 | U-234 | 4774.80 | 40.33 | 0.893 | n/a | 15.76 % |
| Tracer | U-232 | 5320.00 | 99.09 | 8.531 | n/a | 5.08 % |

### Totals

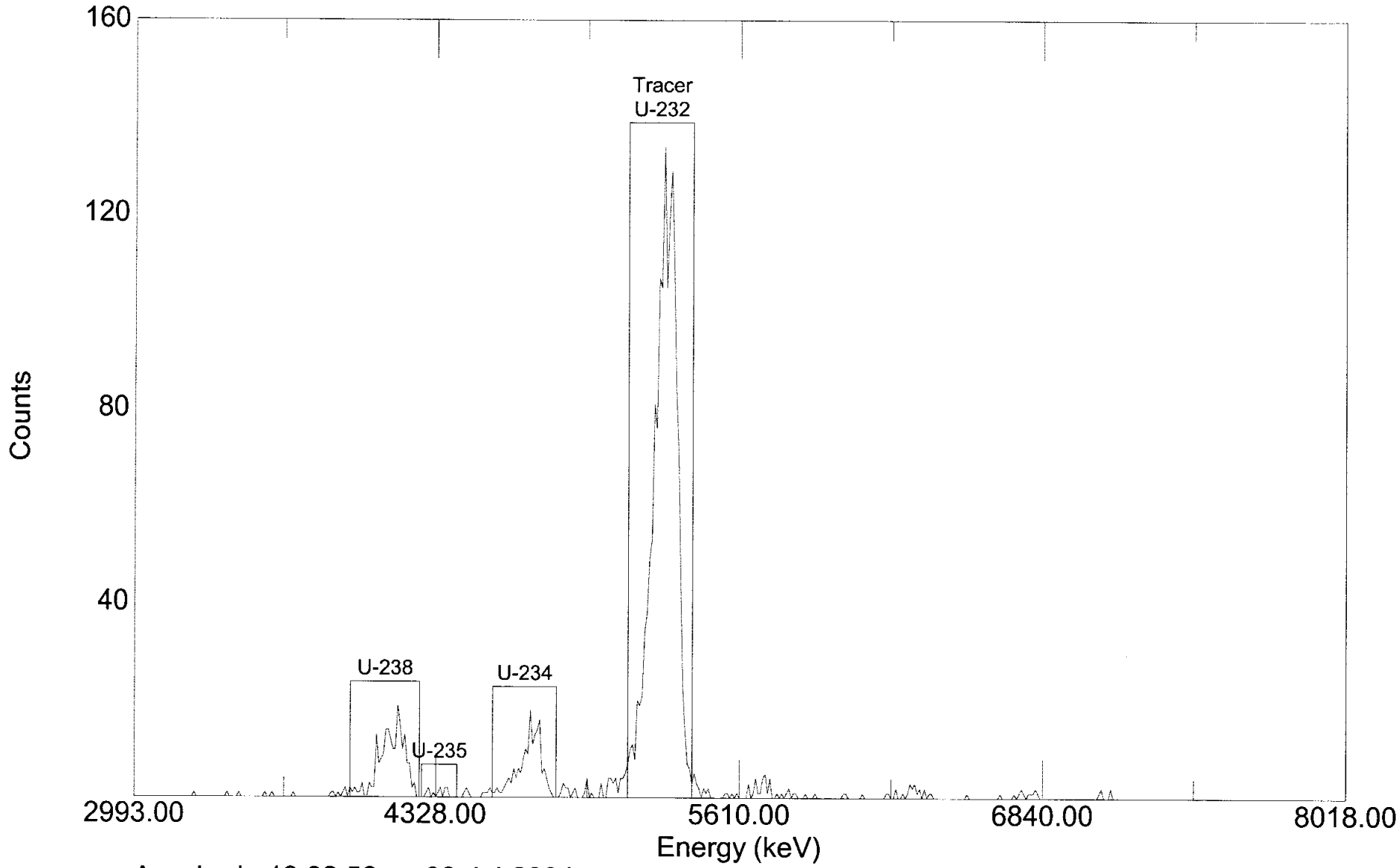
| | | % Total |
|---|---|---|
| Gross Count: | 2,012.00 | 100.00 |
| Net Area: | 1,889.30 | 93.90 |
| Background: | 122.70 | 6.10 |
| Composite Fit: | 1,848.00 | 91.85 |
| Residuals: | 164.00 | 8.15 |

Analyzed By: Sm

Checked By: SD

U509711

AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 13:02:58 on 08-Jul-2004
File: C:\User\Alpha\ALPHA\U509711.SPC
Sample: 0405097-11 UAS040629-9

Real Time: 18008.02 s. Live Time: 18000.00 s.
Detector: #17 MCB 3 Input 1
Type: Uranium Default

000103

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/9/04 9:40:53 AM

Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** 0405097-12 UAS040629-9

**Analysis Type:** Uranium Default

*Detector:* MCB 3 Input 2

*Date/Time of Count:* 7/8/04 1:03:09 PM

*Sample Volume:* 1.000 Total, 1.000 Aliquot.

*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **78.71%**

*Real Time:* 300.13 Minutes

*Total Eff.:* 23.52 %

*Dead Time:* 0.0 %

*Tracer Amount:* 18.939 DPM.

*Acquisition:* 512 Channels

*Efficiency:* 29.88%

*Analysis:* Relative Region-Of-Interest

*Original:* 3,033 + 10.0328 * Chn + -0.00079 * Chn **2.

*Spectrum Calibration:* 3,033 + 10.1241 * Chn + -0.00079 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\U509712.SPC**

***Background File:*** **C:\USER\ALPHA\BKGND\B4070618.SPC**

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

## Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 136.53 | 123 | 139 | 6.00 | 1.00 | 10.00 | 0.90 | 9.10 | 0.13 |
| 2 | 116.07 | 93 | 122 | 4.00 | 32.00 | 317.00 | 1.20 | 315.80 | 4.48 |
| 3 | 174.47 | 152 | 179 | 8.00 | 29.00 | 270.00 | 1.20 | 268.80 | 3.81 |
| Tracer | 230.08 | 212 | 239 | 8.00 | 135.00 | 1,342.00 | 5.70 | 1336.30 | 18.94 |

## Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 59.45 | 0.058 | n/a | 68.39 % |
| 2 | U-238 | 4197.00 | 39.76 | 2.016 | n/a | 11.05 % |
| 3 | U-234 | 4774.80 | 78.78 | 1.716 | n/a | 11.98 % |
| Tracer | U-232 | 5320.00 | 78.07 | 8.531 | n/a | 5.35 % |

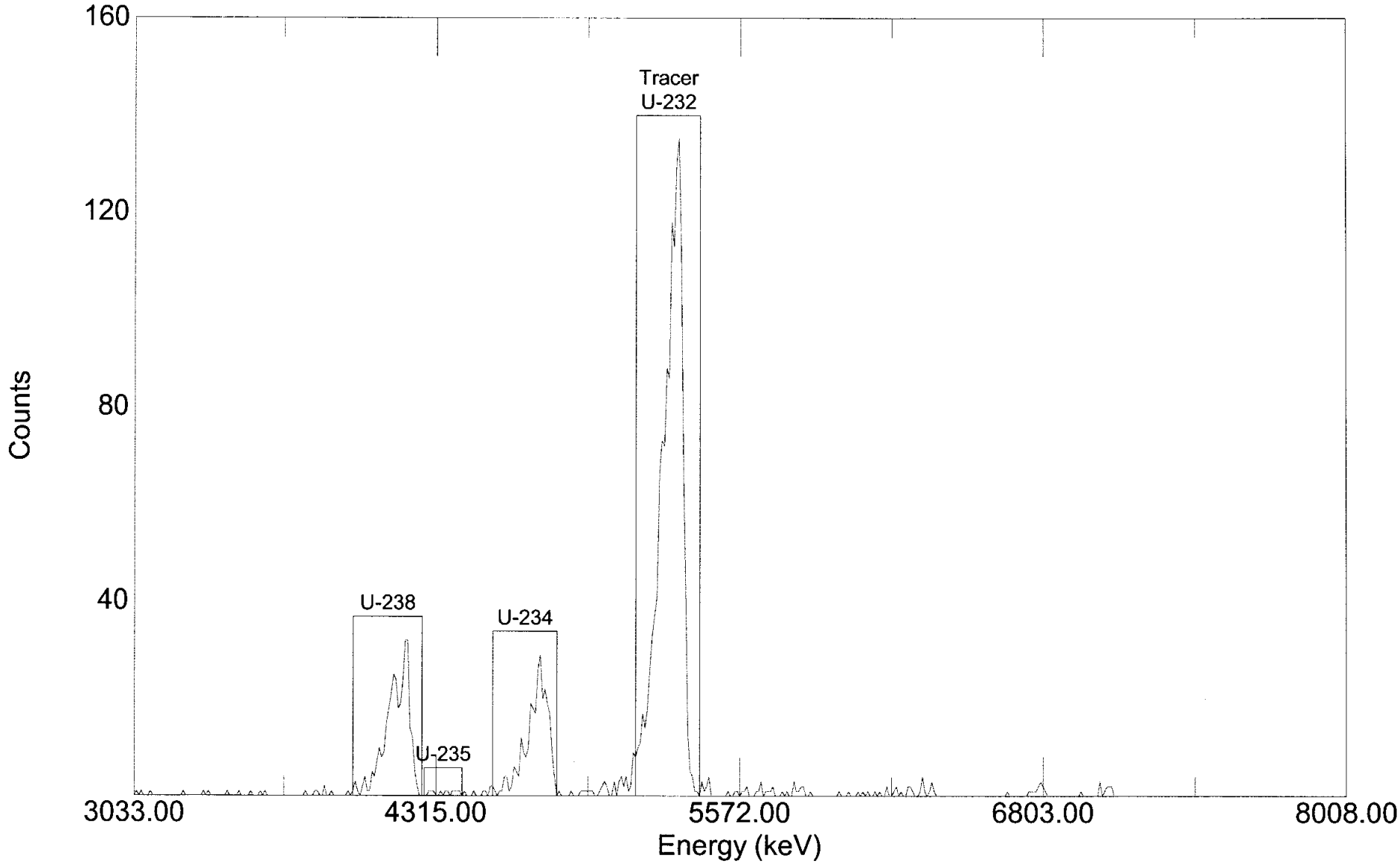
## Totals

| | | % Total |
|---|---|---|
| Gross Count: | 2,099.00 | 100.00 |
| Net Area: | 1,996.40 | 95.11 |
| Background: | 102.60 | 4.89 |
| Composite Fit: | 1,939.00 | 92.38 |
| Residuals: | 160.00 | 7.62 |

Analyzed By: Sm

Checked By: CD

U509712 AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 13:03:09 on 08-Jul-2004
File: C:\User\Alpha\ALPHA\U509712.SPC
Sample: 0405097-12 UAS040629-9

Real Time: 18008.02 s. Live Time: 18000.00 s.
Detector: #18 MCB 3 Input 2
Type: Uranium Default

000105

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/9/04 9:43:13 AM
Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** 0405097-13 UAS040629-9

**Analysis Type:** Uranium Default

*Detector:* MCB 3 Input 3

*Date/Time of Count:* 7/8/04 1:03:21 PM

*Sample Volume:* 1.000 Total, 1.000 Aliquot.

*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **81.46%**

*Real Time:* 300.13 Minutes

*Total Eff.:* 23.98 %

*Dead Time:* 0.0 %

*Tracer Amount:* 18.939 DPM.

*Acquisition:* 512 Channels

*Efficiency:* 29.44%

*Analysis:* Relative Region-Of-Interest

*Original:* 3,020 + 10.1420 * Chn + -0.00094 * Chn **2.

*Spectrum Calibration:* 3,020 + 10.2017 * Chn + -0.00094 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\U509713.SPC**

***Background File:*** **C:\USER\ALPHA\BKGND\B4070619.SPC**

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

### Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 136.99 | 124 | 139 | 10.00 | 3.00 | 19.00 | 0.90 | 18.10 | 0.25 |
| 2 | 116.62 | 94 | 123 | 4.00 | 55.00 | 444.00 | 0.90 | 443.10 | 6.16 |
| 3 | 174.82 | 155 | 182 | 6.00 | 43.00 | 326.00 | 0.90 | 325.10 | 4.52 |
| Tracer | 230.34 | 210 | 237 | 6.00 | 163.00 | 1,365.00 | 2.40 | 1362.60 | 18.94 |

### Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 99.43 | 0.113 | n/a | 47.30 % |
| 2 | U-238 | 4197.00 | 39.93 | 2.774 | n/a | 9.32 % |
| 3 | U-234 | 4774.80 | 59.23 | 2.035 | n/a | 10.89 % |
| Tracer | U-232 | 5320.00 | 58.60 | 8.531 | n/a | 5.31 % |

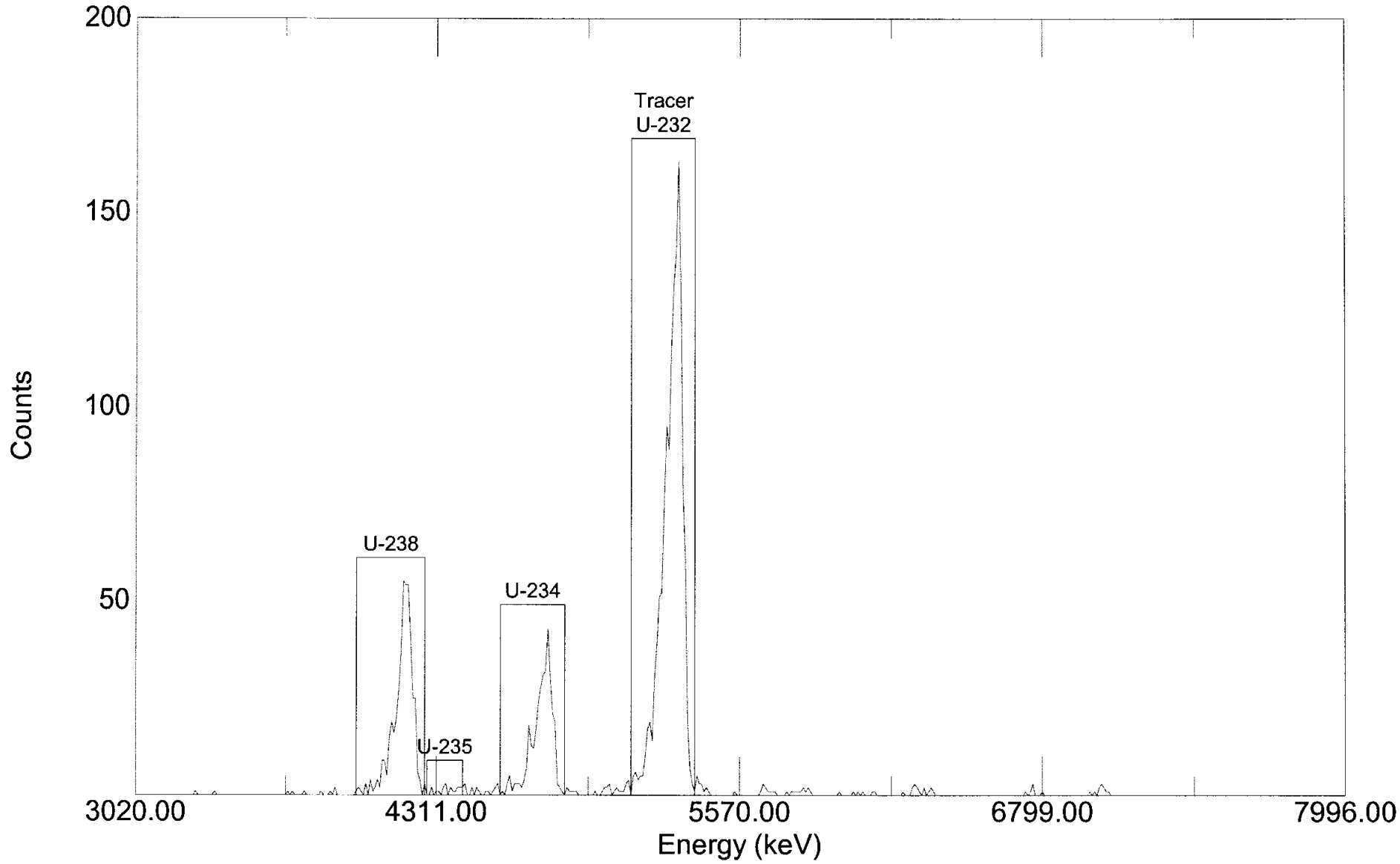
### Totals

| | | % Total |
|---|---|---|
| Gross Count: | 2,283.00 | 100.00 |
| Net Area: | 2,209.80 | 96.79 |
| Background: | 73.20 | 3.21 |
| Composite Fit: | 2,154.00 | 94.35 |
| Residuals: | 129.00 | 5.65 |

Analyzed By: Sm

Checked By: SD

U509713 AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 13:03:21 on 08-Jul-2004 Real Time: 18008.02 s. Live Time: 18000.00 s.
File: C:\User\Alpha\ALPHA\U509713.SPC Detector: #19 MCB 3 Input 3
Sample: 0405097-13 UAS040629-9 Type: Uranium Default

000107

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/9/04 9:45:33 AM
Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** 0405097-14 UAS040629-9

**Analysis Type:** Uranium Default

*Detector:* MCB 3 Input 5

*Date/Time of Count:* 7/8/04 1:03:37 PM

*Sample Volume:* 1.000 Total, 1.000 Aliquot.

*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **89.99%**

*Real Time:* 300.13 Minutes

*Total Eff.:* 25.94 %

*Dead Time:* 0.0 %

*Tracer Amount:* 18.939 DPM.

*Acquisition:* 512 Channels

*Efficiency:* 28.83%

*Analysis:* Relative Region-Of-Interest

*Original:* 2,987 + 10.4577 * Chn + -0.00180 * Chn **2.

*Spectrum Calibration:* 2,987 + 10.7213 * Chn + -0.00180 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\U509714.SPC**

***Background File:*** **C:\USER\ALPHA\BKGND\B4070621.SPC**

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

### Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 134.81 | 121 | 137 | 2.00 | 1.00 | 4.00 | 0.30 | 3.70 | 0.05 |
| 2 | 115.05 | 91 | 120 | 2.00 | 8.00 | 74.00 | 1.20 | 72.80 | 0.94 |
| 3 | 171.67 | 150 | 177 | 6.00 | 15.00 | 86.00 | 1.20 | 84.80 | 1.09 |
| Tracer | 226.16 | 209 | 236 | 8.00 | 148.00 | 1,483.00 | 9.00 | 1474.00 | 18.94 |

### Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 20.47 | 0.021 | n/a | 106.30 % |
| 2 | U-238 | 4197.00 | 20.61 | 0.421 | n/a | 23.18 % |
| 3 | U-234 | 4774.80 | 60.62 | 0.491 | n/a | 21.45 % |
| Tracer | U-232 | 5320.00 | 79.26 | 8.531 | n/a | 5.09 % |

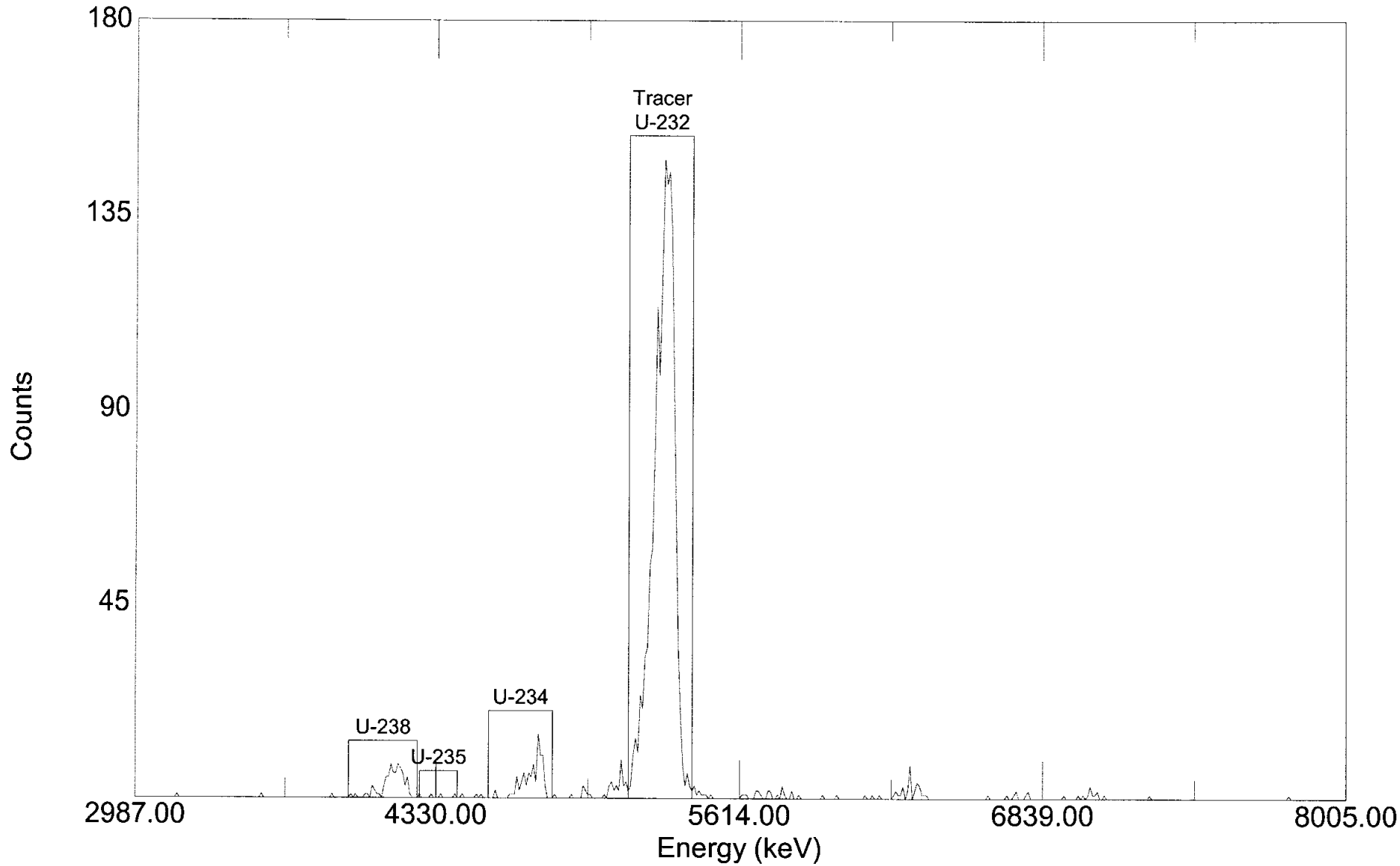
### Totals

| | | % Total |
|---|---|---|
| Gross Count: | 1,780.00 | 100.00 |
| Net Area: | 1,662.10 | 93.38 |
| Background: | 117.90 | 6.62 |
| Composite Fit: | 1,647.00 | 92.53 |
| Residuals: | 133.00 | 7.47 |

Analyzed By: Sm

Checked By: SD

U509714 AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 13:03:37 on 08-Jul-2004
File: C:\User\Alpha\ALPHA\U509714.SPC
Sample: 0405097-14 UAS040629-9

Real Time: 18008.02 s. Live Time: 18000.00 s.
Detector: #21 MCB 3 Input 5
Type: Uranium Default

000109

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/9/04 9:44:58 AM
Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** 0405097-15 UAS040629-9
**Analysis Type:** Uranium Default

*Detector:* MCB 3 Input 6
*Date/Time of Count:* 7/8/04 1:03:48 PM

*Sample Volume:* 1.000 Total, 1.000 Aliquot.
*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **83.39%**
*Real Time:* 300.13 Minutes

*Total Eff.:* 24.00 %
*Dead Time:* 0.0 %

*Tracer Amount:* 18.939 DPM.
*Acquisition:* 512 Channels

*Efficiency:* 28.78%
*Analysis:* Relative Region-Of-Interest

*Original:* 3,020 + 10.1601 * Chn + -0.00097 * Chn **2.

*Spectrum Calibration:* 3,020 + 10.2195 * Chn + -0.00097 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\U509715.SPC**
***Background File:*** **C:\USER\ALPHA\BKGND\B4070622.SPC**
*Library File:* C:\User\Alpha\ALPHAVIS.ALB

## Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 3 | 174.60 | 154 | 181 | 4.00 | 11.00 | 75.00 | 0.30 | 74.70 | 1.04 |
| Tracer | 230.08 | 209 | 236 | 6.00 | 154.00 | 1,366.00 | 2.40 | 1363.60 | 18.94 |
| 1 | 136.81 | 121 | 140 | 2.00 | 1.00 | 3.00 | 0.60 | 2.40 | 0.03 |
| 2 | 116.46 | 94 | 120 | 6.00 | 10.00 | 73.00 | 0.60 | 72.40 | 1.01 |

## Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 3 | U-234 | 4774.80 | 39.52 | 0.467 | n/a | 22.73 % |
| Tracer | U-232 | 5320.00 | 58.64 | 8.531 | n/a | 5.30 % |
| 1 | U-235 | 4400.00 | 19.91 | 0.015 | n/a | 142.72 % |
| 2 | U-238 | 4197.00 | 59.96 | 0.453 | n/a | 23.14 % |

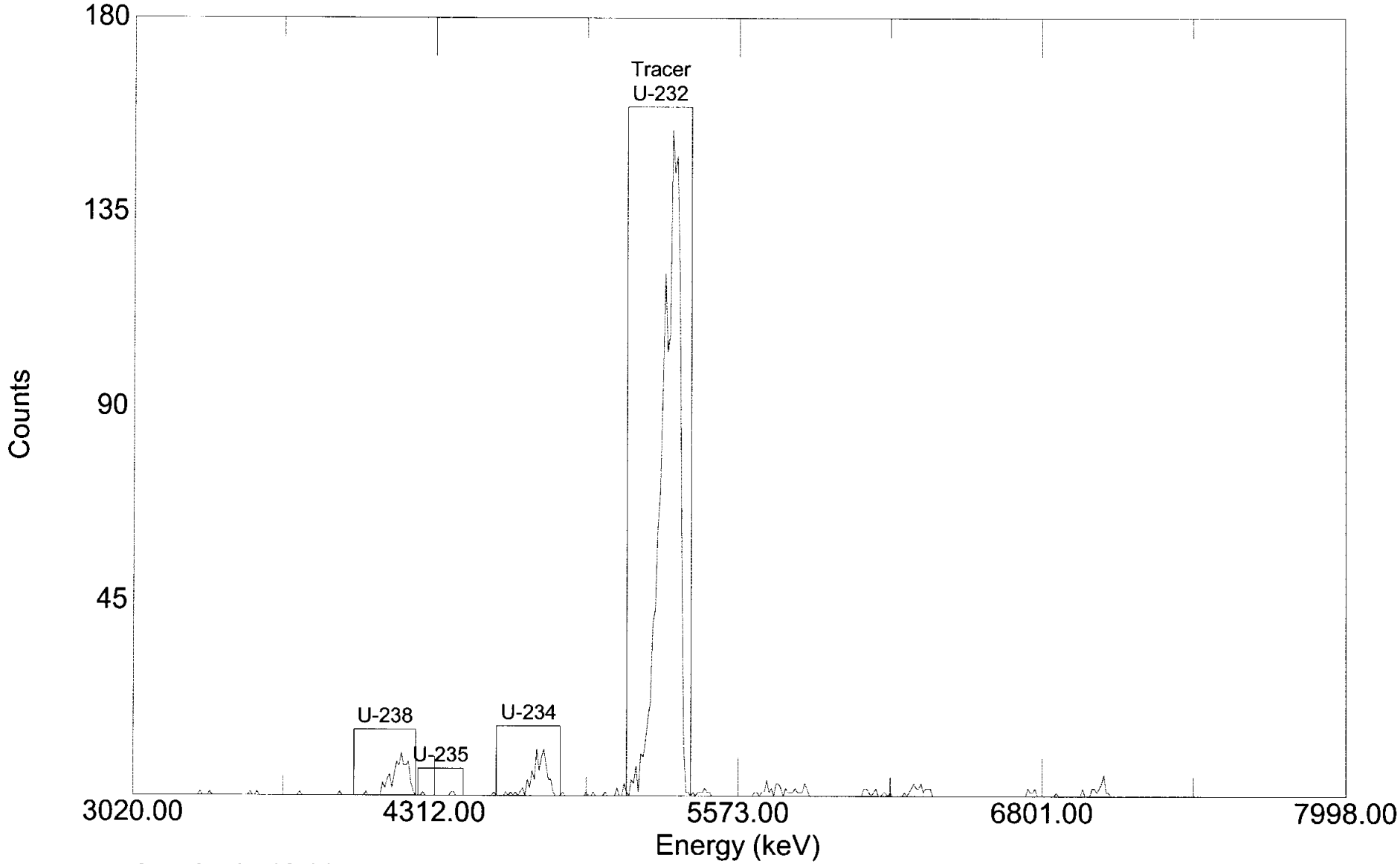
## Totals

| | | % Total |
|---|---|---|
| Gross Count: | 1,633.00 | 100.00 |
| Net Area: | 1,548.70 | 94.84 |
| Background: | 84.30 | 5.16 |
| Composite Fit: | 1,517.00 | 92.90 |
| Residuals: | 116.00 | 7.10 |

Analyzed By: Sm

Checked By: SD

U509715 AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 13:03:48 on 08-Jul-2004
File: C:\User\Alpha\ALPHA\U509715.SPC
Sample: 0405097-15 UAS040629-9

Real Time: 18008.04 s. Live Time: 18000.00 s.
Detector: #22 MCB 3 Input 6
Type: Uranium Default

000111

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/9/04 2:55:12 PM
Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** 0405097-16 UAS040629-9

**Analysis Type:** Uranium Default

*Detector:* MCB 6 Input 2

*Date/Time of Count:* 7/8/04 1:04:51 PM

*Sample Volume:* 1.000 Total, 1.000 Aliquot.

*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **80.65%**

*Real Time:* 304.70 Minutes

*Total Eff.:* 25.49 %

*Dead Time:* 1.6 %

*Tracer Amount:* 18.939 DPM.

*Acquisition:* 512 Channels

*Efficiency:* 31.60%

*Analysis:* Relative Region-Of-Interest

*Original:* 2,973 + 10.4170 * Chn + -0.00120 * Chn **2.

*Spectrum Calibration:* 2,973 + 10.4231 * Chn + -0.00120 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\U509716.SPC**

***Background File:*** **C:\USER\ALPHA\BKGND\B4070642.SPC**

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

### Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 139.12 | 126 | 141 | 2.00 | 2.00 | 7.00 | 0.30 | 6.70 | 0.09 |
| 2 | 119.05 | 96 | 125 | 8.00 | 11.00 | 74.00 | 0.00 | 74.00 | 0.97 |
| 3 | 176.43 | 154 | 181 | 6.00 | 14.00 | 84.00 | 0.00 | 84.00 | 1.10 |
| Tracer | 231.32 | 213 | 240 | 8.00 | 169.00 | 1,451.00 | 3.00 | 1448.00 | 18.94 |

### Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 20.18 | 0.039 | n/a | 77.55 % |
| 2 | U-238 | 4197.00 | 81.10 | 0.436 | n/a | 22.78 % |
| 3 | U-234 | 4774.80 | 60.00 | 0.495 | n/a | 21.39 % |
| Tracer | U-232 | 5320.00 | 78.94 | 8.531 | n/a | 5.15 % |

### Totals

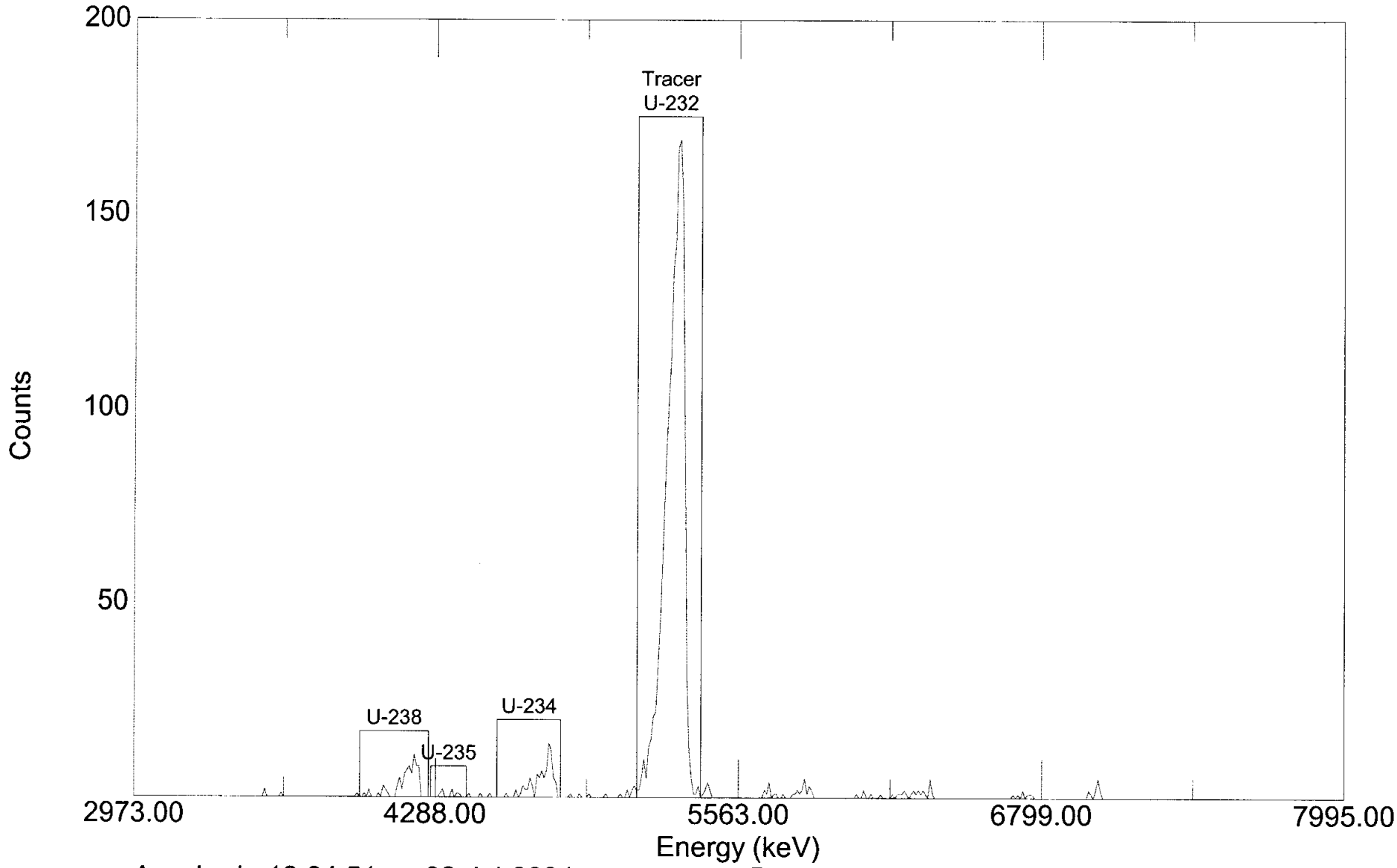
| | | % Total |
|---|---|---|
| Gross Count: | 1,719.00 | 100.00 |
| Net Area: | 1,638.00 | 95.29 |
| Background: | 81.00 | 4.71 |
| Composite Fit: | 1,616.00 | 94.01 |
| Residuals: | 103.00 | 5.99 |

Analyzed By: Sm

Checked By: SD

U509716

AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 13:04:51 on 08-Jul-2004
File: C:\User\Alpha\ALPHA\U509716.SPC
Sample: 0405097-16 UAS040629-9

Real Time: 18281.72 s. Live Time: 18000.00 s.
Detector: #42 MCB 6 Input 2
Type: Uranium Default

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/14/04 6:53:50 PM
Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** 0405097-17 UAS040629-7
**Analysis Type:** Uranium Default

*Detector:* MCB 3 Input 2
*Date/Time of Count:* 7/9/04 7:27:13 AM
*Sample Volume:* 0.300 Total, 0.300 Aliquot.
*Live Time:* **300.00 Minutes**
***Chem. Yield:*** **57.77%**
*Real Time:* 300.25 Minutes
*Total Eff.:* 17.26 %
*Dead Time:* 0.1 %
*Tracer Amount:* 18.939 DPM.
*Acquisition:* 512 Channels
*Efficiency:* 29.88%
*Analysis:* Relative Region-Of-Interest

*Original:* 3,033 + 10.0328 * Chn + -0.00079 * Chn **2.
*Spectrum Calibration:* 3,033 + 10.1545 * Chn + -0.00079 * Chn **2.
*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\U509717.SPC**
***Background File:*** **C:\User\Alpha\ALPHA\B4070618.SPC**
*Library File:* C:\User\Alpha\ALPHAVIS.ALB

## Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 136.11 | 123 | 141 | 2.00 | 35.00 | 300.00 | 0.90 | 299.10 | 5.78 |
| 2 | 173.94 | 153 | 180 | 8.00 | 590.00 | 6,826.00 | 1.20 | 6824.80 | 131.80 |
| 3 | 115.72 | 95 | 122 | 6.00 | 597.00 | 7,041.00 | 1.20 | 7039.80 | 135.95 |
| Tracer | 229.37 | 209 | 236 | 8.00 | 100.00 | 984.00 | 3.30 | 980.70 | 18.94 |

## Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 19.88 | 8.673 | n/a | 11.35 % |
| 2 | U-234 | 4774.80 | 79.03 | 197.891 | n/a | 2.37 % |
| 3 | U-238 | 4197.00 | 59.83 | 204.125 | n/a | 2.34 % |
| Tracer | U-232 | 5320.00 | 78.33 | 28.436 | n/a | 6.25 % |

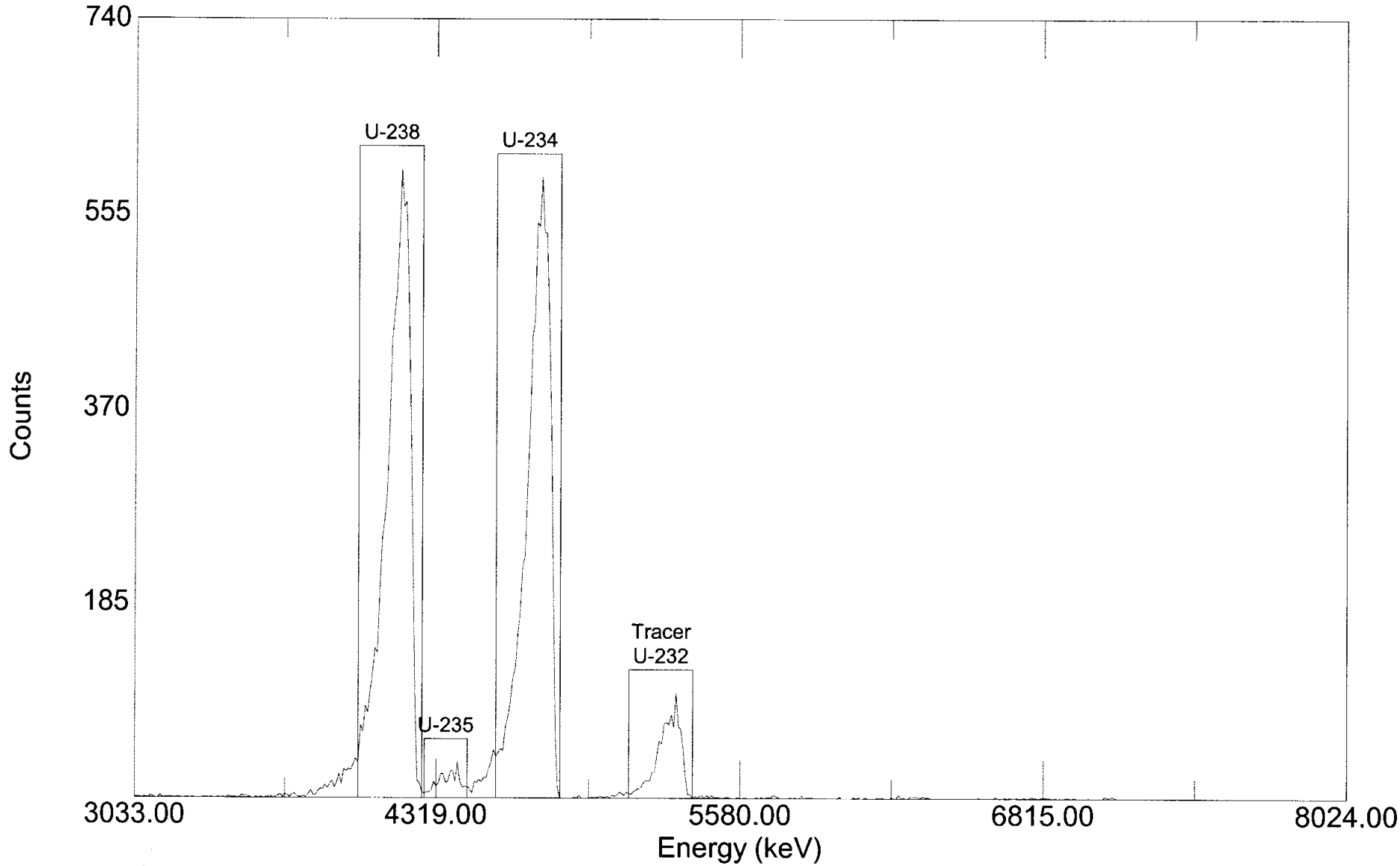
## Totals

| | | % Total |
|---|---|---|
| Gross Count: | 15,930.00 | 100.00 |
| Net Area: | 15,827.40 | 99.36 |
| Background: | 102.60 | 0.64 |
| Composite Fit: | 15,151.00 | 95.11 |
| Residuals: | 779.00 | 4.89 |

Analyzed By: Sm

Checked By: SD

U509717 AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 07:27:13 on 09-Jul-2004
File: C:\User\Alpha\ALPHA\U509717.SPC
Sample: 0405097-17 UAS040629-7

Real Time: 18015.26 s. Live Time: 18000.00 s.
Detector: #18 MCB 3 Input 2
Type: Uranium Default

000115

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/9/04 2:57:06 PM
Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** 0405097-18 UAS040629-9

**Analysis Type:** Uranium Default

*Detector:* MCB 6 Input 3

*Date/Time of Count:* 7/8/04 1:05:01 PM

*Sample Volume:* 1.000 Total, 1.000 Aliquot.

*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **74.99%**

*Real Time:* 304.70 Minutes

*Total Eff.:* 22.82 %

*Dead Time:* 1.6 %

*Tracer Amount:* 18.939 DPM.

*Acquisition:* 512 Channels

*Efficiency:* 30.43%

*Analysis:* Relative Region-Of-Interest

*Original:* 3,033 + 9.8447 * Chn + 0.00003 * Chn **2.

*Spectrum Calibration:* 3,033 + 9.9402 * Chn + 0.00003 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\U509718.SPC**

***Background File:*** **C:\USER\ALPHA\BKGND\B4070643.SPC**

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

### Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 137.46 | 124 | 139 | 2.00 | 31.00 | 250.00 | 0.00 | 250.00 | 3.65 |
| 2 | 117.05 | 94 | 123 | 8.00 | 574.00 | 6,403.00 | 2.10 | 6400.90 | 93.50 |
| 3 | 175.12 | 154 | 181 | 8.00 | 543.00 | 6,110.00 | 0.90 | 6109.10 | 89.24 |
| Tracer | 229.90 | 209 | 236 | 6.00 | 125.00 | 1,301.00 | 4.50 | 1296.50 | 18.94 |

### Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 19.90 | 1.645 | n/a | 12.40 % |
| 2 | U-238 | 4197.00 | 79.58 | 42.117 | n/a | 2.45 % |
| 3 | U-234 | 4774.80 | 79.61 | 40.197 | n/a | 2.51 % |
| Tracer | U-232 | 5320.00 | 59.73 | 8.531 | n/a | 5.43 % |

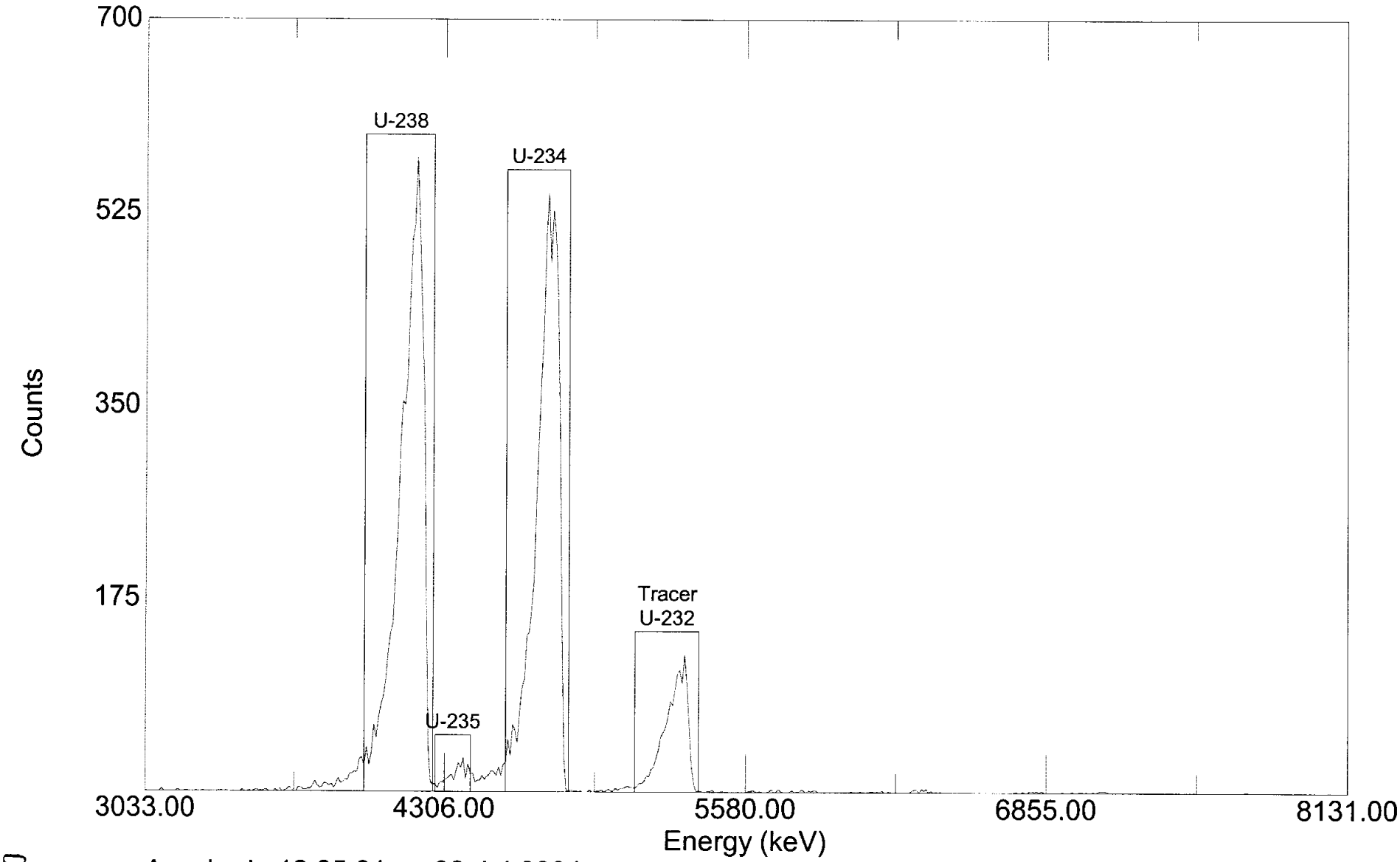
### Totals

| | | % Total |
|---|---|---|
| Gross Count: | 14,747.00 | 100.00 |
| Net Area: | 14,660.60 | 99.41 |
| Background: | 86.40 | 0.59 |
| Composite Fit: | 14,064.00 | 95.37 |
| Residuals: | 683.00 | 4.63 |

Analyzed By: Sm

Checked By: SD

U509718 AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 13:05:01 on 08-Jul-2004
File: C:\User\Alpha\ALPHA\U509718.SPC
Sample: 0405097-18 UAS040629-9

Real Time: 18281.76 s. Live Time: 18000.00 s.
Detector: #43 MCB 6 Input 3
Type: Uranium Default

# Paragon Analytics
## Alpha Spectroscopy Analysis

*Report Printed:*
7/14/04 6:55:07 PM
*Para0327.rpt*
*rev 11/13/03 KVG*

***Sample Name:*** 0405097-19 UAS040629-7

***Analysis Type:*** Uranium Default

*Detector:* MCB 2 Input 5

*Date/Time of Count:* 7/9/04 1:48:52 PM

*Sample Volume:* 0.010 Total, 0.010 Aliquot.

*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **68.64%**

*Real Time:* 300.02 Minutes

*Total Eff.:* 21.48 %

*Dead Time:* 0.0 %

*Tracer Amount:* 18.939 DPM.

*Acquisition:* 512 Channels

*Efficiency:* 31.29%

*Analysis:* Relative Region-Of-Interest

*Original:* 3,042 + 9.9000 * Chn + -0.00035 * Chn **2.

*Spectrum Calibration:* 3,042 + 10.0038 * Chn + -0.00035 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\UR509719.SPC**

***Background File:*** **C:\User\Alpha\ALPHA\B4070613.SPC**

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

## Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 136.38 | 123 | 141 | 6.00 | 31.00 | 318.00 | 0.90 | 317.10 | 4.92 |
| 2 | 174.25 | 153 | 180 | 8.00 | 549.00 | 6,658.00 | 3.90 | 6654.10 | 103.28 |
| 3 | 115.90 | 96 | 122 | 6.00 | 557.00 | 6,656.00 | 1.50 | 6654.50 | 103.28 |
| Tracer | 229.53 | 208 | 235 | 8.00 | 110.00 | 1,225.00 | 4.80 | 1220.20 | 18.94 |

## Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 59.45 | 221.696 | n/a | 11.02 % |
| 2 | U-234 | 4774.80 | 79.06 | 4652.120 | n/a | 2.40 % |
| 3 | U-238 | 4197.00 | 59.54 | 4652.399 | n/a | 2.40 % |
| Tracer | U-232 | 5320.00 | 78.75 | 853.086 | n/a | 5.60 % |

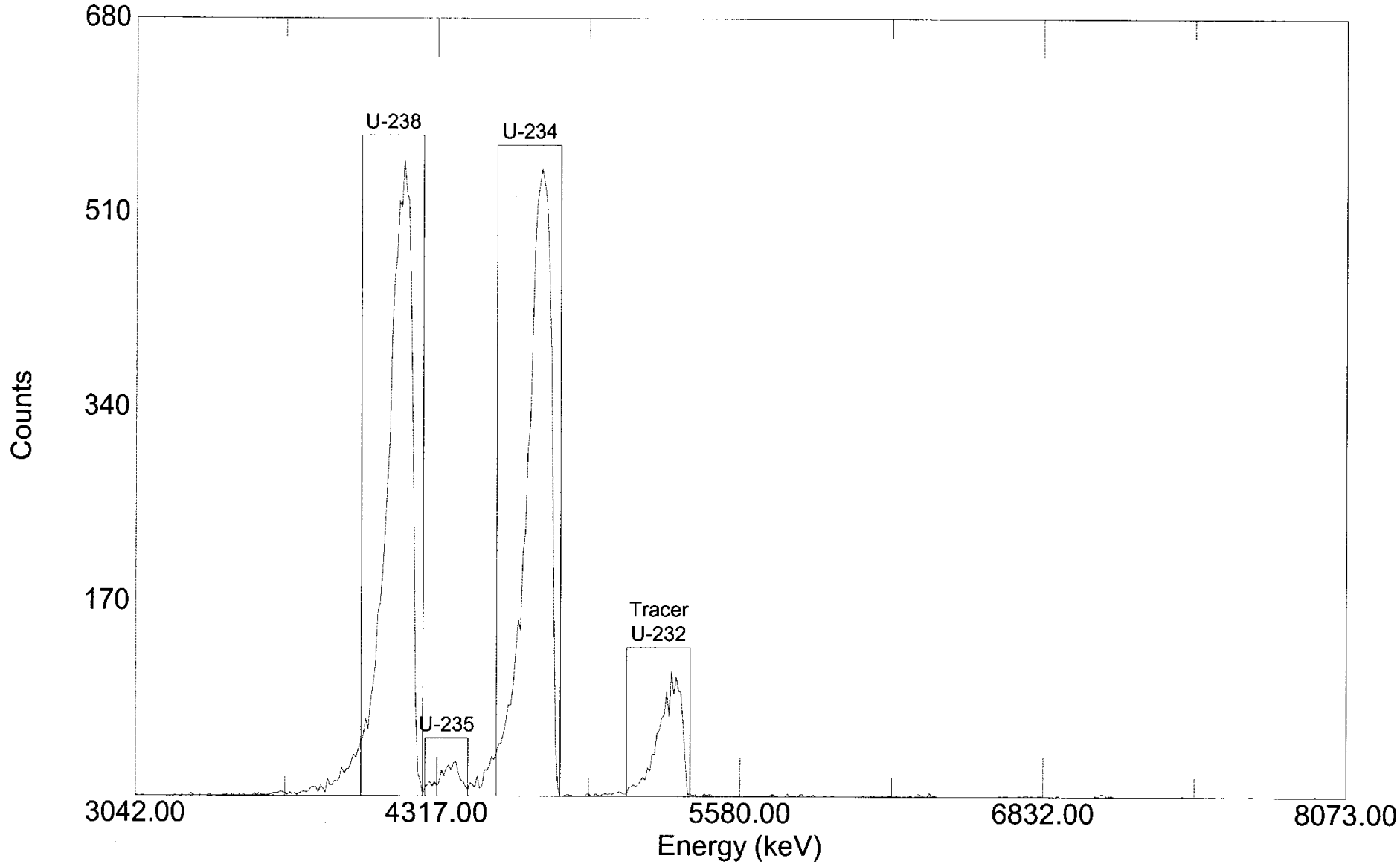
## Totals

| | | % Total |
|---|---|---|
| Gross Count: | 15,643.00 | 100.00 |
| Net Area: | 15,559.90 | 99.47 |
| Background: | 83.10 | 0.53 |
| Composite Fit: | 14,857.00 | 94.98 |
| Residuals: | 786.00 | 5.02 |

Analyzed By: Sm

Checked By: SD

UR509719 AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 13:48:52 on 09-Jul-2004
File: C:\User\Alpha\ALPHA\UR509719.SPC
Sample: 0405097-19 UAS040629-7

Real Time: 18001.30 s. Live Time: 18000.00 s.
Detector: #13 MCB 2 Input 5
Type: Uranium Default

000119

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/17/04 3:13:18 PM
Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** 0405097-20 UAS040712-5
**Analysis Type:** Uranium Default

*Detector:* MCB 2 Input 3
*Date/Time of Count:* 7/16/04 6:35:47 AM
*Sample Volume:* 0.050 Total, 0.050 Aliquot.
*Live Time:* **300.00 Minutes**
***Chem. Yield:*** **88.02%**
*Real Time:* 300.02 Minutes
*Total Eff.:* 25.56 %
*Dead Time:* 0.0 %
*Tracer Amount:* 18.932 DPM.
*Acquisition:* 512 Channels
*Efficiency:* 29.04%
*Analysis:* Relative Region-Of-Interest

*Original:* 3,010 + 9.9861 * Chn + -0.00048 * Chn **2.
*Spectrum Calibration:* 3,010 + 10.0635 * Chn + -0.00048 * Chn **2.
*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\UX509720.SPC**
***Background File:*** **C:\USER\ALPHA\BKGND\B4071011.SPC**
*Library File:* C:\User\Alpha\ALPHAVIS.ALB

### Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 139.03 | 125 | 144 | 6.00 | 20.00 | 162.00 | 0.00 | 162.00 | 2.11 |
| 2 | 118.60 | 97 | 124 | 6.00 | 401.00 | 3,629.00 | 0.60 | 3628.40 | 47.32 |
| 3 | 176.83 | 155 | 184 | 6.00 | 392.00 | 3,646.00 | 1.20 | 3644.80 | 47.53 |
| Tracer | 232.08 | 210 | 237 | 8.00 | 158.00 | 1,453.00 | 1.20 | 1451.80 | 18.93 |

### Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 59.59 | 19.032 | n/a | 15.40 % |
| 2 | U-238 | 4197.00 | 59.70 | 426.267 | n/a | 3.25 % |
| 3 | U-234 | 4774.80 | 59.37 | 428.194 | n/a | 3.25 % |
| Tracer | U-232 | 5320.00 | 78.74 | 170.559 | n/a | 5.14 % |

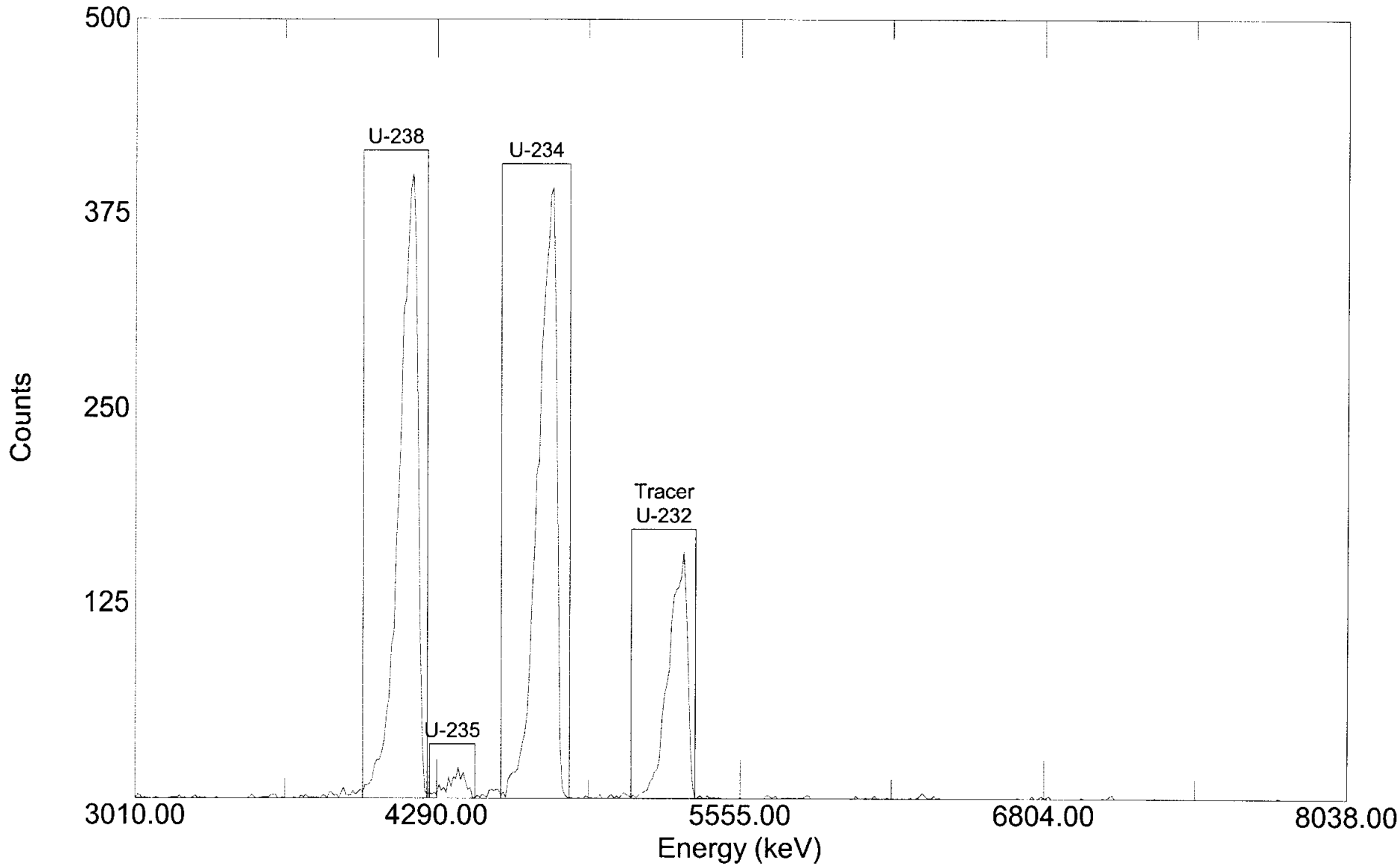
### Totals

| | | % Total |
|---|---|---|
| Gross Count: | 9,130.00 | 100.00 |
| Net Area: | 9,072.70 | 99.37 |
| Background: | 57.30 | 0.63 |
| Composite Fit: | 8,890.00 | 97.37 |
| Residuals: | 240.00 | 2.63 |

Analyzed By: JP

Checked By: Sm

UX509720 AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 06:35:47 on 16-Jul-2004
File: C:\User\Alpha\ALPHA\UX509720.SPC
Sample: 0405097-20 UAS040712-5

Real Time: 18000.94 s. Live Time: 18000.00 s.
Detector: #11 MCB 2 Input 3
Type: Uranium Default

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/17/04 3:14:35 PM
Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** 0405097-20D UAS040712-5

**Analysis Type:** Uranium Default

*Detector:* MCB 2 Input 4

*Date/Time of Count:* 7/16/04 6:35:58 AM

*Sample Volume:* 0.050 Total, 0.050 Aliquot.

*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **88.42%**

*Real Time:* 300.02 Minutes

*Total Eff.:* 25.59 %

*Dead Time:* 0.0 %

*Tracer Amount:* 18.932 DPM.

*Acquisition:* 512 Channels

*Efficiency:* 28.94%

*Analysis:* Relative Region-Of-Interest

*Original:* 3,035 + 9.8891 * Chn + -0.00036 * Chn **2.

*Spectrum Calibration:* 3,035 + 9.9477 * Chn + -0.00036 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\UX509720D.SPC**

***Background File:*** **C:\USER\ALPHA\BKGND\B4071012.SPC**

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

### Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 137.91 | 126 | 143 | 4.00 | 17.00 | 151.00 | 1.20 | 149.80 | 1.95 |
| 2 | 117.32 | 97 | 125 | 8.00 | 358.00 | 3,869.00 | 1.20 | 3867.80 | 50.39 |
| 3 | 176.01 | 155 | 184 | 8.00 | 351.00 | 3,624.00 | 2.10 | 3621.90 | 47.18 |
| Tracer | 231.63 | 211 | 240 | 6.00 | 137.00 | 1,462.00 | 8.70 | 1453.30 | 18.93 |

### Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 39.40 | 17.580 | n/a | 16.08 % |
| 2 | U-238 | 4197.00 | 78.92 | 453.923 | n/a | 3.15 % |
| 3 | U-234 | 4774.80 | 78.58 | 425.064 | n/a | 3.26 % |
| Tracer | U-232 | 5320.00 | 58.70 | 170.559 | n/a | 5.13 % |

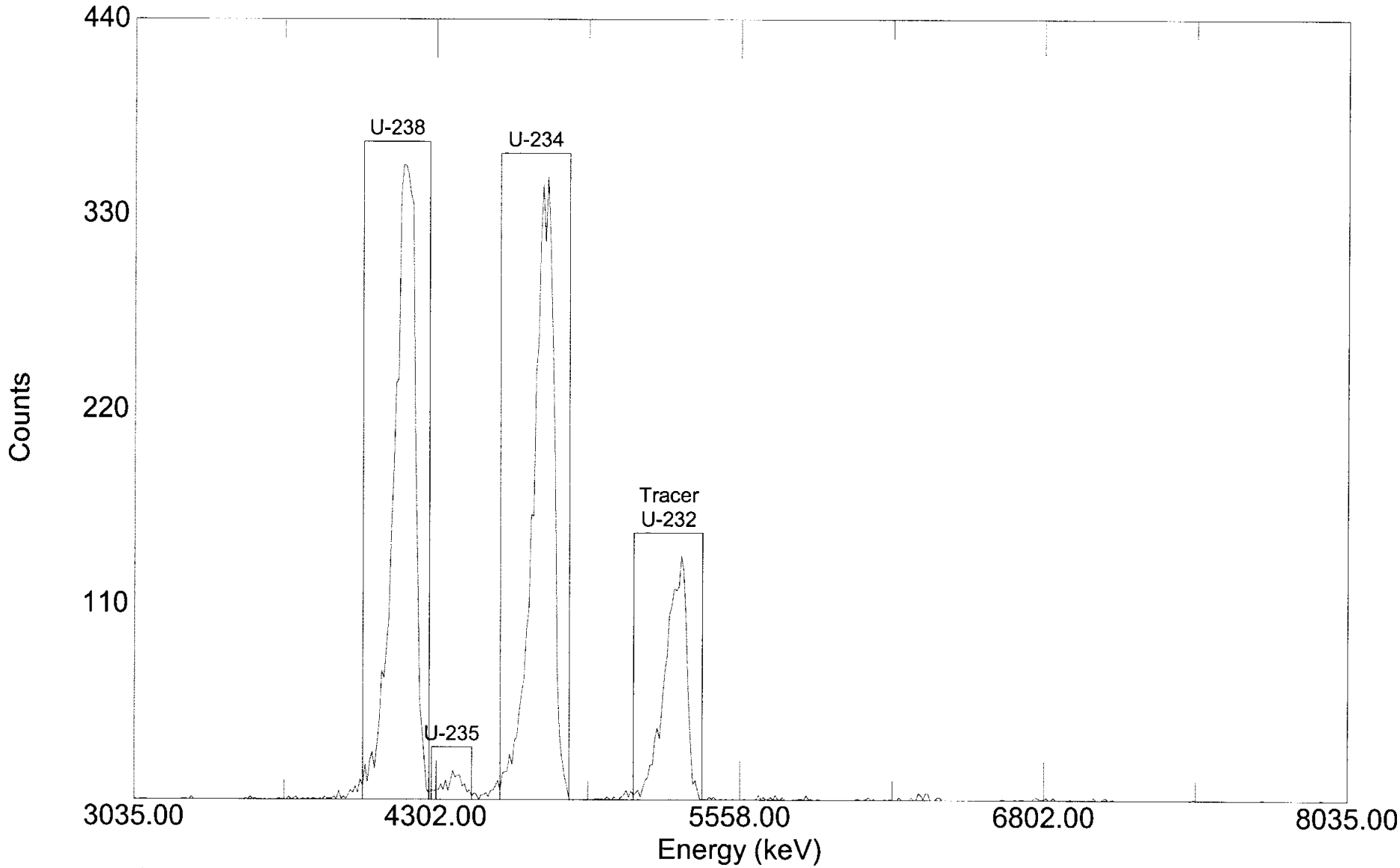
### Totals

| | | % Total |
|---|---|---|
| Gross Count: | 9,351.00 | 100.00 |
| Net Area: | 9,237.00 | 98.78 |
| Background: | 114.00 | 1.22 |
| Composite Fit: | 9,106.00 | 97.38 |
| Residuals: | 245.00 | 2.62 |

Analyzed By: JP

Checked By: Sm

UX509720D AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 06:35:58 on 16-Jul-2004 Real Time: 18000.94 s. Live Time: 18000.00 s.
File: C:\User\Alpha\ALPHA\UX509720D.SPC Detector: #12 MCB 2 Input 4
Sample: 0405097-20D UAS040712-5 Type: Uranium Default

# Paragon Analytics
## Alpha Spectroscopy Analysis

*Report Printed:*
7/14/04 6:57:11 PM
*Para0327.rpt*
*rev 11/13/03 KVG*

***Sample Name:*** 0405097-21 UAS040629-7

***Analysis Type:*** Uranium Default

*Detector:* MCB 2 Input 7

*Date/Time of Count:* 7/9/04 1:49:16 PM

*Sample Volume:* 0.020 Total, 0.020 Aliquot.

*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **52.96%**

*Real Time:* 300.02 Minutes

*Total Eff.:* 15.51 %

*Dead Time:* 0.0 %

*Tracer Amount:* 18.939 DPM.

*Acquisition:* 512 Channels

*Efficiency:* 29.29%

*Analysis:* Relative Region-Of-Interest

*Original:* 3,037 + 9.8877 * Chn + -0.00041 * Chn **2.

*Spectrum Calibration:* 3,037 + 10.0494 * Chn + -0.00041 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\UR509721.SPC**

***Background File:*** **C:\User\Alpha\ALPHA\B4070615.SPC**

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

### Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 136.40 | 123 | 142 | 14.00 | 27.00 | 337.00 | 2.10 | 334.90 | 7.20 |
| 2 | 174.18 | 154 | 181 | 10.00 | 655.00 | 7,270.00 | 0.60 | 7269.40 | 156.21 |
| 3 | 115.99 | 96 | 122 | 8.00 | 641.00 | 7,279.00 | 1.20 | 7277.80 | 156.39 |
| Tracer | 229.35 | 209 | 236 | 10.00 | 80.00 | 893.00 | 11.70 | 881.30 | 18.94 |

### Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 139.11 | 162.089 | n/a | 10.75 % |
| 2 | U-234 | 4774.80 | 99.06 | 3518.337 | n/a | 2.30 % |
| 3 | U-238 | 4197.00 | 79.63 | 3522.402 | n/a | 2.30 % |
| Tracer | U-232 | 5320.00 | 98.60 | 426.543 | n/a | 6.56 % |

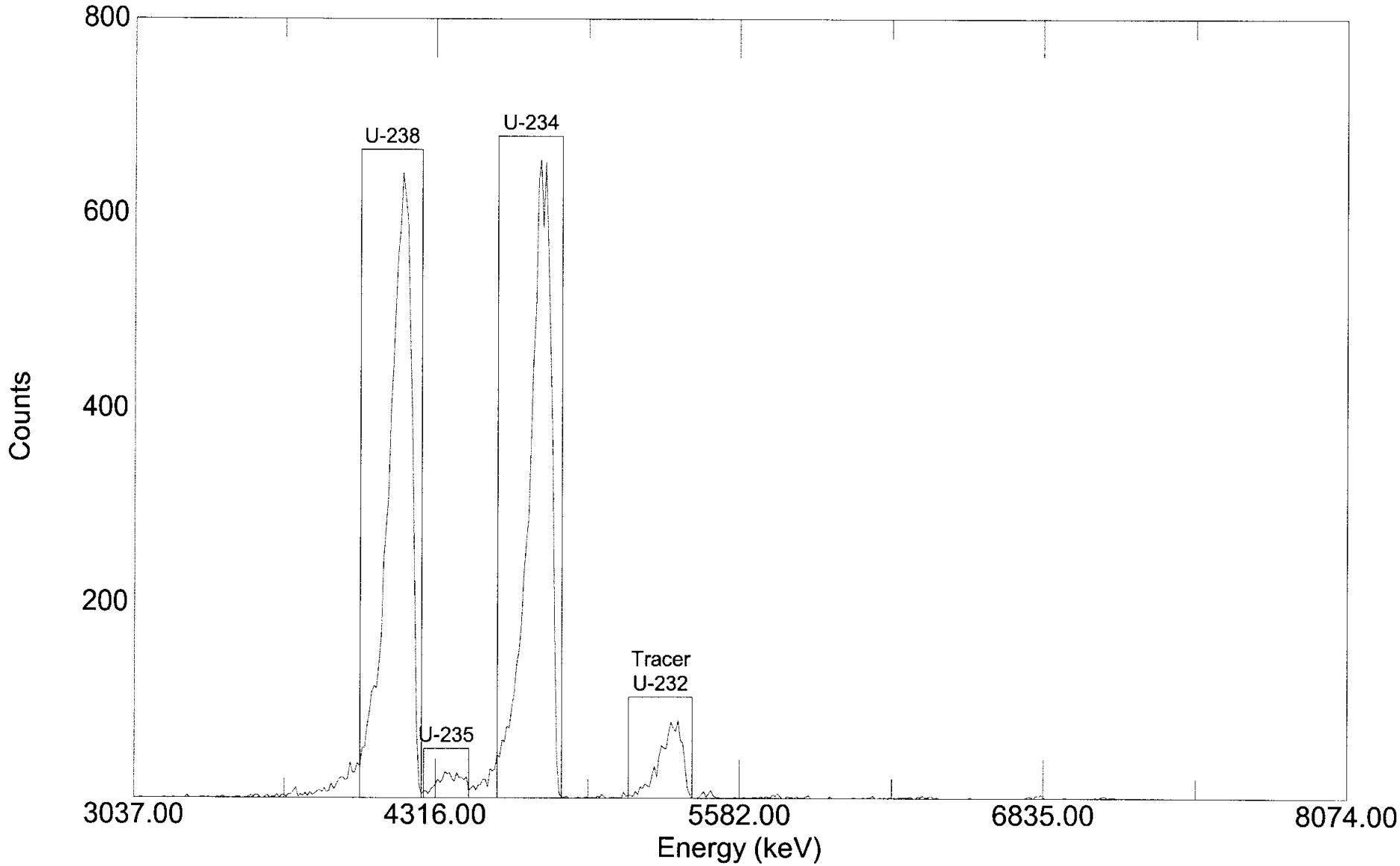
### Totals

| | | % Total |
|---|---|---|
| Gross Count: | 16,525.00 | 100.00 |
| Net Area: | 16,405.30 | 99.28 |
| Background: | 119.70 | 0.72 |
| Composite Fit: | 15,779.00 | 95.49 |
| Residuals: | 746.00 | 4.51 |

Analyzed By: Sm

Checked By: SD

UR509721 AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 13:49:16 on 09-Jul-2004
File: C:\User\Alpha\ALPHA\UR509721.SPC
Sample: 0405097-21 UAS040629-7

Real Time: 18001.28 s. Live Time: 18000.00 s.
Detector: #15 MCB 2 Input 7
Type: Uranium Default

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/14/04 6:58:11 PM

Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** 0405097-22 UAS040629-7

**Analysis Type:** Uranium Default

*Detector:* MCB 3 Input 6

*Date/Time of Count:* 7/9/04 7:28:45 AM

*Sample Volume:* 0.070 Total, 0.070 Aliquot.

*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **72.87%**

*Real Time:* 300.25 Minutes

*Total Eff.:* 20.97 %

*Dead Time:* 0.1 %

*Tracer Amount:* 18.939 DPM.

*Acquisition:* 512 Channels

*Efficiency:* 28.78%

*Analysis:* Relative Region-Of-Interest

*Original:* 3,020 + 10.1601 * Chn + -0.00097 * Chn **2.

*Spectrum Calibration:* 3,020 + 10.2383 * Chn + -0.00097 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\U509722.SPC**

***Background File:*** **C:\User\Alpha\ALPHA\B4070622.SPC**

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

## Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 136.55 | 123 | 142 | 6.00 | 33.00 | 313.00 | 0.30 | 312.70 | 4.97 |
| 2 | 174.27 | 153 | 180 | 8.00 | 582.00 | 6,424.00 | 0.30 | 6423.70 | 102.09 |
| 3 | 116.24 | 95 | 122 | 6.00 | 621.00 | 6,494.00 | 0.90 | 6493.10 | 103.20 |
| Tracer | 229.64 | 208 | 235 | 6.00 | 114.00 | 1,194.00 | 2.40 | 1191.60 | 18.94 |

## Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 59.84 | 31.981 | n/a | 11.09 % |
| 2 | U-234 | 4774.80 | 79.20 | 656.976 | n/a | 2.45 % |
| 3 | U-238 | 4197.00 | 60.08 | 664.073 | n/a | 2.43 % |
| Tracer | U-232 | 5320.00 | 58.76 | 121.869 | n/a | 5.67 % |

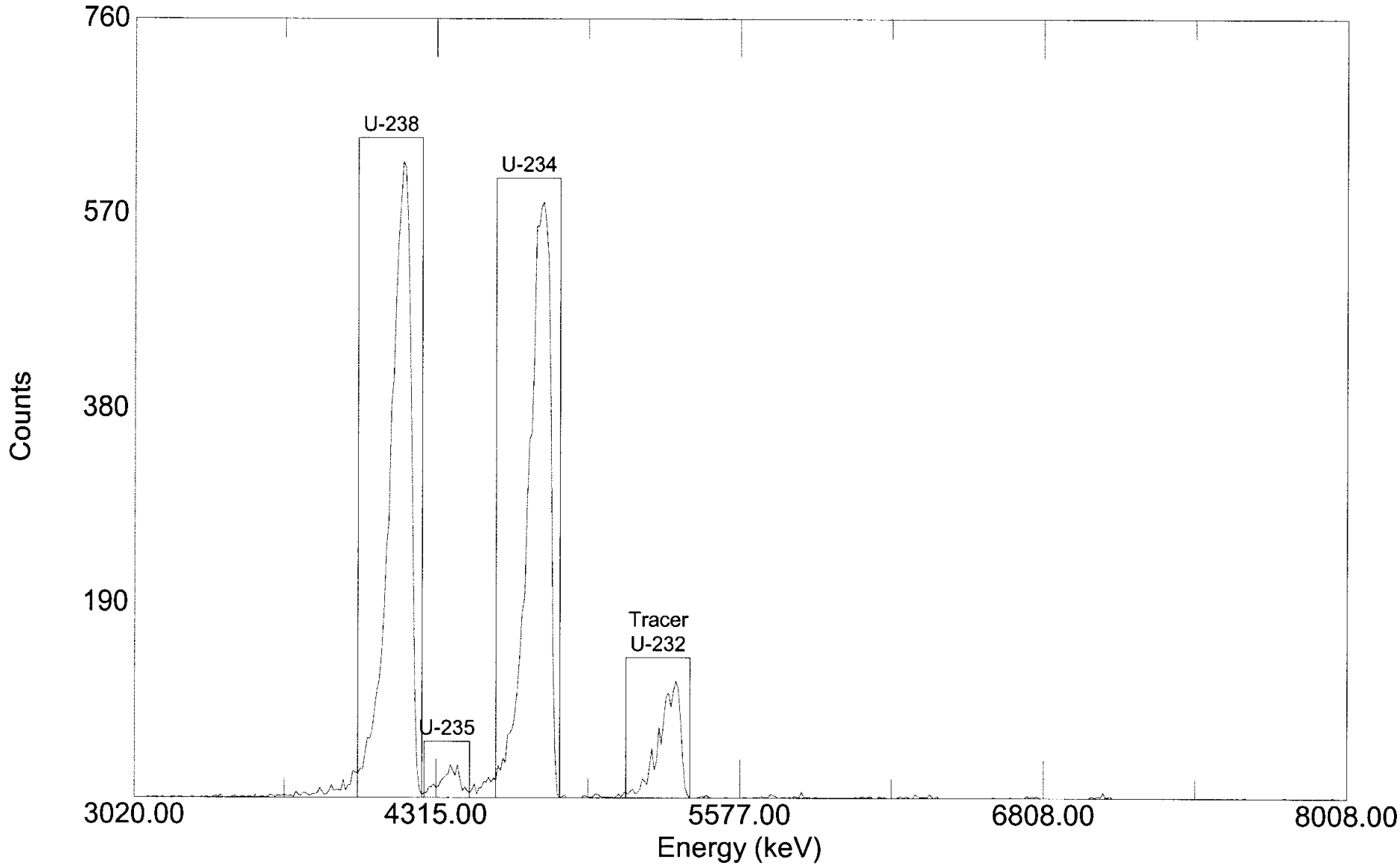
## Totals

| | | % Total |
|---|---|---|
| Gross Count: | 14,974.00 | 100.00 |
| Net Area: | 14,889.70 | 99.44 |
| Background: | 84.30 | 0.56 |
| Composite Fit: | 14,425.00 | 96.33 |
| Residuals: | 549.00 | 3.67 |

Analyzed By: Sm

Checked By: SD

U509722 AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 07:28:45 on 09-Jul-2004
File: C:\User\Alpha\ALPHA\U509722.SPC
Sample: 0405097-22 UAS040629-7

Real Time: 18015.24 s. Live Time: 18000.00 s.
Detector: #22 MCB 3 Input 6
Type: Uranium Default

000127

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/15/04 8:46:32 AM

Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** 0405097-23 UAS040629-7

**Analysis Type:** Uranium Default

*Detector:* MCB 3 Input 7

*Date/Time of Count:* 7/9/04 7:29:10 AM

*Sample Volume:* 0.100 Total, 0.100 Aliquot.

*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **62.40%**

*Real Time:* 300.25 Minutes

*Total Eff.:* 17.82 %

*Dead Time:* 0.1 %

*Tracer Amount:* 18.939 DPM.

*Acquisition:* 512 Channels

*Efficiency:* 28.56%

*Analysis:* Relative Region-Of-Interest

*Original:* 3,016 + 10.0990 * Chn + -0.00081 * Chn **2.

*Spectrum Calibration:* 3,016 + 10.1850 * Chn + -0.00081 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\U509723.SPC**

***Background File:*** **C:\User\Alpha\ALPHA\B4070623.SPC**

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

## Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 137.43 | 124 | 142 | 8.00 | 29.00 | 290.00 | 0.00 | 290.00 | 5.42 |
| 2 | 175.16 | 154 | 181 | 8.00 | 593.00 | 6,517.00 | 0.30 | 6516.70 | 121.89 |
| 3 | 117.09 | 97 | 123 | 8.00 | 646.00 | 7,113.00 | 0.30 | 7112.70 | 133.04 |
| Tracer | 230.47 | 211 | 238 | 10.00 | 97.00 | 1,017.00 | 4.50 | 1012.50 | 18.94 |

## Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 79.71 | 24.434 | n/a | 11.51 % |
| 2 | U-234 | 4774.80 | 79.22 | 549.067 | n/a | 2.43 % |
| 3 | U-238 | 4197.00 | 79.97 | 599.283 | n/a | 2.32 % |
| Tracer | U-232 | 5320.00 | 98.13 | 85.309 | n/a | 6.15 % |

## Totals

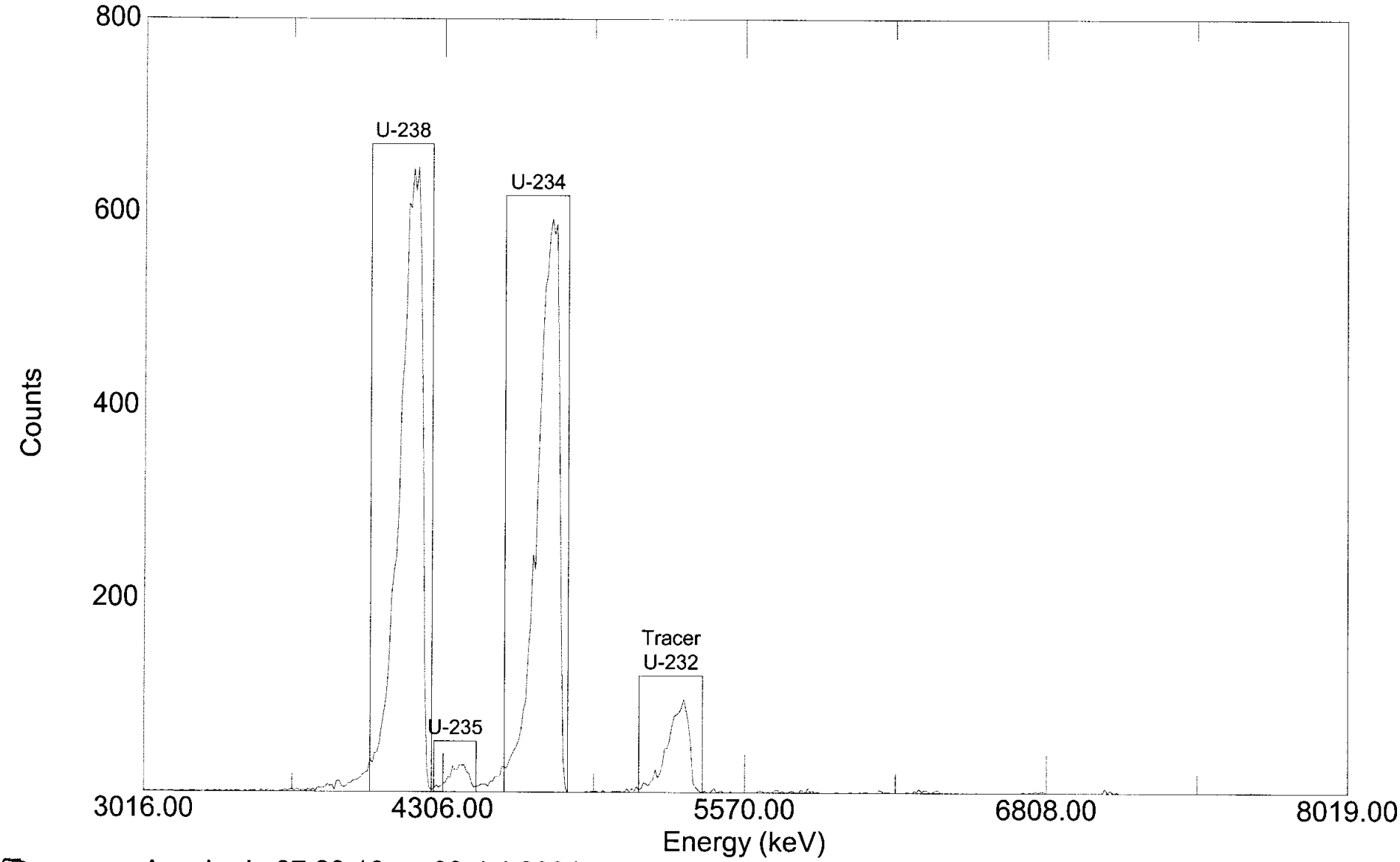
| | | % Total |
|---|---|---|
| Gross Count: | 15,465.00 | 100.00 |
| Net Area: | 15,369.90 | 99.39 |
| Background: | 95.10 | 0.61 |
| Composite Fit: | 14,937.00 | 96.59 |
| Residuals: | 528.00 | 3.41 |

Analyzed By: Sm

Checked By: SD

U509723

AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 07:29:10 on 09-Jul-2004
File: C:\User\Alpha\ALPHA\U509723.SPC
Sample: 0405097-23 UAS040629-7

Real Time: 18015.20 s. Live Time: 18000.00 s.
Detector: #23 MCB 3 Input 7
Type: Uranium Default

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/14/04 7:01:29 PM
Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** 0405097-23D UAS040629-7

**Analysis Type:** Uranium Default

*Detector:* MCB 8 Input 6

*Date/Time of Count:* 7/11/04 9:14:17 AM

*Sample Volume:* 0.130 Total, 0.130 Aliquot.

*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **63.07%**

*Real Time:* 300.03 Minutes

*Total Eff.:* 19.34 %

*Dead Time:* 0.0 %

*Tracer Amount:* 18.939 DPM.

*Acquisition:* 512 Channels

*Efficiency:* 30.67%

*Analysis:* Relative Region-Of-Interest

*Original:* 3,049 + 10.0054 * Chn + -0.00083 * Chn **2.

*Spectrum Calibration:* 3,049 + 10.0898 * Chn + -0.00083 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\UR509723D.SPC**

***Background File:*** **C:\User\Alpha\ALPHA\B4071062.SPC**

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

## Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 135.38 | 120 | 139 | 6.00 | 31.00 | 320.00 | 0.00 | 320.00 | 5.51 |
| 2 | 173.50 | 152 | 179 | 8.00 | 620.00 | 6,913.00 | 0.00 | 6913.00 | 119.13 |
| 3 | 114.84 | 93 | 119 | 6.00 | 715.00 | 7,643.00 | 0.30 | 7642.70 | 131.70 |
| Tracer | 229.39 | 208 | 235 | 8.00 | 99.00 | 1,102.00 | 3.00 | 1099.00 | 18.94 |

## Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 59.19 | 19.107 | n/a | 10.96 % |
| 2 | U-234 | 4774.80 | 78.41 | 412.779 | n/a | 2.36 % |
| 3 | U-238 | 4197.00 | 59.39 | 456.350 | n/a | 2.24 % |
| Tracer | U-232 | 5320.00 | 77.67 | 65.622 | n/a | 5.90 % |

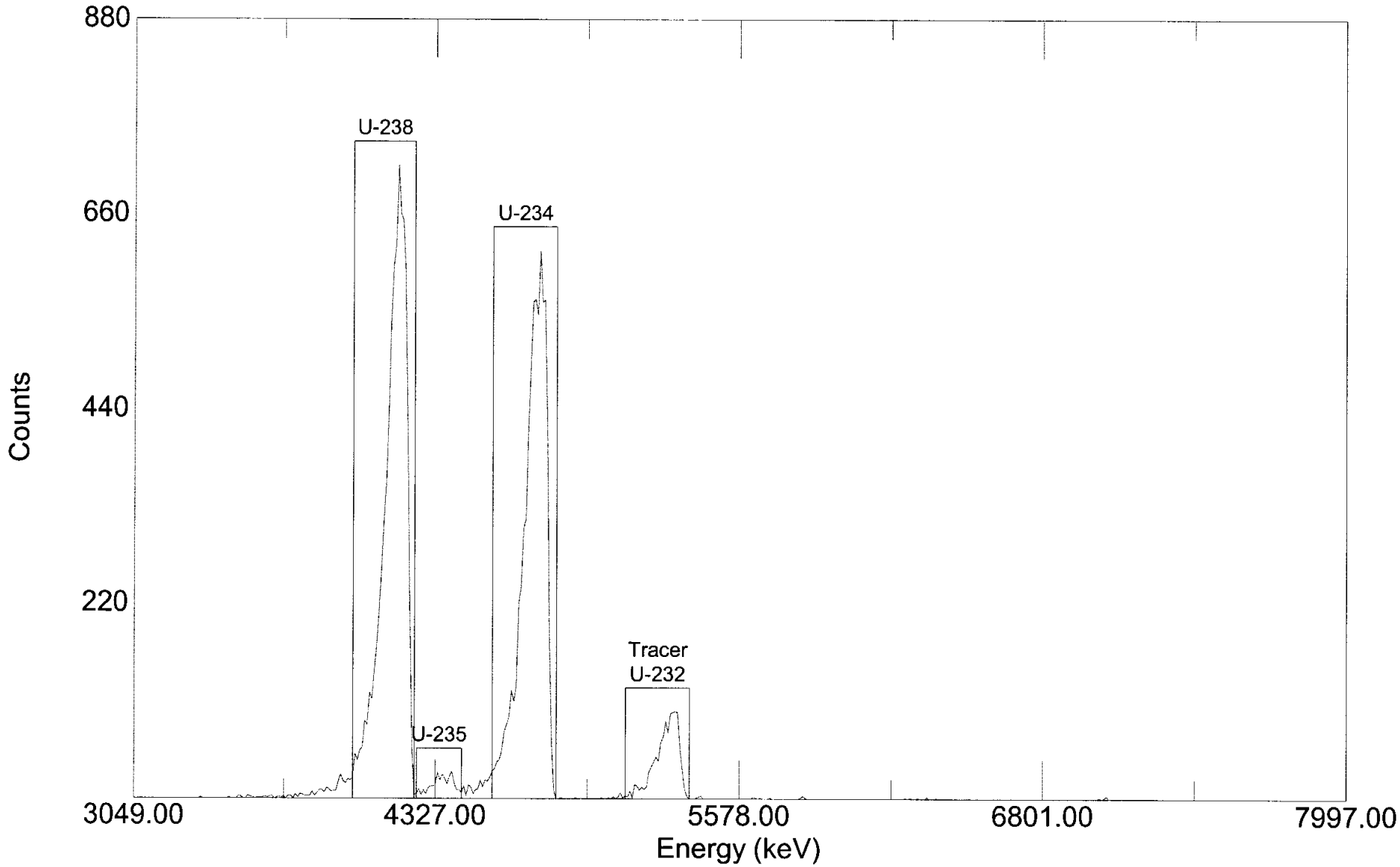
## Totals

| | | % Total |
|---|---|---|
| Gross Count: | 16,613.00 | 100.00 |
| Net Area: | 16,551.20 | 99.63 |
| Background: | 61.80 | 0.37 |
| Composite Fit: | 15,978.00 | 96.18 |
| Residuals: | 635.00 | 3.82 |

Analyzed By: Sm

Checked By: SD

UR509723D AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 09:14:17 on 11-Jul-2004 Real Time: 18001.94 s. Live Time: 18000.00 s.
File: C:\User\Alpha\ALPHA\UR509723D.SPC Detector: #62 MCB 8 Input 6
Sample: 0405097-23D UAS040629-7 Type: Uranium Default

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/14/04 7:03:34 PM
Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** 0405097-24 UAS040629-7

**Analysis Type:** Uranium Default

*Detector:* MCB 6 Input 2

*Date/Time of Count:* 7/9/04 7:30:09 AM

*Sample Volume:* 0.030 Total, 0.030 Aliquot.

*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **53.44%**

*Real Time:* 319.96 Minutes

*Total Eff.:* 16.89 %

*Dead Time:* 6.7 %

*Tracer Amount:* 18.939 DPM.

*Acquisition:* 512 Channels

*Efficiency:* 31.60%

*Analysis:* Relative Region-Of-Interest

*Original:* 2,973 + 10.4170 * Chn + -0.00120 * Chn **2.

*Spectrum Calibration:* 2,973 + 10.4515 * Chn + -0.00120 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\U509724.SPC**

***Background File:*** **C:\User\Alpha\ALPHA\B4070642.SPC**

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

### Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 138.73 | 126 | 144 | 6.00 | 34.00 | 357.00 | 0.30 | 356.70 | 7.04 |
| 2 | 175.93 | 155 | 182 | 8.00 | 701.00 | 7,917.00 | 0.00 | 7917.00 | 156.26 |
| 3 | 118.71 | 97 | 125 | 6.00 | 701.00 | 8,130.00 | 0.00 | 8130.00 | 160.47 |
| Tracer | 230.65 | 209 | 236 | 6.00 | 91.00 | 961.00 | 1.50 | 959.50 | 18.94 |

### Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 60.71 | 105.713 | n/a | 10.38 % |
| 2 | U-234 | 4774.80 | 80.23 | 2346.319 | n/a | 2.20 % |
| 3 | U-238 | 4197.00 | 61.00 | 2409.444 | n/a | 2.17 % |
| Tracer | U-232 | 5320.00 | 59.39 | 284.362 | n/a | 6.32 % |

### Totals

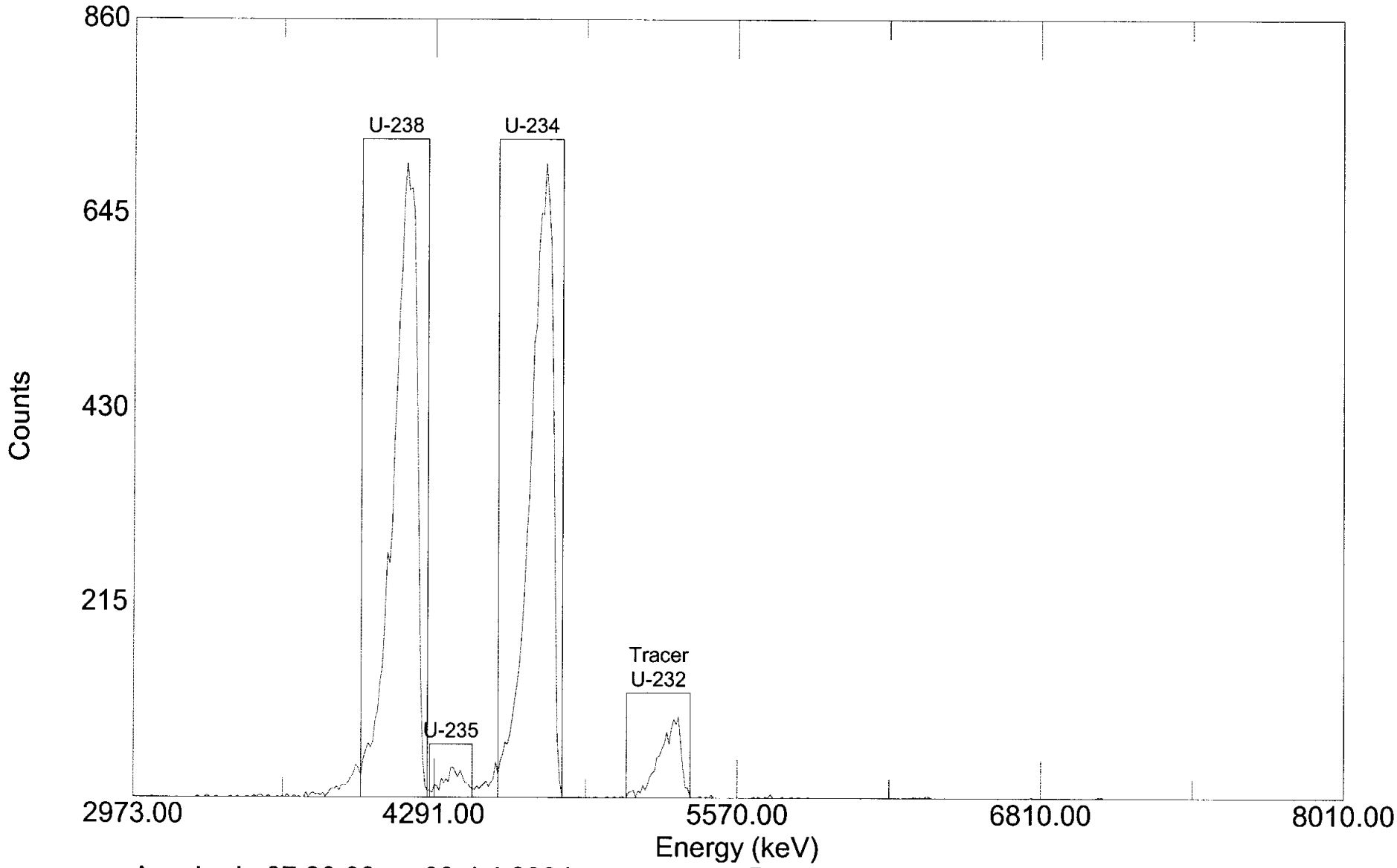
| | | % Total |
|---|---|---|
| Gross Count: | 17,966.00 | 100.00 |
| Net Area: | 17,885.00 | 99.55 |
| Background: | 81.00 | 0.45 |
| Composite Fit: | 17,365.00 | 96.65 |
| Residuals: | 601.00 | 3.35 |

Analyzed By: Sm

Checked By: SD

U509724

AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 07:30:09 on 09-Jul-2004
File: C:\User\Alpha\ALPHA\U509724.SPC
Sample: 0405097-24 UAS040629-7

Real Time: 19197.74 s. Live Time: 18000.00 s.
Detector: #42 MCB 6 Input 2
Type: Uranium Default

0001133

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/14/04 7:05:23 PM
Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** 0405097-25 UAS040629-7

**Analysis Type:** Uranium Default

*Detector:* MCB 2 Input 8

*Date/Time of Count:* 7/9/04 1:49:47 PM

*Sample Volume:* 0.080 Total, 0.080 Aliquot.

*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **78.51%**

*Real Time:* 300.02 Minutes

*Total Eff.:* 22.74 %

*Dead Time:* 0.0 %

*Tracer Amount:* 18.939 DPM.

*Acquisition:* 512 Channels

*Efficiency:* 28.97%

*Analysis:* Relative Region-Of-Interest

*Original:* 3,020 + 9.9835 * Chn + -0.00052 * Chn **2.

*Spectrum Calibration:* 3,020 + 10.0361 * Chn + -0.00052 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\UR509725.SPC**

***Background File:*** **C:\User\Alpha\ALPHA\B4070616.SPC**

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

### Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 138.47 | 124 | 143 | 6.00 | 26.00 | 256.00 | 0.60 | 255.40 | 3.74 |
| 2 | 176.44 | 156 | 183 | 8.00 | 537.00 | 5,885.00 | 0.60 | 5884.40 | 86.24 |
| 3 | 117.97 | 97 | 123 | 8.00 | 534.00 | 5,785.00 | 0.60 | 5784.40 | 84.78 |
| Tracer | 231.93 | 210 | 237 | 6.00 | 137.00 | 1,294.00 | 1.80 | 1292.20 | 18.94 |

### Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 59.35 | 21.076 | n/a | 12.28 % |
| 2 | U-234 | 4774.80 | 78.82 | 485.596 | n/a | 2.56 % |
| 3 | U-238 | 4197.00 | 79.31 | 477.344 | n/a | 2.58 % |
| Tracer | U-232 | 5320.00 | 58.77 | 106.636 | n/a | 5.45 % |

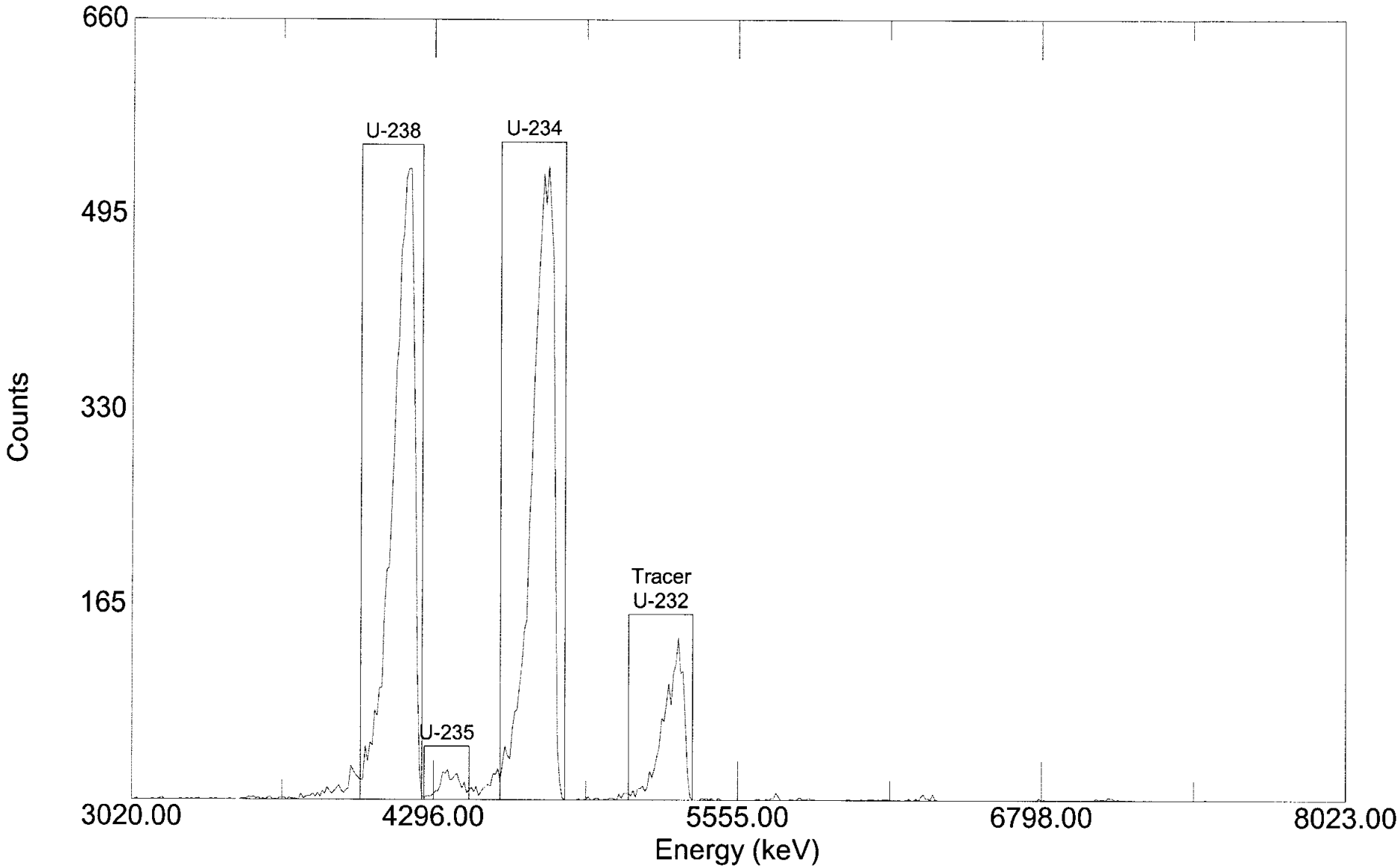
### Totals

| | | % Total |
|---|---|---|
| Gross Count: | 13,778.00 | 100.00 |
| Net Area: | 13,683.20 | 99.31 |
| Background: | 94.80 | 0.69 |
| Composite Fit: | 13,220.00 | 95.95 |
| Residuals: | 558.00 | 4.05 |

Analyzed By: Sm

Checked By: SO

UR509725 AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 13:49:47 on 09-Jul-2004
File: C:\User\Alpha\ALPHA\UR509725.SPC
Sample: 0405097-25 UAS040629-7

Real Time: 18001.28 s. Live Time: 18000.00 s.
Detector: #16 MCB 2 Input 8
Type: Uranium Default

0001135

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/17/04 3:15:47 PM
Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** 0405097-26 UAS040712-5
**Analysis Type:** Uranium Default

*Detector:* MCB 2 Input 5
*Date/Time of Count:* 7/16/04 6:36:12 AM

*Sample Volume:* 0.100 Total, 0.100 Aliquot.
*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **87.40%**
*Real Time:* 300.02 Minutes

*Total Eff.:* 27.44 %
*Dead Time:* 0.0 %

*Tracer Amount:* 18.932 DPM.
*Acquisition:* 512 Channels

*Efficiency:* 31.40%
*Analysis:* Relative Region-Of-Interest

*Original:* 3,018 + 10.1302 * Chn + -0.00091 * Chn **2.

*Spectrum Calibration:* 3,018 + 10.2304 * Chn + -0.00091 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\UX509726.SPC**
***Background File:*** **C:\USER\ALPHA\BKGND\B4071013.SPC**
*Library File:* C:\User\Alpha\ALPHAVIS.ALB

### Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 136.77 | 123 | 143 | 4.00 | 16.00 | 143.00 | 0.30 | 142.70 | 1.73 |
| 2 | 116.47 | 93 | 122 | 8.00 | 316.00 | 3,169.00 | 0.60 | 3168.40 | 38.49 |
| 3 | 174.45 | 152 | 181 | 8.00 | 287.00 | 3,019.00 | 3.60 | 3015.40 | 36.63 |
| Tracer | 229.72 | 208 | 236 | 8.00 | 153.00 | 1,567.00 | 8.40 | 1558.60 | 18.93 |

### Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 39.93 | 7.808 | n/a | 16.43 % |
| 2 | U-238 | 4197.00 | 80.15 | 173.360 | n/a | 3.48 % |
| 3 | U-234 | 4774.80 | 79.31 | 164.989 | n/a | 3.57 % |
| Tracer | U-232 | 5320.00 | 78.51 | 85.279 | n/a | 4.95 % |

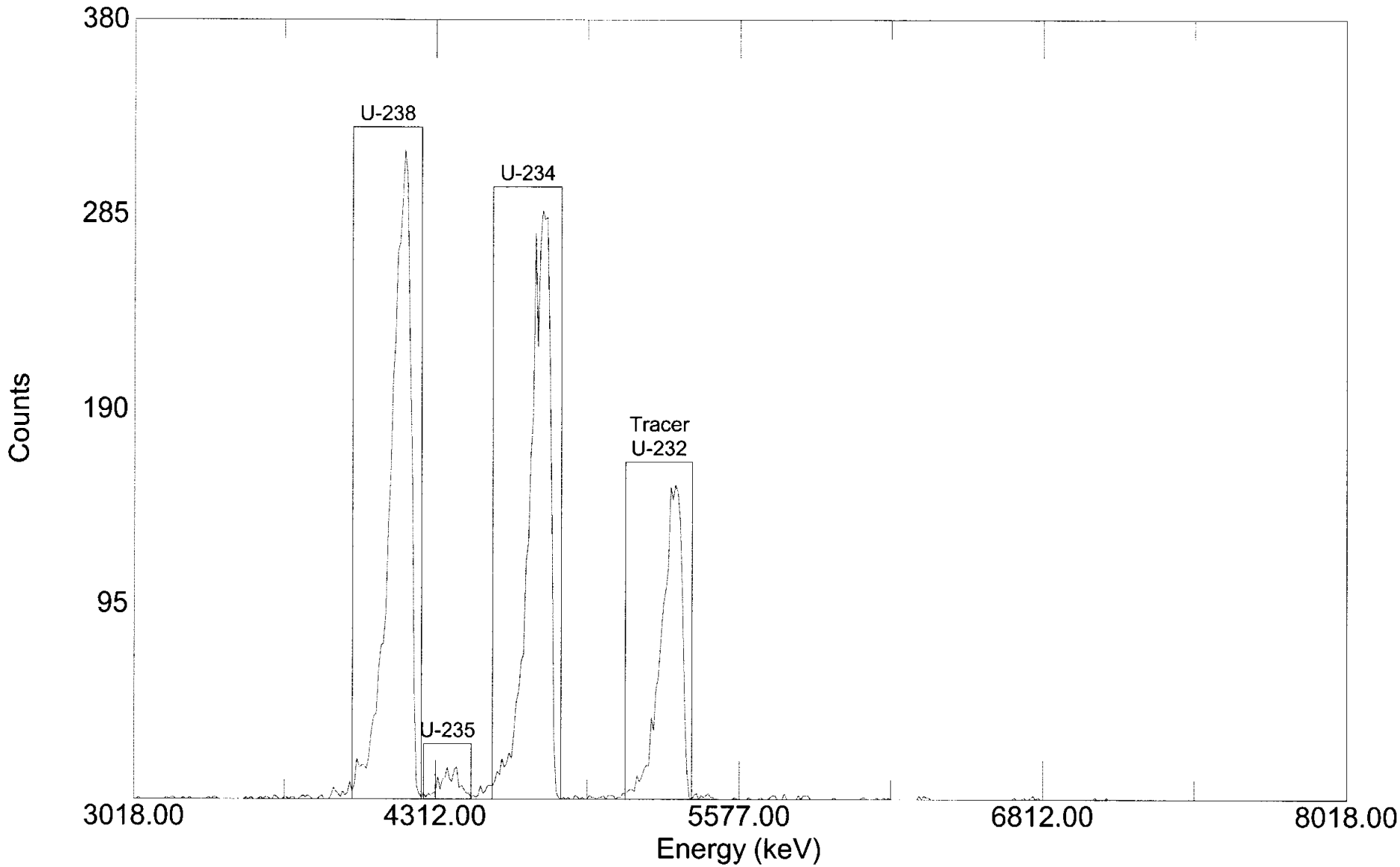
### Totals

| | | % Total |
|---|---|---|
| Gross Count: | 8,075.00 | 100.00 |
| Net Area: | 7,985.60 | 98.89 |
| Background: | 89.40 | 1.11 |
| Composite Fit: | 7,898.00 | 97.81 |
| Residuals: | 177.00 | 2.19 |

Analyzed By: JP

Checked By: Sm

UX509726 AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 06:36:12 on 16-Jul-2004
File: C:\User\Alpha\ALPHA\UX509726.SPC
Sample: 0405097-26 UAS040712-5

Real Time: 18000.94 s. Live Time: 18000.00 s.
Detector: #13 MCB 2 Input 5
Type: Uranium Default

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/17/04 3:17:01 PM

Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** 0405097-27 UAS040712-5

**Analysis Type:** Uranium Default

*Detector:* MCB 2 Input 7

*Date/Time of Count:* 7/16/04 6:36:24 AM

*Sample Volume:* 0.100 Total, 0.100 Aliquot.

*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **90.37%**

*Real Time:* 300.02 Minutes

*Total Eff.:* 26.66 %

*Dead Time:* 0.0 %

*Tracer Amount:* 18.932 DPM.

*Acquisition:* 512 Channels

*Efficiency:* 29.50%

*Analysis:* Relative Region-Of-Interest

*Original:* 3,028 + 9.9689 * Chn + -0.00060 * Chn **2.

*Spectrum Calibration:* 3,028 + 10.0631 * Chn + -0.00060 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\UX509727.SPC**

***Background File:*** **C:\USER\ALPHA\BKGND\B4071015.SPC**

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

### Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 137.49 | 123 | 143 | 2.00 | 16.00 | 105.00 | 0.00 | 105.00 | 1.31 |
| 2 | 117.01 | 95 | 122 | 6.00 | 238.00 | 2,467.00 | 0.60 | 2466.40 | 30.84 |
| 3 | 175.45 | 154 | 180 | 8.00 | 244.00 | 2,456.00 | 0.90 | 2455.10 | 30.70 |
| Tracer | 230.97 | 208 | 237 | 8.00 | 156.00 | 1,524.00 | 9.90 | 1514.10 | 18.93 |

### Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 19.80 | 5.914 | n/a | 19.13 % |
| 2 | U-238 | 4197.00 | 59.53 | 138.916 | n/a | 3.95 % |
| 3 | U-234 | 4774.80 | 78.81 | 138.280 | n/a | 3.96 % |
| Tracer | U-232 | 5320.00 | 78.28 | 85.279 | n/a | 5.02 % |

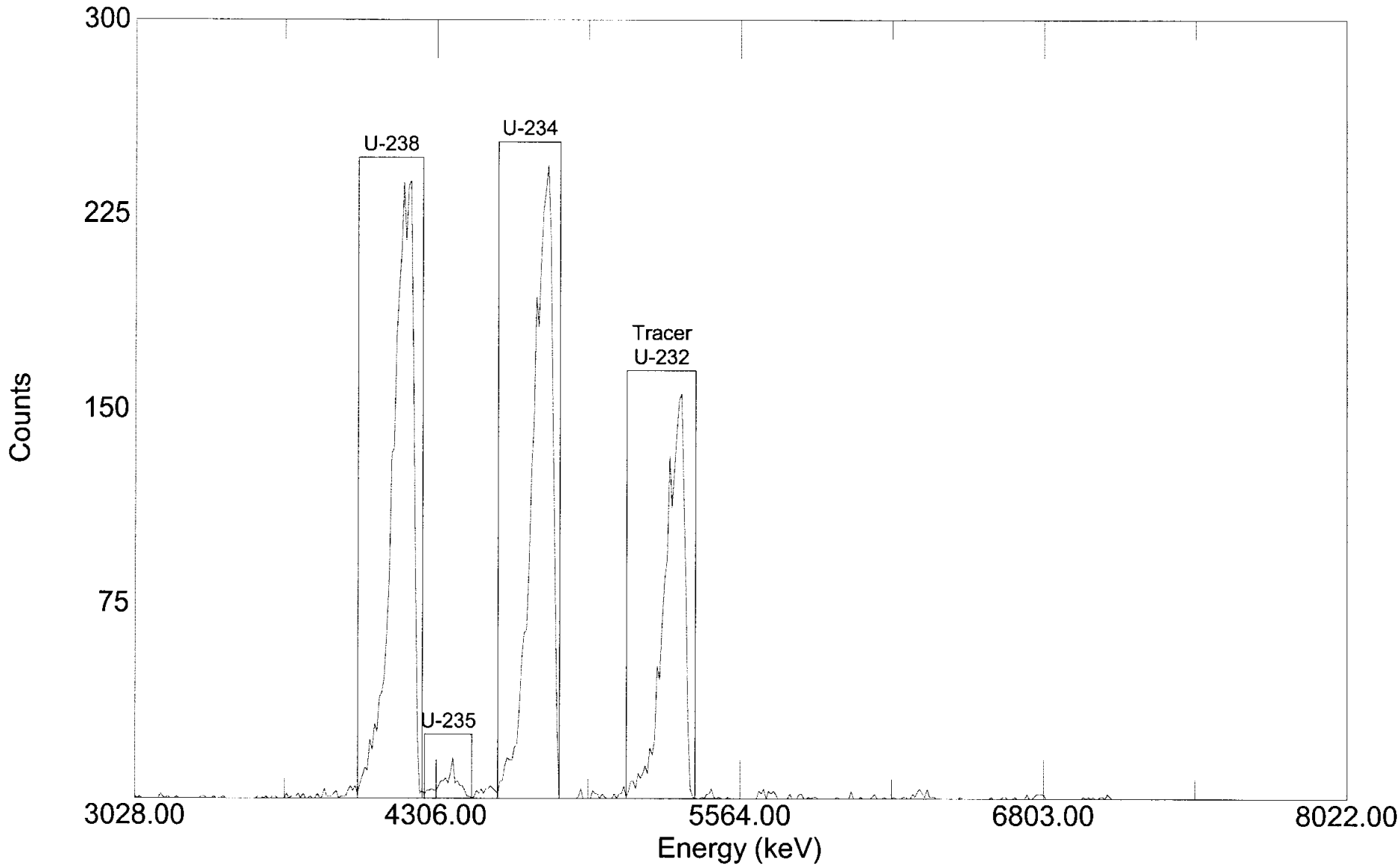
### Totals

| | | % Total |
|---|---|---|
| Gross Count: | 6,766.00 | 100.00 |
| Net Area: | 6,661.90 | 98.46 |
| Background: | 104.10 | 1.54 |
| Composite Fit: | 6,552.00 | 96.84 |
| Residuals: | 214.00 | 3.16 |

Analyzed By: JP

Checked By: SM

UX509727 AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 06:36:24 on 16-Jul-2004
File: C:\User\Alpha\ALPHA\UX509727.SPC
Sample: 0405097-27 UAS040712-5

Real Time: 18000.94 s. Live Time: 18000.00 s.
Detector: #15 MCB 2 Input 7
Type: Uranium Default

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/14/04 7:06:43 PM
Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** 0405097-28 UAS040629-7
**Analysis Type:** Uranium Default

*Detector:* MCB 6 Input 4
*Date/Time of Count:* 7/9/04 7:31:09 AM

*Sample Volume:* 0.030 Total, 0.030 Aliquot.
*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **56.13%**
*Real Time:* 320.05 Minutes

*Total Eff.:* 17.29 %
*Dead Time:* 6.7 %

*Tracer Amount:* 18.939 DPM.
*Acquisition:* 512 Channels

*Efficiency:* 30.81%
*Analysis:* Relative Region-Of-Interest

*Original:* 3,015 + 10.0739 * Chn + -0.00055 * Chn **2.

*Spectrum Calibration:* 3,015 + 10.1505 * Chn + -0.00055 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\U509728.SPC**
***Background File:*** **C:\User\Alpha\ALPHA\B4070644.SPC**
*Library File:* C:\User\Alpha\ALPHAVIS.ALB

### Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 137.48 | 124 | 143 | 8.00 | 31.00 | 297.00 | 2.10 | 294.90 | 5.68 |
| 2 | 175.04 | 154 | 181 | 8.00 | 673.00 | 7,499.00 | 0.60 | 7498.40 | 144.52 |
| 3 | 117.21 | 98 | 123 | 8.00 | 671.00 | 7,195.00 | 0.90 | 7194.10 | 138.66 |
| Tracer | 229.94 | 208 | 236 | 8.00 | 95.00 | 991.00 | 8.40 | 982.60 | 18.94 |

### Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 80.01 | 85.343 | n/a | 11.46 % |
| 2 | U-234 | 4774.80 | 79.68 | 2170.017 | n/a | 2.26 % |
| 3 | U-238 | 4197.00 | 80.18 | 2081.954 | n/a | 2.31 % |
| Tracer | U-232 | 5320.00 | 79.20 | 284.362 | n/a | 6.23 % |

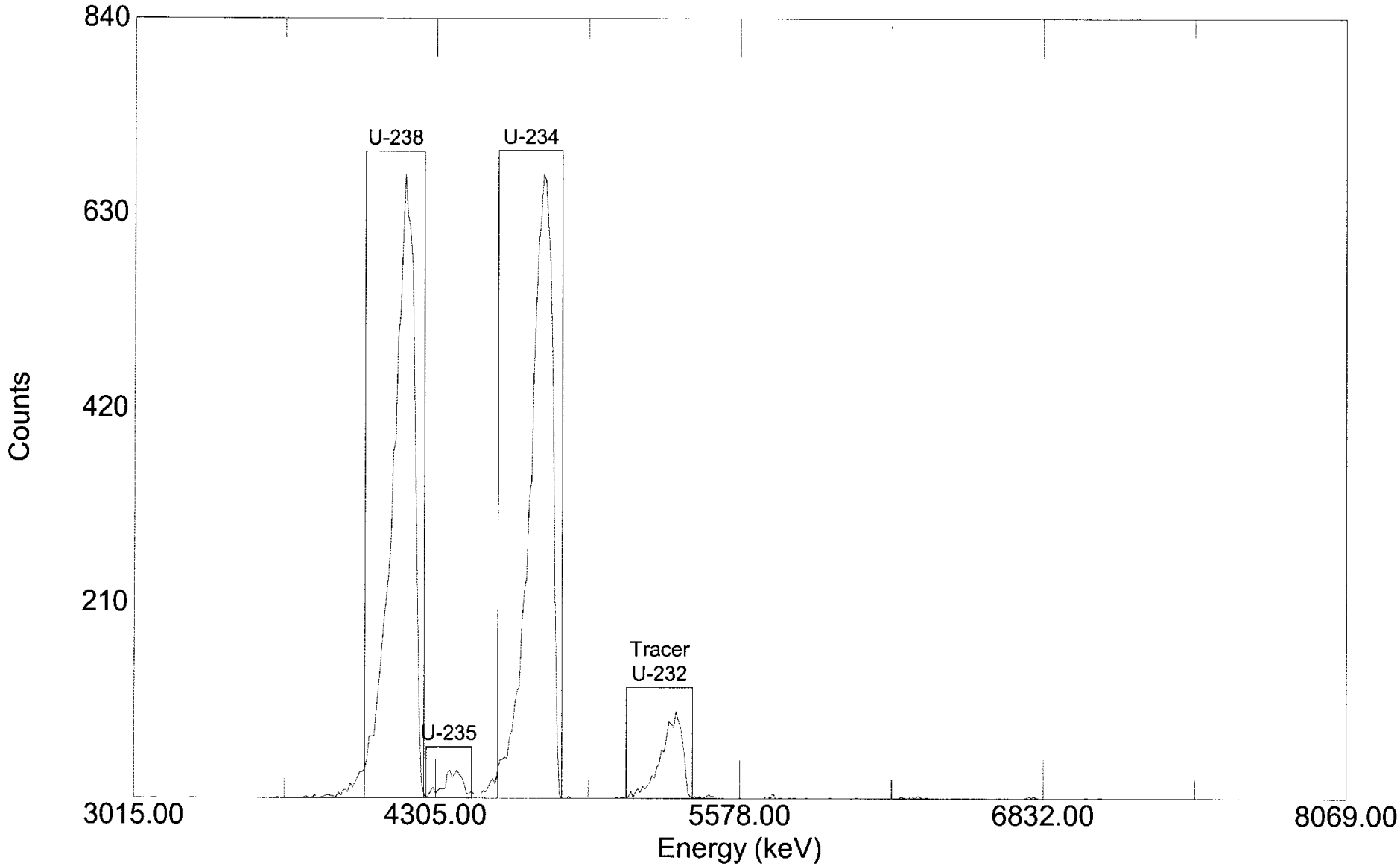
### Totals

| | | % Total |
|---|---|---|
| Gross Count: | 16,441.00 | 100.00 |
| Net Area: | 16,313.80 | 99.23 |
| Background: | 127.20 | 0.77 |
| Composite Fit: | 15,982.00 | 97.21 |
| Residuals: | 459.00 | 2.79 |

Analyzed By: Sm

Checked By: SD

U509728 AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 07:31:09 on 09-Jul-2004
File: C:\User\Alpha\ALPHA\U509728.SPC
Sample: 0405097-28 UAS040629-7

Real Time: 19202.74 s. Live Time: 18000.00 s.
Detector: #44 MCB 6 Input 4
Type: Uranium Default

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/14/04 7:10:21 PM
Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** 0405097-29 UAS040629-7

**Analysis Type:** Uranium Default

*Detector:* MCB 3 Input 1

*Date/Time of Count:* 7/9/04 1:50:16 PM

*Sample Volume:* 0.060 Total, 0.060 Aliquot.

*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **80.59%**

*Real Time:* 300.06 Minutes

*Total Eff.:* 24.53 %

*Dead Time:* 0.0 %

*Tracer Amount:* 18.939 DPM.

*Acquisition:* 512 Channels

*Efficiency:* 30.43%

*Analysis:* Relative Region-Of-Interest

*Original:* 2,993 + 10.3227 * Chn + -0.00160 * Chn **2.

*Spectrum Calibration:* 2,993 + 10.6152 * Chn + -0.00160 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\UR509729.SPC**

***Background File:*** **C:\User\Alpha\ALPHA\B4070617.SPC**

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

## Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 135.33 | 124 | 140 | 4.00 | 27.00 | 255.00 | 0.60 | 254.40 | 3.46 |
| 2 | 172.35 | 153 | 180 | 8.00 | 472.00 | 6,012.00 | 0.60 | 6011.40 | 81.70 |
| 3 | 115.45 | 93 | 123 | 4.00 | 516.00 | 6,257.00 | 0.60 | 6256.40 | 85.03 |
| Tracer | 227.00 | 209 | 236 | 8.00 | 116.00 | 1,400.00 | 6.60 | 1393.40 | 18.94 |

## Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 40.73 | 25.959 | n/a | 12.30 % |
| 2 | U-234 | 4774.80 | 80.51 | 613.396 | n/a | 2.53 % |
| 3 | U-238 | 4197.00 | 40.98 | 638.396 | n/a | 2.48 % |
| Tracer | U-232 | 5320.00 | 79.11 | 142.181 | n/a | 5.24 % |

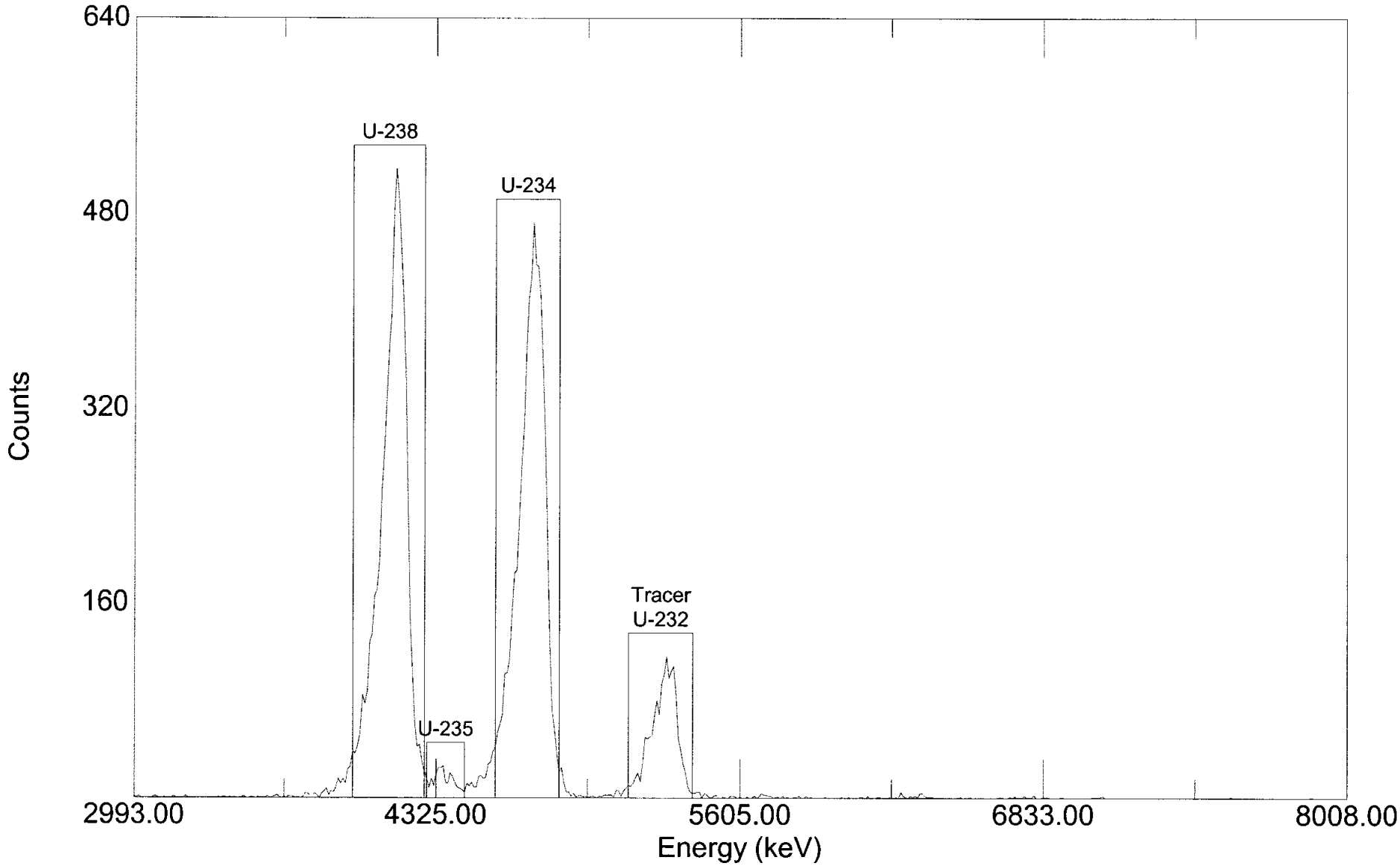
## Totals

| | | % Total |
|---|---|---|
| Gross Count: | 14,593.00 | 100.00 |
| Net Area: | 14,470.30 | 99.16 |
| Background: | 122.70 | 0.84 |
| Composite Fit: | 13,924.00 | 95.42 |
| Residuals: | 669.00 | 4.58 |

Analyzed By: Sm

Checked By: LD

UR509729 AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 13:50:16 on 09-Jul-2004 Real Time: 18003.74 s. Live Time: 18000.00 s.
File: C:\User\Alpha\ALPHA\UR509729.SPC Detector: #17 MCB 3 Input 1
Sample: 0405097-29 UAS040629-7 Type: Uranium Default

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/14/04 7:11:22 PM
Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** 0405097-30 UAS040629-7

**Analysis Type:** Uranium Default

*Detector:* MCB 6 Input 6

*Date/Time of Count:* 7/9/04 7:32:02 AM

*Sample Volume:* 0.070 Total, 0.070 Aliquot.

*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **82.32%**

*Real Time:* 320.04 Minutes

*Total Eff.:* 24.37 %

*Dead Time:* 6.7 %

*Tracer Amount:* 18.939 DPM.

*Acquisition:* 512 Channels

*Efficiency:* 29.61%

*Analysis:* Relative Region-Of-Interest

*Original:* 3,011 + 9.9562 * Chn + -0.00027 * Chn **2.

*Spectrum Calibration:* 3,011 + 10.0736 * Chn + -0.00027 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\U509730.SPC**

***Background File:*** **C:\User\Alpha\ALPHA\B4070646.SPC**

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

## Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 138.41 | 124 | 143 | 10.00 | 31.00 | 317.00 | 0.60 | 316.40 | 4.33 |
| 2 | 175.94 | 155 | 182 | 8.00 | 626.00 | 7,081.00 | 3.60 | 7077.40 | 96.79 |
| 3 | 118.12 | 98 | 123 | 8.00 | 626.00 | 7,069.00 | 1.50 | 7067.50 | 96.66 |
| Tracer | 230.67 | 211 | 238 | 8.00 | 124.00 | 1,389.00 | 4.20 | 1384.80 | 18.94 |

## Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 99.98 | 27.845 | n/a | 11.03 % |
| 2 | U-234 | 4774.80 | 79.82 | 622.847 | n/a | 2.33 % |
| 3 | U-238 | 4197.00 | 80.07 | 621.976 | n/a | 2.33 % |
| Tracer | U-232 | 5320.00 | 79.58 | 121.869 | n/a | 5.26 % |

## Totals

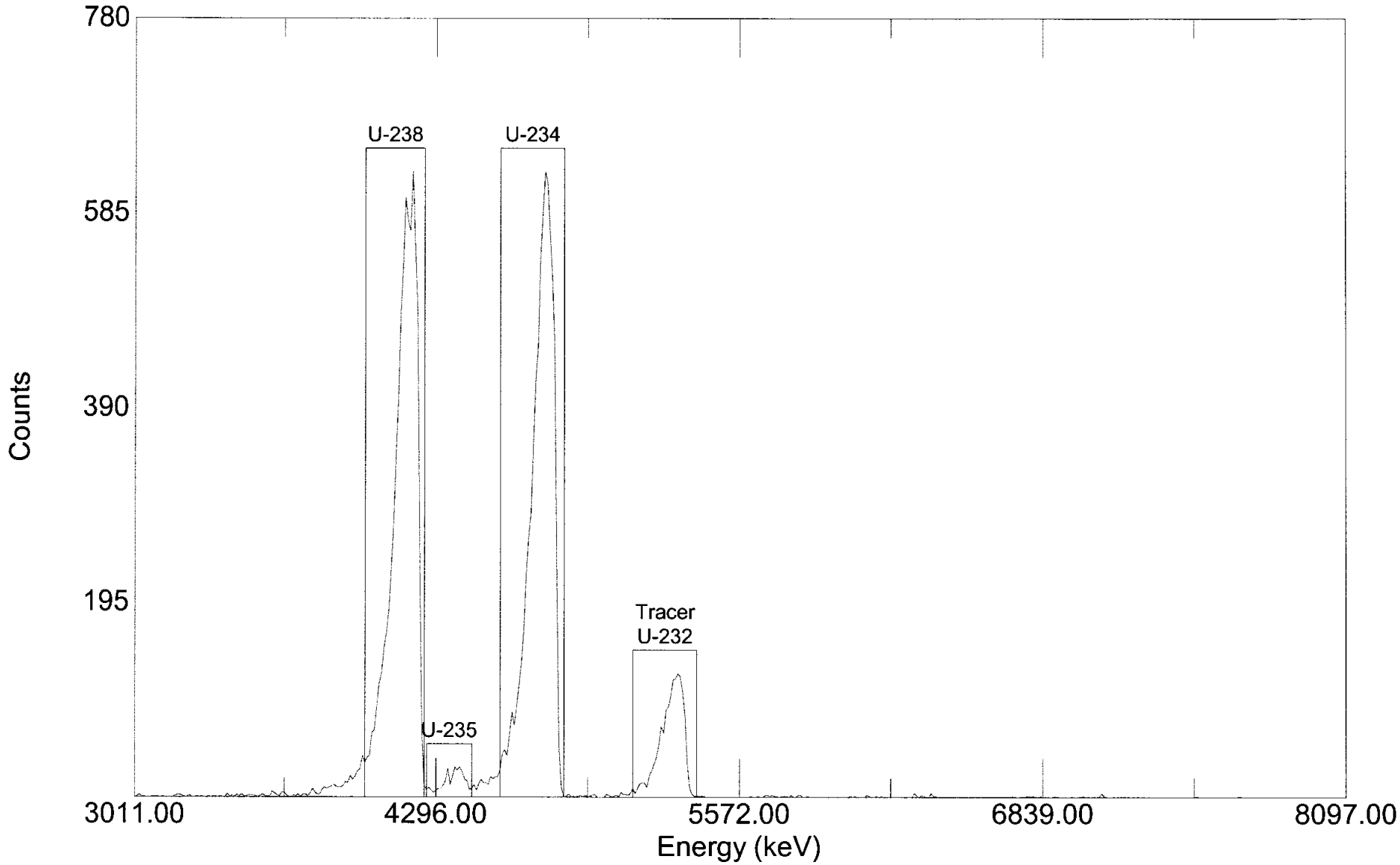
| | | % Total |
|---|---|---|
| Gross Count: | 16,550.00 | 100.00 |
| Net Area: | 16,468.70 | 99.51 |
| Background: | 81.30 | 0.49 |
| Composite Fit: | 15,856.00 | 95.81 |
| Residuals: | 694.00 | 4.19 |

Analyzed By: Sm

Checked By: SD

000144

U509730 AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 07:32:02 on 09-Jul-2004 Real Time: 19202.38 s. Live Time: 18000.00 s.
File: C:\User\Alpha\ALPHA\U509730.SPC Detector: #46 MCB 6 Input 6
Sample: 0405097-30 UAS040629-7 Type: Uranium Default

000145

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/14/04 7:12:51 PM
Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** AS040629-7MB UAS040629-7

**Analysis Type:** Uranium Default

*Detector:* MCB 6 Input 7

*Date/Time of Count:* 7/9/04 7:32:31 AM

*Sample Volume:* 0.050 Total, 0.050 Aliquot.

*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **85.51%**

*Real Time:* 320.01 Minutes

*Total Eff.:* 27.25 %

*Dead Time:* 6.7 %

*Tracer Amount:* 18.939 DPM.

*Acquisition:* 512 Channels

*Efficiency:* 31.87%

*Analysis:* Relative Region-Of-Interest

*Original:* 2,950 + 10.5378 * Chn + -0.00160 * Chn **2.

*Spectrum Calibration:* 2,950 + 10.5966 * Chn + -0.00160 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\U6297B.SPC**

***Background File:*** **C:\User\Alpha\ALPHA\B4070647.SPC**

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

### Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 139.83 | 124 | 143 | 2.00 | 1.00 | 3.00 | 0.30 | 2.70 | 0.03 |
| 2 | 176.97 | 156 | 183 | 2.00 | 2.00 | 9.00 | 0.90 | 8.10 | 0.10 |
| 3 | 119.89 | 98 | 123 | 2.00 | 1.00 | 4.00 | 0.00 | 4.00 | 0.05 |
| Tracer | 231.81 | 212 | 241 | 8.00 | 165.00 | 1,555.00 | 6.60 | 1548.40 | 18.94 |

### Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 20.30 | 0.298 | n/a | 126.30 % |
| 2 | U-234 | 4774.80 | 20.06 | 0.893 | n/a | 72.92 % |
| 3 | U-238 | 4197.00 | 20.43 | 0.441 | n/a | 98.00 % |
| Tracer | U-232 | 5320.00 | 78.84 | 170.617 | n/a | 4.97 % |

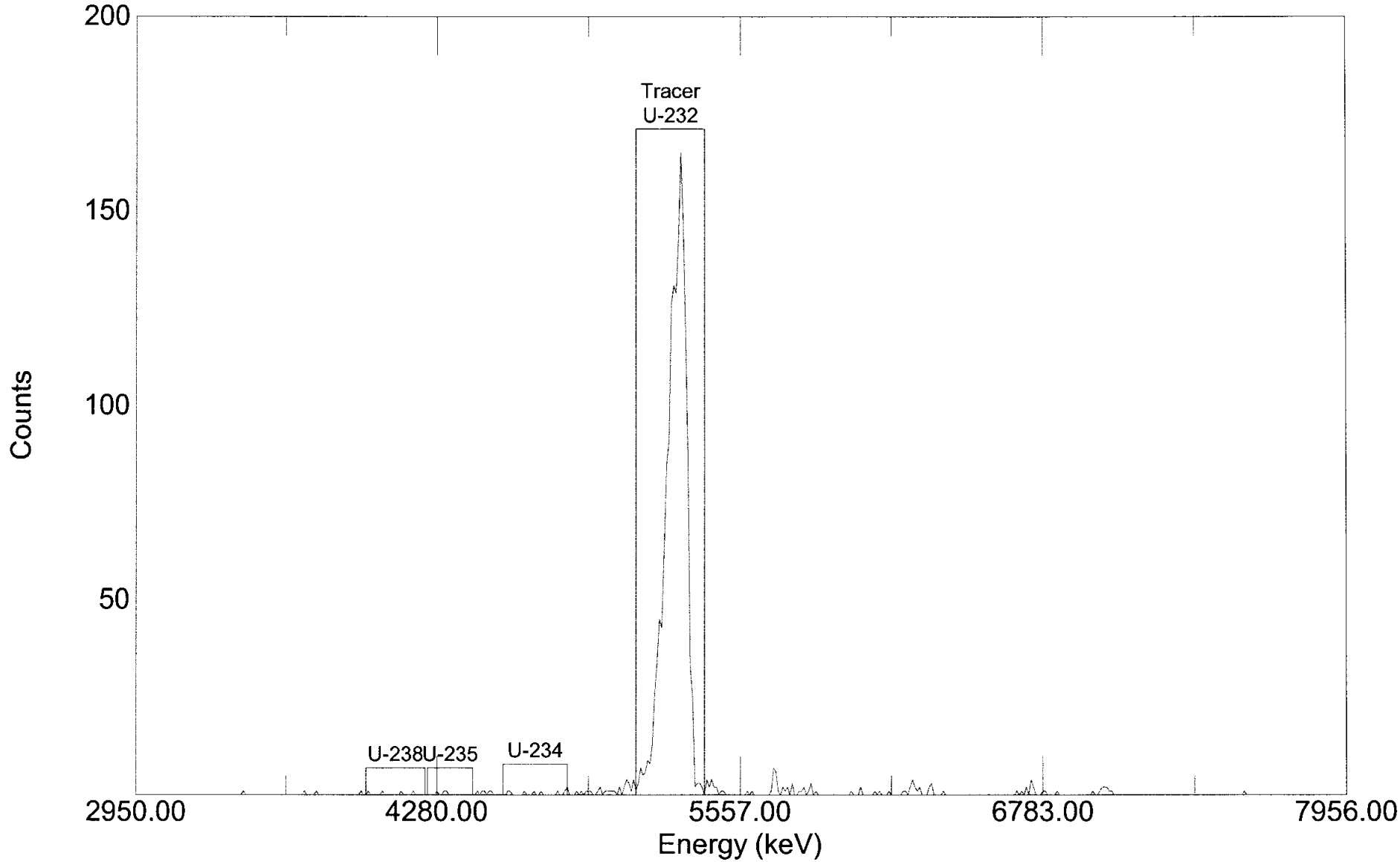
### Totals

| | | % Total |
|---|---|---|
| Gross Count: | 1,708.00 | 100.00 |
| Net Area: | 1,634.80 | 95.71 |
| Background: | 73.20 | 4.29 |
| Composite Fit: | 1,571.00 | 91.98 |
| Residuals: | 137.00 | 8.02 |

Analyzed By: Sm

Checked By: SD

**U6297B** AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 07:32:31 on 09-Jul-2004 Real Time: 19200.82 s. Live Time: 18000.00 s.
File: C:\User\Alpha\ALPHA\U6297B.SPC Detector: #47 MCB 6 Input 7
Sample: AS040629-7MB UAS040629-7 Type: Uranium Default

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/14/04 7:14:20 PM
Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** AS040629-7LCS UAS040629-7

**Analysis Type:** Uranium Default

*Detector:* MCB 8 Input 7

*Date/Time of Count:* 7/9/04 7:33:08 AM

*Sample Volume:* 0.050 Total, 0.050 Aliquot.

*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **86.35%**

*Real Time:* 300.66 Minutes

*Total Eff.:* 25.65 %

*Dead Time:* 0.2 %

*Tracer Amount:* 18.939 DPM.

*Acquisition:* 512 Channels

*Efficiency:* 29.70%

*Analysis:* Relative Region-Of-Interest

*Original:* 3,041 + 9.8750 * Chn + -0.00057 * Chn **2.

*Spectrum Calibration:* 3,041 + 10.2951 * Chn + -0.00057 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\U6297L.SPC**

***Background File:*** **C:\User\Alpha\ALPHA\B4070663.SPC**

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

## Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 132.99 | 119 | 133 | 2.00 | 7.00 | 56.00 | 0.00 | 56.00 | 0.73 |
| 2 | 170.02 | 149 | 176 | 6.00 | 137.00 | 1,498.00 | 0.90 | 1497.10 | 19.46 |
| 3 | 113.01 | 93 | 118 | 2.00 | 187.00 | 1,569.00 | 0.30 | 1568.70 | 20.39 |
| Tracer | 224.15 | 205 | 232 | 8.00 | 163.00 | 1,458.00 | 0.90 | 1457.10 | 18.94 |

## Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 20.29 | 6.557 | n/a | 26.19 % |
| 2 | U-234 | 4774.80 | 60.62 | 175.301 | n/a | 5.07 % |
| 3 | U-238 | 4197.00 | 20.33 | 183.685 | n/a | 4.95 % |
| Tracer | U-232 | 5320.00 | 80.33 | 170.617 | n/a | 5.13 % |

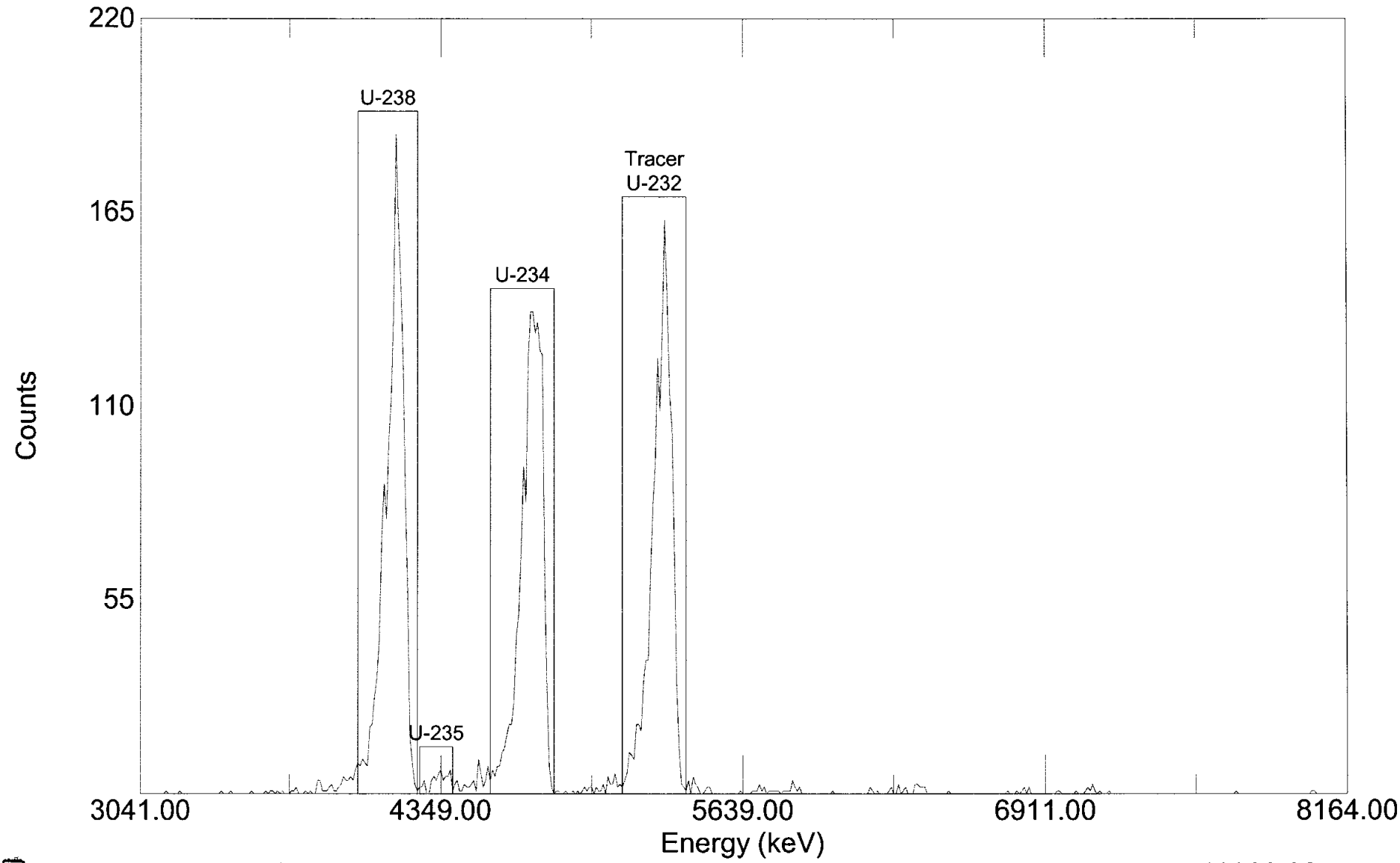
## Totals

| | | % Total |
|---|---|---|
| Gross Count: | 4,842.00 | 100.00 |
| Net Area: | 4,778.70 | 98.69 |
| Background: | 63.30 | 1.31 |
| Composite Fit: | 4,581.00 | 94.61 |
| Residuals: | 261.00 | 5.39 |

Analyzed By: Sm

Checked By: SD

**U6297L** AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 07:33:08 on 09-Jul-2004
File: C:\User\Alpha\ALPHA\U6297L.SPC
Sample: AS040629-7LCS UAS040629-7

Real Time: 18039.76 s. Live Time: 18000.00 s.
Detector: #63 MCB 8 Input 7
Type: Uranium Default

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/9/04 9:53:44 AM
Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** AS040629-9MB UAS040629-9

**Analysis Type:** Uranium Default

*Detector:* MCB 8 Input 2

*Date/Time of Count:* 7/8/04 7:55:42 PM

*Sample Volume:* 1.000 Total, 1.000 Aliquot.

*Live Time:* **420.00 Minutes**

***Chem. Yield:*** **79.64%**

*Real Time:* 420.02 Minutes

*Total Eff.:* 24.56 %

*Dead Time:* 0.0 %

*Tracer Amount:* 18.939 DPM.

*Acquisition:* 512 Channels

*Efficiency:* 30.84%

*Analysis:* Relative Region-Of-Interest

*Original:* 3,059 + 9.8157 * Chn + -0.00043 * Chn **2.

*Spectrum Calibration:* 3,059 + 9.8666 * Chn + -0.00043 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\U6299B.SPC**

***Background File:*** **C:\USER\ALPHA\BKGND\B4070658.SPC**

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

## Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 136.72 | 120 | 139 | 2.00 | 2.00 | 3.00 | 1.68 | 1.32 | 0.01 |
| 2 | 115.91 | 94 | 119 | 2.00 | 2.00 | 5.00 | 3.36 | 1.64 | 0.02 |
| 3 | 175.23 | 154 | 181 | 2.00 | 1.00 | 2.00 | 1.26 | 0.74 | 0.01 |
| Tracer | 231.49 | 212 | 239 | 8.00 | 195.00 | 1,967.00 | 13.44 | 1953.56 | 18.94 |

## Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 19.50 | 0.006 | n/a | 269.59 % |
| 2 | U-238 | 4197.00 | 19.53 | 0.007 | n/a | 282.63 % |
| 3 | U-234 | 4774.80 | 19.43 | 0.003 | n/a | 394.84 % |
| Tracer | U-232 | 5320.00 | 77.33 | 8.531 | n/a | 4.42 % |

## Totals

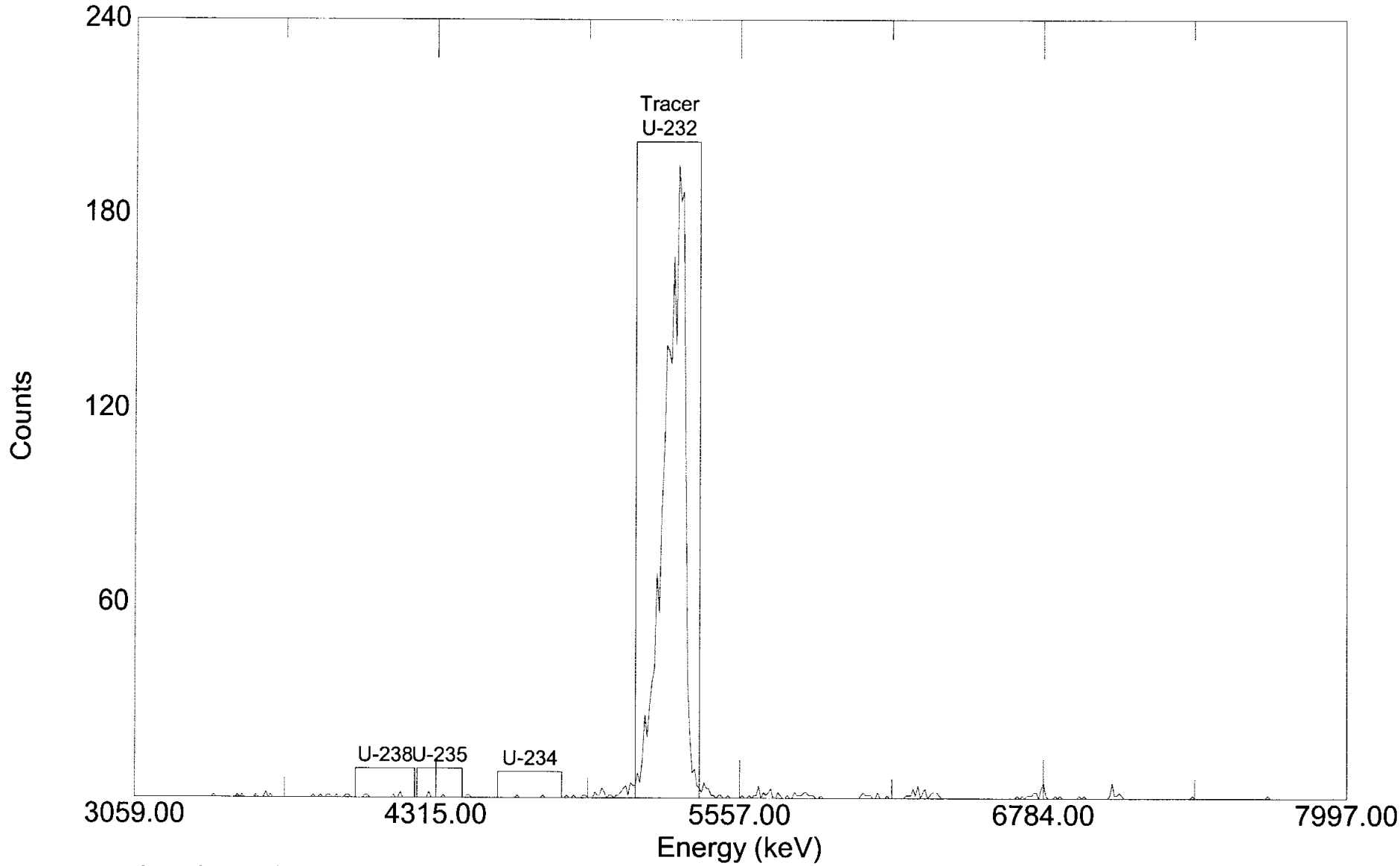
| | | % Total |
|---|---|---|
| Gross Count: | 2,148.00 | 100.00 |
| Net Area: | 2,002.68 | 93.23 |
| Background: | 145.32 | 6.77 |
| Composite Fit: | 1,977.00 | 92.04 |
| Residuals: | 171.00 | 7.96 |

Analyzed By: Sm

Checked By: SD

U6299B

AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 19:55:42 on 08-Jul-2004
File: C:\User\Alpha\ALPHA\U6299B.SPC
Sample: AS040629-9MB UAS040629-9

Real Time: 25201.44 s. Live Time: 25200.00 s.
Detector: #58 MCB 8 Input 2
Type: Uranium Default

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/9/04 9:58:01 AM
Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** AS040629-9LCS UAS040629-9

**Analysis Type:** Uranium Default

*Detector:* MCB 8 Input 3

*Date/Time of Count:* 7/8/04 1:06:50 PM

*Sample Volume:* 2.000 Total, 2.000 Aliquot.

*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **85.12%**

*Real Time:* 300.02 Minutes

*Total Eff.:* 26.06 %

*Dead Time:* 0.0 %

*Tracer Amount:* 18.939 DPM.

*Acquisition:* 512 Channels

*Efficiency:* 30.61%

*Analysis:* Relative Region-Of-Interest

*Original:* 3,028 + 10.0729 * Chn + -0.00120 * Chn **2.

*Spectrum Calibration:* 3,028 + 10.1720 * Chn + -0.00120 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\U6299L.SPC**

***Background File:*** **C:\USER\ALPHA\BKGND\B4070659.SPC**

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

### Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 137.10 | 126 | 141 | 8.00 | 7.00 | 65.00 | 0.60 | 64.40 | 0.82 |
| 2 | 116.53 | 96 | 125 | 8.00 | 171.00 | 1,618.00 | 1.80 | 1616.20 | 20.68 |
| 3 | 175.36 | 156 | 183 | 8.00 | 176.00 | 1,548.00 | 3.00 | 1545.00 | 19.76 |
| Tracer | 231.66 | 213 | 241 | 8.00 | 151.00 | 1,487.00 | 6.60 | 1480.40 | 18.94 |

### Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 78.74 | 0.186 | n/a | 24.55 % |
| 2 | U-238 | 4197.00 | 79.14 | 4.657 | n/a | 4.88 % |
| 3 | U-234 | 4774.80 | 78.01 | 4.452 | n/a | 4.99 % |
| Tracer | U-232 | 5320.00 | 76.93 | 4.265 | n/a | 5.08 % |

### Totals

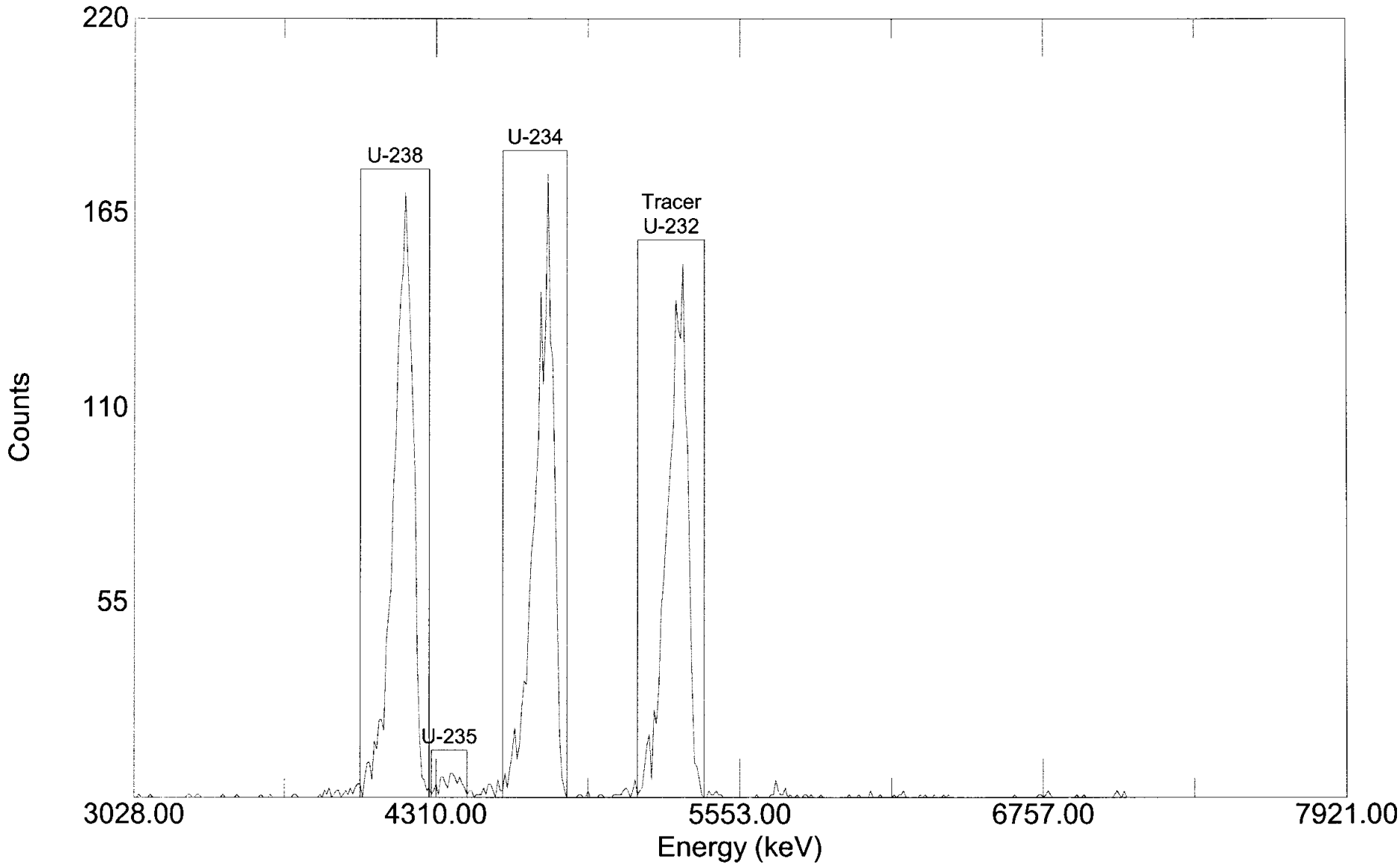
| | | % Total |
|---|---|---|
| Gross Count: | 4,868.00 | 100.00 |
| Net Area: | 4,784.00 | 98.27 |
| Background: | 84.00 | 1.73 |
| Composite Fit: | 4,718.00 | 96.92 |
| Residuals: | 150.00 | 3.08 |

Analyzed By: Sm

Checked By: SD

000152

U6299L AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 13:06:50 on 08-Jul-2004
File: C:\User\Alpha\ALPHA\U6299L.SPC
Sample: AS040629-9LCS UAS040629-9

Real Time: 18001.36 s. Live Time: 18000.00 s.
Detector: #59 MCB 8 Input 3
Type: Uranium Default

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/9/04 9:56:40 AM
Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** AS040629-9LCSD UAS040629-9

**Analysis Type:** Uranium Default

*Detector:* MCB 8 Input 4

*Date/Time of Count:* 7/8/04 1:07:00 PM

*Sample Volume:* 2.000 Total, 2.000 Aliquot.

*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **81.58%**

*Real Time:* 300.02 Minutes

*Total Eff.:* 21.35 %

*Dead Time:* 0.0 %

*Tracer Amount:* 18.939 DPM.

*Acquisition:* 512 Channels

*Efficiency:* 26.17%

*Analysis:* Relative Region-Of-Interest

*Original:* 3,038 + 9.8969 * Chn + -0.00059 * Chn **2.

*Spectrum Calibration:* 3,038 + 9.9583 * Chn + -0.00059 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\U6299LD.SPC**

***Background File:*** **C:\USER\ALPHA\BKGND\B4070660.SPC**

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

## Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 137.90 | 125 | 141 | 4.00 | 7.00 | 48.00 | 0.30 | 47.70 | 0.74 |
| 2 | 117.21 | 95 | 124 | 8.00 | 141.00 | 1,233.00 | 0.60 | 1232.40 | 19.24 |
| 3 | 176.25 | 155 | 182 | 8.00 | 116.00 | 1,161.00 | 1.50 | 1159.50 | 18.10 |
| Tracer | 232.36 | 215 | 241 | 8.00 | 123.00 | 1,216.00 | 3.00 | 1213.00 | 18.94 |

## Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 39.18 | 0.168 | n/a | 28.48 % |
| 2 | U-238 | 4197.00 | 78.56 | 4.334 | n/a | 5.58 % |
| 3 | U-234 | 4774.80 | 78.00 | 4.077 | n/a | 5.76 % |
| Tracer | U-232 | 5320.00 | 77.47 | 4.265 | n/a | 5.62 % |

## Totals

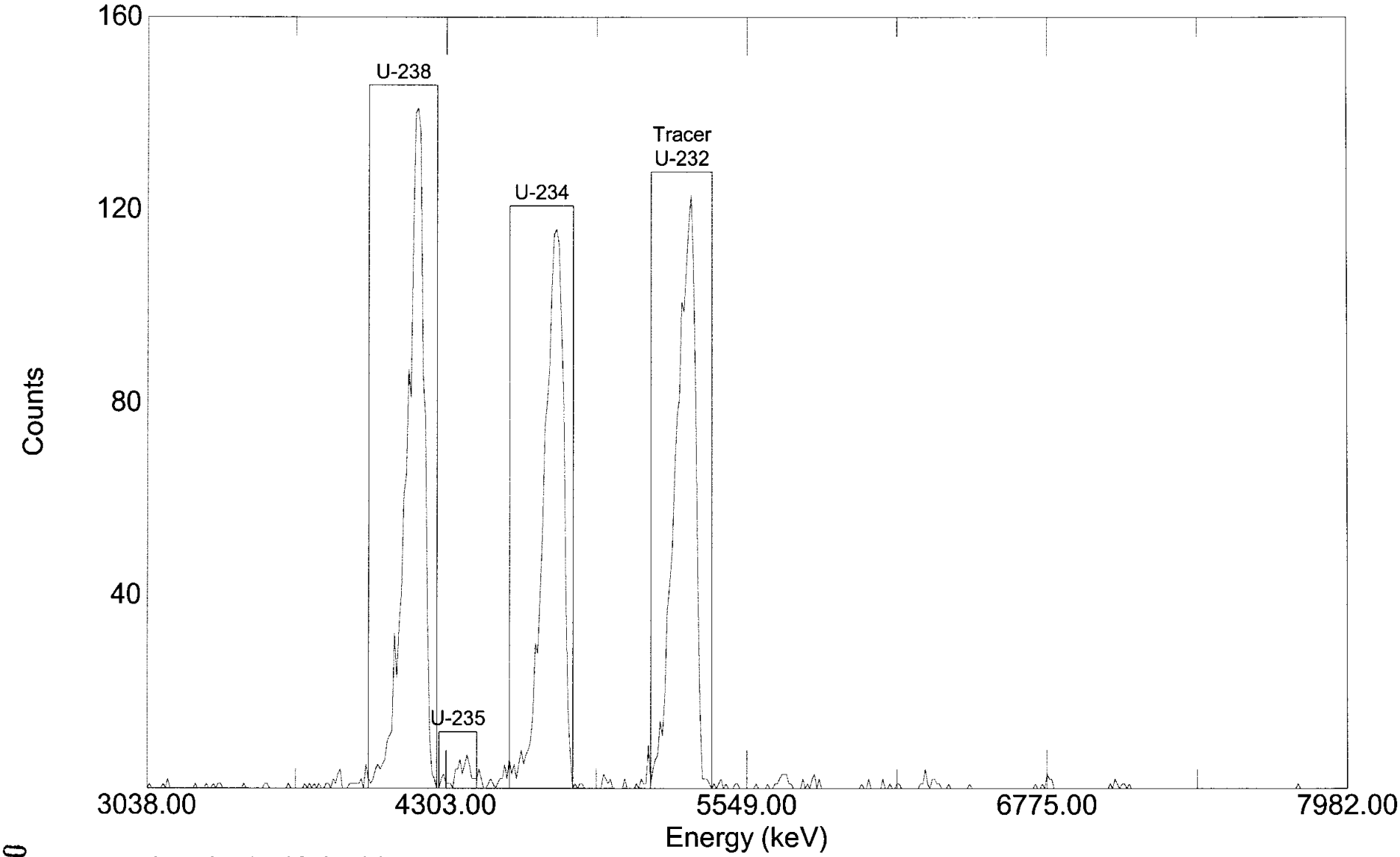
| | | % Total |
|---|---|---|
| Gross Count: | 3,822.00 | 100.00 |
| Net Area: | 3,749.10 | 98.09 |
| Background: | 72.90 | 1.91 |
| Composite Fit: | 3,658.00 | 95.71 |
| Residuals: | 164.00 | 4.29 |

Analyzed By: Sm

Checked By: SD

000154

**U6299LD** AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 13:07:00 on 08-Jul-2004 Real Time: 18001.34 s. Live Time: 18000.00 s.
File: C:\User\Alpha\ALPHA\U6299LD.SPC Detector: #60 MCB 8 Input 4
Sample: AS040629-9LCSD UAS040629-9 Type: Uranium Default

000155

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/17/04 3:18:23 PM
Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** AS040712-5MB UAS040712-5

**Analysis Type:** Uranium Default

*Detector:* MCB 2 Input 8

*Date/Time of Count:* 7/16/04 1:05:34 PM

*Sample Volume:* 0.100 Total, 0.100 Aliquot.

*Live Time:* **1,000.00 Minutes**

***Chem. Yield:*** **89.72%**

*Real Time:* 1,000.03 Minutes

*Total Eff.:* 26.10 %

*Dead Time:* 0.0 %

*Tracer Amount:* 18.932 DPM.

*Acquisition:* 512 Channels

*Efficiency:* 29.09%

*Analysis:* Relative Region-Of-Interest

*Original:* 3,021 + 9.9602 * Chn + -0.00048 * Chn **2.

*Spectrum Calibration:* 3,021 + 9.9787 * Chn + -0.00048 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\U7125B.SPC**

***Background File:*** **C:\USER\ALPHA\BKGND\B4071016.SPC**

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

## Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 139.10 | 119 | 136 | 4.00 | 1.00 | 2.00 | 1.00 | 1.00 | 0.00 |
| 2 | 118.50 | 95 | 118 | 2.00 | 3.00 | 11.00 | 4.00 | 7.00 | 0.03 |
| 3 | 177.24 | 156 | 183 | 2.00 | 2.00 | 13.00 | 4.00 | 9.00 | 0.03 |
| Tracer | 232.97 | 212 | 239 | 6.00 | 585.00 | 4,954.00 | 13.00 | 4941.00 | 18.93 |

## Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 39.38 | 0.017 | n/a | 339.48 % |
| 2 | U-238 | 4197.00 | 19.73 | 0.121 | n/a | 108.44 % |
| 3 | U-234 | 4774.80 | 19.62 | 0.155 | n/a | 89.79 % |
| Tracer | U-232 | 5320.00 | 58.53 | 85.279 | n/a | 2.78 % |

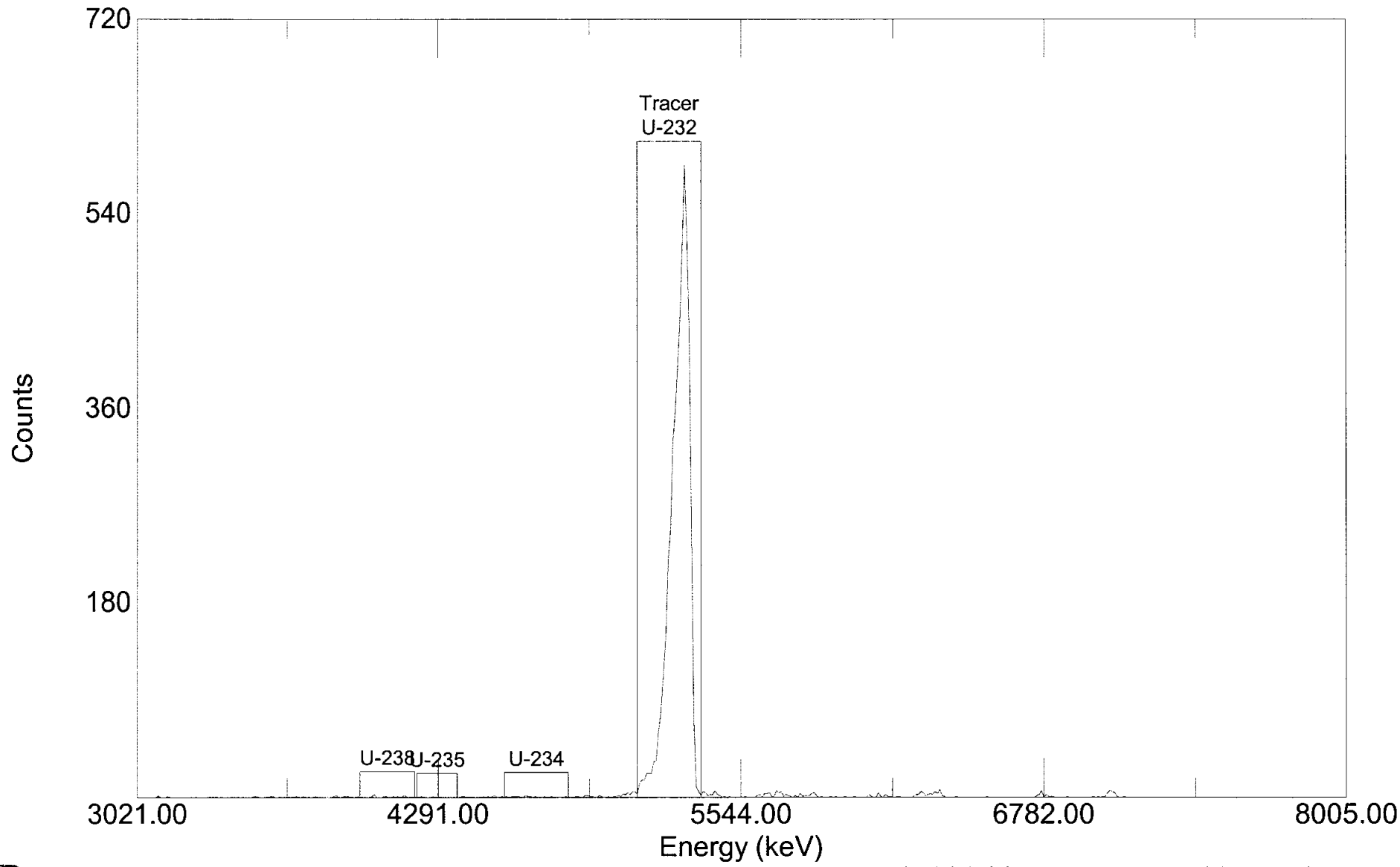
## Totals

| | | % Total |
|---|---|---|
| Gross Count: | 5,274.00 | 100.00 |
| Net Area: | 5,016.00 | 95.11 |
| Background: | 258.00 | 4.89 |
| Composite Fit: | 4,980.00 | 94.43 |
| Residuals: | 294.00 | 5.57 |

Analyzed By: JP

Checked By: Sm

U7125B AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 13:05:34 on 16-Jul-2004
File: C:\User\Alpha\ALPHA\U7125B.SPC
Sample: AS040712-5MB UAS040712-5

Real Time: 60001.98 s. Live Time: 60000.00 s.
Detector: #16 MCB 2 Input 8
Type: Uranium Default

000157

# Paragon Analytics
## Alpha Spectroscopy Analysis

Report Printed:
7/17/04 3:19:18 PM
Para0327.rpt
rev 11/13/03 KVG

**Sample Name:** AS040712-5LCS UAS040712-5

**Analysis Type:** Uranium Default

*Detector:* MCB 2 Input 5

*Date/Time of Count:* 7/16/04 1:06:28 PM

*Sample Volume:* 0.100 Total, 0.100 Aliquot.

*Live Time:* **300.00 Minutes**

***Chem. Yield:*** **92.99%**

*Real Time:* 300.01 Minutes

*Total Eff.:* 29.20 %

*Dead Time:* 0.0 %

*Tracer Amount:* 18.932 DPM.

*Acquisition:* 512 Channels

*Efficiency:* 31.40%

*Analysis:* Relative Region-Of-Interest

*Original:* 3,018 + 10.1302 * Chn + -0.00091 * Chn **2.

*Spectrum Calibration:* 3,018 + 10.2028 * Chn + -0.00091 * Chn **2.

*Cal File:*

***Spectrum File:*** **C:\User\Alpha\ALPHA\UR7125L.SPC**

***Background File:*** **C:\USER\ALPHA\BKGND\B4071013.SPC**

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

## Peaks

| Peak | Channel | Start | End | FWHM | Height | Gross Cts | Bkg Cts | Net Area | DPM |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 137.15 | 122 | 140 | 2.00 | 9.00 | 70.00 | 0.30 | 69.70 | 0.80 |
| 2 | 116.79 | 93 | 121 | 4.00 | 188.00 | 1,894.00 | 0.60 | 1893.40 | 21.62 |
| 3 | 174.93 | 152 | 180 | 6.00 | 173.00 | 1,683.00 | 3.30 | 1679.70 | 19.18 |
| Tracer | 230.37 | 208 | 237 | 8.00 | 168.00 | 1,667.00 | 8.70 | 1658.30 | 18.93 |

## Analysis Results

| Peak | Nuclide | Energy (keV) | Width (keV) | Aliquot pCi | MDA pCi | % Error |
|---|---|---|---|---|---|---|
| 1 | U-235 | 4400.00 | 19.91 | 3.584 | n/a | 23.53 % |
| 2 | U-238 | 4197.00 | 39.96 | 97.367 | n/a | 4.51 % |
| 3 | U-234 | 4774.80 | 59.31 | 86.378 | n/a | 4.79 % |
| Tracer | U-232 | 5320.00 | 78.28 | 85.277 | n/a | 4.80 % |

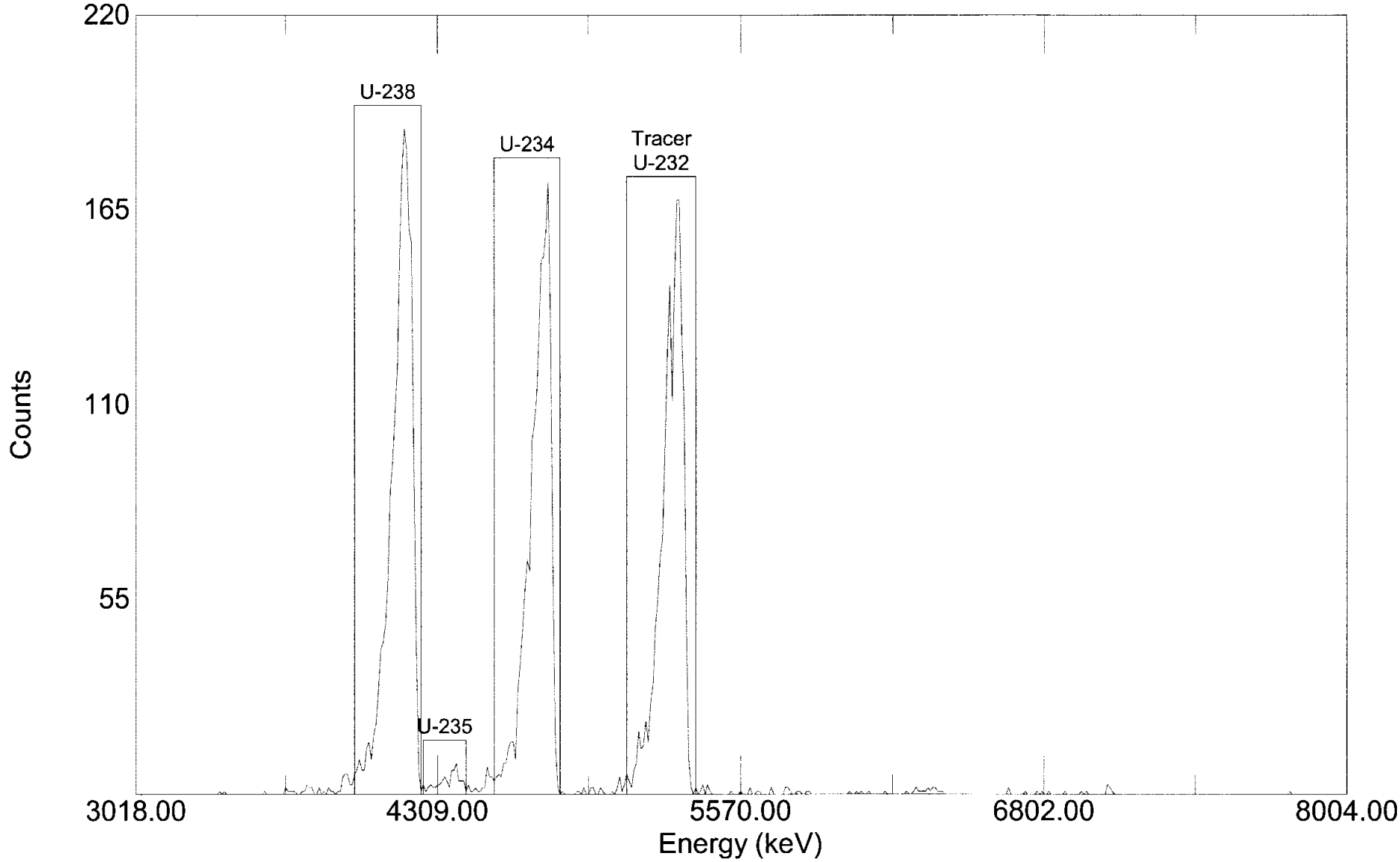
## Totals

| | | % Total |
|---|---|---|
| Gross Count: | 5,483.00 | 100.00 |
| Net Area: | 5,393.60 | 98.37 |
| Background: | 89.40 | 1.63 |
| Composite Fit: | 5,314.00 | 96.92 |
| Residuals: | 169.00 | 3.08 |

Analyzed By: JP

Checked By: Sm

**UR7125L** AlphaVision Relative Region-Of-Interest (Slope Recalibration)




Acquired: 13:06:28 on 16-Jul-2004 Real Time: 18000.86 s. Live Time: 18000.00 s.
File: C:\User\Alpha\ALPHA\UR7125L.SPC Detector: #13 MCB 2 Input 5
Sample: AS040712-5LCS UAS040712-5 Type: Uranium Default

# Paragon Analytics

## Alpha Spectrometer Instrument Run Log

Date: 7/8/04

FORM 746r6.xls (11/8/2000) 279213

| Detector | Batch ID | Sample ID | Iso/Matrix | Duration | Initial | File ID/Comm. |
|---|---|---|---|---|---|---|
| 63 | AS040629-9 | 0405097-1 | u/s | 420 | SD | U50971 |
| 64 | ↓ | ↓ 4 | ↓ | 300 | ↓ | ↓ 4 |
| 9 | | 5 | | | | 5 |
| 10 | | 5D. | | | | 5D |
| 11 | | 6 | | | | 6 |
| 12 | | 7 | | | | 7 |
| 13 | | 8 | | | | 8 |
| 15 | | 9 | | | | 9 |
| 16 | | 10 | | | | 10 |
| 17 | | 11 | | | | 11 |
| 18 | | 12 | | | | 12 |
| 19 | | 13 | | | | 13 |
| 21 | | 14 | | | | 14 |
| 22 | | 15 | | | | 15 |
| 42 | | 16 | | | | 16 |
| 43 | | 18 | | | | 18 |
| 44 | | 20 | | | | 20 |
| 45 | | 26 | | | | 26 |
| 46 | | 27 | | | | 27 |
| 47 | | 0405228-1 | | | | UX52281 |
| 48 | | ↓ 1D | | | | ↓ 1D |
| 57 | | 0406020-4 | | | | UX60204 |
| 58 | | AS040629-9MB | | 420 | | U62998 |
| 59 | | ↓ LCS | | 300 | | ↓ L |
| 60 | | ↓ LCSD | | ↓ | | ↓ LD |

| Detector | Batch ID | Sample ID | Iso/Matrix | Duration | Initial | File ID/Comm. |
|---|---|---|---|---|---|---|
| 61 | 64190 | 0419010-1 | u/v | 300 | SD | U19010 1 |
| 62 | 276537 | ↓ 2 | ↓ | ↓ | ↓ | ↓ 2 |
| 64 | ↓ | ↓ 3 | ↓ | | | ↓ 3 |
| 49 | AS040629-3 | 0406069-6 | Pu/S | | SD | P60696 |
| 50 | ↓ | 7 | ↓ | | ↓ | 7 |
| 51 | | 7D | | | | 7D |
| 52 | | 8 | | | | 8 |
| 53 | | 9 | | | | 9 |
| 54 | | 10 | | | | 10 |
| 56 | | 11 | | | | 11 |
| 25 | | 12 | | | | 12 |
| 26 | | ↓ 13 | | | | ↓ 13 |
| 27 | ↓ | AS040629-3MB | ↓ | ↓ | ↓ | P62913 |
| 28 | AS040621-1 | 0405054-40 | Am/F | 1000 | SD | AS05440 |
| 55 | ↓ | AS040621-1MCS | ↓ | ↓ | ↓ | A6211MC |
| 29 | AS040623-6 | 0405054-13 | | | | AS05413 |
| 30 | ↓ | 15 | ↓ | ↓ | ↓ | 15 |
| 31 | | 19 | | | | 19 |
| 32 | | 23 | | | | 23 |
| 33 | | 24 | | | | 24 |
| 34 | | 25 | | | | 25 |
| 35 | | 26 | | | | 26 |
| 37 | | 27 | | | | 27 |
| 38 | | ↓ 28 | ↓ | ↓ | ↓ | ↓ 28 |
| 36 | ↓ | AS040623-6PLCSD | ↓ | ↓ | ↓ | A6236PLD |

Notes:

cont'd from page 279212
Cont'd to page 279214

Reviewed by: Sm
Date: 7-9-04

# Paragon Analytics

## Alpha Spectrometer Instrument Run Log

FORM 746r6.xls (11/8/2000) 279215

Date: 7-9-04

| Detector | Batch ID | Sample ID | Iso/Matrix | Duration | Initial | File ID/Comm. |
|---|---|---|---|---|---|---|
| 1 | AS040630-2 | 0406120-1 -4 | P/S | 300 | Sm | P61204 |
| 2 | | -2 6 | | | | 6 |
| 3 | | -3 7 | | | | 7 |
| 5 | | -3D 8 | | | | 8 |
| 7 | | -4 9 | | | | 9 |
| 8 | | -6 10 | | | | 10 |
| 49 | | -7 11 | | | | 11 |
| 50 | | -8 12 | | | | 12 |
| 51 | | -9 13 | | | | 13 |
| 52 | | -10 13D | | | | 13D |
| 53 | | AS040630-2MB 1 | | | | P6302B |
| 54 | | 2LCS 2 | | | | L |
| 56 | AS040630-3 | 0406121-1 | P/S | 300 | | P61211 |
| 25 | | -2 | | | | 2 |
| 26 | | -3 | | | | 3 |
| 27 | | -4 | | | | 4 |
| 28 | | -6 | | | | 6 |
| 29 | | -7 | | | | 7 |
| 31 | | -8 | | | | 8 |
| 32 | | -8D | | | | 8D |
| 33 | | -9 | | | | 9 |
| 34 | | -10 | | | | 10 |
| 35 | | -11 | | | | 11 |
| 37 | | AS040630-3MB | | | | P6303B |

Sm 7/9/04

| Detector | Batch ID | Sample ID | Iso/Matrix | Duration | Initial | File ID/Comm. |
|---|---|---|---|---|---|---|
| 38 | AS040630-3 | AS040630-3LCS | P/S | 300 | Sm | P6303L |
| 11 | 276539 | 0419013-1 | U/W | 300 | | UR190131 |
| 13 | | -2 | | | | 2 |
| 15 | AS040629-7 | 0405097-2 | U/S | | | US0972 |
| 16 | | -2D | | | | 2D |
| 17 | | -3 | | | | 3 |
| 18 | | -17 | | | | 17 |
| 19 | | -19 | | | | 19 |
| 21 | | -21 | | | | 21 |
| 22 | | -22 | | | | 22 |
| 23 | | -23 | | | | 23 |
| 24 | | -23D | | | | 23D |
| 42 | | -24 | | | | 24 |
| 43 | | -25 | | | | 25 |
| 44 | | -28 | | | | 28 |
| 45 | | -29 | | | | 29 |
| 46 | | -30 | | | | 30 |
| 47 | | AS040629-7MB | | | | U6297B |
| 63 | | -7LCS | | | | L |
| 48 | AS040629-10 | 0405097-1 | Th/S | | | T50971 |
| 57 | | -4 | | | | 4 |
| 58 | | -5 | | | | 5 |
| 59 | | -6 | | | | 6 |
| 60 | | -7 | | | | 7 |

Notes: Cont on page 279216 Sm 7/9/04

Reviewed by: Sm

Date: 7/9/04

000161

# Paragon Analytics

FORM 746r6.xls (11/8/2000) 279216 Alpha Spectrometer Instrument Run Log Date: 7-9-04

| Detector | Batch ID | Sample ID | Iso/Matrix | Duration | Initial | File ID/Comm. |
|---|---|---|---|---|---|---|
| 61 | AS040629-10 | 0405097-7D | Th/S | 300 | Sm | T50977D |
| 62 | ↓ | ↓ -8 | ↓ | ↓ | ↓ | ↓ 8 |
| 11 | AS040629-7 | 0405097-3 | U/S | 300 | Sm | UR50973 |
| 13 | ↓ | ↓ -19 | ↓ | ↓ | ↓ | ↓ 19 |
| 15 | | -21 | | | | 21 |
| 16 | | -25 | | | | 25 |
| 17 | ↓ | ↓ -29 | ↓ | ↓ | ↓ | ↓ 29 |
| 18 | AS040629-10 | 0405097-7 | Th/S | 300 | | TR50977 |
| 19 | ↓ | ↓ -10 | ↓ | ↓ | ↓ | T509710 |
| 21 | | -11 | | | | 1 |
| 22 | | -12 | | | | 2 |
| 23 | | -13 | | | | 3 |
| 24 | | -14 | | | | 4 |
| 42 | | -15 | | | | 5 |
| 43 | | -16 | | | | 6 |
| 44 | | -16D | | | | 6D |
| 45 | | -18 | | | | 8 |
| 46 | | -20 | | | | 20 |
| 47 | | -26 | | | | 26 |
| 57 | | ↓ -27 | | | | ↓ 27 |
| 58 | | AS040629-10MB Sm 7/9/04 | | | | T62910B |
| 59 | ↓ | ↓ -10LCS | ↓ | ↓ | | ↓ L |
| 48 | AS040623-5 | AS040623-5MLCS | U/F | 785 | ↓ | UR6235ML |
| | | | | | | Sm 7/9/04 |

| Detector | Batch ID | Sample ID | Iso/Matrix | Duration | Initial | File ID/Comm. |
|---|---|---|---|---|---|---|
| 61 | AS040707-1 | 0406215-1 | U/W | 300 | Sm | U62151 |
| 62 | ↓ | ↓ 2 | ↓ | ↓ | ↓ | ↓ 2 |
| 63 | | 4 | | | | 4 |
| 64 | ↓ | ↓ 5 | ↓ | ↓ | | ↓ 5 |
| 1 | AS040623-6 | 0405054-26 | Am/F | 805 | | AR505426 |
| 23 | ↓ | ↓ -32 | ↓ | ↓ | | A505432 |
| 34 Sm 7/9/04 | | 34 | | | | 34 |
| 57 | | 35 | | | | 35 |
| 78 | | 36 | | ↓ | | 36 |
| ~~48~~ | | 37 | | 805 | | 37 |
| 50 | ↓ | AS040623-6PLCS | | 805 | | A6236PL |
| 49 | ↓ | ↓ -6MMB | ↓ | ↓ | | ↓ MB |
| 34 | AS040623-5 | 0405054-41 | | 800 | | A505441 |
| 35 | ↓ | ↓ 42 | ↓ | ↓ | | ↓ 2 |
| 37 | | 43 | | | | 3 |
| 38 | ↓ | ↓ 44 | ↓ | ↓ | | ↓ 4 |
| 51 | AS040623-5 | 0405054-41 | Pu/F | 795 | | P505441 |
| 52 | ↓ | ↓ 42 | ↓ | ↓ | | ↓ 42 |
| 53 | | 43 | | | | 43 |
| 54 | | 44 | | | | 44 |
| 56 | | 45 | | | | 45 |
| 25 | | 46 | | | | 46 |
| 27 | | 47 | | | | 47 |
| 28 | ↓ | ↓ 48 | ↓ | ↓ | ↓ | ↓ 48 |

Notes: Cont from page 279215 Sm 7/9/04
Cont on page 279217 Sm 7/9/04

Reviewed by: Sm
Date: 7-11-04

000162

# Paragon Analytics

FORM 746r6.xls (11/8/2000) 279218 Alpha Spectrometer Instrument Run Log Date: 7-11-04

| Detector | Batch ID | Sample ID | Iso/Matrix | Duration | Initial | File ID/Comm. |
|---|---|---|---|---|---|---|
| 9 | AS040629-1 | 0406175-1 | U/S | 300 | Sm | UC61751 |
| 10 | | -2 | | | | 2 |
| 11 | | -3 | | | | 3 |
| 12 | | -4 | | | | 4 |
| 13 | | -4D | | | | 4D |
| 15 | | -5 | | | | 5 |
| 16 | | -6 | | | | 6 |
| 17 | | -7 | | | | 7 |
| 18 | | -8 | | | | 8 |
| 19 | | -9 | | | | 9 |
| 21 | | -9D | | | | 9D |
| 22 | | -10 | | | | 10 |
| 23 | | -11 | | | | 11 |
| 24 | | -12 | | | | 12 |
| 42 | | -13 | | | | 13 |
| 43 | | AS040629-1MB | | | | UC6291B |
| 44 | | -1LCS | | | | L |
| 48 | 276541 | 0419015-1 | W/W | 300 | Sm | U190151 |
| 58 | | -2 | | | | 2 |
| 59 | | -3 | | | | 3 |
| 61 | | -4 | | | | 4 |
| 62 | AS040629-7 | 0405097-23D | U/S | | Sm | UR509723D |
| 64 | AS040707-1 | 0406215-6 | U/W | | Sm | U62156 |
| 63 | | -7 | | | | 7 |

| Detector | Batch ID | Sample ID | Iso/Matrix | Duration | Initial | File ID/Comm. |
|---|---|---|---|---|---|---|
| 1 | AS040707-5 | 040616-3 | Pu/S | 300 | Sm | P61613 |
| 2 | | -3D | | | | 3D |
| 3 | | -4 | | | | 4 |
| 5 | | -5 | | | | 5 |
| 7 | | -7 | | | | 7 |
| 8 | | -8 | | | | 8 |
| 49 | | -9 | | | | 9 |
| 50 | | -10 | | | | 10 |
| 51 | | -11 | | | | 11 |
| 52 | | AS040707-5MB | | | | P7075B |
| 53 | | -5LCS | | | | L |
| 54 | AS040623-5 | 0405054-42 | Am/F | 1000 | Sm | AR505442 |
| 56 | | -45 | | | | AS05445 |
| 25 | | -46 | | | | 46 |
| 26 | | -47 | | | | 47 |
| 27 | | -48 | | | | 48 |
| 28 | | -49 | | | | 49 |
| 29 | | -50 | | | | 50 |
| 30 | | AS040623-5MMB | | | | A623SMB |
| 31 | | -5MLCS | | | | ML |
| 32 | | -5PMB | | | | PB |
| 55 | | -5PLCS | | | | PL |
| 36 | | -5PLCSD | | | | PLD |

Sm 7-11-04

Notes: Cont. on page 279219 Sm 7/11/04

Reviewed by: Sm
Date: 7-12-04

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

279228

# Paragon Analytics

## Alpha Spectrometer Instrument Run Log

Date: 7/16/04

| Detector | Batch ID | Sample ID | Iso/Matrix | Duration | Initial | File ID/Comm. |
|---|---|---|---|---|---|---|
| SD 7/16/04 ~~9~~ | ~~AS040712-2~~ | ~~0406246-2~~ | | | | |
| 9 | AS040712-2 | 0406246-2 | U/W | 300 | SD | UR62462 |
| 10 | AS040712-5 | 0405097-1 | U/S | | | UX50971 |
| 11 | | 20 | | | | 20 |
| 12 | | 20D | | | | 20D |
| 13 | | 26 | | | | 26 |
| 15 | | 27 | | | | 27 |
| 16 | | AS040712-5MB | | 1000 | | UX7125B |
| 17 | | LCS | | 300 | | L |
| 18 | AS040629-10 | AS040629-10MB | Th/S | 780 | SD | TR62910B |
| 19 | AS040629-1 | 0406175-3 | U/S | 300 | SD | UZ61753 |
| 21 | AS040712-1 | 0406206-1 | Th/W | | SD | T62061 |
| 22 | | 2 | | | | 2 |
| 23 | | 3 | | | | 3 |
| 24 | | 0406213-2 | | | | T62132 |
| 42 | | 0406218-1 | | | | T62181 |
| 43 | | 2 | | | | 2 |
| 44 | | 3 | | | | 3 |
| 45 | | 4 | | | | 4 |
| 46 | | 5 | | | | 5 |
| 47 | | 6 | | | | 6 |
| 48 | | 6D | | | | 6D |
| 57 | | 7 | | | | 7 |
| 58 | | 8 | | | | 8 |

| Detector | Batch ID | Sample ID | Iso/Matrix | Duration | Initial | File ID/Comm. |
|---|---|---|---|---|---|---|
| 59 | AS040712-1 | 0406221-2 | Th/W | 300 | SD | T62212 |
| 61 | | 0406245-1 | | | | T62451 |
| 62 | | 2 | | | | 2 |
| 63 | | 2D | | | | 2D |
| 64 | | 3 | | | | 3 |
| 1 | AS040712-3 | 0406206-1 | Pu/W | | SD | P62061 |
| 2 | | 2 | | | | 2 |
| 3 | | 3 | | | | 3 |
| 4 | | 3D | | | | 3D |
| 5 | | 0406218-1 | | | | P62181 |
| 7 | | 2 | | | | 2 |
| 8 | | 3 | | | | 3 |
| 49 | | 4 | | | | 4 |
| 50 | | 5 | | | | 5 |
| 51 | | 6 | | | | 6 |
| 52 | | 7 | | | | 7 |
| 53 | | 8 | | | | 8 |
| 54 | | 0406225-1 | | | | P62251 |
| 56 | | 0406245-1 | | | | P62451 |
| 25 | | 2 | | | | 2 |
| 26 | | 3 | | | | 3 |
| 27 | | 5 | | | | 5 |
| 28 | | 6 | | | | 6 |
| 29 | | 6D | | | | 6D |

Notes:

Cont'd to Pg 279229

Reviewed by: JP

Date: 7/17/04

# Paragon Analytics

FORM 746r6.xls (11/8/2000) 279229

## Alpha Spectrometer Instrument Run Log

Date: 7/16/04

| Detector | Batch ID | Sample ID | Iso/Matrix | Duration | Initial | File ID/Comm. |
|---|---|---|---|---|---|---|
| 30 | AS040712-3 | AS040712-3MB | Pu/W | 300 | SD | P7123B |
| 31 | ↓ | ↓ LCS | ↓ | ↓ | ↓ | ↓ L |
| 32 | ↓ | ↓ LCSD | ↓ | ↓ | ↓ | ↓ LD |
| 9 | 276545 | 0419020-1 | Th/V | 300 | SD | T190201 |
| 10 | ↓ | ↓ 2 | ↓ | ↓ | ↓ | ↓ 2 |
| 11 | | ↓ 3 | ↓ | ↓ | ↓ | ↓ 3 |
| 12 | ↓ | ↓ 4 | ↓ | ↓ | ↓ | ↓ 4 |
| 13 | AS040712-5 | AS040712-5LCS | U/S | 300 | SD | UR7125L |
| 21 | AS040712-1 | 0406245-5 | Th/W | 300 | SD | T62455 |
| 22 | ↓ | ↓ 6 | ↓ | ↓ | ↓ | ↓ 6 |
| 23 | ↓ | 0406246-2 | ↓ | ↓ | ↓ | T62462 |
| 24 | ↓ | 0406252-2 | ↓ | ↓ | ↓ | T62522 |
| 42 | ↓ | AS040712-1MB | ↓ | ↓ | ↓ | T7121B |
| 43 | ↓ | ↓ LCS | ↓ | ↓ | ↓ | ↓ L |
| 44 | ↓ | ↓ LCSD | ↓ | ↓ | ↓ | ↓ LD |
| ~~1~~ | ~~AS040712-3~~ | SD 7/16/04 | | | | |
| 1 | AS040712-3 | 0406218-2 | Pu/W | 300 | SD | PR62182 |
| | | | | | | JD 7/17/04 |

| Detector | Batch ID | Sample ID | Iso/Matrix | Duration | Initial | File ID/Comm. |
|---|---|---|---|---|---|---|
| | | | | | | JD 7/17/04 |

Notes: cont'd from pg 279228

Reviewed by: JD
Date: 7/17/04

000165

PARAGON ANALYTICS
Radiochemistry Data Package

Section 5

# QUALITY ASSURANCE SUMMARY REPORTS

5

NCR # 005794

# CONTROLLED

## NON-CONFORMANCE REPORT

*Paragon Analytics*

Initiated by Sm Date 7-10-04 Method/Procedure Iso-U

Reason: X Non-Conformance Work Orders Affected 0405097

___ Client Inquiry AS040629-9

___ Other _____ Clients Kent and Sullivan Inc.

**SECTION I** TYPE OF EVENT (circle as appropriate)

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

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

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

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

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

___ 6. Equipment Failure or Laboratory Incident / Error

___ 7. Other _____

Explanation: Sample 0405097-20 Chemical yield is 10.49% which is below the lower control limit of 15%.* All other QC parameters meet requirements. If re-prep required, suggest a reduced aliquot due to increased uranium activity. Low recovery due to native activity in the sample. ~~*Tracer counts < 400 counts at 183.60~~ Sm 7/10/04

Actions to Prevent Recurrence (Retrain, etc.): * Please add #1, #26, #27 and prep as directed below except at 0.1g equivalent. (See comments above and below) SD 7/13/04

**SECTION II** NOTIFICATION

**Client Contacted?** ( Y / N ) Name: Sue Kent Date: 7/12/04 Time: 12:40

**SECTION III** CORRECTIVE ACTIONS

✓ 1. Submit for Re-Prep. or Clean-up

___ 2. Re-analyze see below #20

___ 3. Resubmit Data ( hc, edd, narrative )

___ 4. Document in Narrative

___ 5. Other _____

Approved by: DB DPM [illegible] PM

**SECTION IV** REQUEST FOR REWORK

Initial Batch ID: AS040629-9 Date: 6-29-04

Reworked Batch ID: AS040712-5 Date: 7-12-04

Outcome: Samples passed all QC parameters. Spectral quality was improved and is adequate for accurate quantification.

Approved by: RG 7/22/04

Matrix Effect or Elevated / Sample Activity Suspected? (circle applicable)

**SECTION V** DISPOSITION **Use as is** **Repair** **Reject**

**SECTION VI** COMMENTS Re X; digest 1g, take a 0.05g equivalent from digestate before spiking/tracing. DCB Report the results for the samples listed in section I. from the second batch - AS040712-5. RG 7/22/04

**SECTION VII** APPROVAL SIGNATURES

Project Manager (PM) [signature] Date 7/12/04

Department Manager (DPM) [signature] Date 7/22/04 (Verification of Disposition)

QA Manager [signature] Date 7/22/04

**SECTION VIII** DISTRIBUTION DJF PM RG Dept. Manager KK Lab Director ____ Rpt.Group or ✓ Rad

DCB

FORM 313r14.doc (3/8/04)

000167

*Paragon Analytics, Inc.*

# QUALITY ASSURANCE SUMMARY SHEET

PAI W.O. # / BATCH AS040629-10,-9
TEST Th-ISO
METHOD Prep
SOP/REV (PREP) 7/7/7
SOP/REV (ANAL)

270494

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.

TC 7/6/04

The following applies to work orders 0405097, 0405228, and 0406020 for U-ISO and/or Th-ISO analysis:

TC 7/6/04

1. Due to possible alpha activity a reduced aliquot of approximately 1g was taken for all samples in work order 0405097.

TC 7/6/04

2. 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 or a nitrate column.

TC 7/6/04

TC 7/6/04

TECHNICIAN/ANALYST T. Elbrant DATE 7/6/04

DEPARTMENT MANAGER [signature] DATE 7/6/04

FORM 302r5.FRM (04/30/01)

**Paragon Analytics**

# QUALITY ASSURANCE SUMMARY SHEET

PAI W.O. # / BATCH 0405097/GS040611-1
TEST γ
METHOD prep
SOP/REV (PREP) 739 r8
SOP/REV (ANAL)

277615

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.

The samples were digested per SOP 773r8 without the addition of boric acid in step 8.3.10 to prevent interferences with any other tests (such as Pb-210). The samples were brought to 1L with DI water and packed as a Geo1. After gamma analysis the samples will be used to aliquot for other analyses.

6/16/04

TECHNICIAN/ANALYST [signature] DATE 6/16/04

DEPARTMENT MANAGER [signature] DATE 6/16/04

FORM 302r6.doc (4/22/04)

*Paragon Analytics*

# QUALITY ASSURANCE SUMMARY SHEET

277627

PAI W.O. # / BATCH 0405097/AS040629-7,8
TEST U-ISO, Th-ISO
METHOD Prep
SOP/REV (PREP) 778/9, 777/7
SOP/REV (ANAL) _____

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

TA 7/3/04

The following applies to batches AS040629-7 and AS040629-8 for the analysis of Th-ISO and U-ISO.

1. Aliquots for the samples were taken from gamma fraction digestates (See QASS 277615). Aliquot sizes from the digestates were determined by the activity seen in the gamma analysis data. Actual aliquot sizes were entered onto the benchsheet using the following equation:

   TA 7/3/04 TA 7/3/04

   $$\text{Sample Size (x)} = \frac{\text{(Original Sample weight) * (Digestate taken for analysis)}}{\text{(Total volume of digestate)}}$$

2. A consistent 20-25 mL of ammonium hydroxide was used per sample in order to form the ferric hydroxide precipitate prior to running a chloride column.

TA 7/3/04

TA 7/3/04

TECHNICIAN/ANALYST Z Elhart DATE 7/3/04

DEPARTMENT MANAGER Joh Petro DATE 7/3/04

FORM 302r6.doc (4/22/04)

*Paragon Analytics*

# QUALITY ASSURANCE SUMMARY SHEET

PAI W.O. # / BATCH AS040712-5
TEST U-iso
METHOD Prep
SOP/REV (PREP) 7/8/9
SOP/REV (ANAL)

277650

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.

TE 7/15/04

1. Per NCR 005794, a common digestion was performed on samples 0405097-1, 20, 26, and 27 in order to target aliquots of .05g and .1g. Sample aliquots were entered onto the benchsheet using the following equation:

TE 7/15/04

$$\text{Sample Size (x)} = \frac{\text{(Original Sample weight) * (Digestate taken for analysis)}}{\text{(Total weight of digestate)}}$$

TE 7/15/04

2. A consistent 20-25 mL of ammonium hydroxide was used per sample in order to form the ferric hydroxide precipitate prior to running a chloride column.

TE 7/15/04

TE 7/15/04

TECHNICIAN/ANALYST T Elhart DATE 7/15/04

DEPARTMENT MANAGER Chroncarz DATE 7/15/04

FORM 302r6.doc (4/22/04) 000171

PARAGON ANALYTICS
Radiochemistry Data Package

Section 6

# LABORATORY BENCH SHEETS

6

# Radiochemistry Instrument Worksheet

**Paragon Analytics**

**Prep Batch: AS040629-7**

**Prep Procedure:** UISO

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 | 0405097-2 | SMP | 0.14096 | 0.14096 | g | _50972 | 15 | Sm | _50972 | | | _50972 | | | Sm 7/22/04 |
| 1 | 0405097-2 | DUP | 0.14096 | 0.14096 | g | _50972D | 16 | | _50972D | | | _50972D | | | |
| 1 | 0405097-3 | SMP | 0.311916 | 0.311916 | g | _50973 | 17 | | UR _50973 ✱ | 11 | Sm | _50973 | ✱ Tracer FWHM >100 KeV Sm 7/9/04 | | |
| 1 | 0405097-17 | SMP | 0.026049 | 0.026049 | g | _509717 | 18 | | _509717 | | | _509717 | | | Sm 7/22/04 |
| 1 | 0405097-19 | SMP | 0.014461 | 0.014461 | g | _509719 | 19 | | UR _509719 ✱ | 13 | Sm | _509719 | ✱ Tracer FWHM > 100 KeV Sm 7/9/04 | | |
| 1 | 0405097-21 | SMP | 0.02075 | 0.02075 | g | _509721 | 20 21 | | UR _509721 ✱ | 15 | ↓ | _509721 | ✱ Tracer FWHM > 100 KeV Sm 7/9/04 | | |
| 1 | 0405097-22 | SMP | 0.070550 | 0.070550 | g | _509722 | 21 22 | | _509722 | | | _509722 | | | Sm 7/22/04 |
| 1 | 0405097-23 | SMP | 0.13243 | 0.13243 | g | _509723 | 22 23 | | _509723 | | | _509723 | | | Sm 7/22/04 |
| 1 | 0405097-23 | DUP | 0.13243 | 0.13243 | g | _509723D | 23 24 | | UR _509723D ▲ | 62 | SD | _509723D | ▲ Peak Shift SD 7/20/04 | | |
| 1 | 0405097-24 | SMP | 0.025104 | 0.025104 | g | _509724 | 24 42 | | _509724 | | | _509724 | | | Sm 7/22/04 |
| 1 | 0405097-25 | SMP | 0.082639 | 0.082639 | g | _509725 | 42 43 | | UR _509725 ✱ | 16 | Sm | _509725 | ✱ Tracer FWHM >100KeV Sm 7/9/04 | | |
| 1 | 0405097-28 | SMP | 0.027446 | 0.027446 | g | _509728 | 43 44 | | _509728 | | | _509728 | | | Sm 7-22-04 |
| 1 | 0405097-29 | SMP | 0.056893 | 0.056893 | g | _509729 | 44 45 | | UR _509729 ✱ | 17 | Sm | _509729 | ✱ Tracer FWHM >100KeV Sm 7/9/04 | | |
| 1 | 0405097-30 | SMP | 0.068805 | 0.068805 | g | _509730 | 45 46 | | _509730 | | | _509730 | | | |
| 1 | AS040629-7 | MB | 0.05 | 0.05 | g | _6297B | 46 47 | | _6297B | | | _6297B | | | |
| 1 | AS040629-7 | LCS | 0.05 | 0.05 | g | _6297L | 47 63 | | _6297L | | | _6297L | | | Sm 7-22-04 |

Sm 7/9/04

**Tracer/Carrier Solution Information**

| Soln # | Nuclide | SolnID | Prep Conc | Units | Prep Date | Aliquot | Units | Pipet ID |
|---|---|---|---|---|---|---|---|---|
| T1 | U-232 | 511.2613.40 | 37.877 | DPM/ml | 06/30/04 | 0.5 | ml | AW004 |

**Spike Solution Information**

| Soln # | Nuclide | SolnID | Prep Conc | Units | Prep Date | Aliquot | Units | Pipet ID |
|---|---|---|---|---|---|---|---|---|
| S1 | U-234 | 597.2382.64 | 38.529 | DPM/ml | 06/30/04 | 0.5 | ml | AW004 |
| S1 | U-235 | 597.2382.64 | 1.841 | DPM/ml | 06/30/04 | 0.5 | ml | AW004 |
| S1 | U-238 | 597.2382.64 | 40.001 | DPM/ml | 06/30/04 | 0.5 | ml | AW004 |

000173



Supersedes: NA

# Radiochemistry Prep Worksheet

**Paragon Analytics**

**Prep Batch: AS040629-7**

**Prep Procedure:** UISO

**Reviewed By:** tde TDE **Review Date:** 7/3/04 7/3/04

**Non-Routine Pre-Treatment?** (Y) / N **Batch:** See QASS 277615 **Re-Prep?** Y / (N) **Batch:** NA **Prep QASS / NCR?** (Y) / N 277615, 277627

**Prep SOP:** PAI 778 **Rev:** 9
**Prep SOP:** NONE
**Matrix Class:** solid

**Prep Analyst:** Tambrae Elhart TE
**Prep Date:** 6/30/04
**Prep Dept:** AP

**Balance:** 10
**Balance:**

| Samp Num | Prep Num | LabID | QC Type | Dish No. | Init Alq g | Fin Alq g | Prep Basis | Total Digestate Vol(ml) | Digestate Vol Taken(ml) | Micro Init | Micro Date | Standards | Prep Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 0405097-2 | SMP | | 0.14096 | 0.14096 | Dry Weight | 1000 | 160 | TE | 7/3/04 | T1 | |
| 2 | 1 | 0405097-2 | DUP | | 0.14096 | 0.14096 | Dry Weight | 1000 | 160 | | | T1 | |
| 3 | 1 | 0405097-3 | SMP | | 0.311916 | 0.311916 | Dry Weight | 1000 | 330 | | | T1 | |
| 4 | 1 | 0405097-17 | SMP | | 0.026049 | 0.026049 | Dry Weight | 1000 | 19 | | | T1 | |
| 5 | 1 | 0405097-19 | SMP | | 0.014461 | 0.014461 | Dry Weight | 1000 | 10 | | | T1 | |
| 6 | 1 | 0405097-21 | SMP | | 0.02075 | 0.02075 | Dry Weight | 1000 | 20 | | | T1 | |
| 7 | 1 | 0405097-22 | SMP | | 0.070550 | 0.070550 | Dry Weight | 1000 | 46 | | | T1 | |
| 8 | 1 | 0405097-23 | SMP | | 0.13243 | 0.13243 | Dry Weight | 1000 | 85 | | | T1 | |
| 9 | 1 | 0405097-23 | DUP | | 0.13243 | 0.13243 | Dry Weight | 1000 | 85 | | | T1 | |
| 10 | 1 | 0405097-24 | SMP | | 0.025104 | 0.025104 | Dry Weight | 1000 | 13 | | | T1 | |
| 11 | 1 | 0405097-25 | SMP | | 0.082639 | 0.082639 | Dry Weight | 1000 | 57 | | | T1 | |
| 12 | 1 | 0405097-28 | SMP | | 0.027446 | 0.027446 | Dry Weight | 1000 | 18 | | | T1 | |
| 13 | 1 | 0405097-29 | SMP | | 0.056893 | 0.056893 | Dry Weight | 1000 | 42 | | | T1 | |
| 14 | 1 | 0405097-30 | SMP | | 0.068805 | 0.068805 | Dry Weight | 1000 | 58 | | | T1 | |
| 15 | 1 | AS040629-7 | MB | | 0.05 | 0.05 | Dry Weight | 1000 | 50 | | | T1 | |
| 16 | 1 | AS040629-7 | LCS | | 0.05 | 0.05 | Dry Weight | 1000 | 50 | | | T1,S1 | |

TE 7/3/04

**Spiked By:** Tambrae Elhart **Date:** 6/30/04
**Witnessed By:** Grace Campagnola **Date:** 6/30/04

**Relinquished By:** TE
**Date:** 7/3/04
**Received By:** Sm
**Date:** 7-6-04

**Tracer/Carrier Solution Information**

| Soln # | Nuclide | SolnID | Prep Conc | Units | Prep Date | Aliquot | Units | Pipet ID |
|---|---|---|---|---|---|---|---|---|
| T1 | U-232 | 511.2613.40 | 37.877 | DPM/ml | 06/30/04 | 0.5 | ml | AW004 |

**Spike Solution Information**

| Soln # | Nuclide | SolnID | Prep Conc | Units | Prep Date | Aliquot | Units | Pipet ID |
|---|---|---|---|---|---|---|---|---|
| S1 | U-234 | 597.2382.64 | 38.529 | DPM/ml | 06/30/04 | 0.5 | ml | AW004 |
| S1 | U-235 | 597.2382.64 | 1.841 | DPM/ml | 06/30/04 | 0.5 | ml | AW004 |
| S1 | U-238 | 597.2382.64 | 40.001 | DPM/ml | 06/30/04 | 0.5 | ml | AW004 |

Comments

Page 1 of 1 UISO Bench Sheet
Date Printed: 7/3/04 12:04
Paragon Analytics
LIMS Version: 5.038A
Supersedes: 6/30/04 11:33

000174

# Radiochemistry Prep Worksheet

**Paragon Analytics**

**Prep Batch: AS040629-7**

**Prep Procedure:** UISO

## 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** 277615, 277626

**Prep SOP:** PAI 778 **Rev:** 9
**Prep SOP:** NONE
**Matrix Class:** solid

**Prep Analyst:** Tambrae Elhart TE
**Prep Date:** ~~6/29/04~~ 6/30/04
**Prep Dept:** AP

**Balance:** 10
**Balance:**

| | Samp Num | Prep Num | LabID | QC Type | Dish No. | Init Alq g | Fin Alq g | Prep Basis | Total Digestate Vol(ml) | Digestate Vol Taken(ml) | Micro Init | Micro Date | Standards | Prep Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25 | 1 | 1 | 0405097-2 | SMP | | 0.140079 | 0.140079 | As Received | 1000 | ~~159~~ 160 | | | T1 | |
| 31 | 2 | 1 | 0405097-2 | DUP | | 0.140079 | 0.140079 | As Received | 1000 | ~~159~~ 160 | | | T1 | |
| 22 | 3 | 1 | 0405097-3 | SMP | | 0.313806 | 0.313806 | As Received | 1000 | ~~032~~ 330 | | | T1 | |
| 23 | 4 | 1 | 0405097-17 | SMP | | 0.026049 | 0.026049 | As Received | 1000 | 19 | | | T1 | |
| 4 | 5 | 1 | 0405097-19 | SMP | | 0.014461 | 0.014461 | As Received | 1000 | 10 | | | T1 | |
| 28 | 6 | 1 | 0405097-21 | SMP | | 0.02075 | 0.02075 | As Received | 1000 | 20 | | | T1 | |
| 2 | 7 | 1 | 0405097-22 | SMP | | 0.070550 | 0.070550 | As Received | 1000 | 46 | | | T1 | |
| 9 | 8 | 1 | 0405097-23 | SMP | | 0.098243 | 0.098243 | As Received | 1000 | 85 | | | T1 | |
| 29 | 9 | 1 | 0405097-23 | DUP | | 0.098243 | 0.098243 | As Received | 1000 | 85 | | | T1 | |
| 30 | 10 | 1 | 0405097-24 | SMP | | 0.025104 | 0.025104 | As Received | 1000 | 13 | | | T1 | |
| 21 | 11 | 1 | 0405097-25 | SMP | | 0.082639 | 0.082639 | As Received | 1000 | 57 | | | T1 | |
| 24 | 12 | 1 | 0405097-28 | SMP | | 0.027446 | 0.027446 | As Received | 1000 | 18 | | | T1 | |
| 6 | 13 | 1 | 0405097-29 | SMP | | 0.056893 | 0.056893 | As Received | 1000 | 42 | | | T1 | |
| 33 | 14 | 1 | 0405097-30 | SMP | | 0.068805 | 0.068805 | As Received | 1000 | 58 | | | T1 | |
| 3 | 15 | 1 | AS040629-7 | MB | | 0.05 | 0.05 | As Received | 1000 | 50 | | | T1 | |
| 8 | 16 | 1 | AS040629-7 | LCS | | 0.1 | 0.1 | As Received | 1000 | ~~50~~ | | | T1,S1 | |

**Spiked By:** TE **Date:** 6/30/04
**Witnessed By:** BC **Date:** 6/30/04

**Relinquished By:** _____
**Date:** _____
**Received By:** _____
**Date:** _____

**Tracer/Carrier Solution Information**

| Soln # | Nuclide | SolnID | Prep Conc | Units | Prep Date | Aliquot | Units | Pipet ID |
|---|---|---|---|---|---|---|---|---|
| T1 | U-232 | 511.2613.40 | 37.878 | DPM/ml | 06/29/04 | 0.5 | ml | AW004 |

Exp 6/2/05

**Spike Solution Information**

| Soln # | Nuclide | SolnID | Prep Conc | Units | Prep Date | Aliquot | Units | Pipet ID |
|---|---|---|---|---|---|---|---|---|
| S1 | U-234 | 597.2382.64 | 38.529 | DPM/ml | 06/29/04 | 0.5 | ml | AW004 |
| S1 | U-235 | 597.2382.64 | 1.841 | DPM/ml | 06/29/04 | 0.5 | ml | AW004 |
| S1 | U-238 | 597.2382.64 | 40.001 | DPM/ml | 06/29/04 | 0.5 | ml | AW004 |

Exp 1/7/05

Comments



**Supersedes:** N/A

00017

# SAMPLE CONDITION FORM (SOLIDS)

ANALYST: TE

ANALYSIS DATE: 6/29/04 METHOD: Prep

| WORK ORDER | SAMPLE ID | SAMPLE CONDITION | | |
|---|---|---|---|---|
| | | Dry/Wet | TEXTURE | Remarks |
| 0405097 | 2 | dry | ground | fine |
| | 3 | | | |
| | 17 | | | |
| | 19 | | | |
| | 21 | | | |
| | 22 | | | |
| | 23 | | | |
| | 24 | | | |
| | 25 | | | |
| | 28 | | | |
| | 29 | | | |
| | 30 | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | TE | 6/29/04 |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

000176

26114

# Paragon Analytics, Inc.

## Sample Digestions Worksheet

| Paragon Sample ID | Original sample weight (g) | As Rec'd / Dry Wt (g) | Total ~~Weight~~ Volume of digestate ~~(g)~~ mL | % moist | Sample Matrix | Digest.* Solution Nature | digestate size taken for analysis ~~(g)~~ mL: Pu | U | Th | Am/Cm | Np | Fe-55 | Pu-241 | Sr | a/b | H-3 | C-14 | other |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1405097-2 | .881 | Dry wt | 1000 | NA | Soil | Nitric, DI H2O | | 160 | 106 | | | | | | | | | |
| 2-D | .881 | | | | | | | 160 | 6/30/04 | | | | | | | | | |
| 3 | .9452 | | | | | | | 330 | 220 | | | | | | | | | |
| 17 | 1.371 | | | | | | | 19 | 13 | | | | | | | | | |
| 19 | 1.4461 | | | | | | | 10 | 7 | | | | | | | | | |
| 19-D | 1.4461 | | | | | | | 6/30/04 | 7 | | | | | | | | | |
| 21 | 1.0375 | | | | | | | 20 | 14 | | | | | | | | | |
| 22 | 1.5337 | | | | | | | 46 | 31 | | | | | | | | | |
| 23 | 1.1558 | | | | | | | 85 | 58 | | | | | | | | | |
| 23-D | 1.1558 | | | | | | | 85 | 6/30/04 | | | | | | | | | |
| 24 | 1.9311 | | | | | | | 13 | 9 | | | | | | | | | |
| 25 | 1.4498 | | | | | | | 57 | 38 | | | | | | | | | |
| 28 | 1.5248 | | | | | | | 18 | 12 | | | | | | | | | |
| 29 | 1.3546 | | | | | | | 42 | 28 | | | | | | | | | |
| 29-D | 1.3546 | | | | | | | 6/30/04 | 28 | | | | | | | | | |
| 30 | 1.1863 | | | | | | | 58 | 38 | | | | | | | | | |
| MB | 1.0000 | | | | | | | 50 | 30 | | | | | | | | | |
| LCS | 1.0000 | | | | | | | 50 | 30 | | | | | | | | | |

7A 6/30/04

7A 6/30/04

Prep Analyst 7C
Prep Date 6/30/04
Balance No. NA
QASS#
SOP/REV

* Digest solution nature = The name of digestate media (e.g., 8N HNO3)

Reviewed by 7C

Date 7/3/04

Form 780r2.xls (10/17/2001)

000177

# Radiochemistry Instrument Worksheet

**Paragon Analytics**

**Prep Batch: AS040629-9**

**Prep Procedure:** UISO

Analytical QASS / NCR? Y / N 5794

| 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 | 0405097-1 | SMP | 1.0114 | 1.0114 | g | U _50971 | 63 | Sm | _50971 | | | _50971 | | | |
| 1 | 0405097-4 | SMP | 1.0125 | 1.0125 | g | _50974 | 64 | SD | _50974 | | | _50974 | | | |
| 1 | 0405097-5 | SMP | 1.0047 | 1.0047 | g | _50975 | 9 | SD | _50975 | | | _50975 | | | |
| 1 | 0405097-5 | DUP | 1.0091 | 1.0091 | g | _50975D | 10 | | _50975D | | | _50975D | | | |
| 1 | 0405097-6 | SMP | 1.0061 | 1.0061 | g | _50976 | 11 | | _50976 | | | _50976 | | | |
| 1 | 0405097-7 | SMP | 1.0112 | 1.0112 | g | _50977 | 12 | | _50977 | | | _50977 | | | |
| 1 | 0405097-8 | SMP | 1.0397 | 1.0397 | g | _50978 | 13 | | _50978 | | | _50978 | | | |
| 1 | 0405097-9 | SMP | 1.0086 | 1.0086 | g | _50979 | 15 | | _50979 | | | _50979 | | | |
| 1 | 0405097-10 | SMP | 1.0283 | 1.0283 | g | _509710 | 16 | | _509710 | | | _509710 | | | |
| 1 | 0405097-11 | SMP | 1.0571 | 1.0571 | g | _509711 | 17 | | _509711 | | | _509711 | | | |
| 1 | 0405097-12 | SMP | 1.0206 | 1.0206 | g | _509712 | 18 | | _509712 | | | _509712 | | | |
| 1 | 0405097-13 | SMP | 1.025 | 1.025 | g | _509713 | 19 | | _509713 | | | _509713 | | | |
| 1 | 0405097-14 | SMP | 1.0057 | 1.0057 | g | _509714 | 21 | | _509714 | | | _509714 | | | |
| 1 | 0405097-15 | SMP | 1.0285 | 1.0285 | g | _509715 | 22 | | _509715 | | | _509715 | | | |
| 1 | 0405097-16 | SMP | 1.0052 | 1.0052 | g | _509716 | 42 | | _509716 | | | _509716 | | | |
| 1 | 0405097-18 | SMP | 1.0079 | 1.0079 | g | _509718 | 43 | | _509718 | | | _509718 | | | |
| 1 | 0405097-20 | SMP | 1.0126 | 1.0126 | g | _509720 | 44 | | _509720 | | | _509720 | | | |
| 1 | 0405097-26 | SMP | 1.0593 | 1.0593 | g | _509726 | 45 | | _509726 | | | _509726 | | | |
| 1 | 0405097-27 | SMP | 1.0081 | 1.0081 | g | _509727 | 46 | | _509727 | | | _509727 | | | |
| 1 | 0405228-1 | SMP | 2.0135 | 2.0135 | g | UX _52281 | 47 | | _52281 | | | _52281 | | | |
| 1 | 0405228-1 | DUP | 2.0043 | 2.0043 | g | _52281D | 48 | | _52281D | | | _52281D | | | |
| 1 | 0406020-4 | SMP | 2.0027 | 2.0027 | g | _60204 | 57 | | _60204 | | | _60204 | | | |
| 1 | AS040629-9 | MB | 2 | 2 | g | U _6299B | 58 | Sm | _6299B | | | _6299B | | | |
| 1 | AS040629-9 | LCS | 2 | 2 | g | _6299L | 59 | SD | _6299L | | | _6299L | | | |
| 1 | AS040629-9 | LCSD | 2 | 2 | g | _6299LD | 60 | | _6299LD | | | _6299LD | | | |

Sm 7-22-04

0001



Supersedes: N/A

# Radiochemistry Instrument Worksheet

**Paragon Analytics**

**Prep Batch:** AS040629-9

**Prep Procedure:** UISO

**Analytical QASS / NCR? Y / N** 5794

| 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

**Tracer/Carrier Solution Information**

| Soln # | Nuclide | SolnID | Prep Conc | Units | Prep Date | Aliquot | Units | Pipet ID |
|---|---|---|---|---|---|---|---|---|
| T1 | U-232 | 511.2613.40 | 37.877 | DPM/ml | 06/30/04 | 0.5 | ml | AW004 |

**Spike Solution Information**

| Soln # | Nuclide | SolnID | Prep Conc | Units | Prep Date | Aliquot | Units | Pipet ID |
|---|---|---|---|---|---|---|---|---|
| S1 | U-234 | 597.2382.64 | 38.529 | DPM/ml | 06/30/04 | 0.5 | ml | AW004 |
| S1 | U-235 | 597.2382.64 | 1.841 | DPM/ml | 06/30/04 | 0.5 | ml | AW004 |
| S1 | U-238 | 597.2382.64 | 40.001 | DPM/ml | 06/30/04 | 0.5 | ml | AW004 |

# Radiochemistry Prep Worksheet

**Paragon Analytics**

**Prep Batch:** AS040629-9

**Prep Procedure:** UISO

**Reviewed By:** tde TDE **Review Date:** 7/4/04 7/4/04

**Non-Routine Pre-Treatment?** (Y) / N **Batch:** Muffling **Re-Prep?** (Y) / N **Batch:** AS040615-6 **Prep QASS / NCR?** (Y) / N 270494

**Prep SOP:** PAI 778 **Rev:** 9
**Prep SOP:** NONE
**Matrix Class:** solid

**Prep Analyst:** Tambrae Elhart TE
**Prep Date:** 6/30/04
**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 | 0405097-1 | SMP | | 1.0114 | 1.0114 | Dry Weight | TE | 7/3/04 | T1 | |
| 2 | 1 | 0405097-4 | SMP | | 1.0125 | 1.0125 | Dry Weight | | | T1 | |
| 3 | 1 | 0405097-5 | SMP | | 1.0047 | 1.0047 | Dry Weight | | | T1 | |
| 4 | 1 | 0405097-5 | DUP | | 1.0091 | 1.0091 | Dry Weight | | | T1 | |
| 5 | 1 | 0405097-6 | SMP | | 1.0061 | 1.0061 | Dry Weight | | | T1 | |
| 6 | 1 | 0405097-7 | SMP | | 1.0112 | 1.0112 | Dry Weight | | | T1 | |
| 7 | 1 | 0405097-8 | SMP | | 1.0397 | 1.0397 | Dry Weight | | | T1 | |
| 8 | 1 | 0405097-9 | SMP | | 1.0086 | 1.0086 | Dry Weight | | | T1 | |
| 9 | 1 | 0405097-10 | SMP | | 1.0283 | 1.0283 | Dry Weight | | | T1 | |
| 10 | 1 | 0405097-11 | SMP | | 1.0571 | 1.0571 | Dry Weight | | | T1 | |
| 11 | 1 | 0405097-12 | SMP | | 1.0206 | 1.0206 | Dry Weight | | | T1 | |
| 12 | 1 | 0405097-13 | SMP | | 1.025 | 1.025 | Dry Weight | | | T1 | |
| 13 | 1 | 0405097-14 | SMP | | 1.0057 | 1.0057 | Dry Weight | | | T1 | |
| 14 | 1 | 0405097-15 | SMP | | 1.0285 | 1.0285 | Dry Weight | | | T1 | |
| 15 | 1 | 0405097-16 | SMP | | 1.0052 | 1.0052 | Dry Weight | | | T1 | |
| 16 | 1 | 0405097-18 | SMP | | 1.0079 | 1.0079 | Dry Weight | | | T1 | |
| 17 | 1 | 0405097-20 | SMP | | 1.0126 | 1.0126 | Dry Weight | | | T1 | |
| 18 | 1 | 0405097-26 | SMP | | 1.0593 | 1.0593 | Dry Weight | | | T1 | |
| 19 | 1 | 0405097-27 | SMP | | 1.0081 | 1.0081 | Dry Weight | | | T1 | |
| 20 | 1 | 0405228-1 | SMP | | 2.0135 | 2.0135 | Dry Weight | | | T1 | |
| 21 | 1 | 0405228-1 | DUP | | 2.0043 | 2.0043 | Dry Weight | | | T1 | |
| 22 | 1 | 0406020-4 | SMP | | 2.0027 | 2.0027 | Dry Weight | | | T1 | |
| 23 | 1 | AS040629-9 | MB | | 2 | 2 | Dry Weight | | | T1 | |
| 24 | 1 | AS040629-9 | LCS | | 2 | 2 | Dry Weight | | | T1,S1 | |
| 25 | 1 | AS040629-9 | LCSD | | 2 | 2 | Dry Weight | ✓ | ✓ | T1,S1 | |

7/3/04 TE

Comments
Samples were muffled overnight at 600 C. A PEG treatment was performed on all samples.

# Radiochemistry Prep Worksheet

**Paragon Analytics**

**Prep Batch:** AS040629-9

**Prep Procedure:** UISO

**Reviewed By:** tde TE **Review Date:** 7/4/04 7/4/04

**Non-Routine Pre-Treatment?** (Y) / N **Batch:** Muffling **Re-Prep?** (Y) / N **Batch:** AS040615-6 **Prep QASS / NCR?** (Y) / N 20494

**Prep SOP:** PAI 778 **Rev:** 9
**Prep SOP:** NONE
**Matrix Class:** solid

**Prep Analyst:** Tambrae Elhart TE
**Prep Date:** 6/30/04
**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 |
|---|---|---|---|---|---|---|---|---|---|---|---|

**Spiked By:** Tambrae Elhart **Date:** 6/30/04
**Witnessed By:** Carissa Moncavage **Date:** 6/30/04

**Relinquished By:** TE
**Date:** 7/4/04
**Received By:** SM
**Date:** 7/5/04

**Tracer/Carrier Solution Information**

| Soln # | Nuclide | SolnID | Prep Conc | Units | Prep Date | Aliquot | Units | Pipet ID |
|---|---|---|---|---|---|---|---|---|
| T1 | U-232 | 511.2613.40 | 37.877 | DPM/ml | 06/30/04 | 0.5 | ml | AW004 |

**Spike Solution Information**

| Soln # | Nuclide | SolnID | Prep Conc | Units | Prep Date | Aliquot | Units | Pipet ID |
|---|---|---|---|---|---|---|---|---|
| S1 | U-234 | 597.2382.64 | 38.529 | DPM/ml | 06/30/04 | 0.5 | ml | AW004 |
| S1 | U-235 | 597.2382.64 | 1.841 | DPM/ml | 06/30/04 | 0.5 | ml | AW004 |
| S1 | U-238 | 597.2382.64 | 40.001 | DPM/ml | 06/30/04 | 0.5 | ml | AW004 |

Comments
Samples were muffled overnight at 600 C. A PEG treatment was performed on all samples.

# Radiochemistry Prep Worksheet

**Paragon Analytics**

**Prep Batch: AS040629-9**

**Prep Procedure:** UISO

## Prep Batch Not Validated!!!

**Reviewed By:** **Review Date:**

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

**Prep SOP:** PAI 778 **Rev:** 9
**Prep SOP:** NONE
**Matrix Class:** solid

**Prep Analyst:** Tambrae Elhart TE
**Prep Date:** ~~6/29/04~~ 6/30/04
**Prep Dept:** AP

**Balance:**
**Balance:**

| | Samp Num | Prep Num | LabID | QC Type | Dish No. | Init Alq g | Fin Alq g | Prep Basis Dry wt | Micro Init | Micro Date | Standards | Prep Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 29 | 1 | 1 | 0405097-1 | SMP | | 1 | 1 | As Received | 453 | 1.0114 | T1 | |
| 4 | 2 | 1 | 0405097-4 | SMP | | 1 | 1 | As Received | 485 | 1.0125 | T1 | |
| 31 | 3 | 1 | 0405097-5 | SMP | | 1 | 1 | As Received | 584 | 1.0047 | T1 | |
| 2 | 4 | 1 | 0405097-5 | DUP | | 1 | 1 | As Received | 503 | 1.0091 | T1 | |
| 22 | 5 | 1 | 0405097-6 | SMP | | 1 | 1 | As Received | 500 | 1.0061 | T1 | |
| 25 | 6 | 1 | 0405097-7 | SMP | | 1 | 1 | As Received | 592 | 1.0112 | T1 | |
| 41 | 7 | 1 | 0405097-8 | SMP | | 1 | 1 | As Received | 461 | 1.0397 | T1 | |
| 39 | 8 | 1 | 0405097-9 | SMP | | 1 | 1 | As Received | 478 | 1.0086 | T1 | |
| 21 | 9 | 1 | 0405097-10 | SMP | | 1 | 1 | As Received | 1143 | 1.0283 | T1 | |
| 28 | 10 | 1 | 0405097-11 | SMP | | 1 | 1 | As Received | 498 | 1.0571 | T1 | |
| ~~8~~ | ~~11~~ | ~~1~~ | ~~0405097-11~~ | ~~DUP~~ | | ~~1~~ | ~~1~~ | ~~As Received~~ | ~~1021~~ | ~~1.0508~~ | T1 | |
| 9 | 12 | 1 | 0405097-12 | SMP | | 1 | 1 | As Received | 491 | 1.0206 | T1 | |
| 23 | 13 | 1 | 0405097-13 | SMP | | 1 | 1 | As Received | 502 | 1.0250 | T1 | |
| 24 | 14 | 1 | 0405097-14 | SMP | | 1 | 1 | As Received | 567 | 1.0057 | T1 | |
| 3 | 15 | 1 | 0405097-15 | SMP | | 1 | 1 | As Received | 505 | 1.0285 | T1 | |
| 30 | 16 | 1 | 0405097-16 | SMP | | 1 | 1 | As Received | 466 | 1.0052 | T1 | |
| 36 | 17 | 1 | 0405097-18 | SMP | | 1 | 1 | As Received | 493 | 1.0079 | T1 | |
| 34 | 18 | 1 | 0405097-20 | SMP | | 1 | 1 | As Received | 506 | 1.0126 | T1 | |
| 40 | 19 | 1 | 0405097-26 | SMP | | 1 | 1 | As Received | 477 | 1.0593 | T1 | |
| 33 | 20 | 1 | 0405097-27 | SMP | | 1 | 1 | As Received | 577 | 1.0081 | T1 | |
| 35 | 21 | 1 | AS040629-9 | MB | | 1 | 1 | As Received | 475 | 1.000 | T1 | |
| 37 | 22 | 1 | AS040629-9 | LCS | | 1 | 1 | As Received | 482 | 1.000 | T1,S1 | |

**Spiked By:** TE **Date:** 6/30/04

**Witnessed By:** [illegible] **Date:** 6/30/04

**Relinquished By:** _____
**Date:** _____
**Received By:** _____
**Date:** _____

**Tracer/Carrier Solution Information** Exp 6/2/05

| Soln # | Nuclide | SolnID | Prep Conc | Units | Prep Date | Aliquot | Units | Pipet ID |
|---|---|---|---|---|---|---|---|---|
| T1 | U-232 | 511.2613.40 | 37.878 | DPM/ml | 06/29/04 | 0.5 | ml | AW004 |

**Spike Solution Information**

| Soln # | Nuclide | SolnID | Prep Conc | Units | Prep Date | Aliquot | Units | Pipet ID |
|---|---|---|---|---|---|---|---|---|
| S1 | U-234 | 597.2382.64 | 38.529 | DPM/ml | 06/29/04 | 0.5 | ml | AW004 |
| S1 | U-235 | 597.2382.64 | 1.841 | DPM/ml | 06/29/04 | 0.5 | ml | AW004 |
| S1 | U-238 | 597.2382.64 | 40.001 | DPM/ml | 06/29/04 | 0.5 | ml | AW004 |

Exp 1/7/05

| | | | | |
|---|---|---|---|---|
| 6 | 23 | 0405228-1 | 1060 | 2.0135 |
| 38 | 24 | 0406020-4 | 587 | 2.0027 |
| | | AS040629-9 LCS-D ~~2.000~~ | 594 | 2.000 |
| 8 | | 0405228-1dup | 583 | 2.0043 |

Comments



**Supersedes:** NA

# SAMPLE CONDITION FORM (SOLIDS)

ANALYST: TC

ANALYSIS DATE: 6/29/04 METHOD: Prep

| WORK ORDER | SAMPLE ID | SAMPLE CONDITION | | |
|---|---|---|---|---|
| | | Dry/Wet | TEXTURE | Remarks |
| 0405097 | 1 | dry | grand | fine |
| | 4 | | | |
| | 5 | | | |
| | 6 | | | |
| | 7 | | | |
| | 8 | | | |
| | 9 | | | |
| | 10 | | | |
| | 11 | | | |
| | 12 | | | |
| | 13 | | | |
| | 14 | | | |
| | 15 | | | |
| | 16 | | | |
| | 18 | | | |
| | 20 | | | |
| | 26 | | | |
| | 27 | | | |
| 0405228 | 1 | | | |
| 0406020 | 4 | | | |

# Radiochemistry Instrument Worksheet

**Paragon Analytics**

**Prep Batch: AS040712-5**

**Prep Procedure:** UISO

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 | 0405097-1 | SMP | 0.100104 | 0.100104 | g | UX _50971 | 10 | SD | _50971 | | | _50971 | | | |
| 1 | 0405097-20 | SMP | 0.050778 | 0.050778 | g | _509720 | 11 | | _509720 | | | _509720 | | | |
| 1 | 0405097-20 | DUP | 0.050275 | 0.050275 | g | _509720D | 12 | | _509720D | | | _509720D | | | |
| 1 | 0405097-26 | SMP | 0.101496 | 0.101496 | g | _509726 | 13 | | _509726 | | | _509726 | | | |
| 1 | 0405097-27 | SMP | 0.100742 | 0.100742 | g | _509727 | 15 | | _509727 | | | _509727 | | | |
| 1 | AS040712-5 | MB | 0.1 | 0.1 | g | _7125B | 16 | SD JP | _7125B | | | _7125B | | | Lm 7/22/04 |
| 1 | AS040712-5 | LCS | 0.1 | 0.1 | g | _7125L | 17 | | UR _7125L * | 13 JP | | _7125L | | | *FWHM > 100 SD 7/16/04 |

**Tracer/Carrier Solution Information**

| Soln # | Nuclide | SolnID | Prep Conc | Units | Prep Date | Aliquot | Units | Pipet ID |
|---|---|---|---|---|---|---|---|---|
| T1 | U-232 | 511.2613.40 | 37.863 | DPM/ml | 07/13/04 | 0.5 | ml | AW004 |

**Spike Solution Information**

| Soln # | Nuclide | SolnID | Prep Conc | Units | Prep Date | Aliquot | Units | Pipet ID |
|---|---|---|---|---|---|---|---|---|
| S1 | U-234 | 643.2382.44 | 38.522 | DPM/ml | 07/13/04 | 0.5 | ml | AW004 |
| S1 | U-235 | 643.2382.44 | 1.841 | DPM/ml | 07/13/04 | 0.5 | ml | AW004 |
| S1 | U-238 | 643.2382.44 | 39.994 | DPM/ml | 07/13/04 | 0.5 | ml | AW004 |

# Radiochemistry Prep Worksheet

**Paragon Analytics**

**Prep Batch: AS040712-5**

**Prep Procedure:** UISO

**Reviewed By:** tde TDE **Review Date:** 7/15/04 7/15/04

**Non-Routine Pre-Treatment?** (Y) / N **Batch:** Common Digestion **Re-Prep?** (Y) / N **Batch:** AS040629-9 **Prep QASS / NCR?** (Y) / N 277650

**Prep SOP:** PAI 778 **Rev:** 9
**Prep SOP:** NONE
**Matrix Class:** solid

**Prep Analyst:** Tambrae Elhart TE
**Prep Date:** 7/13/04
**Prep Dept:** AP

**Balance:** 23
**Balance:** 19

| Samp Num | Prep Num | LabID | QC Type | Dish No. | Init Alq g | Fin Alq g | Prep Basis | Total Digestate(g) | Digestate Taken(g) | Micro Init | Micro Date | Standards | Prep Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 0405097-1 | SMP | | 0.100104 | 0.100104 | Dry Weight | 200 | 18.5 | TE | 7/15/04 | T1 | |
| 2 | 1 | 0405097-20 | SMP | | 0.050778 | 0.050778 | Dry Weight | 200 | 10.1 | | | T1 | |
| 3 | 1 | 0405097-20 | DUP | | 0.050275 | 0.050275 | Dry Weight | 200 | 10 | | | T1 | |
| 4 | 1 | 0405097-26 | SMP | | 0.101496 | 0.101496 | Dry Weight | 200.1 | 18.6 | | | T1 | |
| 5 | 1 | 0405097-27 | SMP | | 0.100742 | 0.100742 | Dry Weight | 200 | 18.5 | | | T1 | |
| 6 | 1 | AS040712-5 | MB | | 0.1 | 0.1 | Dry Weight | 200 | 20 | | | T1 | |
| 7 | 1 | AS040712-5 | LCS | | 0.1 | 0.1 | Dry Weight | 200 | 20 | | | T1,S1 | |

TE 7/15/04

**Spiked By:** Tambrae Elhart **Date:** 7/14/04

**Witnessed By:** Grace Campagnola **Date:** 7/14/04

**Relinquished By:** Com
**Date:** 7/14/04
**Received By:** SD
**Date:** 7/15/04

**Tracer/Carrier Solution Information**

| Soln # | Nuclide | SolnID | Prep Conc | Units | Prep Date | Aliquot | Units | Pipet ID |
|---|---|---|---|---|---|---|---|---|
| T1 | U-232 | 511.2613.40 | 37.863 | DPM/ml | 07/13/04 | 0.5 | ml | AW004 |

**Spike Solution Information**

| Soln # | Nuclide | SolnID | Prep Conc | Units | Prep Date | Aliquot | Units | Pipet ID |
|---|---|---|---|---|---|---|---|---|
| S1 | U-234 | 643.2382.44 | 38.522 | DPM/ml | 07/13/04 | 0.5 | ml | AW004 |
| S1 | U-235 | 643.2382.44 | 1.841 | DPM/ml | 07/13/04 | 0.5 | ml | AW004 |
| S1 | U-238 | 643.2382.44 | 39.994 | DPM/ml | 07/13/04 | 0.5 | ml | AW004 |

Comments
Samples were muffled overnight at 600 C.

# Radiochemistry Prep Worksheet

**Paragon Analytics**

**Prep Batch: AS040712-5**

**Prep Procedure:** UISO

## Prep Batch Not Validated!!!

**Reviewed By:** **Review Date:**

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

**Prep SOP:** PAI 778 **Rev:** 9
**Prep SOP:** NONE
**Matrix Class:** solid

**Prep Analyst:** Tambrae Elhart TE
**Prep Date:** ~~7/12/04~~ 7/13/04
**Prep Dept:** AP

**Balance:** 23
**Balance:** 19

| | Samp Num | Prep Num | LabID | QC Type | Dish No. | Init Aiq g | Fin Aiq g | Prep Basis | Micro Init (Actual) | Micro Date (target) | Standards | Prep Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 4 | 1 | 1 | 0405097-1 | SMP | | 1 | 1 | Dry Weight | 1.0822 | .1g | T1 | |
| 6 | 2 | 1 | 0405097-20 | SMP | | 1 | 1 | Dry Weight | 1.0055 | .05g | T1 | |
| 30 | 3 | 1 | 0405097-20 | DUP | | 1 | 1 | Dry Weight | 1.0055 | .05g | T1 | |
| 22 | 4 | 1 | 0405097-26 | SMP | | 1 | 1 | Dry Weight | 1.0919 | .1g | T1 | |
| 28 | 5 | 1 | 0405097-27 | SMP | | 1 | 1 | Dry Weight | 1.0891 | .1g | T1 | |
| 24 | 6 | 1 | AS040712-5 | MB | | 1 | 1 | Dry Weight | 1.0000 | .1g | T1 | |
| 37 | 7 | 1 | AS040712-5 | LCS | | 1 | 1 | Dry Weight | 1.0000 | .1g | T1,S1 | |

**Spiked By:** TE **Date:** 7/14/04
**Witnessed By:** JC **Date:** 7/14/04

**Relinquished By:** _____
**Date:** _____
**Received By:** _____
**Date:** _____

**Tracer/Carrier Solution Information**

| Soln # | Nuclide | SolnID | Prep Conc | Units | Prep Date | Aliquot | Units | Pipet ID |
|---|---|---|---|---|---|---|---|---|
| T1 | U-232 | 511.2613.40 | 37.864 | DPM/ml | 07/12/04 | 0.5 | ml | AW004 |

Exp 6/2/05

**Spike Solution Information**

| Soln # | Nuclide | SolnID | Prep Conc | Units | Prep Date | Aliquot | Units | Pipet ID |
|---|---|---|---|---|---|---|---|---|
| S1 | U-234 | 643.2382.44 | 38.522 | DPM/ml | 07/12/04 | 0.5 | ml | AW004 |
| S1 | U-235 | 643.2382.44 | 1.841 | DPM/ml | 07/12/04 | 0.5 | ml | AW004 |
| S1 | U-238 | 643.2382.44 | 39.994 | DPM/ml | 07/12/04 | 0.5 | ml | AW004 |

Exp 11/1/04

Comments



**Supersedes:** NA

# SAMPLE CONDITION FORM (SOLIDS)

ANALYST: TC

ANALYSIS DATE: 7/13/04 METHOD: Prep

| WORK ORDER | SAMPLE ID | SAMPLE CONDITION | | |
|---|---|---|---|---|
| | | Dry/Wet | TEXTURE | Remarks |
| 0405097 | 1 | dry | ground | fine |
| | 20 | | | |
| | 26 | | | |
| | 27 | | | |

TC 7/13/04

000187

267115

# Paragon Analytics, Inc.

## Sample Digestions Worksheet

| Paragon Sample ID | Original sample weight (g) | As Rec'd / Dry Wt (g) | Total weight of digestate (g) | % moist | Sample Matrix | Digest.* Solution Nature | digestate size taken for analysis (g) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Pu | U | Th | Am/Cm | Np | Fe-55 | Pu-241 | Sr | a/b | H-3 | C-14 | other |
| 0405097-1 | 1.0822 | Dry wt. | 200.0 | NA | Soil | Nitric, | | 18.5 | | | | | | | | | | |
| 20 | 1.0055 | | 200.0 | | | Boric, | | 10.1 | | | | | | | | | | |
| 20-D | 1.0055 | | 200.0 | | | DI $H_2O$ | | 10.0 | | | | | | | | | | |
| 26 | 1.0919 | | 200.1 | | | | | 18.6 | | | | | | | | | | |
| 27 | 1.0891 | | 200.00 | | | | | 18.5 | | | | | | | | | | |
| MB | 1.0000 | | 200.0 | | | | | 20.0 | | | | | | | | | | |
| LCS | 1.0000 | | 200.0 | | | | | 20.0 | | | | | | | | | | |

TP 7/14/04

TP 7/14/04

TP 7/14/04

Prep Analyst TP
Prep Date 7/14/04
Balance No. 19
QASS#
SOP/REV

* Digest solution nature = The name of digestate media (e.g., 8N HNO3)

Reviewed by DC Date 7/14/04

Form 780r2.xls (10/17/2001)

000188

PARAGON ANALYTICS
Radiochemistry Data Package

Section 7

# STANDARDS TRACEABILITY DOCUMENTS

7

PROJECT U-232 511.~~1572~~ 2613.40 CDM 4/20/04

Notebook No. 2613

Continued From Page

U-232 working dilution

Prepare a working level dilution of U-232 by diluting w/ 2M HCL to 40 dpm/mL. This working level standard will be made by diluting std 511.1572.82 to 40 dpm/mL with 2M HCL.

1) Determine the density of 2M HCL lot #43268

| | |
|---|---|
| Mass of empty 100 mL Class A volumetric flask | 68.2978 g |
| Mass of 100 mL of 2M HCL & flask | 171.1645 g |
| Net mass of 2M HCL | 102.8667 |
| | $\rho$ = 1.0287 g/mL |

2) Transfer U-232 (std 511.1572.82) to a 500 mL nalgene bottle

| | |
|---|---|
| a) Mass of nalgene bottle without lid | 48.2085 g |
| b) Mass of glass graduated cylinder empty | 36.0527 g |
| c) Mass of glass graduated cylinder & U-232 std | 46.8358 g |
| ~~Net mass of standard transferred~~ CDM 4/20/04 | |
| d) Mass of glass graduated cylinder after transfer | 36.1577 g |
| e) Net mass of standard transferred (calculation taken from difference of lines c & d) | 10.6781 g |

3) Dilute to final volume with 2M HCL

| | |
|---|---|
| Mass of nalgene bottle w/out lid (from above) | 48.2085 g |
| Mass of nalgene bottle, std & 2M HCL | 575.57 g |
| Net mass of standard | 527.36 g |

4) Final Activity Calculation

$$\frac{(1920.01\ \frac{dpm}{g})(1.0287\ \frac{g}{mL})(10.6781\ g)}{527.36\ g} = 39.99\ dpm/mL$$

SD 6/4/04

Stnd ID: 511.2613.40

Description: U-232

Expiration: 6/2/2005

Activity: 39.99 dpm/mL

2s Uncertainty: 1.33 dpm/mL

SD 6/4/04

Ref. Date: 2/4/1999

Ref Time: N/A

SD 6/4/04

Prep Date: 4/20/2004 Prep by: CDM

Matrix/Comp. 2M HCl

Half Life (y): 6.98E+01

Continued on Page

Requires NCR for ICPT work.

SD 6/4/04

Read and Understood By

C Moncavage 4/20/04 [signature] 6/4/04

Signed Date Signed Date

PROJECT $U^{232}$ Standard 511.1572.82

Notebook No. 1572

Continued From Page

Transfer $U^{232}$ standard RSO # 511 to a 1 Liter Nalgene bottle.

balance 12

empty bottle (w/lid): 59.2300 g

full bottle (w/lid): 594.60 g

Balance 21

535.37 g total amt standard

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

(17170 dps)(60 sec/min) = 1,030,200 dpm

1,030,200 dpm / 536.56 g = 1920.01 dpm/g

ref date: 2/4/99

$t_{1/2}$ = 69.8 yr

Subsequent Dilutions to be verified.

This was a direct transfer, w/o dilution.

Continued on Page

Read and Understood By

Signed: [signature] Date: 3/31/99

Signed: [signature] Date: 4/[illegible]

ANALYTICS

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

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

PAI I.D. #511
rec'd 2-10-99

# CERTIFICATE OF CALIBRATION

## Standard Radionuclide Source

57106-307

U-232 500 mL Liquid in Flame Sealed Bottle

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

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

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

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

536.56 grams of solution 2M $HNO_3$.
Impurities detected: U-233 <50 dps/bottle, Am-241 <25 dps/bottle on above referenced date.

P O NUMBER 22055, Item 1

SOURCE PREPARED BY: _____
E. A. Taskaev, Radiochemist

Q A APPROVED: _____ 2-4-99

PROJECT U-238 597.2382.64

Continued From Page

U-238

Prepare a working level dilution of U-238 (597.1808.85) to 40 dpm/ml by diluting w/ 0.5M $HNO_3$ (Lot # K29665901-133)

1) Determine the density of 0.5M $HNO_3$

| | |
|---|---|
| mass of 100 ml empty vol flask | 56.4399 g (Bal 12) |
| mass of flask + 0.5M $HNO_3$ | 157.6749 g ↓ |
| Net mass of 0.5M $HNO_3$ | 101.235 g |
| | $\rho$ = 1.0124 g/ml |

2) Transfer approx 21 g of U-238 (597.1808.85) to a 1L nalgene bottle

| | |
|---|---|
| mass of empty nalgene bottle w/o lid | 75.0308 g (bal 12) |
| mass of bottle + std | 96.1715 g ↓ |
| Net mass of std transferred | 21.1407 g |

3) Dilute to final volume w/ 0.5M $HNO_3$

| | |
|---|---|
| mass of empty nalgene bottle w/o lid (from above) | 75.0308 g (bal 12) |
| mass of bottle, std + 0.5M $HNO_3$ | 1,073.0 g (bal 26) |
| Net mass of std | 997.97 g |

4) Final Activity Calc

CDM 2/3/03 ~~18.1~~

$$\frac{(1865.2\ dpm/g)(21.1407\ g)(1.0124\ g/ml)}{997.97\ g} = 40.00\ dpm/ml$$

RG 2/28/03

Stnd ID: 597.2382.64

Description: U-238
Activity: 40.00 dpm/ml
2s Uncertainty: 0.24 dpm/ml
Ref. Date: 8/1/97
Ref Time: na
Prep Date: 2/3/03 Prep by: CDM
Expiration: 2/7/04
Matrix/Comp. 0.5M HNO3
Half Life (y): 4.47E+09

RG 2/28/03

RG 2/28/03

U-234=38.53 dpm/ml, U-235=1.84 dpm/ml

RG 2/28/03

Continued on Page

Read and Understood By

C. Moncarrage 2/3/03 Signed Date

Renee Gallegos 2/28/03 Signed Date

PROJECT 597.1808.85

Continued From Page

U-238 Primary Dilution 11/30/01

1) Dilute RSO # 597 with approximately 40 ml of 0.5 M $HNO_3$

2) 0.5 N $HNO_3$ → dilute 31 ml Conc. $HNO_3$ to final volume of 1.0 L w/ DI water

Density Determination 0.5 M $HNO_3$

| | | |
|---|---|---|
| mass 100 ml Vol. flask | 62.4705 g | bal #12 |
| flask + 0.5 M $HNO_3$ | 163.7770 g | ↓ |
| net mass 0.5 M $HNO_3$ | 101.3065 g | |

$\rho = 1.0131$ g/ml

3) Transfer contents of RSO # 597 to 40 ml VOA vial

| | | |
|---|---|---|
| mass of VOA Vial (w/o lid) | 22.3629 g | bal #12 |
| mass of open ampoule + 50 ml beaker | 38.2913 g | ↓ |
| mass of empty ampoule + 50 ml beaker | 33.1546 g | |
| net mass of std transferred | 5.1367 g | |

4) Final dilution with 0.5 M $HNO_3$

| | | |
|---|---|---|
| mass of vial from above | 22.3629 g | bal #12 |
| mass vial, std + 0.5 M $HNO_3$ | 62.3514 g | ↓ |
| Net mass of final dilution | 39.9885 g | |

5) Final Activity Calculation

$$\frac{\left(14{,}520 \frac{dpm}{g}\right)(5.1367\,g)}{39.9885\,g} = 1{,}865.2 \frac{dpm}{g}\ {}^{238}U$$

85.9 $\frac{dpm}{g}$ U-235

1,796.6 $\frac{dpm}{g}$ U-234

U.S. Department of Commerce
National Institute of Standards and Technology
SRM 4321C
Natural Uranium
<3 kBq in 6% nitric acid
CAUTION
RADIOACTIVE

Continued on Page

Read and Understood By

| | | | |
|---|---|---|---|
| N. Carver | 11/30/01 | Bence Gallegos | 12/13/01 |
| Signed | Date | Signed | Date |

# National Institute of Standards & Technology

# Certificate

597 DB
PAI 04497 11/19/01
recd 11-19-01

## Standard Reference Material 4321C
## Natural Uranium Radioactivity Standard

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

### Radiological Hazard

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

### Chemical Hazard

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

### Storage and Handling

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

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

### Preparation

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

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

Gaithersburg, Maryland 20899
November 1997

Thomas E. Gills, Chief
Standard Reference Materials Program



*Notes and references are on pages 5 and 6.

## Recommended Procedure for Opening the SRM Ampoule

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

2) Wear eye protection, gloves, and protective clothing and work over a tray with absorbent paper in it. Work in a fume hood. In addition to the radioactive material, the solution contains strong acid and is corrosive.

3) Shake the ampoule to wet all of the inside surface of the ampoule. Return the ampoule to the upright position.

4) Check that all of the liquid has drained out of the neck of the ampoule. If necessary, gently tap the neck to speed the process.

5) Holding the ampoule upright, score the narrowest part of the neck with a scribe or diamond pencil.

6) Lightly wet the scored line. This reduces the crack propagation velocity and makes for a cleaner break.

7) Hold the ampoule upright with a paper towel, a wiper, or a support jig. Position the scored line away from you. Using a paper towel or wiper to avoid contamination, snap off the top of the ampoule by pressing the narrowest part of the neck away from you while pulling the tip of the ampoule towards you.

8) Transfer the solution from the ampoule using a pycnometer or a pipet with dispenser handle. NEVER PIPETTE BY MOUTH.

9) Seal any unused SRM solution in a flame-sealed glass ampoule, if possible, to minimize the evaporation loss.

See also reference [4]*.



*Notes and references are on pages 5 and 6.

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

| | | | |
|---|---|---|---|
| Source identification number | NIST SRM 4321C | | |
| Physical Properties: | | | |
| Source description | Liquid in flame-sealed NIST borosilicate-glass ampoule | | |
| Ampoule specifications | Body outside diameter<br>Wall Thickness<br>Barium content<br>Lead-oxide content<br>Other heavy elements | (16.5 ± 0.5) mm<br>(0.60 ± 0.04) mm<br>Less than 2.5%<br>Less than 0.02%<br>Trace quantities | |
| **Solution density** | (1.053 ± 0.001) $g \cdot mL^{-1}$ at 21.4 °C [b]* | | |
| **Solution mass** | (5.258 ± 0.002) g [b] | | |
| Chemical Properties: | | | |
| Solution composition | Chemical Formula | Concentration ($mol \cdot L^{-1}$) | Mass Fraction ($g \cdot g^{-1}$) |
| | $H_2O$<br>$HNO_3$<br>$UO_2(NO_3)_2$ | 53<br>1.0<br>0.09 | 0.91<br>0.06<br>0.03 |
| Radiological Properties: | | | |
| **Radionuclide** | **Natural Uranium (Mixture of U-238, U-235, and U-234)** | | |
| **Reference time** | **1200 EST, 1 August 1997** | | |
| **Massic activity of the solution** [c] | **U-238: 242.0 $Bq \cdot g^{-1}$**<br>**U-235: 11.14 $Bq \cdot g^{-1}$**<br>**U-234: 233.1 $Bq \cdot g^{-1}$** | | |
| **Relative expanded uncertainty ($k$=2)** | **U-238: 0.60%** [d] [e]<br>**U-235: 0.62%** [d] [e]<br>**U-234: 0.98%** [d] [e] | | |
| **Mass fraction of uranium** | (0.01960 ± 0.00010) $g \cdot g^{-1}$ [b] | | |
| Photon-emitting impurities | None detected [f] | | |
| Half lives used | Uranium-238: (4.468 ± 0.003) × $10^9$ a [g]<br>Uranium-235: (7.038 ± 0.005) × $10^8$ a [g]<br>Uranium-234: (2.455 ± 0.006) × $10^5$ a [g] | | |
| Measuring instruments | Mass spectrometer, silicon surface-barrier detector, and $4\pi(\alpha+\beta)$ liquid-scintillation counting systems. | | |



*Notes and references are on pages 5 and 6.

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

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

*Notes and references are on pages 5 and 6.

## NOTES

[a] The Sievert is the SI unit for dose equivalent. See reference [1]. One $\mu$Sv is equal to 0.1 mrem.

| Distance from Ampoule (cm): | 1 | 30 | 100 |
|---|---|---|---|
| Approximate Dose Rate ($\mu$Sv/h): | <0.1 | - | - |

[b] The stated uncertainty is two times the standard uncertainty.

[c] Massic activity is the preferred name for the quantity activity divided by the total mass of the sample. See reference [1].

[d] The reported value, $y$, of massic activity (activity per unit mass) at the reference time was not measured directly but was derived from measurements and calculations of other quantities. This can be expressed as $y = f(x_1, x_2, x_3, \ldots x_n)$, where $f$ is a mathematical function derived from the assumed model of the measurement process.

The value, $x_i$, used for each input quantity $i$ has a **standard uncertainty**, $u(x_i)$, that generates a corresponding uncertainty in $y$, $u_i(y) \equiv |\partial y/\partial x_i| \cdot u(x_i)$, called a **component of combined standard uncertainty** of $y$.

The **combined standard uncertainty** of $y$, $u_c(y)$, is the positive square root of the sum of the squares of the components of combined standard uncertainty.

The combined standard uncertainty is multiplied by a **coverage factor** of $k = 2$ to obtain $U$, the **expanded uncertainty** of $y$.

Since it can be assumed that the possible estimated values of the massic activity are approximately normally distributed with approximate standard deviation $u_c(y)$, the unknown value of the massic activity is believed to lie in the interval $y \pm U$ with a level of confidence of approximately 95 percent.

For further information on the expression of uncertainties, see references [2] and [3].

[e] The value of each standard uncertainty component, and hence the value of the expanded uncertainty itself, is a best estimate based upon all available information, but is only approximately known. That is to say, the "uncertainty of the uncertainty" is large and not well known. This is true for uncertainties evaluated by statistical methods (e.g., the relative standard deviation of the standard deviation of the mean for the massic count rate is approximately 50%) and for uncertainties evaluated by other methods (which could easily be over estimated or under estimated by substantial amounts). The unknown value of the expanded uncertainty is believed to lie in the interval $U/2$ to $2U$ (i.e., within a factor of 2 of the estimated value).

[f] Estimated limits of detection for photon-emitting impurities are:
1.4 $\gamma \cdot s^{-1} \cdot g^{-1}$ for energies between 8 and 59 keV,
1.1 $\gamma \cdot s^{-1} \cdot g^{-1}$ for energies between 67 and 88 keV,
0.5 $\gamma \cdot s^{-1} \cdot g^{-1}$ for energies between 102 and 197 keV,
0.3 $\gamma \cdot s^{-1} \cdot g^{-1}$ for energies between 205 and 762 keV,
0.2 $\gamma \cdot s^{-1} \cdot g^{-1}$ for energies between 770 and 996 keV, and
0.1 $\gamma \cdot s^{-1} \cdot g^{-1}$ for energies between 1006 and 1900 keV,
provided that the photons are separated in energy by 4 keV or more from photons emitted in the decay of uranium-238, uranium-235, uranium-234, or their progeny.

[g] The stated uncertainty is the standard uncertainty. See reference [5].

[h] Relative standard uncertainty of the input quantity $x_i$.

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

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

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

## REFERENCES


[1] International Organization for Standardization (ISO), *ISO Standards Handbook - Quantities and Units*, 1993. Available from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036, U.S.A. 1-212-642-4900.

[2] International Organization for Standardization (ISO), *Guide to the Expression of Uncertainty in Measurement*, 1993. Available from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036, U.S.A. 1-212-642-4900. (Listed under ISO miscellaneous publications as "ISO Guide to the Expression 1993".)

[3] B. N. Taylor and C. E. Kuyatt, *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*, NIST Technical Note 1297, 1994. Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20407, U.S.A.

[4] National Council on Radiation Protection and Measurements Report No. 58, *A Handbook of Radioactivity Measurements Procedures*, Second Edition, 1985. Available from the National Council on Radiation Protection and Measurements, 7910 Woodmont Avenue, Bethesda, MD 20814 U.S.A.

[5] Evaluated Nuclear Structure Data File (ENSDF), August 1997.

U-238 working dilution

CDM 10-18-02

prepare a working dilution of U-238 643.2382.~~44~~43
to 40 dpm/ml by diluting w/ 1N $HNO_3$ (Lot #42207)

Copied from 643.2382.421

1) Determine the density of 1N $HNO_3$ (Lot #42207)

| | | |
|---|---|---|
| mass of 100 ml vol flask | 64.6667 g | (Bal 12) |
| mass of vol flask & 1N $HNO_3$ | 167.4861 g | |
| Net mass of ~~std~~ HNO3 RG 12/3/02 | 102.819 g | |

$\rho = .028$ g/mL

2) Transfer approx 20g ~~10~~ g CDM 10-18-02 of U-238 (643.2382.43)
to 1L wide mouth bottle

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

3) Dilute to final Vol w/ 1N $HNO_3$

| | | |
|---|---|---|
| mass of wide mouth (from above) | 74.1463 g | (Bal 12) |
| mass of wide mouth & std & 1N $HNO_3$ | 953.3 g | (Bal 26) |
| Net mass of std | 879.2 g | |

4) Final Activity Calculation

$$\frac{(1913.24\ \text{dpm/g})(17.878\ \text{g})(1.028\ \text{g/mL})}{879.2\ \text{g}} = \cancel{40.00}\ 39.99\ \text{dpm/mL}$$

CDM 10/18/02

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

Stnd ID: 643.2382.44 RG 11/10/02

| | |
|---|---|
| Description: | U-238 |
| Activity: | 39.99 dpm/ml |
| 2s Uncertainty: | 0.24 dpm/ml |
| Ref. Date: | 8/1/97 |
| Ref Time: | na 10/18/02 |
| Prep Date: | ~~10/4/02~~ Prep by: CM/DCB |
| Expiration: | 11/6/03 |
| Matrix/Comp. | 1.0N HNO3 |
| Half Life (y): | 4.47E+09 RG 11/10/02 |

RG 11/10/02

Read and Understood By

CDM [signature] 10-18-02 [signature] 11/10/02
Signed Date Signed Date

U-238 primary dilution

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

1) Transfer ampule to a 40 ml VOA Vial

mass of empty 50 ml beaker 29.3895 g (Bal 12)

mass of beaker + ampule 38.0584 g

CDM 10-18-02 ~~Net mass of std transferred~~ 8.6689 g

mass of beaker + empty ampule: 32.9475 g (Bal 12) Net mass of std transferred: 5.1109 g

2) Dilute to final volume w/ 1N $HNO_3$

mass of empty VOA Vial 22.0308 g (Bal 12)

mass of VOA vial + std + 1N $HNO_3$ 60.8186 g

Net mass of diluted ~~std~~ $HNO_3$ 38.7878 g

RG 12/5/02

3) Final activity Calculation

~~CH2~~ CDM 10-18-02

$$\frac{(242.0\ \text{Bq/g})(60\ \text{dpm/Bq})(\cancel{8.6689\ \text{g}})(.028\ \text{g/mL})}{38.7878\ \text{g}}$$

5.1109 g

CDM 10-18-02

from 642.2382.42

1966.808 dpm/mL

= ~~3334.02 dpm/mL~~ CDM 10-18-02

1913.24 dpm/g

= ~~3429.43 dpm/g~~ CDM 10-18-02

Continued on Page

Read and Understood By

CDM [signature] 10-18-02 Signed Date

[signature] 11/10/02 Signed Date

# National Institute of Standards & Technology

# Certificate

PAI IAD C643
rec'd 10-18-02

## Standard Reference Material 4321C
## Natural Uranium Radioactivity Standard

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

### Radiological Hazard

ie SRM ampoule contains uranium-238, uranium-235, and uranium-234 with a total activity of approximately 00 Bq. Uranium decays by alpha-particle emission. The progeny of uranium-238, uranium-235, and anium-234 have a total activity of approximately 2600 Bq and decay by alpha- and beta-particle emission. one of the alpha or beta particles escape from the SRM ampoule. During the decay process X-rays and mma rays with energies from 11 keV to 2.0 MeV are also emitted. Most of these photons escape from the RM ampoule but their intensities are so small that they do not represent a radiation hazard. Approximate nshielded dose rates at several distances (as of the reference time) are given in note [a]*. The SRM should e used only by persons qualified to handle radioactive material.

### Chemical Hazard

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

### Storage and Handling

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

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

### Preparation

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

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

Thomas E. Gills, Chief
Standard Reference Materials Program

Gaithersburg, Maryland 20899
November 1997

*Notes and references are on pages 5 and 6.

Recommended Procedure for Opening the SRM Ampoule

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

Wear eye protection, gloves, and protective clothing and work over a tray with absorbent paper in it. Work in a fume hood. In addition to the radioactive material, the solution contains strong acid and is corrosive.

Shake the ampoule to wet all of the inside surface of the ampoule. Return the ampoule to the upright position.

Check that all of the liquid has drained out of the neck of the ampoule. If necessary, gently tap the neck to speed the process.

Holding the ampoule upright, score the narrowest part of the neck with a scribe or diamond pencil.

Lightly wet the scored line. This reduces the crack propagation velocity and makes for a cleaner break.

Hold the ampoule upright with a paper towel, a wiper, or a support jig. Position the scored line away from you. Using a paper towel or wiper to avoid contamination, snap off the top of the ampoule by pressing the narrowest part of the neck away from you while pulling the tip of the ampoule towards you.

Transfer the solution from the ampoule using a pycnometer or a pipet with dispenser handle. NEVER PIPETTE BY MOUTH.

Seal any unused SRM solution in a flame-sealed glass ampoule, if possible, to minimize the evaporation loss.

e also reference [4]*.

*Notes and references are on pages 5 and 6.

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

| | |
|---|---|
| ource identification number | NIST SRM 4321C |
| hysical Properties: | |
| ource description | Liquid in flame-sealed NIST borosilicate-glass ampoule |
| Ampoule specifications | Body outside diameter (16.5 ± 0.5) mm<br>Wall Thickness (0.60 ± 0.04) mm<br>Barium content Less than 2.5%<br>Lead-oxide content Less than 0.02%<br>Other heavy elements Trace quantities |
| Solution density | (1.053 ± 0.001) $g \cdot mL^{-1}$ at 21.4 °C [b]* |
| Solution mass | (5.258 ± 0.002) g [b] |

Chemical Properties:

| Solution composition | Chemical Formula | Concentration ($mol \cdot L^{-1}$) | Mass Fraction ($g \cdot g^{-1}$) |
|---|---|---|---|
| | $H_2O$ | 53 | 0.91 |
| | $HNO_3$ | 1.0 | 0.06 |
| | $UO_2(NO_3)_2$ | 0.09 | 0.03 |

Radiological Properties:

| | |
|---|---|
| Radionuclide | Natural Uranium (Mixture of U-238, U-235, and U-234) |
| Reference time | 1200 EST, 1 August 1997 |
| Massic activity of the solution [c] | U-238: 242.0 $Bq \cdot g^{-1}$<br>U-235: 11.14 $Bq \cdot g^{-1}$<br>U-234: 233.1 $Bq \cdot g^{-1}$ |
| Relative expanded uncertainty ($k=2$) | U-238: 0.60% [d] [e]<br>U-235: 0.62% [d] [e]<br>U-234: 0.98% [d] [e] |
| Mass fraction of uranium | (0.01960 ± 0.00010) $g \cdot g^{-1}$ [b] |
| Photon-emitting impurities | None detected [f] |
| Half lives used | Uranium-238: (4.468 ± 0.003) × $10^9$ a [g]<br>Uranium-235: (7.038 ± 0.005) × $10^8$ a [g]<br>Uranium-234: (2.455 ± 0.006) × $10^5$ a [g] |
| Measuring instruments | Mass spectrometer, silicon surface-barrier detector, and $4\pi(\alpha+\beta)$ liquid-scintillation counting systems. |

*Notes and references are on pages 5 and 6.

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

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

*Notes and references are on pages 5 and 6.

NOTES

The Sievert is the SI unit for dose equivalent. See reference [1]. One μSv is equal to 0.1 mrem.

| Distance from Ampoule (cm): | 1 | 30 | 100 |
|---|---|---|---|
| Approximate Dose Rate (μSv/h): | <0.1 | - | - |

The stated uncertainty is two times the standard uncertainty.

Massic activity is the preferred name for the quantity activity divided by the total mass of the sample. See reference [1].

The reported value, $y$, of massic activity (activity per unit mass) at the reference time was not measured directly but was derived from measurements and calculations of other quantities. This can be expressed as $y = f(x_1, x_2, x_3, \ldots x_n)$, where $f$ is a mathematical function derived from the assumed model of the measurement process.

The value, $x_i$, used for each input quantity $i$ has a standard uncertainty, $u(x_i)$, that generates a corresponding uncertainty in $y$, $u_i(y) \equiv |\partial y/\partial x_i| \cdot u(x_i)$, called a component of combined standard uncertainty of $y$.

The combined standard uncertainty of $y$, $u_c(y)$, is the positive square root of the sum of the squares of the components of combined standard uncertainty.

The combined standard uncertainty is multiplied by a coverage factor of $k = 2$ to obtain $U$, the expanded uncertainty of $y$.

Since it can be assumed that the possible estimated values of the massic activity are approximately normally distributed with approximate standard deviation $u_c(y)$, the unknown value of the massic activity is believed to lie in the interval $y \pm U$ with a level of confidence of approximately 95 percent.

For further information on the expression of uncertainties, see references [2] and [3].

[e] The value of each standard uncertainty component, and hence the value of the expanded uncertainty itself, is a best estimate based upon all available information, but is only approximately known. That is to say, the "uncertainty of the uncertainty" is large and not well known. This is true for uncertainties evaluated by statistical methods (e.g., the relative standard deviation of the standard deviation of the mean for the massic count rate is approximately 50%) and for uncertainties evaluated by other methods (which could easily be over estimated or under estimated by substantial amounts). The unknown value of the expanded uncertainty is believed to lie in the interval $U/2$ to $2U$ (i.e., within a factor of 2 of the estimated value).

[f] Estimated limits of detection for photon-emitting impurities are:
1.4 $\gamma \cdot s^{-1} \cdot g^{-1}$ for energies between 8 and 59 keV,
1.1 $\gamma \cdot s^{-1} \cdot g^{-1}$ for energies between 67 and 88 keV,
0.5 $\gamma \cdot s^{-1} \cdot g^{-1}$ for energies between 102 and 197 keV,
0.3 $\gamma \cdot s^{-1} \cdot g^{-1}$ for energies between 205 and 762 keV,
0.2 $\gamma \cdot s^{-1} \cdot g^{-1}$ for energies between 770 and 996 keV, and
0.1 $\gamma \cdot s^{-1} \cdot g^{-1}$ for energies between 1006 and 1900 keV,
provided that the photons are separated in energy by 4 keV or more from photons emitted in the decay of uranium-238, uranium-235, uranium-234, or their progeny.

[g] The stated uncertainty is the standard uncertainty. See reference [5].

Relative standard uncertainty of the input quantity $x_i$.

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

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

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

## REFERENCES


International Organization for Standardization (ISO), *ISO Standards Handbook - Quantities and Units*, 1993. Available from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036, U.S.A. 1-212-642-4900.

International Organization for Standardization (ISO), *Guide to the Expression of Uncertainty in Measurement*, 1993. Available from the American National Standards Institute, 11 West 42nd Street, New York, NY 10036, U.S.A. 1-212-642-4900. (Listed under ISO miscellaneous publications as "ISO Guide to the Expression 1993".)

] B. N. Taylor and C. E. Kuyatt, *Guidelines for Evaluating and Expressing the Uncertainty of NIST Measurement Results*, NIST Technical Note 1297, 1994. Available from the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20407, U.S.A.

4] National Council on Radiation Protection and Measurements Report No. 58, *A Handbook of Radioactivity Measurements Procedures*, Second Edition, 1985. Available from the National Council on Radiation Protection and Measurements, 7910 Woodmont Avenue, Bethesda, MD 20814 U.S.A.

5] Evaluated Nuclear Structure Data File (ENSDF), August 1997.

PARAGON ANALYTICS
Radiochemistry Data Package

Section 8

# CHAIN OF CUSTODY

8

# Paragon Analytics

## Sample Number(s) Cross-Reference Table

**Paragon OrderNum:** 0405097
**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 |
|---|---|---|---|---|---|
| HR-01 | 0405097-1 | | SOLID | 06-May-04 | 19:00 |
| MR-01 | 0405097-2 | | SOLID | 07-May-04 | 13:30 |
| MR-02 | 0405097-3 | | SOLID | 07-May-04 | 13:20 |
| GR-01 | 0405097-4 | | SOLID | 07-May-04 | 13:11 |
| GR-02 | 0405097-5 | | SOLID | 07-May-04 | 13:38 |
| GR-03 | 0405097-6 | | SOLID | 07-May-04 | 14:00 |
| GR-04 | 0405097-7 | | SOLID | 07-May-04 | 14:20 |
| GR-05 | 0405097-8 | | SOLID | 07-May-04 | 14:38 |
| GR-06 | 0405097-9 | | SOLID | 07-May-04 | 14:58 |
| GR-07 | 0405097-10 | | SOLID | 07-May-04 | 15:10 |
| GR-08 | 0405097-11 | | SOLID | 07-May-04 | 15:10 |
| GR-09 | 0405097-12 | | SOLID | 07-May-04 | 15:20 |
| GR-10 | 0405097-13 | | SOLID | 07-May-04 | 15:35 |
| QM-01 | 0405097-14 | | SOLID | 03-May-04 | 13:40 |
| QM-02 | 0405097-15 | | SOLID | 03-May-04 | 14:00 |
| QM-03 | 0405097-16 | | SOLID | 03-May-04 | 14:20 |
| 300-01 | 0405097-17 | | SOLID | 04-May-04 | 9:50 |
| 300-02 | 0405097-18 | | SOLID | 07-May-04 | 16:30 |
| 700-01 | 0405097-19 | | SOLID | 07-May-04 | 17:00 |
| 700-02 | 0405097-20 | | SOLID | 07-May-04 | 17:30 |
| 700-03 | 0405097-21 | | SOLID | 07-May-04 | 17:20 |
| 700-04 | 0405097-22 | | SOLID | 07-May-04 | 18:00 |
| 900-01 | 0405097-23 | | SOLID | 07-May-04 | 13:00 |
| 900-02 | 0405097-24 | | SOLID | 07-May-04 | 12:10 |
| 900-03 | 0405097-25 | | SOLID | 07-May-04 | 12:30 |
| 900-04 | 0405097-26 | | SOLID | 07-May-04 | 19:00 |
| 900-05 | 0405097-27 | | SOLID | 07-May-04 | 18:40 |
| OSA-01 | 0405097-28 | | SOLID | 06-May-04 | 14:00 |
| OSA-02 | 0405097-29 | | SOLID | 06-May-04 | 19:00 |
| OSA-03 | 0405097-30 | | SOLID | 06-May-04 | 17:00 |

**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) 0405097

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 | | SOIL | 3 | | | | | | | | | | C | | | | | | | | | | X | | | X | | | X | |
| SOIL-02 | 5-6 | 1540 | | SOIL | 3 | | | | | | | | | | C | | | | | | | | | | X | | | X | | | X | |
| SOIL-04 | 5-6 | 1504 | | SOIL | 3 | | | | | | | | | | C | | | | | | | | | | X | | | X | | | X | |
| SOIL-05 | 5-6 | 1510 | | SOIL | 3 | | | | | | | | | | C | | | | | | | | | | X | | | X | | | X | |
| SOIL-07 | 5-7 | 1350 | | SOIL | 3 | | | | | | | | | | C | | | | | | | | | | X | | | X | | | X | |
| SOIL-08 | 5-7 | 1615 | | SOIL | 3 | | | | | | | | | | C | | | | | | | | | | X | | | X | | | X | |
| SOIL-09 | 5-7 | 1410 | | SOIL | 3 | | | | | | | | | | C | | | | | | | | | | X | | | X | | | X | |
| SOIL-10 | 5-7 | 1640 | | SOIL | 3 | | | | | | | | | | C | | | | | | | | | | X | | | X | | | X | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| HR-01 | 5-6 | 1900 | 1 | RK | 1 | | | | | | | | | | C | | | | | | | | | | X | | | X | | | X | |

Comments:

(*) on WO # 0405096
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 AWolf
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)

0000211

* Time Zone (circle one): EST CST MST PST

** Indicate specific analytes under comments.

Distribution: white / yellow (Paragon); pink retained by originator.

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800-443-1511 or (970) 490-1511 (970) 490-1522 Fax

# Chain-of-Custody

Accession Number (LAB ID) 0405097

Date _____ Page 6 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 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 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MR-01 | 5-7 | 1330 | 2 | RK | 3 | | | | | | | | | | C | | | | | | | | | | | X | | | X | | | X |
| MR-02 | 5-7 | 1320 | 3 | RK | 3 | | | | | | | | | | C | | | | | | | | | | | X | | | X | | | X |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| GR-01 | 5-7 | 1311 | 4 | RK | 1 | | | | | | | | | | C | | | | | | | | | | | X | | | X | | | X |
| GR-02 | | 1338 | 5 | | 1 | | | | | | | | | | C | | | | | | | | | | | | | | | | | |
| GR-03 | | 1400 | 6 | | 1 | | | | | | | | | | C | | | | | | | | | | | | | | | | | |
| GR-04 | | 1420 | 7 | | 1 | | | | | | | | | | C | | | | | | | | | | | | | | | | | |
| GR-05 | | 1438 | 8 | | 1 | | | | | | | | | | C | | | | | | | | | | | | | | | | | |
| GR-06 | | 1458 | 9 | | 1 | | | | | | | | | | C | | | | | | | | | | | | | | | | | |
| GR-07 | | 1510 | 10 | | 1 | | | | | | | | | | C | | | | | | | | | | | | | | | | | |

Comments:

000212

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 | Signature |
| Printed Name Amy Wolf | Printed Name |
| Date 5/11/04 Time 10:15 | Date Time |
| Company Paragon Analytics | Company |

** Indicate specific analytes under comments

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# Chain-of-Custody

Accession Number (LAB ID) 0405097

Date _____ Page 7 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~~ 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 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| GR-08 | 5-7 | 1510 | 11 | RK | 1 | | | | | | | | | | C | | | | | | | | | | | X | | | X | | | X |
| GR-09 | ↓ | 1520 | 12 | ↓ | 1 | | | | | | | | | | C | | | | | | | | | | | X | | | X | | | X |
| GR-10 | ↓ | 1535 | 13 | ↓ | 1 | | | | | | | | | | C | | | | | | | | | | | X | | | X | | | X |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| QM-01 | 5-3 | 1340 | 14 | RK | 1 | | | | | | | | | | C | | | | | | | | | | | X | | | X | | | X |
| QM-02 | ↓ | 1400 | 15 | ↓ | 1 | | | | | | | | | | C | | | | | | | | | | | X | | | X | | | X |
| QM-03 | ↓ | 1420 | 16 | ↓ | 1 | | | | | | | | | | C | | | | | | | | | | | X | | | X | | | X |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 300-01 | 5-4 | 0950 | 17 | RK | 1 | | | | | | | | | | C | | | | | | | | | | | X | | | X | | | X |
| 300-02 | 5-7 | 1630 | 18 | RK | 1 | | | | | | | | | | C | | | | | | | | | | | X | | | X | | | X |

Comments:

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 [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)

000213

* Time Zone (circle one): EST CST MST PST ** Indicate specific analytes under comments. Distribution: white / yellow (Paragon); pink retained by originator.

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# Chain-of-Custody

Accession Number (LAB ID) 0405097

Date _____ Page 8 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 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 / Pa 231 / Pb 210 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 700-01 | 5-7 | 1700 | 19 | RK | 3 | | | | | | | | | | X | | | | | | | | | | | X | | | X | | | X | X |
| 700-02 | 5-7 | 1730 | 20 | RK | 1 | | | | | | | | | | (C) | | | | | | | | | | | X | | | X | | | X | |
| 700-03 | 5-7 | 1720 | 21 | RK | 3 | | | | | | | | | | X | | | | | | | | | | | X | | | X | | | X | X |
| 700-04 | 5-7 | 18:00 | 22 | RK | 1 | | | | | | | | | | (C) | | | | | | | | | | | X | | | X | | | X | |
| 900-01 | 5-7 | 1300 | 23 | RK | 3 | | | | | | | | | | X | | | | | | | | | | | X | | | X | | | X | X |
| 900-02 | ↓ | 1210 | 24 | ↓ | 1 | | | | | | | | | | (C) | | | | | | | | | | | ↓ | | | ↓ | | | ↓ | |
| 900-03 | | 1230 | 25 | | 1 | | | | | | | | | | (C) | | | | | | | | | | | | | | | | | | |
| 900-04 | | 1900 | 26 | | 1 | | | | | | | | | | (C) | | | | | | | | | | | | | | | | | | |
| 900-05 | | 1840 | 27 | | 1 | | | | | | | | | | (C) | | | | | | | | | | | | | | | | | | |

Comments:
(C) Hold analysis pending metal results from samples 700-01, 700-02, 900-01, OSA-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 [signature] | Signature |
| Printed Name Amy Wolf | Printed Name |
| Date 5/11/04 Time 1645 | Date Time |
| Company Paragon Analytics | Company |

000214

Form 202r4.xls (1/3/01)

* Time Zone ... EST, CST, MST, PST ** Indicate specific analytes under comments

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# Chain-of-Custody

Accession Number (LAB ID) 0405097
Date _____ Page 9 of ____

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~~ 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 / Pa 231 / Pb 210 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| OSA-01 | 5-6 | 1400 | 28 | RK | 3 | | | | | | | | | | X | | | | | | | | | | | X | | | X | | | X | X |
| OSA-02 | 5-6 | 1900 | 29 | ↓ | 3 | | | | | | | | | | (C) | | | | | | | | | | | X | | | X | | | X | |
| OSA-03 | 5-6 | 1700 | 30 | ↓ | 3 | | | | | | | | | | (C) | | | | | | | | | | | X | | | X | | | X | |

Comments:
(C) Hold analysis pending metal results from samples OSA-01, 700-01, 700-03, and 900-01.

000215

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 [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 ... EST, CST, MST, PST ** Indicate specific analytes under comments

Distribution: white / yellow (Paragon); pink retained by originator.

# Paragon Analytics, Inc. -- Fort Collins, Colorado

## CONDITION OF SAMPLE UPON RECEIPT FORM

CLIENT: Kent + Sullivan WORKORDER NO: 0405097

PROJECT MANAGER: Debbie Fazio INITIALS: AW 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 | 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 5/12/04

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

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

# Paragon Analytics, Inc. -- Fort Collins, Colorado

## CONDITION OF SAMPLE UPON RECEIPT FORM

CLIENT: Kent + Sullivan WORKORDER NO: 0405097

PROJECT MANAGER: Debbie Fazio INITIALS: DW 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.
- [ ] **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.

Was the client contacted? ___ No; ✓ Yes: Name Sue Kent Date/Time 5/12/04

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: DF 5/12/04

000217

0405096
0405097

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

1-800-2ALASKA

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

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

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

#949 2 seals

ARTIC 0-0410-3-1635

0405096
0405097

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°C

#868

2 seals

ARTIC 0-0410-3-1635

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°C

#22

2 seals

ARTIC 0-0410-3-1635

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:_____ Date/Time:_____

**Project Manager Signature/ Date:** _____

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:_____ Date/Time:_____

**Project Manager Signature/ Date:** _____

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:_____ Date/Time:_____

**Project Manager Signature/ Date:** _____

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:_____ Date/Time:_____

**Project Manager Signature/ Date:** _____

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:_____ Date/Time:_____

**Project Manager Signature/ Date:** _____

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:_____ Date/Time:_____

**Project Manager Signature/ Date:** _____

PARAGON ANALYTICS
Radiochemistry Data Package

Section 9

# ADDITIONAL SUPPORTING DOCUMENTATION

9

# Alpha Spectroscopy

# Quality Control Data

# Weekly Background, Energy, and Efficiency Calibrations

# Calibration Data Summary

**Laboratory Name:** Paragon Analytics
**PAI Work Order:** 0405097

**Prep SOP:** PAI 778
**Analytical SOP:** PAI 714

**Reported on:** Thursday, July 22, 2004
1:34:49 PM

| Lab Sample ID<br>Spectrum<br>Analysis Date | QC Type | Batch ID<br>Analysis Run | Test Name | Detector Id | Eff Spectrum<br>Bkg Spectrum<br>Egy Spectrum | Eff Date<br>Bkg Date<br>Egy Date | RESULTS<br>%Efficiency<br>Bkg CPM<br>Energy keV | FLAGS<br>Efficiency<br>Background<br>Energy | LCL<br>%Efficiency<br>Bkg CPM<br>Energy keV | LWL<br>%Efficiency<br>Bkg CPM<br>Energy keV | UWL<br>%Efficiency<br>Bkg CPM<br>Energy keV | UCL<br>%Efficiency<br>Bkg CPM<br>Energy keV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0405097-1 | SMP | AS040712-5 | UISO | 10 | C4071010 | 7/10/2004 | 30.42 | Pass | 28.38 | 28.88 | 30.86 | 31.36 |
| UX50971 | | AS040712-5A | | | B4071010 | 7/11/2004 | 0.2050 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/16/2004 | | | | | C4071010 | 7/10/2004 | 5541.2 | Pass | 5497.3 | 5507.3 | 5587.3 | 5597.3 |
| 0405097-2 | SMP | AS040629-7 | UISO | 15 | C4070615 | 7/6/2004 | 29.29 | Pass | 28.43 | 28.94 | 30.83 | 31.43 |
| U50972 | | AS040629-7A | | | B4070615 | 7/7/2004 | 0.3990 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/9/2004 | | | | | C4070615 | 7/6/2004 | 5541.1 | Pass | 5535.0 | 5538.0 | 5550.0 | 5553.0 |
| 0405097-2 | DUP | AS040629-7 | UISO | 16 | C4070616 | 7/6/2004 | 28.97 | Pass | 27.77 | 28.27 | 30.11 | 30.69 |
| U50972D | | AS040629-7A | | | B4070616 | 7/7/2004 | 0.3160 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/9/2004 | | | | | C4070616 | 7/6/2004 | 5542.0 | Pass | 5506.9 | 5516.9 | 5596.9 | 5606.9 |
| 0405097-3 | SMP | AS040629-7 | UISO | 11 | C4070611 | 7/6/2004 | 29.00 | Pass | 26.79 | 27.27 | 29.13 | 29.61 |
| UR50973 | | AS040629-7A | | | B4070611 | 7/7/2004 | 0.1930 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/9/2004 | | | | | C4070611 | 7/6/2004 | 5537.2 | Pass | 5484.4 | 5494.4 | 5574.4 | 5584.4 |
| 0405097-4 | SMP | AS040629-9 | UISO | 64 | C4070664 | 7/6/2004 | 30.68 | Pass | 29.04 | 29.56 | 31.49 | 32.10 |
| U50974 | | AS040629-9b | | | B4070664 | 7/7/2004 | 0.2890 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/8/2004 | | | | | C4070664 | 7/6/2004 | 5536.6 | Pass | 5520.0 | 5530.0 | 5610.0 | 5620.0 |
| 0405097-5 | SMP | AS040629-9 | UISO | 9 | C4070609 | 7/6/2004 | 29.27 | Pass | 28.42 | 28.93 | 30.91 | 31.42 |
| U50975 | | AS040629-9b | | | B4070609 | 7/7/2004 | 0.1980 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/8/2004 | | | | | C4070609 | 7/6/2004 | 5535.6 | Pass | 5477.6 | 5487.6 | 5567.6 | 5577.6 |
| 0405097-5 | DUP | AS040629-9 | UISO | 10 | C4070610 | 7/6/2004 | 29.73 | Pass | 28.38 | 28.88 | 30.86 | 31.36 |
| U50975D | | AS040629-9b | | | B4070610 | 7/7/2004 | 0.2290 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/8/2004 | | | | | C4070610 | 7/6/2004 | 5553.5 | Pass | 5497.3 | 5507.3 | 5587.3 | 5597.3 |
| 0405097-6 | SMP | AS040629-9 | UISO | 11 | C4070611 | 7/6/2004 | 29.00 | Pass | 26.79 | 27.27 | 29.13 | 29.61 |
| U50976 | | AS040629-9b | | | B4070611 | 7/7/2004 | 0.1930 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/8/2004 | | | | | C4070611 | 7/6/2004 | 5537.2 | Pass | 5484.4 | 5494.4 | 5574.4 | 5584.4 |
| 0405097-7 | SMP | AS040629-9 | UISO | 12 | C4070612 | 7/6/2004 | 29.45 | Pass | 27.56 | 28.05 | 29.97 | 30.46 |
| U50977 | | AS040629-9b | | | B4070612 | 7/7/2004 | 0.3760 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/8/2004 | | | | | C4070612 | 7/6/2004 | 5550.7 | Pass | 5493.9 | 5503.9 | 5583.9 | 5593.9 |

**Data Package ID:** *ur0405097-1*

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.



000228

# Calibration Data Summary

**Laboratory Name:** **Paragon Analytics**
**PAI Work Order:** 0405097

**Prep SOP:** PAI 778
**Analytical SOP:** PAI 714

**Reported on:** Thursday, July 22, 2004
1:35:59 PM

| Lab Sample ID<br>Spectrum<br>Analysis Date | QC Type | Batch ID<br>Analysis Run | Test Name | Detector Id | Eff Spectrum<br>Bkg Spectrum<br>Egy Spectrum | Eff Date<br>Bkg Date<br>Egy Date | RESULTS<br>%Efficiency<br>Bkg CPM<br>Energy keV | FLAGS<br>Efficiency<br>Background<br>Energy | LCL<br>%Efficiency<br>Bkg CPM<br>Energy keV | LWL<br>%Efficiency<br>Bkg CPM<br>Energy keV | UWL<br>%Efficiency<br>Bkg CPM<br>Energy keV | UCL<br>%Efficiency<br>Bkg CPM<br>Energy keV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0405097-8 | SMP | AS040629-9 | UISO | 13 | C4070613 | 7/6/2004 | 31.29 | Pass | 29.90 | 30.43 | 32.51 | 33.04 |
| U50978 | | AS040629-9b | | | B4070613 | 7/7/2004 | 0.2770 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/8/2004 | | | | | C4070613 | 7/6/2004 | 5553.8 | Pass | 5504.0 | 5514.0 | 5594.0 | 5604.0 |
| 0405097-9 | SMP | AS040629-9 | UISO | 15 | C4070615 | 7/6/2004 | 29.29 | Pass | 28.43 | 28.94 | 30.83 | 31.43 |
| U50979 | | AS040629-9b | | | B4070615 | 7/7/2004 | 0.3990 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/8/2004 | | | | | C4070615 | 7/6/2004 | 5541.1 | Pass | 5535.0 | 5538.0 | 5550.0 | 5553.0 |
| 0405097-10 | SMP | AS040629-9 | UISO | 16 | C4070616 | 7/6/2004 | 28.97 | Pass | 27.77 | 28.27 | 30.11 | 30.69 |
| U509710 | | AS040629-9b | | | B4070616 | 7/7/2004 | 0.3160 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/8/2004 | | | | | C4070616 | 7/6/2004 | 5542.0 | Pass | 5506.9 | 5516.9 | 5596.9 | 5606.9 |
| 0405097-11 | SMP | AS040629-9 | UISO | 17 | C4070617 | 7/6/2004 | 30.43 | Pass | 29.36 | 29.88 | 31.83 | 32.45 |
| U509711 | | AS040629-9b | | | B4070617 | 7/7/2004 | 0.4090 | Warning | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/8/2004 | | | | | C4070617 | 7/6/2004 | 5530.5 | Pass | 5483.4 | 5493.4 | 5573.4 | 5583.4 |
| 0405097-12 | SMP | AS040629-9 | UISO | 18 | C4070618 | 7/6/2004 | 29.88 | Pass | 28.80 | 29.32 | 31.23 | 31.84 |
| U509712 | | AS040629-9b | | | B4070618 | 7/7/2004 | 0.3420 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/8/2004 | | | | | C4070618 | 7/6/2004 | 5549.0 | Pass | 5499.6 | 5509.6 | 5589.6 | 5599.6 |
| 0405097-13 | SMP | AS040629-9 | UISO | 19 | C4070619 | 7/6/2004 | 29.44 | Pass | 27.15 | 27.64 | 29.44 | 30.01 |
| U509713 | | AS040629-9b | | | B4070619 | 7/7/2004 | 0.2440 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/8/2004 | | | | | C4070619 | 7/6/2004 | 5554.7 | Pass | 5492.2 | 5502.2 | 5582.2 | 5592.2 |
| 0405097-14 | SMP | AS040629-9 | UISO | 21 | C4070621 | 7/6/2004 | 28.83 | Pass | 27.83 | 28.32 | 30.17 | 30.75 |
| U509714 | | AS040629-9b | | | B4070621 | 7/7/2004 | 0.3930 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/8/2004 | | | | | C4070621 | 7/6/2004 | 5546.6 | Pass | 5491.1 | 5501.1 | 5581.1 | 5591.1 |
| 0405097-15 | SMP | AS040629-9 | UISO | 22 | C4070622 | 7/6/2004 | 28.78 | Pass | 27.18 | 27.67 | 29.47 | 30.04 |
| U509715 | | AS040629-9b | | | B4070622 | 7/7/2004 | 0.2810 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/8/2004 | | | | | C4070622 | 7/6/2004 | 5557.4 | Pass | 5503.6 | 5513.6 | 5593.6 | 5603.6 |
| 0405097-16 | SMP | AS040629-9 | UISO | 42 | C4070642 | 7/6/2004 | 31.60 | Pass | 29.74 | 30.28 | 32.25 | 32.88 |
| U509716 | | AS040629-9b | | | B4070642 | 7/7/2004 | 0.2700 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/8/2004 | | | | | C4070642 | 7/6/2004 | 5561.3 | Pass | 5494.2 | 5504.2 | 5584.2 | 5594.2 |

**Data Package ID:** *ur0405097-1*

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:** 0405097

**Prep SOP:** PAI 778
**Analytical SOP:** PAI 714

**Reported on:** Thursday, July 22, 2004
1:36:21 PM

| Lab Sample ID<br>Spectrum<br>Analysis Date | QC Type | Batch ID<br>Analysis Run | Test Name | Detector Id | Eff Spectrum<br>Bkg Spectrum<br>Egy Spectrum | Eff Date<br>Bkg Date<br>Egy Date | RESULTS<br>%Efficiency<br>Bkg CPM<br>Energy keV | FLAGS<br>Efficiency<br>Background<br>Energy | LCL<br>%Efficiency<br>Bkg CPM<br>Energy keV | LWL<br>%Efficiency<br>Bkg CPM<br>Energy keV | UWL<br>%Efficiency<br>Bkg CPM<br>Energy keV | UCL<br>%Efficiency<br>Bkg CPM<br>Energy keV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0405097-17 | SMP | AS040629-7 | UISO | 18 | C4070618 | 7/6/2004 | 29.88 | Pass | 28.80 | 29.32 | 31.23 | 31.84 |
| U509717 | | AS040629-7A | | | B4070618 | 7/7/2004 | 0.3420 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/9/2004 | | | | | C4070618 | 7/6/2004 | 5549.0 | Pass | 5499.6 | 5509.6 | 5589.6 | 5599.6 |
| 0405097-18 | SMP | AS040629-9 | UISO | 43 | C4070643 | 7/6/2004 | 30.43 | Pass | 29.78 | 30.29 | 32.20 | 32.80 |
| U509718 | | AS040629-9b | | | B4070643 | 7/7/2004 | 0.2880 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/8/2004 | | | | | C4070643 | 7/6/2004 | 5555.4 | Pass | 5476.5 | 5486.5 | 5566.5 | 5576.5 |
| 0405097-19 | SMP | AS040629-7 | UISO | 13 | C4070613 | 7/6/2004 | 31.29 | Pass | 29.90 | 30.43 | 32.51 | 33.04 |
| UR509719 | | AS040629-7A | | | B4070613 | 7/7/2004 | 0.2770 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/9/2004 | | | | | C4070613 | 7/6/2004 | 5553.8 | Pass | 5504.0 | 5514.0 | 5594.0 | 5604.0 |
| 0405097-20 | SMP | AS040712-5 | UISO | 11 | C4071011 | 7/10/2004 | 29.04 | Pass | 26.79 | 27.27 | 29.13 | 29.61 |
| UX509720 | | AS040712-5A | | | B4071011 | 7/11/2004 | 0.1910 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/16/2004 | | | | | C4071011 | 7/10/2004 | 5535.4 | Pass | 5484.4 | 5494.4 | 5574.4 | 5584.4 |
| 0405097-20 | DUP | AS040712-5 | UISO | 12 | C4071012 | 7/10/2004 | 28.94 | Pass | 27.56 | 28.05 | 29.97 | 30.46 |
| UX509720D | | AS040712-5A | | | B4071012 | 7/11/2004 | 0.3800 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/16/2004 | | | | | C4071012 | 7/10/2004 | 5543.2 | Pass | 5493.9 | 5503.9 | 5583.9 | 5593.9 |
| 0405097-21 | SMP | AS040629-7 | UISO | 15 | C4070615 | 7/6/2004 | 29.29 | Pass | 28.43 | 28.94 | 30.83 | 31.43 |
| UR509721 | | AS040629-7A | | | B4070615 | 7/7/2004 | 0.3990 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/9/2004 | | | | | C4070615 | 7/6/2004 | 5541.1 | Pass | 5535.0 | 5538.0 | 5550.0 | 5553.0 |
| 0405097-22 | SMP | AS040629-7 | UISO | 22 | C4070622 | 7/6/2004 | 28.78 | Pass | 27.18 | 27.67 | 29.47 | 30.04 |
| U509722 | | AS040629-7A | | | B4070622 | 7/7/2004 | 0.2810 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/9/2004 | | | | | C4070622 | 7/6/2004 | 5557.4 | Pass | 5503.6 | 5513.6 | 5593.6 | 5603.6 |
| 0405097-23 | SMP | AS040629-7 | UISO | 23 | C4070623 | 7/6/2004 | 28.56 | Pass | 27.21 | 27.72 | 29.53 | 30.10 |
| U509723 | | AS040629-7A | | | B4070823 | 7/9/2004 | 0.3210 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/9/2004 | | | | | C4070623 | 7/6/2004 | 5548.0 | Pass | 5490.3 | 5500.3 | 5580.3 | 5590.3 |
| 0405097-23 | DUP | AS040629-7 | UISO | 62 | C4071062 | 7/10/2004 | 30.67 | Pass | 28.57 | 29.08 | 31.06 | 31.57 |
| UR509723D | | AS040629-7A | | | B4071062 | 7/11/2004 | 0.2060 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/11/2004 | | | | | C4071062 | 7/10/2004 | 5556.2 | Pass | 5493.0 | 5503.0 | 5583.0 | 5593.0 |

**Data Package ID:** *ur0405097-1*

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.



0230

# Calibration Data Summary

**Laboratory Name:** **Paragon Analytics**
**PAI Work Order:** 0405097

**Prep SOP:** PAI 778
**Analytical SOP:** PAI 714

**Reported on:** Thursday, July 22, 2004
1:36:21 PM

| Lab Sample ID<br>Spectrum<br>Analysis Date | QC Type | Batch ID<br>Analysis Run | Test Name | Detector Id | Eff Spectrum<br>Bkg Spectrum<br>Egy Spectrum | Eff Date<br>Bkg Date<br>Egy Date | RESULTS<br>%Efficiency<br>Bkg CPM<br>Energy keV | FLAGS<br>Efficiency<br>Background<br>Energy | LCL<br>%Efficiency<br>Bkg CPM<br>Energy keV | LWL<br>%Efficiency<br>Bkg CPM<br>Energy keV | UWL<br>%Efficiency<br>Bkg CPM<br>Energy keV | UCL<br>%Efficiency<br>Bkg CPM<br>Energy keV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0405097-24 | SMP | AS040629-7 | UISO | 42 | C4070642 | 7/6/2004 | 31.60 | Pass | 29.74 | 30.28 | 32.25 | 32.88 |
| U509724 | | AS040629-7A | | | B4070642 | 7/7/2004 | 0.2700 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/9/2004 | | | | | C4070642 | 7/6/2004 | 5561.3 | Pass | 5494.2 | 5504.2 | 5584.2 | 5594.2 |
| 0405097-25 | SMP | AS040629-7 | UISO | 16 | C4070616 | 7/6/2004 | 28.97 | Pass | 27.77 | 28.27 | 30.11 | 30.69 |
| UR509725 | | AS040629-7A | | | B4070616 | 7/7/2004 | 0.3160 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/9/2004 | | | | | C4070616 | 7/6/2004 | 5542.0 | Pass | 5506.9 | 5516.9 | 5596.9 | 5606.9 |
| 0405097-26 | SMP | AS040712-5 | UISO | 13 | C4071013 | 7/10/2004 | 31.40 | Pass | 29.90 | 30.43 | 32.51 | 33.04 |
| UX509726 | | AS040712-5A | | | B4071013 | 7/11/2004 | 0.2980 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/16/2004 | | | | | C4071013 | 7/10/2004 | 5551.6 | Pass | 5504.0 | 5514.0 | 5594.0 | 5604.0 |
| 0405097-27 | SMP | AS040712-5 | UISO | 15 | C4071015 | 7/10/2004 | 29.50 | Pass | 28.43 | 28.94 | 30.83 | 31.43 |
| UX509727 | | AS040712-5A | | | B4071015 | 7/11/2004 | 0.3470 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/16/2004 | | | | | C4071015 | 7/10/2004 | 5540.4 | Pass | 5535.0 | 5538.0 | 5550.0 | 5553.0 |
| 0405097-28 | SMP | AS040629-7 | UISO | 44 | C4070644 | 7/6/2004 | 30.81 | Pass | 29.31 | 29.84 | 31.78 | 32.40 |
| U509728 | | AS040629-7A | | | B4070644 | 7/7/2004 | 0.4240 | Warning | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/9/2004 | | | | | C4070644 | 7/6/2004 | 5558.0 | Pass | 5508.2 | 5518.2 | 5598.2 | 5608.2 |
| 0405097-29 | SMP | AS040629-7 | UISO | 17 | C4070617 | 7/6/2004 | 30.43 | Pass | 29.36 | 29.88 | 31.83 | 32.45 |
| UR509729 | | AS040629-7A | | | B4070617 | 7/7/2004 | 0.4090 | Warning | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/9/2004 | | | | | C4070617 | 7/6/2004 | 5530.5 | Pass | 5483.4 | 5493.4 | 5573.4 | 5583.4 |
| 0405097-30 | SMP | AS040629-7 | UISO | 46 | C4070646 | 7/6/2004 | 29.61 | Warning | 29.36 | 29.89 | 31.97 | 32.50 |
| U509730 | | AS040629-7A | | | B4070646 | 7/7/2004 | 0.2710 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/9/2004 | | | | | C4070646 | 7/6/2004 | 5541.8 | Pass | 5485.1 | 5495.1 | 5575.1 | 5585.1 |
| AS040629-7 | MB | AS040629-7 | UISO | 47 | C4070647 | 7/6/2004 | 31.87 | Pass | 29.92 | 30.45 | 32.53 | 33.06 |
| U6297B | | AS040629-7A | | | B4070647 | 7/7/2004 | 0.2440 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/9/2004 | | | | | C4070647 | 7/6/2004 | 5542.4 | Pass | 5513.5 | 5523.5 | 5603.5 | 5613.3 |
| AS040629-7 | LCS | AS040629-7 | UISO | 63 | C4070663 | 7/6/2004 | 29.70 | Pass | 28.10 | 28.63 | 30.79 | 31.30 |
| U6297L | | AS040629-7A | | | B4070663 | 7/7/2004 | 0.2110 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/9/2004 | | | | | C4070663 | 7/6/2004 | 5531.7 | Pass | 5488.0 | 5498.0 | 5578.0 | 5588.0 |

**Data Package ID:** *ur0405097-1*

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.



00231

# Calibration Data Summary

**Laboratory Name:** Paragon Analytics
**PAI Work Order:** 0405097

**Prep SOP:** PAI 778
**Analytical SOP:** PAI 714

**Reported on:** Thursday, July 22, 2004
1:35:59 PM

| Lab Sample ID<br>Spectrum<br>Analysis Date | QC Type | Batch ID<br>Analysis Run | Test Name | Detector Id | Eff Spectrum<br>Bkg Spectrum<br>Egy Spectrum | Eff Date<br>Bkg Date<br>Egy Date | RESULTS<br>%Efficiency<br>Bkg CPM<br>Energy keV | FLAGS<br>Efficiency<br>Background<br>Energy | LCL<br>%Efficiency<br>Bkg CPM<br>Energy keV | LWL<br>%Efficiency<br>Bkg CPM<br>Energy keV | UWL<br>%Efficiency<br>Bkg CPM<br>Energy keV | UCL<br>%Efficiency<br>Bkg CPM<br>Energy keV |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| AS040629-9 | MB | AS040629-9 | UISO | 58 | C4070658 | 7/6/2004 | 30.84 | Warning | 29.80 | 30.90 | 32.10 | 33.00 |
| U6299B | | AS040629-9b | | | B4070658 | 7/7/2004 | 0.3460 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/8/2004 | | | | | C4070658 | 7/6/2004 | 5543.6 | Pass | 5484.4 | 5494.4 | 5574.4 | 5584.4 |
| AS040629-9 | LCS | AS040629-9 | UISO | 59 | C4070659 | 7/6/2004 | 30.61 | Warning | 30.37 | 30.91 | 32.93 | 33.57 |
| U6299L | | AS040629-9b | | | B4070659 | 7/7/2004 | 0.2800 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/8/2004 | | | | | C4070659 | 7/6/2004 | 5528.0 | Pass | 5487.7 | 5497.7 | 5577.7 | 5587.7 |
| AS040629-9 | LCSD | AS040629-9 | UISO | 60 | C4070660 | 7/6/2004 | 26.17 | Pass | 24.46 | 24.90 | 26.60 | 27.04 |
| U6299LD | | AS040629-9b | | | B4070660 | 7/7/2004 | 0.2430 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/8/2004 | | | | | C4070660 | 7/6/2004 | 5532.9 | Pass | 5489.5 | 5499.5 | 5579.5 | 5589.5 |
| AS040712-5 | MB | AS040712-5 | UISO | 16 | C4071016 | 7/10/2004 | 29.09 | Pass | 27.77 | 28.27 | 30.11 | 30.69 |
| U7125B | | AS040712-5A | | | B4071016 | 7/11/2004 | 0.2580 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/16/2004 | | | | | C4071016 | 7/10/2004 | 5539.6 | Pass | 5506.9 | 5516.9 | 5596.9 | 5606.9 |
| AS040712-5 | LCS | AS040712-5 | UISO | 13 | C4071013 | 7/10/2004 | 31.40 | Pass | 29.90 | 30.43 | 32.51 | 33.04 |
| UR7125L | | AS040712-5A | | | B4071013 | 7/11/2004 | 0.2980 | Pass | 0.0000 | 0.0500 | 0.4000 | 0.5000 |
| 7/16/2004 | | | | | C4071013 | 7/10/2004 | 5551.6 | Pass | 5504.0 | 5514.0 | 5594.0 | 5604.0 |

**Data Package ID:** *ur0405097-1*

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

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Valencia, California 91355

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[α 1]

PAI 182
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.:** | 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
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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

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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 Thomas Van Delsen
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 4

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

Isotope Products Laboratories
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[α 5]

PAI ID 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 James Van Dalsem
Quality Control

19-Mar-03
Date Signed

IPL Ref. No.: 987-2

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PAID, 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 DeAlsem
Quality Control

19-Mar-03
Date Signed

IPL Ref. No.: 987-2

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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 James Van Dalsem
Quality Control

19-Mar-03
Date Signed

IPL Ref. No.: 987-2

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[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