



Paragon Analytics, Inc.

Radiochemistry Case Narrative

Isotopic Uranium

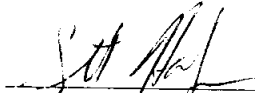
New Horizons

CSMRI / 2112

PAI WO 0212096

1. This report consists of three filter samples received by Paragon on 12/19/02.
2. The samples were prepared according to QASS 253318 and Paragon Analytics, Inc. procedures PAI SOP776R7 and PAI SOP773R7.
3. The samples were analyzed for the presence of isotopic uranium according to Paragon Analytics, Inc. procedure PAI SOP714R7. The analyses were completed on 12/20/02.
4. The analysis results for these samples are reported on an "as received" basis in units of pCi/filter.
5. Due to insufficient sample volume, a duplicate laboratory control sample (LCS) was prepared in lieu of a prep batch duplicate.
6. To minimize the potential high bias due to possible tailing of the U-234 peak into the U-235 region of interest, 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. U-234 and U-238 activities are reported in the associated method blank above the calculated minimum detectable concentration values. The measured blank activities are below the requested MDC of 0.2 pCi/filter. Results should be compared to the method blank activity to determine the validity of the measurement.
8. No further anomalous situations were encountered during the preparation or analysis of these samples. All remaining quality control criteria were met.

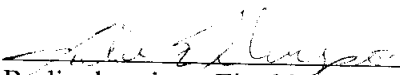
The data contained in the following report have been reviewed and approved by the personnel listed below. In addition, Paragon Analytics, Inc. certifies that the analyses reported herein are true, complete and correct within the limits of the methods employed.



Scott Hafeman
Radiochemistry Instrumentation

1/6/03

Date



Radiochemistry Final Data Review

1/7/03

Date

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Isotopic Uranium By Alpha Spectroscopy

Method PAI SOP 714R7

Method Blank Results

Page: 1 of 1

Reported on: Monday, January 06, 2003
16:17:48

Client Name: New Horizons

Client Project Name: CSMRI

Client Project Number: 2112

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 0212096

Field ID:

Lab ID: AS06024BLK1

Sample Matrix: Filter

Date Prepared: 20-Dec-02

Prep SOP: PAI 778R8

Prep Batch: AS06024

Date Collected: 20-Dec-02

Date Analyzed: 31-Dec-02

Analytical SOP: PAI 714R7

Final Aliquot: 0.2500

Aliquot Units: filter

Report Basis: As Received

Count Time (min.): 1000

Target Nuclide	Result +/- 2s TPU	MDC	Reporting Units	Lab Qualifier
U-234	0.099 +/- 0.060	0.027	pCi/filt	B3
U-235	0.011 +/- 0.051	0.081	pCi/filt	U
U-238	0.045 +/- 0.044	0.027	pCi/filt	B3

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits	Flag
U-232	8.7	7.19	pCi/filt	83.01	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 in control at 100-110%. Quantitative yield is assumed.
- Y2 - Chemical Yield outside default limits.
- B3 - Analyte concentration greater than MDC but less than Requested MDC.
- B - Analyte concentration greater than MDC.

Abbreviations:

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

Data Package ID: U0212096-1

Paragon Analytics Inc.

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Isotopic Uranium By Alpha Spectroscopy

Method PAI SOP 714R7

LCS Results

Page: 1 of 2

Reported on: Monday, January 06, 2003
16:17:48

Client Name: New Horizons

Client Project Name: CSMRI

Client Project Number: 2112

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 0212096

Field ID: Lab ID: AS06024LCS1	Sample Matrix: Filter Date Prepared: 20-Dec-02 Prep SOP: PAI 778R8 Prep Batch: AS06024	Date Collected: 20-Dec-02 Date Analyzed: 31-Dec-02 Analytical SOP: PAI 714R7	Final Aliquot: 0.2500 Aliquot Units: filter Report Basis: As Received Count Time (min.): 1000
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Target Nuclide	LCS Results +/- 2s TPU	MDC	Spike Added	Reporting Units	LCS Recovery	Control Limits	Lab Qualifier
U-234	8.0 +/- 1.1	0.078	8.68	pCi/filt	92%	82-122%	P
U-235	0.52 +/- 0.15	0.080	N/A	pCi/filt	N/A	N/A	
U-238	9.0 +/- 1.3	0.068	9.01	pCi/filt	100%	82-122%	P

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits	Flag
U-232	8.7	7.20	pCi/filt	83.10	30-110%	

Comments:

Data Package ID: U0212096-1

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.
- * - Duplicate DER not within control limits.
- L - LCS Recovery below lower control limit.
- H - LCS Recovery above upper control limit.
- P - LCS Recovery within control limits.

Abbreviations:

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

Paragon Analytics Inc.

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Isotopic Uranium By Alpha Spectroscopy

Method PAI SOP 714R7

LCS Results

Page: 2 of 2

Reported on: Monday, January 06, 2003
16:17:48

Client Name: New Horizons

Client Project Name: CSMRI

Client Project Number: 2112

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 0212096

Field ID: Lab ID: AS06024LCS1-D1	Sample Matrix: Filter Date Prepared: 20-Dec-02 Prep SOP: PAI 778R8 Prep Batch: AS06024	Date Collected: 20-Dec-02 Date Analyzed: 31-Dec-02 Analytical SOP: PAI 714R7	Final Aliquot: 0.2500 Aliquot Units: filter Report Basis: As Received Count Time (min.): 1000
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Target Nuclide	LCS Results +/- 2s TPU	MDC	Spike Added	Reporting Units	LCS Recovery	Control Limits	Lab Qualifier
U-234	8.5 +/- 1.2	0.11	8.68	pCi/filt	98%	82-122%	P
U-235	0.44 +/- 0.14	0.083	N/A	pCi/filt	N/A	N/A	
U-238	8.5 +/- 1.2	0.056	9.01	pCi/filt	95%	82-122%	P

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits	Flag
U-232	8.7	7.17	pCi/filt	82.74	30-110%	

Comments:

Data Package ID: U0212096-1

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.
- * - Duplicate DER not within control limits.
- L - LCS Recovery below lower control limit.
- H - LCS Recovery above upper control limit.
- P - LCS Recovery within control limits.

Abbreviations:

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

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Isotopic Uranium By Alpha Spectroscopy

Method PAI SOP 714R7

Duplicate Sample Results (DER)

Page: 1 of 1

Reported on: Monday, January 06, 2003
16:17:48

Client Name: New Horizons

Client Project Name: CSMRI

Client Project Number: 2112

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 0212096

Field ID:	Prep Date	Analysis Date	Prep Batch	Final Aliquot
Lab ID: AS06024LCS1	12/20/02	12/31/02	AS06024	0.2500
DUP ID: AS06024LCS1-D1	12/20/02	12/31/02	AS06024	0.2500

Sample Matrix: Filter
Date Collected: 20-Dec-02
Analytical SOP: PAI 714R7
Prep SOP: PAI 778R8
Aliquot Units: filter
Report Basis: As Received

Analyte	Sample Result +/- 2s TPU	Duplicate Result +/- 2s TPU	Units	DER	Warning Limit	Lab Qualifiers
U-234	8.0 +/- 1.1	8.5 +/- 1.2	pCi/filt	0.3	< 1.42	
U-235	0.52 +/- 0.15	0.44 +/- 0.14	pCi/filt	0.38	< 1.42	
U-238	9.0 +/- 1.3	8.5 +/- 1.2	pCi/filt	0.27	< 1.42	

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits	Flag
U-232	8.7	7.17	pCi/filt	82.74	30-110%	

Comments:

Qualifiers/Flags:

W - DER is greater than Warning Limit of 1.42

H - DER is Higher than Control Limit of 2.13

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

DER - Duplicate Error Ratio

Data Package ID: U0212096-1

Paragon Analytics Inc.

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Isotopic Uranium By Alpha Spectroscopy

Method PAI SOP 714R7

Sample Results

Page: 1 of 3

Reported on: Monday, January 06, 2003
16:17:47

Client Name: New Horizons

Client Project Name: CSMRI

Client Project Number: 2112

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 0212096

Field ID: 11072002-2

Lab ID: 0212096-1

Sample Matrix: Filter

Date Prepared: 20-Dec-02

Prep SOP: PAI 778R8

Prep Batch: AS06024

Date Collected: 07-Nov-02

Date Analyzed: 31-Dec-02

Analytical SOP: PAI 714R7

Final Aliquot: 0.2500 filter

Report Basis: As Received

Count Time (min.): 1000

Target Nuclide	Result +/- 2 s TPU	MDC	Reporting Units	Lab Qualifier
U-234	0.088 +/- 0.076	0.11	pCi/filt	U
U-235	0.019 +/- 0.064	0.13	pCi/filt	U
U-238	0.032 +/- 0.059	0.11	pCi/filt	U

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits	Flag
U-232	8.7	6.11	pCi/filt	70.48	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)

Data Package ID: U0212096-1

Paragon Analytics Inc.

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Isotopic Uranium By Alpha Spectroscopy

Method PAI SOP 714R7

Sample Results

Page: 2 of 3

Reported on: Monday, January 06, 2003
16:17:47

Client Name: New Horizons

Client Project Name: CSMRI

Client Project Number: 2112

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 0212096

Field ID: 11062002-1

Lab ID: 0212096-2

Sample Matrix: Filter

Date Prepared: 20-Dec-02

Prep SOP: PAI 778R8

Prep Batch: AS06024

Date Collected: 06-Nov-02

Date Analyzed: 31-Dec-02

Analytical SOP: PAI 714R7

Final Aliquot: 0.2500 filter

Report Basis: As Received

Count Time (min.): 1000

Target Nuclide	Result +/- 2 s TPU	MDC	Reporting Units	Lab Qualifier
U-234	0.086 +/- 0.076	0.11	pCi/filt	U
U-235	0.030 +/- 0.048	0.030	pCi/filt	LT
U-238	0.051 +/- 0.071	0.12	pCi/filt	U

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits	Flag
U-232	8.7	6.28	pCi/filt	72.36	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)

Data Package ID: U0212096-1

Paragon Analytics Inc.

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Isotopic Uranium By Alpha Spectroscopy

Method PAI SOP 714R7

Sample Results

Page: 3 of 3

Reported on: Monday, January 06, 2003
16:17:47

Client Name: New Horizons

Client Project Name: CSMRI

Client Project Number: 2112

Laboratory Name: Paragon Analytics, Inc.

PAI Work Order: 0212096

Field ID: 10312002-2

Lab ID: 0212096-3

Sample Matrix: Filter

Date Prepared: 20-Dec-02

Prep SOP: PAI 778R8

Prep Batch: AS06024

Date Collected: 31-Oct-02

Date Analyzed: 31-Dec-02

Analytical SOP: PAI 714R7

Final Aliquot: 0.2500 filter

Report Basis: As Received

Count Time (min.): 1000

Target Nuclide	Result +/- 2 s TPU	MDC	Reporting Units	Lab Qualifier
U-234	0.176 +/- 0.097	0.12	pCi/filt	LT
U-235	0.085 +/- 0.062	0.072	pCi/filt	LT
U-238	0.080 +/- 0.074	0.12	pCi/filt	U

Chemical Yield Summary

Tracer Nuclide	Tracer Known	Tracer Measured	Units	Tracer Yield	Control Limits	Flag
U-232	8.7	5.97	pCi/filt	68.78	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)

Data Package ID: U0212096-1

Paragon Analytics Inc.

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QUALITY ASSURANCE SUMMARY SHEET

PAI W.O. # / BATCH 0212096 / AS06024
TEST U-ISO
METHOD PREP
SOP/REV (PREP) 778/R8
SOP/REV (ANAL) _____

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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.

JDB 12/24/02

JDB 12/24/02

Samples were muffled and digested in accordance with SOP 773/R7. After step 8.3.8 (SOP 773/R7), the samples were brought to a volume of 1 Liter with DI water. The samples were treated as waters, and for the actinides tests SOP 776/R7 was followed; SOP 783/R3 was followed for Ra226 (903.1).

Aliquot sizes were determined according to project specified detection limits. The aliquot sizes taken for the required tests are as follows:

Ra226 (903.1) 250 mL
TH-ISO 250 mL
U-ISO 250 mL

The samples are to be reported on a per filter basis. The filter equivalents were calculated using the following equation:

$$\text{filter equivalent (x)} = \frac{\text{aliquot volume (mL)}}{\text{sample volume (mL)}}$$

Hence the filter equivalents entered into the bench sheets as "Sample Size" are:

Ra226 (903.1) .250
TH-ISO .250
U-ISO .250

LCS duplicates were created due to limited sample volume.

Because the digestate solution is a common one for multiple analyses, the samples were traced and spiked after the aliquots were taken from the 1.0 L common digestate. Tracing and spiking at this stage reduced the potential for interferences caused by the different matrices used in the tracing and spiking solutions.

JDB 12/24/02

JDB 12/24/02

TECHNICIAN/ANALYST Jerry Bell (JDB)

DATE 12/24/02

DEPARTMENT MANAGER R. Fowler

DATE 12/24/02