



Paragon Analytics

Radiochemistry Case Narrative

Isotopic Thorium

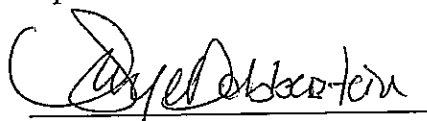
New Horizons

CSMRI / 2135


PA WO 0405215

1. This report consists of the analytical results for three soil samples received by Paragon on 05/26/04.
2. These samples were prepared according to Paragon Analytics procedures PA SOP721R10, PA SOP773R8, and PA SOP777R7.
3. The samples were analyzed for the presence of isotopic thorium according to Paragon Analytics procedure PA SOP714R8. The analyses were completed on 06/21/04.
4. The isotopic analysis results for these samples are reported on a dry weight basis in units of pCi/gram.
5. Sample SDA3 (PA ID 0405215-1) did not meet the requested MDC of 0.1 pCi/g for Th-228, however its reported Th-228 activity exceeds the achieved Th-228 MDC value. This sample is identified with an "M3" flag on the final reports.
6. No anomalous situations were encountered during the preparation or analysis of these samples. All quality control criteria were met.

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


Skye Dobberstein
Radiochemistry Instrumentation

6/24/04
Date


John Pehon
Radiochemistry Final Data Review

6/24/04
Date

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 8

Method Blank Results

Lab Name: Paragon Analytics

Work Order Number: 0405215

Client Name: New Horizons

ClientProject ID: CSMRI 2135

Lab ID: AS040610-2MB

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 10-Jun-04
Date Prepared: 10-Jun-04
Date Analyzed: 21-Jun-04

Prep Batch: AS040610-2
QCBatchID: AS040610-2-2
Run ID: AS040610-2a
Count Time: 300 minutes

Final Aliquot: 2.00 g
Result Units: pCi/g
File Name: T6102B

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	0.007 +/- 0.024	0.055	U
14269-63-7	Th-230	-0.014 +/- 0.031	0.078	U
7440-29-1	Th-232	0.003 +/- 0.013	0.019	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	2.309	1.69	pCi/g	73.1	30 - 110 %	

Comments:

Qualifiers/Flags:

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

Abbreviations:

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

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

Data Package ID: TH0405215-1

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 8

Laboratory Control Sample(s)

Lab Name: Paragon Analytics

Work Order Number: 0405215

Client Name: New Horizons

ClientProject ID: CSMRI 2135

Lab ID: AS040610-2LCS

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 10-Jun-04
Date Prepared: 10-Jun-04
Date Analyzed: 21-Jun-04

Prep Batch: AS040610-2
QCBatchID: AS040610-2-2
Run ID: AS040610-2a
Count Time: 300 minutes

Final Aliquot: 2.00 g
Result Units: pCi/g
File Name: T6102L

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
14269-63-7	Th-230	2.38 +/- 0.43	0.08	2.30	104	85 - 121	P

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	2.309	1.88	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 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)

Data Package ID: TH0405215-1

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 8

Sample Results

Lab Name: Paragon Analytics

Work Order Number: 0405215

Client Name: New Horizons

Client/Project ID: CSMRI 2135

Field ID: SDA3
Lab ID: 0405215-1

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 13-May-04
Date Prepared: 10-Jun-04
Date Analyzed: 21-Jun-04

Prep Batch: AS040610-2
QCBatchID: AS040610-2-2
Run ID: AS040610-2a
Count Time: 300 minutes
Report Basis: Dry Weight

Final Aliquot: 2.01 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: T52151

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	2.62 +/- 0.50	0.11	M3
14269-63-7	Th-230	1.37 +/- 0.28	0.09	
7440-29-1	Th-232	2.33 +/- 0.44	0.02	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	2.301	1.38	pCi/g	59.9	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: TH0405215-1

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 8
Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0405215
Client Name: New Horizons
ClientProject ID: CSMRI 2135

Field ID: C2101M
Lab ID: 0405215-2

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 26-May-04
Date Prepared: 10-Jun-04
Date Analyzed: 21-Jun-04

Prep Batch: AS040610-2
QCBatchID: AS040610-2-2
Run ID: AS040610-2a
Count Time: 300 minutes
Report Basis: Dry Weight

Final Aliquot: 2.05 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: T52152

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	1.76 +/- 0.35	0.07	
14269-63-7	Th-230	1.21 +/- 0.26	0.09	
7440-29-1	Th-232	1.57 +/- 0.32	0.04	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	2.257	1.31	pCi/g	58.0	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: TH0405215-1

Isotopic Thorium By Alpha Spectroscopy

PAI 714 Rev 8

Sample Results

Lab Name: Paragon Analytics

Work Order Number: 0405215

Client Name: New Horizons

ClientProject ID: CSMRI 2135

Field ID: C2102M
Lab ID: 0405215-3

Sample Matrix: SOIL
Prep SOP: PAI 777 Rev 7
Date Collected: 26-May-04
Date Prepared: 10-Jun-04
Date Analyzed: 21-Jun-04

Prep Batch: AS040610-2
QCBatchID: AS040610-2-2
Run ID: AS040610-2a
Count Time: 300 minutes
Report Basis: Dry Weight

Final Aliquot: 2.04 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: T52153

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14274-82-9	Th-228	1.64 +/- 0.32	0.09	
14269-63-7	Th-230	1.28 +/- 0.26	0.08	
7440-29-1	Th-232	1.63 +/- 0.32	0.02	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
Th-229	2.268	1.45	pCi/g	63.7	30 - 110 %	

Comments:

Qualifiers/Flags:

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

Abbreviations:

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

Data Package ID: TH0405215-1