



Paragon Analytics

Radiochemistry Case Narrative

Lead-210 by Liquid Scintillation

New Horizons

CSMRI / 2135

Paragon WO 0404284

1. This report consists of the analytical results for three soil samples received by Paragon on 4/28/04.
2. These samples were prepared according to Paragon Analytics procedure SOP726R3 with modifications as described in QASS 270522.
3. These samples were analyzed for the presence of Lead-210 according to Paragon Analytics procedure SOP704R6. The analyses were completed on 6/17/04.
4. The analysis results for these samples are reported on a “dry weight” basis in units of pCi/gram.
5. 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.
6. The requested MDC of 0.6 pCi/g was not met for some samples in this work order. The reported activity for these samples is greater than the achieved MDC. These samples are identified with a “M3” flag on the final reports.
7. ICP chemical recoveries for some samples in this work order were below the lower control limit of 40%. Matrix interference and incomplete sample dissolution are believed to be the cause of the low recoveries. The ICP recoveries were rerun after more complete sample dissolution. The chemical recoveries from the second run will be used in calculations. Samples with chemical recoveries of less than 40% are flagged with a Y2 flag. Please refer to QASS 278621 and NCR 5706.
8. The chemical recovery of 106% for sample H-10-2 (PAI Sample ID 0404284-3) is within the requested 40-110% limit. However, in such cases PAI assumes a 100% quantitative recovery in the calculations. While the ‘Tracer Yield’ on the report form shows the observed recovery (106%), a ‘Y1’ flag signifies this calculation convention. Results are submitted without further qualification.

9. No further anomalous situations were encountered during the preparation and 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.

Leah Balko
Leah Balko
Radiochemistry Instrument Technician

6/18/04
Date

[Signature]
Radiochemistry Final Data Review

6.18.04
Date

QUALITY ASSURANCE SUMMARY SHEET

PAI W.O. # / BATCH FOR ALL
TEST Pb
METHOD _____
SOP/REV (PREP) 726 R3
SOP/REV (ANAL) _____

270522

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.

Q 04/15/04

SOP 726 R3 HAS BEEN MODIFIED IN THE FOLLOWING MANNER:

1. AFTER STEP 6.3.8, ADD 10 mL 8N HNO₃ TO EACH SAMPLE.
2. DRY THE SAMPLES ON THE STEAMBATH UNTIL THERE IS LESS THAN 0.5 mL OF SAMPLE LEFT IN THE CUP.
3. USING A TRANSFER PIPET, TRANSFER THE SAMPLE TO A PLASTIC LIQUID SCINTILLATION VIAL, RINSING THE CUP WITH 2- 2.5 mL RINSES OF 8N HNO₃ AND ADDING THE RINSES TO THE VIAL.
4. PLACE THE VIAL IN A NEW, LABELED 100 mL PLASTIC CUP AND DRY THE VIALS ON THE STEAMBATH.
5. ADD 0.25 mL 16 N HNO₃ TO EACH VIAL, MAKING SURE ALL OF THE SAMPLE DISSOLVES BEFORE CONTINUING.
6. ADD 4.85 mL DI H₂O TO EACH VIAL.
7. USING A CALIBRATED PIPETTE, REMOVE 0.1 mL FROM EACH VIAL AND PLACE IT INTO A LABELED PLASTIC TEST TUBE.
8. TO THE ALIQUOT FROM STEP 7, ADD 9.9 OR 10 mL ICP DILUTING SOLUTION TO EACH TUBE, COVER THE TUBE WITH PARAFILM, AND SUBMIT THE INITIAL AND FINAL ICP ALIQUOTS TO THE METALS LAB FOR COUNTING.
9. LABEL THE CAP FOR EACH VIAL, DO NOT WRITE ON THE VIAL.
10. ADD 15 mL UG-LLT COCKTAIL TO EACH VIAL, SHAKE THE VIALS, WIPE THEM WITH A KIMWIPE WETTED WITH METHANOL, AND SUBMIT THE VIALS TO THE INSTRUMENT LAB FOR COUNTING.

Q 04/15/04

Q 04/15/04

Q 04/15/04

TECHNICIAN/ANALYST *[Signature]* DATE *04/15/04*
 DEPARTMENT MANAGER *[Signature]* DATE *4/15/04*

CONTROLLED
NON-CONFORMANCE REPORT

Initiated by A. Frieda Date 5/28/04 Method/Procedure ²¹⁰Pb
Reason: Non-Conformance Work Orders Affected 0404241, 0404284,
 Client Inquiry REDISTRIBUTION 0405025
 Other 6/11/04 MS Clients NEW HORIZONS

SECTION I TYPE OF EVENT (circle as appropriate)
 1. LCS / Surrogate / IS / Tracer or Chemical Yield Criteria Not Met Explanation: CHEMICAL RECOVERY FOR
SAMPLES 0404241-3,-5,-7,-12;
0404284-1,-1 DUP,; 0405025-2,-6
WERE BELOW THE LCL OF 40% AT
24.55, 24.87, 23.68, 24.81, 35.11, 28.45,
36.37, + 30.50%, RESPECTIVELY.
24.79, 25.12, 23.92, 27.08, 35.46, 28.74,
36.74, + 30.80% * SEE BACK FOR
UPDATED INFORMATION (6/18/04) *
Actions to Prevent Recurrence (Retrain, etc.): POSSIBLE MATRIX INTERFERENCE

SECTION II NOTIFICATION
Client Contacted? (Y) / (N) Name: S. Coffin Date: 5/28/04 Time: 1400 Voice Mail

SECTION III CORRECTIVE ACTIONS
 1. Submit for Re-Prep. or Clean-up
 2. Re-analyze
 3. Resubmit Data (hc, edd, narrative)
 4. Document in Narrative
 5. Other _____
Approved by: RG DPM [Signature] PM 5/28/04
SECTION IV REQUEST FOR REWORK
Initial Batch ID: _____ Date: _____
Reworked Batch ID: _____ Date: _____
Outcome: [Signature] 5/28/04
Approved by: _____
Matrix Effect or Elevated / Sample Activity Suspected? (circle applicable)

SECTION V DISPOSITION Use as is Repair Reject

SECTION VI COMMENTS Increase count time as possible to attempt to
keep MDC near 0.6 pCi/g.

SECTION VII APPROVAL SIGNATURES
Project Manager (PM) [Signature] Date 5/28/04
Department Manager (DPM) [Signature] Date 5/28/04 (Verification of Disposition)
QA Manager [Signature] Date 6/2/04

SECTION VIII DISTRIBUTION LMP PM RG Dept. Manager LDC Lab Director Rpt. Group or Rad

DCB

6/18/04

* FINAL ICP ALIQUOTS WERE REWORKED FOR ALL SAMPLES IN BATCH. (SEE @ASS 278621) THIS CHANGES YIELD DATA NOTED ON 5/28/04. NEW CHEMICAL YIELD DATA FOR SAMPLES IN THIS NCR ARE:

<u>SAMPLE ID</u>	<u>PREVIOUS % YIELD</u>	<u>NEW % YIELD</u>	<u>PASS/FAIL?</u>
0404284-1 @ 6/18/04 - 1DUP			
0404241-3	24.79	26.89	F
↓ -5	25.12	29.55	F
↓ -7	23.92	28.82	F
↓ -12	27.08	33.34	F
0404284-1	35.46	38.85	F
↓ - 1DUP	28.74	31.96	F
0405025-2	36.74	51.22	P
↓ -6	30.80	40.70	P

QUALITY ASSURANCE SUMMARY SHEET

PAI W.O. #/ BATCH 0404241 / 0404284 / 0405025 / PRO 0513-1
TEST 210PB
METHOD
SOP/REV (PREP) 726P3
SOP/REV (ANAL)

278621

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.

[Signature] 6/18/04

CHEMICAL YIELDS FOR SAMPLES IN BATCH 040513-1 WERE SUSPECTED TO BE LOW DUE TO AN INCOMPLETE SAMPLE DISSOLUTION WHEN TAKING THE FINAL ICP ALIQUOT. AFTER SAMPLES WERE COUNTED, THEY WERE RETURNED TO THE PREP LAB AND A NEW FINAL ICP ALIQUOT WAS TAKEN. 0.1 mL WAS REMOVED FROM EACH VIAL CONTAINING THE SAMPLE IN UGLLT COCKTAIL (20 mL TOTAL VOLUME). THE ICP TUBES WERE BROUGHT UP TO A FINAL VOLUME OF 10.1 mL WITH ICP DILUTING SOLUTION AND TAKEN TO METALS FOR ANALYSIS. THE ICP BENCHSHEET REFLECTS THE NEW ICP DATA AND WAS VERIFIED BY A MANUAL CALCULATION. THE FINAL ALIQUOT VOLUME WAS ENTERED MANUALLY INTO THE BENCHSHEET SINCE THE ICP CALCULATION INCORRECTLY CHANGED THE FINAL ALIQUOT. DATA IS SUBMITTED WITHOUT FURTHER QUALIFICATION.

[Signature] 6/18/04

[Signature] 6/18/04

[Signature] 6/18/04

[Signature] 6/18/04

TECHNICIAN/ANALYST

[Signature]

DATE 6/18/04

DEPARTMENT MANAGER

[Signature]

DATE 6/18/04

Lead-210 Analysis by Liquid Scintillation

PAI 704 Rev 6

Method Blank Results

Lab Name: Paragon Analytics

Work Order Number: 0404284

Client Name: New Horizons

ClientProject ID: CSMRI 2135

Lab ID: PB040513-1MB

Sample Matrix: SOIL

Prep Batch: PB040513-1

Final Allquot: 2.03 g

Prep SOP: PAI 726 Rev 3

QCBatchID: PB040513-1-1

Result Units: pCi/g

Date Collected: 13-May-04

Run ID: pb040513-1a

File Name: Manual Entry

Date Prepared: 13-May-04

Count Time: 355.4 minutes

Date Analyzed: 17-Jun-04

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14255-04-0	Pb-210	-0.08 +/- 0.25	0.42	U

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
LEAD	1059	565.9	ug	53.5	40 - 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: PB2100404284-1

Lead-210 Analysis by Liquid Scintillation

PAI 704 Rev 6

Laboratory Control Sample(s)

Lab Name: Paragon Analytics

Work Order Number: 0404284

Client Name: New Horizons

ClientProject ID: CSMRI 2135

Lab ID: PB040513-1LCS

Sample Matrix: SOIL
Prep SOP: PAI 726 Rev 3
Date Collected: 13-May-04
Date Prepared: 13-May-04
Date Analyzed: 17-Jun-04

Prep Batch: PB040513-1
QC Batch ID: PB040513-1-1
Run ID: pb040513-1a
Count Time: 59.2 minutes

Final Allquot: 2.07 g
Result Units: pCi/g
File Name: Manual Entry

CASNO	Target Nuclide	Results +/- 2s TPU	MDC	Spike Added	% Rec	Control Limits	Lab Qualifier
14255-04-0	Pb-210	8.4 +/- 2.2	0.8	6.79	124	70 - 130	P,M3

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
LEAD	1051	784.2	ug	74.6	40 - 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: PB2100404284-1

Lead-210 Analysis by Liquid Scintillation

PAI 704 Rev 6

Duplicate Sample Results (DER)

Lab Name: Paragon Analytics

Work Order Number: 0404284

Client Name: New Horizons

ClientProject ID: CSMRI 2135

Field ID: Area I Bottom
Lab ID: 0404284-1DUP

Sample Matrix: SOIL
Prep SOP: PAI 726 Rev 3
Date Collected: 27-Apr-04
Date Prepared: 13-May-04
Date Analyzed: 14-Jun-04

Prep Batch: PB040513-1
QCBatchID: PB040513-1-1
Run ID: pb040513-1a
Count Time: 355.4 minutes
Report Basis: Dry Weight

Final Aliquot: 2.08 g
Prep Basis: Dry Weight
Moisture(%): NA
Result Units: pCi/g
File Name: Manual Entry

CASNO	Analyte	Sample Result +/- 2 s TPU	Duplicate Result +/- 2 s TPU	DER	Control Limit	Lab Qualifiers
14255-04-0	Pb-210	50 +/- 12	46 +/- 11	0.29	2.13	Y2,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: PB2100404284-1

Lead-210 Analysis by Liquid Scintillation

PAI 704 Rev 6

Sample Results

Lab Name: Paragon Analytics

Work Order Number: 0404284

Client Name: New Horizons

ClientProject ID: CSMRI 2135

Field ID: Area I Bottom

Lab ID: 0404284-1

Sample Matrix: SOIL

Prep SOP: PAI 726 Rev 3

Date Collected: 27-Apr-04

Date Prepared: 13-May-04

Date Analyzed: 14-Jun-04

Prep Batch: PB040513-1

QCBatchID: PB040513-1-1

Run ID: pb040513-1a

Count Time: 355.4 minutes

Report Basis: Dry Weight

Final Aliquot: 2.01 g

Prep Basis: Dry Weight

Moisture(%): NA

Result Units: pCi/g

File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14255-04-0	Pb-210	50 +/- 12	1	Y2,M3

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
LEAD	1647	639.8	ug	38.8	40 - 110 %	Y2

Comments:

Qualifiers/Flags:

U - Result is less than the sample specific MDC.

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

Y2 - Chemical Yield outside default limits.

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

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

M - The requested MDC was not met.

Abbreviations:

TPU - Total Propagated Uncertainty (see PAI SOP 743)

MDC - Minimum Detectable Concentration (see PAI SOP 709)

BDL - Below Detection Limit

Data Package ID: *PB2100404284-1*

Lead-210 Analysis by Liquid Scintillation

PAI 704 Rev 6

Sample Duplicate Results

Lab Name: Paragon Analytics

Work Order Number: 0404284

Client Name: New Horizons

ClientProject ID: CSMRI 2135

Field ID: Area I Bottom	Sample Matrix: SOIL	Prep Batch: PB040513-1	Final Allquot: 2.08 g
Lab ID: 0404284-1DUP	Prep SOP: PAI 726 Rev 3	QC Batch ID: PB040513-1-1	Prep Basis: Dry Weight
	Date Collected: 27-Apr-04	Run ID: pb040513-1a	Moisture(%): NA
	Date Prepared: 13-May-04	Count Time: 355.4 minutes	Result Units: pCi/g
	Date Analyzed: 14-Jun-04	Report Basis: Dry Weight	File Name: Manual Entry

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14255-04-0	Pb-210	46 +/- 11	1	Y2,M3

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
LEAD	1632	521.4	ug	32.0	40 - 110 %	Y2

Comments:

Qualifiers/Flags:

- U - Result is less than the sample specific MDC.
- Y1 - Chemical Yield is in control at 100-110%. Quantitative yield is assumed.
- Y2 - Chemical Yield outside default limits.
- LT - Result is less than Requested MDC, greater than sample specific MDC.
- 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: *PB2100404284-1*

Lead-210 Analysis by Liquid Scintillation

PAI 704 Rev 6

Sample Results

Lab Name: Paragon Analytics

Work Order Number: 0404284

Client Name: New Horizons

ClientProject ID: CSMRI 2135

Field ID: Area K Bottom Lab ID: 0404284-2	Sample Matrix: SOIL Prep SOP: PAI 726 Rev 3 Date Collected: 28-Apr-04 Date Prepared: 13-May-04 Date Analyzed: 14-Jun-04	Prep Batch: PB040513-1 QC Batch ID: PB040513-1-1 Run ID: pb040513-1a Count Time: 236.9 minutes Report Basis: Dry Weight	Final Allquot: 2.06 g Prep Basis: Dry Weight Moisture(%): NA Result Units: pCi/g File Name: Manual Entry
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CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14255-04-0	Pb-210	17.4 +/- 4.2	0.4	

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
LEAD	3387	2235	ug	66.0	40 - 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: PB2100404284-1

Lead-210 Analysis by Liquid Scintillation

PAI 704 Rev 6

Sample Results

Lab Name: Paragon Analytics

Work Order Number: 0404284

Client Name: New Horizons

ClientProject ID: CSMRI 2135

Field ID: H-10-2
Lab ID: 0404284-3

Sample Matrix: SOIL
Prep SOP: PAI 726 Rev 3
Date Collected: 26-Apr-04
Date Prepared: 13-May-04
Date Analyzed: 15-Jun-04

Prep Batch: PB040513-1
QCBatchID: PB040513-1-1
Run ID: pb040513-1a
Count Time: 118.4 minutes
Report Basis: Dry Weight

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

CASNO	Target Nuclide	Result +/- 2 s TPU	MDC	Lab Qualifier
14255-04-0	Pb-210	640 +/- 150	0	Y1

Chemical Yield Summary

Carrier/Tracer	Amount Added	Result	Units	Yield	Control Limits	Flag
LEAD	16390	17330	ug	106	40 - 110 %	Y1

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: *PB2100404284-1*