Paragon Analytics

TOTAL METALS CASE NARRATIVE

New Horizons

CSMRI -- 2135

Order Number - 0405169

1. This report consists of 4 soil samples.
2. The samples were received intact on 5/19/04. The temperature of the samples upon receipt was ambient.
3. The samples were prepared for analysis based on SW-846, 3rd Edition procedures.

   For analysis by Trace ICP, the samples were digested following method 3050B and PA SOP 806 Rev. 9.

   For analysis by Cold Vapor AA (CVAA), the samples were digested following method 7471A and PA SOP 812 Rev. 10.
4. The samples were analyzed following SW-846, 3rd Edition procedures.

   Analysis by Trace ICP followed method 6010B and PA SOP 834 Rev. 2.

   The relationship between intensity and concentration for each element is established using at least four standards, one of which is a blank solution. The equation which relates intensity to concentration is:

$$I = A_0 + (A_1 * c^n) + (A_2 * c^{2n})$$

   where: I = intensity

   c = concentration

   A_0 = offset coefficient

   A_1 = gain coefficient

   A_2 = curvature coefficient

   n = exponent coefficient

   During sample analysis concentrations are computed by the software and the results are printed in mg/L. The instrument software does not provide a printout which gives both intensity and concentration. The validity of the calibration equation is tested by analyzing the following solutions: a blank, a

low level check solution with concentrations near the reporting limit, an Initial Calibration Verification (ICV) standard from a 2nd source standard solution with concentrations near the middle of the analytical range, a Continuing Calibration Verification (CCV) standard with concentrations at two times those in the ICV, and a readback of the highest calibration standard.

These solutions provide verification that the calibration equations are functioning properly throughout the analytical range of the instrument. During sample analysis dilutions are made for analytes found at concentrations above the highest calibration standard. No results are taken from extrapolations beyond the highest standard.

Analysis by CVAA followed method 7471A and PA SOP 812 Rev. 10.

The relationship between intensity and concentration is determined daily, prior to sample analysis. At least five standards and a blank solution are analyzed to establish the calibration curve. The instrument software performs a linear regression to fit the calibration data to a curve of the form:

$$\text{conc.} = B * I + C$$

where: conc. = concentration

B = slope coefficient

I = intensity

C = intercept coefficient

A printout summarizing the calibration data supplies the calibration curve and correlation coefficient. During sample analysis both intensity and concentration values are printed. Dilutions are made for concentrations above the highest calibration standard. No results are taken from extrapolations above the highest standard.

5. All standards and solutions are NIST traceable and were used within their recommended shelf life.
6. The samples were prepared and analyzed within the established hold times.

All in house quality control procedures were followed, as described below.

7. General quality control procedures.
   - A preparation (method) blank and laboratory control sample were digested and analyzed with the samples in each digestion batch. There were not more than 20 samples in each digestion batch.
   - The preparation (method) blank associated with each digestion batch was below the practical quantitation limit for each requested analyte.
   - The laboratory control sample associated with each digestion batch was within the acceptance limits. This indicates complete digestion according to the method.

- All initial and continuing calibration blanks associated with each analytical batch were below the practical quantitation limits for the requested analytes.
- All initial and continuing calibration verifications associated with each analytical batch were within the acceptance criteria for the requested analytes. This indicates a valid calibration and stable instrument conditions.
- The interference check samples and high standard readbacks associated with Method 6010B analyses were within acceptance criteria.

8. Matrix specific quality control procedures.

   PA sample ID 0405169-13 was designated as the quality control sample for the Trace ICP analyses. Since a sample from this Order Number was not selected as a quality control (QC) sample, matrix specific QC results for mercury are not included in this report.

   - A matrix spike and matrix spike duplicate were digested and analyzed with the Trace ICP batch. All acceptance criteria for accuracy were met.
   - Matrix spike recoveries could not be evaluated for the following analyte:

Analyte	Sample ID
Lead	0405169-13

     The concentration of this analyte in the native sample was greater than four times the concentration of matrix spike added during the digestion. When sample concentration is that much greater than the spike added, spike recoveries may not be accurate. The laboratory control sample indicates that the digestion and analysis were in control.

   - A sample duplicate and matrix spike duplicate were digested and analyzed with the Trace ICP batch. All acceptance criteria for precision were met.
   - A serial dilution was analyzed with the Trace ICP batch. All acceptance criteria were met.

9. All samples required dilutions to bring iron and/or manganese into the analytical range of the Trace ICP. Accurate quantitation of iron and manganese is necessary to correct for spectral interferences on cadmium and/or lead. The cadmium and lead results were determined from the diluted samples. All samples required a dilution to bring mercury into the analytical range of the mercury analyzer.

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.

Megan Johnson — 6/17/04

Megan Johnson
Data Reporting Specialist
Date

REM — 6/17/04

Reviewer's Initials
Date

Paragon Analytics

Sample Number(s) Cross-Reference Table

Paragon OrderNum: 0405169
Client Name: New Horizons
Client Project Name: CSMRI
Client Project Number: 2135
Client PO Number:

Client Sample	Lab Sample Number	COC Number	Matrix	Date Collected	Time Collected
IC1008	0405169-1		SOIL	03-May-04	15:00
IC1008	0405169-2		SOIL	03-May-04	15:00
IC1025	0405169-3		SOIL	04-May-04	11:28
IC1025	0405169-4		SOIL	04-May-04	11:28
IC1028	0405169-5		SOIL	04-May-04	11:45
IC1028	0405169-6		SOIL	04-May-04	11:45
H214	0405169-7		SOIL	04-May-04	14:08
H214	0405169-8		SOIL	04-May-04	14:08
H236	0405169-9		SOIL	05-May-04	10:50
H236	0405169-10		SOIL	05-May-04	10:50
E32	0405169-11		SOIL	10-May-04	11:41
E32	0405169-12		SOIL	10-May-04	11:41
SDA064	0405169-13		SOIL	13-May-04	13:45

Inorganic Data Reporting Qualifiers

The following qualifiers are used by the laboratory when reporting results of inorganic analyses.

- Result qualifier -- A "B" is entered if the reported value was obtained from a reading that was less than the Practical Quantitation Limit but greater than or equal to the Method Detection Limit (MDL). If the analyte was analyzed for but not detected a "U" is entered.

- QC qualifier -- Specified entries and their meanings are as follows:

  E - The reported value is estimated because of the presence of interference. An explanatory note may be included in the narrative.

  M - Duplicate injection precision was not met.

  N - Spiked sample recovery not within control limits. A post spike is analyzed for all 6010B analyses when the matrix spike and or spike duplicate fail and the native sample concentration is less than four times the spike added concentration.

  Z - Spiked recovery not within control limits. An explanatory note may be included in the narrative.

  * - Duplicate analysis (relative percent difference) not within control limits.

Total ICP Metals

Method SW6010

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0405169
Client Name: New Horizons
ClientProject ID: CSMRI 2135

Field ID: H214
Lab ID: 0405169-8

Sample Matrix: SOIL
% Moisture: 11.8
Date Collected: 04-May-04
Date Extracted: 21-May-04
Date Analyzed: 24-May-04

Prep Batch: IP040521-3
QCBatchID: IP040521-3-1
Run ID: IT040524-1A2
Cleanup: NONE
Basis: Dry Weight

Sample Aliquot: 1 g
Final Volume: 100 ml
Result Units: mg/kg
Clean DF: 1
File Name: TS40524

CASNO	Target Analyte	Dilution Factor	Result	Reporting Limit	MDL	Result Qualifier	EPA Qualifier
7440-38-2	ARSENIC	1	49	1.1	0.23		
7440-43-9	CADMIUM	2	6	1.1	0.046		
7439-92-1	LEAD	2	1800	0.68	0.39		

Data Package ID: *IT0405169-1*

Total ICP Metals

Method SW6010

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0405169
Client Name: New Horizons
ClientProject ID: CSMRI 2135

Field ID: H236
Lab ID: 0405169-10

Sample Matrix: SOIL
% Moisture: 23.5
Date Collected: 05-May-04
Date Extracted: 21-May-04
Date Analyzed: 24-May-04

Prep Batch: IP040521-3
QCBatchID: IP040521-3-1
Run ID: IT040524-1A2
Cleanup: NONE
Basis: Dry Weight

Sample Aliquot: 1 g
Final Volume: 100 ml
Result Units: mg/kg
Clean DF: 1
File Name: TS40524

CASNO	Target Analyte	Dilution Factor	Result	Reporting Limit	MDL	Result Qualifier	EPA Qualifier
7440-38-2	ARSENIC	1	140	1.3	0.27		
7440-43-9	CADMIUM	5	46	3.3	0.13		
7439-92-1	LEAD	5	4600	2	1.1		

Data Package ID: *IT0405169-1*

Total ICP Metals

Method SW6010

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0405169
Client Name: New Horizons
ClientProject ID: CSMRI 2135

Field ID: E32
Lab ID: 0405169-12

Sample Matrix: SOIL
% Moisture: 10
Date Collected: 10-May-04
Date Extracted: 21-May-04
Date Analyzed: 24-May-04

Prep Batch: IP040521-3
QCBatchID: IP040521-3-1
Run ID: IT040524-1A2
Cleanup: NONE
Basis: Dry Weight

Sample Aliquot: 1 g
Final Volume: 100 ml
Result Units: mg/kg
Clean DF: 1
File Name: TS40524

CASNO	Target Analyte	Dilution Factor	Result	Reporting Limit	MDL	Result Qualifier	EPA Qualifier
7440-38-2	ARSENIC	1	64	1.1	0.23		
7440-43-9	CADMIUM	2	2.3	1.1	0.045		
7439-92-1	LEAD	5	1200	1.7	0.95		

Data Package ID: *IT0405169-1*

Total ICP Metals

Method SW6010

Sample Results

Lab Name: Paragon Analytics
Work Order Number: 0405169
Client Name: New Horizons
ClientProject ID: CSMRI 2135

Field ID: SDA064
Lab ID: 0405169-13

Sample Matrix: SOIL
% Moisture: 6.9
Date Collected: 13-May-04
Date Extracted: 21-May-04
Date Analyzed: 24-May-04

Prep Batch: IP040521-3
QCBatchID: IP040521-3-1
Run ID: IT040524-1A2
Cleanup: NONE
Basis: Dry Weight

Sample Aliquot: 1 g
Final Volume: 100 ml
Result Units: mg/kg
Clean DF: 1
File Name: TS40524

CASNO	Target Analyte	Dilution Factor	Result	Reporting Limit	MDL	Result Qualifier	EPA Qualifier
7440-38-2	ARSENIC	1	320	1.1	0.22		
7440-43-9	CADMIUM	1	0.26	0.54	0.022	B	
7439-92-1	LEAD	5	1600	1.6	0.92		

Data Package ID: *IT0405169-1*

Total MERCURY

Method SW7471

Sample Results

Lab Name: Paragon Analytics
Client Name: New Horizons
Client Project ID: CSMRI 2135
Work Order Number: 0405169
Reporting Basis: Dry Weight

Final Volume: 100 ml
Matrix: SOIL
Result Units: mg/kg

Client Sample ID	Lab ID	Date Collected	Date Prepared	Date Analyzed	Percent Moisture	Dilution Factor	Result	Reporting Limit	MDL	Flag	Sample Aliquot
H214	0405169-8	5/4/2004	5/27/2004	05/28/2004	11.8	10	1.8	1.1	0.0051		0.6 g
H236	0405169-10	5/5/2004	5/27/2004	05/28/2004	23.5	50	15	6.5	0.029		0.6 g
E32	0405169-12	5/10/2004	5/27/2004	05/28/2004	10	50	16	5.6	0.025		0.6 g
SDA064	0405169-13	5/13/2004	5/27/2004	05/28/2004	6.9	50	9.8	5.4	0.024		0.6 g

Comments:

1. ND or U = Not Detected at or above the client requested detection limit.

Data Package ID: *HG0405169-1*

ICP Metals

Method SW6010

Method Blank

Lab Name: Paragon Analytics
Work Order Number: 0405169
Client Name: New Horizons
ClientProject ID: CSMRI 2135

Lab ID: IP040521-3MB

Sample Matrix: SOIL
% Moisture: N/A
Date Collected: N/A
Date Extracted: 05/21/2004
Date Analyzed: 05/24/2004

Prep Batch: IP040521-3
QCBatchID: IP040521-3-1
Run ID: IT040524-1A2
Cleanup: NONE
Basis: N/A

Sample Aliquot: 1 g
Final Volume: 100 ml
Result Units: mg/kg
Clean DF: 1
File Name: TS40524

CASNO	Target Analyte	DF	Result	Reporting Limit	MDL	Result Qualifier	EPA Qualifier
7440-38-2	ARSENIC	1	0.21	1	0.21	U	
7440-43-9	CADMIUM	1	-0.043	0.5	0.02	B	
7439-92-1	LEAD	1	0.17	0.3	0.17	U	

Data Package ID: *IT0405169-1*

ICP Metals

Method SW6010

Laboratory Control Sample

Lab Name: Paragon Analytics
Work Order Number: 0405169
Client Name: New Horizons
ClientProject ID: CSMRI 2135

Lab ID: IP040521-3LCS

Sample Matrix: SOIL
% Moisture: N/A
Date Collected: N/A
Date Extracted: 05/21/2004
Date Analyzed: 05/24/2004

Prep Batch: IP040521-3
QCBatchID: IP040521-3-1
Run ID: IT040524-1A2
Cleanup: NONE
Basis: N/A

Sample Aliquot: 1 g
Final Volume: 100 ml
Result Units: mg/kg
Clean DF: 1

CASNO	Target Analyte	Spike Added	LCS Result	Reporting Limit	Result Qualifier	LCS % Rec.	Control Limits
7440-38-2	ARSENIC	200	197	1		99	80 - 120%
7440-43-9	CADMIUM	5	4.79	0.5		96	80 - 120%
7439-92-1	LEAD	50	48.5	0.3		97	80 - 120%

Data Package ID: *IT0405169-1*

ICP Metals

Method SW6010

Matrix Spike And Matrix Spike Duplicate

Lab Name: Paragon Analytics
Work Order Number: 0405169
Client Name: New Horizons
ClientProject ID: CSMRI 2135

Field ID: SDA064
LabID: 0405169-13MS

Sample Matrix: SOIL
% Moisture: 6.9
Date Collected: 13-May-04
Date Extracted: 21-May-04
Date Analyzed: 24-May-04

Prep Batch: IP040521-3
QCBatchID: IP040521-3-1
Run ID: IT040524-1A2
Cleanup: NONE
Basis: Dry Weight

Sample Aliquot: 1 g
Final Volume: 100 ml
Result Units: mg/kg

CASNO	Target Analyte	Sample Result	Samp Qual	MS Result	MS Qual	Reporting Limit	Spike Added	MS % Rec.	Control Limits
7440-38-2	ARSENIC	320		516		1.07	215	90	80 - 120%
7440-43-9	CADMIUM	0.26	B	5.43		0.537	5.37	96	80 - 120%
7439-92-1	LEAD	1600		1520		1.61	53.7	-233	80 - 120%

MSD Lab ID: 0405169-13MSD

Sample Aliquot: 1 g
Final Volume: 100 ml

CASNO	Target Analyte	Spike Added	MSD Result	MSD Qual	Reporting Limit	MSD % Rec.	RPD	RPD Limits
7440-38-2	ARSENIC	215	528		1.07	96	3	20
7440-43-9	CADMIUM	5.37	5.33		0.537	94	2	20
7439-92-1	LEAD	53.7	1510		1.61	-255	1	20

Data Package ID: *IT0405169-1*

Mercury

Method SW7471

Method Blank

Lab Name: Paragon Analytics
Work Order Number: 0405169
Client Name: New Horizons
ClientProject ID: CSMRI 2135

Lab ID: HG040527-1MB

Sample Matrix: SOIL
% Moisture: N/A
Date Collected: N/A
Date Extracted: 05/27/2004
Date Analyzed: 05/28/2004

Prep Batch: HG040527-1
QCBatchID: HG040527-1-2
Run ID: HG040528-1A2
Cleanup: NONE
Basis: N/A

Sample Aliquot: 0.6 g
Final Volume: 100 ml
Result Units: mg/kg
Clean DF: 1
File Name: 04052801

CASNO	Target Analyte	DF	Result	Reporting Limit	MDL	Result Qualifier	EPA Qualifier
7439-97-6	MERCURY	1	0.00045	0.1	0.00045	U	

Data Package ID: *HG0405169-1*

Mercury

Method SW7471

Laboratory Control Sample

Lab Name: Paragon Analytics
Work Order Number: 0405169
Client Name: New Horizons
ClientProject ID: CSMRI 2135

Lab ID: HG040527-1LCS

Sample Matrix: SOIL
% Moisture: N/A
Date Collected: N/A
Date Extracted: 05/27/2004
Date Analyzed: 05/28/2004

Prep Batch: HG040527-1
QCBatchID: HG040527-1-2
Run ID: HG040528-1A2
Cleanup: NONE
Basis: N/A

Sample Aliquot: 0.6 g
Final Volume: 100 ml
Result Units: mg/kg
Clean DF: 1

CASNO	Target Analyte	Spike Added	LCS Result	Reporting Limit	Result Qualifier	LCS % Rec.	Control Limits
7439-97-6	MERCURY	0.167	0.167	0.1		100	80 - 120%

Data Package ID: *HG0405169-1*