

Split Samples SDGs - Anaconda Copper Mine/Yerington

NAREL Lab Work

SDG 0400068 (gamma spec) U 234,235,238; Th 227,228, 230,232; Ra 228 - gross alpha/beta

PA GW 20

PA GW 25

FB01

SDG 0500007 (U234,235,238; Th 227,228, 230,232, gamma spec, gross alpha/beta

P17 B

P17C

P17 D

P17E

K9A

K9B

K9C

PA HH 10-5

PA HH 10-10

PA HH 10-15

PA HH 10-20

PA HH 11-5X

PA HH 11-10

PA HH 11-15

PA HH 11-20

PA HH 11-25

PA HH 8-5

PA HH 8-10

PA HH 8-15

SDG 0500008 (gamma spec, gross alpha/beta)

PA HH 8-20

PA HH 8-25

PA BBB 2-5

PA BBB 2-15

PA BBB 2-20

PA BBB 2-25

PA C2-1

PA C2-5

PA C2-10

PA V1-1

PA V1-5

PA V1-10

PA Q1-1

PA Q1-5

PA Q1-10

PA P19-5
PA P19-6
PA P19-10
PA P19-15

SDG 0500009 (U 234,235,238; Th 227,228, 230,232, gamma spec, gross alpha/beta)

PA P19-20
PA P19-25
PA EE 14-1
PA EE 14-10
PA EE 14-15
PA EE 14-20
PA EE 14-21

SDG 0500010 (U 234, 235,238, Th 227,228, 230,232, Ra 228, gamma spec)

PA GW 09
PA GW 18
PA GW 18X

Missing

PA 02-1
PA 02-5
PA 02-10
PA GW 23

CLP Lab Work

SDG MY1MS8 (metals)

PA HH 8-15
PA HH 8-20
PA HH 8-25

SDG MY1MQ3 (metals, VOC, SVOC, pesticides/PCBs)

PA GW 09
PA GW 18

SDG MY1MX6 (metals)

PA EE 14-15
PA EE 14-20
PA EE 14-21
PA P19-6

SDG Y1LQ1 (pesticides/PCBs, metals)

PA GW 20
PA GW 23
PA GW 25

FB01

SDG Y1LQ6 (Pesticides/PCBs, SVOC, VOCs)

P17 B

P17C

P17 D

P17E

SDG Y1MR1 (VOCs, Pesticides/PCBs,SVOC, metals)

K9A

K9B

K9C

PA HH 10-5

PA HH 10-10

PA HH 10-15

PA HH 10-20

PA HH 11-5X

PA HH 11-10

PA HH 11-15

PA HH 11-20

PA HH 11-25

PA HH 8-5

PA HH 8-10

PA BBB 2-5

PA BBB 2-15

PA BBB 2-20

PA BBB 2-25

SDG Y1MT6 (VOC, SVOC, pesticides/pcbs, metals)

PA C2-1

PA C2-5

PA C2-10

PA V1-1

PA V1-5

PA V1-10

PA Q1-1

PA Q1-5

PA Q1-10

PA O2-1

PA O2-5

PA O2-10

PA P19-5

PA P19-6

PA P19-10

PA P19-15

PA P19-20

PA P19-25
PA EE 14-1
PA EE 14-5
PA EE 14-10

SDG Y1MW8 (VOC, SVOC, pesticides/PCBs)

PA P19-5
PA P19-6
PA P19-10
PA P19-15
PA P19-20
PA P19-25
PA EE 14-1
PA EE 14-5
PA EE 14-10
PA EE 14-15
PA EE 14-20
PA EE 14-21

EPA Region Lab Work

SDG 04341A (TPH purgeable, alkalinity, TOC, anions, pH, TPH extractable)

PA GW 20
PAGW 23
PAGW 25
TB01
TB02
FB 01

SDG 05014A (pH, TPH extractable, solids, TPH purgeable)

P17 B
P17C
P17 D
P17E
K9A
K9B
K9C
PA BBB 2-5
PA BBB 2-15
PA BBB 2-20
PA BBB 2-25
PA HH 10-5
PA HH 10-10
PA HH 10-15
PA HH 10-20
PA HH 11-5X

PA HH 11-10
PA HH 11-15
PA HH 11-20
PA HH 11-25
PA HH 8-5
PA HH 8-10
PA HH 8-15
PA HH 8-20
PA HH 8-25

SDG 05025A (TPH extractable, TPH purgeable, anions, TOC)

PA GW 09
PA GW 18
TB04

SDG 05038A (pH, Solids, TPH purgeable, TPH extractable)

PA P19-5
PA P19-6
PA P19-10
PA P19-15
PA P19-20
PA P19-25
PA EE 14-1
PA EE 14-10
PA EE 14-15
PA EE 14-20
PA EE 14-21
PA C2-1
PA C2-5
PA C2-10
PA V1-1
PA V1-5
PA V1-10
PA Q1-1
PA Q1-5
PA Q1-10

Data Package Checklist

Project: ANACONDA COPPER MINE SDG Number: #0400068

Date due: _____ Analysis: NAREL GR-01

Type of Package: 9 Data Summary Package 9 Complete Package

Y N N/A

- 9 9 9 All samples in the SDG are reported
- 9 9 9 All results are the ones intended
- 9 9 9 Printed results match the raw data
- 9 9 9 Error report forms are attached
- 9 9 9 SDG Form is attached
- 9 9 9 Analyst's checklist is attached
- 9 9 9 Original prep batch forms are attached
- 9 9 9 All supporting data sheets are attached
- 9 9 9 All raw data sheets appear to be correct
- 9 9 9 All handwritten notes are initialed and dated
- 9 9 9 Package is arranged correctly
- 9 9 9 Package appears to be complete

Were holding times met? 9 Yes 9 No 9 N/A

Were all QC results acceptable? 9 Yes 9 No

Are there any exceptions to report? 9 Yes 9 No

QAO Review

Y N N/A

- 9 9 9 All QC failures are noted
 - 9 9 9 Raw data look reasonable
 - 9 9 9 All exceptions have been noted
- Note: If changes to the case narrative are suggested, please provide the necessary language.

Comments: _____

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES**

REPORT OF SAMPLE DELIVERY GROUP #0400068

Project: ANACONDA COPPER MINE
Analysis Procedure: Gross Alpha and Beta on Water Samples
Date Reported: 01/13/2005

SAMPLES

NAREL Sample #	Client Sample ID	Type	Matrix	Date Collected	Date Received
A4.05913J	PAGW20	SAM	WATER-GROUND	12/01/2004	12/06/2004
A4.05936R	PAGW25	SAM	WATER-GROUND	12/07/2004	12/09/2004
A4.05937T	FB01	SAM	WATER-GROUND	12/08/2004	12/09/2004

EXCEPTIONS

1. Packaging and Shipping - No problems were observed.
2. Documentation - No problems were observed.
3. Sample Preparation - No problems were encountered.
4. Analysis - No problems were encountered.
5. Holding Times - All holding times were met.

QUALITY CONTROL

1. QC samples - All QC analysis results met NAREL acceptance criteria.
2. Instruments - Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Chief of the Monitoring and Analytical Services Branch and the NAREL Quality Assurance Coordinator, or their designees, as verified by the following signatures.

Quality Assurance Coordinator

Chief, Monitoring and Analytical Services Branch

GENERAL INFORMATION

SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Reagent blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A reagent blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "Z scores." A Z score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The Z score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The Z score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the Z score is computed.

Each standard uncertainty used to compute a Z score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

GENERAL INFORMATION (CONTINUED)

GROSS ALPHA AND BETA ANALYSIS

In comparison to the methods employed to determine radionuclide-specific activities, the method employed by NAREL to determine gross alpha and beta activity in water samples has the potential for greater analytical bias. It should be noted that this potential analytical uncertainty is not included in the two-sigma counting uncertainty term. Therefore, gross alpha and beta results should be used as gross approximations of the alpha and beta activity present.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 ALPBET ANALYSES
 SDG #0400068**

ANALYSIS SUMMARY

Analysis Procedure: NAREL GR-01
 Title: Gross Alpha and Beta on Water Samples

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Prep Batch #	QC Batch #
A4.05913J	DUP	N/A	01/04/2005	0009300Z	0003511Y
A4.05913J		N/A	01/04/2005	0009300Z	0003511Y
A4.05936R		N/A	01/04/2005	0009300Z	0003511Y
A4.05937T		N/A	01/04/2005	0009300Z	0003511Y

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

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NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0400068**

SAMPLE ANALYSIS REPORT

Sample #:	A4.05913J	QC batch #:	0003511Y
Matrix:	WATER-GROUND	Prep batch #:	0009300Z
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e+01 ML	Analysis procedure:	NAREL GR-01
Dry/wet weight:	N/A	Analyst:	EFG
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
01/04/2005 17:05	100.0	G54A	GVJ

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	3.51e+02	1.4e+02	7.2e+01	PCI/L	01/04/2005
Beta	9.69e+01	3.8e+01	4.9e+01	PCI/L	01/04/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 ALPBET ANALYSES
 SDG #0400068**

SAMPLE ANALYSIS REPORT

Sample #:	A4.05913J	QC batch #:	0003511Y
Matrix:	WATER-GROUND	Prep batch #:	0009300Z
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e+01 ML	Analysis procedure:	NAREL GR-01
Dry/wet weight:	N/A	Analyst:	EFG
Ash/dry weight:	N/A	QC type:	DUP

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
01/04/2005 17:05	100.0	G54B	GVJ

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	1.96e+02	1.1e+02	6.8e+01	PCI/L	01/04/2005
Beta	8.89e+01	3.6e+01	4.6e+01	PCI/L	01/04/2005

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 ALPBET ANALYSES
 SDG #0400068**

SAMPLE ANALYSIS REPORT

Sample #:	A4.05936R	QC batch #:	0003511Y
Matrix:	WATER-GROUND	Prep batch #:	0009300Z
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e+01 ML	Analysis procedure:	NAREL GR-01
Dry/wet weight:	N/A	Analyst:	EFG
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
01/04/2005 17:05	100.0	G54C	GVJ

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	1.31e+02	6.1e+01	3.4e+01	PCI/L	01/04/2005
Beta	4.90e+01	1.9e+01	2.4e+01	PCI/L	01/04/2005

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ALPBET ANALYSES
SDG #0400068**

SAMPLE ANALYSIS REPORT

Sample #:	A4.05937T	QC batch #:	0003511Y
Matrix:	WATER-GROUND	Prep batch #:	0009300Z
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.500e+02 ML	Analysis procedure:	NAREL GR-01
Dry/wet weight:	N/A	Analyst:	EFG
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
01/04/2005 17:05	100.0	G54D	GVJ

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	1.94e+01	7.3e+00	3.7e+00	PCI/L	01/04/2005
Beta	8.73e+00	2.5e+00	3.1e+00	PCI/L	01/04/2005

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 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 ALPBET ANALYSES
 SDG #0400068**

QC BATCH SUMMARY

QC batch #: 0003511Y
 Preparation procedure: N/A
 Analysis procedure: NAREL GR-01

NAREL Sample #	QC Type	Yield (%)	\forall 2 Φ Uncertainty (%)	Analyst
A4.05913J	DUP	N/A		EFG
A4.05913J		N/A		EFG
A4.05936R		N/A		EFG
A4.05937T		N/A		EFG

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

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NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0400068**

PREPARATION BATCH SUMMARY

SAMPLES ANALYZED

NAREL Sample #	QC Type	Aliquot Size	Completion Date	Prep Batch
A4.05913J	DUP	1.00e+01 ML	01/04/2005	0009300Z
A4.05913J		1.00e+01 ML	01/04/2005	0009300Z
A4.05936R		2.00e+01 ML	01/04/2005	0009300Z
A4.05937T		1.50e+02 ML	01/04/2005	0009300Z

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

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NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0400068**

DETECTOR REPORT

The following were used for samples in the SDG

G54A 01/04/2005 17:05 00481912H A4.05913J
G54B 01/04/2005 17:05 00481913J A4.05913J
G54C 01/04/2005 17:05 00481954U A4.05936R
G54D 01/04/2005 17:05 00481960R A4.05937T

The following were used for other samples in the QC batches

None found

Data Package Checklist

Project: ANACONDA COPPER MINE SDG Number: #0500009

Date due: _____ Analysis: NAREL GR-03

Type of Package: 9 Data Summary Package 9 Complete Package

Y N N/A

- 9 9 9 All samples in the SDG are reported
- 9 9 9 All results are the ones intended
- 9 9 9 Printed results match the raw data
- 9 9 9 Error report forms are attached
- 9 9 9 SDG Form is attached
- 9 9 9 Analyst's checklist is attached
- 9 9 9 Original prep batch forms are attached
- 9 9 9 All supporting data sheets are attached
- 9 9 9 All raw data sheets appear to be correct
- 9 9 9 All handwritten notes are initialed and dated
- 9 9 9 Package is arranged correctly
- 9 9 9 Package appears to be complete

Were holding times met? 9 Yes 9 No 9 N/A

Were all QC results acceptable? 9 Yes 9 No

Are there any exceptions to report? 9 Yes 9 No

QAO Review

Y N N/A

- 9 9 9 All QC failures are noted
 - 9 9 9 Raw data look reasonable
 - 9 9 9 All exceptions have been noted
- Note: If changes to the case narrative are suggested, please provide the necessary language.

Comments: _____

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES**

REPORT OF SAMPLE DELIVERY GROUP #0500009

Project: ANACONDA COPPER MINE
Analysis Procedure: Gross Alpha and Beta on Solid Samples
Date Reported: 03/29/2005

SAMPLES

NAREL Sample #	Client Sample ID	Type	Matrix	Date Collected	Date Received
A5.00719U	PA-P19-20	SAM	SOIL	02/04/2005	02/07/2005
A5.00720L	PA-P19-25	SAM	SOIL	02/04/2005	02/07/2005
A5.00721M	PA-EE14-1	SAM	SOIL	02/04/2005	02/07/2005
A5.00722N	PA-EE14-5	SAM	SOIL	02/04/2005	02/07/2005
A5.00723P	PA-EE14-10	SAM	SOIL	02/04/2005	02/07/2005
A5.00724Q	PA-EE14-15	SAM	SOIL	02/04/2005	02/07/2005
A5.00725R	PA-EE14-20	SAM	SOIL	02/04/2005	02/07/2005
A5.00726T	PA-EE14-21	SAM	SOIL	02/04/2005	02/07/2005

EXCEPTIONS

1. Packaging and Shipping - No problems were observed.
2. Documentation - No problems were observed.
3. Sample Preparation - No problems were encountered.
4. Analysis - No problems were encountered.
5. Holding Times - All holding times were met.

QUALITY CONTROL

1. QC samples - All QC analysis results met NAREL acceptance criteria.
2. Instruments - Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Chief of the Monitoring and Analytical Services Branch and the NAREL Quality Assurance Coordinator, or their designees, as verified by the following signatures.

Quality Assurance Coordinator

Chief, Monitoring and Analytical Services Branch

GENERAL INFORMATION

SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Reagent blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A reagent blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "Z scores." A Z score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The Z score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The Z score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the Z score is computed.

Each standard uncertainty used to compute a Z score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

GENERAL INFORMATION (CONTINUED)

GROSS ALPHA AND BETA ANALYSIS

In comparison to the methods employed to determine radionuclide-specific activities, the method employed by NAREL to determine gross alpha and beta activity has the potential for greater analytical bias. This is especially true for solid samples. It should be noted that this potential analytical uncertainty is not included in the two-sigma counting uncertainty term. Therefore, gross alpha and beta results should be used as gross approximations of the alpha and beta activity present.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 ALPBET ANALYSES
 SDG #0500009**

ANALYSIS SUMMARY

Analysis Procedure: NAREL GR-03
 Title: Gross Alpha and Beta on Solid Samples

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Prep Batch #	QC Batch #
A5.00719U	DUP	N/A	02/25/2005	0009454T	0003575Q
A5.00720L		N/A	02/25/2005	0009454T	0003575Q
A5.00720L		N/A	02/25/2005	0009454T	0003575Q
A5.00721M		N/A	02/25/2005	0009454T	0003575Q
A5.00722N		N/A	02/25/2005	0009454T	0003575Q
A5.00723P		N/A	02/25/2005	0009454T	0003575Q
A5.00724Q		N/A	02/25/2005	0009454T	0003575Q
A5.00725R		N/A	02/25/2005	0009454T	0003575Q
A5.00726T		N/A	02/25/2005	0009454T	0003575Q

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 ALPBET ANALYSES
 SDG #0500009**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00719U	QC batch #:	0003575Q
Matrix:	SOIL	Prep batch #:	0009454T
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	90.93 %	Analyst:	VH
Ash/dry weight:	96.80 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/25/2005 13:53	100.0	G54A	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	1.73e+01	1.4e+01	1.0e+01	PCI/GDRY	02/25/2005
Beta	3.73e+01	5.5e+00	5.1e+00	PCI/GDRY	02/25/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 ALPBET ANALYSES
 SDG #0500009**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00720L	QC batch #:	0003575Q
Matrix:	SOIL	Prep batch #:	0009454T
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	95.72 %	Analyst:	VH
Ash/dry weight:	98.40 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/25/2005 13:53	100.0	G54B	DPS

ANALYTICAL RESULTS

Analyte	Activity	$\sqrt{2\Phi}$ Uncertainty	MDC	Unit	Date
Alpha	3.50e+01	1.6e+01	1.1e+01	PCI/GDRY	02/25/2005
Beta	3.87e+01	5.5e+00	5.2e+00	PCI/GDRY	02/25/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 ALPBET ANALYSES
 SDG #0500009**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00720L	QC batch #:	0003575Q
Matrix:	SOIL	Prep batch #:	0009454T
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	95.72 %	Analyst:	VH
Ash/dry weight:	98.40 %	QC type:	DUP

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/25/2005 13:53	100.0	G54D	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	2.41e+01	1.5e+01	7.8e+00	PCI/GDRY	02/25/2005
Beta	3.51e+01	5.5e+00	5.5e+00	PCI/GDRY	02/25/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 ALPBET ANALYSES
 SDG #0500009**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00721M	QC batch #:	0003575Q
Matrix:	SOIL	Prep batch #:	0009454T
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	94.84 %	Analyst:	VH
Ash/dry weight:	97.60 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/25/2005 15:33	100.0	G54A	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	2.28e+01	1.5e+01	1.0e+01	PCI/GDRY	02/25/2005
Beta	3.33e+01	5.3e+00	5.2e+00	PCI/GDRY	02/25/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 ALPBET ANALYSES
 SDG #0500009**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00722N	QC batch #:	0003575Q
Matrix:	SOIL	Prep batch #:	0009454T
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	90.94 %	Analyst:	VH
Ash/dry weight:	98.00 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/25/2005 15:33	100.0	G54B	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	2.63e+00	1.2e+01	1.1e+01	PCI/GDRY	02/25/2005
Beta	3.07e+01	5.0e+00	4.8e+00	PCI/GDRY	02/25/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0500009**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00723P	QC batch #:	0003575Q
Matrix:	SOIL	Prep batch #:	0009454T
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	95.93 %	Analyst:	VH
Ash/dry weight:	98.80 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/25/2005 15:33	100.0	G54D	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	8.63e+00	1.2e+01	7.8e+00	PCI/GDRY	02/25/2005
Beta	3.00e+01	5.2e+00	5.3e+00	PCI/GDRY	02/25/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0500009**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00724Q	QC batch #:	0003575Q
Matrix:	SOIL	Prep batch #:	0009454T
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	96.86 %	Analyst:	VH
Ash/dry weight:	98.40 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/25/2005 17:13	100.0	G54A	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	1.21e+01	1.4e+01	1.0e+01	PCI/GDRY	02/25/2005
Beta	4.20e+01	5.7e+00	5.1e+00	PCI/GDRY	02/25/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 ALPBET ANALYSES
 SDG #0500009**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00725R	QC batch #:	0003575Q
Matrix:	SOIL	Prep batch #:	0009454T
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	95.21 %	Analyst:	VH
Ash/dry weight:	99.20 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/25/2005 17:13	100.0	G54B	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	1.90e+01	1.4e+01	1.1e+01	PCI/GDRY	02/25/2005
Beta	3.43e+01	5.3e+00	5.0e+00	PCI/GDRY	02/25/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
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ALPBET ANALYSES
SDG #0500009**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00726T	QC batch #:	0003575Q
Matrix:	SOIL	Prep batch #:	0009454T
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	95.65 %	Analyst:	VH
Ash/dry weight:	98.40 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/25/2005 17:13	100.0	G54D	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	1.58e+01	1.3e+01	7.8e+00	PCI/GDRY	02/25/2005
Beta	3.27e+01	5.4e+00	5.4e+00	PCI/GDRY	02/25/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
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 ALPBET ANALYSES
 SDG #0500009**

QC BATCH SUMMARY

QC batch #: 0003575Q
 Preparation procedure: N/A
 Analysis procedure: NAREL GR-03

NAREL Sample #	QC Type	Yield (%)	\forall 2 Φ Uncertainty (%)	Analyst
A5.00719U	DUP	N/A		VH
A5.00720L		N/A		VH
A5.00720L		N/A		VH
A5.00721M		N/A		VH
A5.00722N		N/A		VH
A5.00723P		N/A		VH
A5.00724Q		N/A		VH
A5.00725R		N/A		VH
A5.00726T		N/A		VH

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

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 ALPBET ANALYSES
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PREPARATION BATCH SUMMARY

SAMPLES ANALYZED

NAREL Sample #	QC Type	Aliquot Size	Completion Date	Prep Batch
A5.00719U	DUP	1.00e-01 GASH	02/25/2005	0009454T
A5.00720L		1.00e-01 GASH	02/25/2005	0009454T
A5.00720L		1.00e-01 GASH	02/25/2005	0009454T
A5.00721M		1.00e-01 GASH	02/25/2005	0009454T
A5.00722N		1.00e-01 GASH	02/25/2005	0009454T
A5.00723P		1.00e-01 GASH	02/25/2005	0009454T
A5.00724Q		1.00e-01 GASH	02/25/2005	0009454T
A5.00725R		1.00e-01 GASH	02/25/2005	0009454T
A5.00726T		1.00e-01 GASH	02/25/2005	0009454T

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

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ALPBET ANALYSES
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DETECTOR REPORT

The following were used for samples in the SDG

G54A	02/25/2005	13:53	00484651U	A5.00719U
G54A	02/25/2005	15:33	00484657A	A5.00721M
G54A	02/25/2005	17:13	00484666B	A5.00724Q
G54B	02/25/2005	13:53	00484654X	A5.00720L
G54B	02/25/2005	15:33	00484660V	A5.00722N
G54B	02/25/2005	17:13	00484669E	A5.00725R
G54D	02/25/2005	13:53	00484675C	A5.00720L
G54D	02/25/2005	15:33	00484663Y	A5.00723P
G54D	02/25/2005	17:13	00484672Z	A5.00726T

The following were used for other samples in the QC batches

None found

Data Package Checklist

Project: ANACONDA COPPER MINE SDG Number: #0500008

Date due: _____ Analysis: NAREL GR-03

Type of Package: 9 Data Summary Package 9 Complete Package

Y N N/A

- 9 9 9 All samples in the SDG are reported
- 9 9 9 All results are the ones intended
- 9 9 9 Printed results match the raw data
- 9 9 9 Error report forms are attached
- 9 9 9 SDG Form is attached
- 9 9 9 Analyst's checklist is attached
- 9 9 9 Original prep batch forms are attached
- 9 9 9 All supporting data sheets are attached
- 9 9 9 All raw data sheets appear to be correct
- 9 9 9 All handwritten notes are initialed and dated
- 9 9 9 Package is arranged correctly
- 9 9 9 Package appears to be complete

Were holding times met? 9 Yes 9 No 9 N/A

Were all QC results acceptable? 9 Yes 9 No

Are there any exceptions to report? 9 Yes 9 No

QAO Review

Y N N/A

- 9 9 9 All QC failures are noted
 - 9 9 9 Raw data look reasonable
 - 9 9 9 All exceptions have been noted
- Note: If changes to the case narrative are suggested, please provide the necessary language.

Comments: _____

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES**

REPORT OF SAMPLE DELIVERY GROUP #0500008

Project: ANACONDA COPPER MINE
Analysis Procedure: Gross Alpha and Beta on Solid Samples
Date Reported: 03/29/2005

SAMPLES

NAREL Sample #	Client Sample ID	Type	Matrix	Date Collected	Date Received
A5.00538Q	PA-HH8-20	SAM	SOIL	01/26/2005	01/28/2005
A5.00539R	PA-HH8-25	SAM	SOIL	01/26/2005	01/28/2005
A5.00540J	PA-BBB2-5	SAM	SOIL	01/27/2005	01/28/2005
A5.00541K	PA-BBB2-10	SAM	SOIL	01/27/2005	01/28/2005
A5.00542L	PA-BBB2-15	SAM	SOIL	01/27/2005	01/28/2005
A5.00543M	PA-BBB2-20	SAM	SOIL	01/27/2005	01/28/2005
A5.00544N	PA-BBB2-25	SAM	SOIL	01/27/2005	01/28/2005
A5.00706N	PA-C2-1	SAM	SOIL	02/02/2005	02/07/2005
A5.00707P	PA-C2-5	SAM	SOIL	02/02/2005	02/07/2005
A5.00708Q	PA-C2-10	SAM	SOIL	02/02/2005	02/07/2005
A5.00709R	PA-V1-1	SAM	SOIL	02/02/2005	02/07/2005
A5.00710J	PA-V1-10	SAM	SOIL	02/02/2005	02/07/2005
A5.00711K	PA-V1-5	SAM	SOIL	02/02/2005	02/07/2005
A5.00712L	PA-Q1-1	SAM	SOIL	02/02/2005	02/07/2005
A5.00713M	PA-Q1-5	SAM	SOIL	02/02/2005	02/07/2005
A5.00714N	PA-Q1-10	SAM	SOIL	02/02/2005	02/07/2005
A5.00715P	PA-P19-5	SAM	SOIL	02/04/2005	02/07/2005
A5.00716Q	PA-P19-6	SAM	SOIL	02/04/2005	02/07/2005
A5.00717R	PA-P19-10	SAM	SOIL	02/04/2005	02/07/2005
A5.00718T	PA-P19-15	SAM	SOIL	02/04/2005	02/07/2005

EXCEPTIONS

1. Packaging and Shipping - No problems were observed.
2. Documentation - No problems were observed.
3. Sample Preparation - No problems were encountered.
4. Analysis - No problems were encountered.
5. Holding Times - All holding times were met.

QUALITY CONTROL

1. QC samples - All QC analysis results met NAREL acceptance criteria.
2. Instruments - Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Chief of the Monitoring and Analytical Services Branch and the NAREL Quality Assurance Coordinator, or their designees, as verified by the following signatures.

Quality Assurance Coordinator

Chief, Monitoring and Analytical Services Branch

GENERAL INFORMATION

SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Reagent blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A reagent blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "Z scores." A Z score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The Z score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The Z score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the Z score is computed.

Each standard uncertainty used to compute a Z score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

GENERAL INFORMATION (CONTINUED)

GROSS ALPHA AND BETA ANALYSIS

In comparison to the methods employed to determine radionuclide-specific activities, the method employed by NAREL to determine gross alpha and beta activity has the potential for greater analytical bias. This is especially true for solid samples. It should be noted that this potential analytical uncertainty is not included in the two-sigma counting uncertainty term. Therefore, gross alpha and beta results should be used as gross approximations of the alpha and beta activity present.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0500008**

ANALYSIS SUMMARY

Analysis Procedure: NAREL GR-03
Title: Gross Alpha and Beta on Solid Samples

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Prep Batch #	QC Batch #
A5.00538Q		N/A	02/28/2005	0009455U	0003577T
A5.00539R		N/A	02/28/2005	0009455U	0003577T
A5.00540J		N/A	02/28/2005	0009455U	0003577T
A5.00541K		N/A	02/28/2005	0009455U	0003577T
A5.00542L		N/A	02/28/2005	0009455U	0003577T
A5.00543M		N/A	02/28/2005	0009455U	0003577T
A5.00544N		N/A	02/28/2005	0009455U	0003577T
A5.00544N	DUP	N/A	02/28/2005	0009455U	0003577T
A5.00706N		N/A	02/28/2005	0009455U	0003577T
A5.00707P		N/A	02/28/2005	0009455U	0003577T
A5.00708Q		N/A	02/28/2005	0009455U	0003577T
A5.00709R		N/A	02/28/2005	0009455U	0003577T
A5.00710J		N/A	02/28/2005	0009455U	0003577T
A5.00711K		N/A	02/28/2005	0009455U	0003577T
A5.00712L		N/A	02/28/2005	0009455U	0003577T
A5.00713M		N/A	02/28/2005	0009455U	0003577T
A5.00714N		N/A	02/28/2005	0009455U	0003577T
A5.00715P		N/A	02/28/2005	0009455U	0003577T
A5.00716Q		N/A	02/28/2005	0009455U	0003577T
A5.00717R		N/A	02/28/2005	0009455U	0003577T
A5.00718T		N/A	02/28/2005	0009455U	0003577T

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 ALPBET ANALYSES
 SDG #0500008**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00538Q	QC batch #:	0003577T
Matrix:	SOIL	Prep batch #:	0009455U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	96.38 %	Analyst:	VH
Ash/dry weight:	98.80 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/28/2005 06:52	100.0	G54A	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	1.28e+01	1.4e+01	9.5e+00	PCI/GDRY	02/28/2005
Beta	3.73e+01	5.4e+00	4.9e+00	PCI/GDRY	02/28/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 ALPBET ANALYSES
 SDG #0500008**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00539R	QC batch #:	0003577T
Matrix:	SOIL	Prep batch #:	0009455U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	95.77 %	Analyst:	VH
Ash/dry weight:	99.20 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/28/2005 06:52	100.0	G54B	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	2.89e+01	1.5e+01	9.6e+00	PCI/GDRY	02/28/2005
Beta	4.35e+01	5.7e+00	4.9e+00	PCI/GDRY	02/28/2005

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 ALPBET ANALYSES
 SDG #0500008**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00540J	QC batch #:	0003577T
Matrix:	SOIL	Prep batch #:	0009455U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	92.31 %	Analyst:	VH
Ash/dry weight:	98.40 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/28/2005 06:52	100.0	G54D	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	1.60e+01	1.4e+01	9.5e+00	PCI/GDRY	02/28/2005
Beta	2.91e+01	4.9e+00	4.7e+00	PCI/GDRY	02/28/2005

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ALPBET ANALYSES
SDG #0500008**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00541K	QC batch #:	0003577T
Matrix:	SOIL	Prep batch #:	0009455U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	96.02 %	Analyst:	VH
Ash/dry weight:	98.80 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/28/2005 08:32	100.0	G54A	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	1.48e+01	1.4e+01	9.4e+00	PCI/GDRY	02/28/2005
Beta	3.31e+01	5.2e+00	4.9e+00	PCI/GDRY	02/28/2005

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 ALPBET ANALYSES
 SDG #0500008**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00542L	QC batch #:	0003577T
Matrix:	SOIL	Prep batch #:	0009455U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	96.96 %	Analyst:	VH
Ash/dry weight:	98.80 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/28/2005 08:32	100.0	G54B	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	1.66e+01	1.4e+01	9.6e+00	PCI/GDRY	02/28/2005
Beta	3.64e+01	5.3e+00	4.7e+00	PCI/GDRY	02/28/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 ALPBET ANALYSES
 SDG #0500008**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00543M	QC batch #:	0003577T
Matrix:	SOIL	Prep batch #:	0009455U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	96.25 %	Analyst:	VH
Ash/dry weight:	98.40 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/28/2005 08:32	100.0	G54D	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	2.32e+01	1.5e+01	9.5e+00	PCI/GDRY	02/28/2005
Beta	3.36e+01	5.2e+00	4.8e+00	PCI/GDRY	02/28/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
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 ALPBET ANALYSES
 SDG #0500008**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00544N	QC batch #:	0003577T
Matrix:	SOIL	Prep batch #:	0009455U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	97.04 %	Analyst:	VH
Ash/dry weight:	99.60 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/28/2005 10:12	100.0	G54A	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	2.15e+01	1.5e+01	9.6e+00	PCI/GDRY	02/28/2005
Beta	4.11e+01	5.7e+00	5.0e+00	PCI/GDRY	02/28/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0500008**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00544N	QC batch #:	0003577T
Matrix:	SOIL	Prep batch #:	0009455U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	97.04 %	Analyst:	VH
Ash/dry weight:	99.60 %	QC type:	DUP

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/28/2005 10:12	100.0	G54B	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	2.71e+01	1.5e+01	9.7e+00	PCI/GDRY	02/28/2005
Beta	3.56e+01	5.3e+00	4.9e+00	PCI/GDRY	02/28/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 ALPBET ANALYSES
 SDG #0500008**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00706N	QC batch #:	0003577T
Matrix:	SOIL	Prep batch #:	0009455U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	94.50 %	Analyst:	VH
Ash/dry weight:	97.60 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/28/2005 10:12	100.0	G54D	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	8.72e+00	1.2e+01	9.4e+00	PCI/GDRY	02/28/2005
Beta	3.23e+01	5.1e+00	4.6e+00	PCI/GDRY	02/28/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 ALPBET ANALYSES
 SDG #0500008**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00707P	QC batch #:	0003577T
Matrix:	SOIL	Prep batch #:	0009455U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	95.91 %	Analyst:	VH
Ash/dry weight:	98.40 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/28/2005 11:53	100.0	G54A	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	1.17e+01	1.3e+01	9.4e+00	PCI/GDRY	02/28/2005
Beta	3.32e+01	5.2e+00	4.9e+00	PCI/GDRY	02/28/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 ALPBET ANALYSES
 SDG #0500008**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00708Q	QC batch #:	0003577T
Matrix:	SOIL	Prep batch #:	0009455U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	97.07 %	Analyst:	VH
Ash/dry weight:	100.00 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/28/2005 11:53	100.0	G54B	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	1.59e+01	1.4e+01	9.8e+00	PCI/GDRY	02/28/2005
Beta	3.68e+01	5.4e+00	4.8e+00	PCI/GDRY	02/28/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 ALPBET ANALYSES
 SDG #0500008**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00709R	QC batch #:	0003577T
Matrix:	SOIL	Prep batch #:	0009455U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	94.09 %	Analyst:	VH
Ash/dry weight:	100.00 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/28/2005 11:53	100.0	G54D	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	8.92e+00	1.3e+01	9.6e+00	PCI/GDRY	02/28/2005
Beta	3.74e+01	5.4e+00	4.7e+00	PCI/GDRY	02/28/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 ALPBET ANALYSES
 SDG #0500008**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00710J	QC batch #:	0003577T
Matrix:	SOIL	Prep batch #:	0009455U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	95.31 %	Analyst:	VH
Ash/dry weight:	98.80 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/28/2005 13:33	100.0	G54A	DPS

ANALYTICAL RESULTS

Analyte	Activity	$\sqrt{2\Phi}$ Uncertainty	MDC	Unit	Date
Alpha	1.71e+01	1.4e+01	9.5e+00	PCI/GDRY	02/28/2005
Beta	3.25e+01	5.2e+00	5.0e+00	PCI/GDRY	02/28/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 ALPBET ANALYSES
 SDG #0500008**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00711K	QC batch #:	0003577T
Matrix:	SOIL	Prep batch #:	0009455U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	93.65 %	Analyst:	VH
Ash/dry weight:	98.00 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/28/2005 13:33	100.0	G54B	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	8.39e+00	1.2e+01	9.5e+00	PCI/GDRY	02/28/2005
Beta	3.62e+01	5.2e+00	4.6e+00	PCI/GDRY	02/28/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 ALPBET ANALYSES
 SDG #0500008**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00712L	QC batch #:	0003577T
Matrix:	SOIL	Prep batch #:	0009455U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	95.76 %	Analyst:	VH
Ash/dry weight:	97.20 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/28/2005 13:33	100.0	G54D	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	1.78e+01	1.4e+01	9.4e+00	PCI/GDRY	02/28/2005
Beta	2.20e+01	4.5e+00	4.7e+00	PCI/GDRY	02/28/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 ALPBET ANALYSES
 SDG #0500008**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00713M	QC batch #:	0003577T
Matrix:	SOIL	Prep batch #:	0009455U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	97.04 %	Analyst:	VH
Ash/dry weight:	98.80 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/28/2005 15:13	100.0	G54A	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	1.29e+01	1.4e+01	9.5e+00	PCI/GDRY	02/28/2005
Beta	3.35e+01	5.3e+00	4.9e+00	PCI/GDRY	02/28/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 ALPBET ANALYSES
 SDG #0500008**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00714N	QC batch #:	0003577T
Matrix:	SOIL	Prep batch #:	0009455U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	94.68 %	Analyst:	VH
Ash/dry weight:	98.00 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/28/2005 15:13	100.0	G54B	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	1.04e+01	1.3e+01	9.5e+00	PCI/GDRY	02/28/2005
Beta	3.51e+01	5.2e+00	4.6e+00	PCI/GDRY	02/28/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 ALPBET ANALYSES
 SDG #0500008**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00715P	QC batch #:	0003577T
Matrix:	SOIL	Prep batch #:	0009455U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	94.37 %	Analyst:	VH
Ash/dry weight:	98.40 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/28/2005 15:13	100.0	G54D	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	2.00e+01	1.4e+01	9.4e+00	PCI/GDRY	02/28/2005
Beta	3.87e+01	5.5e+00	4.8e+00	PCI/GDRY	02/28/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 ALPBET ANALYSES
 SDG #0500008**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00716Q	QC batch #:	0003577T
Matrix:	SOIL	Prep batch #:	0009455U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	94.56 %	Analyst:	VH
Ash/dry weight:	98.80 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/28/2005 16:53	100.0	G54A	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	2.67e+01	1.6e+01	9.5e+00	PCI/GDRY	02/28/2005
Beta	4.07e+01	5.7e+00	5.1e+00	PCI/GDRY	02/28/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 ALPBET ANALYSES
 SDG #0500008**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00717R	QC batch #:	0003577T
Matrix:	SOIL	Prep batch #:	0009455U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	92.11 %	Analyst:	VH
Ash/dry weight:	98.80 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/28/2005 16:53	100.0	G54B	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	2.17e+01	1.4e+01	9.6e+00	PCI/GDRY	02/28/2005
Beta	3.57e+01	5.3e+00	4.8e+00	PCI/GDRY	02/28/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 ALPBET ANALYSES
 SDG #0500008**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00718T	QC batch #:	0003577T
Matrix:	SOIL	Prep batch #:	0009455U
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	94.71 %	Analyst:	VH
Ash/dry weight:	98.80 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/28/2005 16:53	100.0	G54D	DPS

ANALYTICAL RESULTS

Analyte	Activity	$\sqrt{2\Phi}$ Uncertainty	MDC	Unit	Date
Alpha	1.70e+01	1.4e+01	9.5e+00	PCI/GDRY	02/28/2005
Beta	3.24e+01	5.1e+00	4.8e+00	PCI/GDRY	02/28/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 ALPBET ANALYSES
 SDG #0500008**

QC BATCH SUMMARY

QC batch #: 0003577T
 Preparation procedure: N/A
 Analysis procedure: NAREL GR-03

NAREL Sample #	QC Type	Yield (%)	\forall 2 Φ Uncertainty (%)	Analyst
A5.00538Q		N/A		VH
A5.00539R		N/A		VH
A5.00540J		N/A		VH
A5.00541K		N/A		VH
A5.00542L		N/A		VH
A5.00543M		N/A		VH
A5.00544N		N/A		VH
A5.00544N	DUP	N/A		VH
A5.00706N		N/A		VH
A5.00707P		N/A		VH
A5.00708Q		N/A		VH
A5.00709R		N/A		VH
A5.00710J		N/A		VH
A5.00711K		N/A		VH
A5.00712L		N/A		VH
A5.00713M		N/A		VH
A5.00714N		N/A		VH
A5.00715P		N/A		VH
A5.00716Q		N/A		VH
A5.00717R		N/A		VH
A5.00718T		N/A		VH

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0500008**

PREPARATION BATCH SUMMARY

SAMPLES ANALYZED

NAREL Sample #	QC Type	Aliquot Size	Completion Date	Prep Batch
A5.00538Q	DUP	1.00e-01 GASH	02/28/2005	0009455U
A5.00539R		1.00e-01 GASH	02/28/2005	0009455U
A5.00540J		1.00e-01 GASH	02/28/2005	0009455U
A5.00541K		1.00e-01 GASH	02/28/2005	0009455U
A5.00542L		1.00e-01 GASH	02/28/2005	0009455U
A5.00543M		1.00e-01 GASH	02/28/2005	0009455U
A5.00544N		1.00e-01 GASH	02/28/2005	0009455U
A5.00544N		1.00e-01 GASH	02/28/2005	0009455U
A5.00706N		1.00e-01 GASH	02/28/2005	0009455U
A5.00707P		1.00e-01 GASH	02/28/2005	0009455U
A5.00708Q		1.00e-01 GASH	02/28/2005	0009455U
A5.00709R		1.00e-01 GASH	02/28/2005	0009455U
A5.00710J		1.00e-01 GASH	02/28/2005	0009455U
A5.00711K		1.00e-01 GASH	02/28/2005	0009455U
A5.00712L		1.00e-01 GASH	02/28/2005	0009455U
A5.00713M		1.00e-01 GASH	02/28/2005	0009455U
A5.00714N		1.00e-01 GASH	02/28/2005	0009455U
A5.00715P		1.00e-01 GASH	02/28/2005	0009455U
A5.00716Q		1.00e-01 GASH	02/28/2005	0009455U
A5.00717R		1.00e-01 GASH	02/28/2005	0009455U
A5.00718T	1.00e-01 GASH	02/28/2005	0009455U	

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0500008**

DETECTOR REPORT

The following were used for samples in the SDG

G54A	02/28/2005	06:52	00484248L	A5.00538Q
G54A	02/28/2005	08:32	00484309G	A5.00541K
G54A	02/28/2005	10:12	00484328K	A5.00544N
G54A	02/28/2005	11:53	00484615P	A5.00707P
G54A	02/28/2005	13:33	00484624Q	A5.00710J
G54A	02/28/2005	15:13	00484633R	A5.00713M
G54A	02/28/2005	16:53	00484642T	A5.00716Q
G54B	02/28/2005	06:52	00484254J	A5.00539R
G54B	02/28/2005	08:32	00484315E	A5.00542L
G54B	02/28/2005	10:12	00484329L	A5.00544N
G54B	02/28/2005	11:53	00484618T	A5.00708Q
G54B	02/28/2005	13:33	00484627U	A5.00711K
G54B	02/28/2005	15:13	00484636V	A5.00714N
G54B	02/28/2005	16:53	00484645W	A5.00717R
G54D	02/28/2005	06:52	00484303A	A5.00540J
G54D	02/28/2005	08:32	00484321C	A5.00543M
G54D	02/28/2005	10:12	00484612L	A5.00706N
G54D	02/28/2005	11:53	00484621M	A5.00709R
G54D	02/28/2005	13:33	00484630N	A5.00712L
G54D	02/28/2005	15:13	00484639Y	A5.00715P
G54D	02/28/2005	16:53	00484648Z	A5.00718T

The following were used for other samples in the QC batches

None found

Data Package Checklist

Project: ANACONDA COPPER MINE SDG Number: #0500007

Date due: _____ Analysis: NAREL GR-03

Type of Package: 9 Data Summary Package 9 Complete Package

Y N N/A

- 9 9 9 All samples in the SDG are reported
- 9 9 9 All results are the ones intended
- 9 9 9 Printed results match the raw data
- 9 9 9 Error report forms are attached
- 9 9 9 SDG Form is attached
- 9 9 9 Analyst's checklist is attached
- 9 9 9 Original prep batch forms are attached
- 9 9 9 All supporting data sheets are attached
- 9 9 9 All raw data sheets appear to be correct
- 9 9 9 All handwritten notes are initialed and dated
- 9 9 9 Package is arranged correctly
- 9 9 9 Package appears to be complete

Were holding times met? 9 Yes 9 No 9 N/A

Were all QC results acceptable? 9 Yes 9 No

Are there any exceptions to report? 9 Yes 9 No

QAO Review

Y N N/A

- 9 9 9 All QC failures are noted
 - 9 9 9 Raw data look reasonable
 - 9 9 9 All exceptions have been noted
- Note: If changes to the case narrative are suggested, please provide the necessary language.

Comments: _____

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES**

REPORT OF SAMPLE DELIVERY GROUP #0500007

Project: ANACONDA COPPER MINE
Analysis Procedure: Gross Alpha and Beta on Solid Samples
Date Reported: 03/29/2005

SAMPLES

NAREL Sample #	Client Sample ID	Type	Matrix	Date Collected	Date Received
A5.00255G	P17B	SAM	SOIL	01/11/2005	01/14/2005
A5.00256H	P17C	SAM	SOIL	01/11/2005	01/14/2005
A5.00257J	P17D	SAM	SOIL	01/11/2005	01/14/2005
A5.00258K	P17E	SAM	SOIL	01/11/2005	01/14/2005
A5.00522G	K9A	SAM	SOIL	01/24/2005	01/28/2005
A5.00523H	K9B	SAM	SOIL	01/24/2005	01/28/2005
A5.00524J	K9C	SAM	SOIL	01/24/2005	01/28/2005
A5.00525K	PA-HH10-5	SAM	SOIL	01/26/2005	01/28/2005
A5.00526L	PA-HH10-10	SAM	SOIL	01/26/2005	01/28/2005
A5.00527M	PA-HH10-15	SAM	SOIL	01/26/2005	01/28/2005
A5.00528N	PA-HH10-20	SAM	SOIL	01/26/2005	01/28/2005
A5.00529P	PA-HH11-5	SAM	SOIL	01/26/2005	01/28/2005
A5.00530G	PA-HH11-10	SAM	SOIL	01/26/2005	01/28/2005
A5.00531H	PA-HH11-5X	SAM	SOIL	01/26/2005	01/28/2005
A5.00532J	PA-HH11-15	SAM	SOIL	01/26/2005	01/28/2005
A5.00533K	PA-HH11-20	SAM	SOIL	01/26/2005	01/28/2005
A5.00534L	PA-HH11-25	SAM	SOIL	01/26/2005	01/28/2005
A5.00535M	PA-HH8-5	SAM	SOIL	01/26/2005	01/28/2005
A5.00536N	PA-HH8-10	SAM	SOIL	01/26/2005	01/28/2005
A5.00537P	PA-HH8-15	SAM	SOIL	01/26/2005	01/28/2005

EXCEPTIONS

1. Packaging and Shipping - No problems were observed.
2. Documentation - No problems were observed.
3. Sample Preparation - No problems were encountered.
4. Analysis - No problems were encountered.
5. Holding Times - All holding times were met.

QUALITY CONTROL

1. QC samples - All QC analysis results met NAREL acceptance criteria.
2. Instruments - Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Chief of the Monitoring and Analytical Services Branch and the NAREL Quality Assurance Coordinator, or their designees, as verified by the following signatures.

Quality Assurance Coordinator

Chief, Monitoring and Analytical Services Branch

GENERAL INFORMATION

SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Reagent blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A reagent blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "Z scores." A Z score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The Z score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The Z score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the Z score is computed.

Each standard uncertainty used to compute a Z score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

GENERAL INFORMATION (CONTINUED)

GROSS ALPHA AND BETA ANALYSIS

In comparison to the methods employed to determine radionuclide-specific activities, the method employed by NAREL to determine gross alpha and beta activity has the potential for greater analytical bias. This is especially true for solid samples. It should be noted that this potential analytical uncertainty is not included in the two-sigma counting uncertainty term. Therefore, gross alpha and beta results should be used as gross approximations of the alpha and beta activity present.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 ALPBET ANALYSES
 SDG #0500007**

ANALYSIS SUMMARY

Analysis Procedure: NAREL GR-03
 Title: Gross Alpha and Beta on Solid Samples

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Prep Batch #	QC Batch #
A5.00255G	DUP	N/A	02/24/2005	0009453R	0003574P
A5.00255G		N/A	02/24/2005	0009453R	0003574P
A5.00256H		N/A	02/24/2005	0009453R	0003574P
A5.00257J		N/A	02/24/2005	0009453R	0003574P
A5.00258K		N/A	02/24/2005	0009453R	0003574P
A5.00522G		N/A	02/24/2005	0009453R	0003574P
A5.00523H		N/A	02/24/2005	0009453R	0003574P
A5.00524J		N/A	02/24/2005	0009453R	0003574P
A5.00525K		N/A	02/24/2005	0009453R	0003574P
A5.00526L		N/A	02/25/2005	0009453R	0003574P
A5.00527M		N/A	02/25/2005	0009453R	0003574P
A5.00528N		N/A	02/25/2005	0009453R	0003574P
A5.00529P		N/A	02/25/2005	0009453R	0003574P
A5.00530G		N/A	02/25/2005	0009453R	0003574P
A5.00531H		N/A	02/25/2005	0009453R	0003574P
A5.00532J		N/A	02/25/2005	0009453R	0003574P
A5.00533K		N/A	02/25/2005	0009453R	0003574P
A5.00534L		N/A	02/25/2005	0009453R	0003574P
A5.00535M		N/A	02/25/2005	0009453R	0003574P
A5.00536N		N/A	02/25/2005	0009453R	0003574P
A5.00537P	N/A	02/25/2005	0009453R	0003574P	

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00255G	QC batch #:	0003574P
Matrix:	SOIL	Prep batch #:	0009453R
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	97.13 %	Analyst:	VH
Ash/dry weight:	99.20 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/24/2005 17:31	100.0	G54A	GVJ

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	1.17e+01	1.3e+01	9.0e+00	PCI/GDRY	02/24/2005
Beta	2.96e+01	5.1e+00	5.0e+00	PCI/GDRY	02/24/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00255G	QC batch #:	0003574P
Matrix:	SOIL	Prep batch #:	0009453R
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	97.13 %	Analyst:	VH
Ash/dry weight:	99.20 %	QC type:	DUP

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/24/2005 17:31	100.0	G54B	GVJ

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	8.40e+00	1.2e+01	8.0e+00	PCI/GDRY	02/24/2005
Beta	3.54e+01	5.4e+00	5.0e+00	PCI/GDRY	02/24/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00256H	QC batch #:	0003574P
Matrix:	SOIL	Prep batch #:	0009453R
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	96.38 %	Analyst:	VH
Ash/dry weight:	99.60 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/24/2005 17:31	100.0	G54D	GVJ

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	8.10e+00	1.3e+01	9.8e+00	PCI/GDRY	02/24/2005
Beta	3.10e+01	5.2e+00	5.0e+00	PCI/GDRY	02/24/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00257J	QC batch #:	0003574P
Matrix:	SOIL	Prep batch #:	0009453R
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	96.93 %	Analyst:	VH
Ash/dry weight:	99.20 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/24/2005 19:11	100.0	G54A	GVJ

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	1.59e+01	1.4e+01	9.0e+00	PCI/GDRY	02/24/2005
Beta	3.30e+01	5.3e+00	5.1e+00	PCI/GDRY	02/24/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00258K	QC batch #:	0003574P
Matrix:	SOIL	Prep batch #:	0009453R
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	96.41 %	Analyst:	VH
Ash/dry weight:	99.20 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/24/2005 19:11	100.0	G54B	GVJ

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	1.56e+01	1.3e+01	8.0e+00	PCI/GDRY	02/24/2005
Beta	3.44e+01	5.3e+00	5.1e+00	PCI/GDRY	02/24/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00522G	QC batch #:	0003574P
Matrix:	SOIL	Prep batch #:	0009453R
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	93.90 %	Analyst:	VH
Ash/dry weight:	99.20 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/24/2005 19:11	100.0	G54D	GVJ

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	1.12e+01	1.3e+01	9.8e+00	PCI/GDRY	02/24/2005
Beta	2.98e+01	5.1e+00	5.0e+00	PCI/GDRY	02/24/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00523H	QC batch #:	0003574P
Matrix:	SOIL	Prep batch #:	0009453R
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	94.21 %	Analyst:	VH
Ash/dry weight:	99.60 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/24/2005 20:51	100.0	G54A	GVJ

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	1.90e+01	1.4e+01	8.9e+00	PCI/GDRY	02/24/2005
Beta	3.21e+01	5.3e+00	5.1e+00	PCI/GDRY	02/24/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00524J	QC batch #:	0003574P
Matrix:	SOIL	Prep batch #:	0009453R
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	91.16 %	Analyst:	VH
Ash/dry weight:	99.20 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/24/2005 20:51	100.0	G54B	GVJ

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	1.55e+01	1.3e+01	8.0e+00	PCI/GDRY	02/24/2005
Beta	3.41e+01	5.3e+00	5.1e+00	PCI/GDRY	02/24/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00525K	QC batch #:	0003574P
Matrix:	SOIL	Prep batch #:	0009453R
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	95.70 %	Analyst:	VH
Ash/dry weight:	99.20 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/24/2005 20:51	100.0	G54D	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\sqrt{2\Phi}$ Uncertainty	MDC	Unit	Date
Alpha	1.95e+01	1.4e+01	9.8e+00	PCI/GDRY	02/24/2005
Beta	3.63e+01	5.5e+00	5.1e+00	PCI/GDRY	02/24/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00526L	QC batch #:	0003574P
Matrix:	SOIL	Prep batch #:	0009453R
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	94.19 %	Analyst:	VH
Ash/dry weight:	99.20 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/24/2005 22:31	100.0	G54A	GVJ

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	3.21e+01	1.6e+01	9.0e+00	PCI/GDRY	02/24/2005
Beta	3.56e+01	5.5e+00	5.3e+00	PCI/GDRY	02/24/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00527M	QC batch #:	0003574P
Matrix:	SOIL	Prep batch #:	0009453R
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	95.55 %	Analyst:	VH
Ash/dry weight:	99.20 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/24/2005 22:31	100.0	G54B	GVJ

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	1.35e+01	1.3e+01	8.0e+00	PCI/GDRY	02/24/2005
Beta	3.51e+01	5.4e+00	5.1e+00	PCI/GDRY	02/24/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00528N	QC batch #:	0003574P
Matrix:	SOIL	Prep batch #:	0009453R
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	96.48 %	Analyst:	VH
Ash/dry weight:	99.60 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/24/2005 22:31	100.0	G54D	GVJ

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	1.44e+01	1.4e+01	9.9e+00	PCI/GDRY	02/24/2005
Beta	3.05e+01	5.2e+00	5.1e+00	PCI/GDRY	02/24/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00529P	QC batch #:	0003574P
Matrix:	SOIL	Prep batch #:	0009453R
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	96.07 %	Analyst:	VH
Ash/dry weight:	99.20 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/25/2005 00:12	100.0	G54A	GVJ

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	1.59e+01	1.4e+01	9.0e+00	PCI/GDRY	02/25/2005
Beta	3.30e+01	5.3e+00	5.1e+00	PCI/GDRY	02/25/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00530G	QC batch #:	0003574P
Matrix:	SOIL	Prep batch #:	0009453R
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	96.84 %	Analyst:	VH
Ash/dry weight:	99.20 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/25/2005 00:12	100.0	G54B	GVJ

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	3.00e+01	1.5e+01	8.0e+00	PCI/GDRY	02/25/2005
Beta	2.94e+01	5.1e+00	5.2e+00	PCI/GDRY	02/25/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00531H	QC batch #:	0003574P
Matrix:	SOIL	Prep batch #:	0009453R
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	96.25 %	Analyst:	VH
Ash/dry weight:	99.60 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/25/2005 00:12	100.0	G54D	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\sqrt{2\Phi}$ Uncertainty	MDC	Unit	Date
Alpha	1.43e+01	1.4e+01	9.8e+00	PCI/GDRY	02/25/2005
Beta	3.58e+01	5.4e+00	5.1e+00	PCI/GDRY	02/25/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00532J	QC batch #:	0003574P
Matrix:	SOIL	Prep batch #:	0009453R
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	96.48 %	Analyst:	VH
Ash/dry weight:	98.40 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/25/2005 01:52	100.0	G54A	GVJ

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	2.43e+01	1.5e+01	8.9e+00	PCI/GDRY	02/25/2005
Beta	3.75e+01	5.5e+00	5.1e+00	PCI/GDRY	02/25/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00533K	QC batch #:	0003574P
Matrix:	SOIL	Prep batch #:	0009453R
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	96.45 %	Analyst:	VH
Ash/dry weight:	99.20 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/25/2005 01:52	100.0	G54B	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\sqrt{2\Phi}$ Uncertainty	MDC	Unit	Date
Alpha	1.87e+01	1.4e+01	8.0e+00	PCI/GDRY	02/25/2005
Beta	3.49e+01	5.4e+00	5.1e+00	PCI/GDRY	02/25/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00534L	QC batch #:	0003574P
Matrix:	SOIL	Prep batch #:	0009453R
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	93.99 %	Analyst:	VH
Ash/dry weight:	98.80 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/25/2005 01:52	100.0	G54D	GVJ

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	1.74e+01	1.4e+01	9.8e+00	PCI/GDRY	02/25/2005
Beta	3.34e+01	5.3e+00	5.1e+00	PCI/GDRY	02/25/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00535M	QC batch #:	0003574P
Matrix:	SOIL	Prep batch #:	0009453R
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	96.39 %	Analyst:	VH
Ash/dry weight:	98.40 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/25/2005 03:32	100.0	G54A	GVJ

ANALYTICAL RESULTS

Analyte	Activity	$\sqrt{2\Phi}$ Uncertainty	MDC	Unit	Date
Alpha	1.78e+01	1.4e+01	8.9e+00	PCI/GDRY	02/25/2005
Beta	2.94e+01	5.1e+00	5.1e+00	PCI/GDRY	02/25/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00536N	QC batch #:	0003574P
Matrix:	SOIL	Prep batch #:	0009453R
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	95.39 %	Analyst:	VH
Ash/dry weight:	98.40 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/25/2005 03:32	100.0	G54B	GVJ

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	2.55e+01	1.5e+01	7.9e+00	PCI/GDRY	02/25/2005
Beta	3.37e+01	5.3e+00	5.1e+00	PCI/GDRY	02/25/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00537P	QC batch #:	0003574P
Matrix:	SOIL	Prep batch #:	0009453R
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 GASH	Analysis procedure:	NAREL GR-03
Dry/wet weight:	96.09 %	Analyst:	VH
Ash/dry weight:	98.40 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/25/2005 03:32	100.0	G54D	GVJ

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	2.66e+01	1.5e+01	9.8e+00	PCI/GDRY	02/25/2005
Beta	4.16e+01	5.7e+00	5.2e+00	PCI/GDRY	02/25/2005

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QC BATCH SUMMARY

QC batch #: 0003574P
 Preparation procedure: N/A
 Analysis procedure: NAREL GR-03

NAREL Sample #	QC Type	Yield (%)	\forall 2 Φ Uncertainty (%)	Analyst
A5.00255G	DUP	N/A		VH
A5.00255G		N/A		VH
A5.00256H		N/A		VH
A5.00257J		N/A		VH
A5.00258K		N/A		VH
A5.00522G		N/A		VH
A5.00523H		N/A		VH
A5.00524J		N/A		VH
A5.00525K		N/A		VH
A5.00526L		N/A		VH
A5.00527M		N/A		VH
A5.00528N		N/A		VH
A5.00529P		N/A		VH
A5.00530G		N/A		VH
A5.00531H		N/A		VH
A5.00532J		N/A		VH
A5.00533K		N/A		VH
A5.00534L		N/A		VH
A5.00535M		N/A		VH
A5.00536N		N/A		VH
A5.00537P	N/A		VH	

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

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PREPARATION BATCH SUMMARY

SAMPLES ANALYZED

NAREL Sample #	QC Type	Aliquot Size	Completion Date	Prep Batch
A5.00255G	DUP	1.00e-01 GASH	02/24/2005	0009453R
A5.00255G		1.00e-01 GASH	02/24/2005	0009453R
A5.00256H		1.00e-01 GASH	02/24/2005	0009453R
A5.00257J		1.00e-01 GASH	02/24/2005	0009453R
A5.00258K		1.00e-01 GASH	02/24/2005	0009453R
A5.00522G		1.00e-01 GASH	02/24/2005	0009453R
A5.00523H		1.00e-01 GASH	02/24/2005	0009453R
A5.00524J		1.00e-01 GASH	02/24/2005	0009453R
A5.00525K		1.00e-01 GASH	02/24/2005	0009453R
A5.00526L		1.00e-01 GASH	02/25/2005	0009453R
A5.00527M		1.00e-01 GASH	02/25/2005	0009453R
A5.00528N		1.00e-01 G	02/25/2005	0009453R
A5.00529P		1.00e-01 GASH	02/25/2005	0009453R
A5.00530G		1.00e-01 GASH	02/25/2005	0009453R
A5.00531H		1.00e-01 GASH	02/25/2005	0009453R
A5.00532J		1.00e-01 GASH	02/25/2005	0009453R
A5.00533K		1.00e-01 GASH	02/25/2005	0009453R
A5.00534L		1.00e-01 GASH	02/25/2005	0009453R
A5.00535M		1.00e-01 GASH	02/25/2005	0009453R
A5.00536N		1.00e-01 GASH	02/25/2005	0009453R
A5.00537P	1.00e-01 GASH	02/25/2005	0009453R	

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0500007**

DETECTOR REPORT

The following were used for samples in the SDG

G54A	02/24/2005	17:31	00483641M	A5.00255G
G54A	02/24/2005	19:11	00483648V	A5.00257J
G54A	02/24/2005	20:51	00484158K	A5.00523H
G54A	02/24/2005	22:31	00484176M	A5.00526L
G54A	02/25/2005	00:12	00484194P	A5.00529P
G54A	02/25/2005	01:52	00484212Y	A5.00532J
G54A	02/25/2005	03:32	00484230A	A5.00535M
G54B	02/24/2005	17:31	00483642N	A5.00255G
G54B	02/24/2005	19:11	00483651P	A5.00258K
G54B	02/24/2005	20:51	00484164H	A5.00524J
G54B	02/24/2005	22:31	00484182K	A5.00527M
G54B	02/25/2005	00:12	00484200U	A5.00530G
G54B	02/25/2005	01:52	00484218E	A5.00533K
G54B	02/25/2005	03:32	00484236G	A5.00536N
G54D	02/24/2005	17:31	00483645R	A5.00256H
G54D	02/24/2005	19:11	00484152D	A5.00522G
G54D	02/24/2005	20:51	00484170F	A5.00525K
G54D	02/24/2005	22:31	00484188R	A5.00528N
G54D	02/25/2005	00:12	00484206A	A5.00531H
G54D	02/25/2005	01:52	00484224C	A5.00534L
G54D	02/25/2005	03:32	00484242E	A5.00537P

The following were used for other samples in the QC batches

None found

Data Package Checklist

Project: ANACONDA COPPER MINE SDG Number: #0500010

Date due: _____ Analysis: NAREL GR-01

Type of Package: 9 Data Summary Package 9 Complete Package

Y N N/A

- 9 9 9 All samples in the SDG are reported
- 9 9 9 All results are the ones intended
- 9 9 9 Printed results match the raw data
- 9 9 9 Error report forms are attached
- 9 9 9 SDG Form is attached
- 9 9 9 Analyst's checklist is attached
- 9 9 9 Original prep batch forms are attached
- 9 9 9 All supporting data sheets are attached
- 9 9 9 All raw data sheets appear to be correct
- 9 9 9 All handwritten notes are initialed and dated
- 9 9 9 Package is arranged correctly
- 9 9 9 Package appears to be complete

Were holding times met? 9 Yes 9 No 9 N/A

Were all QC results acceptable? 9 Yes 9 No

Are there any exceptions to report? 9 Yes 9 No

QAO Review

Y N N/A

- 9 9 9 All QC failures are noted
 - 9 9 9 Raw data look reasonable
 - 9 9 9 All exceptions have been noted
- Note: If changes to the case narrative are suggested, please provide the necessary language.

Comments: _____

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES**

REPORT OF SAMPLE DELIVERY GROUP #0500010

Project: ANACONDA COPPER MINE
Analysis Procedure: Gross Alpha and Beta on Water Samples
Date Reported: 03/23/2005

SAMPLES

NAREL Sample #	Client Sample ID	Type	Matrix	Date Collected	Date Received
A5.00519M	PAGW09	SAM	WATER	01/22/2005	01/28/2005
A5.00520E	PAGW18	SAM	WATER	01/23/2005	01/28/2005
A5.00521F	PAGW18X	SAM	WATER	01/23/2005	01/28/2005

EXCEPTIONS

1. Packaging and Shipping - No problems were observed.
2. Documentation - No problems were observed.
3. Sample Preparation - No problems were encountered.
4. Analysis - No problems were encountered.
5. Holding Times - All holding times were met.

QUALITY CONTROL

1. QC samples - All QC analysis results met NAREL acceptance criteria.
2. Instruments - Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Chief of the Monitoring and Analytical Services Branch and the NAREL Quality Assurance Coordinator, or their designees, as verified by the following signatures.

Quality Assurance Coordinator

Chief, Monitoring and Analytical Services Branch

GENERAL INFORMATION

SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Reagent blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A reagent blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "Z scores." A Z score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The Z score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The Z score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the Z score is computed.

Each standard uncertainty used to compute a Z score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

GENERAL INFORMATION (CONTINUED)

GROSS ALPHA AND BETA ANALYSIS

In comparison to the methods employed to determine radionuclide-specific activities, the method employed by NAREL to determine gross alpha and beta activity in water samples has the potential for greater analytical bias. It should be noted that this potential analytical uncertainty is not included in the two-sigma counting uncertainty term. Therefore, gross alpha and beta results should be used as gross approximations of the alpha and beta activity present.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 ALPBET ANALYSES
 SDG #0500010**

ANALYSIS SUMMARY

Analysis Procedure: NAREL GR-01
 Title: Gross Alpha and Beta on Water Samples

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Prep Batch #	QC Batch #
A5.00519M	DUP	N/A	03/01/2005	0009456V	0003576R
A5.00519M		N/A	03/01/2005	0009456V	0003576R
A5.00520E		N/A	03/01/2005	0009456V	0003576R
A5.00521F		N/A	03/01/2005	0009456V	0003576R

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0500010**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00519M	QC batch #:	0003576R
Matrix:	WATER	Prep batch #:	0009456V
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e+02 ML	Analysis procedure:	NAREL GR-01
Dry/wet weight:	N/A	Analyst:	VH
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/01/2005 07:05	100.0	G54A	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	4.15e+01	1.7e+01	9.9e+00	PCI/L	03/01/2005
Beta	9.78e+00	4.0e+00	5.4e+00	PCI/L	03/01/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 ALPBET ANALYSES
 SDG #0500010**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00519M	QC batch #:	0003576R
Matrix:	WATER	Prep batch #:	0009456V
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e+02 ML	Analysis procedure:	NAREL GR-01
Dry/wet weight:	N/A	Analyst:	VH
Ash/dry weight:	N/A	QC type:	DUP

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/01/2005 07:05	100.0	G54B	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	2.58e+01	1.4e+01	9.3e+00	PCI/L	03/01/2005
Beta	7.96e+00	4.0e+00	5.5e+00	PCI/L	03/01/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0500010**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00520E	QC batch #:	0003576R
Matrix:	WATER	Prep batch #:	0009456V
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e+01 ML	Analysis procedure:	NAREL GR-01
Dry/wet weight:	N/A	Analyst:	VH
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/01/2005 07:05	100.0	G54D	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	8.61e+02	1.4e+02	4.5e+01	PCI/L	03/01/2005
Beta	2.90e+02	3.4e+01	3.3e+01	PCI/L	03/01/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 ALPBET ANALYSES
 SDG #0500010**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00521F	QC batch #:	0003576R
Matrix:	WATER	Prep batch #:	0009456V
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e+01 ML	Analysis procedure:	NAREL GR-01
Dry/wet weight:	N/A	Analyst:	VH
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/01/2005 08:46	100.0	G54A	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Alpha	7.09e+02	1.3e+02	4.9e+01	PCI/L	03/01/2005
Beta	2.77e+02	3.3e+01	3.2e+01	PCI/L	03/01/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 ALPBET ANALYSES
 SDG #0500010**

QC BATCH SUMMARY

QC batch #: 0003576R
 Preparation procedure: N/A
 Analysis procedure: NAREL GR-01

NAREL Sample #	QC Type	Yield (%)	\forall 2 Φ Uncertainty (%)	Analyst
A5.00519M	DUP	N/A		VH
A5.00519M		N/A		VH
A5.00520E		N/A		VH
A5.00521F		N/A		VH

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0500010**

PREPARATION BATCH SUMMARY

SAMPLES ANALYZED

NAREL Sample #	QC Type	Aliquot Size	Completion Date	Prep Batch
A5.00519M	DUP	1.00e+02 ML	03/01/2005	0009456V
A5.00519M		1.00e+02 ML	03/01/2005	0009456V
A5.00520E		2.00e+01 ML	03/01/2005	0009456V
A5.00521F		2.00e+01 ML	03/01/2005	0009456V

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
ALPBET ANALYSES
SDG #0500010**

DETECTOR REPORT

The following were used for samples in the SDG

G54A 03/01/2005 07:05 00484133A A5.00519M
G54A 03/01/2005 08:46 00484146F A5.00521F
G54B 03/01/2005 07:05 00484134B A5.00519M
G54D 03/01/2005 07:05 00484140Z A5.00520E

The following were used for other samples in the QC batches

None found

Data Package Checklist

Project: ANACONDA COPPER MINE SDG Number: #0400068

Date due: _____ Analysis: NAREL GAM-01

Type of Package: 9 Data Summary Package 9 Complete Package

Y N N/A

- 9 9 9 All samples in the SDG are reported
- 9 9 9 All results are the ones intended
- 9 9 9 Printed results match the raw data
- 9 9 9 Error report forms are attached
- 9 9 9 SDG Form is attached
- 9 9 9 Analyst's checklist is attached
- 9 9 9 Original prep batch forms are attached
- 9 9 9 All supporting data sheets are attached
- 9 9 9 All raw data sheets appear to be correct
- 9 9 9 All handwritten notes are initialed and dated
- 9 9 9 Package is arranged correctly
- 9 9 9 Package appears to be complete

Were holding times met? 9 Yes 9 No 9 N/A

Were all QC results acceptable? 9 Yes 9 No

Are there any exceptions to report? 9 Yes 9 No

QAO Review

Y N N/A

- 9 9 9 All QC failures are noted
 - 9 9 9 Raw data look reasonable
 - 9 9 9 All exceptions have been noted
- Note: If changes to the case narrative are suggested, please provide the necessary language.

Comments: _____

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES**

REPORT OF SAMPLE DELIVERY GROUP #0400068

Project: ANACONDA COPPER MINE
Analysis Procedure: Gamma Spectrometry
Date Reported: 01/13/2005

SAMPLES

NAREL Sample #	Client Sample ID	Type	Matrix	Date Collected	Date Received
A4.05913J	PAGW20	SAM	WATER-GROUND	12/01/2004	12/06/2004
A4.05936R	PAGW25	SAM	WATER-GROUND	12/07/2004	12/09/2004
A4.05937T	FB01	SAM	WATER-GROUND	12/08/2004	12/09/2004

EXCEPTIONS

1. Packaging and Shipping - No problems were observed.
2. Documentation - No problems were observed.
3. Sample Preparation - No problems were encountered.
4. Analysis - No problems were encountered.
5. Holding Times - All holding times were met.

QUALITY CONTROL

1. QC samples - All QC analysis results met NAREL acceptance criteria.
2. Instruments - Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Chief of the Monitoring and Analytical Services Branch and the NAREL Quality Assurance Coordinator, or their designees, as verified by the following signatures.

Quality Assurance Coordinator

Chief, Monitoring and Analytical Services Branch

GENERAL INFORMATION

SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Reagent blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A reagent blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "Z scores." A Z score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The Z score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The Z score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the Z score is computed.

Each standard uncertainty used to compute a Z score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

GENERAL INFORMATION (CONTINUED)

GAMMA ANALYSIS

The reporting format lists the gamma emitters in alphabetical order. The activity and 2-sigma uncertainty for radionuclides measured by gamma spectroscopy are reported only if the nuclide is detected. Nuclides that are not detected do not appear in the report, with the exception of Ba-140, Co-60, Cs-137, I-131, K-40, Ra-226 and Ra-228. If one of these seven nuclides is undetected, NAREL reports it as "Not Detected" or "ND", and provides a sample-specific estimate of the MDC.

Due to potential spectral interferences and other possible problems associated with the determination of the activity of certain radionuclides, the activities for Bi-214, Pb-214, Th-234, Pa-234m, Ra-226, Th-231, and U-235 are subject to greater possible uncertainty than other commonly reported radionuclides. It should be noted that this potential uncertainty is not included in the two-sigma counting uncertainty which is reported with each activity. Although in this report we do provide the calculated activities for these radionuclides, we recommend that the results be used only as a qualitative means of indicating the presence of these radionuclides and not as a quantitative measure of their concentration. The results for these nuclides are not used in the evaluation of quality control samples. Furthermore, because of mutual interference between Ra-226 and U-235, NAREL's gamma analysis software tends to overestimate the amounts of these nuclides whenever both are present in a sample. Lower estimates for Ra-226 activities can be obtained from the reported activities of its decay products, Pb-214 and Bi-214, which are likely to be somewhat less than the Ra-226 activity because of the potential escape of radon gas.

NAREL's gamma spectroscopy software corrects activities and MDCs for decay between collection and analysis, but only up to a limit of ten half-lives. So, if the decay time for a sample is more than ten half-lives of a radionuclide, that nuclide will almost always be undetected and the reported MDC will be meaningless. This is usually a problem only for short-lived radionuclides, such as I-131 and Ba-140, when there is a long delay between collection and analysis.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 GAMMA ANALYSES
 SDG #0400068**

ANALYSIS SUMMARY

Analysis Procedure: NAREL GAM-01
 Title: Gamma Spectrometry

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Prep Batch #	QC Batch #
A4.05913J	DUP	N/A	12/11/2004	0009234G	0003496T
A4.05913J		N/A	12/15/2004	0009234G	0003496T
A4.05936R		N/A	12/11/2004	0009240E	0003496T
A4.05937T		N/A	12/11/2004	0009240E	0003496T

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0400068**

SAMPLE ANALYSIS REPORT

Sample #:	A4.05913J	QC batch #:	0003496T
Matrix:	WATER-GROUND	Prep batch #:	0009234G
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
12/10/2004 15:14	1000.0	GE06	RCL

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		2.5e+01	PCI/L	12/01/2004
Bi214	4.37e+01	7.2e+00		PCI/L	12/01/2004
Co60	ND		5.5e+00	PCI/L	12/01/2004
Cs137	ND		5.0e+00	PCI/L	12/01/2004
I131	ND		8.8e+00	PCI/L	12/01/2004
K40	3.62e+01	3.3e+01		PCI/L	12/01/2004
Pb210	ND		3.9e+02	PCI/L	12/01/2004
Pb214	3.53e+01	6.6e+00		PCI/L	12/01/2004
Ra226	6.91e+01	6.2e+01		PCI/L	12/01/2004
Ra228	ND		2.8e+01	PCI/L	12/01/2004

* An asterisk indicates a result whose value may be significantly over or underestimated.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0400068**

SAMPLE ANALYSIS REPORT

Sample #:	A4.05913J	QC batch #:	0003496T
Matrix:	WATER-GROUND	Prep batch #:	0009234G
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	DUP

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
12/14/2004 14:17	1000.0	GE17	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		2.7e+01	PCI/L	12/01/2004
Bi212	2.30e+01	4.1e+01		PCI/L	12/01/2004
Co60	ND		5.2e+00	PCI/L	12/01/2004
Cs137	ND		4.0e+00	PCI/L	12/01/2004
I131	ND		9.8e+00	PCI/L	12/01/2004
K40	2.31e+01	3.2e+01		PCI/L	12/01/2004
Pb210	ND		1.0e+02	PCI/L	12/01/2004
Pb212	5.01e+00	4.4e+00		PCI/L	12/01/2004
Pb214	* 1.74e+01	4.7e+00		PCI/L	12/01/2004
Ra226	ND		6.0e+01	PCI/L	12/01/2004
Ra228	ND		3.1e+01	PCI/L	12/01/2004
Th234	* 2.96e+01	1.7e+01		PCI/L	12/01/2004

* An asterisk indicates a result whose value may be significantly over or underestimated.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0400068**

SAMPLE ANALYSIS REPORT

Sample #:	A4.05936R	QC batch #:	0003496T
Matrix:	WATER-GROUND	Prep batch #:	0009240E
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
12/10/2004 15:14	1000.0	GE07	RCL

ANALYTICAL RESULTS

Analyte	Activity	$\sqrt{2\Phi}$ Uncertainty	MDC	Unit	Date
Ba140	ND		2.0e+01	PCI/L	12/07/2004
Bi214	5.62e+01	8.9e+00		PCI/L	12/07/2004
Co60	ND		6.1e+00	PCI/L	12/07/2004
Cs137	ND		5.5e+00	PCI/L	12/07/2004
I131	ND		6.1e+00	PCI/L	12/07/2004
K40	2.54e+01	4.4e+01		PCI/L	12/07/2004
Pb210	8.86e+02	6.6e+02		PCI/L	12/07/2004
Pb214	6.42e+01	8.8e+00		PCI/L	12/07/2004
Ra226	7.74e+01	8.0e+01		PCI/L	12/07/2004
Ra228	ND		3.6e+01	PCI/L	12/07/2004

* An asterisk indicates a result whose value may be significantly over or underestimated.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0400068**

SAMPLE ANALYSIS REPORT

Sample #:	A4.05937T	QC batch #:	0003496T
Matrix:	WATER-GROUND	Prep batch #:	0009240E
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
12/10/2004 15:14	1000.0	GE08	RCL

ANALYTICAL RESULTS

Analyte	Activity	$\nabla 2\Phi$ Uncertainty	MDC	Unit	Date
Ba140	ND		2.2e+01	PCI/L	12/08/2004
Bi214	8.62e+01	1.1e+01		PCI/L	12/08/2004
Co60	ND		7.6e+00	PCI/L	12/08/2004
Cs137	ND		6.2e+00	PCI/L	12/08/2004
I131	ND		5.9e+00	PCI/L	12/08/2004
K40	ND		8.6e+01	PCI/L	12/08/2004
Pb210	ND		1.3e+02	PCI/L	12/08/2004
Pb212	5.13e+00	7.3e+00		PCI/L	12/08/2004
Pb214	8.95e+01	1.0e+01		PCI/L	12/08/2004
Ra224	7.06e+01	6.2e+01		PCI/L	12/08/2004
Ra226	ND		9.9e+01	PCI/L	12/08/2004
Ra228	ND		4.5e+01	PCI/L	12/08/2004

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 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 GAMMA ANALYSES
 SDG #0400068**

QC BATCH SUMMARY

QC batch #: 0003496T
 Preparation procedure: N/A
 Analysis procedure: NAREL GAM-01

NAREL Sample #	QC Type	Yield (%)	\forall 2 Φ Uncertainty (%)	Analyst
A4.05913J	DUP	N/A		N/A
A4.05913J		N/A		N/A
A4.05936R		N/A		N/A
A4.05937T		N/A		N/A

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

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GAMMA ANALYSES
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PREPARATION BATCH SUMMARY

SAMPLES ANALYZED

NAREL Sample #	QC Type	Aliquot Size	Completion Date	Prep Batch
A4.05913J	DUP	1.00e+00 L	12/11/2004	0009234G
A4.05913J		1.00e+00 L	12/15/2004	0009234G
A4.05936R		1.00e+00 L	12/11/2004	0009240E
A4.05937T		1.00e+00 L	12/11/2004	0009240E

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GAMMA ANALYSES
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DETECTOR REPORT

The following were used for samples in the SDG

GE06	12/10/2004	15:14	00481910F	A4.05913J
GE07	12/10/2004	15:14	00481953T	A4.05936R
GE08	12/10/2004	15:14	00481959Z	A4.05937T
GE17	12/14/2004	14:17	00481911G	A4.05913J

The following were used for other samples in the QC batches

None found

Data Package Checklist

Project: ANACONDA COPPER MINE SDG Number: #0500009

Date due: _____ Analysis: NAREL GAM-01

Type of Package: 9 Data Summary Package 9 Complete Package

Y N N/A

- 9 9 9 All samples in the SDG are reported
- 9 9 9 All results are the ones intended
- 9 9 9 Printed results match the raw data
- 9 9 9 Error report forms are attached
- 9 9 9 SDG Form is attached
- 9 9 9 Analyst's checklist is attached
- 9 9 9 Original prep batch forms are attached
- 9 9 9 All supporting data sheets are attached
- 9 9 9 All raw data sheets appear to be correct
- 9 9 9 All handwritten notes are initialed and dated
- 9 9 9 Package is arranged correctly
- 9 9 9 Package appears to be complete

Were holding times met? 9 Yes 9 No 9 N/A

Were all QC results acceptable? 9 Yes 9 No

Are there any exceptions to report? 9 Yes 9 No

QAO Review

Y N N/A

- 9 9 9 All QC failures are noted
 - 9 9 9 Raw data look reasonable
 - 9 9 9 All exceptions have been noted
- Note: If changes to the case narrative are suggested, please provide the necessary language.

Comments: _____

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES**

REPORT OF SAMPLE DELIVERY GROUP #0500009

Project: ANACONDA COPPER MINE
Analysis Procedure: Gamma Spectrometry
Date Reported: 03/29/2005

SAMPLES

NAREL Sample #	Client Sample ID	Type	Matrix	Date Collected	Date Received
A5.00719U	PA-P19-20	SAM	SOIL	02/04/2005	02/07/2005
A5.00720L	PA-P19-25	SAM	SOIL	02/04/2005	02/07/2005
A5.00721M	PA-EE14-1	SAM	SOIL	02/04/2005	02/07/2005
A5.00722N	PA-EE14-5	SAM	SOIL	02/04/2005	02/07/2005
A5.00723P	PA-EE14-10	SAM	SOIL	02/04/2005	02/07/2005
A5.00724Q	PA-EE14-15	SAM	SOIL	02/04/2005	02/07/2005
A5.00725R	PA-EE14-20	SAM	SOIL	02/04/2005	02/07/2005
A5.00726T	PA-EE14-21	SAM	SOIL	02/04/2005	02/07/2005

EXCEPTIONS

1. Packaging and Shipping - No problems were observed.
2. Documentation - No problems were observed.
3. Sample Preparation - No problems were encountered.
4. Analysis - No problems were encountered.
5. Holding Times - All holding times were met.

QUALITY CONTROL

1. QC samples - All QC analysis results met NAREL acceptance criteria.
2. Instruments - Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Chief of the Monitoring and Analytical Services Branch and the NAREL Quality Assurance Coordinator, or their designees, as verified by the following signatures.

Quality Assurance Coordinator

Chief, Monitoring and Analytical Services Branch

GENERAL INFORMATION

SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Reagent blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A reagent blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "Z scores." A Z score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The Z score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The Z score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the Z score is computed.

Each standard uncertainty used to compute a Z score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

GENERAL INFORMATION (CONTINUED)

GAMMA ANALYSIS

The reporting format lists the gamma emitters in alphabetical order. The activity and 2-sigma uncertainty for radionuclides measured by gamma spectroscopy are reported only if the nuclide is detected. Nuclides that are not detected do not appear in the report, with the exception of Ba-140, Co-60, Cs-137, I-131, K-40, Ra-226 and Ra-228. If one of these seven nuclides is undetected, NAREL reports it as "Not Detected" or "ND", and provides a sample-specific estimate of the MDC.

Due to potential spectral interferences and other possible problems associated with the determination of the activity of certain radionuclides, the activities for Bi-214, Pb-214, Th-234, Pa-234m, Ra-226, Th-231, and U-235 are subject to greater possible uncertainty than other commonly reported radionuclides. It should be noted that this potential uncertainty is not included in the two-sigma counting uncertainty which is reported with each activity. Although in this report we do provide the calculated activities for these radionuclides, we recommend that the results be used only as a qualitative means of indicating the presence of these radionuclides and not as a quantitative measure of their concentration. The results for these nuclides are not used in the evaluation of quality control samples. Furthermore, because of mutual interference between Ra-226 and U-235, NAREL's gamma analysis software tends to overestimate the amounts of these nuclides whenever both are present in a sample. Lower estimates for Ra-226 activities can be obtained from the reported activities of its decay products, Pb-214 and Bi-214, which are likely to be somewhat less than the Ra-226 activity because of the potential escape of radon gas.

NAREL's gamma spectroscopy software corrects activities and MDCs for decay between collection and analysis, but only up to a limit of ten half-lives. So, if the decay time for a sample is more than ten half-lives of a radionuclide, that nuclide will almost always be undetected and the reported MDC will be meaningless. This is usually a problem only for short-lived radionuclides, such as I-131 and Ba-140, when there is a long delay between collection and analysis.

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 GAMMA ANALYSES
 SDG #0500009**

ANALYSIS SUMMARY

Analysis Procedure: NAREL GAM-01
 Title: Gamma Spectrometry

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Prep Batch #	QC Batch #
A5.00719U	DUP	N/A	02/18/2005	0009436Q	0003584R
A5.00720L		N/A	02/18/2005	0009436Q	0003584R
A5.00720L		N/A	02/19/2005	0009436Q	0003584R
A5.00721M		N/A	02/18/2005	0009436Q	0003584R
A5.00722N		N/A	02/18/2005	0009436Q	0003584R
A5.00723P		N/A	02/18/2005	0009436Q	0003584R
A5.00724Q		N/A	02/18/2005	0009436Q	0003584R
A5.00725R		N/A	02/18/2005	0009436Q	0003584R
A5.00726T		N/A	02/18/2005	0009436Q	0003584R

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**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0500009**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00719U	QC batch #:	0003584R
Matrix:	SOIL	Prep batch #:	0009436Q
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	9.820e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	90.93 %	Analyst:	DPS
Ash/dry weight:	96.80 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/17/2005 12:41	1000.0	GE07	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		3.0e-01	PCI/GDRY	02/04/2005
Bi212	1.68e+00	3.2e-01		PCI/GDRY	02/04/2005
Bi214	1.45e+00	1.1e-01		PCI/GDRY	02/04/2005
Co60	ND		5.1e-02	PCI/GDRY	02/04/2005
Cs137	ND		4.7e-02	PCI/GDRY	02/04/2005
I131	ND		1.1e-01	PCI/GDRY	02/04/2005
K40	2.54e+01	1.6e+00		PCI/GDRY	02/04/2005
Pb210	ND		4.6e+00	PCI/GDRY	02/04/2005
Pb212	1.54e+00	1.1e-01		PCI/GDRY	02/04/2005
Pb214	1.57e+00	1.1e-01		PCI/GDRY	02/04/2005
Ra223	4.89e-01	1.1e-01		PCI/GDRY	02/04/2005
Ra224	1.07e+00	5.9e-01		PCI/GDRY	02/04/2005
Ra226	5.73e+00	5.4e-01		PCI/GDRY	02/04/2005
Ra228	1.60e+00	1.3e-01		PCI/GDRY	02/04/2005
Th234	3.20e+00	5.1e-01		PCI/GDRY	02/04/2005
Tl208	5.00e-01	4.5e-02		PCI/GDRY	02/04/2005
U235	3.48e-01	3.3e-02		PCI/GDRY	02/04/2005

* An asterisk indicates a result whose value may be significantly over or underestimated.

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GAMMA ANALYSES
SDG #0500009**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00720L	QC batch #:	0003584R
Matrix:	SOIL	Prep batch #:	0009436Q
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.990e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	95.72 %	Analyst:	DPS
Ash/dry weight:	98.40 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/17/2005 12:42	1000.0	GE11	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		1.3e-01	PCI/GDRY	02/04/2005
Bi212	1.54e+00	1.7e-01		PCI/GDRY	02/04/2005
Bi214	1.25e+00	7.7e-02		PCI/GDRY	02/04/2005
Co60	ND		2.1e-02	PCI/GDRY	02/04/2005
Cs137	ND		2.2e-02	PCI/GDRY	02/04/2005
I131	ND		4.5e-02	PCI/GDRY	02/04/2005
K40	2.69e+01	1.6e+00		PCI/GDRY	02/04/2005
Pb210	ND		1.5e+00	PCI/GDRY	02/04/2005
Pb212	1.59e+00	9.4e-02		PCI/GDRY	02/04/2005
Pb214	1.33e+00	8.0e-02		PCI/GDRY	02/04/2005
Ra223	4.45e-01	5.4e-02		PCI/GDRY	02/04/2005
Ra224	9.57e-01	2.2e-01		PCI/GDRY	02/04/2005
Ra226	2.63e+00	2.7e-01		PCI/GDRY	02/04/2005
Ra228	1.64e+00	1.0e-01		PCI/GDRY	02/04/2005
Th234	9.99e-01	2.7e-01		PCI/GDRY	02/04/2005
Tl208	5.00e-01	3.2e-02		PCI/GDRY	02/04/2005
U235	1.58e-01	1.6e-02		PCI/GDRY	02/04/2005

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GAMMA ANALYSES
SDG #0500009**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00720L	QC batch #:	0003584R
Matrix:	SOIL	Prep batch #:	0009436Q
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.990e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	95.72 %	Analyst:	DPS
Ash/dry weight:	98.40 %	QC type:	DUP

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/18/2005 09:03	1000.0	GE15	GVJ

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		1.4e-01	PCI/GDRY	02/04/2005
Bi212	1.82e+00	1.7e-01		PCI/GDRY	02/04/2005
Bi214	1.31e+00	7.8e-02		PCI/GDRY	02/04/2005
Co60	ND		2.4e-02	PCI/GDRY	02/04/2005
Cs137	ND		2.0e-02	PCI/GDRY	02/04/2005
I131	ND		5.6e-02	PCI/GDRY	02/04/2005
K40	2.76e+01	1.6e+00		PCI/GDRY	02/04/2005
Pb210	1.39e+00	2.9e-01		PCI/GDRY	02/04/2005
Pb212	1.62e+00	9.6e-02		PCI/GDRY	02/04/2005
Pb214	1.40e+00	8.3e-02		PCI/GDRY	02/04/2005
Ra224	1.29e+00	2.5e-01		PCI/GDRY	02/04/2005
Ra226	2.64e+00	2.6e-01		PCI/GDRY	02/04/2005
Ra228	1.66e+00	1.0e-01		PCI/GDRY	02/04/2005
Th234	7.54e-01	1.4e-01		PCI/GDRY	02/04/2005
Tl208	5.16e-01	3.3e-02		PCI/GDRY	02/04/2005
U235	1.62e-01	1.6e-02		PCI/GDRY	02/04/2005

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GAMMA ANALYSES
SDG #0500009**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00721M	QC batch #:	0003584R
Matrix:	SOIL	Prep batch #:	0009436Q
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	9.370e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	94.84 %	Analyst:	DPS
Ash/dry weight:	97.60 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/17/2005 12:41	1000.0	GE08	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		3.3e-01	PCI/GDRY	02/04/2005
Bi212	1.48e+00	3.8e-01		PCI/GDRY	02/04/2005
Bi214	1.14e+00	9.8e-02		PCI/GDRY	02/04/2005
Co60	ND		6.3e-02	PCI/GDRY	02/04/2005
Cs137	ND		5.5e-02	PCI/GDRY	02/04/2005
I131	ND		1.2e-01	PCI/GDRY	02/04/2005
K40	2.55e+01	1.7e+00		PCI/GDRY	02/04/2005
Pb210	1.53e+00	6.1e-01		PCI/GDRY	02/04/2005
Pb212	1.38e+00	1.0e-01		PCI/GDRY	02/04/2005
Pb214	1.30e+00	1.0e-01		PCI/GDRY	02/04/2005
Ra223	4.77e-01	1.3e-01		PCI/GDRY	02/04/2005
Ra224	1.85e+00	6.0e-01		PCI/GDRY	02/04/2005
Ra226	3.00e+00	6.4e-01		PCI/GDRY	02/04/2005
Ra228	1.40e+00	1.4e-01		PCI/GDRY	02/04/2005
Th234	1.14e+00	2.7e-01		PCI/GDRY	02/04/2005
Tl208	3.80e-01	4.4e-02		PCI/GDRY	02/04/2005
U235	1.88e-01	4.0e-02		PCI/GDRY	02/04/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00722N	QC batch #:	0003584R
Matrix:	SOIL	Prep batch #:	0009436Q
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	9.430e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	90.94 %	Analyst:	DPS
Ash/dry weight:	98.00 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/17/2005 12:42	1000.0	GE09	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		2.7e-01	PCI/GDRY	02/04/2005
Bi212	1.10e+00	2.8e-01		PCI/GDRY	02/04/2005
Bi214	1.15e+00	8.9e-02		PCI/GDRY	02/04/2005
Co60	ND		4.5e-02	PCI/GDRY	02/04/2005
Cs137	ND		4.3e-02	PCI/GDRY	02/04/2005
I131	ND		1.1e-01	PCI/GDRY	02/04/2005
K40	2.41e+01	1.5e+00		PCI/GDRY	02/04/2005
Pb210	ND		5.3e+00	PCI/GDRY	02/04/2005
Pb212	1.19e+00	8.5e-02		PCI/GDRY	02/04/2005
Pb214	1.28e+00	9.2e-02		PCI/GDRY	02/04/2005
Ra223	3.76e-01	1.1e-01		PCI/GDRY	02/04/2005
Ra224	8.59e-01	5.8e-01		PCI/GDRY	02/04/2005
Ra226	2.59e+00	4.8e-01		PCI/GDRY	02/04/2005
Ra228	1.16e+00	1.0e-01		PCI/GDRY	02/04/2005
Th234	9.90e-01	3.8e-01		PCI/GDRY	02/04/2005
Tl208	3.56e-01	3.7e-02		PCI/GDRY	02/04/2005

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SDG #0500009**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00723P	QC batch #:	0003584R
Matrix:	SOIL	Prep batch #:	0009436Q
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	9.230e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	95.93 %	Analyst:	DPS
Ash/dry weight:	98.80 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/17/2005 12:42	1000.0	GE10	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		3.0e-01	PCI/GDRY	02/04/2005
Bi212	1.27e+00	2.9e-01		PCI/GDRY	02/04/2005
Bi214	9.67e-01	8.2e-02		PCI/GDRY	02/04/2005
Co60	ND		5.6e-02	PCI/GDRY	02/04/2005
Cs137	ND		5.1e-02	PCI/GDRY	02/04/2005
I131	ND		1.0e-01	PCI/GDRY	02/04/2005
K40	2.49e+01	1.6e+00		PCI/GDRY	02/04/2005
Pb210	ND		2.3e+00	PCI/GDRY	02/04/2005
Pb212	1.04e+00	7.8e-02		PCI/GDRY	02/04/2005
Pb214	1.11e+00	8.4e-02		PCI/GDRY	02/04/2005
Ra223	2.49e-01	1.0e-01		PCI/GDRY	02/04/2005
Ra224	8.41e-01	4.8e-01		PCI/GDRY	02/04/2005
Ra226	ND		5.7e-01	PCI/GDRY	02/04/2005
Ra228	1.14e+00	1.1e-01		PCI/GDRY	02/04/2005
Th234	6.03e-01	3.4e-01		PCI/GDRY	02/04/2005
Tl208	3.28e-01	3.6e-02		PCI/GDRY	02/04/2005
U235	1.35e-01	3.1e-02		PCI/GDRY	02/04/2005

* An asterisk indicates a result whose value may be significantly over or underestimated.

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GAMMA ANALYSES
SDG #0500009**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00724Q	QC batch #:	0003584R
Matrix:	SOIL	Prep batch #:	0009436Q
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	9.850e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	96.86 %	Analyst:	DPS
Ash/dry weight:	98.40 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/17/2005 12:54	1000.0	GE15	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		2.1e-01	PCI/GDRY	02/04/2005
Bi212	1.30e+00	2.3e-01		PCI/GDRY	02/04/2005
Bi214	9.27e-01	6.5e-02		PCI/GDRY	02/04/2005
Co60	ND		4.2e-02	PCI/GDRY	02/04/2005
Cs137	ND		3.7e-02	PCI/GDRY	02/04/2005
I131	ND		8.1e-02	PCI/GDRY	02/04/2005
K40	2.68e+01	1.6e+00		PCI/GDRY	02/04/2005
Pb210	1.61e+00	3.6e-01		PCI/GDRY	02/04/2005
Pb212	1.14e+00	7.5e-02		PCI/GDRY	02/04/2005
Pb214	1.07e+00	7.0e-02		PCI/GDRY	02/04/2005
Ra224	9.70e-01	3.1e-01		PCI/GDRY	02/04/2005
Ra226	3.45e+00	3.6e-01		PCI/GDRY	02/04/2005
Ra228	1.11e+00	8.6e-02		PCI/GDRY	02/04/2005
Th234	1.81e+00	2.3e-01		PCI/GDRY	02/04/2005
Tl208	3.31e-01	2.8e-02		PCI/GDRY	02/04/2005
U235	2.09e-01	2.2e-02		PCI/GDRY	02/04/2005

* An asterisk indicates a result whose value may be significantly over or underestimated.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0500009**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00725R	QC batch #:	0003584R
Matrix:	SOIL	Prep batch #:	0009436Q
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	9.540e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	95.21 %	Analyst:	DPS
Ash/dry weight:	99.20 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/17/2005 12:54	1000.0	GE16	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		2.1e-01	PCI/GDRY	02/04/2005
Bi212	1.36e+00	2.2e-01		PCI/GDRY	02/04/2005
Bi214	1.10e+00	7.5e-02		PCI/GDRY	02/04/2005
Co60	ND		4.0e-02	PCI/GDRY	02/04/2005
Cs137	ND		3.5e-02	PCI/GDRY	02/04/2005
I131	ND		7.9e-02	PCI/GDRY	02/04/2005
K40	2.70e+01	1.6e+00		PCI/GDRY	02/04/2005
Pb210	1.30e+00	3.9e-01		PCI/GDRY	02/04/2005
Pb212	1.33e+00	8.7e-02		PCI/GDRY	02/04/2005
Pb214	1.24e+00	8.1e-02		PCI/GDRY	02/04/2005
Ra223	3.61e-01	7.2e-02		PCI/GDRY	02/04/2005
Ra224	1.13e+00	3.4e-01		PCI/GDRY	02/04/2005
Ra226	2.67e+00	3.9e-01		PCI/GDRY	02/04/2005
Ra228	1.35e+00	9.5e-02		PCI/GDRY	02/04/2005
Th234	1.02e+00	1.6e-01		PCI/GDRY	02/04/2005
Tl208	4.04e-01	3.1e-02		PCI/GDRY	02/04/2005
U235	1.58e-01	2.3e-02		PCI/GDRY	02/04/2005

* An asterisk indicates a result whose value may be significantly over or underestimated.

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NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0500009**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00726T	QC batch #:	0003584R
Matrix:	SOIL	Prep batch #:	0009436Q
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	9.030e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	95.65 %	Analyst:	DPS
Ash/dry weight:	98.40 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/17/2005 12:54	1000.0	GE17	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		2.1e-01	PCI/GDRY	02/04/2005
Bi212	1.36e+00	3.4e-01		PCI/GDRY	02/04/2005
Bi214	1.01e+00	7.8e-02		PCI/GDRY	02/04/2005
Co60	ND		5.1e-02	PCI/GDRY	02/04/2005
Cs137	ND		3.8e-02	PCI/GDRY	02/04/2005
I131	ND		7.4e-02	PCI/GDRY	02/04/2005
K40	2.76e+01	1.7e+00		PCI/GDRY	02/04/2005
Pb210	7.98e-01	2.7e-01		PCI/GDRY	02/04/2005
Pb212	1.31e+00	8.8e-02		PCI/GDRY	02/04/2005
Pb214	1.12e+00	7.8e-02		PCI/GDRY	02/04/2005
Ra223	3.91e-01	7.8e-02		PCI/GDRY	02/04/2005
Ra224	7.22e-01	3.7e-01		PCI/GDRY	02/04/2005
Ra226	2.32e+00	3.5e-01		PCI/GDRY	02/04/2005
Ra228	1.30e+00	1.2e-01		PCI/GDRY	02/04/2005
Th234	9.75e-01	1.6e-01		PCI/GDRY	02/04/2005
Tl208	3.91e-01	3.8e-02		PCI/GDRY	02/04/2005
U235	1.45e-01	2.2e-02		PCI/GDRY	02/04/2005

* An asterisk indicates a result whose value may be significantly over or underestimated.

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 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 GAMMA ANALYSES
 SDG #0500009**

QC BATCH SUMMARY

QC batch #: 0003584R
 Preparation procedure: N/A
 Analysis procedure: NAREL GAM-01

NAREL Sample #	QC Type	Yield (%)	\forall 2 Φ Uncertainty (%)	Analyst
A5.00719U	DUP	N/A		DPS
A5.00720L		N/A		DPS
A5.00720L		N/A		DPS
A5.00721M		N/A		DPS
A5.00722N		N/A		DPS
A5.00723P		N/A		DPS
A5.00724Q		N/A		DPS
A5.00725R		N/A		DPS
A5.00726T		N/A		DPS

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

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 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 GAMMA ANALYSES
 SDG #0500009**

PREPARATION BATCH SUMMARY

SAMPLES ANALYZED

NAREL Sample #	QC Type	Aliquot Size	Completion Date	Prep Batch
A5.00719U	DUP	9.82e+01 GDRY	02/18/2005	0009436Q
A5.00720L		2.99e+02 GDRY	02/18/2005	0009436Q
A5.00720L		2.99e+02 GDRY	02/19/2005	0009436Q
A5.00721M		9.37e+01 GDRY	02/18/2005	0009436Q
A5.00722N		9.43e+01 GDRY	02/18/2005	0009436Q
A5.00723P		9.23e+01 GDRY	02/18/2005	0009436Q
A5.00724Q		9.85e+01 GDRY	02/18/2005	0009436Q
A5.00725R		9.54e+01 GDRY	02/18/2005	0009436Q
A5.00726T		9.03e+01 GDRY	02/18/2005	0009436Q

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

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GAMMA ANALYSES
SDG #0500009**

DETECTOR REPORT

The following were used for samples in the SDG

GE07	02/17/2005	12:41	00484650T	A5.00719U
GE08	02/17/2005	12:41	00484656Z	A5.00721M
GE09	02/17/2005	12:42	00484659C	A5.00722N
GE10	02/17/2005	12:42	00484662X	A5.00723P
GE11	02/17/2005	12:42	00484653W	A5.00720L
GE15	02/17/2005	12:54	00484665A	A5.00724Q
GE15	02/18/2005	09:03	00484674B	A5.00720L
GE16	02/17/2005	12:54	00484668D	A5.00725R
GE17	02/17/2005	12:54	00484671Y	A5.00726T

The following were used for other samples in the QC batches

None found

Data Package Checklist

Project: ANACONDA COPPER MINE SDG Number: #0500008

Date due: _____ Analysis: NAREL GAM-01

Type of Package: 9 Data Summary Package 9 Complete Package

Y N N/A

- 9 9 9 All samples in the SDG are reported
- 9 9 9 All results are the ones intended
- 9 9 9 Printed results match the raw data
- 9 9 9 Error report forms are attached
- 9 9 9 SDG Form is attached
- 9 9 9 Analyst's checklist is attached
- 9 9 9 Original prep batch forms are attached
- 9 9 9 All supporting data sheets are attached
- 9 9 9 All raw data sheets appear to be correct
- 9 9 9 All handwritten notes are initialed and dated
- 9 9 9 Package is arranged correctly
- 9 9 9 Package appears to be complete

Were holding times met? 9 Yes 9 No 9 N/A

Were all QC results acceptable? 9 Yes 9 No

Are there any exceptions to report? 9 Yes 9 No

QAO Review

Y N N/A

- 9 9 9 All QC failures are noted
 - 9 9 9 Raw data look reasonable
 - 9 9 9 All exceptions have been noted
- Note: If changes to the case narrative are suggested, please provide the necessary language.

Comments: _____

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES**

REPORT OF SAMPLE DELIVERY GROUP #0500008

Project: ANACONDA COPPER MINE
Analysis Procedure: Gamma Spectrometry
Date Reported: 03/29/2005

SAMPLES

NAREL Sample #	Client Sample ID	Type	Matrix	Date Collected	Date Received
A5.00538Q	PA-HH8-20	SAM	SOIL	01/26/2005	01/28/2005
A5.00539R	PA-HH8-25	SAM	SOIL	01/26/2005	01/28/2005
A5.00540J	PA-BBB2-5	SAM	SOIL	01/27/2005	01/28/2005
A5.00541K	PA-BBB2-10	SAM	SOIL	01/27/2005	01/28/2005
A5.00542L	PA-BBB2-15	SAM	SOIL	01/27/2005	01/28/2005
A5.00543M	PA-BBB2-20	SAM	SOIL	01/27/2005	01/28/2005
A5.00544N	PA-BBB2-25	SAM	SOIL	01/27/2005	01/28/2005
A5.00706N	PA-C2-1	SAM	SOIL	02/02/2005	02/07/2005
A5.00707P	PA-C2-5	SAM	SOIL	02/02/2005	02/07/2005
A5.00708Q	PA-C2-10	SAM	SOIL	02/02/2005	02/07/2005
A5.00709R	PA-V1-1	SAM	SOIL	02/02/2005	02/07/2005
A5.00710J	PA-V1-10	SAM	SOIL	02/02/2005	02/07/2005
A5.00711K	PA-V1-5	SAM	SOIL	02/02/2005	02/07/2005
A5.00712L	PA-Q1-1	SAM	SOIL	02/02/2005	02/07/2005
A5.00713M	PA-Q1-5	SAM	SOIL	02/02/2005	02/07/2005
A5.00714N	PA-Q1-10	SAM	SOIL	02/02/2005	02/07/2005
A5.00715P	PA-P19-5	SAM	SOIL	02/04/2005	02/07/2005
A5.00716Q	PA-P19-6	SAM	SOIL	02/04/2005	02/07/2005
A5.00717R	PA-P19-10	SAM	SOIL	02/04/2005	02/07/2005
A5.00718T	PA-P19-15	SAM	SOIL	02/04/2005	02/07/2005

EXCEPTIONS

1. Packaging and Shipping - No problems were observed.
2. Documentation - No problems were observed.
3. Sample Preparation - No problems were encountered.
4. Analysis - No problems were encountered.
5. Holding Times - All holding times were met.

QUALITY CONTROL

1. QC samples - All QC analysis results met NAREL acceptance criteria.
2. Instruments - Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Chief of the Monitoring and Analytical Services Branch and the NAREL Quality Assurance Coordinator, or their designees, as verified by the following signatures.

Quality Assurance Coordinator

Chief, Monitoring and Analytical Services Branch

GENERAL INFORMATION

SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Reagent blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A reagent blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "Z scores." A Z score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The Z score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The Z score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the Z score is computed.

Each standard uncertainty used to compute a Z score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

GENERAL INFORMATION (CONTINUED)

GAMMA ANALYSIS

The reporting format lists the gamma emitters in alphabetical order. The activity and 2-sigma uncertainty for radionuclides measured by gamma spectroscopy are reported only if the nuclide is detected. Nuclides that are not detected do not appear in the report, with the exception of Ba-140, Co-60, Cs-137, I-131, K-40, Ra-226 and Ra-228. If one of these seven nuclides is undetected, NAREL reports it as "Not Detected" or "ND", and provides a sample-specific estimate of the MDC.

Due to potential spectral interferences and other possible problems associated with the determination of the activity of certain radionuclides, the activities for Bi-214, Pb-214, Th-234, Pa-234m, Ra-226, Th-231, and U-235 are subject to greater possible uncertainty than other commonly reported radionuclides. It should be noted that this potential uncertainty is not included in the two-sigma counting uncertainty which is reported with each activity. Although in this report we do provide the calculated activities for these radionuclides, we recommend that the results be used only as a qualitative means of indicating the presence of these radionuclides and not as a quantitative measure of their concentration. The results for these nuclides are not used in the evaluation of quality control samples. Furthermore, because of mutual interference between Ra-226 and U-235, NAREL's gamma analysis software tends to overestimate the amounts of these nuclides whenever both are present in a sample. Lower estimates for Ra-226 activities can be obtained from the reported activities of its decay products, Pb-214 and Bi-214, which are likely to be somewhat less than the Ra-226 activity because of the potential escape of radon gas.

NAREL's gamma spectroscopy software corrects activities and MDCs for decay between collection and analysis, but only up to a limit of ten half-lives. So, if the decay time for a sample is more than ten half-lives of a radionuclide, that nuclide will almost always be undetected and the reported MDC will be meaningless. This is usually a problem only for short-lived radionuclides, such as I-131 and Ba-140, when there is a long delay between collection and analysis.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 GAMMA ANALYSES
 SDG #0500008**

ANALYSIS SUMMARY

Analysis Procedure: NAREL GAM-01
 Title: Gamma Spectrometry

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Prep Batch #	QC Batch #
A5.00538Q		N/A	02/12/2005	0009416L	0003583Q
A5.00539R		N/A	02/12/2005	0009416L	0003583Q
A5.00540J		N/A	02/12/2005	0009416L	0003583Q
A5.00541K		N/A	02/12/2005	0009416L	0003583Q
A5.00542L		N/A	02/12/2005	0009416L	0003583Q
A5.00543M		N/A	02/12/2005	0009416L	0003583Q
A5.00544N		N/A	02/12/2005	0009416L	0003583Q
A5.00544N	DUP	N/A	02/15/2005	0009416L	0003583Q
A5.00706N		N/A	02/16/2005	0009425M	0003583Q
A5.00707P		N/A	02/16/2005	0009425M	0003583Q
A5.00708Q		N/A	02/16/2005	0009425M	0003583Q
A5.00709R		N/A	02/16/2005	0009425M	0003583Q
A5.00710J		N/A	02/16/2005	0009425M	0003583Q
A5.00711K		N/A	02/16/2005	0009425M	0003583Q
A5.00712L		N/A	02/16/2005	0009425M	0003583Q
A5.00713M		N/A	02/16/2005	0009425M	0003583Q
A5.00714N		N/A	02/16/2005	0009425M	0003583Q
A5.00715P		N/A	02/16/2005	0009425M	0003583Q
A5.00716Q		N/A	02/18/2005	0009436Q	0003583Q
A5.00717R		N/A	02/18/2005	0009436Q	0003583Q
A5.00718T		N/A	02/18/2005	0009436Q	0003583Q

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0500008**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00538Q	QC batch #:	0003583Q
Matrix:	SOIL	Prep batch #:	0009416L
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	8.940e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	96.38 %	Analyst:	N/A
Ash/dry weight:	98.80 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/11/2005 15:40	1000.0	GE02	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		4.8e-01	PCI/GDRY	01/26/2005
Bi212	1.57e+00	4.9e-01		PCI/GDRY	01/26/2005
Bi214	1.25e+00	1.2e-01		PCI/GDRY	01/26/2005
Co60	ND		9.5e-02	PCI/GDRY	01/26/2005
Cs137	ND		7.5e-02	PCI/GDRY	01/26/2005
I131	ND		1.9e-01	PCI/GDRY	01/26/2005
K40	2.85e+01	2.0e+00		PCI/GDRY	01/26/2005
Pb210	ND		2.4e+00	PCI/GDRY	01/26/2005
Pb212	1.42e+00	1.1e-01		PCI/GDRY	01/26/2005
Pb214	1.39e+00	1.1e-01		PCI/GDRY	01/26/2005
Ra223	3.70e-01	1.1e-01		PCI/GDRY	01/26/2005
Ra224	4.87e-01	5.4e-01		PCI/GDRY	01/26/2005
Ra226	2.69e+00	5.7e-01		PCI/GDRY	01/26/2005
Ra228	1.52e+00	1.6e-01		PCI/GDRY	01/26/2005
Th234	1.50e+00	4.1e-01		PCI/GDRY	01/26/2005
Tl208	4.56e-01	5.2e-02		PCI/GDRY	01/26/2005
U235	1.66e-01	3.5e-02		PCI/GDRY	01/26/2005

* An asterisk indicates a result whose value may be significantly over or underestimated.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0500008**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00539R	QC batch #:	0003583Q
Matrix:	SOIL	Prep batch #:	0009416L
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	9.710e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	95.77 %	Analyst:	N/A
Ash/dry weight:	99.20 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/11/2005 15:39	1000.0	GE06	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		2.5e-01	PCI/GDRY	01/26/2005
Bi212	1.34e+00	2.6e-01		PCI/GDRY	01/26/2005
Bi214	9.86e-01	7.9e-02		PCI/GDRY	01/26/2005
Co60	ND		4.3e-02	PCI/GDRY	01/26/2005
Cs137	ND		3.5e-02	PCI/GDRY	01/26/2005
I131	ND		1.0e-01	PCI/GDRY	01/26/2005
K40	2.57e+01	1.6e+00		PCI/GDRY	01/26/2005
Pb210	ND		3.2e+00	PCI/GDRY	01/26/2005
Pb212	1.10e+00	7.8e-02		PCI/GDRY	01/26/2005
Pb214	1.10e+00	7.9e-02		PCI/GDRY	01/26/2005
Ra223	3.79e-01	8.6e-02		PCI/GDRY	01/26/2005
Ra224	7.65e-01	3.7e-01		PCI/GDRY	01/26/2005
Ra226	2.09e+00	4.5e-01		PCI/GDRY	01/26/2005
Ra228	1.14e+00	9.6e-02		PCI/GDRY	01/26/2005
Th234	1.19e+00	3.5e-01		PCI/GDRY	01/26/2005
Tl208	3.44e-01	3.3e-02		PCI/GDRY	01/26/2005
U235	1.31e-01	2.8e-02		PCI/GDRY	01/26/2005

* An asterisk indicates a result whose value may be significantly over or underestimated.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0500008**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00540J	QC batch #:	0003583Q
Matrix:	SOIL	Prep batch #:	0009416L
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	9.210e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	92.31 %	Analyst:	N/A
Ash/dry weight:	98.40 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/11/2005 15:39	1000.0	GE07	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		3.2e-01	PCI/GDRY	01/27/2005
Bi212	1.24e+00	2.7e-01		PCI/GDRY	01/27/2005
Bi214	9.54e-01	8.4e-02		PCI/GDRY	01/27/2005
Co60	ND		5.7e-02	PCI/GDRY	01/27/2005
Cs137	ND		5.0e-02	PCI/GDRY	01/27/2005
I131	ND		1.3e-01	PCI/GDRY	01/27/2005
K40	2.56e+01	1.6e+00		PCI/GDRY	01/27/2005
Pb210	ND		3.8e+00	PCI/GDRY	01/27/2005
Pb212	1.13e+00	8.6e-02		PCI/GDRY	01/27/2005
Pb214	1.12e+00	8.5e-02		PCI/GDRY	01/27/2005
Ra223	3.48e-01	1.1e-01		PCI/GDRY	01/27/2005
Ra224	7.28e-01	5.8e-01		PCI/GDRY	01/27/2005
Ra226	3.16e+00	4.3e-01		PCI/GDRY	01/27/2005
Ra228	1.20e+00	1.1e-01		PCI/GDRY	01/27/2005
Th234	1.19e+00	4.7e-01		PCI/GDRY	01/27/2005
Tl208	3.72e-01	4.0e-02		PCI/GDRY	01/27/2005
U235	1.94e-01	2.7e-02		PCI/GDRY	01/27/2005

* An asterisk indicates a result whose value may be significantly over or underestimated.

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00541K	QC batch #:	0003583Q
Matrix:	SOIL	Prep batch #:	0009416L
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.400e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	96.02 %	Analyst:	N/A
Ash/dry weight:	98.80 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/11/2005 15:40	1000.0	GE08	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		1.9e-01	PCI/GDRY	01/27/2005
Bi212	1.38e+00	2.5e-01		PCI/GDRY	01/27/2005
Bi214	1.08e+00	7.6e-02		PCI/GDRY	01/27/2005
Co60	ND		4.6e-02	PCI/GDRY	01/27/2005
Cs137	ND		3.5e-02	PCI/GDRY	01/27/2005
I131	ND		7.9e-02	PCI/GDRY	01/27/2005
K40	2.53e+01	1.5e+00		PCI/GDRY	01/27/2005
Pb210	ND		5.7e-01	PCI/GDRY	01/27/2005
Pb212	1.13e+00	7.5e-02		PCI/GDRY	01/27/2005
Pb214	1.10e+00	7.4e-02		PCI/GDRY	01/27/2005
Ra223	2.68e-01	6.5e-02		PCI/GDRY	01/27/2005
Ra224	9.07e-01	3.2e-01		PCI/GDRY	01/27/2005
Ra226	2.48e+00	3.7e-01		PCI/GDRY	01/27/2005
Ra228	1.17e+00	9.4e-02		PCI/GDRY	01/27/2005
Th234	1.27e+00	1.9e-01		PCI/GDRY	01/27/2005
Tl208	3.33e-01	2.9e-02		PCI/GDRY	01/27/2005
U235	1.56e-01	2.4e-02		PCI/GDRY	01/27/2005

* An asterisk indicates a result whose value may be significantly over or underestimated.

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00542L	QC batch #:	0003583Q
Matrix:	SOIL	Prep batch #:	0009416L
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	9.870e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	96.96 %	Analyst:	N/A
Ash/dry weight:	98.80 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/11/2005 15:40	1000.0	GE09	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		3.2e-01	PCI/GDRY	01/27/2005
Bi212	1.00e+00	2.6e-01		PCI/GDRY	01/27/2005
Bi214	1.17e+00	8.9e-02		PCI/GDRY	01/27/2005
Co60	ND		5.4e-02	PCI/GDRY	01/27/2005
Cs137	ND		4.9e-02	PCI/GDRY	01/27/2005
I131	ND		1.4e-01	PCI/GDRY	01/27/2005
K40	2.48e+01	1.6e+00		PCI/GDRY	01/27/2005
Pb210	ND		5.1e+00	PCI/GDRY	01/27/2005
Pb212	1.19e+00	8.5e-02		PCI/GDRY	01/27/2005
Pb214	1.23e+00	8.9e-02		PCI/GDRY	01/27/2005
Ra223	3.10e-01	9.0e-02		PCI/GDRY	01/27/2005
Ra224	1.07e+00	5.6e-01		PCI/GDRY	01/27/2005
Ra226	2.47e+00	4.6e-01		PCI/GDRY	01/27/2005
Ra228	1.20e+00	1.1e-01		PCI/GDRY	01/27/2005
Th234	1.12e+00	3.9e-01		PCI/GDRY	01/27/2005
Tl208	3.83e-01	3.8e-02		PCI/GDRY	01/27/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00543M	QC batch #:	0003583Q
Matrix:	SOIL	Prep batch #:	0009416L
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	9.050e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	96.25 %	Analyst:	N/A
Ash/dry weight:	98.40 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/11/2005 15:40	1000.0	GE10	DPS

ANALYTICAL RESULTS

Analyte	Activity	$\nabla 2\Phi$ Uncertainty	MDC	Unit	Date
Ba140	ND		3.4e-01	PCI/GDRY	01/27/2005
Bi212	1.37e+00	3.2e-01		PCI/GDRY	01/27/2005
Bi214	1.20e+00	9.6e-02		PCI/GDRY	01/27/2005
Co60	ND		6.2e-02	PCI/GDRY	01/27/2005
Cs137	ND		5.3e-02	PCI/GDRY	01/27/2005
I131	ND		1.4e-01	PCI/GDRY	01/27/2005
K40	2.50e+01	1.6e+00		PCI/GDRY	01/27/2005
Pb210	ND		2.9e+00	PCI/GDRY	01/27/2005
Pb212	1.37e+00	9.6e-02		PCI/GDRY	01/27/2005
Pb214	1.32e+00	9.4e-02		PCI/GDRY	01/27/2005
Ra223	4.43e-01	1.0e-01		PCI/GDRY	01/27/2005
Ra224	1.24e+00	5.2e-01		PCI/GDRY	01/27/2005
Ra226	2.52e+00	5.1e-01		PCI/GDRY	01/27/2005
Ra228	1.38e+00	1.2e-01		PCI/GDRY	01/27/2005
Th234	1.01e+00	3.7e-01		PCI/GDRY	01/27/2005
Tl208	4.07e-01	3.9e-02		PCI/GDRY	01/27/2005
U235	1.58e-01	3.2e-02		PCI/GDRY	01/27/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00544N	QC batch #:	0003583Q
Matrix:	SOIL	Prep batch #:	0009416L
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.670e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	97.04 %	Analyst:	N/A
Ash/dry weight:	99.60 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/11/2005 15:40	1000.0	GE11	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		1.1e-01	PCI/GDRY	01/27/2005
Bi212	1.25e+00	1.3e-01		PCI/GDRY	01/27/2005
Bi214	9.18e-01	5.7e-02		PCI/GDRY	01/27/2005
Co60	ND		1.9e-02	PCI/GDRY	01/27/2005
Cs137	ND		1.7e-02	PCI/GDRY	01/27/2005
I131	ND		4.9e-02	PCI/GDRY	01/27/2005
K40	2.39e+01	1.4e+00		PCI/GDRY	01/27/2005
Pb210	ND		1.5e+00	PCI/GDRY	01/27/2005
Pb212	1.09e+00	6.5e-02		PCI/GDRY	01/27/2005
Pb214	9.80e-01	5.9e-02		PCI/GDRY	01/27/2005
Ra223	2.96e-01	4.7e-02		PCI/GDRY	01/27/2005
Ra224	8.97e-01	2.0e-01		PCI/GDRY	01/27/2005
Ra226	2.07e+00	2.0e-01		PCI/GDRY	01/27/2005
Ra228	1.18e+00	7.5e-02		PCI/GDRY	01/27/2005
Th227	3.21e-02	2.8e-02		PCI/GDRY	01/27/2005
Th234	1.51e+00	2.3e-01		PCI/GDRY	01/27/2005
Tl208	3.50e-01	2.3e-02		PCI/GDRY	01/27/2005
U235	1.30e-01	1.3e-02		PCI/GDRY	01/27/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00544N	QC batch #:	0003583Q
Matrix:	SOIL	Prep batch #:	0009416L
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.670e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	97.04 %	Analyst:	N/A
Ash/dry weight:	99.60 %	QC type:	DUP

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/14/2005 13:19	1000.0	GE17	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		1.5e-01	PCI/GDRY	01/27/2005
Bi212	1.28e+00	1.6e-01		PCI/GDRY	01/27/2005
Bi214	9.36e-01	5.8e-02		PCI/GDRY	01/27/2005
Co60	ND		2.7e-02	PCI/GDRY	01/27/2005
Cs137	ND		1.9e-02	PCI/GDRY	01/27/2005
I131	ND		6.1e-02	PCI/GDRY	01/27/2005
K40	2.49e+01	1.4e+00		PCI/GDRY	01/27/2005
Pb210	9.26e-01	1.7e-01		PCI/GDRY	01/27/2005
Pb212	1.06e+00	6.4e-02		PCI/GDRY	01/27/2005
Pb214	9.71e-01	5.9e-02		PCI/GDRY	01/27/2005
Ra223	2.87e-01	4.2e-02		PCI/GDRY	01/27/2005
Ra224	8.95e-01	2.0e-01		PCI/GDRY	01/27/2005
Ra226	1.75e+00	2.0e-01		PCI/GDRY	01/27/2005
Ra228	1.14e+00	7.6e-02		PCI/GDRY	01/27/2005
Th234	1.04e+00	1.1e-01		PCI/GDRY	01/27/2005
Tl208	3.38e-01	2.4e-02		PCI/GDRY	01/27/2005
U235	1.08e-01	1.2e-02		PCI/GDRY	01/27/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00706N	QC batch #:	0003583Q
Matrix:	SOIL	Prep batch #:	0009425M
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	9.430e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	94.50 %	Analyst:	N/A
Ash/dry weight:	97.60 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/15/2005 16:52	1000.0	GE02	DPS

ANALYTICAL RESULTS

Analyte	Activity	$\sqrt{2\Phi}$ Uncertainty	MDC	Unit	Date
Ba140	ND		3.5e-01	PCI/GDRY	02/02/2005
Bi212	1.59e+00	5.0e-01		PCI/GDRY	02/02/2005
Bi214	9.82e-01	1.0e-01		PCI/GDRY	02/02/2005
Co60	ND		7.4e-02	PCI/GDRY	02/02/2005
Cs137	ND		5.8e-02	PCI/GDRY	02/02/2005
I131	ND		1.2e-01	PCI/GDRY	02/02/2005
K40	2.44e+01	1.8e+00		PCI/GDRY	02/02/2005
Pb210	ND		2.1e+00	PCI/GDRY	02/02/2005
Pb212	1.12e+00	8.8e-02		PCI/GDRY	02/02/2005
Pb214	1.11e+00	9.1e-02		PCI/GDRY	02/02/2005
Ra223	3.58e-01	1.2e-01		PCI/GDRY	02/02/2005
Ra224	7.34e-01	5.4e-01		PCI/GDRY	02/02/2005
Ra226	2.16e+00	5.3e-01		PCI/GDRY	02/02/2005
Ra228	1.15e+00	1.3e-01		PCI/GDRY	02/02/2005
Th234	6.34e-01	3.5e-01		PCI/GDRY	02/02/2005
Tl208	3.46e-01	4.5e-02		PCI/GDRY	02/02/2005
U235	1.36e-01	3.3e-02		PCI/GDRY	02/02/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00707P	QC batch #:	0003583Q
Matrix:	SOIL	Prep batch #:	0009425M
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	9.430e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	95.91 %	Analyst:	N/A
Ash/dry weight:	98.40 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/15/2005 16:52	1000.0	GE06	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		2.4e-01	PCI/GDRY	02/02/2005
Bi212	1.26e+00	2.6e-01		PCI/GDRY	02/02/2005
Bi214	9.50e-01	7.7e-02		PCI/GDRY	02/02/2005
Co60	ND		4.9e-02	PCI/GDRY	02/02/2005
Cs137	ND		3.6e-02	PCI/GDRY	02/02/2005
I131	ND		8.3e-02	PCI/GDRY	02/02/2005
K40	2.58e+01	1.6e+00		PCI/GDRY	02/02/2005
Pb210	ND		3.2e+00	PCI/GDRY	02/02/2005
Pb212	1.11e+00	7.9e-02		PCI/GDRY	02/02/2005
Pb214	1.03e+00	7.5e-02		PCI/GDRY	02/02/2005
Ra223	3.38e-01	7.7e-02		PCI/GDRY	02/02/2005
Ra224	7.05e-01	3.7e-01		PCI/GDRY	02/02/2005
Ra226	1.96e+00	4.2e-01		PCI/GDRY	02/02/2005
Ra228	1.17e+00	9.9e-02		PCI/GDRY	02/02/2005
Th234	9.80e-01	3.6e-01		PCI/GDRY	02/02/2005
Tl208	3.29e-01	3.3e-02		PCI/GDRY	02/02/2005
U235	1.21e-01	2.5e-02		PCI/GDRY	02/02/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00708Q	QC batch #:	0003583Q
Matrix:	SOIL	Prep batch #:	0009425M
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.610e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	97.07 %	Analyst:	N/A
Ash/dry weight:	100.00 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/15/2005 16:52	1000.0	GE04	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		1.5e-01	PCI/GDRY	02/02/2005
Bi212	1.07e+00	1.6e-01		PCI/GDRY	02/02/2005
Bi214	9.51e-01	6.3e-02		PCI/GDRY	02/02/2005
Co60	ND		3.0e-02	PCI/GDRY	02/02/2005
Cs137	ND		2.5e-02	PCI/GDRY	02/02/2005
I131	ND		5.6e-02	PCI/GDRY	02/02/2005
K40	2.39e+01	1.4e+00		PCI/GDRY	02/02/2005
Pb210	ND		4.5e+00	PCI/GDRY	02/02/2005
Pb212	1.00e+00	6.4e-02		PCI/GDRY	02/02/2005
Pb214	1.06e+00	6.7e-02		PCI/GDRY	02/02/2005
Ra223	2.82e-01	5.2e-02		PCI/GDRY	02/02/2005
Ra224	9.55e-01	2.7e-01		PCI/GDRY	02/02/2005
Ra226	2.10e+00	2.7e-01		PCI/GDRY	02/02/2005
Ra228	1.03e+00	7.4e-02		PCI/GDRY	02/02/2005
Th234	7.30e-01	2.3e-01		PCI/GDRY	02/02/2005
Tl208	3.19e-01	2.4e-02		PCI/GDRY	02/02/2005
U235	1.32e-01	1.7e-02		PCI/GDRY	02/02/2005

* An asterisk indicates a result whose value may be significantly over or underestimated.

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00709R	QC batch #:	0003583Q
Matrix:	SOIL	Prep batch #:	0009425M
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	9.640e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	94.09 %	Analyst:	N/A
Ash/dry weight:	100.00 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/15/2005 16:52	1000.0	GE07	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		2.3e-01	PCI/GDRY	02/02/2005
Bi212	1.19e+00	2.7e-01		PCI/GDRY	02/02/2005
Bi214	9.53e-01	8.3e-02		PCI/GDRY	02/02/2005
Co60	ND		5.2e-02	PCI/GDRY	02/02/2005
Cs137	ND		4.3e-02	PCI/GDRY	02/02/2005
I131	ND		8.9e-02	PCI/GDRY	02/02/2005
K40	2.40e+01	1.5e+00		PCI/GDRY	02/02/2005
Pb210	ND		4.9e+00	PCI/GDRY	02/02/2005
Pb212	1.06e+00	8.2e-02		PCI/GDRY	02/02/2005
Pb214	1.04e+00	8.0e-02		PCI/GDRY	02/02/2005
Ra223	4.03e-01	1.1e-01		PCI/GDRY	02/02/2005
Ra224	7.10e-01	5.6e-01		PCI/GDRY	02/02/2005
Ra226	3.23e+00	4.1e-01		PCI/GDRY	02/02/2005
Ra228	1.14e+00	1.1e-01		PCI/GDRY	02/02/2005
Th234	1.13e+00	4.1e-01		PCI/GDRY	02/02/2005
Tl208	3.36e-01	3.7e-02		PCI/GDRY	02/02/2005
U235	2.03e-01	2.6e-02		PCI/GDRY	02/02/2005

* An asterisk indicates a result whose value may be significantly over or underestimated.

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00710J	QC batch #:	0003583Q
Matrix:	SOIL	Prep batch #:	0009425M
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	8.640e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	95.31 %	Analyst:	N/A
Ash/dry weight:	98.80 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/15/2005 16:53	1000.0	GE08	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		3.1e-01	PCI/GDRY	02/02/2005
Bi212	9.33e-01	3.4e-01		PCI/GDRY	02/02/2005
Bi214	1.07e+00	9.9e-02		PCI/GDRY	02/02/2005
Co60	ND		7.3e-02	PCI/GDRY	02/02/2005
Cs137	ND		5.9e-02	PCI/GDRY	02/02/2005
I131	ND		1.3e-01	PCI/GDRY	02/02/2005
K40	2.42e+01	1.6e+00		PCI/GDRY	02/02/2005
Pb210	1.49e+00	6.8e-01		PCI/GDRY	02/02/2005
Pb212	1.26e+00	9.9e-02		PCI/GDRY	02/02/2005
Pb214	1.15e+00	9.9e-02		PCI/GDRY	02/02/2005
Ra223	4.39e-01	1.2e-01		PCI/GDRY	02/02/2005
Ra224	1.10e+00	5.6e-01		PCI/GDRY	02/02/2005
Ra226	2.48e+00	6.8e-01		PCI/GDRY	02/02/2005
Ra228	1.15e+00	1.4e-01		PCI/GDRY	02/02/2005
Th234	7.35e-01	2.7e-01		PCI/GDRY	02/02/2005
Tl208	3.79e-01	4.6e-02		PCI/GDRY	02/02/2005
U235	1.56e-01	4.3e-02		PCI/GDRY	02/02/2005

* An asterisk indicates a result whose value may be significantly over or underestimated.

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00711K	QC batch #:	0003583Q
Matrix:	SOIL	Prep batch #:	0009425M
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	9.040e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	93.65 %	Analyst:	N/A
Ash/dry weight:	98.00 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/15/2005 16:53	1000.0	GE09	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		2.9e-01	PCI/GDRY	02/02/2005
Bi212	1.30e+00	3.0e-01		PCI/GDRY	02/02/2005
Bi214	1.05e+00	8.7e-02		PCI/GDRY	02/02/2005
Co60	ND		4.9e-02	PCI/GDRY	02/02/2005
Cs137	ND		4.9e-02	PCI/GDRY	02/02/2005
I131	ND		1.1e-01	PCI/GDRY	02/02/2005
K40	2.58e+01	1.6e+00		PCI/GDRY	02/02/2005
Pb210	ND		5.4e+00	PCI/GDRY	02/02/2005
Pb212	1.27e+00	9.2e-02		PCI/GDRY	02/02/2005
Pb214	1.20e+00	8.6e-02		PCI/GDRY	02/02/2005
Ra223	3.05e-01	9.3e-02		PCI/GDRY	02/02/2005
Ra224	1.05e+00	5.9e-01		PCI/GDRY	02/02/2005
Ra226	2.74e+00	4.8e-01		PCI/GDRY	02/02/2005
Ra228	1.29e+00	1.1e-01		PCI/GDRY	02/02/2005
Th234	9.66e-01	4.2e-01		PCI/GDRY	02/02/2005
Tl208	4.03e-01	4.0e-02		PCI/GDRY	02/02/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00712L	QC batch #:	0003583Q
Matrix:	SOIL	Prep batch #:	0009425M
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	8.450e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	95.76 %	Analyst:	N/A
Ash/dry weight:	97.20 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/15/2005 16:53	1000.0	GE10	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		2.7e-01	PCI/GDRY	02/02/2005
Bi212	9.40e-01	2.8e-01		PCI/GDRY	02/02/2005
Bi214	5.62e-01	6.6e-02		PCI/GDRY	02/02/2005
Co60	ND		5.7e-02	PCI/GDRY	02/02/2005
Cs137	ND		4.4e-02	PCI/GDRY	02/02/2005
I131	ND		9.3e-02	PCI/GDRY	02/02/2005
K40	1.92e+01	1.3e+00		PCI/GDRY	02/02/2005
Pb210	ND		2.9e+00	PCI/GDRY	02/02/2005
Pb212	8.00e-01	6.8e-02		PCI/GDRY	02/02/2005
Pb214	6.66e-01	6.3e-02		PCI/GDRY	02/02/2005
Ra223	2.00e-01	9.0e-02		PCI/GDRY	02/02/2005
Ra224	5.81e-01	4.5e-01		PCI/GDRY	02/02/2005
Ra226	1.07e+00	4.8e-01		PCI/GDRY	02/02/2005
Ra228	7.11e-01	9.4e-02		PCI/GDRY	02/02/2005
Tl208	2.23e-01	3.1e-02		PCI/GDRY	02/02/2005
U235	6.72e-02	2.9e-02		PCI/GDRY	02/02/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00713M	QC batch #:	0003583Q
Matrix:	SOIL	Prep batch #:	0009425M
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	9.200e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	97.04 %	Analyst:	N/A
Ash/dry weight:	98.80 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/15/2005 16:47	500.0	GE13	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		3.0e-01	PCI/GDRY	02/02/2005
Bi212	1.26e+00	3.8e-01		PCI/GDRY	02/02/2005
Bi214	1.02e+00	9.0e-02		PCI/GDRY	02/02/2005
Co60	ND		5.3e-02	PCI/GDRY	02/02/2005
Cs137	ND		5.3e-02	PCI/GDRY	02/02/2005
I131	ND		1.3e-01	PCI/GDRY	02/02/2005
K40	2.61e+01	1.7e+00		PCI/GDRY	02/02/2005
Pb210	ND		4.7e+00	PCI/GDRY	02/02/2005
Pb212	1.21e+00	9.5e-02		PCI/GDRY	02/02/2005
Pb214	1.13e+00	9.1e-02		PCI/GDRY	02/02/2005
Ra223	2.88e-01	1.3e-01		PCI/GDRY	02/02/2005
Ra224	6.78e-01	5.6e-01		PCI/GDRY	02/02/2005
Ra226	2.07e+00	5.6e-01		PCI/GDRY	02/02/2005
Ra228	1.27e+00	1.2e-01		PCI/GDRY	02/02/2005
Th234	9.78e-01	5.1e-01		PCI/GDRY	02/02/2005
Tl208	3.78e-01	4.2e-02		PCI/GDRY	02/02/2005
U235	1.30e-01	3.5e-02		PCI/GDRY	02/02/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00714N	QC batch #:	0003583Q
Matrix:	SOIL	Prep batch #:	0009425M
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	9.410e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	94.68 %	Analyst:	N/A
Ash/dry weight:	98.00 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/16/2005 01:09	500.0	GE13	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		3.2e-01	PCI/GDRY	02/02/2005
Bi212	1.67e+00	4.9e-01		PCI/GDRY	02/02/2005
Bi214	1.22e+00	1.0e-01		PCI/GDRY	02/02/2005
Co60	ND		5.6e-02	PCI/GDRY	02/02/2005
Cs137	ND		5.5e-02	PCI/GDRY	02/02/2005
I131	ND		1.3e-01	PCI/GDRY	02/02/2005
K40	2.40e+01	1.6e+00		PCI/GDRY	02/02/2005
Pb210	ND		5.0e+00	PCI/GDRY	02/02/2005
Pb212	1.51e+00	1.1e-01		PCI/GDRY	02/02/2005
Pb214	1.40e+00	1.0e-01		PCI/GDRY	02/02/2005
Ra223	5.15e-01	1.3e-01		PCI/GDRY	02/02/2005
Ra224	9.81e-01	6.5e-01		PCI/GDRY	02/02/2005
Ra226	3.08e+00	6.2e-01		PCI/GDRY	02/02/2005
Ra228	1.47e+00	1.4e-01		PCI/GDRY	02/02/2005
Tl208	4.33e-01	4.4e-02		PCI/GDRY	02/02/2005
U235	1.93e-01	3.9e-02		PCI/GDRY	02/02/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00715P	QC batch #:	0003583Q
Matrix:	SOIL	Prep batch #:	0009425M
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	9.430e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	94.37 %	Analyst:	N/A
Ash/dry weight:	98.40 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/15/2005 16:55	1000.0	GE16	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		2.0e-01	PCI/GDRY	02/04/2005
Bi212	1.65e+00	2.5e-01		PCI/GDRY	02/04/2005
Bi214	1.26e+00	8.5e-02		PCI/GDRY	02/04/2005
Co60	ND		4.0e-02	PCI/GDRY	02/04/2005
Cs137	ND		3.4e-02	PCI/GDRY	02/04/2005
I131	ND		7.0e-02	PCI/GDRY	02/04/2005
K40	2.87e+01	1.7e+00		PCI/GDRY	02/04/2005
Pb210	1.69e+00	4.2e-01		PCI/GDRY	02/04/2005
Pb212	1.63e+00	1.0e-01		PCI/GDRY	02/04/2005
Pb214	1.40e+00	9.0e-02		PCI/GDRY	02/04/2005
Ra223	4.12e-01	8.0e-02		PCI/GDRY	02/04/2005
Ra224	1.43e+00	3.8e-01		PCI/GDRY	02/04/2005
Ra226	3.83e+00	4.5e-01		PCI/GDRY	02/04/2005
Ra228	1.62e+00	1.1e-01		PCI/GDRY	02/04/2005
Th234	1.88e+00	2.2e-01		PCI/GDRY	02/04/2005
Tl208	4.64e-01	3.4e-02		PCI/GDRY	02/04/2005
U235	2.41e-01	2.8e-02		PCI/GDRY	02/04/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00716Q	QC batch #:	0003583Q
Matrix:	SOIL	Prep batch #:	0009436Q
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	8.300e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	94.56 %	Analyst:	N/A
Ash/dry weight:	98.80 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/17/2005 12:40	1000.0	GE02	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		4.4e-01	PCI/GDRY	02/04/2005
Bi212	1.83e+00	5.4e-01		PCI/GDRY	02/04/2005
Bi214	1.33e+00	1.3e-01		PCI/GDRY	02/04/2005
Co60	ND		9.3e-02	PCI/GDRY	02/04/2005
Cs137	ND		8.0e-02	PCI/GDRY	02/04/2005
I131	ND		1.6e-01	PCI/GDRY	02/04/2005
K40	2.82e+01	2.0e+00		PCI/GDRY	02/04/2005
Pb210	ND		2.6e+00	PCI/GDRY	02/04/2005
Pb212	1.66e+00	1.2e-01		PCI/GDRY	02/04/2005
Pb214	1.42e+00	1.1e-01		PCI/GDRY	02/04/2005
Ra223	4.33e-01	1.3e-01		PCI/GDRY	02/04/2005
Ra224	1.64e+00	6.7e-01		PCI/GDRY	02/04/2005
Ra226	3.71e+00	6.4e-01		PCI/GDRY	02/04/2005
Ra228	1.66e+00	1.6e-01		PCI/GDRY	02/04/2005
Th234	2.22e+00	4.1e-01		PCI/GDRY	02/04/2005
Tl208	5.30e-01	5.8e-02		PCI/GDRY	02/04/2005
U235	2.24e-01	3.9e-02		PCI/GDRY	02/04/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00717R	QC batch #:	0003583Q
Matrix:	SOIL	Prep batch #:	0009436Q
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.220e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	92.11 %	Analyst:	N/A
Ash/dry weight:	98.80 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/17/2005 12:40	1000.0	GE04	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		1.9e-01	PCI/GDRY	02/04/2005
Bi212	1.31e+00	1.9e-01		PCI/GDRY	02/04/2005
Bi214	9.57e-01	6.5e-02		PCI/GDRY	02/04/2005
Co60	ND		3.1e-02	PCI/GDRY	02/04/2005
Cs137	ND		2.9e-02	PCI/GDRY	02/04/2005
I131	ND		6.7e-02	PCI/GDRY	02/04/2005
K40	2.50e+01	1.5e+00		PCI/GDRY	02/04/2005
Pb210	ND		4.2e+00	PCI/GDRY	02/04/2005
Pb212	1.21e+00	7.7e-02		PCI/GDRY	02/04/2005
Pb214	1.04e+00	6.7e-02		PCI/GDRY	02/04/2005
Ra223	3.43e-01	5.9e-02		PCI/GDRY	02/04/2005
Ra224	1.01e+00	2.9e-01		PCI/GDRY	02/04/2005
Ra226	1.98e+00	3.1e-01		PCI/GDRY	02/04/2005
Ra228	1.19e+00	8.4e-02		PCI/GDRY	02/04/2005
Tl208	3.66e-01	2.8e-02		PCI/GDRY	02/04/2005
U235	1.22e-01	1.9e-02		PCI/GDRY	02/04/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00718T	QC batch #:	0003583Q
Matrix:	SOIL	Prep batch #:	0009436Q
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	8.890e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	94.71 %	Analyst:	N/A
Ash/dry weight:	98.80 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/17/2005 12:41	1000.0	GE06	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		2.3e-01	PCI/GDRY	02/04/2005
Bi212	1.57e+00	3.1e-01		PCI/GDRY	02/04/2005
Bi214	1.04e+00	8.4e-02		PCI/GDRY	02/04/2005
Co60	ND		4.8e-02	PCI/GDRY	02/04/2005
Cs137	ND		4.0e-02	PCI/GDRY	02/04/2005
I131	ND		9.2e-02	PCI/GDRY	02/04/2005
K40	2.79e+01	1.7e+00		PCI/GDRY	02/04/2005
Pb210	ND		3.5e+00	PCI/GDRY	02/04/2005
Pb212	1.27e+00	8.8e-02		PCI/GDRY	02/04/2005
Pb214	1.16e+00	8.5e-02		PCI/GDRY	02/04/2005
Ra223	3.83e-01	9.8e-02		PCI/GDRY	02/04/2005
Ra224	1.03e+00	4.2e-01		PCI/GDRY	02/04/2005
Ra226	2.30e+00	4.3e-01		PCI/GDRY	02/04/2005
Ra228	1.41e+00	1.1e-01		PCI/GDRY	02/04/2005
Th234	5.73e-01	3.8e-01		PCI/GDRY	02/04/2005
Tl208	3.63e-01	3.5e-02		PCI/GDRY	02/04/2005
U235	1.44e-01	2.7e-02		PCI/GDRY	02/04/2005

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QC BATCH SUMMARY

QC batch #: 0003583Q
 Preparation procedure: N/A
 Analysis procedure: NAREL GAM-01

NAREL Sample #	QC Type	Yield (%)	\forall 2 Φ Uncertainty (%)	Analyst
A5.00538Q		N/A		N/A
A5.00539R		N/A		N/A
A5.00540J		N/A		N/A
A5.00541K		N/A		N/A
A5.00542L		N/A		N/A
A5.00543M		N/A		N/A
A5.00544N		N/A		N/A
A5.00544N	DUP	N/A		N/A
A5.00706N		N/A		N/A
A5.00707P		N/A		N/A
A5.00708Q		N/A		N/A
A5.00709R		N/A		N/A
A5.00710J		N/A		N/A
A5.00711K		N/A		N/A
A5.00712L		N/A		N/A
A5.00713M		N/A		N/A
A5.00714N		N/A		N/A
A5.00715P		N/A		N/A
A5.00716Q		N/A		N/A
A5.00717R		N/A		N/A
A5.00718T		N/A		N/A

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

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PREPARATION BATCH SUMMARY

SAMPLES ANALYZED

NAREL Sample #	QC Type	Aliquot Size	Completion Date	Prep Batch
A5.00538Q	DUP	8.94e+01 GDRY	02/12/2005	0009416L
A5.00539R		9.71e+01 GDRY	02/12/2005	0009416L
A5.00540J		9.21e+01 GDRY	02/12/2005	0009416L
A5.00541K		2.40e+02 GDRY	02/12/2005	0009416L
A5.00542L		9.87e+01 GDRY	02/12/2005	0009416L
A5.00543M		9.05e+01 GDRY	02/12/2005	0009416L
A5.00544N		3.67e+02 GDRY	02/12/2005	0009416L
A5.00544N		3.67e+02 GDRY	02/15/2005	0009416L
A5.00706N		9.43e+01 GDRY	02/16/2005	0009425M
A5.00707P		9.43e+01 GDRY	02/16/2005	0009425M
A5.00708Q		2.61e+02 GDRY	02/16/2005	0009425M
A5.00709R		9.64e+01 GDRY	02/16/2005	0009425M
A5.00710J		8.64e+01 GDRY	02/16/2005	0009425M
A5.00711K		9.04e+01 GDRY	02/16/2005	0009425M
A5.00712L		8.45e+01 GDRY	02/16/2005	0009425M
A5.00713M		9.20e+01 GDRY	02/16/2005	0009425M
A5.00714N		9.41e+01 GDRY	02/16/2005	0009425M
A5.00715P		9.43e+01 GDRY	02/16/2005	0009425M
A5.00716Q		8.30e+01 GDRY	02/18/2005	0009436Q
A5.00717R		2.22e+02 GDRY	02/18/2005	0009436Q
A5.00718T	8.89e+01 GDRY	02/18/2005	0009436Q	

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DETECTOR REPORT

The following were used for samples in the SDG

GE02	02/11/2005	15:40	00484247K	A5.00538Q
GE02	02/15/2005	16:52	00484611K	A5.00706N
GE02	02/17/2005	12:40	00484641R	A5.00716Q
GE04	02/15/2005	16:52	00484617R	A5.00708Q
GE04	02/17/2005	12:40	00484644V	A5.00717R
GE06	02/11/2005	15:39	00484253H	A5.00539R
GE06	02/15/2005	16:52	00484614N	A5.00707P
GE06	02/17/2005	12:41	00484647Y	A5.00718T
GE07	02/11/2005	15:39	00484302Z	A5.00540J
GE07	02/15/2005	16:52	00484620L	A5.00709R
GE08	02/11/2005	15:40	00484308F	A5.00541K
GE08	02/15/2005	16:53	00484623P	A5.00710J
GE09	02/11/2005	15:40	00484314D	A5.00542L
GE09	02/15/2005	16:53	00484626T	A5.00711K
GE10	02/11/2005	15:40	00484320B	A5.00543M
GE10	02/15/2005	16:53	00484629W	A5.00712L
GE11	02/11/2005	15:40	00484326H	A5.00544N
GE13	02/15/2005	16:47	00484632Q	A5.00713M
GE13	02/16/2005	01:09	00484635U	A5.00714N
GE16	02/15/2005	16:55	00484638X	A5.00715P
GE17	02/14/2005	13:19	00484327J	A5.00544N

The following were used for other samples in the QC batches

None found

Data Package Checklist

Project: ANACONDA COPPER MINE SDG Number: #0500007

Date due: _____ Analysis: NAREL GAM-01

Type of Package: 9 Data Summary Package 9 Complete Package

Y N N/A

- 9 9 9 All samples in the SDG are reported
- 9 9 9 All results are the ones intended
- 9 9 9 Printed results match the raw data
- 9 9 9 Error report forms are attached
- 9 9 9 SDG Form is attached
- 9 9 9 Analyst's checklist is attached
- 9 9 9 Original prep batch forms are attached
- 9 9 9 All supporting data sheets are attached
- 9 9 9 All raw data sheets appear to be correct
- 9 9 9 All handwritten notes are initialed and dated
- 9 9 9 Package is arranged correctly
- 9 9 9 Package appears to be complete

Were holding times met? 9 Yes 9 No 9 N/A

Were all QC results acceptable? 9 Yes 9 No

Are there any exceptions to report? 9 Yes 9 No

QAO Review

Y N N/A

- 9 9 9 All QC failures are noted
 - 9 9 9 Raw data look reasonable
 - 9 9 9 All exceptions have been noted
- Note: If changes to the case narrative are suggested, please provide the necessary language.

Comments: _____

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES**

REPORT OF SAMPLE DELIVERY GROUP #0500007

Project: ANACONDA COPPER MINE
Analysis Procedure: Gamma Spectrometry
Date Reported: 03/29/2005

SAMPLES

NAREL Sample #	Client Sample ID	Type	Matrix	Date Collected	Date Received
A5.00255G	P17B	SAM	SOIL	01/11/2005	01/14/2005
A5.00256H	P17C	SAM	SOIL	01/11/2005	01/14/2005
A5.00257J	P17D	SAM	SOIL	01/11/2005	01/14/2005
A5.00258K	P17E	SAM	SOIL	01/11/2005	01/14/2005
A5.00522G	K9A	SAM	SOIL	01/24/2005	01/28/2005
A5.00523H	K9B	SAM	SOIL	01/24/2005	01/28/2005
A5.00524J	K9C	SAM	SOIL	01/24/2005	01/28/2005
A5.00525K	PA-HH10-5	SAM	SOIL	01/26/2005	01/28/2005
A5.00526L	PA-HH10-10	SAM	SOIL	01/26/2005	01/28/2005
A5.00527M	PA-HH10-15	SAM	SOIL	01/26/2005	01/28/2005
A5.00528N	PA-HH10-20	SAM	SOIL	01/26/2005	01/28/2005
A5.00529P	PA-HH11-5	SAM	SOIL	01/26/2005	01/28/2005
A5.00530G	PA-HH11-10	SAM	SOIL	01/26/2005	01/28/2005
A5.00531H	PA-HH11-5X	SAM	SOIL	01/26/2005	01/28/2005
A5.00532J	PA-HH11-15	SAM	SOIL	01/26/2005	01/28/2005
A5.00533K	PA-HH11-20	SAM	SOIL	01/26/2005	01/28/2005
A5.00534L	PA-HH11-25	SAM	SOIL	01/26/2005	01/28/2005
A5.00535M	PA-HH8-5	SAM	SOIL	01/26/2005	01/28/2005
A5.00536N	PA-HH8-10	SAM	SOIL	01/26/2005	01/28/2005
A5.00537P	PA-HH8-15	SAM	SOIL	01/26/2005	01/28/2005

EXCEPTIONS

1. Packaging and Shipping - No problems were observed.
2. Documentation - No problems were observed.
3. Sample Preparation - No problems were encountered.
4. Analysis - No problems were encountered.
5. Holding Times - All holding times were met.

QUALITY CONTROL

1. QC samples - All QC analysis results met NAREL acceptance criteria.
2. Instruments - Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Chief of the Monitoring and Analytical Services Branch and the NAREL Quality Assurance Coordinator, or their designees, as verified by the following signatures.

Quality Assurance Coordinator

Chief, Monitoring and Analytical Services Branch

GENERAL INFORMATION

SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Reagent blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A reagent blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "Z scores." A Z score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The Z score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The Z score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the Z score is computed.

Each standard uncertainty used to compute a Z score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

GENERAL INFORMATION (CONTINUED)

GAMMA ANALYSIS

The reporting format lists the gamma emitters in alphabetical order. The activity and 2-sigma uncertainty for radionuclides measured by gamma spectroscopy are reported only if the nuclide is detected. Nuclides that are not detected do not appear in the report, with the exception of Ba-140, Co-60, Cs-137, I-131, K-40, Ra-226 and Ra-228. If one of these seven nuclides is undetected, NAREL reports it as "Not Detected" or "ND", and provides a sample-specific estimate of the MDC.

Due to potential spectral interferences and other possible problems associated with the determination of the activity of certain radionuclides, the activities for Bi-214, Pb-214, Th-234, Pa-234m, Ra-226, Th-231, and U-235 are subject to greater possible uncertainty than other commonly reported radionuclides. It should be noted that this potential uncertainty is not included in the two-sigma counting uncertainty which is reported with each activity. Although in this report we do provide the calculated activities for these radionuclides, we recommend that the results be used only as a qualitative means of indicating the presence of these radionuclides and not as a quantitative measure of their concentration. The results for these nuclides are not used in the evaluation of quality control samples. Furthermore, because of mutual interference between Ra-226 and U-235, NAREL's gamma analysis software tends to overestimate the amounts of these nuclides whenever both are present in a sample. Lower estimates for Ra-226 activities can be obtained from the reported activities of its decay products, Pb-214 and Bi-214, which are likely to be somewhat less than the Ra-226 activity because of the potential escape of radon gas.

NAREL's gamma spectroscopy software corrects activities and MDCs for decay between collection and analysis, but only up to a limit of ten half-lives. So, if the decay time for a sample is more than ten half-lives of a radionuclide, that nuclide will almost always be undetected and the reported MDC will be meaningless. This is usually a problem only for short-lived radionuclides, such as I-131 and Ba-140, when there is a long delay between collection and analysis.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0500007**

ANALYSIS SUMMARY

Analysis Procedure: NAREL GAM-01
Title: Gamma Spectrometry

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Prep Batch #	QC Batch #
A5.00255G	DUP	N/A	02/01/2005	0009380R	0003582P
A5.00255G		N/A	02/02/2005	0009380R	0003582P
A5.00256H		N/A	02/01/2005	0009380R	0003582P
A5.00257J		N/A	02/01/2005	0009380R	0003582P
A5.00258K		N/A	02/01/2005	0009380R	0003582P
A5.00522G		N/A	02/09/2005	0009405H	0003582P
A5.00523H		N/A	02/09/2005	0009405H	0003582P
A5.00524J		N/A	02/09/2005	0009405H	0003582P
A5.00525K		N/A	02/09/2005	0009405H	0003582P
A5.00526L		N/A	02/09/2005	0009405H	0003582P
A5.00527M		N/A	02/09/2005	0009405H	0003582P
A5.00528N		N/A	02/09/2005	0009405H	0003582P
A5.00529P		N/A	02/09/2005	0009405H	0003582P
A5.00530G		N/A	02/08/2005	0009405H	0003582P
A5.00531H		N/A	02/09/2005	0009405H	0003582P
A5.00532J		N/A	02/10/2005	0009410E	0003582P
A5.00533K		N/A	02/10/2005	0009410E	0003582P
A5.00534L		N/A	02/10/2005	0009410E	0003582P
A5.00535M		N/A	02/10/2005	0009410E	0003582P
A5.00536N		N/A	02/10/2005	0009410E	0003582P
A5.00537P	N/A	02/10/2005	0009410E	0003582P	

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0500007**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00255G	QC batch #:	0003582P
Matrix:	SOIL	Prep batch #:	0009380R
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.130e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	97.13 %	Analyst:	DPS
Ash/dry weight:	99.20 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
01/31/2005 10:57	1000.0	GE02	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		4.9e-01	PCI/GDRY	01/11/2005
Bi212	1.17e+00	4.2e-01		PCI/GDRY	01/11/2005
Bi214	9.98e-01	9.2e-02		PCI/GDRY	01/11/2005
Co60	ND		7.2e-02	PCI/GDRY	01/11/2005
Cs137	ND		5.9e-02	PCI/GDRY	01/11/2005
I131	ND		2.2e-01	PCI/GDRY	01/11/2005
K40	2.56e+01	1.8e+00		PCI/GDRY	01/11/2005
Pb210	ND		1.9e+00	PCI/GDRY	01/11/2005
Pb212	1.15e+00	8.6e-02		PCI/GDRY	01/11/2005
Pb214	1.12e+00	8.7e-02		PCI/GDRY	01/11/2005
Ra223	3.23e-01	1.3e-01		PCI/GDRY	01/11/2005
Ra224	1.11e+00	4.9e-01		PCI/GDRY	01/11/2005
Ra226	2.49e+00	4.6e-01		PCI/GDRY	01/11/2005
Ra228	1.17e+00	1.2e-01		PCI/GDRY	01/11/2005
Tl208	3.61e-01	4.3e-02		PCI/GDRY	01/11/2005
U235	1.56e-01	2.9e-02		PCI/GDRY	01/11/2005

* An asterisk indicates a result whose value may be significantly over or underestimated.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0500007**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00255G	QC batch #:	0003582P
Matrix:	SOIL	Prep batch #:	0009380R
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.130e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	97.13 %	Analyst:	DPS
Ash/dry weight:	99.20 %	QC type:	DUP

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/01/2005 15:53	500.0	GE13	ZS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		4.2e-01	PCI/GDRY	01/11/2005
Bi212	9.47e-01	3.3e-01		PCI/GDRY	01/11/2005
Bi214	1.02e+00	8.3e-02		PCI/GDRY	01/11/2005
Co60	ND		4.9e-02	PCI/GDRY	01/11/2005
Cs137	ND		4.6e-02	PCI/GDRY	01/11/2005
I131	ND		2.2e-01	PCI/GDRY	01/11/2005
K40	2.59e+01	1.6e+00		PCI/GDRY	01/11/2005
Pb210	ND		4.7e+00	PCI/GDRY	01/11/2005
Pb212	1.20e+00	9.0e-02		PCI/GDRY	01/11/2005
Pb214	1.12e+00	8.6e-02		PCI/GDRY	01/11/2005
Ra223	4.07e-01	1.1e-01		PCI/GDRY	01/11/2005
Ra224	6.68e-01	5.2e-01		PCI/GDRY	01/11/2005
Ra226	2.19e+00	5.3e-01		PCI/GDRY	01/11/2005
Ra228	1.21e+00	1.1e-01		PCI/GDRY	01/11/2005
Tl208	3.55e-01	3.7e-02		PCI/GDRY	01/11/2005
U235	1.38e-01	3.4e-02		PCI/GDRY	01/11/2005

* An asterisk indicates a result whose value may be significantly over or underestimated.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0500007**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00256H	QC batch #:	0003582P
Matrix:	SOIL	Prep batch #:	0009380R
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.100e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	96.38 %	Analyst:	DPS
Ash/dry weight:	99.60 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
01/31/2005 10:58	1000.0	GE06	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		3.2e-01	PCI/GDRY	01/11/2005
Bi212	1.17e+00	2.5e-01		PCI/GDRY	01/11/2005
Bi214	1.06e+00	7.9e-02		PCI/GDRY	01/11/2005
Co60	ND		4.2e-02	PCI/GDRY	01/11/2005
Cs137	ND		3.7e-02	PCI/GDRY	01/11/2005
I131	ND		1.5e-01	PCI/GDRY	01/11/2005
K40	2.59e+01	1.6e+00		PCI/GDRY	01/11/2005
Pb210	1.26e+00	2.0e+00		PCI/GDRY	01/11/2005
Pb212	1.13e+00	7.7e-02		PCI/GDRY	01/11/2005
Pb214	1.19e+00	8.1e-02		PCI/GDRY	01/11/2005
Ra223	3.11e-01	7.1e-02		PCI/GDRY	01/11/2005
Ra224	9.24e-01	3.7e-01		PCI/GDRY	01/11/2005
Ra226	1.91e+00	4.3e-01		PCI/GDRY	01/11/2005
Ra228	1.25e+00	9.8e-02		PCI/GDRY	01/11/2005
Th234	7.00e-01	3.1e-01		PCI/GDRY	01/11/2005
Tl208	3.69e-01	3.2e-02		PCI/GDRY	01/11/2005
U235	1.16e-01	2.6e-02		PCI/GDRY	01/11/2005

* An asterisk indicates a result whose value may be significantly over or underestimated.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0500007**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00257J	QC batch #:	0003582P
Matrix:	SOIL	Prep batch #:	0009380R
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.100e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	96.93 %	Analyst:	DPS
Ash/dry weight:	99.20 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
01/31/2005 10:58	1000.0	GE07	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		3.1e-01	PCI/GDRY	01/11/2005
Bi212	1.43e+00	2.6e-01		PCI/GDRY	01/11/2005
Bi214	1.01e+00	8.0e-02		PCI/GDRY	01/11/2005
Co60	ND		4.6e-02	PCI/GDRY	01/11/2005
Cs137	ND		3.8e-02	PCI/GDRY	01/11/2005
I131	ND		1.5e-01	PCI/GDRY	01/11/2005
K40	2.64e+01	1.6e+00		PCI/GDRY	01/11/2005
Pb210	ND		4.5e+00	PCI/GDRY	01/11/2005
Pb212	1.16e+00	8.3e-02		PCI/GDRY	01/11/2005
Pb214	1.15e+00	8.2e-02		PCI/GDRY	01/11/2005
Ra223	3.65e-01	9.4e-02		PCI/GDRY	01/11/2005
Ra224	1.09e+00	5.3e-01		PCI/GDRY	01/11/2005
Ra226	3.19e+00	4.3e-01		PCI/GDRY	01/11/2005
Ra228	1.12e+00	1.0e-01		PCI/GDRY	01/11/2005
Tl208	3.58e-01	3.5e-02		PCI/GDRY	01/11/2005
U235	2.00e-01	2.7e-02		PCI/GDRY	01/11/2005

* An asterisk indicates a result whose value may be significantly over or underestimated.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0500007**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00258K	QC batch #:	0003582P
Matrix:	SOIL	Prep batch #:	0009380R
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.040e+02 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	96.41 %	Analyst:	DPS
Ash/dry weight:	99.20 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
01/31/2005 10:58	1000.0	GE08	DPS

ANALYTICAL RESULTS

Analyte	Activity	$\nabla 2\Phi$ Uncertainty	MDC	Unit	Date
Ba140	ND		4.0e-01	PCI/GDRY	01/11/2005
Bi212	1.31e+00	3.6e-01		PCI/GDRY	01/11/2005
Bi214	1.06e+00	9.1e-02		PCI/GDRY	01/11/2005
Co60	ND		6.3e-02	PCI/GDRY	01/11/2005
Cs137	ND		5.3e-02	PCI/GDRY	01/11/2005
I131	ND		1.7e-01	PCI/GDRY	01/11/2005
K40	2.50e+01	1.6e+00		PCI/GDRY	01/11/2005
Pb210	1.09e+00	6.5e-01		PCI/GDRY	01/11/2005
Pb212	1.24e+00	9.2e-02		PCI/GDRY	01/11/2005
Pb214	1.18e+00	9.2e-02		PCI/GDRY	01/11/2005
Ra223	4.97e-01	1.2e-01		PCI/GDRY	01/11/2005
Ra224	1.13e+00	5.0e-01		PCI/GDRY	01/11/2005
Ra226	2.19e+00	5.8e-01		PCI/GDRY	01/11/2005
Ra228	1.22e+00	1.2e-01		PCI/GDRY	01/11/2005
Th234	9.33e-01	2.3e-01		PCI/GDRY	01/11/2005
Tl208	3.67e-01	4.1e-02		PCI/GDRY	01/11/2005
U235	1.38e-01	3.7e-02		PCI/GDRY	01/11/2005

* An asterisk indicates a result whose value may be significantly over or underestimated.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0500007**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00522G	QC batch #:	0003582P
Matrix:	SOIL	Prep batch #:	0009405H
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	7.850e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	93.90 %	Analyst:	DPS
Ash/dry weight:	99.20 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/08/2005 14:38	1000.0	GE02	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		4.4e-01	PCI/GDRY	01/24/2005
Bi212	1.02e+00	4.8e-01		PCI/GDRY	01/24/2005
Bi214	1.14e+00	1.2e-01		PCI/GDRY	01/24/2005
Co60	ND		8.9e-02	PCI/GDRY	01/24/2005
Cs137	ND		6.8e-02	PCI/GDRY	01/24/2005
I131	ND		1.7e-01	PCI/GDRY	01/24/2005
K40	2.72e+01	2.0e+00		PCI/GDRY	01/24/2005
Pb210	ND		2.8e+00	PCI/GDRY	01/24/2005
Pb212	1.16e+00	9.7e-02		PCI/GDRY	01/24/2005
Pb214	1.27e+00	1.1e-01		PCI/GDRY	01/24/2005
Ra223	3.14e-01	1.2e-01		PCI/GDRY	01/24/2005
Ra224	8.25e-01	6.3e-01		PCI/GDRY	01/24/2005
Ra226	2.48e+00	6.0e-01		PCI/GDRY	01/24/2005
Ra228	1.23e+00	1.5e-01		PCI/GDRY	01/24/2005
Th234	7.48e-01	3.8e-01		PCI/GDRY	01/24/2005
Tl208	3.56e-01	5.5e-02		PCI/GDRY	01/24/2005
U235	1.56e-01	3.8e-02		PCI/GDRY	01/24/2005

* An asterisk indicates a result whose value may be significantly over or underestimated.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0500007**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00523H	QC batch #:	0003582P
Matrix:	SOIL	Prep batch #:	0009405H
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	9.290e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	94.21 %	Analyst:	DPS
Ash/dry weight:	99.60 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/08/2005 14:40	1000.0	GE06	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		2.5e-01	PCI/GDRY	01/24/2005
Bi212	1.30e+00	2.6e-01		PCI/GDRY	01/24/2005
Bi214	1.01e+00	8.1e-02		PCI/GDRY	01/24/2005
Co60	ND		4.9e-02	PCI/GDRY	01/24/2005
Cs137	ND		3.7e-02	PCI/GDRY	01/24/2005
I131	ND		9.9e-02	PCI/GDRY	01/24/2005
K40	2.57e+01	1.6e+00		PCI/GDRY	01/24/2005
Pb210	ND		3.4e+00	PCI/GDRY	01/24/2005
Pb212	1.20e+00	8.4e-02		PCI/GDRY	01/24/2005
Pb214	1.11e+00	8.1e-02		PCI/GDRY	01/24/2005
Ra223	2.88e-01	8.2e-02		PCI/GDRY	01/24/2005
Ra224	9.05e-01	4.1e-01		PCI/GDRY	01/24/2005
Ra226	2.56e+00	4.4e-01		PCI/GDRY	01/24/2005
Ra228	1.26e+00	1.0e-01		PCI/GDRY	01/24/2005
Tl208	3.79e-01	3.5e-02		PCI/GDRY	01/24/2005
U235	1.61e-01	2.8e-02		PCI/GDRY	01/24/2005

* An asterisk indicates a result whose value may be significantly over or underestimated.

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00524J	QC batch #:	0003582P
Matrix:	SOIL	Prep batch #:	0009405H
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	9.770e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	91.16 %	Analyst:	DPS
Ash/dry weight:	99.20 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/08/2005 14:40	1000.0	GE07	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		2.7e-01	PCI/GDRY	01/24/2005
Bi212	1.44e+00	2.8e-01		PCI/GDRY	01/24/2005
Bi214	9.82e-01	8.2e-02		PCI/GDRY	01/24/2005
Co60	ND		4.6e-02	PCI/GDRY	01/24/2005
Cs137	ND		3.9e-02	PCI/GDRY	01/24/2005
I131	ND		1.1e-01	PCI/GDRY	01/24/2005
K40	2.47e+01	1.6e+00		PCI/GDRY	01/24/2005
Pb210	ND		4.7e+00	PCI/GDRY	01/24/2005
Pb212	1.11e+00	8.3e-02		PCI/GDRY	01/24/2005
Pb214	1.07e+00	8.1e-02		PCI/GDRY	01/24/2005
Ra223	3.44e-01	8.6e-02		PCI/GDRY	01/24/2005
Ra224	9.15e-01	5.5e-01		PCI/GDRY	01/24/2005
Ra226	2.80e+00	4.3e-01		PCI/GDRY	01/24/2005
Ra228	1.14e+00	1.1e-01		PCI/GDRY	01/24/2005
Th234	8.56e-01	4.1e-01		PCI/GDRY	01/24/2005
Tl208	3.72e-01	3.9e-02		PCI/GDRY	01/24/2005
U235	1.76e-01	2.7e-02		PCI/GDRY	01/24/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00525K	QC batch #:	0003582P
Matrix:	SOIL	Prep batch #:	0009405H
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	9.520e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	95.70 %	Analyst:	DPS
Ash/dry weight:	99.20 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/08/2005 14:41	1000.0	GE08	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		3.2e-01	PCI/GDRY	01/26/2005
Bi212	1.17e+00	3.6e-01		PCI/GDRY	01/26/2005
Bi214	1.12e+00	9.8e-02		PCI/GDRY	01/26/2005
Co60	ND		6.6e-02	PCI/GDRY	01/26/2005
Cs137	ND		5.4e-02	PCI/GDRY	01/26/2005
I131	ND		1.2e-01	PCI/GDRY	01/26/2005
K40	2.50e+01	1.6e+00		PCI/GDRY	01/26/2005
Pb210	1.02e+00	7.0e-01		PCI/GDRY	01/26/2005
Pb212	1.23e+00	9.5e-02		PCI/GDRY	01/26/2005
Pb214	1.21e+00	9.7e-02		PCI/GDRY	01/26/2005
Ra223	4.17e-01	1.3e-01		PCI/GDRY	01/26/2005
Ra224	1.59e+00	5.6e-01		PCI/GDRY	01/26/2005
Ra226	2.34e+00	6.2e-01		PCI/GDRY	01/26/2005
Ra228	1.14e+00	1.3e-01		PCI/GDRY	01/26/2005
Th234	8.40e-01	2.4e-01		PCI/GDRY	01/26/2005
Tl208	3.74e-01	4.5e-02		PCI/GDRY	01/26/2005
U235	1.47e-01	3.9e-02		PCI/GDRY	01/26/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00526L	QC batch #:	0003582P
Matrix:	SOIL	Prep batch #:	0009405H
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	8.220e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	94.19 %	Analyst:	DPS
Ash/dry weight:	99.20 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/08/2005 16:58	1000.0	GE09	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		2.9e-01	PCI/GDRY	01/26/2005
Bi212	1.86e+00	3.9e-01		PCI/GDRY	01/26/2005
Bi214	1.28e+00	1.0e-01		PCI/GDRY	01/26/2005
Co60	ND		5.2e-02	PCI/GDRY	01/26/2005
Cs137	ND		5.0e-02	PCI/GDRY	01/26/2005
I131	ND		1.3e-01	PCI/GDRY	01/26/2005
K40	2.73e+01	1.7e+00		PCI/GDRY	01/26/2005
Pb210	ND		6.1e+00	PCI/GDRY	01/26/2005
Pb212	1.46e+00	1.0e-01		PCI/GDRY	01/26/2005
Pb214	1.46e+00	1.0e-01		PCI/GDRY	01/26/2005
Ra223	4.04e-01	1.0e-01		PCI/GDRY	01/26/2005
Ra224	9.07e-01	6.7e-01		PCI/GDRY	01/26/2005
Ra226	3.22e+00	5.7e-01		PCI/GDRY	01/26/2005
Ra228	1.49e+00	1.3e-01		PCI/GDRY	01/26/2005
Th234	1.15e+00	4.5e-01		PCI/GDRY	01/26/2005
Tl208	4.38e-01	4.3e-02		PCI/GDRY	01/26/2005
U235	1.98e-01	3.5e-02		PCI/GDRY	01/26/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00527M	QC batch #:	0003582P
Matrix:	SOIL	Prep batch #:	0009405H
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	9.330e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	95.55 %	Analyst:	DPS
Ash/dry weight:	99.20 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/08/2005 16:58	1000.0	GE10	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		2.3e-01	PCI/GDRY	01/26/2005
Bi212	1.15e+00	2.9e-01		PCI/GDRY	01/26/2005
Bi214	1.15e+00	9.1e-02		PCI/GDRY	01/26/2005
Co60	ND		6.6e-02	PCI/GDRY	01/26/2005
Cs137	ND		4.4e-02	PCI/GDRY	01/26/2005
I131	ND		9.2e-02	PCI/GDRY	01/26/2005
K40	2.58e+01	1.6e+00		PCI/GDRY	01/26/2005
Pb210	ND		3.5e+00	PCI/GDRY	01/26/2005
Pb212	1.26e+00	8.9e-02		PCI/GDRY	01/26/2005
Pb214	1.24e+00	8.8e-02		PCI/GDRY	01/26/2005
Ra223	3.85e-01	1.0e-01		PCI/GDRY	01/26/2005
Ra224	9.81e-01	5.1e-01		PCI/GDRY	01/26/2005
Ra226	2.25e+00	4.4e-01		PCI/GDRY	01/26/2005
Ra228	1.27e+00	1.2e-01		PCI/GDRY	01/26/2005
Th234	5.26e-01	3.5e-01		PCI/GDRY	01/26/2005
Tl208	3.77e-01	3.7e-02		PCI/GDRY	01/26/2005
U235	1.41e-01	2.8e-02		PCI/GDRY	01/26/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00528N	QC batch #:	0003582P
Matrix:	SOIL	Prep batch #:	0009405H
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	9.310e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	96.48 %	Analyst:	DPS
Ash/dry weight:	99.60 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/08/2005 14:45	1000.0	GE16	DPS

ANALYTICAL RESULTS

Analyte	Activity	$\nabla 2\Phi$ Uncertainty	MDC	Unit	Date
Ba140	ND		2.2e-01	PCI/GDRY	01/26/2005
Bi212	1.32e+00	2.3e-01		PCI/GDRY	01/26/2005
Bi214	1.13e+00	7.7e-02		PCI/GDRY	01/26/2005
Co60	ND		4.3e-02	PCI/GDRY	01/26/2005
Cs137	ND		3.6e-02	PCI/GDRY	01/26/2005
I131	ND		7.9e-02	PCI/GDRY	01/26/2005
K40	2.80e+01	1.7e+00		PCI/GDRY	01/26/2005
Pb210	1.39e+00	4.0e-01		PCI/GDRY	01/26/2005
Pb212	1.38e+00	9.0e-02		PCI/GDRY	01/26/2005
Pb214	1.30e+00	8.4e-02		PCI/GDRY	01/26/2005
Ra223	3.92e-01	7.1e-02		PCI/GDRY	01/26/2005
Ra224	1.24e+00	3.9e-01		PCI/GDRY	01/26/2005
Ra226	2.62e+00	3.5e-01		PCI/GDRY	01/26/2005
Ra228	1.48e+00	1.0e-01		PCI/GDRY	01/26/2005
Th234	8.86e-01	1.7e-01		PCI/GDRY	01/26/2005
Tl208	4.25e-01	3.1e-02		PCI/GDRY	01/26/2005
U235	1.63e-01	2.2e-02		PCI/GDRY	01/26/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00529P	QC batch #:	0003582P
Matrix:	SOIL	Prep batch #:	0009405H
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	9.010e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	96.07 %	Analyst:	DPS
Ash/dry weight:	99.20 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/08/2005 14:45	1000.0	GE17	DPS

ANALYTICAL RESULTS

Analyte	Activity	$\nabla 2\Phi$ Uncertainty	MDC	Unit	Date
Ba140	ND		2.6e-01	PCI/GDRY	01/26/2005
Bi212	1.40e+00	3.4e-01		PCI/GDRY	01/26/2005
Bi214	1.07e+00	8.1e-02		PCI/GDRY	01/26/2005
Co60	ND		5.6e-02	PCI/GDRY	01/26/2005
Cs137	ND		4.4e-02	PCI/GDRY	01/26/2005
I131	ND		8.3e-02	PCI/GDRY	01/26/2005
K40	2.69e+01	1.6e+00		PCI/GDRY	01/26/2005
Pb210	1.27e+00	2.9e-01		PCI/GDRY	01/26/2005
Pb212	1.22e+00	8.4e-02		PCI/GDRY	01/26/2005
Pb214	1.16e+00	8.1e-02		PCI/GDRY	01/26/2005
Ra223	3.36e-01	7.6e-02		PCI/GDRY	01/26/2005
Ra224	1.21e+00	4.0e-01		PCI/GDRY	01/26/2005
Ra226	2.37e+00	3.7e-01		PCI/GDRY	01/26/2005
Ra228	1.27e+00	1.2e-01		PCI/GDRY	01/26/2005
Th234	9.48e-01	1.7e-01		PCI/GDRY	01/26/2005
Tl208	3.79e-01	3.8e-02		PCI/GDRY	01/26/2005
U235	1.29e-01	2.1e-02		PCI/GDRY	01/26/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00530G	QC batch #:	0003582P
Matrix:	SOIL	Prep batch #:	0009405H
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	8.830e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	96.84 %	Analyst:	DPS
Ash/dry weight:	99.20 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/08/2005 14:38	500.0	GE13	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		3.1e-01	PCI/GDRY	01/26/2005
Bi212	1.27e+00	3.8e-01		PCI/GDRY	01/26/2005
Bi214	1.09e+00	9.8e-02		PCI/GDRY	01/26/2005
Co60	ND		5.7e-02	PCI/GDRY	01/26/2005
Cs137	ND		5.3e-02	PCI/GDRY	01/26/2005
I131	ND		1.4e-01	PCI/GDRY	01/26/2005
K40	2.47e+01	1.6e+00		PCI/GDRY	01/26/2005
Pb210	ND		4.9e+00	PCI/GDRY	01/26/2005
Pb212	1.33e+00	1.0e-01		PCI/GDRY	01/26/2005
Pb214	1.25e+00	9.9e-02		PCI/GDRY	01/26/2005
Ra223	3.88e-01	1.4e-01		PCI/GDRY	01/26/2005
Ra224	7.46e-01	6.4e-01		PCI/GDRY	01/26/2005
Ra226	2.09e+00	6.6e-01		PCI/GDRY	01/26/2005
Ra228	1.25e+00	1.2e-01		PCI/GDRY	01/26/2005
Tl208	3.57e-01	4.2e-02		PCI/GDRY	01/26/2005
U235	1.31e-01	4.1e-02		PCI/GDRY	01/26/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00531H	QC batch #:	0003582P
Matrix:	SOIL	Prep batch #:	0009405H
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	9.050e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	96.25 %	Analyst:	DPS
Ash/dry weight:	99.60 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/08/2005 23:01	500.0	GE13	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		3.3e-01	PCI/GDRY	01/26/2005
Bi212	1.46e+00	4.0e-01		PCI/GDRY	01/26/2005
Bi214	1.01e+00	9.2e-02		PCI/GDRY	01/26/2005
Co60	ND		4.9e-02	PCI/GDRY	01/26/2005
Cs137	ND		5.5e-02	PCI/GDRY	01/26/2005
I131	ND		1.4e-01	PCI/GDRY	01/26/2005
K40	2.70e+01	1.7e+00		PCI/GDRY	01/26/2005
Pb210	ND		4.9e+00	PCI/GDRY	01/26/2005
Pb212	1.23e+00	9.8e-02		PCI/GDRY	01/26/2005
Pb214	1.24e+00	9.8e-02		PCI/GDRY	01/26/2005
Ra223	4.14e-01	1.2e-01		PCI/GDRY	01/26/2005
Ra224	1.09e+00	6.9e-01		PCI/GDRY	01/26/2005
Ra226	2.52e+00	5.9e-01		PCI/GDRY	01/26/2005
Ra228	1.23e+00	1.2e-01		PCI/GDRY	01/26/2005
Tl208	3.79e-01	4.2e-02		PCI/GDRY	01/26/2005
U235	1.58e-01	3.7e-02		PCI/GDRY	01/26/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00532J	QC batch #:	0003582P
Matrix:	SOIL	Prep batch #:	0009410E
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	8.220e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	96.48 %	Analyst:	DPS
Ash/dry weight:	98.40 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/09/2005 13:01	1000.0	GE06	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		3.0e-01	PCI/GDRY	01/26/2005
Bi212	1.58e+00	3.7e-01		PCI/GDRY	01/26/2005
Bi214	1.38e+00	1.0e-01		PCI/GDRY	01/26/2005
Co60	ND		5.6e-02	PCI/GDRY	01/26/2005
Cs137	ND		4.6e-02	PCI/GDRY	01/26/2005
I131	ND		1.1e-01	PCI/GDRY	01/26/2005
K40	2.85e+01	1.8e+00		PCI/GDRY	01/26/2005
Pb210	ND		4.5e+00	PCI/GDRY	01/26/2005
Pb212	1.62e+00	1.1e-01		PCI/GDRY	01/26/2005
Pb214	1.55e+00	1.1e-01		PCI/GDRY	01/26/2005
Ra223	4.00e-01	9.3e-02		PCI/GDRY	01/26/2005
Ra224	1.16e+00	4.6e-01		PCI/GDRY	01/26/2005
Ra226	3.41e+00	5.4e-01		PCI/GDRY	01/26/2005
Ra228	1.83e+00	1.4e-01		PCI/GDRY	01/26/2005
Tl208	5.17e-01	4.4e-02		PCI/GDRY	01/26/2005
U235	2.08e-01	3.2e-02		PCI/GDRY	01/26/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00533K	QC batch #:	0003582P
Matrix:	SOIL	Prep batch #:	0009410E
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	8.720e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	96.45 %	Analyst:	DPS
Ash/dry weight:	99.20 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/09/2005 13:01	1000.0	GE07	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		2.7e-01	PCI/GDRY	01/26/2005
Bi212	1.53e+00	3.3e-01		PCI/GDRY	01/26/2005
Bi214	9.53e-01	8.6e-02		PCI/GDRY	01/26/2005
Co60	ND		5.1e-02	PCI/GDRY	01/26/2005
Cs137	ND		4.5e-02	PCI/GDRY	01/26/2005
I131	ND		1.1e-01	PCI/GDRY	01/26/2005
K40	2.71e+01	1.7e+00		PCI/GDRY	01/26/2005
Pb210	ND		5.2e+00	PCI/GDRY	01/26/2005
Pb212	1.02e+00	8.2e-02		PCI/GDRY	01/26/2005
Pb214	1.06e+00	8.3e-02		PCI/GDRY	01/26/2005
Ra223	3.82e-01	1.1e-01		PCI/GDRY	01/26/2005
Ra224	6.86e-01	5.9e-01		PCI/GDRY	01/26/2005
Ra226	3.31e+00	4.4e-01		PCI/GDRY	01/26/2005
Ra228	1.07e+00	1.1e-01		PCI/GDRY	01/26/2005
Tl208	3.02e-01	3.7e-02		PCI/GDRY	01/26/2005
U235	2.08e-01	2.8e-02		PCI/GDRY	01/26/2005

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SAMPLE ANALYSIS REPORT

Sample #:	A5.00534L	QC batch #:	0003582P
Matrix:	SOIL	Prep batch #:	0009410E
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	8.580e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	93.99 %	Analyst:	DPS
Ash/dry weight:	98.80 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/09/2005 13:01	1000.0	GE08	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		4.0e-01	PCI/GDRY	01/26/2005
Bi212	1.65e+00	4.1e-01		PCI/GDRY	01/26/2005
Bi214	1.04e+00	9.8e-02		PCI/GDRY	01/26/2005
Co60	ND		7.8e-02	PCI/GDRY	01/26/2005
Cs137	ND		6.4e-02	PCI/GDRY	01/26/2005
I131	ND		1.5e-01	PCI/GDRY	01/26/2005
K40	2.39e+01	1.6e+00		PCI/GDRY	01/26/2005
Pb210	1.38e+00	7.3e-01		PCI/GDRY	01/26/2005
Pb212	1.33e+00	1.0e-01		PCI/GDRY	01/26/2005
Pb214	1.16e+00	1.0e-01		PCI/GDRY	01/26/2005
Ra223	3.67e-01	1.3e-01		PCI/GDRY	01/26/2005
Ra224	1.63e+00	6.0e-01		PCI/GDRY	01/26/2005
Ra226	2.51e+00	7.2e-01		PCI/GDRY	01/26/2005
Ra228	1.23e+00	1.4e-01		PCI/GDRY	01/26/2005
Th234	1.04e+00	2.7e-01		PCI/GDRY	01/26/2005
Tl208	4.20e-01	4.8e-02		PCI/GDRY	01/26/2005
U235	1.58e-01	4.5e-02		PCI/GDRY	01/26/2005

* An asterisk indicates a result whose value may be significantly over or underestimated.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0500007**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00535M	QC batch #:	0003582P
Matrix:	SOIL	Prep batch #:	0009410E
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	8.710e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	96.39 %	Analyst:	DPS
Ash/dry weight:	98.40 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/09/2005 13:00	1000.0	GE09	ZS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		3.0e-01	PCI/GDRY	01/26/2005
Bi212	1.15e+00	3.3e-01		PCI/GDRY	01/26/2005
Bi214	1.03e+00	8.5e-02		PCI/GDRY	01/26/2005
Co60	ND		4.9e-02	PCI/GDRY	01/26/2005
Cs137	ND		5.2e-02	PCI/GDRY	01/26/2005
I131	ND		1.3e-01	PCI/GDRY	01/26/2005
K40	2.50e+01	1.6e+00		PCI/GDRY	01/26/2005
Pb210	ND		6.1e+00	PCI/GDRY	01/26/2005
Pb212	1.24e+00	9.1e-02		PCI/GDRY	01/26/2005
Pb214	1.21e+00	8.8e-02		PCI/GDRY	01/26/2005
Ra223	3.76e-01	9.6e-02		PCI/GDRY	01/26/2005
Ra224	1.08e+00	6.3e-01		PCI/GDRY	01/26/2005
Ra226	2.59e+00	5.2e-01		PCI/GDRY	01/26/2005
Ra228	1.25e+00	1.1e-01		PCI/GDRY	01/26/2005
Th234	1.00e+00	4.2e-01		PCI/GDRY	01/26/2005
Tl208	3.38e-01	3.7e-02		PCI/GDRY	01/26/2005

* An asterisk indicates a result whose value may be significantly over or underestimated.

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GAMMA ANALYSES
SDG #0500007**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00536N	QC batch #:	0003582P
Matrix:	SOIL	Prep batch #:	0009410E
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	8.990e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	95.39 %	Analyst:	DPS
Ash/dry weight:	98.40 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/09/2005 13:00	1000.0	GE10	ZS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		3.2e-01	PCI/GDRY	01/26/2005
Bi212	1.45e+00	3.3e-01		PCI/GDRY	01/26/2005
Bi214	1.26e+00	9.7e-02		PCI/GDRY	01/26/2005
Co60	ND		6.8e-02	PCI/GDRY	01/26/2005
Cs137	ND		4.8e-02	PCI/GDRY	01/26/2005
I131	ND		1.2e-01	PCI/GDRY	01/26/2005
K40	2.76e+01	1.7e+00		PCI/GDRY	01/26/2005
Pb210	ND		3.4e+00	PCI/GDRY	01/26/2005
Pb212	1.51e+00	1.0e-01		PCI/GDRY	01/26/2005
Pb214	1.40e+00	9.7e-02		PCI/GDRY	01/26/2005
Ra223	4.05e-01	9.2e-02		PCI/GDRY	01/26/2005
Ra224	1.31e+00	5.2e-01		PCI/GDRY	01/26/2005
Ra226	2.82e+00	5.2e-01		PCI/GDRY	01/26/2005
Ra228	1.48e+00	1.3e-01		PCI/GDRY	01/26/2005
Th234	9.67e-01	3.4e-01		PCI/GDRY	01/26/2005
Tl208	4.58e-01	4.3e-02		PCI/GDRY	01/26/2005
U235	1.77e-01	3.3e-02		PCI/GDRY	01/26/2005

* An asterisk indicates a result whose value may be significantly over or underestimated.

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GAMMA ANALYSES
SDG #0500007**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00537P	QC batch #:	0003582P
Matrix:	SOIL	Prep batch #:	0009410E
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	8.160e+01 GDRY	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	96.09 %	Analyst:	DPS
Ash/dry weight:	98.40 %	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/09/2005 13:03	1000.0	GE17	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		2.7e-01	PCI/GDRY	01/26/2005
Bi212	1.86e+00	3.9e-01		PCI/GDRY	01/26/2005
Bi214	1.39e+00	1.0e-01		PCI/GDRY	01/26/2005
Co60	ND		6.2e-02	PCI/GDRY	01/26/2005
Cs137	ND		4.3e-02	PCI/GDRY	01/26/2005
I131	ND		9.8e-02	PCI/GDRY	01/26/2005
K40	3.02e+01	1.8e+00		PCI/GDRY	01/26/2005
Pb210	1.26e+00	3.0e-01		PCI/GDRY	01/26/2005
Pb212	1.76e+00	1.1e-01		PCI/GDRY	01/26/2005
Pb214	1.59e+00	1.1e-01		PCI/GDRY	01/26/2005
Ra223	4.32e-01	8.7e-02		PCI/GDRY	01/26/2005
Ra224	1.66e+00	4.7e-01		PCI/GDRY	01/26/2005
Ra226	3.23e+00	5.0e-01		PCI/GDRY	01/26/2005
Ra228	1.72e+00	1.4e-01		PCI/GDRY	01/26/2005
Th234	1.18e+00	1.9e-01		PCI/GDRY	01/26/2005
Tl208	4.83e-01	4.5e-02		PCI/GDRY	01/26/2005
U235	2.03e-01	3.1e-02		PCI/GDRY	01/26/2005

* An asterisk indicates a result whose value may be significantly over or underestimated.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
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GAMMA ANALYSES
SDG #0500007**

QC BATCH SUMMARY

QC batch #: 0003582P
Preparation procedure: N/A
Analysis procedure: NAREL GAM-01

NAREL Sample #	QC Type	Yield (%)	$\sqrt{2\Phi}$ Uncertainty (%)	Analyst
A5.00255G	DUP	N/A		DPS
A5.00255G		N/A		DPS
A5.00256H		N/A		DPS
A5.00257J		N/A		DPS
A5.00258K		N/A		DPS
A5.00522G		N/A		DPS
A5.00523H		N/A		DPS
A5.00524J		N/A		DPS
A5.00525K		N/A		DPS
A5.00526L		N/A		DPS
A5.00527M		N/A		DPS
A5.00528N		N/A		DPS
A5.00529P		N/A		DPS
A5.00530G		N/A		DPS
A5.00531H		N/A		DPS
A5.00532J		N/A		DPS
A5.00533K		N/A		DPS
A5.00534L		N/A		DPS
A5.00535M		N/A		DPS
A5.00536N		N/A		DPS
A5.00537P	N/A		DPS	

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

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GAMMA ANALYSES
SDG #0500007**

PREPARATION BATCH SUMMARY

SAMPLES ANALYZED

NAREL Sample #	QC Type	Aliquot Size	Completion Date	Prep Batch
A5.00255G	DUP	1.13e+02 GDRY	02/01/2005	0009380R
A5.00255G		1.13e+02 GDRY	02/02/2005	0009380R
A5.00256H		1.10e+02 GDRY	02/01/2005	0009380R
A5.00257J		1.10e+02 GDRY	02/01/2005	0009380R
A5.00258K		1.04e+02 GDRY	02/01/2005	0009380R
A5.00522G		7.85e+01 GDRY	02/09/2005	0009405H
A5.00523H		9.29e+01 GDRY	02/09/2005	0009405H
A5.00524J		9.77e+01 GDRY	02/09/2005	0009405H
A5.00525K		9.52e+01 GDRY	02/09/2005	0009405H
A5.00526L		8.22e+01 GDRY	02/09/2005	0009405H
A5.00527M		9.33e+01 GDRY	02/09/2005	0009405H
A5.00528N		9.31e+01 GDRY	02/09/2005	0009405H
A5.00529P		9.01e+01 GDRY	02/09/2005	0009405H
A5.00530G		8.83e+01 GDRY	02/08/2005	0009405H
A5.00531H		9.05e+01 GDRY	02/09/2005	0009405H
A5.00532J		8.22e+01 GDRY	02/10/2005	0009410E
A5.00533K		8.72e+01 GDRY	02/10/2005	0009410E
A5.00534L		8.58e+01 GDRY	02/10/2005	0009410E
A5.00535M		8.71e+01 GDRY	02/10/2005	0009410E
A5.00536N		8.99e+01 GDRY	02/10/2005	0009410E
A5.00537P	8.16e+01 GDRY	02/10/2005	0009410E	

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

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GAMMA ANALYSES
SDG #0500007**

DETECTOR REPORT

The following were used for samples in the SDG

GE02	01/31/2005	10:57	00483639U	A5.00255G
GE02	02/08/2005	14:38	00484151C	A5.00522G
GE06	01/31/2005	10:58	00483644Q	A5.00256H
GE06	02/08/2005	14:40	00484157J	A5.00523H
GE06	02/09/2005	13:01	00484211X	A5.00532J
GE07	01/31/2005	10:58	00483647U	A5.00257J
GE07	02/08/2005	14:40	00484163G	A5.00524J
GE07	02/09/2005	13:01	00484217D	A5.00533K
GE08	01/31/2005	10:58	00483650N	A5.00258K
GE08	02/08/2005	14:41	00484169N	A5.00525K
GE08	02/09/2005	13:01	00484223B	A5.00534L
GE09	02/08/2005	16:58	00484175L	A5.00526L
GE09	02/09/2005	13:00	00484229H	A5.00535M
GE10	02/08/2005	16:58	00484181J	A5.00527M
GE10	02/09/2005	13:00	00484235F	A5.00536N
GE13	02/01/2005	15:53	00483640L	A5.00255G
GE13	02/08/2005	14:38	00484199V	A5.00530G
GE13	02/08/2005	23:01	00484205Z	A5.00531H
GE16	02/08/2005	14:45	00484187Q	A5.00528N
GE17	02/08/2005	14:45	00484193N	A5.00529P
GE17	02/09/2005	13:03	00484241D	A5.00537P

The following were used for other samples in the QC batches

None found

Data Package Checklist

Project: ANACONDA COPPER MINE SDG Number: #0500010

Date due: _____ Analysis: NAREL GAM-01

Type of Package: 9 Data Summary Package 9 Complete Package

Y N N/A

- 9 9 9 All samples in the SDG are reported
- 9 9 9 All results are the ones intended
- 9 9 9 Printed results match the raw data
- 9 9 9 Error report forms are attached
- 9 9 9 SDG Form is attached
- 9 9 9 Analyst's checklist is attached
- 9 9 9 Original prep batch forms are attached
- 9 9 9 All supporting data sheets are attached
- 9 9 9 All raw data sheets appear to be correct
- 9 9 9 All handwritten notes are initialed and dated
- 9 9 9 Package is arranged correctly
- 9 9 9 Package appears to be complete

Were holding times met? 9 Yes 9 No 9 N/A

Were all QC results acceptable? 9 Yes 9 No

Are there any exceptions to report? 9 Yes 9 No

QAO Review

Y N N/A

- 9 9 9 All QC failures are noted
 - 9 9 9 Raw data look reasonable
 - 9 9 9 All exceptions have been noted
- Note: If changes to the case narrative are suggested, please provide the necessary language.

Comments: _____

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES**

REPORT OF SAMPLE DELIVERY GROUP #0500010

Project: ANACONDA COPPER MINE
Analysis Procedure: Gamma Spectrometry
Date Reported: 03/23/2005

SAMPLES

NAREL Sample #	Client Sample ID	Type	Matrix	Date Collected	Date Received
A5.00519M	PAGW09	SAM	WATER	01/22/2005	01/28/2005
A5.00520E	PAGW18	SAM	WATER	01/23/2005	01/28/2005
A5.00521F	PAGW18X	SAM	WATER	01/23/2005	01/28/2005

EXCEPTIONS

1. Packaging and Shipping - No problems were observed.
2. Documentation - No problems were observed.
3. Sample Preparation - No problems were encountered.
4. Analysis - No problems were encountered.
5. Holding Times - All holding times were met.

QUALITY CONTROL

1. QC samples - All QC analysis results met NAREL acceptance criteria.
2. Instruments - Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Chief of the Monitoring and Analytical Services Branch and the NAREL Quality Assurance Coordinator, or their designees, as verified by the following signatures.

Quality Assurance Coordinator

Chief, Monitoring and Analytical Services Branch

GENERAL INFORMATION

SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Reagent blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A reagent blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "Z scores." A Z score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The Z score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The Z score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the Z score is computed.

Each standard uncertainty used to compute a Z score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

GENERAL INFORMATION (CONTINUED)

GAMMA ANALYSIS

The reporting format lists the gamma emitters in alphabetical order. The activity and 2-sigma uncertainty for radionuclides measured by gamma spectroscopy are reported only if the nuclide is detected. Nuclides that are not detected do not appear in the report, with the exception of Ba-140, Co-60, Cs-137, I-131, K-40, Ra-226 and Ra-228. If one of these seven nuclides is undetected, NAREL reports it as "Not Detected" or "ND", and provides a sample-specific estimate of the MDC.

Due to potential spectral interferences and other possible problems associated with the determination of the activity of certain radionuclides, the activities for Bi-214, Pb-214, Th-234, Pa-234m, Ra-226, Th-231, and U-235 are subject to greater possible uncertainty than other commonly reported radionuclides. It should be noted that this potential uncertainty is not included in the two-sigma counting uncertainty which is reported with each activity. Although in this report we do provide the calculated activities for these radionuclides, we recommend that the results be used only as a qualitative means of indicating the presence of these radionuclides and not as a quantitative measure of their concentration. The results for these nuclides are not used in the evaluation of quality control samples. Furthermore, because of mutual interference between Ra-226 and U-235, NAREL's gamma analysis software tends to overestimate the amounts of these nuclides whenever both are present in a sample. Lower estimates for Ra-226 activities can be obtained from the reported activities of its decay products, Pb-214 and Bi-214, which are likely to be somewhat less than the Ra-226 activity because of the potential escape of radon gas.

NAREL's gamma spectroscopy software corrects activities and MDCs for decay between collection and analysis, but only up to a limit of ten half-lives. So, if the decay time for a sample is more than ten half-lives of a radionuclide, that nuclide will almost always be undetected and the reported MDC will be meaningless. This is usually a problem only for short-lived radionuclides, such as I-131 and Ba-140, when there is a long delay between collection and analysis.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 GAMMA ANALYSES
 SDG #0500010**

ANALYSIS SUMMARY

Analysis Procedure: NAREL GAM-01
 Title: Gamma Spectrometry

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Prep Batch #	QC Batch #
A5.00519M	DUP	N/A	02/04/2005	0009391V	0003585T
A5.00519M		N/A	02/05/2005	0009391V	0003585T
A5.00520E		N/A	02/12/2005	0009391V	0003585T
A5.00521F		N/A	02/12/2005	0009391V	0003585T

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0500010**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00519M	QC batch #:	0003585T
Matrix:	WATER	Prep batch #:	0009391V
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/04/2005 15:30	300.0	GE14	DPG

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		1.6e+01	PCI/L	01/22/2005
Bi214	1.74e+01	3.2e+00		PCI/L	01/22/2005
Co60	ND		2.1e+00	PCI/L	01/22/2005
Cs137	ND		2.3e+00	PCI/L	01/22/2005
I131	ND		8.0e+00	PCI/L	01/22/2005
K40	ND		2.1e+01	PCI/L	01/22/2005
Pb210	ND		5.8e+02	PCI/L	01/22/2005
Pb214	1.58e+01	3.0e+00		PCI/L	01/22/2005
Ra226	ND		6.4e+01	PCI/L	01/22/2005
Ra228	ND		1.4e+01	PCI/L	01/22/2005

* An asterisk indicates a result whose value may be significantly over or underestimated.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
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GAMMA ANALYSES
SDG #0500010**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00519M	QC batch #:	0003585T
Matrix:	WATER	Prep batch #:	0009391V
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	DUP

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/04/2005 20:32	300.0	GE14	DPG

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		1.7e+01	PCI/L	01/22/2005
Bi214	1.43e+01	2.9e+00		PCI/L	01/22/2005
Co60	ND		1.8e+00	PCI/L	01/22/2005
Cs137	ND		2.5e+00	PCI/L	01/22/2005
I131	ND		8.2e+00	PCI/L	01/22/2005
K40	ND		2.0e+01	PCI/L	01/22/2005
Pb210	ND		5.4e+02	PCI/L	01/22/2005
Pb214	1.61e+01	3.2e+00		PCI/L	01/22/2005
Ra226	ND		6.2e+01	PCI/L	01/22/2005
Ra228	ND		1.4e+01	PCI/L	01/22/2005

* An asterisk indicates a result whose value may be significantly over or underestimated.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0500010**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00520E	QC batch #:	0003585T
Matrix:	WATER	Prep batch #:	0009391V
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/11/2005 15:38	1000.0	GE15	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Ba140	ND		1.6e+01	PCI/L	01/23/2005
Co60	ND		2.0e+00	PCI/L	01/23/2005
Cs137	ND		1.8e+00	PCI/L	01/23/2005
I131	ND		8.6e+00	PCI/L	01/23/2005
K40	1.41e+01	1.2e+01		PCI/L	01/23/2005
Pb210	ND		4.6e+01	PCI/L	01/23/2005
Pb212	1.43e+00	1.8e+00		PCI/L	01/23/2005
Pb214	* 6.17e+00	1.5e+00		PCI/L	01/23/2005
Ra226	ND		3.0e+01	PCI/L	01/23/2005
Ra228	ND		1.2e+01	PCI/L	01/23/2005
Th234	* 9.82e+01	1.5e+01		PCI/L	01/23/2005
Tl208	6.68e-01	1.1e+00		PCI/L	01/23/2005
U235	* 1.22e+01	1.6e+00		PCI/L	01/23/2005

* An asterisk indicates a result whose value may be significantly over or underestimated.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0500010**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00521F	QC batch #:	0003585T
Matrix:	WATER	Prep batch #:	0009391V
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	3.000e+00 L	Analysis procedure:	NAREL GAM-01
Dry/wet weight:	N/A	Analyst:	N/A
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
02/11/2005 15:38	1000.0	GE16	DPS

ANALYTICAL RESULTS

Analyte	Activity	$\nabla 2\Phi$ Uncertainty	MDC	Unit	Date
Ba140	ND		1.3e+01	PCI/L	01/23/2005
Co60	ND		1.7e+00	PCI/L	01/23/2005
Cs137	ND		1.5e+00	PCI/L	01/23/2005
I131	ND		6.3e+00	PCI/L	01/23/2005
K40	1.32e+01	7.6e+00		PCI/L	01/23/2005
Pb210	ND		3.5e+01	PCI/L	01/23/2005
Pb214	* 2.55e+00	1.7e+00		PCI/L	01/23/2005
Ra226	* 5.58e+01	2.5e+01		PCI/L	01/23/2005
Ra228	ND		9.6e+00	PCI/L	01/23/2005
Th234	* 8.92e+01	1.1e+01		PCI/L	01/23/2005
U235	* 1.06e+01	1.6e+00		PCI/L	01/23/2005

* An asterisk indicates a result whose value may be significantly over or underestimated.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 GAMMA ANALYSES
 SDG #0500010**

QC BATCH SUMMARY

QC batch #: 0003585T
 Preparation procedure: N/A
 Analysis procedure: NAREL GAM-01

NAREL Sample #	QC Type	Yield (%)	\forall 2 Φ Uncertainty (%)	Analyst
A5.00519M	DUP	N/A		N/A
A5.00519M		N/A		N/A
A5.00520E		N/A		N/A
A5.00521F		N/A		N/A

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0500010**

PREPARATION BATCH SUMMARY

SAMPLES ANALYZED

NAREL Sample #	QC Type	Aliquot Size	Completion Date	Prep Batch
A5.00519M	DUP	3.00e+00 L	02/04/2005	0009391V
A5.00519M		3.00e+00 L	02/05/2005	0009391V
A5.00520E		3.00e+00 L	02/12/2005	0009391V
A5.00521F		3.00e+00 L	02/12/2005	0009391V

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
GAMMA ANALYSES
SDG #0500010**

DETECTOR REPORT

The following were used for samples in the SDG

GE14 02/04/2005 15:30 00484131Y A5.00519M
GE14 02/04/2005 20:32 00484132Z A5.00519M
GE15 02/11/2005 15:38 00484791F A5.00520E
GE16 02/11/2005 15:38 00484792G A5.00521F

The following were used for other samples in the QC batches

None found

Data Package Checklist

Project: ANACONDA COPPER MINE SDG Number: #0400068

Date due: _____ Analysis: NAREL TH-EICHROM

Type of Package: 9 Data Summary Package 9 Complete Package

Y N N/A

- 9 9 9 All samples in the SDG are reported
- 9 9 9 All results are the ones intended
- 9 9 9 Printed results match the raw data
- 9 9 9 Error report forms are attached
- 9 9 9 SDG Form is attached
- 9 9 9 Analyst's checklist is attached
- 9 9 9 Original prep batch forms are attached
- 9 9 9 All supporting data sheets are attached
- 9 9 9 All raw data sheets appear to be correct
- 9 9 9 All handwritten notes are initialed and dated
- 9 9 9 Package is arranged correctly
- 9 9 9 Package appears to be complete

Were holding times met? 9 Yes 9 No 9 N/A

Were all QC results acceptable? 9 Yes 9 No

Are there any exceptions to report? 9 Yes 9 No

QAO Review

Y N N/A

- 9 9 9 All QC failures are noted
 - 9 9 9 Raw data look reasonable
 - 9 9 9 All exceptions have been noted
- Note: If changes to the case narrative are suggested, please provide the necessary language.

Comments: _____

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
TH ANALYSES**

REPORT OF SAMPLE DELIVERY GROUP #0400068

Project: ANACONDA COPPER MINE
Analysis Procedure: Actinides (Thorium) by Extraction Chromatography
Date Reported: 03/31/2005

SAMPLES

NAREL Sample #	Client Sample ID	Type	Matrix	Date Collected	Date Received
A4.05913J	PAGW20	SAM	WATER-GROUND	12/01/2004	12/06/2004
A4.05936R	PAGW25	SAM	WATER-GROUND	12/07/2004	12/09/2004
A4.05937T	FB01	SAM	WATER-GROUND	12/08/2004	12/09/2004

EXCEPTIONS

1. Packaging and Shipping - No problems were observed.
2. Documentation - No problems were observed.
3. Sample Preparation - No problems were encountered.
4. Analysis - In accordance with the project acceptance form, uranium and thorium analyses were only performed on samples with a gross alpha greater than 15 pCi/L.
5. Holding Times - All holding times were met.

QUALITY CONTROL

1. QC samples - All QC analysis results met NAREL acceptance criteria.
2. Yields - All chemical yields were within acceptance limits.
3. Instruments - Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Chief of the Monitoring and Analytical Services Branch and the NAREL Quality Assurance Coordinator, or their designees, as verified by the following signatures.

Quality Assurance Coordinator

Chief, Monitoring and Analytical Services Branch

GENERAL INFORMATION

SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Reagent blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A reagent blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "Z scores." A Z score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The Z score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The Z score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the Z score is computed.

Each standard uncertainty used to compute a Z score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

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**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
TH ANALYSES
SDG #0400068**

ANALYSIS SUMMARY

Analysis Procedure: NAREL TH-EICHROM
Title: Actinides (Thorium) by Extraction Chromatography

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Prep Batch #	QC Batch #
A4.05913J		N/A	03/24/2005	0009345N	0003614E
A4.05936R		N/A	03/24/2005	0009345N	0003614E
A4.05937T		N/A	03/24/2005	0009345N	0003614E
A5.00519M *		N/A	03/24/2005	0009345N	0003614E
A5.00519M *	MS	N/A	03/24/2005	0009345N	0003614E
A5.00519M *	MSD	N/A	03/24/2005	0009345N	0003614E
A5.00520E *		N/A	03/24/2005	0009345N	0003614E
A5.00520E *	DUP	N/A	03/25/2005	0009345N	0003614E
A5.00521F *		N/A	03/25/2005	0009345N	0003614E
RBK-00486330M *	RBK	N/A	03/25/2005	0009345N	0003614E

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 TH ANALYSES
 SDG #0400068**

SAMPLE ANALYSIS REPORT

Sample #:	A4.05913J	QC batch #:	0003614E
Matrix:	WATER-GROUND	Prep batch #:	0009345N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.500e-02 L	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/23/2005 16:21	1000.0	AS08	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Th227	7.43e-02	6.8e-01	1.4e+00	PCI/L	03/22/2005
Th228	8.04e-01	1.1e+00	1.8e+00	PCI/L	03/22/2005
Th230	2.81e-01	5.0e-01	7.4e-01	PCI/L	03/22/2005
Th232	-4.01e-02	2.7e-01	6.3e-01	PCI/L	03/22/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
TH ANALYSES
SDG #0400068**

SAMPLE ANALYSIS REPORT

Sample #:	A4.05936R	QC batch #:	0003614E
Matrix:	WATER-GROUND	Prep batch #:	0009345N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-02 L	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/23/2005 16:21	1000.0	AS09	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Th227	3.30e-01	1.2e+00	2.3e+00	PCI/L	03/22/2005
Th228	4.55e+00	2.0e+00	2.4e+00	PCI/L	03/22/2005
Th230	3.21e+00	1.5e+00	1.3e+00	PCI/L	03/22/2005
Th232	2.67e+00	1.3e+00	1.1e+00	PCI/L	03/22/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
TH ANALYSES
SDG #0400068**

SAMPLE ANALYSIS REPORT

Sample #:	A4.05937T	QC batch #:	0003614E
Matrix:	WATER-GROUND	Prep batch #:	0009345N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 L	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/23/2005 16:21	1000.0	AS10	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Th227	3.95e-02	1.5e-01	2.7e-01	PCI/L	03/22/2005
Th228	4.99e-02	1.8e-01	3.3e-01	PCI/L	03/22/2005
Th230	-7.12e-03	6.8e-02	1.6e-01	PCI/L	03/22/2005
Th232	0.00e+00	6.7e-02	1.5e-01	PCI/L	03/22/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
TH ANALYSES
SDG #0400068**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00519M	QC batch #:	0003614E
Matrix:	WATER	Prep batch #:	0009345N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	5.000e-02 L	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	ANA

Note: This sample is not in SDG #0400068

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/23/2005 16:21	1000.0	AS11	DPS

ANALYTICAL RESULTS

Analyte	Activity	$\sqrt{2\Phi}$ Uncertainty	MDC	Unit	Date
Th227	-1.30e-01	2.7e-01	7.2e-01	PCI/L	03/22/2005
Th228	5.77e-01	4.8e-01	7.1e-01	PCI/L	03/22/2005
Th230	8.45e-02	2.0e-01	3.5e-01	PCI/L	03/22/2005
Th232	-2.81e-02	9.7e-02	2.6e-01	PCI/L	03/22/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
TH ANALYSES
SDG #0400068**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00519M	QC batch #:	0003614E
Matrix:	WATER	Prep batch #:	0009345N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	5.000e-02 L	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	MS

Note: This sample is not in SDG #0400068

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/23/2005 16:21	1000.0	AS18	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Th227	1.45e-01	2.6e-01	2.2e-01	PCI/L	03/22/2005
Th228	2.61e-01	2.3e-01	2.0e-01	PCI/L	03/22/2005
Th230	1.25e+02	7.3e+00	2.4e-01	PCI/L	03/22/2005
Th232	1.17e-01	1.6e-01	1.2e-01	PCI/L	03/22/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
TH ANALYSES
SDG #0400068**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00519M	QC batch #:	0003614E
Matrix:	WATER	Prep batch #:	0009345N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	5.000e-02 L	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	MSD

Note: This sample is not in SDG #0400068

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/23/2005 16:21	1000.0	AS20	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Th227	2.74e-01	4.2e-01	6.6e-01	PCI/L	03/22/2005
Th228	2.96e-01	4.4e-01	7.3e-01	PCI/L	03/22/2005
Th230	1.25e+02	7.5e+00	3.0e-01	PCI/L	03/22/2005
Th232	1.08e-01	1.7e-01	2.1e-01	PCI/L	03/22/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
TH ANALYSES
SDG #0400068**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00520E	QC batch #:	0003614E
Matrix:	WATER	Prep batch #:	0009345N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	5.000e-03 L	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	ANA

Note: This sample is not in SDG #0400068

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/23/2005 16:21	1000.0	AS26	DPS

ANALYTICAL RESULTS

Analyte	Activity	$\sqrt{2\Phi}$ Uncertainty	MDC	Unit	Date
Th227	6.28e-01	1.8e+00	1.9e+00	PCI/L	03/22/2005
Th228	4.19e+00	2.7e+00	2.7e+00	PCI/L	03/22/2005
Th230	1.58e+00	1.7e+00	1.8e+00	PCI/L	03/22/2005
Th232	-1.13e-01	7.5e-01	1.8e+00	PCI/L	03/22/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
TH ANALYSES
SDG #0400068**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00520E	QC batch #:	0003614E
Matrix:	WATER	Prep batch #:	0009345N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	5.000e-03 L	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	DUP

Note: This sample is not in SDG #0400068

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/24/2005 12:56	1000.0	AS08	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Th227	1.55e+00	2.8e+00	4.1e+00	PCI/L	03/22/2005
Th228	1.98e+00	3.2e+00	5.3e+00	PCI/L	03/22/2005
Th230	1.16e-01	1.1e+00	2.1e+00	PCI/L	03/22/2005
Th232	2.32e-01	1.0e+00	1.8e+00	PCI/L	03/22/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
TH ANALYSES
SDG #0400068**

SAMPLE ANALYSIS REPORT

QC Sample #: RBK-00486330M

QC batch #: 0003614E
Prep batch #: 0009345N
Prep procedure: N/A
Analysis procedure: NAREL TH-EICHROM
Analyst: PMT
QC type: RBK

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/24/2005 12:56	1000.0	AS10	DPS

ANALYTICAL RESULTS

Analyte	Activity	$\nabla 2\Phi$ Uncertainty	MDC	Unit	Date
Th227	-4.28e-03	1.0e-02	2.9e-02	PCI	03/22/2005
Th228	5.24e-03	1.9e-02	3.5e-02	PCI	03/22/2005
Th230	3.74e-03	9.6e-03	1.7e-02	PCI	03/22/2005
Th232	2.24e-03	8.3e-03	1.5e-02	PCI	03/22/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
TH ANALYSES
SDG #0400068**

QC BATCH SUMMARY

QC batch #: 0003614E
Preparation procedure: N/A
Analysis procedure: NAREL TH-EICHROM

NAREL Sample #	QC Type	Yield (%)	$\sqrt{2\Phi}$ Uncertainty (%)	Analyst
A4.05913J		92.36 %	2.44 %	PMT
A4.05936R		94.88 %	2.46 %	PMT
A4.05937T		98.86 %	2.54 %	PMT
A5.00519M *		95.09 %	2.45 %	PMT
A5.00519M *	MS	97.43 %	2.51 %	PMT
A5.00519M *	MSD	96.74 %	2.50 %	PMT
A5.00520E *		90.95 %	2.36 %	PMT
A5.00520E *	DUP	95.85 %	2.51 %	PMT
A5.00521F *		99.03 %	2.55 %	PMT
RBK-00486330M *	RBK	94.23 %	2.43 %	PMT

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 TH ANALYSES
 SDG #0400068**

PREPARATION BATCH SUMMARY

SAMPLES ANALYZED

NAREL Sample #	QC Type	Aliquot Size	Completion Date	Prep Batch
A4.05913J		1.50e-02 L	03/24/2005	0009345N
A4.05936R		2.00e-02 L	03/24/2005	0009345N
A4.05937T		1.00e-01 L	03/24/2005	0009345N
A5.00519M *		5.00e-02 L	03/24/2005	0009345N
A5.00519M *	MS	5.00e-02 L	03/24/2005	0009345N
A5.00519M *	MSD	5.00e-02 L	03/24/2005	0009345N
A5.00520E *		5.00e-03 L	03/24/2005	0009345N
A5.00520E *	DUP	5.00e-03 L	03/25/2005	0009345N
A5.00521F *		5.00e-03 L	03/25/2005	0009345N
RBK-00486330M *	RBK	1.00e+00 SAMP	03/25/2005	0009345N

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
TH ANALYSES
SDG #0400068**

DETECTOR REPORT

The following were used for samples in the SDG

AS08	03/23/2005	16:21	00481917N	A4.05913J
AS09	03/23/2005	16:21	00481958Y	A4.05936R
AS10	03/23/2005	16:21	00481964W	A4.05937T

The following were used for other samples in the QC batches

AS08	03/24/2005	12:56	00486333Q	A5.00520E
AS09	03/24/2005	12:56	00484150B	A5.00521F
AS10	03/24/2005	12:56	00486330M	
AS11	03/23/2005	16:21	00484138F	A5.00519M
AS18	03/23/2005	16:21	00486331N	A5.00519M
AS20	03/23/2005	16:21	00486332P	A5.00519M
AS26	03/23/2005	16:21	00484144D	A5.00520E

Data Package Checklist

Project: ANACONDA COPPER MINE SDG Number: #0500010

Date due: _____ Analysis: NAREL TH-EICHROM

Type of Package: 9 Data Summary Package 9 Complete Package

Y N N/A

- 9 9 9 All samples in the SDG are reported
- 9 9 9 All results are the ones intended
- 9 9 9 Printed results match the raw data
- 9 9 9 Error report forms are attached
- 9 9 9 SDG Form is attached
- 9 9 9 Analyst's checklist is attached
- 9 9 9 Original prep batch forms are attached
- 9 9 9 All supporting data sheets are attached
- 9 9 9 All raw data sheets appear to be correct
- 9 9 9 All handwritten notes are initialed and dated
- 9 9 9 Package is arranged correctly
- 9 9 9 Package appears to be complete

Were holding times met? 9 Yes 9 No 9 N/A

Were all QC results acceptable? 9 Yes 9 No

Are there any exceptions to report? 9 Yes 9 No

QAO Review

Y N N/A

- 9 9 9 All QC failures are noted
 - 9 9 9 Raw data look reasonable
 - 9 9 9 All exceptions have been noted
- Note: If changes to the case narrative are suggested, please provide the necessary language.

Comments: _____

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
TH ANALYSES**

REPORT OF SAMPLE DELIVERY GROUP #0500010

Project: ANACONDA COPPER MINE
Analysis Procedure: Actinides (Thorium) by Extraction Chromatography
Date Reported: 03/31/2005

SAMPLES

NAREL Sample #	Client Sample ID	Type	Matrix	Date Collected	Date Received
A5.00519M	PAGW09	SAM	WATER	01/22/2005	01/28/2005
A5.00520E	PAGW18	SAM	WATER	01/23/2005	01/28/2005
A5.00521F	PAGW18X	SAM	WATER	01/23/2005	01/28/2005

EXCEPTIONS

1. Packaging and Shipping - No problems were observed.
2. Documentation - No problems were observed.
3. Sample Preparation - No problems were encountered.
4. Analysis - In accordance with the project acceptance form, uranium and thorium analyses were only performed on samples with a gross alpha greater than 15 pCi/L.
5. Holding Times - All holding times were met.

QUALITY CONTROL

1. QC samples - All QC analysis results met NAREL acceptance criteria.
2. Yields - All chemical yields were within acceptance limits.
3. Instruments - Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Chief of the Monitoring and Analytical Services Branch and the NAREL Quality Assurance Coordinator, or their designees, as verified by the following signatures.

Quality Assurance Coordinator

Chief, Monitoring and Analytical Services Branch

GENERAL INFORMATION

SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Reagent blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A reagent blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "Z scores." A Z score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The Z score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The Z score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the Z score is computed.

Each standard uncertainty used to compute a Z score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
TH ANALYSES
SDG #0500010**

ANALYSIS SUMMARY

Analysis Procedure: NAREL TH-EICHROM
Title: Actinides (Thorium) by Extraction Chromatography

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Prep Batch #	QC Batch #
A5.00519M		N/A	03/24/2005	0009345N	0003614E
A5.00519M	MS	N/A	03/24/2005	0009345N	0003614E
A5.00519M	MSD	N/A	03/24/2005	0009345N	0003614E
A5.00520E		N/A	03/24/2005	0009345N	0003614E
A5.00520E	DUP	N/A	03/25/2005	0009345N	0003614E
A5.00521F		N/A	03/25/2005	0009345N	0003614E
A4.05913J *		N/A	03/24/2005	0009345N	0003614E
A4.05936R *		N/A	03/24/2005	0009345N	0003614E
A4.05937T *		N/A	03/24/2005	0009345N	0003614E
RBK-00486330M *	RBK	N/A	03/25/2005	0009345N	0003614E

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 TH ANALYSES
 SDG #0500010**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00519M	QC batch #:	0003614E
Matrix:	WATER	Prep batch #:	0009345N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	5.000e-02 L	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/23/2005 16:21	1000.0	AS11	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Th227	-1.30e-01	2.7e-01	7.2e-01	PCI/L	03/22/2005
Th228	5.77e-01	4.8e-01	7.1e-01	PCI/L	03/22/2005
Th230	8.45e-02	2.0e-01	3.5e-01	PCI/L	03/22/2005
Th232	-2.81e-02	9.7e-02	2.6e-01	PCI/L	03/22/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
TH ANALYSES
SDG #0500010**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00519M	QC batch #:	0003614E
Matrix:	WATER	Prep batch #:	0009345N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	5.000e-02 L	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	MS

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/23/2005 16:21	1000.0	AS18	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Th227	1.45e-01	2.6e-01	2.2e-01	PCI/L	03/22/2005
Th228	2.61e-01	2.3e-01	2.0e-01	PCI/L	03/22/2005
Th230	1.25e+02	7.3e+00	2.4e-01	PCI/L	03/22/2005
Th232	1.17e-01	1.6e-01	1.2e-01	PCI/L	03/22/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
TH ANALYSES
SDG #0500010**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00519M	QC batch #:	0003614E
Matrix:	WATER	Prep batch #:	0009345N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	5.000e-02 L	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	MSD

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/23/2005 16:21	1000.0	AS20	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Th227	2.74e-01	4.2e-01	6.6e-01	PCI/L	03/22/2005
Th228	2.96e-01	4.4e-01	7.3e-01	PCI/L	03/22/2005
Th230	1.25e+02	7.5e+00	3.0e-01	PCI/L	03/22/2005
Th232	1.08e-01	1.7e-01	2.1e-01	PCI/L	03/22/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
TH ANALYSES
SDG #0500010**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00520E	QC batch #:	0003614E
Matrix:	WATER	Prep batch #:	0009345N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	5.000e-03 L	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/23/2005 16:21	1000.0	AS26	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Th227	6.28e-01	1.8e+00	1.9e+00	PCI/L	03/22/2005
Th228	4.19e+00	2.7e+00	2.7e+00	PCI/L	03/22/2005
Th230	1.58e+00	1.7e+00	1.8e+00	PCI/L	03/22/2005
Th232	-1.13e-01	7.5e-01	1.8e+00	PCI/L	03/22/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
TH ANALYSES
SDG #0500010**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00520E	QC batch #:	0003614E
Matrix:	WATER	Prep batch #:	0009345N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	5.000e-03 L	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	DUP

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/24/2005 12:56	1000.0	AS08	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Th227	1.55e+00	2.8e+00	4.1e+00	PCI/L	03/22/2005
Th228	1.98e+00	3.2e+00	5.3e+00	PCI/L	03/22/2005
Th230	1.16e-01	1.1e+00	2.1e+00	PCI/L	03/22/2005
Th232	2.32e-01	1.0e+00	1.8e+00	PCI/L	03/22/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 TH ANALYSES
 SDG #0500010**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00521F	QC batch #:	0003614E
Matrix:	WATER	Prep batch #:	0009345N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	5.000e-03 L	Analysis procedure:	NAREL TH-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/24/2005 12:56	1000.0	AS09	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
Th227	3.27e-01	4.4e+00	9.0e+00	PCI/L	03/22/2005
Th228	1.54e+00	5.2e+00	9.3e+00	PCI/L	03/22/2005
Th230	1.54e+00	2.9e+00	4.9e+00	PCI/L	03/22/2005
Th232	2.05e+00	2.9e+00	4.3e+00	PCI/L	03/22/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
TH ANALYSES
SDG #0500010**

SAMPLE ANALYSIS REPORT

QC Sample #: RBK-00486330M

QC batch #: 0003614E
 Prep batch #: 0009345N
 Prep procedure: N/A
 Analysis procedure: NAREL TH-EICHROM
 Analyst: PMT
 QC type: RBK

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/24/2005 12:56	1000.0	AS10	DPS

ANALYTICAL RESULTS

Analyte	Activity	$\nabla 2\Phi$ Uncertainty	MDC	Unit	Date
Th227	-4.28e-03	1.0e-02	2.9e-02	PCI	03/22/2005
Th228	5.24e-03	1.9e-02	3.5e-02	PCI	03/22/2005
Th230	3.74e-03	9.6e-03	1.7e-02	PCI	03/22/2005
Th232	2.24e-03	8.3e-03	1.5e-02	PCI	03/22/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
TH ANALYSES
SDG #0500010**

QC BATCH SUMMARY

QC batch #: 0003614E
Preparation procedure: N/A
Analysis procedure: NAREL TH-EICHROM

NAREL Sample #	QC Type	Yield (%)	$\sqrt{2\Phi}$ Uncertainty (%)	Analyst
A5.00519M		95.09 %	2.45 %	PMT
A5.00519M	MS	97.43 %	2.51 %	PMT
A5.00519M	MSD	96.74 %	2.50 %	PMT
A5.00520E		90.95 %	2.36 %	PMT
A5.00520E	DUP	95.85 %	2.51 %	PMT
A5.00521F		99.03 %	2.55 %	PMT
A4.05913J *		92.36 %	2.44 %	PMT
A4.05936R *		94.88 %	2.46 %	PMT
A4.05937T *		98.86 %	2.54 %	PMT
RBK-00486330M *	RBK	94.23 %	2.43 %	PMT

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 TH ANALYSES
 SDG #0500010**

PREPARATION BATCH SUMMARY

SAMPLES ANALYZED

NAREL Sample #	QC Type	Aliquot Size	Completion Date	Prep Batch
A5.00519M		5.00e-02 L	03/24/2005	0009345N
A5.00519M	MS	5.00e-02 L	03/24/2005	0009345N
A5.00519M	MSD	5.00e-02 L	03/24/2005	0009345N
A5.00520E		5.00e-03 L	03/24/2005	0009345N
A5.00520E	DUP	5.00e-03 L	03/25/2005	0009345N
A5.00521F		5.00e-03 L	03/25/2005	0009345N
A4.05913J *		1.50e-02 L	03/24/2005	0009345N
A4.05936R *		2.00e-02 L	03/24/2005	0009345N
A4.05937T *		1.00e-01 L	03/24/2005	0009345N
RBK-00486330M *	RBK	1.00e+00 SAMP	03/25/2005	0009345N

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
TH ANALYSES
SDG #0500010**

DETECTOR REPORT

The following were used for samples in the SDG

AS08 03/24/2005 12:56 00486333Q A5.00520E
AS09 03/24/2005 12:56 00484150B A5.00521F
AS11 03/23/2005 16:21 00484138F A5.00519M
AS18 03/23/2005 16:21 00486331N A5.00519M
AS20 03/23/2005 16:21 00486332P A5.00519M
AS26 03/23/2005 16:21 00484144D A5.00520E

The following were used for other samples in the QC batches

AS08 03/23/2005 16:21 00481917N A4.05913J
AS09 03/23/2005 16:21 00481958Y A4.05936R
AS10 03/23/2005 16:21 00481964W A4.05937T
AS10 03/24/2005 12:56 00486330M

Data Package Checklist

Project: ANACONDA COPPER MINE SDG Number: #0400068

Date due: _____ Analysis: NAREL U-EICHROM

Type of Package: 9 Data Summary Package 9 Complete Package

Y N N/A

- 9 9 9 All samples in the SDG are reported
- 9 9 9 All results are the ones intended
- 9 9 9 Printed results match the raw data
- 9 9 9 Error report forms are attached
- 9 9 9 SDG Form is attached
- 9 9 9 Analyst's checklist is attached
- 9 9 9 Original prep batch forms are attached
- 9 9 9 All supporting data sheets are attached
- 9 9 9 All raw data sheets appear to be correct
- 9 9 9 All handwritten notes are initialed and dated
- 9 9 9 Package is arranged correctly
- 9 9 9 Package appears to be complete

Were holding times met? 9 Yes 9 No 9 N/A

Were all QC results acceptable? 9 Yes 9 No

Are there any exceptions to report? 9 Yes 9 No

QAO Review

Y N N/A

- 9 9 9 All QC failures are noted
 - 9 9 9 Raw data look reasonable
 - 9 9 9 All exceptions have been noted
- Note: If changes to the case narrative are suggested, please provide the necessary language.

Comments: _____

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
U ANALYSES**

REPORT OF SAMPLE DELIVERY GROUP #0400068

Project: ANACONDA COPPER MINE
Analysis Procedure: Actinides (Uranium) by Extraction Chromatography
Date Reported: 03/31/2005

SAMPLES

NAREL Sample #	Client Sample ID	Type	Matrix	Date Collected	Date Received
A4.05913J	PAGW20	SAM	WATER-GROUND	12/01/2004	12/06/2004
A4.05936R	PAGW25	SAM	WATER-GROUND	12/07/2004	12/09/2004
A4.05937T	FB01	SAM	WATER-GROUND	12/08/2004	12/09/2004

EXCEPTIONS

1. Packaging and Shipping - No problems were observed.
2. Documentation - No problems were observed.
3. Sample Preparation - No problems were encountered.
4. Analysis - In accordance with the project acceptance form, uranium and thorium analyses were only performed on samples with a gross alpha greater than 15 pCi/L.
5. Holding Times - All holding times were met.

QUALITY CONTROL

1. QC samples - All QC analysis results met NAREL acceptance criteria.
2. Yields - All chemical yields were within acceptance limits.
3. Instruments - Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Chief of the Monitoring and Analytical Services Branch and the NAREL Quality Assurance Coordinator, or their designees, as verified by the following signatures.

Quality Assurance Coordinator

Chief, Monitoring and Analytical Services Branch

GENERAL INFORMATION

SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Reagent blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A reagent blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "Z scores." A Z score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The Z score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The Z score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the Z score is computed.

Each standard uncertainty used to compute a Z score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

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**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
U ANALYSES
SDG #0400068**

ANALYSIS SUMMARY

Analysis Procedure: NAREL U-EICHROM
Title: Actinides (Uranium) by Extraction Chromatography

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Prep Batch #	QC Batch #
A4.05913J		N/A	03/24/2005	0009531N	0003615F
A4.05936R		N/A	03/24/2005	0009531N	0003615F
A4.05937T		N/A	03/24/2005	0009531N	0003615F
A5.00519M *		N/A	03/24/2005	0009531N	0003615F
A5.00519M *	MS	N/A	03/24/2005	0009531N	0003615F
A5.00519M *	MSD	N/A	03/24/2005	0009531N	0003615F
A5.00520E *		N/A	03/24/2005	0009531N	0003615F
A5.00520E *	DUP	N/A	03/25/2005	0009531N	0003615F
A5.00521F *		N/A	03/25/2005	0009531N	0003615F
RBK-00486347X *	RBK	N/A	03/25/2005	0009531N	0003615F

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
U ANALYSES
SDG #0400068**

SAMPLE ANALYSIS REPORT

Sample #:	A4.05913J	QC batch #:	0003615F
Matrix:	WATER-GROUND	Prep batch #:	0009531N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.500e-02 L	Analysis procedure:	NAREL U-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/23/2005 16:08	1000.0	AS02	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
U234	1.08e+02	1.1e+01	1.1e+00	PCI/L	03/23/2005
U235	4.57e+00	1.9e+00	9.6e-01	PCI/L	03/23/2005
U238	8.25e+01	9.2e+00	9.4e-01	PCI/L	03/23/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
U ANALYSES
SDG #0400068**

SAMPLE ANALYSIS REPORT

Sample #:	A4.05936R	QC batch #:	0003615F
Matrix:	WATER-GROUND	Prep batch #:	0009531N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	2.000e-02 L	Analysis procedure:	NAREL U-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/23/2005 16:08	1000.0	AS03	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
U234	3.70e+01	4.9e+00	7.0e-01	PCI/L	03/23/2005
U235	1.74e+00	1.0e+00	7.1e-01	PCI/L	03/23/2005
U238	2.81e+01	4.1e+00	8.5e-01	PCI/L	03/23/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
U ANALYSES
SDG #0400068**

SAMPLE ANALYSIS REPORT

Sample #:	A4.05937T	QC batch #:	0003615F
Matrix:	WATER-GROUND	Prep batch #:	0009531N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	1.000e-01 L	Analysis procedure:	NAREL U-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/23/2005 16:08	1000.0	AS05	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
U234	6.13e+00	8.6e-01	1.6e-01	PCI/L	03/23/2005
U235	1.68e-01	1.5e-01	1.6e-01	PCI/L	03/23/2005
U238	5.00e+00	7.6e-01	1.5e-01	PCI/L	03/23/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
U ANALYSES
SDG #0400068**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00519M	QC batch #:	0003615F
Matrix:	WATER	Prep batch #:	0009531N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	5.000e-02 L	Analysis procedure:	NAREL U-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	ANA

Note: This sample is not in SDG #0400068

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/23/2005 16:08	1000.0	AS12	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
U234	1.12e+01	1.6e+00	2.2e-01	PCI/L	03/23/2005
U235	2.98e-01	2.9e-01	3.4e-01	PCI/L	03/23/2005
U238	7.14e+00	1.2e+00	2.8e-01	PCI/L	03/23/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
U ANALYSES
SDG #0400068**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00519M	QC batch #:	0003615F
Matrix:	WATER	Prep batch #:	0009531N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	5.000e-02 L	Analysis procedure:	NAREL U-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	MS

Note: This sample is not in SDG #0400068

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/23/2005 16:08	1000.0	AS17	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
U234	5.12e+01	4.8e+00	2.8e-01	PCI/L	03/23/2005
U235	1.99e+00	7.1e-01	2.9e-01	PCI/L	03/23/2005
U238	4.90e+01	4.6e+00	1.4e-01	PCI/L	03/23/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 U ANALYSES
 SDG #0400068**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00519M	QC batch #:	0003615F
Matrix:	WATER	Prep batch #:	0009531N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	5.000e-02 L	Analysis procedure:	NAREL U-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	MSD

Note: This sample is not in SDG #0400068

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/23/2005 16:08	1000.0	AS22	DPS

ANALYTICAL RESULTS

Analyte	Activity	$\sqrt{2\Phi}$ Uncertainty	MDC	Unit	Date
U234	5.36e+01	4.9e+00	4.1e-01	PCI/L	03/23/2005
U235	2.75e+00	8.3e-01	4.2e-01	PCI/L	03/23/2005
U238	5.14e+01	4.7e+00	4.4e-01	PCI/L	03/23/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 U ANALYSES
 SDG #0400068**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00520E	QC batch #:	0003615F
Matrix:	WATER	Prep batch #:	0009531N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	5.000e-03 L	Analysis procedure:	NAREL U-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	ANA

Note: This sample is not in SDG #0400068

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/23/2005 16:08	1000.0	AS24	DPS

ANALYTICAL RESULTS

Analyte	Activity	$\sqrt{2\Phi}$ Uncertainty	MDC	Unit	Date
U234	3.21e+02	3.3e+01	2.7e+00	PCI/L	03/23/2005
U235	1.22e+01	5.4e+00	3.6e+00	PCI/L	03/23/2005
U238	2.47e+02	2.7e+01	2.3e+00	PCI/L	03/23/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
U ANALYSES
SDG #0400068**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00520E	QC batch #:	0003615F
Matrix:	WATER	Prep batch #:	0009531N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	5.000e-03 L	Analysis procedure:	NAREL U-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	DUP

Note: This sample is not in SDG #0400068

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/24/2005 12:55	1000.0	AS02	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
U234	3.32e+02	3.5e+01	3.5e+00	PCI/L	03/24/2005
U235	1.42e+01	6.0e+00	3.0e+00	PCI/L	03/24/2005
U238	2.76e+02	3.0e+01	2.9e+00	PCI/L	03/24/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
U ANALYSES
SDG #0400068**

SAMPLE ANALYSIS REPORT

QC Sample #: RBK-00486347X

QC batch #: 0003615F
Prep batch #: 0009531N
Prep procedure: N/A
Analysis procedure: NAREL U-EICHROM
Analyst: PMT
QC type: RBK

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/24/2005 12:55	1000.0	AS05	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
U234	1.44e-02	1.3e-02	1.6e-02	PCI	03/24/2005
U235	8.61e-04	7.9e-03	1.6e-02	PCI	03/24/2005
U238	2.16e-03	8.0e-03	1.5e-02	PCI	03/24/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
U ANALYSES
SDG #0400068**

QC BATCH SUMMARY

QC batch #: 0003615F
Preparation procedure: N/A
Analysis procedure: NAREL U-EICHROM

NAREL Sample #	QC Type	Yield (%)	$\sqrt{2\Phi}$ Uncertainty (%)	Analyst
A4.05913J		87.37 %	6.53 %	PMT
A4.05936R		89.31 %	6.67 %	PMT
A4.05937T		91.54 %	6.78 %	PMT
A5.00519M *		87.49 %	6.33 %	PMT
A5.00519M *	MS	88.09 %	6.76 %	PMT
A5.00519M *	MSD	85.79 %	6.49 %	PMT
A5.00520E *		90.67 %	6.87 %	PMT
A5.00520E *	DUP	84.43 %	6.37 %	PMT
A5.00521F *		91.64 %	6.80 %	PMT
RBK-00486347X *	RBK	93.95 %	6.91 %	PMT

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 U ANALYSES
 SDG #0400068**

PREPARATION BATCH SUMMARY

SAMPLES ANALYZED

NAREL Sample #	QC Type	Aliquot Size	Completion Date	Prep Batch
A4.05913J		1.50e-02 L	03/24/2005	0009531N
A4.05936R		2.00e-02 L	03/24/2005	0009531N
A4.05937T		1.00e-01 L	03/24/2005	0009531N
A5.00519M *		5.00e-02 L	03/24/2005	0009531N
A5.00519M *	MS	5.00e-02 L	03/24/2005	0009531N
A5.00519M *	MSD	5.00e-02 L	03/24/2005	0009531N
A5.00520E *		5.00e-03 L	03/24/2005	0009531N
A5.00520E *	DUP	5.00e-03 L	03/25/2005	0009531N
A5.00521F *		5.00e-03 L	03/25/2005	0009531N
RBK-00486347X *	RBK	1.00e+00 SAMP	03/25/2005	0009531N

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
U ANALYSES
SDG #0400068**

DETECTOR REPORT

The following were used for samples in the SDG

AS02 03/23/2005 16:08 00481916M A4.05913J
AS03 03/23/2005 16:08 00481957X A4.05936R
AS05 03/23/2005 16:08 00481963V A4.05937T

The following were used for other samples in the QC batches

AS02 03/24/2005 12:55 00486344U A5.00520E
AS03 03/24/2005 12:55 00484149J A5.00521F
AS05 03/24/2005 12:55 00486347X
AS12 03/23/2005 16:08 00484137E A5.00519M
AS17 03/23/2005 16:08 00486342R A5.00519M
AS22 03/23/2005 16:08 00486343T A5.00519M
AS24 03/23/2005 16:08 00484143C A5.00520E

Data Package Checklist

Project: ANACONDA COPPER MINE SDG Number: #0500010

Date due: _____ Analysis: NAREL U-EICHROM

Type of Package: 9 Data Summary Package 9 Complete Package

Y N N/A

- 9 9 9 All samples in the SDG are reported
- 9 9 9 All results are the ones intended
- 9 9 9 Printed results match the raw data
- 9 9 9 Error report forms are attached
- 9 9 9 SDG Form is attached
- 9 9 9 Analyst's checklist is attached
- 9 9 9 Original prep batch forms are attached
- 9 9 9 All supporting data sheets are attached
- 9 9 9 All raw data sheets appear to be correct
- 9 9 9 All handwritten notes are initialed and dated
- 9 9 9 Package is arranged correctly
- 9 9 9 Package appears to be complete

Were holding times met? 9 Yes 9 No 9 N/A

Were all QC results acceptable? 9 Yes 9 No

Are there any exceptions to report? 9 Yes 9 No

QAO Review

Y N N/A

- 9 9 9 All QC failures are noted
 - 9 9 9 Raw data look reasonable
 - 9 9 9 All exceptions have been noted
- Note: If changes to the case narrative are suggested, please provide the necessary language.

Comments: _____

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
U ANALYSES**

REPORT OF SAMPLE DELIVERY GROUP #0500010

Project: ANACONDA COPPER MINE
Analysis Procedure: Actinides (Uranium) by Extraction Chromatography
Date Reported: 03/31/2005

SAMPLES

NAREL Sample #	Client Sample ID	Type	Matrix	Date Collected	Date Received
A5.00519M	PAGW09	SAM	WATER	01/22/2005	01/28/2005
A5.00520E	PAGW18	SAM	WATER	01/23/2005	01/28/2005
A5.00521F	PAGW18X	SAM	WATER	01/23/2005	01/28/2005

EXCEPTIONS

1. Packaging and Shipping - No problems were observed.
2. Documentation - No problems were observed.
3. Sample Preparation - No problems were encountered.
4. Analysis - No problems were encountered.
5. Holding Times - All holding times were met.

QUALITY CONTROL

1. QC samples - All QC analysis results met NAREL acceptance criteria.
2. Yields - All chemical yields were within acceptance limits.
3. Instruments - Response and background checks for all instruments used in these analyses met NAREL acceptance criteria.

CERTIFICATION

I certify that this data report complies with the terms and conditions of the Quality Assurance Project Plan, except as noted above. Release of the data contained in this report has been authorized by the Chief of the Monitoring and Analytical Services Branch and the NAREL Quality Assurance Coordinator, or their designees, as verified by the following signatures.

Quality Assurance Coordinator

Chief, Monitoring and Analytical Services Branch

GENERAL INFORMATION

SAMPLE TYPES

BLD	Blind sample
FBK	Field blank
SAM	Normal sample

ANALYSIS QC TYPES

ANA	Normal analysis
DUP	Laboratory duplicate
LCS	Laboratory control sample (blank spike)
MS	Matrix spike
MSD	Matrix spike duplicate
RBK	Reagent blank

QUALITY INDICATORS

RPD	Relative Percent Difference
%R	Percent Recovery
Z	Number of standard deviations by which a QC measurement differs from the expected value

EVALUATION OF QC ANALYSES

A reagent blank result is considered unacceptable if it is more than 3 standard deviations below zero or more than 3 standard deviations above a predetermined upper control limit. For some analyses NAREL has set the upper control limit at zero. For others the control limit is a small positive number.

NAREL evaluates the results of duplicate and spike analyses using "Z scores." A Z score is the number of standard deviations by which the QC result differs from its ideal value. The score is considered acceptable if its absolute value is not greater than 3.

The Z score for a spiked sample is computed by dividing the difference between the measured value and the target value by the combined standard uncertainty of the difference.

The Z score for a duplicate analysis is computed by dividing the difference between the two measured values by the combined standard uncertainty of the difference. When the precision of paired MS/MSD analyses is evaluated, the native sample activity is subtracted from each measured value and the net concentrations are then converted to total activities before the Z score is computed.

Each standard uncertainty used to compute a Z score includes an additional fixed term to represent sources of measurement error other than counting error. This additional term is not used in the evaluation of reagent blanks.

NAREL reports the "relative percent difference," or RPD, between duplicate results and the "percent recovery," or %R, for spiked analyses, but does not use these values for evaluation.

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**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
U ANALYSES
SDG #0500010**

ANALYSIS SUMMARY

Analysis Procedure: NAREL U-EICHROM
Title: Actinides (Uranium) by Extraction Chromatography

NAREL Sample #	QC Type	Preparation Procedure	Date Completed	Prep Batch #	QC Batch #
A5.00519M		N/A	03/24/2005	0009531N	0003615F
A5.00519M	MS	N/A	03/24/2005	0009531N	0003615F
A5.00519M	MSD	N/A	03/24/2005	0009531N	0003615F
A5.00520E		N/A	03/24/2005	0009531N	0003615F
A5.00520E	DUP	N/A	03/25/2005	0009531N	0003615F
A5.00521F		N/A	03/25/2005	0009531N	0003615F
A4.05913J *		N/A	03/24/2005	0009531N	0003615F
A4.05936R *		N/A	03/24/2005	0009531N	0003615F
A4.05937T *		N/A	03/24/2005	0009531N	0003615F
RBK-00486347X *	RBK	N/A	03/25/2005	0009531N	0003615F

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 U ANALYSES
 SDG #0500010**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00519M	QC batch #:	0003615F
Matrix:	WATER	Prep batch #:	0009531N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	5.000e-02 L	Analysis procedure:	NAREL U-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/23/2005 16:08	1000.0	AS12	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
U234	1.12e+01	1.6e+00	2.2e-01	PCI/L	03/23/2005
U235	2.98e-01	2.9e-01	3.4e-01	PCI/L	03/23/2005
U238	7.14e+00	1.2e+00	2.8e-01	PCI/L	03/23/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
U ANALYSES
SDG #0500010**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00519M	QC batch #:	0003615F
Matrix:	WATER	Prep batch #:	0009531N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	5.000e-02 L	Analysis procedure:	NAREL U-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	MS

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/23/2005 16:08	1000.0	AS17	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
U234	5.12e+01	4.8e+00	2.8e-01	PCI/L	03/23/2005
U235	1.99e+00	7.1e-01	2.9e-01	PCI/L	03/23/2005
U238	4.90e+01	4.6e+00	1.4e-01	PCI/L	03/23/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
U ANALYSES
SDG #0500010**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00519M	QC batch #:	0003615F
Matrix:	WATER	Prep batch #:	0009531N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	5.000e-02 L	Analysis procedure:	NAREL U-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	MSD

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/23/2005 16:08	1000.0	AS22	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
U234	5.36e+01	4.9e+00	4.1e-01	PCI/L	03/23/2005
U235	2.75e+00	8.3e-01	4.2e-01	PCI/L	03/23/2005
U238	5.14e+01	4.7e+00	4.4e-01	PCI/L	03/23/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
U ANALYSES
SDG #0500010**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00520E	QC batch #:	0003615F
Matrix:	WATER	Prep batch #:	0009531N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	5.000e-03 L	Analysis procedure:	NAREL U-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/23/2005 16:08	1000.0	AS24	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
U234	3.21e+02	3.3e+01	2.7e+00	PCI/L	03/23/2005
U235	1.22e+01	5.4e+00	3.6e+00	PCI/L	03/23/2005
U238	2.47e+02	2.7e+01	2.3e+00	PCI/L	03/23/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 U ANALYSES
 SDG #0500010**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00520E	QC batch #:	0003615F
Matrix:	WATER	Prep batch #:	0009531N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	5.000e-03 L	Analysis procedure:	NAREL U-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	DUP

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/24/2005 12:55	1000.0	AS02	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
U234	3.32e+02	3.5e+01	3.5e+00	PCI/L	03/24/2005
U235	1.42e+01	6.0e+00	3.0e+00	PCI/L	03/24/2005
U238	2.76e+02	3.0e+01	2.9e+00	PCI/L	03/24/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
U ANALYSES
SDG #0500010**

SAMPLE ANALYSIS REPORT

Sample #:	A5.00521F	QC batch #:	0003615F
Matrix:	WATER	Prep batch #:	0009531N
Sample type:	SAM	Prep procedure:	N/A
Amount analyzed:	5.000e-03 L	Analysis procedure:	NAREL U-EICHROM
Dry/wet weight:	N/A	Analyst:	PMT
Ash/dry weight:	N/A	QC type:	ANA

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/24/2005 12:55	1000.0	AS03	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
U234	3.27e+02	3.3e+01	2.7e+00	PCI/L	03/24/2005
U235	1.43e+01	5.8e+00	2.8e+00	PCI/L	03/24/2005
U238	2.51e+02	2.8e+01	3.3e+00	PCI/L	03/24/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
U ANALYSES
SDG #0500010**

SAMPLE ANALYSIS REPORT

QC Sample #: RBK-00486347X

QC batch #: 0003615F
Prep batch #: 0009531N
Prep procedure: N/A
Analysis procedure: NAREL U-EICHROM
Analyst: PMT
QC type: RBK

COUNTING INFORMATION

Date and time	Duration (min)	Detector ID	Operator
03/24/2005 12:55	1000.0	AS05	DPS

ANALYTICAL RESULTS

Analyte	Activity	∇ 2 Φ Uncertainty	MDC	Unit	Date
U234	1.44e-02	1.3e-02	1.6e-02	PCI	03/24/2005
U235	8.61e-04	7.9e-03	1.6e-02	PCI	03/24/2005
U238	2.16e-03	8.0e-03	1.5e-02	PCI	03/24/2005

**U.S. ENVIRONMENTAL PROTECTION AGENCY
 NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
 U ANALYSES
 SDG #0500010**

QC BATCH SUMMARY

QC batch #: 0003615F
 Preparation procedure: N/A
 Analysis procedure: NAREL U-EICHROM

NAREL Sample #	QC Type	Yield (%)	$\sqrt{2\Phi}$ Uncertainty (%)	Analyst
A5.00519M		87.49 %	6.33 %	PMT
A5.00519M	MS	88.09 %	6.76 %	PMT
A5.00519M	MSD	85.79 %	6.49 %	PMT
A5.00520E		90.67 %	6.87 %	PMT
A5.00520E	DUP	84.43 %	6.37 %	PMT
A5.00521F		91.64 %	6.80 %	PMT
A4.05913J *		87.37 %	6.53 %	PMT
A4.05936R *		89.31 %	6.67 %	PMT
A4.05937T *		91.54 %	6.78 %	PMT
RBK-00486347X *	RBK	93.95 %	6.91 %	PMT

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
U ANALYSES
SDG #0500010**

PREPARATION BATCH SUMMARY

SAMPLES ANALYZED

NAREL Sample #	QC Type	Aliquot Size	Completion Date	Prep Batch
A5.00519M		5.00e-02 L	03/24/2005	0009531N
A5.00519M	MS	5.00e-02 L	03/24/2005	0009531N
A5.00519M	MSD	5.00e-02 L	03/24/2005	0009531N
A5.00520E		5.00e-03 L	03/24/2005	0009531N
A5.00520E	DUP	5.00e-03 L	03/25/2005	0009531N
A5.00521F		5.00e-03 L	03/25/2005	0009531N
A4.05913J *		1.50e-02 L	03/24/2005	0009531N
A4.05936R *		2.00e-02 L	03/24/2005	0009531N
A4.05937T *		1.00e-01 L	03/24/2005	0009531N
RBK-00486347X *	RBK	1.00e+00 SAMP	03/25/2005	0009531N

* Samples marked with an asterisk are not in this sample delivery group but were analyzed with it for QC purposes.

**U.S. ENVIRONMENTAL PROTECTION AGENCY
NATIONAL AIR AND RADIATION ENVIRONMENTAL LABORATORY
U ANALYSES
SDG #0500010**

DETECTOR REPORT

The following were used for samples in the SDG

AS02 03/24/2005 12:55 00486344U A5.00520E
AS03 03/24/2005 12:55 00484149J A5.00521F
AS12 03/23/2005 16:08 00484137E A5.00519M
AS17 03/23/2005 16:08 00486342R A5.00519M
AS22 03/23/2005 16:08 00486343T A5.00519M
AS24 03/23/2005 16:08 00484143C A5.00520E

The following were used for other samples in the QC batches

AS02 03/23/2005 16:08 00481916M A4.05913J
AS03 03/23/2005 16:08 00481957X A4.05936R
AS05 03/23/2005 16:08 00481963V A4.05937T
AS05 03/24/2005 12:55 00486347X