9.13 DETAILED RESULTS FOR SURVEY UNIT 013

Trench Soil in Room 2124 and 2124A (Class 2 Interior Area)

INDEX

SU-013 Survey Package Worksheet 1
SU-013 Survey Maps 4
SU-013 Gamma Fixed Point Survey Reports 5
SU-013 Field Sample Data Sheet 9
SU-013 COMPASS Survey Plan 12
SU-013 Survey Location Calculations 14
SU-013 Soil Sample #01 Results 15
SU-013 Soil Sample #02 Results 22
SU-013 Soil Sample #03 Results 30
SU-013 Soil Sample #04 Results 37
SU-013 Soil Sample #05 Results 44
SU-013 Soil Sample #06 Results 51
SU-013 Soil Sample #07 Results 58
SU-013 Soil Sample #08 Results 65
SU-013 Soil Sample #09 Results 72
SU-013 Soil Sample #10 Results 79
SU-013 Soil Sample #11 Results 86
SU-013 Soil Sample #12 Results 93
SU-013 Soil Sample #13 Results 100
SU-013 Soil Sample #14 Results 107
SU-013 Soil Sample #15 Results 114
SU-013 Gross Wipe from West End of Drain Pipe Results 121

ENERGYSOLUTIONS

Survey Package Worksheet for NIST Boulder SU013

Package Identification No.: SU013	**Prepared by:** Paul C. Ely
Location: Soil in pipe excavation trench in room 2124 (Class 2 Area)	**Date Prepared:** 2/19/2009
Area Classification: Class 2	**Signature:** Paul Ely

Area Description

The survey area includes the soil in the trench resulting from excavation of a drain pipe in rooms 2124 and 2124A.

Historical Information

On June 9, 2008, researchers ruptured a glass vial of 0.25 grams of mixed plutonium isotopes in the form of $PuSO_4$-$4H_2O$ resulting in the contamination of laboratory rooms 2124, 2124A, 2120, 2120A and 2007 in Building 1 on the NIST campus in Boulder, Colorado. Room 2124 is the room where the glass vial ruptured and some activity was washed down a sink drain in room 2124. This excavation is a Class 2 area because the drain was contaminated and the soil had the potential for activity in excess of the modified Am-241 release limit of 0.42 pCi/g (the Am-241 screening limit of 2.1 pCi/g was modified to compensate for the fact that the other contaminates, Pu-238, Pu-239, Pu-240, Pu-241, Pu-242, are not detectable at low concentrations by gamma spectroscopy).

General Survey Instructions

1. Perform soil surveys and sampling according to procedure CS-FO-PR-003 and this instruction.
2. Use a 2" by 2" NaI detector, Ludlum model number 44-10, or equivalent as approved by the ES PM for exposure rate soil surveys. Obtain surface scan exposure rate data, at about 6-in above the soil surface, over 100% of the soil in the trench bottom. Scans will be logged but the logged data is for information only. Identify any elevated areas of measurement and record the maximum reading obtained.
3. Sample locations are indicated on the attached figure. Using a tape measure locate each sample to be taken in the trench area and mark the location with a surveyors wire flag and mark the sample location number on the flag.
4. Obtain and record a dose rate measurement at each sample location at about 6-in above the soil surface in the trench bottom.
5. Using hand tools, obtain a ~ 1,000 ml surface sample (~0 to 6-in deep) from the sample location. Place the sample into a gallon size large Ziploc® type bag and label the container with the sample information. Record the sample information on Field Sample Data Sheets (attached).
6. Every 10^{th} sample will have twice as much material collected and half the sample will be sent offsite for analysis. A Chain-Of-Custody form (attached) will be completed for each sample sent offsite.
7. After each use, thoroughly clean all parts of the soil sampling tool. Cleaning is accomplished with a nylon brush, clean water and phosphate-free soap. Then rinse with clean water.

Special Instructions

- Source check instrumentation to Cs-137 for gamma measurements.
- Perform a minimum of three one-minute field backgrounds using the plastic shield on the survey surface.
- Record maximum scan measurement results, in cpm, for each scan area.
- Measurement and sampling locations are based on a random-start location and fixed offset pattern.
- The attached map provides measurement and sampling locations.
- Notify the ES Project Manager of locations that exceed measured activity 50% greater than the average activity.
- Attach photographic records if available and provide descriptive comments for each image under Survey Comments.

Survey performance (Initial and date as each survey is complete)

Location Code					General Description	Beta Scan	Direct Beta	Direct Alpha	Gamma Scan	Direct Gamma	Soil Samples
L1	L2	L6	L7	L8							
NIST Boulder SU013 Class 2 Area											
Package ID	Surface or Structure	Material Code	Row	Location				@60 sec	100% @15 cm	@15 cm	
SU013	T01	B0016	ZZZZZ	0-14	Trench	N/A	N/A	N/A		14	14 es 4.8.09

Survey Comments

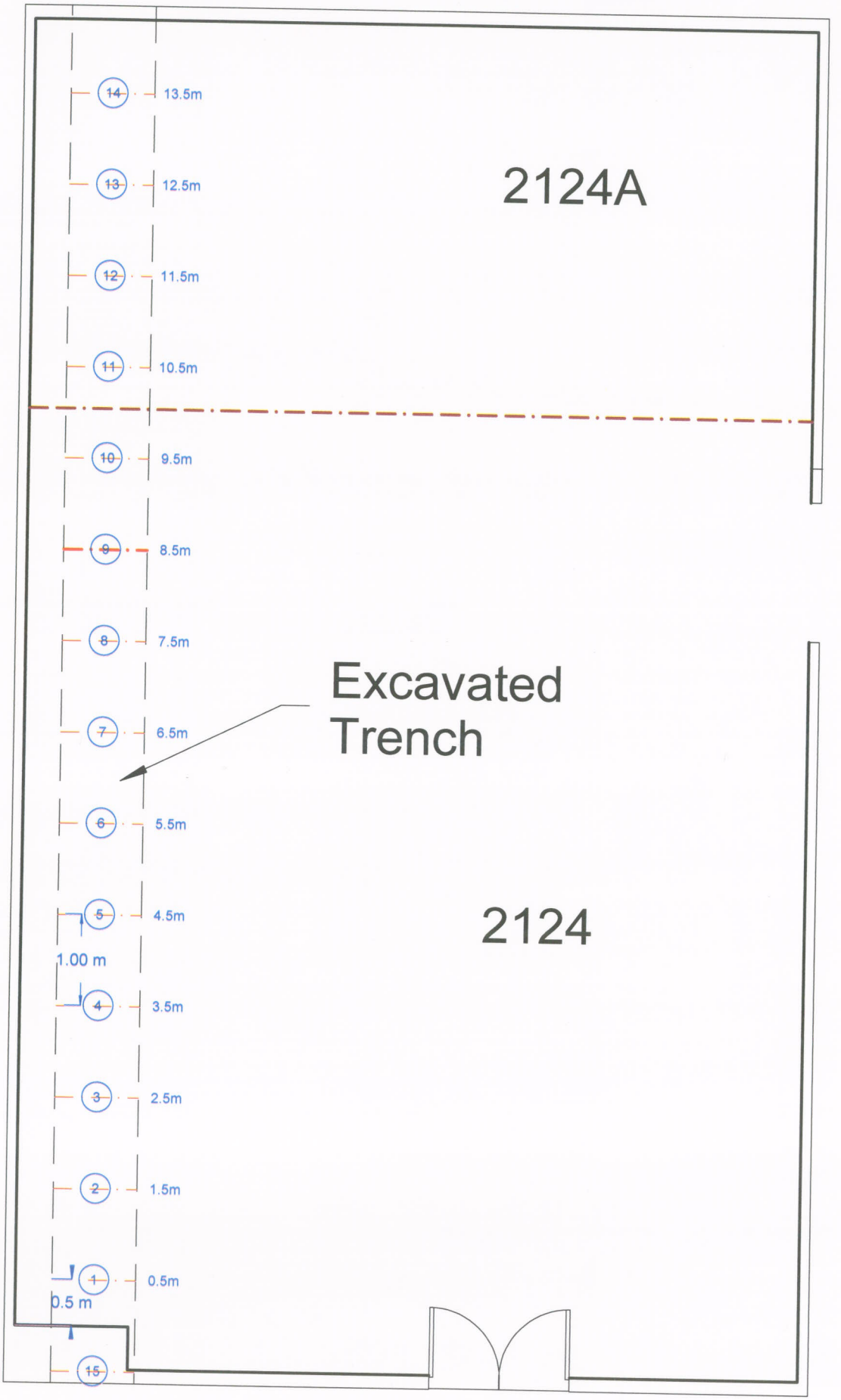
One additional soil sample added, #15, by hallway outside of Room 212H. Map modified to show 15 samples. PCE 4.7.09

Package Review

Surveyor(s) Signatures: Ed Seamans

Date Package Completed: 4/8/09

Package Reviewed by and Date (Signature): Paul Ely 4/8/09



NIST Survey Unit 013

ATTACHMENT 14 - SURVEY DOWNLOAD DATA SHEET

Download Technician: Print Name: Sean McChesney **Signature:** Sean McChesney **Date:** 4/5/09

Download Station #: x2 Download File #: 299

Serial # Verification: Model 2350-1 ☐ Detector: ☐ Problems: (See Comments)

Survey Technician(s):

Print Name: Siemers **User ID** ecs6581 **Signature:** S **Date:** 4-5-09

Print Name: _____ **User ID** _____ **Signature:** _____ **Date:** _____

Instrument Serial #(s): Model 2350-1: ~~44-4~~ 98617

Survey Unit Description: SU 13.

(Example: Survey Package + description i.e. D16, Building 43, Area 09, Room 100, Floor - Grid Locations A1 through A7)

Instrument Calibration Due Date: 11-17-09 Detector Calibration Due Date: 9-29-09

Type Of Survey: ☐ Term Survey ☐ Characterization ☐ Information Only

Other (explain): FSS

Type of Measurement	Detector Serial Number	Detector Model Number	Detector Efficiency	Source Mean BKG Value	Pre & Post Use Info	
					Pre File#	Post File#
☐ Alpha α		43-37				
☐ Beta β		43-68B				
☐ Alpha α		43-68A				
☒ Gamma γ	229174	~~44-2~~ 44-10	N/A	N/A		
☐ Alpha α		43-93				

Local Area Background Measurements — MEAN Value in cpm ↓

β Beta	1	2	3	4	5	6	
α Alpha	1	2	3	4	5	6	

COMMENTS: _____

Duratek™

M2350-1 Download Gamma Report

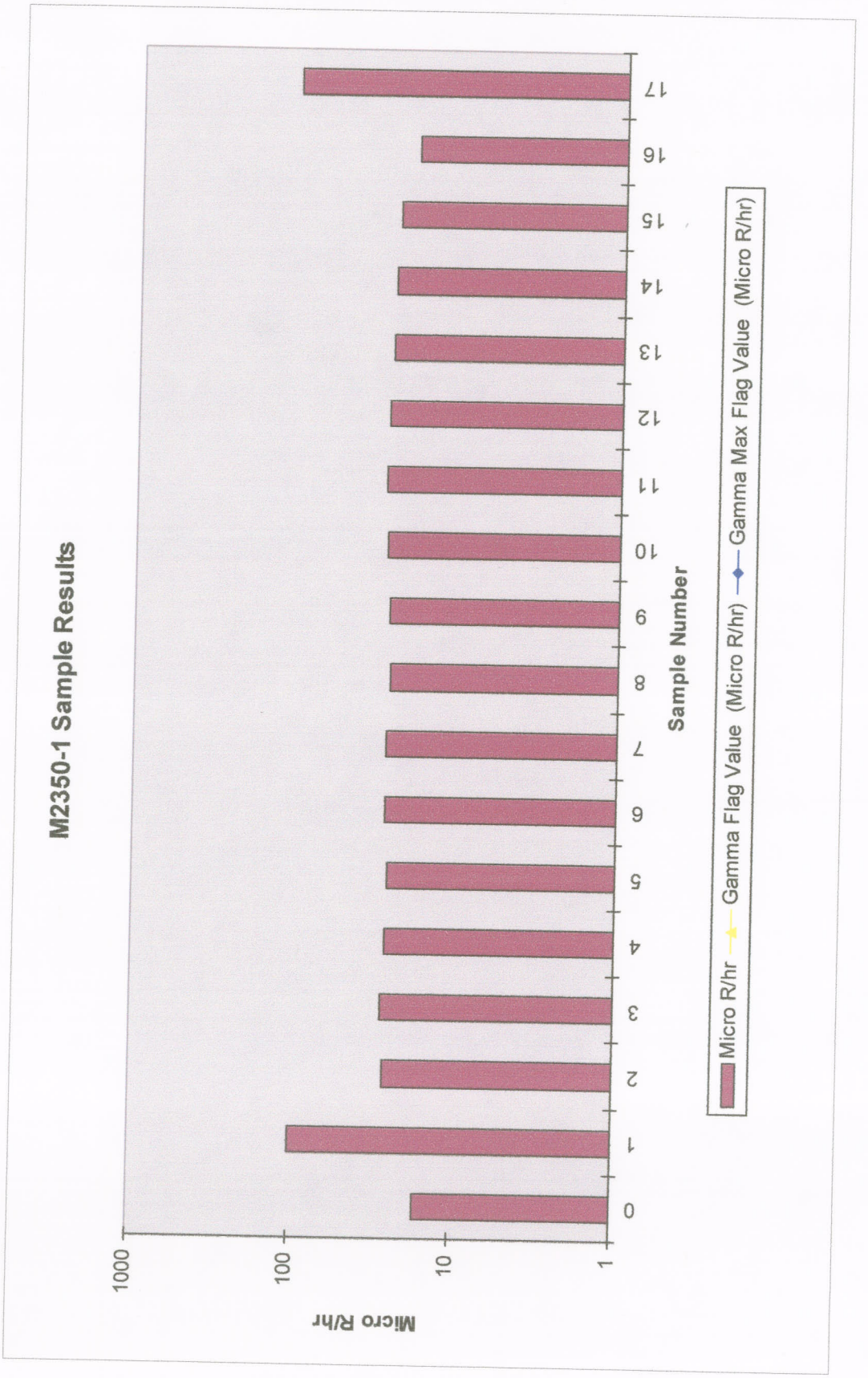
Station 2 File : 00000299	Survey Description :SU13 In side Trench	
Survey Reason : Termination		
User ID : EES6581	Technician Name : Ed Siemers	
Instrument Model : 2350-1	Instrument S/N : 98617	Instrument Cal. Due : 11/17/09
Detector Model : LMI 44-10	Detector S/N : 229174	Detector Cal. Due : 9/29/09
Measurement Type : Gamma	Detector Type : 03300 : 2x2 NaI(Tl) detector	
Cal. Constant : 58403470000		Survey Date : 4/5/09

Print Name	Signature	Date
Ed Siemers	S	4/5/09

Comments:

Sign-Off

Print Name	Signature	Date
Paul Ely	Paul Ely	4.7.09


M2350-1 Sample Results
Micro R/hr
1000
100
10
1
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
Sample Number
Micro R/hr
Gamma Flag Value (Micro R/hr)
Gamma Max Flag Value (Micro R/hr)

Duratek Gamma Survey Report

Package ID(L1)	Surface (L2)	Sample #	Counts	Time (sec)	Count Type(L5)	Material Type(L6)	Grid ID(L7)	Location # (L8)	Bkgd (cpm)	µ R/hr:
ZZZZZ	ZZZZZ	0	161,546.0	600	PRGBK	B9999	ZZZZZ	1	0	16.6
ZZZZZ	ZZZZZ	1	96,496.0	60	PRG06	B9999	ZZZZZ	1	0	99.1
SU013	T01	2	25,870.0	60	FLDCT	B9999	ZZZZZ	1	0	26.6
SU013	T01	3	26,614.0	60	FLDCT	B9999	ZZZZZ	2	0	27.3
SU013	T01	4	25,748.0	60	FLDCT	B9999	ZZZZZ	3	0	26.5
SU013	T01	5	25,133.0	60	FLDCT	B9999	ZZZZZ	4	0	25.8
SU013	T01	6	25,912.0	60	FLDCT	B9999	ZZZZZ	5	0	26.6
SU013	T01	7	26,232.0	60	FLDCT	B9999	ZZZZZ	6	0	26.9
SU013	T01	8	25,180.0	60	FLDCT	B9999	ZZZZZ	7	0	25.9
SU013	T01	9	25,792.0	60	FLDCT	B9999	ZZZZZ	8	0	26.5
SU013	T01	10	26,911.0	60	FLDCT	B9999	ZZZZZ	9	0	27.6
SU013	T01	11	27,680.0	60	FLDCT	B9999	ZZZZZ	10	0	28.4
SU013	T01	12	26,619.0	60	FLDCT	B9999	ZZZZZ	11	0	27.3
SU013	T01	13	25,820.0	60	FLDCT	B9999	ZZZZZ	12	0	26.5
SU013	T01	14	25,133.0	60	FLDCT	B9999	ZZZZZ	13	0	25.8
SU013	T01	15	23,846.0	60	FLDCT	B9999	ZZZZZ	14	0	24.5
SU013	T01	16	185,369.0	600	PTGBK	B9999	ZZZZZ	1	0	19.0
SU013	T01	17	102,567.0	60	PTG06	B9999	ZZZZZ	1	0	105.4

Gamma Flag -

Gamma Max Flag

Sunday, April 05, 2009

Field Sample Data Sheet

Project Name: NIST Boulder
Project Number: 313083.201
Instrument Model: Tennelec
Instrument Serial #: 84920
Background (cpm): 0-15 cpm

Collected By: Siemers, Ed. Initials: ES
Date Taken: 4.4.07
Instrument 2-pi Efficiency: 68.58 %
Surface Efficiency: 0.25
MDA: 9.64

Sample ID Number*	Sample Location**	Time Taken	Removable cpm	Removable dpm/100cm^2	Sample Description***
SU 013-01	See map #1	0820	See	Attached	Soil
SU 013-02	See map #2	0825			Soil
SU 013-03	See map #3	0828			Soil
SU 013-04	See map #4	0832			Soil
SU 013-05	See map #5	0835			Soil
SU 013-06	See map #6	0840			Soil
SU 013-07	See map #7	0842			Soil
SU 013-08	See map #8	0844			Soil
SU 013-09	See map #9	0848			Soil
SU 013-10	See map #10	0854			Soil
SU 013-11	See map #11	0856	See	Attached	Soil

*NXX-01-03-SL, where the first field (NXX) identifies the project(N) and area(XX), the second field (01) corresponds to the sample location number, the third field (03) corresponds to the sampling depth below grade (bgs) (e.g., 3 ft bgs), and the fourth field (SL) soil, (A) air,(AQ) aqueous, (S) sediment.
** Attach map if available
*** Clay, sand, silt, loam, sediment, vegetation, groundwater, etc.)

Field Sample Data Sheet

Project Name: NIST Boulder
Project Number: 313083.201
Instrument Model: Tennelec
Instrument Serial #: 84920
Background (cpm): 0.15 cpm

Collected By: Siemers Ed Initials: es
Date Taken: 4.4.09
Instrument 2-pi Efficiency: 68.58 %
Surface Efficiency: 0.25 %
MDA: 9.66 dpm

Sample ID Number*	Sample Location**	Time Taken	Removable cpm	Removable dpm/100cm^2	Sample Description***
SU013-12	See map # 12	0900	See	Attached	Soil
SU013-13	See map # 13	0902			Soil
SU013-14	See map # 14	0904			Soil
SU013-15	See map # 15	4-6-09 0910	See	Attached	Soil

*NXX-01-03-SL, where the first field (NXX) identifies the project(N) and area(XX), the second field (01) corresponds to the sample location number, the third field (03) corresponds to the sampling depth below grade (bgs) (e.g., 3 ft bgs), and the fourth field (SL) soil, (A) air,(AQ) aqueous, (S) sediment.
** Attach map if available
*** Clay, sand, silt, loam, sediment, vegetation, groundwater, etc.)

Tennelec XLB Series 5 - NIST Boulder - Smear Analysis

Soil

Report Revision: NIST-1 NIST09-0515

Date: 4/4/2009 9:43:42AM

Counting Unit ID: Tennelec 84920

Batch Name: Smears 3 min - 200904040943

Batch Start Time: Sat, April 04, 2009 09:43:42 AM

Geometry: 1/8" Stainless Steel

Alpha Surface Eff. (including self Absorption) %: 0.25

Beta Surface Eff. (including self Absorption) %: 0.25

Cal Due: Aug 15 2009

Background Subtract: Background Subtracted

Batch ID:

Alpha Activity Action Level (DPM): 20.00

Beta Activity Action Level (DPM): 1,000.00

Certainty Level for MDA and Flags: 95%

High Voltage Setting: 1380

Count Minutes: 3.00

Total alpha Efficiency %: 17.15

Total beta Efficiency %: 12.10

Alpha Eff. Std:	060101 Alpha Th-23
4 π Alpha Eff. %:	34.29 ± 0.30
2 π Alpha Eff. %:	68.58 ± 0.61
Alpha BG CPM:	0.08 ± 0.04
Beta Eff. Std:	079706 Beta Tc-99
4 π Beta Eff. %:	24.19 ± 0.32
2 π Beta Eff. %:	48.39 ± 0.64
Beta BG CPM:	1.65 ± 0.17

Carrier	Sample ID	Alpha Activity DPM	Alpha Activity 2 Sigma	Alpha Activity Fla	Alpha Activity MDA	Beta Activity DPM	Beta Activity 2 Sigma	Beta Activity Fla	Beta Activity MDA	Count time (min)	Alpha CPM	Beta CPM	Count Start
53	1	3.40	5.52	<MDA	8.54	2.89	13.77	<MDA	28.12	3.00	0.67	2.00	4/4/2009 12:22:21PM
54		-0.49	0.43	<MDA	8.54	5.65	14.84	<MDA	28.12	3.00	0.00	2.33	4/4/2009 12:25:34PM
55		-0.49	0.43	<MDA	8.54	5.65	14.84	<MDA	28.12	3.00	0.00	2.33	4/4/2009 12:28:47PM
56		-0.49	0.43	<MDA	8.54	5.65	14.84	<MDA	28.12	3.00	0.00	2.33	4/4/2009 12:32:00PM
57		-0.49	0.43	<MDA	8.54	5.65	14.84	<MDA	28.12	3.00	0.00	2.33	4/4/2009 12:35:13PM
58		-0.49	0.43	<MDA	8.54	-5.37	9.93	<MDA	28.12	3.00	0.00	1.00	4/4/2009 12:38:26PM
59		-0.49	0.43	<MDA	8.54	5.65	14.84	<MDA	28.12	3.00	0.00	2.33	4/4/2009 12:41:38PM
60		-0.49	0.43	<MDA	8.54	24.94	20.81	<Action Level	28.12	3.00	0.00	4.67	4/4/2009 12:44:51PM
61		-0.49	0.43	<MDA	8.54	-2.62	11.36	<MDA	28.12	3.00	0.00	1.33	4/4/2009 12:48:04PM
62		1.46	3.91	<MDA	8.54	-8.13	8.26	<MDA	28.12	3.00	0.33	0.67	4/4/2009 12:51:17PM
63		1.46	3.91	<MDA	8.54	11.16	16.76	<MDA	28.12	3.00	0.33	3.00	4/4/2009 12:54:30PM
64		-0.49	0.43	<MDA	8.54	-2.62	11.36	<MDA	28.12	3.00	0.00	1.33	4/4/2009 12:57:43PM
65		-0.49	0.43	<MDA	8.54	0.14	12.62	<MDA	28.12	3.00	0.00	1.67	4/4/2009 1:00:56PM
66	14	-0.49	0.43	<MDA	8.54	0.14	12.62	<MDA	28.12	3.00	0.00	1.67	4/4/2009 1:04:09PM

Smear out side Bag.

Soil samples go.

QA Reviewer: P C Ely

Technician: L C. Fenn

SURFACE SOIL SURVEY PLAN

Survey Plan Summary

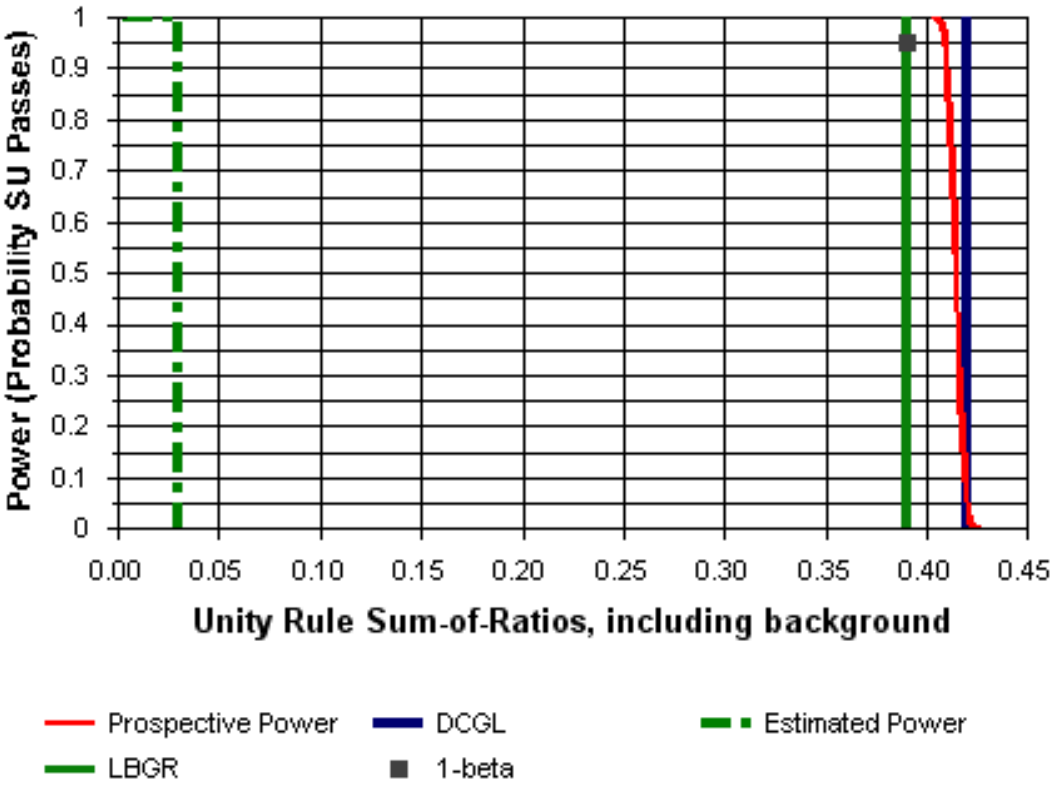
Site Name:	NIST Boulder Campus
Planner(s):	p ely
Survey Unit Name:	SU013
Comments:	N/A

Statistical Design Details

Area (m²):	27	Classification:	2
Selected Test:	Sign	Estimated Sigma (SOR):	0.01
DCGL (SOR):	0.42	Sample Size (N):	14
LBGR (SOR):	0.39	Estimated Conc. (SOR):	0.03
Alpha:	0.050	Estimated Power:	1.0
Beta:	0.050		

NOTE: SOR = Sum-of-Ratios

Prospective Power Curve



Measured Contaminant Details

Contaminant	DCGLw (pCi/g)	Modified DCGLw (pCi/g)	Survey Unit Estimate (Mean ± 1-Sigma) (pCi/g)	Reference Area Estimate (Mean ± 1-Sigma) (pCi/g)
Am-241	2.1	0.42	0.03 ± 0.01	0.03 ± 0.01

Inferred Contaminant Details (DCGL Modification)

Contaminant	DCGLw (pCi/g)	Surrogate Contaminant (pCi/g)	Ratio (Inferred/Surrogate)
Pu-238	2.5	Am-241	0.08
Pu-239	2.2	Am-241	3.1
Pu-240	2.3	Am-241	0.98
Pu-241	73	Am-241	4.7

Report Created 02/18/2009 1505 (*COMPASS v1.1.0*)

Survey Unit 013
Class 2
Soil Area Inside Rooms 2124 & 2124A

X (Max):	**3.0**	feet	0.9	meters	Estimated dimension
Y (Max):	**48.5**	feet	14.8	meters	Estimated dimension
A (Area):	146	ft^2	14	m^2	Area of Survey area
Actual Survey Area:	146	ft^2			
Required Survey Points:	**14**	0%	Percent void area		
N (Points):	**14**	14	Estimated Minimum Points		

$$L = \left[\frac{A}{N} \right]^{1/2}$$

Spacing for a square grid

L=	1.00	meters	(distance between measurement points)

Y (Random):	4.8	random generated number
Y (Origin):	8.5	initially generated random number

ORTEC g v - i (1215) env32 G53W4.09 07-APR-2009 10:16:52 Page 1
Mobile Lab Spectrum name: NT1-0081.An1

Sample description
Final Survey Unit 13 soil #01 room 2124 in trench 4/4/09

Spectrum Filename: C:\User\NT1-0081.An1

Acquisition information
Start time: 07-Apr-2009 09:06:45
Live time: 4184
Real time: 4200
Dead time: 0.38 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: NIST 250 ml Soil ReGe.Clb
250 ml Soil in Marinelli

Energy Calibration
Created: 03-Oct-2008 16:16:15
Zero offset: 0.310 keV
Gain: 0.250 keV/channel
Quadratic: -4.593E-09 keV/channel^2

Efficiency Calibration
Created: 03-Oct-2008 16:49:35
Knee Energy: 165.00 keV
Above the Knee: Quadratic Uncertainty = 0.94 %
Log(Eff): 1.725969E-02 + (-3.837367E-01*Log(E)) +
(-3.461374E-02*Log(E)^2)
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: NIST-Lib1.Lib
Library Match Width: 0.400
Peak stripping: Library based

Analysis parameters
Analysis engine: env32 G53W4.09
Start channel: 67 (17.05keV)
Stop channel: 8000 (1999.37keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.5570E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5570E+02) =
2.8114E+03
Detection limit method: Traditional ORTEC method

Random error: 1.0000000E+00

ORTEC g v - i (1215) env32 G53W4.09 07-APR-2009 10:16:52 Page 2
Mobile Lab Spectrum name: NT1-0081.An1

Page 1

Final Survey Unit 013 #01 soil Rm. 2124 trench 4-4-09.txt

Systematic error: 1.0000000E+00
Fraction Limit: 0.000%
Background width: best method (based on spectrum).

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	Air Filter in Petris ReGe.Pbc 07-Oct-2008 08:47:29
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks allocated 23 cutoff 10.00000 %
Energy Calibration
Normalized diff: 0.1586

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. pCi/g	Nuc
17.45	89.	25.58	0.54	0.000E+00				
46.54	219.	18.02	0.93	4.139E-02	46.52	4.000	1.727E+00	PB210
53.44	58.	51.07	1.02	5.173E-02	53.20	1.100	1.838E+00	PB214
					53.23	1.105	1.828E+00	PB214
63.46	214.	21.77	0.87	6.228E-02	63.29	3.900	1.149E+00	TH234
74.95	881.	5.56	0.92	6.431E-02	74.81	9.600	2.593E+00	PB212
					74.81	6.330	3.858E+00	PB214
77.27	1404.	3.77	0.92	6.472E-02	77.11	17.500	2.216E+00	PB212
					77.11	10.700	3.683E+00	PB214
84.20	158.	22.39	0.93	6.594E-02				
87.30	420.	9.53	0.93	6.649E-02	87.20	3.700	3.102E+00	PB214
					87.20	6.300	1.788E+00	PB212
90.13	276.	13.09	0.93	6.655E-02	89.80	1.030	7.143E+00	PB214
92.46	108.	23.97	0.93	6.641E-02	92.38	2.570	6.902E-01	TH234
93.25	432.	9.12	0.94	6.636E-02				
209.42	179.	20.40	0.96	4.869E-02	209.40	4.553	1.373E+00	AC228
238.78	1907.	2.98	0.97	4.408E-02	238.63	43.100	1.791E+00	PB212
241.77	240.	14.79	1.70	4.365E-02	241.92	7.470	1.339E+00	PB214
277.96	87.	31.54	1.05	3.929E-02	277.36	6.500	6.215E-01	TL208
295.51	392.	9.17	1.09	3.741E-02	295.22	19.200	9.830E-01	PB214
300.13	116.	23.73	0.98	3.696E-02	300.09	3.270	1.748E+00	PB212
328.00	-9.	0.00	0.00	3.448E-02	328.00	3.364	PBC<MDA	AC228
338.52	416.	9.09	0.87	3.364E-02	338.40	12.010	1.805E+00	AC228
352.14	618.	5.87	1.04	3.261E-02	351.99	37.100	8.952E-01	PB214
463.00	-10.	0.00	0.00	2.620E-02	463.00	4.640	PBC<MDA	AC228
511.02	315.	11.86	1.56	2.418E-02	510.72	22.500	5.686E-01	TL208
583.43	571.	5.81	1.37	2.169E-02	583.14	86.000	5.432E-01	TL208

ORTEC g v - i (1215) env32 G53W4.09 07-APR-2009 10:16:52 Page 3
Mobile Lab Spectrum name: NT1-0081.An1

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
609.56	451.	6.50	1.19	2.092E-02	609.32	46.090	8.011E-01	BI214
768.72	45.	40.89	0.48	1.724E-02	768.36	4.885	9.656E-01	BI214

Page 2

860.60	83.	18.58	1.32	1.566E-02	860.47	12.000	8.015E-01	TL208
911.56	426.	6.42	1.10	1.491E-02				
933.54	6.	65.40	0.43	1.460E-02	934.05	3.165	PBC<MDA	BI214
965.09	68.	21.12	1.37	1.421E-02	964.60	5.452	1.601E+00	AC228
1120.55	100.	15.76	0.53	1.248E-02	1120.28	15.040	9.721E-01	BI214
1238.54	66.	25.64	0.61	1.144E-02	1238.11	5.916	1.783E+00	BI214
1377.90	39.	25.07	1.84	1.041E-02	1377.65	4.020	1.675E+00	BI214
1461.13	1862.	2.39	1.87	9.882E-03	1460.75	10.700	3.086E+01	K40
1729.45	23.	20.85	0.62	8.499E-03	1729.60	3.047	1.613E+00	BI214
1764.96	80.	12.84	0.95	8.347E-03	1764.51	15.920	1.086E+00	BI214

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Centroid Channel	Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
68.58	17.45	184.	89.	0.021	51.16	0.539	MO-99	s
298.69	74.96	2589.	723.	0.173	21.26	0.919	PB-214	D
335.89	84.18	514.	195.	0.047	35.82	0.927	TA-182	D
348.40	87.38	2108.	388.	0.093	34.98	0.930	PB-214	D
359.60	90.10	515.	240.	0.057	29.71	0.933	PB-214	D
372.10	93.22	601.	390.	0.093	20.44	0.936	U-235	D
3646.41	911.56	62.	426.	0.102	12.84	1.097	AC-228	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: NIST-Lib1.Lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
PB-210	184.99	46.54	508.	157.	0.038	36.04	0.929
PB-214	212.58	53.44	250.	58.	0.014	102.13	1.018
PB-214	0.00	53.23	9.	0.	0.000	0.00	0.000
TH-234	252.69	63.46	712.	154.	0.037	43.54	0.874
PB-212	298.10	74.81	829.	608.	0.145	0.23	0.777A
PB-214	298.10	74.81	1150.	119.	0.029	81.20	0.492A
BI-214	0.00	76.86	0.	0.	0.000	0.00	0.000
PB-212	307.30	77.11	707.	1115.	0.266	0.13	0.921A
PB-214	307.30	77.11	685.	353.	0.084	0.38	0.921A
NP-237	344.83	86.49	874.	0.	0.000	0.00	0.929D
PB-214	0.00	89.80	6.	0.	0.000	0.00	0.000

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
TH-234	368.40	92.38	936.	108.	0.026	47.94	0.935A
TH-234	370.08	92.80	1022.	126.	0.030	54.01	0.935A
AC-228	836.73	209.42	341.	168.	0.040	40.81	0.963
PB-212	954.21	238.78	426.	1875.	0.448	5.95	0.971
PB-214	966.18	241.77	349.	240.	0.057	29.58	1.701s
AC-228	0.00	270.30	8.	0.	0.000	0.00	0.000
TL-208	1111.00	277.96	256.	87.	0.021	63.08	1.048s
PB-214	1181.22	295.51	228.	389.	0.093	18.34	1.086
PB-212	1199.70	300.13	194.	116.	0.028	47.45	0.976

AC-228	0.00	328.00	9.	0.	0.000	0.00	0.000
AC-228	1353.31	338.52	247.	402.	0.096	18.17	0.872
PB-214	1407.81	352.14	195.	597.	0.143	11.73	1.038
AC-228	0.00	463.00	10.	0.	0.000	0.00	0.000
TL-208	2043.56	511.02	361.	170.	0.041	23.71	1.561s
TL-208	2333.33	583.43	127.	558.	0.133	11.62	1.374s
BI-214	2437.90	609.56	124.	425.	0.102	13.01	1.190
BI-214	0.00	665.45	0.	0.	0.000	0.00	0.000
BI-214	3074.80	768.72	105.	45.	0.011	81.77	0.479s
PB-214	0.00	785.95	1.	0.	0.000	0.00	0.000
AC-228	0.00	794.80	14.	0.	0.000	0.00	0.000
BI-214	0.00	806.17	0.	0.	0.000	0.00	0.000
TL-208	3442.51	860.60	62.	83.	0.020	37.17	1.322
AC-228	3644.00	910.95	321.	0.	0.000	0.00	0.000s
AC-228	3860.63	965.09	50.	68.	0.016	42.23	1.371
AC-228	0.00	968.90	9.	0.	0.000	0.00	0.000
BI-214	4482.77	1120.55	53.	100.	0.024	31.53	0.529s
BI-214	0.00	1155.19	0.	0.	0.000	0.00	0.000
BI-214	4954.98	1238.54	58.	66.	0.016	51.27	0.607s
BI-214	0.00	1280.96	0.	0.	0.000	0.00	0.000
BI-214	5512.69	1377.90	21.	39.	0.009	50.13	1.840
BI-214	0.00	1401.50	0.	0.	0.000	0.00	0.000
K-40	5845.82	1461.13	85.	1797.	0.430	4.78	1.869
BI-214	6648.00	1661.57	2.	0.	0.000	0.00	0.000s
BI-214	6919.68	1729.45	0.	23.	0.005	41.70	0.625s
BI-214	7061.79	1764.96	4.	80.	0.019	25.69	0.945s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity pCi/g	Peak Energy keV	Peak Activity pCi/g	Peak Code	Peak MDA Value pCi/g	COMMENTS
AM-241		0.0000E+00					
			59.54	0.000E+00	&	2.109E-02	209.75 G

Nuclide		Ave activity	Energy	Activity	Code	Peak MDA	Comments
K-40	N	3.0861E+01					
			1460.75	3.086E+01	(P	2.322E-01	2.39 G
RA-226	M	0.0000E+00					
			185.99	0.000E+00	*(		13.09 G
PB-212	N	1.7880E+00					
			238.63	1.791E+00	(P	2.838E-02	2.98 G K
			77.11	1.788E+00	} P	1.023E-01	Energy duplication 0.06 X
			74.81	1.788E+00	}	1.651E-01	Energy duplication 0.12 X
			87.20	1.299E-01	} P	1.702E-01	Energy duplication 91.09 G
			300.09	1.748E+00	(	3.033E-01	23.73 G

TH-234	N	1.1490E+00						
			63.29	1.149E+00	(P	2.861E-01	21.77	G
			92.80	1.149E+00	} P	4.234E-01	27.01	G
			92.38	1.149E+00	} P	4.814E-01	23.97	G
PB-210	N	1.7269E+00						
			46.52	1.727E+00	(P	3.553E-01	18.02	G
PB-214	N	9.2516E-01						
			351.99	8.952E-01	(P	3.043E-02	5.87	G K
			295.22	9.830E-01	(P	5.522E-02	9.17	G
							Energy duplication	
			77.11	9.252E-01	}	9.841E-02	0.19	X
			241.92	1.339E+00	+ P	1.940E-01	14.79	G
							Energy duplication	
			74.81	5.327E-01	} P	2.178E-01	40.60	X
							Energy duplication	
			87.20	0.000E+00	}	2.926E-01	2782.09	X
			53.23	0.000E+00	P	2.057E-01	0.00	G
			53.20	1.838E+00	+ P	8.082E-01	51.07	G
			785.95	0.000E+00	P	2.374E-01	0.00	G
			89.80	0.000E+00	P	1.469E-01	0.00	G
BI-214	N	8.1683E-01						
			609.32	8.011E-01	(P	3.055E-02	6.50	G
			1764.51	1.086E+00	+	1.841E-01	12.84	G
			1120.28	9.721E-01	+ P	1.741E-01	15.76	G
			1238.11	1.783E+00	+ P	4.363E-01	25.64	G
			768.36	9.656E-01	(P	3.238E-01	40.89	G
			1377.65	1.675E+00	+ P	4.975E-01	25.07	G
			934.05	0.000E+00	% P	4.091E-01	65.40	G
			1729.60	1.613E+00	+	5.120E-01	20.85	G
			1407.98	0.000E+00	%	3.590E-01	297.91	G
			1509.19	0.000E+00	%	2.210E-01	169.97	G
			1847.44	0.000E+00	%	5.794E-01	626.28	G
			1155.19	0.000E+00		8.843E-02	0.00	G
			665.45	0.000E+00		5.973E-02	0.00	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1280.96	0.000E+00		1.110E-01	0.00 G
		1401.50	0.000E+00		1.278E-01	0.00 G
		806.17	0.000E+00		8.933E-02	0.00 G
		1661.28	0.000E+00	?	4.590E-01	0.00 G
		79.29	0.000E+00	%	1.740E+00	221.62 X
		76.86	0.000E+00		7.804E-02	0.00 X
TL-208	N	5.5260E-01				
		583.14	5.432E-01	@(P	1.599E-02	5.81 G K
		510.72	5.686E-01	*(P	9.127E-02	11.86 G
		860.47	8.015E-01	+ P	1.694E-01	18.58 G
		277.36	6.215E-01	&(P	1.644E-01	31.54 G
AC-228	N	0.0000E+00				
		911.07	0.000E+00	? P	1.282E-01	30.96 G K
		968.90	0.000E+00	P	4.875E-02	0.00 G
		338.40	1.805E+00	$ P	1.642E-01	9.09 G
		964.60	1.601E+00	? P	3.721E-01	21.12 G
		794.80	0.000E+00	P	1.763E-01	0.00 G
		463.00	0.000E+00	P	1.043E-01	0.00 G

			209.40	1.373E+00	$ P	2.655E-01	20.40 G
			270.30	0.000E+00	P	7.266E-02	0.00 G
			1587.90	0.000E+00	% P	5.749E-01	201.00 G
			328.00	0.000E+00	P	1.045E-01	0.00 G
BI-212	N	0.0000E+00					
			727.17	0.000E+00	?(	1.656E-01	18.41 G K
			1620.56	0.000E+00	%	3.824E-01	134.77 G
			785.42	0.000E+00	%	4.953E-01	992.47 G
			39.86	0.000E+00	(	1.469E+00	42.66 G
NP-237	M	0.0000E+00					
			86.49	0.000E+00	%		0.00 G K
			95.87	0.000E+00	& P		216.88 G
CS-137	M	0.0000E+00					
			661.62	0.000E+00	&		135.40 G
U-235	M	0.0000E+00					
			185.72	0.000E+00	(		14.66 G K
			143.76	0.000E+00	&		104.69 G
U-234	M	0.0000E+00					
			53.20	0.000E+00	?(		87.41 G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.

! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****
Time of Count Uncertainty 2 Sigma

Nuclide	Activity pCi/g	Counting pCi/g	Total pCi/g
AM-241 <	2.1090E-02		
K-40	3.0861E+01	1.529E+00	1.937E+00
PB-212	1.7880E+00	1.083E-01	1.283E-01
TH-234	1.1490E+00	6.970E-01	6.983E-01
PB-210	1.7269E+00	8.663E-01	8.687E-01
PB-214	9.2516E-01	1.023E-01	1.083E-01
BI-214	8.1683E-01	1.126E-01	1.169E-01
TL-208	5.5260E-01	6.571E-02	6.908E-02
AC-228 B<	1.2822E-01		
BI-212 <	1.6556E-01		

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

S U M M A R Y

Total Activity (95.8 to 1999.4 keV) 3.7819309E+01 pCi/g

ORTEC g v - i (1215) env32 G53W4.09 07-APR-2009 10:16:52 Page 8
Mobile Lab Spectrum name: NT1-0081.An1

The library has energies which are not separable.

Analyzed by: SC. Lena
EnergySolutions

Reviewed by: PC Ely
Supervisor

Laboratory: Mobile Lab

ORTEC g v - i (1215) env32 G53W4.09 07-APR-2009 08:55:36 Page 1
Mobile Lab Spectrum name: NT1-0080.An1

Sample description
Final Survey Unit 13 Soil #2 Rm. 2124 Trench 4/4/09

Spectrum Filename: C:\User\NT1-0080.An1

Acquisition information
Start time: 07-Apr-2009 07:45:29
Live time: 4183
Real time: 4200
Dead time: 0.40 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: NIST 250 ml Soil ReGe.Clb
250 ml Soil in Marinelli

Energy Calibration
Created: 03-Oct-2008 16:16:15
Zero offset: 0.310 keV
Gain: 0.250 keV/channel
Quadratic: -4.593E-09 keV/channel^2

Efficiency Calibration
Created: 03-Oct-2008 16:49:35
Knee Energy: 165.00 keV
Above the Knee: Quadratic Uncertainty = 0.94 %
Log(Eff): 1.725969E-02 + (-3.837367E-01*Log(E)) + (-3.461374E-02*Log(E)^2)
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: NIST-Lib1.Lib
Library Match Width: 0.400
Peak stripping: Library based

Analysis parameters
Analysis engine: env32 G53W4.09
Start channel: 67 (17.05keV)
Stop channel: 8000 (1999.37keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.7690E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.7690E+02) = 2.6532E+03
Detection limit method: Traditional ORTEC method

Random error: 1.0000000E+00

ORTEC g v - i (1215) env32 G53W4.09 07-APR-2009 08:55:36 Page 2
Mobile Lab Spectrum name: NT1-0080.An1

Final Survey Unit 013 #02 soil Rm. 2124 trench 4-4-09.txt

Systematic error: 1.0000000E+00
Fraction Limit: 0.000%
Background width: best method (based on spectrum).

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	Air Filter in Petris ReGe.Pbc 07-Oct-2008 08:47:29
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks allocated 29 cutoff 10.00000 %

Energy Calibration
Normalized diff: 0.2274

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. pCi/g	Nuc
17.73	1073.	7.67	1.16	0.000E+00				
40.26	108.	52.82	0.47	3.163E-02				
46.84	205.	21.28	0.87	4.185E-02	46.52	4.000	1.485E+00	PB210
53.40	117.	37.68	1.45	5.178E-02	53.20	1.100	3.528E+00	PB214
					53.23	1.105	3.508E+00	PB214
63.53	220.	21.36	0.85	6.229E-02	63.29	3.900	1.123E+00	TH234
74.95	910.	5.62	0.92	6.431E-02	74.81	9.600	2.528E+00	PB212
					74.81	6.330	3.762E+00	PB214
76.64	87.	48.39	0.92	6.461E-02				
76.64	87.	48.39	0.92	6.461E-02	76.86	0.360	6.413E+00	BI214
77.30	1323.	4.05	0.92	6.472E-02	77.11	17.500	1.968E+00	PB212
					77.11	10.700	3.275E+00	PB214
87.38	434.	9.42	0.93	6.650E-02	87.20	3.700	3.023E+00	PB214
					87.20	6.300	1.743E+00	PB212
90.13	291.	12.99	0.93	6.655E-02	89.80	1.030	7.113E+00	PB214
92.42	112.	24.91	0.93	6.641E-02	92.38	2.570	PBC<MDA	TH234
93.09	366.	11.08	0.94	6.637E-02	92.80	3.000	2.869E+00	TH234
93.53	65.	58.93	0.94	6.634E-02				
129.11	176.	21.65	0.82	6.341E-02				
143.24	38.	99.01	0.24	6.093E-02	143.76	10.500	1.014E-01	U235
170.47	32.	56.08	0.33	5.678E-02				
186.05	258.	14.47	1.06	5.321E-02	185.72	54.000	1.331E-01	U235
					185.99	3.280	2.537E+00	RA226
209.36	179.	20.32	1.52	4.870E-02	209.40	4.553	1.386E+00	AC228
238.80	2147.	2.43	1.06	4.408E-02	238.63	43.100	1.907E+00	PB212
241.71	266.	12.12	1.06	4.368E-02	241.92	7.470	1.365E+00	PB214
270.31	158.	19.40	1.12	4.008E-02	270.30	3.770	1.702E+00	AC228
277.87	100.	25.66	1.25	3.929E-02	277.36	6.500	6.739E-01	TL208
295.48	370.	9.05	1.05	3.741E-02	295.22	19.200	8.742E-01	PB214
300.17	147.	20.00	1.41	3.696E-02	300.09	3.270	2.085E+00	PB212

Final Survey Unit 013 #02 soil Rm. 2124 trench 4-4-09.txt

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
328.20	103.	28.11	1.08	3.448E-02	328.00	3.364	1.525E+00	AC228
338.54	402.	7.47	1.18	3.363E-02	338.40	12.010	1.645E+00	AC228
352.12	646.	5.64	1.03	3.261E-02	351.99	37.100	8.853E-01	PB214
463.13	96.	19.13	0.68	2.620E-02	463.00	4.640	1.354E+00	AC228
511.04	261.	12.51	0.86	2.418E-02	510.72	22.500	3.680E-01	TL208
583.41	631.	5.44	1.43	2.169E-02	583.14	86.000	5.672E-01	TL208
609.52	407.	7.66	1.49	2.092E-02	609.32	46.090	6.782E-01	BI214
727.61	209.	11.04	1.29	1.805E-02	727.17	11.800	1.619E+00	BI212
785.96	9.	7.02	0.53	1.691E-02	785.95	1.090	1.734E+00	PB214
795.14	90.	16.54	1.39	1.676E-02	794.80	4.843	1.911E+00	AC228
860.82	89.	16.95	1.27	1.566E-02	860.47	12.000	8.112E-01	TL208
911.37	494.	5.95	1.64	1.491E-02	911.07	29.000	1.874E+00	AC228
933.80	38.	35.46	0.33	1.460E-02	934.05	3.165	1.408E+00	BI214
964.86	93.	22.23	1.56	1.421E-02	964.60	5.452	2.058E+00	AC228
969.31	272.	8.04	1.52	1.415E-02	968.90	17.460	1.819E+00	AC228
1238.11	73.	28.64	0.62	1.144E-02	1238.11	5.916	1.839E+00	BI214
1461.15	2008.	2.28	1.75	9.882E-03	1460.75	10.700	3.150E+01	K40
1509.46	16.	45.50	0.60	9.602E-03	1509.19	2.192	1.330E+00	BI214
1587.73	-8.	0.00	0.29	9.176E-03	1587.90	3.712	PBC<MDA	AC228
1621.00	26.	18.57	0.54	9.011E-03	1620.56	2.750	1.781E+00	BI212
1764.90	74.	12.75	1.12	8.347E-03	1764.51	15.920	9.610E-01	BI214
1847.19	2.	88.71	0.33	8.008E-03	1847.44	2.123	PBC<MDA	BI214

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
69.71	17.73	1900.	1073.	0.256	15.34	1.160	MO-99	SM
159.85	40.26	484.	108.	0.026	105.64	0.467	EU-152	SM
298.71	74.96	2744.	777.	0.186	20.37	0.919	PB-214	D
305.42	76.64	844.	87.	0.021	96.78	0.921	PB-212	D
359.72	90.13	579.	279.	0.067	27.18	0.933	PB-214	D
373.00	93.53	712.	65.	0.016	117.85	0.937	U-235	D
515.36	129.11	403.	176.	0.042	43.30	0.818	AC-228	
680.86	170.47	145.	32.	0.008	112.15	0.334	-	S
2910.30	727.61	89.	172.	0.041	21.78	1.446	J-132	D

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: NIST-Lib1.Lib

ORTEC g v - i (1215) env32 G53W4.09 07-APR-2009 08:55:36 Page 4
Mobile Lab Spectrum name: NT1-0080.An1

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
BI-212	0.00	39.86	3.	0.	0.000	0.00	0.000
PB-210	186.17	46.84	628.	143.	0.034	42.56	0.872s
PB-214	0.00	53.20	9.	0.	0.000	0.00	0.000
PB-214	212.43	53.40	396.	117.	0.028	75.37	1.452s
TH-234	252.97	63.53	759.	159.	0.038	42.72	0.853

Page 3

PB-212	298.10	74.81	904.	654.	0.156	0.22	0.771A
PB-214	298.10	74.81	1217.	104.	0.025	96.51	0.427A
BI-214	0.00	76.86	0.	0.	0.000	0.00	0.000
PB-212	307.30	77.11	713.	871.	0.208	12.48	0.921A
PB-214	307.30	77.11	691.	356.	0.085	0.37	0.921A
NP-237	344.76	86.47	736.	0.	0.000	0.00	0.929
PB-214	347.68	87.20	602.	126.	0.030	1.05	1.142A
PB-212	347.68	87.20	610.	318.	0.076	26.57	1.142A
PB-214	0.00	89.80	6.	0.	0.000	0.00	0.000
TH-234	368.40	92.38	1097.	112.	0.027	49.81	0.935A
TH-234	370.08	92.80	712.	131.	0.031	58.42	0.935A
U-235	571.89	143.24	431.	38.	0.009	198.02	0.242s
U-235	743.20	186.05	395.	223.	0.053	28.94	1.063
RA-226	0.00	185.99	0.	0.	0.000	0.00	0.000
AC-228	836.47	209.36	369.	179.	0.043	40.64	1.515s
PB-212	954.20	238.78	403.	2015.	0.482	5.60	1.049
PB-214	965.85	241.69	421.	239.	0.057	33.63	1.549s
AC-228	1080.58	270.36	244.	135.	0.032	41.79	1.064
TL-208	1110.60	277.87	211.	100.	0.024	51.31	1.249s
PB-214	1181.07	295.48	198.	367.	0.088	18.11	1.053
PB-212	1199.85	300.17	205.	147.	0.035	40.00	1.409s
AC-228	1312.03	328.20	242.	103.	0.025	56.23	1.077
AC-228	1353.39	338.54	163.	388.	0.093	14.93	1.182
PB-214	1407.75	352.12	200.	625.	0.149	11.29	1.030
AC-228	1851.96	463.13	108.	96.	0.023	38.27	0.676s
TL-208	2043.68	511.04	366.	119.	0.028	25.43	0.859s
TL-208	2333.27	583.41	130.	618.	0.148	10.89	1.430
BI-214	2437.76	609.52	146.	382.	0.091	15.32	1.492
BI-212	3141.64	785.42	54.	0.	0.000	0.00	1.487A
PB-214	3143.76	785.95	35.	9.	0.002	14.04	0.533A
AC-228	3180.53	795.14	62.	90.	0.022	33.09	1.394
BI-214	0.00	806.17	0.	0.	0.000	0.00	0.000
TL-208	3443.40	860.82	60.	89.	0.021	33.90	1.272
AC-228	3644.47	911.07	105.	440.	0.105	12.79	1.623D
BI-214	3735.41	933.80	62.	38.	0.009	70.93	0.327s
AC-228	3859.73	964.86	80.	93.	0.022	44.46	1.559
AC-228	3877.52	969.31	55.	262.	0.063	16.08	1.516
BI-214	0.00	1155.19	0.	0.	0.000	0.00	0.000
BI-214	4953.26	1238.11	71.	73.	0.017	57.28	0.619s

ORTEC g v - i (1215) env32 G53W4.09 07-APR-2009 08:55:36 Page 5
Mobile Lab Spectrum name: NT1-0080.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
BI-214	0.00	1401.50	0.	0.	0.000	0.00	0.000
BI-214	5632.50	1407.83	4.	0.	0.000	0.00	0.292s
K-40	5845.89	1461.15	80.	1943.	0.465	4.56	1.749
BI-214	6039.22	1509.46	12.	16.	0.004	90.99	0.596s
AC-228	6352.50	1587.73	18.	0.	0.000	0.00	0.292s
BI-212	6485.62	1621.00	3.	26.	0.006	37.14	0.542s
BI-214	7061.58	1764.90	4.	74.	0.018	25.50	1.118s
BI-214	7390.92	1847.19	1.	2.	0.001	177.42	0.331s

S - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity pCi/g	Peak Energy kev	Peak Activity pCi/g	Peak Code	Peak MDA Value pCi/g	COMMENTS

AM-241		0.0000E+00						
			59.54	0.000E+00	&(	2.480E-02	55.04	G
K-40	N	3.1496E+01						
			1460.75	3.150E+01	(P	2.129E-01	2.28	G
RA-226	M	0.0000E+00						
			185.99	0.000E+00			0.00	G
PB-212	N	1.8171E+00						
			238.63	1.817E+00	(P	2.605E-02	2.80	G K
			77.11	1.318E+00	} P	9.481E-02	Energy duplication 6.24	X
			74.81	1.817E+00	}	1.621E-01	Energy duplication 0.11	X
			87.20	1.302E+00	} P	1.460E-01	Energy duplication 13.29	G
			300.09	2.085E+00	+	3.834E-01	20.00	G
TH-234	N	1.1235E+00						
			63.29	1.123E+00	(P	2.786E-01	21.36	G
			92.80	1.123E+00	} P	3.900E-01	29.21	G
			92.38	1.123E+00	} P	4.832E-01	24.91	G
PB-210	N	1.4850E+00						
			46.52	1.485E+00	(P	3.723E-01	21.28	G
PB-214	N	8.8155E-01						
			351.99	8.853E-01	(P	2.905E-02	5.64	G K
			295.22	8.742E-01	(P	4.871E-02	9.05	G
			77.11	8.816E-01	}	9.329E-02	Energy duplication 0.19	X
			241.92	1.256E+00	+ P	1.937E-01	16.82	G
			74.81	4.386E-01	} P	2.114E-01	Energy duplication 48.25	X

□

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		87.20	8.816E-01 }		3.301E-01	0.53 X
		53.23	3.508E+00 +	P	9.745E-01	37.68 G
		53.20	0.000E+00	P	1.953E-01	0.00 G
		785.95	8.816E-01 }	P	1.014E+00	7.02 G
		89.80	0.000E+00	P	1.386E-01	0.00 G
BI-214	N 6.7822E-01					
		609.32	6.782E-01	(P	3.131E-02	7.66 G
		1764.51	9.610E-01 +		1.677E-01	12.75 G
		1120.28	0.000E+00 %	P	1.421E-01	255.15 G
		1238.11	1.839E+00 +	P	4.428E-01	28.64 G
		768.36	0.000E+00 %	P	1.935E-01	241.74 G
		1377.65	0.000E+00 %	P	4.338E-01	1044.03 G
		934.05	1.408E+00 +	P	5.434E-01	35.46 G
		1729.60	0.000E+00 %		4.929E-01	215.06 G
		1407.98	0.000E+00 ?		2.285E-01	0.00 G
		1509.19	1.330E+00 +		6.515E-01	45.50 G
		1847.44	2.184E-01 -		3.025E-01	88.71 G
		1155.19	0.000E+00		8.347E-02	0.00 G
		665.45	0.000E+00 %		6.667E-01	171.65 G

			1280.96	0.000E+00 %	4.659E-01	354.34	G
			1401.50	0.000E+00	1.206E-01	0.00	G
			806.17	0.000E+00	8.432E-02	0.00	G
			1661.28	0.000E+00 %	4.333E-01	158.11	G
			79.29	0.000E+00 %	1.548E+00	2877.64	X
			76.86	0.000E+00	7.366E-02	0.00	X
TL-208	N	5.6723E-01					
			583.14	5.672E-01 (P	1.530E-02	5.44	G K
			510.72	3.744E-01 - P	9.966E-02	12.72	G
			860.47	8.112E-01 + P	1.621E-01	16.95	G
			277.36	6.739E-01 & P	1.708E-01	25.66	G
AC-228	N	1.7583E+00					
			911.07	1.744E+00 (P	5.942E-02	6.40	G K
			968.90	1.819E+00 (P	7.621E-02	8.04	G
			338.40	1.645E+00 (P	7.882E-02	7.47	G
			964.60	2.058E+00 (P	2.913E-01	22.23	G
			794.80	1.911E+00 (P	2.452E-01	16.54	G
			463.00	1.354E+00 - P	2.919E-01	19.13	G
			209.40	1.386E+00 - P	2.598E-01	20.32	G
			270.30	1.534E+00 ?(P	2.562E-01	20.89	G
			1587.90	0.000E+00 ? P	3.871E-01	0.00	G
			328.00	1.525E+00 (P	3.325E-01	28.11	G
BI-212	N	0.0000E+00					
			727.17	0.000E+00 % P	1.868E-01	80.27	G K
			1620.56	1.781E+00 P	5.626E-01	18.57	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		785.42	0.000E+00 }		5.522E-01	0.00 G
		39.86	0.000E+00	P	1.905E-01	0.00 G
NP-237	M 0.0000E+00					
		86.49	0.000E+00			0.00 G K
		95.87	0.000E+00 %	P		510.51 G
CS-137	M 0.0000E+00					
		661.62	0.000E+00 %			268.74 G
U-235	M 1.2794E-01					
		185.72	1.331E-01 (P			14.47 G K
		143.76	1.014E-01 &(			99.01 G
U-234	M 0.0000E+00					
		53.20	0.000E+00 (			46.28 G

Ra-226 PCE 4.7.09

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
\+ - Peak activity higher than counting uncertainty range.
\- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.

& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

ORTEC g v - i (1215) env32 G53W4.09 07-APR-2009 08:55:36 Page 8
Mobile Lab Spectrum name: NT1-0080.An1

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity pCi/g	Uncertainty Counting 2 Sigma pCi/g	Total pCi/g
AM-241 <	2.4804E-02		
K-40	3.1496E+01	1.485E+00	1.917E+00
PB-212	1.8171E+00	1.033E-01	1.248E-01
TH-234	1.1235E+00	6.622E-01	6.635E-01
PB-210 #	1.4850E+00	9.040E-01	9.057E-01
PB-214	8.8155E-01	9.549E-02	1.013E-01
BI-214	6.7822E-01	1.108E-01	1.138E-01
TL-208	5.6723E-01	6.305E-02	6.673E-02
AC-228	1.7583E+00	2.355E-01	2.450E-01
BI-212 B<	1.8679E-01		
~~U-235~~	~~1.2794E-01~~	~~4.281E-02~~	~~4.310E-02~~

Ra-226 PCE 4.7.09

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

S U M M A R Y

Total Activity (785.8 to 1999.4 keV) 3.9934349E+01 pCi/g

The library has energies which are not separable.

Analyzed by: LC. Lane
EnergySolutions

Reviewed by: PCE 4/9
Supervisor

Laboratory: Mobile Lab

ORTEC g v - i (1215) env32 G53W4.09 06-APR-2009 15:33:46 Page 1
Mobile Lab Spectrum name: NT2-0059.An1

Sample description
Final Survey Unit 13 #03 soil Rm. 2124 Trench 4/4/09

Spectrum Filename: C:\User\NT2-0059.An1

Acquisition information
Start time: 06-Apr-2009 14:23:39
Live time: 4157
Real time: 4200
Dead time: 1.03 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: NIST 250 ml Soil LeGe.Clb
NIST 250 ml Soil Standard 74706-466; 1.6 g/cc

Energy Calibration
Created: 16-May-2007 12:12:20
Zero offset: 0.180 keV
Gain: 0.250 keV/channel
Quadratic: -5.594E-09 keV/channel^2

Efficiency Calibration
Created: 15-Sep-2008 13:59:21
Knee Energy: 350.00 keV
Above the Knee: Quadratic Uncertainty = 1.41 %
Log(Eff): 4.799504E+00 + (-1.839562E+00*Log(E)) +
(7.136665E-02*Log(E)^2)
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: NIST-Lib1.Lib
Library Match Width: 0.400
Peak stripping: Library based

Analysis parameters
Analysis engine: env32 G53W4.09
Start channel: 67 (16.93keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.4500E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.4500E+02) =
2.8986E+03
Detection limit method: Traditional ORTEC method

Random error: 1.0000000E+00

ORTEC g v - i (1215) env32 G53W4.09 06-APR-2009 15:33:46 Page 2
Mobile Lab Spectrum name: NT2-0059.An1

Final Survey Unit 013 #03 soil from 2124 trench 4-4-09.txt

Systematic error: 1.0000000E+00
Fraction Limit: 0.000%
Background width: best method (based on spectrum).

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	Air Filter in Petris LeGe.Pbc 06-Oct-2008 17:02:51
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks allocated 26 cutoff 10.00000 %

Energy Calibration
Normalized diff: 0.1457

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. pCi/g	Nuc
17.46	49.	42.86	1.02	0.000E+00				
46.66	166.	19.70	0.80	3.370E-02	46.52	4.000	1.585E+00	PB210
53.11	49.	48.09	0.47	4.094E-02	53.20	1.100	2.063E+00	PB214
					53.23	1.105	2.051E+00	PB214
53.23	-9.	0.00	0.00	4.097E-02	53.23	1.105	PBC<MDA	PB214
63.37	164.	26.06	0.81	4.857E-02	63.29	3.900	1.109E+00	TH234
74.85	627.	6.83	0.97	5.041E-02	74.81	9.600	2.441E+00	PB212
					74.81	6.330	3.634E+00	PB214
77.17	1017.	4.49	0.97	5.078E-02				
77.17	1017.	4.49	0.97	5.078E-02	76.86	0.360	1.049E+02	BI214
					77.11	17.500	2.117E+00	PB212
					77.11	10.700	3.527E+00	PB214
87.29	342.	11.02	0.98	5.240E-02	87.20	3.700	3.329E+00	PB214
					87.20	6.300	1.884E+00	PB212
90.02	194.	17.67	0.98	5.253E-02	89.80	1.030	6.538E+00	PB214
92.47	79.	46.56	0.98	5.252E-02	92.38	2.570	PBC<MDA	TH234
93.09	323.	11.10	0.99	5.252E-02	92.80	3.000	3.302E+00	TH234
93.83	71.	47.09	0.99	5.251E-02				
143.46	36.	63.72	0.54	4.912E-02	143.76	10.500	1.297E-01	U235
163.23	43.	44.15	0.72	4.617E-02				
185.95	263.	13.49	1.10	4.403E-02	185.72	54.000	1.902E-01	U235
					185.99	3.280	3.282E+00	RA226
209.27	145.	19.94	0.93	4.200E-02	209.40	4.553	1.423E+00	AC228
238.57	1378.	3.47	0.99	3.945E-02	238.63	43.100	1.492E+00	PB212
241.41	177.	16.98	1.36	3.915E-02	241.92	7.470	1.139E+00	PB214
270.12	135.	21.13	1.42	3.668E-02	270.30	3.770	1.837E+00	AC228
277.32	59.	31.26	0.57	3.607E-02	277.36	6.500	4.771E-01	TL208
295.11	280.	9.95	1.23	3.453E-02	295.22	19.200	7.483E-01	PB214

ORTEC g v - i (1215) env32 G53W4.09 06-APR-2009 15:33:46 Page 3
Mobile Lab Spectrum name: NT2-0059.An1

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
299.92	109.	23.57	0.38	3.409E-02	300.09	3.270	1.837E+00	PB212

328.07	94.	19.70	1.25	3.166E-02	328.00	3.364	1.656E+00	AC228
338.28	289.	9.37	0.93	3.077E-02	338.40	12.010	1.407E+00	AC228
351.89	468.	6.39	1.00	2.922E-02	351.99	37.100	7.824E-01	PB214
463.16	93.	19.16	1.23	2.231E-02	463.00	4.640	1.685E+00	AC228
503.78	20.	39.40	0.71	2.058E-02				
510.68	292.	9.30	1.02	2.031E-02	510.72	22.500	5.645E-01	TL208
583.38	435.	6.17	1.30	1.792E-02	583.14	86.000	5.101E-01	TL208
609.50	343.	7.66	1.41	1.721E-02	609.32	46.090	7.847E-01	BI214
768.52	51.	31.24	0.61	1.395E-02	768.36	4.885	1.424E+00	BI214
795.28	25.	32.80	0.34	1.353E-02	794.80	4.843	7.161E-01	AC228
860.97	77.	17.09	1.39	1.262E-02	860.47	12.000	9.584E-01	TL208
911.47	311.	7.58	1.19	1.200E-02	911.07	29.000	1.573E+00	AC228
934.76	6.	50.62	0.29	1.175E-02	934.05	3.165	PBC<MDA	BI214
964.81	92.	16.26	1.37	1.143E-02	964.60	5.452	2.787E+00	AC228
1120.78	80.	22.47	0.63	1.006E-02				
1408.31	22.	33.25	0.73	8.345E-03	1407.98	2.477	2.006E+00	BI214
1461.37	1450.	2.66	1.71	8.100E-03	1460.75	10.700	3.004E+01	K40
1587.93	37.	21.26	0.70	7.583E-03	1587.90	3.712	2.498E+00	AC228
1659.70	14.	26.73	0.25	7.319E-03	1661.28	1.150	3.135E+00	BI214

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
69.12	17.46	168.	49.	0.012	85.71	1.021	MO-99	s
300.08	75.18	581.	70.	0.017	100.29	0.971	PB-214	D
306.69	76.83	581.	41.	0.010	170.58	0.972	BI-207	c
360.02	90.01	463.	165.	0.040	40.02	0.983	PB-214	D
374.72	93.83	523.	71.	0.017	94.17	0.986	TH-227	D
652.40	163.23	136.	43.	0.010	88.29	0.721	U-235	s
2015.09	503.78	20.	20.	0.005	78.80	0.708	-	s
4484.13	1120.78	57.	80.	0.019	44.94	0.630	SC-46	s
5847.22	1461.37	6.	1450.	0.349	5.32	1.710	K-40	

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: NIST-Lib1.Lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
PB-210	185.96	46.66	372.	113.	0.027	39.41	0.802
PB-214	211.79	53.11	297.	49.	0.012	96.18	0.470s
PB-214	0.00	53.23	9.	0.	0.000	0.00	0.000
TH-234	252.82	63.37	607.	111.	0.027	52.11	0.814
PB-212	298.61	74.81	656.	383.	0.092	0.35	0.971A
PB-214	298.61	74.81	668.	130.	0.031	0.94	0.971A
BI-214	0.00	76.86	0.	0.	0.000	0.00	0.000
PB-212	307.81	77.11	685.	703.	0.169	0.19	0.972A
PB-214	307.81	77.11	666.	222.	0.053	0.55	0.972A
PB-214	348.18	87.20	531.	79.	0.019	1.55	0.981A

PB-212	348.18	87.20	543.	257.	0.062	24.32	0.981A
PB-214	0.00	89.80	7.	0.	0.000	0.00	0.000
TH-234	368.91	92.38	827.	79.	0.019	93.12	0.985A
TH-234	370.59	92.80	523.	93.	0.022	69.58	0.985A
U-235	573.31	143.46	190.	36.	0.009	127.45	0.537s
U-235	743.32	185.95	284.	240.	0.058	26.99	1.095s
RA-226	0.00	185.99	0.	0.	0.000	0.00	0.000
AC-228	836.63	209.27	220.	144.	0.035	39.89	0.926
PB-212	953.85	238.57	292.	1346.	0.324	6.94	0.987
PB-214	965.23	241.41	262.	177.	0.043	33.97	1.357s
AC-228	1080.10	270.12	198.	135.	0.032	42.25	1.416s
TL-208	1108.90	277.32	167.	59.	0.014	62.52	0.574s
PB-214	1180.08	295.11	160.	263.	0.063	19.90	1.232
PB-212	1199.33	299.92	149.	109.	0.026	47.15	0.376s
AC-228	1312.00	328.07	102.	94.	0.023	39.40	1.246
AC-228	1352.84	338.28	178.	276.	0.066	18.75	0.926
PB-214	1407.29	351.89	141.	450.	0.108	12.79	1.003
AC-228	1852.53	463.16	92.	93.	0.022	38.31	1.234
TL-208	2042.69	510.68	247.	137.	0.033	18.59	1.018s
TL-208	2333.59	583.38	95.	417.	0.100	12.33	1.300
BI-214	2438.13	609.50	100.	330.	0.079	15.33	1.410
BI-214	3074.44	768.52	66.	51.	0.012	62.47	0.606s
PB-214	0.00	785.95	3.	0.	0.000	0.00	0.000
AC-228	3181.56	795.28	53.	25.	0.006	65.61	0.345s
TL-208	3444.44	860.97	36.	77.	0.019	34.18	1.388
AC-228	3646.55	911.48	87.	289.	0.070	15.23	1.183s
AC-228	3859.99	964.81	39.	92.	0.022	32.51	1.365
BI-214	0.00	1155.19	0.	0.	0.000	0.00	0.000
BI-214	0.00	1280.96	0.	0.	0.000	0.00	0.000
BI-214	0.00	1401.50	0.	0.	0.000	0.00	0.000
BI-214	5634.88	1408.31	7.	22.	0.005	66.49	0.727s
K-40	5844.73	1460.75	1512.	0.	0.000	0.00	1.849
AC-228	6353.74	1587.93	8.	37.	0.009	42.51	0.697s
BI-214	6641.00	1659.70	0.	14.	0.003	53.45	0.250s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity pCi/g	Peak Energy keV	Peak Activity pCi/g	Peak Code	Peak MDA Value pCi/g	COMMENTS
AM-241		0.0000E+00					
			59.54	0.000E+00	?(	2.903E-02	50.22 G
K-40	N	0.0000E+00					
			1460.75	0.000E+00	P	1.232E+00	0.00 G
RA-226	M	0.0000E+00					
			185.99	0.000E+00			0.00 G
PB-212	N	1.4921E+00					
			238.63	1.492E+00	(P	2.736E-02	3.47 G K Energy duplication

			77.11	1.492E+00	} P	1.241E-01	0.10	X
							Energy duplication	
			74.81	1.492E+00	}	1.986E-01	0.18	X
							Energy duplication	
			87.20	1.470E+00	} P	1.933E-01	12.16	G
			300.09	1.837E+00	+	3.926E-01	23.57	G
TH-234	N	1.1094E+00						
			63.29	1.109E+00	(P	3.516E-01	26.06	G
			92.80	1.109E+00	} P	4.763E-01	34.79	G
			92.38	1.109E+00	} P	5.887E-01	46.56	G
PB-210	N	1.5854E+00						
			46.52	1.585E+00	?(P	3.902E-01	19.70	G
PB-214	N	7.7075E-01						
			351.99	7.824E-01	(P	3.010E-02	6.39	G K
			295.22	7.483E-01	(P	5.229E-02	9.95	G
							Energy duplication	
			77.11	7.708E-01	}	1.284E-01	0.28	X
			241.92	1.139E+00	& P	1.942E-01	16.98	G
							Energy duplication	
			74.81	7.708E-01	} P	2.207E-01	0.47	X
							Energy duplication	
			87.20	7.708E-01	}	4.121E-01	0.78	X
			53.23	0.000E+00	P	2.672E-01	0.00	G
			53.20	2.063E+00	+ P	1.122E+00	48.09	G
			785.95	0.000E+00	P	4.850E-01	0.00	G
			89.80	0.000E+00	P	1.974E-01	0.00	G
BI-214	N	7.8469E-01						
			609.32	7.847E-01	(P	3.473E-02	7.66	G
			1764.51	0.000E+00	% P	2.032E-01	124.88	G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
		1120.28	0.000E+00	% P	1.902E-01		94.67 G
		1238.11	0.000E+00	% P	5.055E-01		308.76 G
		768.36	1.424E+00	+ P	4.372E-01		31.24 G
		1377.65	0.000E+00	% P	4.587E-01		563.72 G
		934.05	0.000E+00	& P	4.315E-01		50.62 G
		1729.60	0.000E+00	&	3.228E-01		194.94 G
		1407.98	2.006E+00	+	7.414E-01		33.25 G
		1509.19	0.000E+00	%	4.935E-01		402.08 G
		1847.44	0.000E+00	&	4.874E-01		200.92 G
		1155.19	0.000E+00		1.136E-01		0.00 G
		665.45	0.000E+00	%	5.431E-01		221.50 G
		1280.96	0.000E+00		1.419E-01		0.00 G
		1401.50	0.000E+00		1.623E-01		0.00 G
		806.17	0.000E+00	%	6.677E-01		208.74 G
		1661.28	3.135E+00	&	1.302E+00		26.73 G
		79.29	0.000E+00	%	2.108E+00		123.62 X
		76.86	0.000E+00		1.032E-01		0.00 X
TL-208	N	5.1888E-01					
		583.14	5.101E-01	(P	1.743E-02		6.17 G K
		510.72	5.645E-01	*(P	9.376E-02		9.30 G
		860.47	9.584E-01	+ P	1.934E-01		17.09 G
		277.36	4.771E-01	(P	1.508E-01		31.26 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
AC-228	N	1.5542E+00						
			911.07	1.566E+00	(P	7.398E-02	7.62	G K
			968.90	0.000E+00	% P	1.415E-01	124.26	G
			338.40	1.407E+00	(P	9.893E-02	9.37	G
			964.60	2.787E+00	+ P	5.048E-01	16.26	G
			794.80	7.161E-01	- P	3.738E-01	32.80	G
			463.00	1.685E+00	(P	2.568E-01	19.16	G
			209.40	1.423E+00	(P	2.116E-01	19.94	G
			270.30	1.837E+00	*(P	2.782E-01	21.13	G
			1587.90	2.498E+00	+ P	6.695E-01	21.26	G
			328.00	1.656E+00	(P	2.622E-01	19.70	G
BI-212	N	0.0000E+00						
			727.17	0.000E+00	?(	1.627E-01	32.08	G K
			1620.56	0.000E+00	%	3.926E-01	110.55	G
			785.42	0.000E+00	?(	7.899E-01	45.88	G
			39.86	0.000E+00	?(	1.927E+00	79.44	G
NP-237	M	0.0000E+00						
			86.49	0.000E+00	%		521.21	G K
			95.87	0.000E+00	& P		142.79	G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
CS-137	M	0.0000E+00						
			661.62	0.000E+00	%		403.11	G
U-235	M	1.9022E-01						
			185.72	1.902E-01	*(P		13.49	G K Ra-226
			143.76	1.297E-01	-		63.72	G KEH 7.09
U-234	M	0.0000E+00						
			53.20	0.000E+00	?(		48.09	G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line

M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded
A - Not in Average
C - Coincidence Peak

- -

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity pCi/g	Uncertainty Counting 2 Sigma pCi/g	Total pCi/g
AM-241	<	✓ 2.9025E-02		
K-40	<	1.2325E+00		
PB-212		1.4921E+00	1.061E-01	1.195E-01
TH-234		1.1094E+00	8.505E-01	8.515E-01

ORTEC g v - i (1215) env32 G53W4.09 06-APR-2009 15:33:46 Page 8
Mobile Lab Spectrum name: NT2-0059.An1

PB-210	#	1.5854E+00	9.186E-01	9.205E-01
PB-214		7.7075E-01	9.654E-02	1.014E-01
BI-214		7.8469E-01	1.249E-01	1.288E-01
TL-208		5.1888E-01	6.663E-02	6.985E-02
AC-228		1.5542E+00	2.299E-01	2.383E-01
BI-212	<	1.6274E-01		
~~U-235~~	~~#~~	~~1.9022E-01~~	~~5.631E-02~~	~~5.675E-02~~

R_a-226 PCE 4.7.09

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------
Total Activity (1461.3 to 1999.2 keV) 8.0056086E+00 pCi/g

The library has energies which are not separable.

Analyzed by: LC. Fenn
EnergySolutions

Reviewed by: PC Ely
Supervisor

Laboratory: Mobile Lab

ORTEC g v - i (1215) env32 G53W4.09 06-APR-2009 15:49:54 Page 1
Mobile Lab Spectrum name: NT1-0076.An1

Sample description
Final Survey Unit 13 #04 soil Rm. 2124 trench 4/4/09

Spectrum Filename: C:\User\NT1-0076.An1

Acquisition information
Start time: 06-Apr-2009 14:39:46
Live time: 4183
Real time: 4200
Dead time: 0.41 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: NIST 250 ml Soil ReGe.Clb
250 ml Soil in Marinelli

Energy Calibration
Created: 03-Oct-2008 16:16:15
Zero offset: 0.310 keV
Gain: 0.250 keV/channel
Quadratic: -4.593E-09 keV/channel^2

Efficiency Calibration
Created: 03-Oct-2008 16:49:35
Knee Energy: 165.00 keV
Above the Knee: Quadratic Uncertainty = 0.94 %
Log(Eff): 1.725969E-02 + (-3.837367E-01*Log(E)) + (-3.461374E-02*Log(E)^2)
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: NIST-Lib1.Lib
Library Match Width: 0.400
Peak stripping: Library based

Analysis parameters
Analysis engine: env32 G53W4.09
Start channel: 67 (17.05keV)
Stop channel: 8000 (1999.37keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.4080E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.4080E+02) = 2.9343E+03
Detection limit method: Traditional ORTEC method

Random error: 1.0000000E+00

ORTEC g v - i (1215) env32 G53W4.09 06-APR-2009 15:49:54 Page 2
Mobile Lab Spectrum name: NT1-0076.An1

Final Survey Unit 013 #04 soil Rm. 2124 trench 4-4-09.txt

Systematic error: 1.0000000E+00
Fraction Limit: 0.000%
Background width: best method (based on spectrum).

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	Air Filter in Petris ReGe.Pbc 07-Oct-2008 08:47:29
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks allocated 27 cutoff 10.00000 %

Energy Calibration
Normalized diff: 0.2366

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. pCi/g	Nuc
17.74	179.	16.47	1.14	0.000E+00				
46.75	184.	20.95	0.95	4.172E-02	46.52	4.000	1.402E+00	PB210
53.66	105.	40.14	0.50	5.178E-02	53.23	1.105	3.482E+00	PB214
63.58	205.	19.95	0.53	6.230E-02	63.29	3.900	1.127E+00	TH234
74.94	872.	5.53	0.92	6.431E-02				
74.94	872.	5.53	0.92	6.431E-02	74.81	6.330	3.985E+00	PB214
75.34	443.	10.06	0.57	6.428E-02	74.81	9.600	1.360E+00	PB212
77.33	1379.	3.74	0.92	6.473E-02	77.11	10.700	3.776E+00	PB214
					77.11	17.500	2.271E+00	PB212
87.32	411.	9.43	0.93	6.649E-02	87.20	6.300	1.825E+00	PB212
					87.20	3.700	3.167E+00	PB214
90.17	284.	13.45	0.93	6.655E-02	89.80	1.030	7.682E+00	PB214
92.46	101.	23.67	0.93	6.641E-02	92.38	2.570	6.860E-01	TH234
93.25	398.	9.66	0.94	6.636E-02				
209.45	175.	20.48	0.81	4.869E-02	209.40	4.553	1.397E+00	AC228
238.82	1873.	2.59	1.06	4.408E-02	238.63	43.100	1.836E+00	PB212
241.73	249.	12.72	1.06	4.367E-02				
270.54	194.	15.45	1.10	4.006E-02	270.30	3.770	2.338E+00	AC228
277.78	126.	21.46	1.12	3.929E-02	277.36	6.500	9.359E-01	TL208
295.54	339.	8.53	1.25	3.741E-02	295.22	19.200	8.865E-01	PB214
300.35	121.	23.17	0.82	3.694E-02	300.09	3.270	1.898E+00	PB212
338.59	428.	8.52	1.10	3.363E-02	338.40	12.010	1.940E+00	AC228
352.25	682.	5.85	1.25	3.260E-02	351.99	37.100	1.035E+00	PB214
511.26	279.	13.86	0.92	2.417E-02				
583.50	670.	5.35	1.21	2.169E-02	583.14	86.000	6.674E-01	TL208
609.76	419.	7.08	1.25	2.092E-02	609.32	46.090	7.744E-01	BI214
727.55	150.	13.17	1.35	1.805E-02	727.17	11.800	1.263E+00	BI212
768.70	48.	22.17	0.50	1.724E-02	768.36	4.885	1.091E+00	BI214
785.54	10.	57.89	1.49	1.691E-02	785.42	2.000	PBC<MDA	BI212

ORTEC g v - i (1215) env32 G53W4.09 06-APR-2009 15:49:54 Page 3
Mobile Lab Spectrum name: NT1-0076.An1

pk	energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc

Page 2

794.80	-14.	0.00	0.00	1.676E-02	785.95	1.090	PBC<MDA	PB214
860.58	69.	20.16	1.42	1.566E-02	794.80	4.843	PBC<MDA	AC228
911.55	400.	7.16	1.53	1.491E-02	860.47	12.000	6.939E-01	TL208
933.79	32.	42.37	0.42	1.460E-02	911.07	29.000	1.665E+00	AC228
965.02	87.	17.23	0.37	1.421E-02	934.05	3.165	1.311E+00	BI214
1378.25	26.	35.41	0.25	1.041E-02	964.60	5.452	2.137E+00	AC228
1461.29	1818.	2.46	1.72	9.881E-03	1377.65	4.020	1.167E+00	BI214
1621.10	26.	18.57	0.69	9.011E-03	1460.75	10.700	3.143E+01	K40
1729.88	17.	34.55	0.78	8.499E-03	1620.56	2.750	1.970E+00	BI212
1764.97	69.	15.13	0.31	8.347E-03	1729.60	3.047	1.245E+00	BI214
					1764.51	15.920	9.844E-01	BI214

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
69.74	17.74	230.	179.	0.043	32.94	1.141	MO-99	sM
297.23	74.59	2119.	494.	0.118	27.83	0.919	BI-207	D
359.75	90.13	573.	249.	0.060	29.96	0.933	PB-214	D
372.10	93.22	584.	355.	0.085	22.02	0.936	U-235	D
965.15	241.52	723.	250.	0.060	32.96	1.065	PB-214	D
2044.56	511.26	187.	279.	0.067	27.71	0.919	RH-106M	s
3646.37	911.55	76.	400.	0.096	14.31	1.533	AC-228	
5846.74	1461.36	950.	464.	0.111	20.97	1.899	K-40	D

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: NIST-Lib1.Lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	
BI-212	0.00	39.86	3.	0.	0.000	0.00	0.000	
PB-210	185.83	46.75	496.	122.	0.029	41.90	0.949	
PB-214	0.00	53.20	9.	0.	0.000	0.00	0.000	
PB-214	213.47	53.66	339.	105.	0.025	80.28	0.500	s
TH-234	253.15	63.58	609.	144.	0.034	39.90	0.530	s
PB-214	298.10	74.81	737.	222.	0.053	0.71	0.817	A
PB-212	298.10	74.81	1059.	443.	0.106	20.13	0.566	A
BI-214	0.00	76.86	0.	0.	0.000	0.00	0.000	
PB-214	307.30	77.11	528.	378.	0.090	0.42	0.921	A

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM	
PB-212	307.30	77.11	550.	1065.	0.255	0.12	0.921	A
NP-237	344.64	86.44	700.	0.	0.000	0.00	0.929	
PB-212	347.68	87.20	572.	258.	0.062	31.56	1.096	A
PB-214	347.68	87.20	564.	134.	0.032	1.17	1.096	A
PB-214	0.00	89.80	6.	0.	0.000	0.00	0.000	
TH-234	368.40	92.38	892.	101.	0.024	47.34	0.935	A
TH-234	370.08	92.80	990.	118.	0.028	56.03	0.935	A
AC-228	836.86	209.45	343.	163.	0.039	40.95	0.815	

PB-212	954.30	238.80	331.	1780.	0.426	5.80	1.039
AC-228	1081.38	270.56	193.	181.	0.043	30.61	1.095s
TL-208	1110.28	277.78	208.	126.	0.030	42.92	1.121s
PB-214	1181.33	295.54	169.	336.	0.080	17.07	1.253
PB-212	1200.60	300.35	190.	121.	0.029	46.34	0.817s
AC-228	0.00	328.00	9.	0.	0.000	0.00	0.000
AC-228	1353.57	338.58	207.	410.	0.098	16.77	1.099
PB-214	1408.24	352.25	231.	661.	0.158	11.70	1.253
TL-208	2332.18	583.14	143.	577.	0.138	11.19	1.157D
BI-214	2438.61	609.74	127.	387.	0.092	13.90	1.251
BI-212	2910.05	727.55	68.	142.	0.034	26.33	1.350s
BI-214	3074.73	768.70	43.	48.	0.012	44.34	0.501s
PB-214	3143.76	785.95	59.	10.	0.002	115.78	1.487A
AC-228	0.00	794.80	14.	0.	0.000	0.00	0.000
TL-208	3442.42	860.58	60.	69.	0.016	40.31	1.421
AC-228	3644.00	910.95	217.	0.	0.000	0.00	0.000s
BI-214	3735.41	933.79	69.	32.	0.008	84.75	0.423s
AC-228	3860.37	965.02	43.	87.	0.021	34.47	0.374s
AC-228	0.00	968.90	9.	0.	0.000	0.00	0.000
BI-214	4620.00	1154.84	11.	0.	0.000	0.00	0.042s
BI-214	4950.00	1237.30	56.	0.	0.000	0.00	0.000s
BI-214	0.00	1280.96	0.	0.	0.000	0.00	0.000
BI-214	5514.11	1378.25	30.	26.	0.006	70.81	0.253s
BI-214	5607.00	1401.46	3.	0.	0.000	0.00	0.000s
BI-214	0.00	1407.98	0.	0.	0.000	0.00	0.000
K-40	5846.47	1461.30	619.	1175.	0.281	9.86	1.571
BI-214	6038.00	1509.15	4.	0.	0.000	0.00	0.000s
BI-212	6486.04	1621.10	3.	26.	0.006	37.14	0.687s
BI-214	6921.41	1729.88	5.	17.	0.004	69.10	0.777s
BI-214	7061.86	1764.97	8.	69.	0.016	30.26	0.307s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

ORTEC g v - i (1215) env32 G53W4.09 06-APR-2009 15:49:54 Page 5
Mobile Lab Spectrum name: NT1-0076.An1

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity pCi/g	Peak Energy keV	Peak Activity pCi/g	Code	MDA Value pCi/g	COMMENTS
AM-241		0.0000E+00					
			59.54	0.000E+00	&	2.366E-02	102.22 G
K-40	N	2.1062E+01					
			1460.75	2.106E+01	?(P	6.398E-01	4.93 G
RA-226	M	0.0000E+00					
			185.99	0.000E+00	(		16.65 G
PB-212	N	1.7841E+00					
			238.63	1.775E+00	(P	2.616E-02	2.90 G K
			77.11	1.784E+00	} P	5.754E-02	Energy duplication 0.06 X
			74.81	1.360E+00	}	1.430E-01	Energy duplication 10.06 X
			87.20	1.167E+00	} P	2.002E-01	15.78 G

			300.09	1.898E+00	(	3.137E-01	23.17	G
TH-234	N	1.1268E+00						
			63.29	1.127E+00	?(P	2.764E-01	19.95	G
			92.80	1.127E+00	} P	4.353E-01	28.02	G
			92.38	1.127E+00	} P	4.908E-01	23.67	G
PB-210	N	1.4019E+00						
			46.52	1.402E+00	(P	3.666E-01	20.95	G
PB-214	N	1.0349E+00						
			351.99	1.035E+00	(P	3.450E-02	5.85	G K
			295.22	8.865E-01	- P	8.516E-02	8.53	G
							Energy duplication	
			77.11	1.035E+00	}	1.694E-01	0.21	X
			241.92	0.000E+00	% P	1.473E-01	141.11	G
							Energy duplication	
			74.81	1.035E+00	} P	2.546E-01	0.35	X
							Energy duplication	
			87.20	1.035E+00	}	2.628E-01	0.59	X
			53.23	3.482E+00	+ P	1.004E+00	40.14	G
			53.20	0.000E+00	P	2.160E-01	0.00	G
			785.95	1.035E+00	} P	1.269E+00	57.89	G
			89.80	0.000E+00	P	1.533E-01	0.00	G
BI-214	N	7.5999E-01						
			609.32	7.600E-01	(P	3.237E-02	6.95	G
			1764.51	9.844E-01	+	1.843E-01	15.13	G
			1120.28	0.000E+00	% P	1.250E-01	169.31	G
			1238.11	0.000E+00	& P	3.113E-01	0.00	G
			768.36	1.091E+00	+ P	3.152E-01	22.17	G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
		1377.65	1.167E+00	+ P		5.026E-01	35.41 G
		934.05	1.311E+00	+ P		6.039E-01	42.37 G
		1729.60	1.245E+00	+		5.236E-01	34.55 G
		1407.98	0.000E+00			7.495E-02	0.00 G
		1509.19	0.000E+00	?		3.038E-01	0.00 G
		1847.44	0.000E+00	%		3.761E-01	180.28 G
		1155.19	0.000E+00	?		4.816E-01	0.00 G
		665.45	0.000E+00	%		4.644E-01	310.91 G
		1280.96	0.000E+00			1.159E-01	0.00 G
		1401.50	0.000E+00	?		4.002E-01	0.00 G
		806.17	0.000E+00	&		7.208E-01	142.13 G
		1661.28	0.000E+00	%		3.742E-01	120.19 G
		79.29	0.000E+00	%		1.953E+00	270.34 X
		76.86	0.000E+00			8.147E-02	0.00 X
TL-208	N	5.8574E-01					
		583.14	5.857E-01	(P		1.772E-02	5.60 G K
		510.72	0.000E+00	% P		1.214E-01	119.28 G
		860.47	6.939E-01	+ P		1.671E-01	20.16 G
		277.36	9.359E-01	+ P		1.956E-01	21.46 G
AC-228	N	0.0000E+00					
		911.07	0.000E+00	? P		1.048E-01	57.69 G K
		968.90	0.000E+00	P		5.089E-02	0.00 G
		338.40	1.922E+00	$ P		1.672E-01	8.38 G
		964.60	2.137E+00	? P		4.072E-01	17.23 G

			794.80	0.000E+00	P	1.841E-01	0.00	G
			463.00	0.000E+00 %	P	2.641E-01	235.23	G
			209.40	1.397E+00 $	P	2.763E-01	20.48	G
			270.30	2.276E+00 *	P	3.495E-01	15.30	G
			1587.90	0.000E+00 %	P	4.281E-01	169.56	G
			328.00	0.000E+00	P	1.091E-01	0.00	G
BI-212	N	1.2627E+00						
			727.17	1.263E+00	(P	1.084E-01	13.17	G K
			1620.56	1.970E+00 +	P	6.222E-01	18.57	G
			785.42	3.460E-01 }		6.914E-01	187.30	G
			39.86	0.000E+00	P	2.107E-01	0.00	G
NP-237	M	0.0000E+00						
			86.49	0.000E+00			0.00	G K
			95.87	0.000E+00 %	P		111.54	G
CS-137	M	0.0000E+00						
			661.62	0.000E+00 %			209.79	G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
U-235	M 0.0000E+00						
		185.72	0.000E+00	(			17.75 G K
		143.76	0.000E+00 &(				71.73 G
U-234	M 0.0000E+00						
		53.20	0.000E+00	(			46.85 G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
\+ - Peak activity higher than counting uncertainty range.
\- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity pCi/g	Uncertainty Counting 2 Sigma pCi/g	Total pCi/g
AM-241	<	2.3655E-02		
K-40	<	6.3981E-01		
PB-212		1.7841E+00	1.053E-01	1.257E-01
TH-234		1.1268E+00	6.377E-01	6.391E-01
PB-210		1.4019E+00	8.836E-01	8.851E-01
PB-214		1.0349E+00	1.250E-01	1.312E-01
BI-214		7.5999E-01	1.126E-01	1.163E-01

ORTEC g v - i (1215) env32 G53W4.09 06-APR-2009 15:49:54 Page 8
Mobile Lab Spectrum name: NT1-0076.An1

TL-208		5.8574E-01	6.706E-02	7.075E-02
AC-228	B<	1.0481E-01		
BI-212	#	1.2627E+00	3.514E-01	3.548E-01

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------
Total Activity (794.8 to 1999.4 keV) 7.9562273E+00 pCi/g

The library has energies which are not separable.

Analyzed by: _____
EnergySolutions

Reviewed by: _____
Supervisor

Laboratory: Mobile Lab

ORTEC g v - i (1215) env32 G53W4.09 06-APR-2009 16:48:57 Page 1
Mobile Lab Spectrum name: NT2-0060.An1

Sample description
Final Survey Unit 13 #05 soil Rm. 2124 Trench 4/4/09

Spectrum Filename: C:\User\NT2-0060.An1

Acquisition information
Start time: 06-Apr-2009 15:38:48
Live time: 4152
Real time: 4200
Dead time: 1.15 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: NIST 250 ml Soil LeGe.Clb
NIST 250 ml Soil Standard 74706-466; 1.6 g/cc

Energy Calibration
Created: 16-May-2007 12:12:20
Zero offset: 0.180 keV
Gain: 0.250 keV/channel
Quadratic: -5.594E-09 keV/channel^2

Efficiency Calibration
Created: 15-Sep-2008 13:59:21
Knee Energy: 350.00 keV
Above the Knee: Quadratic Uncertainty = 1.41 %
Log(Eff): 4.799504E+00 + (-1.839562E+00*Log(E)) + (7.136665E-02*Log(E)^2)
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: NIST-Lib1.Lib
Library Match Width: 0.400
Peak stripping: Library based

Analysis parameters
Analysis engine: env32 G53W4.09
Start channel: 67 (16.93keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.2290E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.2290E+02) = 3.0969E+03
Detection limit method: Traditional ORTEC method

Random error: 1.0000000E+00

ORTEC g v - i (1215) env32 G53W4.09 06-APR-2009 16:48:57 Page 2
Mobile Lab Spectrum name: NT2-0060.An1

Final Survey Unit 013 #05 soil from 2124 trench 4-4-09.txt

Systematic error: 1.0000000E+00
Fraction Limit: 0.000%
Background width: best method (based on spectrum).

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	Air Filter in Petris LeGe.Pbc 06-Oct-2008 17:02:51
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks allocated 26 cutoff 10.00000 %

Energy Calibration
Normalized diff: 0.1604

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. pCi/g	Nuc
39.86	-16.	0.00	0.00	2.618E-02	39.86	1.100	PBC<MDA	BI212
53.24	44.	55.11	0.97	4.097E-02	53.20	1.100	1.983E+00	PB214
					53.23	1.105	1.972E+00	PB214
63.41	161.	23.58	1.01	4.858E-02	63.29	3.900	1.156E+00	TH234
74.87	720.	5.77	0.97	5.041E-02	74.81	6.330	4.477E+00	PB214
					74.81	9.600	3.000E+00	PB212
77.19	1261.	3.82	0.97	5.078E-02	76.86	0.360	1.392E+02	BI214
					77.11	10.700	4.679E+00	PB214
					77.11	17.500	2.818E+00	PB212
87.28	378.	10.06	0.98	5.239E-02				
87.28	378.	10.06	0.98	5.239E-02	87.20	6.300	2.231E+00	PB212
					87.20	3.700	3.928E+00	PB214
90.04	232.	14.95	0.98	5.253E-02	89.80	1.030	8.400E+00	PB214
92.46	77.	50.34	0.98	5.252E-02	92.38	2.570	6.920E-01	TH234
					92.80	3.000	PBC<MDA	TH234
93.07	379.	9.74	0.99	5.252E-02	92.80	3.000	4.242E+00	TH234
144.29	38.	71.37	0.27	4.912E-02	143.76	10.500	1.466E-01	U235
185.89	252.	13.80	1.02	4.403E-02	185.72	54.000	1.935E-01	U235
					185.99	3.280	3.347E+00	RA226
209.15	186.	15.85	1.10	4.201E-02				
238.54	1577.	3.58	1.12	3.945E-02	238.63	43.100	1.832E+00	PB212
241.41	197.	17.52	1.44	3.915E-02	241.92	7.470	1.356E+00	PB214
270.20	188.	15.74	1.02	3.669E-02				
277.66	78.	25.89	1.31	3.607E-02	277.36	6.500	6.682E-01	TL208
295.12	360.	10.98	0.98	3.452E-02	295.22	19.200	1.042E+00	PB214
299.98	142.	20.53	1.66	3.409E-02	300.09	3.270	2.565E+00	PB212
327.95	127.	20.76	0.52	3.167E-02				
338.36	313.	10.55	1.14	3.076E-02				
351.89	536.	5.68	1.08	2.922E-02	351.99	37.100	9.632E-01	PB214

ORTEC g v - i (1215) env32 G53W4.09 06-APR-2009 16:48:57 Page 3
Mobile Lab Spectrum name: NT2-0060.An1

pk energy area uncert fwhm corr nuclide brnch. act. nuc

511.05	115.	10.35	1.59	2.031E-02	510.72	22.500	5.077E-01	TL208
583.32	507.	6.07	1.05	1.793E-02	583.14	86.000	6.403E-01	TL208
609.52	366.	7.73	1.11	1.721E-02	609.32	46.090	8.992E-01	BI214
665.11	9.	77.78	0.46	1.588E-02	665.45	1.563	7.312E-01	BI214
727.46	146.	12.37	1.04	1.465E-02	727.17	11.800	1.558E+00	BI212
768.40	-6.	0.00	0.00	1.395E-02	768.36	4.885	PBC<MDA	BI214
785.54	12.	72.03	1.48	1.368E-02	785.42	2.000	PBC<MDA	BI212
					785.95	1.090	PBC<MDA	PB214
934.05	-9.	0.00	0.00	1.175E-02	934.05	3.165	PBC<MDA	BI214
969.42	206.	9.86	0.71	1.138E-02				
1120.28	-12.	0.00	0.00	1.007E-02	1120.28	15.040	PBC<MDA	BI214
1238.11	-13.	0.00	0.00	9.266E-03	1238.11	5.916	PBC<MDA	BI214
1408.09	6.	88.98	0.20	8.345E-03	1407.98	2.477	5.852E-01	BI214
1461.42	1270.	2.98	1.61	8.100E-03	1460.75	10.700	2.797E+01	K40
1620.23	-4.	0.00	0.04	7.463E-03	1620.56	2.750	PBC<MDA	BI212

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
299.77	75.10	600.	88.	0.021	81.95	0.971	PB-214	D
307.36	77.00	600.	117.	0.028	61.87	0.972	PB-214	D
347.78	87.10	1386.	291.	0.070	38.08	0.980	PB-214	D
359.68	89.99	410.	237.	0.057	27.48	0.983	PB-214	D
371.80	93.02	538.	331.	0.080	22.68	0.985	TH-234	D
836.12	209.15	214.	186.	0.045	31.71	1.096	AC-228	
1080.42	270.20	198.	188.	0.045	31.47	1.022	AC-228	s
1311.49	327.95	147.	127.	0.031	41.52	0.515	AC-228	s
1353.14	338.36	202.	313.	0.075	21.10	1.144	AC-228	
2438.19	609.52	104.	366.	0.088	15.45	1.112	BI-214	
3878.40	969.42	46.	206.	0.049	19.71	0.710	AC-228	SM

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: NIST-Lib1.Lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
BI-212	0.00	39.86	16.	0.	0.000	0.00	0.000
PB-214	0.00	53.20	9.	0.	0.000	0.00	0.000
PB-214	212.31	53.24	309.	44.	0.011	110.21	0.969
TH-234	252.98	63.41	532.	109.	0.026	47.16	1.014
PB-214	298.61	74.81	521.	157.	0.038	0.89	0.971A
PB-212	298.61	74.81	509.	440.	0.106	0.36	0.971A
BI-214	306.82	76.86	2040.	0.	0.000	0.00	0.972A
PB-214	307.81	77.11	522.	267.	0.064	0.52	0.972A
PB-212	307.81	77.11	541.	807.	0.194	10.50	0.972A
BI-214	316.53	79.29	704.	0.	0.000	0.00	0.974D
NP-237	0.00	86.49	0.	0.	0.000	0.00	0.000

PB-212	348.18	87.20	519.	300.	0.072	0.53	1.187A
PB-214	348.18	87.20	539.	95.	0.023	65.89	0.479A
PB-214	0.00	89.80	7.	0.	0.000	0.00	0.000
TH-234	368.91	92.38	776.	77.	0.019	100.68	0.985A
TH-234	370.59	92.80	914.	90.	0.022	71.89	0.985A
NP-237	0.00	95.87	0.	0.	0.000	0.00	0.000
U-235	576.60	144.29	272.	38.	0.009	142.74	0.274s
U-235	743.06	185.89	296.	228.	0.055	27.61	1.022s
RA-226	0.00	185.99	0.	0.	0.000	0.00	0.000
PB-212	953.72	238.54	451.	1545.	0.372	7.16	1.117
PB-214	965.23	241.41	362.	197.	0.047	35.03	1.437s
TL-208	1110.27	277.66	187.	78.	0.019	51.78	1.308
PB-214	1180.11	295.12	306.	342.	0.082	21.96	0.977
PB-212	1199.58	299.98	184.	142.	0.034	41.06	1.657s
PB-214	1407.31	351.89	125.	518.	0.125	11.36	1.081
TL-208	2044.18	511.05	301.	115.	0.028	20.70	1.594s
TL-208	2333.34	583.32	105.	490.	0.118	12.14	1.046
BI-214	2437.41	609.32	332.	0.	0.000	0.00	0.408s
BI-214	2660.67	665.11	20.	9.	0.002	155.56	0.455s
BI-212	2910.16	727.46	57.	134.	0.032	24.73	1.038s
BI-214	3074.00	768.40	29.	0.	0.000	0.00	0.000s
BI-212	3142.09	785.42	62.	12.	0.003	144.06	1.480A
BI-214	0.00	806.17	0.	0.	0.000	0.00	0.000
BI-214	0.00	934.05	9.	0.	0.000	0.00	0.000
BI-214	0.00	1120.28	12.	0.	0.000	0.00	0.000
BI-214	0.00	1238.11	13.	0.	0.000	0.00	0.000
BI-214	5513.00	1377.86	13.	0.	0.000	0.00	0.000s
BI-214	5634.00	1408.09	9.	6.	0.001	177.95	0.200s
K-40	5847.48	1461.44	93.	1193.	0.287	5.94	1.613
BI-212	6483.00	1620.23	6.	0.	0.000	0.00	0.042s
BI-214	6920.50	1729.54	2.	0.	0.000	0.00	0.292s
BI-214	0.00	1764.51	9.	0.	0.000	0.00	0.000

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity pCi/g	Peak Energy keV	Peak Activity pCi/g	Code	MDA Value pCi/g	COMMENTS
AM-241		0.0000E+00					
			59.54	0.000E+00	(	3.367E-02	62.13 G
K-40	N	2.7732E+01					
			1460.75	2.773E+01	(P	3.297E-01	2.97 G
RA-226	M	0.0000E+00					
			185.99	0.000E+00			0.00 G
PB-212	N	1.8319E+00					
			238.63	1.832E+00	(P	3.623E-02	3.58 G K Energy duplication
			77.11	1.832E+00	} P	7.707E-02	5.25 X Energy duplication

			74.81	1.832E+00	}	1.351E-01	0.18	X
							Energy duplication	
			87.20	1.832E+00	} P	2.621E-01	0.27	G
			300.09	2.565E+00	+	4.709E-01	20.53	G
TH-234	N	1.1556E+00						
			63.29	1.156E+00	?(P	3.528E-01	23.58	G
			92.80	1.156E+00	} P	5.676E-01	35.94	G
			92.38	1.156E+00	} P	6.132E-01	50.34	G
PB-210	N	0.0000E+00						
			46.52	0.000E+00	(	4.618E-01	32.32	G
PB-214	N	9.9006E-01						
			351.99	9.632E-01	(P	3.039E-02	5.68	G K
			295.22	1.042E+00	(P	7.674E-02	10.98	G
							Energy duplication	
			77.11	9.901E-01	}	2.223E-01	0.26	X
			241.92	1.356E+00	& P	2.340E-01	17.52	G
							Energy duplication	
			74.81	9.901E-01	} P	3.156E-01	0.44	X
							Energy duplication	
			87.20	9.860E-01	}	3.468E-01	32.94	X
			53.23	1.972E+00	+ P	1.205E+00	55.11	G
			53.20	0.000E+00	P	2.873E-01	0.00	G
			785.95	8.288E-01	} P	1.759E+00	154.77	G
			89.80	0.000E+00	P	2.110E-01	0.00	G
BI-214	N	0.0000E+00						
			609.32	0.000E+00	? P	7.494E-02	41.19	G
			1764.51	0.000E+00	P	1.207E-01	0.00	G
			1120.28	0.000E+00	P	9.943E-02	0.00	G
			1238.11	0.000E+00	P	2.827E-01	0.00	G
			768.36	0.000E+00	? P	2.593E-01	0.00	G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
		1377.65	0.000E+00	? P		4.195E-01	0.00 G
		934.05	0.000E+00	P		3.532E-01	0.00 G
		1729.60	0.000E+00	?		2.389E-01	0.00 G
		1407.98	5.852E-01	?		5.852E-01	88.98 G
		1509.19	0.000E+00	&		6.078E-01	525.99 G
		1847.44	0.000E+00	%		7.348E-01	517.20 G
		1155.19	0.000E+00	%		9.562E-01	790.92 G
		665.45	7.312E-01	?		6.607E-01	77.78 G
		1280.96	0.000E+00	%		1.015E+00	118.88 G
		1401.50	0.000E+00	&		1.132E+00	251.71 G
		806.17	0.000E+00			1.228E-01	0.00 G
		1661.28	0.000E+00	%		7.186E-01	208.17 G
		79.29	0.000E+00	!		2.487E+00	0.00 X
		76.86	0.000E+00	}		7.107E+00	0.00 X
TL-208	N	6.4226E-01					
		583.14	6.403E-01	(P		1.963E-02	6.07 G K
		510.72	5.077E-01	- P		1.295E-01	10.35 G
		860.47	0.000E+00	% P		1.624E-01	1176.62 G
		277.36	6.682E-01	(P		1.708E-01	25.89 G
AC-228	N	0.0000E+00					
		911.07	0.000E+00	?(		1.539E-01	10.63 G K

			968.90	0.000E+00	?(	2.188E-01	14.02	G
			338.40	0.000E+00	(	1.729E-01	8.41	G
			964.60	0.000E+00	%	3.797E-01	533.18	G
			794.80	0.000E+00	?(	4.329E-01	25.22	G
			463.00	0.000E+00	(	3.711E-01	19.27	G
			209.40	0.000E+00	(	3.036E-01	15.85	G
			270.30	0.000E+00	(	4.124E-01	15.74	G
			1587.90	0.000E+00	%	1.835E-01	158.11	G
			328.00	0.000E+00	(	4.404E-01	21.87	G
BI-212	N	1.5578E+00						
			727.17	1.558E+00	(P	1.309E-01	12.37	G K
			1620.56	0.000E+00	? P	5.122E-01	0.00	G
			785.42	9.023E-01	} P	9.281E-01	72.03	G
			39.86	0.000E+00	P	5.938E-01	0.00	G
NP-237	M	0.0000E+00						
			86.49	0.000E+00			0.00	G K
			95.87	0.000E+00			0.00	G
CS-137	M	0.0000E+00						
			661.62	0.000E+00	%		310.91	G

Nuclide		Ave activity	Energy	Activity	Code	Peak MDA	Comments
U-235	M	1.8586E-01					
			185.72	1.935E-01	*(P	13.80	G K — Ra-226 PCE 4.7.09
			143.76	1.466E-01	&(	71.37	G
U-234	M	0.0000E+00					
			53.20	0.000E+00	(		55.11 G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
\+ - Peak activity higher than counting uncertainty range.
\- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

H - Halflife limit exceeded

- -

***** SUMMARY OF NUCLIDES IN SAMPLE *****

Nuclide		Time of Count Activity pCi/g	Uncertainty Counting 2 Sigma pCi/g	Total pCi/g
AM-241	<	3.3668E-02		
K-40		2.7732E+01	1.739E+00	2.069E+00
PB-212		1.8319E+00	1.338E-01	1.500E-01
TH-234		1.1556E+00	8.083E-01	8.094E-01
PB-210	<	4.6176E-01		
PB-214		9.9006E-01	1.165E-01	1.231E-01
BI-214	<	7.4942E-02		

ORTEC g v - i (1215) env32 G53W4.09 06-APR-2009 16:48:57 Page 8
Mobile Lab Spectrum name: NT2-0060.An1

TL-208		6.4226E-01	8.071E-02	8.478E-02
AC-228	<	1.5390E-01		
BI-212		1.5578E+00	4.211E-01	4.257E-01
~~U-235~~	~~#~~	~~1.8586E-01~~	~~5.653E-02~~	~~5.695E-02~~

R_a · 226 AE 4.7.09

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- SUMMARY ----------

Total Activity (806.1 to 1999.2 keV) 3.4095699E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Lenk
EnergySolutions

Reviewed by: PC Eby
Supervisor

Laboratory: Mobile Lab

ORTEC g v - i (1215) env32 G53W4.09 06-APR-2009 13:50:08 Page 1
Mobile Lab Spectrum name: NT2-0058.An1

Sample description
Final Survey Unit 13 #06 soil Rm. 2124 Trench 4/4/09

Spectrum Filename: C:\User\NT2-0058.An1

Acquisition information
Start time: 06-Apr-2009 12:40:00
Live time: 4148
Real time: 4200
Dead time: 1.24 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: NIST 250 ml Soil LeGe.Clb
NIST 250 ml Soil Standard 74706-466; 1.6 g/cc

Energy Calibration
Created: 16-May-2007 12:12:20
Zero offset: 0.180 keV
Gain: 0.250 keV/channel
Quadratic: -5.594E-09 keV/channel^2

Efficiency Calibration
Created: 15-Sep-2008 13:59:21
Knee Energy: 350.00 keV
Above the Knee: Quadratic Uncertainty = 1.41 %
Log(Eff): 4.799504E+00 + (-1.839562E+00*Log(E)) + (7.136665E-02*Log(E)^2)
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: NIST-Lib1.Lib
Library Match Width: 0.400
Peak stripping: Library based

Analysis parameters
Analysis engine: env32 G53W4.09
Start channel: 67 (16.93keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.6720E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.6720E+02) = 2.7233E+03
Detection limit method: Traditional ORTEC method

Random error: 1.0000000E+00

ORTEC g v - i (1215) env32 G53W4.09 06-APR-2009 13:50:08 Page 2
Mobile Lab Spectrum name: NT2-0058.An1

Final Survey Unit 013 #06 soil from 2124 trench 4-4-09.txt

Systematic error: 1.0000000E+00
Fraction Limit: 0.000%
Background width: best method (based on spectrum).

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	Air Filter in Petris LeGe.Pbc 06-Oct-2008 17:02:51
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks allocated 27 cutoff 10.00000 %

Energy Calibration
Normalized diff: 0.2180

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. pCi/g	Nuc
17.50	2860.	2.91	0.92	0.000E+00				
20.20	1583.	5.91	0.93	3.341E-03				
46.60	162.	22.41	0.59	3.364E-02	46.52	4.000	1.444E+00	PB210
53.53	44.	64.62	0.35	4.097E-02	53.23	1.105	1.736E+00	PB214
63.44	215.	20.69	1.07	4.858E-02	63.29	3.900	1.523E+00	TH234
74.85	756.	5.64	0.97	5.041E-02	74.81	9.600	2.771E+00	PB212
					74.81	6.330	4.138E+00	PB214
77.18	1177.	3.97	0.97	5.078E-02	76.86	0.360	1.144E+02	BI214
					77.11	17.500	2.314E+00	PB212
					77.11	10.700	3.845E+00	PB214
79.37	58.	50.21	0.97	5.113E-02	79.29	0.603	3.323E+00	BI214
87.25	309.	11.68	0.98	5.240E-02	87.20	3.700	2.829E+00	PB214
					87.20	6.300	1.595E+00	PB212
90.09	202.	17.76	0.98	5.253E-02	89.80	1.030	6.392E+00	PB214
92.40	116.	33.04	0.98	5.252E-02	92.38	2.570	PBC<MDA	TH234
92.86	337.	11.44	0.99	5.252E-02	92.80	3.000	3.267E+00	TH234
129.03	119.	28.47	0.64	5.135E-02				
209.11	202.	16.73	1.20	4.201E-02	209.40	4.553	1.872E+00	AC228
238.52	1518.	2.86	1.10	3.945E-02	238.63	43.100	1.551E+00	PB212
241.54	208.	13.58	1.10	3.919E-02	241.92	7.470	1.173E+00	PB214
270.02	151.	21.10	0.93	3.671E-02	270.30	3.770	1.867E+00	AC228
277.77	64.	30.86	1.33	3.607E-02	277.36	6.500	4.861E-01	TL208
295.08	340.	10.10	0.94	3.453E-02	295.22	19.200	8.631E-01	PB214
299.91	142.	19.03	1.12	3.409E-02	300.09	3.270	2.260E+00	PB212
327.92	117.	25.71	0.82	3.167E-02	328.00	3.364	1.843E+00	AC228
338.13	255.	15.72	0.89	3.078E-02	338.40	12.010	1.159E+00	AC228
351.78	526.	6.29	1.08	2.923E-02	351.99	37.100	8.306E-01	PB214

ORTEC g v - i (1215) env32 G53W4.09 06-APR-2009 13:50:08 Page 3
Mobile Lab Spectrum name: NT2-0058.An1

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
462.88	98.	20.97	0.55	2.231E-02	463.00	4.640	1.687E+00	AC228
510.80	136.	9.72	1.50	2.031E-02	510.72	22.500	5.273E-01	TL208

Page 2

583.30	467.	6.27	1.03	1.793E-02	583.14	86.000	5.175E-01	TL208
609.43	436.	6.60	1.38	1.721E-02	609.32	46.090	9.480E-01	BI214
768.78	35.	29.57	1.06	1.395E-02	768.36	4.885	9.115E-01	BI214
795.01	38.	28.69	1.21	1.353E-02	794.80	4.843	1.018E+00	AC228
861.02	65.	18.28	1.25	1.262E-02	860.47	12.000	7.620E-01	TL208
911.40	349.	7.40	1.51	1.200E-02	911.07	29.000	1.674E+00	AC228
933.60	48.	26.63	0.52	1.175E-02	934.05	3.165	2.291E+00	BI214
964.79	83.	16.05	0.56	1.143E-02	964.60	5.452	2.377E+00	AC228
969.27	192.	9.04	0.87	1.138E-02				
1120.43	88.	20.47	1.40	1.007E-02	1120.28	15.040	1.036E+00	BI214
1238.59	39.	26.66	1.72	9.266E-03	1238.11	5.916	1.273E+00	BI214
1407.87	6.	74.41	0.29	8.345E-03	1407.98	2.477	4.721E-01	BI214
1461.25	1387.	2.87	1.76	8.101E-03	1460.75	10.700	2.701E+01	K40
1509.51	8.	49.21	0.92	7.895E-03	1509.19	2.192	8.203E-01	BI214
1764.61	59.	12.13	1.08	6.985E-03	1764.51	15.920	9.349E-01	BI214

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
70.21	17.73	3131.	2654.	0.640	8.62	1.350	MO-99	sD
81.00	20.42	3960.	557.	0.134	38.97	1.260	TC-99M	sD
299.69	75.08	579.	162.	0.039	44.88	0.971	PB-214	D
307.56	77.05	579.	144.	0.035	50.11	0.972	PB-214	D
317.14	79.38	391.	58.	0.014	99.25	0.974	TH-227	D
359.91	90.11	455.	225.	0.054	29.88	0.983	PB-214	D
372.00	93.15	546.	35.	0.009	189.93	0.987	U-235	c
515.57	129.03	325.	119.	0.029	56.95	0.637	AC-228	s
3877.88	969.29	400.	201.	0.048	31.49	1.591	AC-228	D

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: NIST-Lib1.Lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
PB-210	185.75	46.60	462.	109.	0.026	44.82	0.590s
PB-214	0.00	53.20	9.	0.	0.000	0.00	0.000
PB-214	213.48	53.53	429.	44.	0.011	129.24	0.348s
TH-234	253.12	63.44	640.	163.	0.039	41.38	1.072

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
PB-212	298.61	74.81	531.	392.	0.095	0.35	0.971A
PB-214	298.61	74.81	543.	151.	0.036	0.94	0.971A
BI-214	0.00	76.86	0.	0.	0.000	0.00	0.000
PB-212	307.81	77.11	645.	720.	0.174	0.19	0.972A
PB-214	307.81	77.11	626.	258.	0.062	0.55	0.972A
BI-214	0.00	79.29	0.	0.	0.000	0.00	0.000
NP-237	345.47	86.52	675.	0.	0.000	0.00	0.980
PB-214	348.18	87.20	458.	92.	0.022	1.55	0.880A
PB-212	348.18	87.20	470.	268.	0.065	0.51	0.880A

PB-214	0.00	89.80	7.	0.	0.000	0.00	0.000
TH-234	368.91	92.38	965.	116.	0.028	66.08	0.985A
TH-234	370.59	92.80	628.	135.	0.033	51.49	0.985A
AC-228	835.99	209.11	247.	202.	0.049	33.46	1.199
PB-212	954.10	238.63	317.	1378.	0.332	6.89	1.031D
PB-214	965.65	241.52	294.	183.	0.044	33.32	0.642s
AC-228	1079.69	270.02	222.	145.	0.035	42.20	0.933
TL-208	1110.72	277.77	175.	64.	0.015	61.73	1.328s
PB-214	1179.97	295.08	211.	322.	0.078	20.20	0.938s
PB-212	1199.30	299.91	147.	142.	0.034	38.05	1.119s
AC-228	1311.84	328.04	154.	97.	0.023	49.88	0.802s
AC-228	1352.22	338.13	248.	241.	0.058	31.43	0.887s
PB-214	1406.83	351.78	155.	507.	0.122	12.58	1.083
AC-228	1851.41	462.88	118.	98.	0.024	41.95	0.547s
TL-208	2043.17	510.80	313.	136.	0.033	19.44	1.501s
TL-208	2333.27	583.30	107.	450.	0.108	12.54	1.032
BI-214	2437.83	609.43	100.	424.	0.102	13.20	1.376
BI-214	2662.00	665.45	14.	0.	0.000	0.00	0.000s
BI-214	3075.49	768.78	38.	35.	0.008	59.14	1.064s
AC-228	3180.49	795.01	64.	38.	0.009	57.37	1.209
BI-214	0.00	806.17	0.	0.	0.000	0.00	0.000
TL-208	3444.62	861.02	38.	65.	0.016	36.55	1.249
AC-228	3646.22	911.40	77.	328.	0.079	14.79	1.510
BI-214	3735.05	933.60	49.	48.	0.012	53.25	0.519s
AC-228	3859.89	964.79	33.	83.	0.020	32.09	0.556s
BI-214	4482.76	1120.43	75.	88.	0.021	40.95	1.396
BI-214	0.00	1155.19	0.	0.	0.000	0.00	0.000
BI-214	4955.63	1238.59	50.	39.	0.009	53.31	1.720
BI-214	0.00	1280.96	0.	0.	0.000	0.00	0.000
BI-214	0.00	1401.50	0.	0.	0.000	0.00	0.000
BI-214	5633.08	1407.87	4.	6.	0.001	148.82	0.291s
K-40	5846.74	1461.25	101.	1320.	0.318	5.74	1.764
BI-214	6039.88	1509.51	3.	8.	0.002	98.43	0.916s
BI-214	6647.00	1661.20	2.	0.	0.000	0.00	0.000s
BI-214	6922.00	1729.91	3.	0.	0.000	0.00	0.125s
BI-214	7060.90	1764.61	9.	59.	0.014	24.25	1.083s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

ORTEC g v - i (1215) env32 G53W4.09 06-APR-2009 13:50:08 Page 5
Mobile Lab Spectrum name: NT2-0058.An1

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity pCi/g	Peak Energy keV	Peak Activity pCi/g	Code	Peak MDA Value pCi/g		COMMENTS
AM-241		0.0000E+00						
			59.54	0.000E+00	%	2.446E-02	165.68	G
K-40	N	2.7011E+01						
			1460.75	2.701E+01	(P	3.016E-01	2.87	G
RA-226	M	0.0000E+00						
			185.99	0.000E+00	*(		15.58	G
PB-212	N	1.4387E+00						

			238.63	1.439E+00	(P	2.680E-02	3.44 G K	
			77.11	1.439E+00	} P	1.210E-01	Energy duplication 0.10 X	
			74.81	1.439E+00	}	1.881E-01	Energy duplication 0.18 X	
			87.20	1.439E+00	} P	1.698E-01	Energy duplication 0.26 G	
			300.09	2.260E+00	+	3.907E-01	19.03 G	
TH-234	N	1.5235E+00						
			63.29	1.523E+00	(P	3.401E-01	20.69 G	
			92.80	1.523E+00	} P	4.869E-01	25.74 G	
			92.38	1.523E+00	} P	5.928E-01	33.04 G	
PB-210	N	1.4435E+00						
			46.52	1.444E+00	(P	4.085E-01	22.41 G	
PB-214	N	8.4165E-01						
			351.99	8.306E-01	(P	2.964E-02	6.29 G K	
			295.22	8.631E-01	*(P	5.631E-02	10.10 G	
			77.11	8.417E-01	}	1.172E-01	Energy duplication 0.28 X	
			241.92	1.109E+00	+ P	1.904E-01	16.66 G	
			74.81	8.417E-01	} P	1.880E-01	Energy duplication 0.47 X	
			87.20	8.417E-01	}	3.699E-01	0.78 X	
			53.23	1.736E+00	+ P	1.225E+00	64.62 G	
			53.20	0.000E+00	P	2.528E-01	0.00 G	
			785.95	0.000E+00	% P	1.096E+00	390.97 G	
			89.80	0.000E+00	P	1.857E-01	0.00 G	
BI-214	N	9.5584E-01						
			609.32	9.480E-01	(P	3.278E-02	6.60 G	
			1764.51	9.349E-01	?(P	7.767E-02	12.13 G	
			1120.28	1.036E+00	(P	1.491E-01	20.47 G	
			1238.11	1.273E+00	+ P	4.483E-01	26.66 G	
			768.36	9.115E-01	?(P	2.404E-01	29.57 G	

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
		1377.65	0.000E+00	& P		4.157E-01	143.29 G
		934.05	2.291E+00	+ P		6.888E-01	26.63 G
		1729.60	0.000E+00	?		2.463E-01	0.00 G
		1407.98	4.721E-01	-		4.292E-01	74.41 G
		1509.19	8.203E-01	?(		3.076E-01	49.21 G
		1847.44	0.000E+00	%		5.916E-01	500.00 G
		1155.19	0.000E+00			1.070E-01	0.00 G
		665.45	0.000E+00	?		4.158E-01	0.00 G
		1280.96	0.000E+00			1.336E-01	0.00 G
		1401.50	0.000E+00			1.528E-01	0.00 G
		806.17	0.000E+00			1.081E-01	0.00 G
		1661.28	0.000E+00	?		5.400E-01	0.00 G
		79.29	0.000E+00			5.757E-02	0.00 X
		76.86	0.000E+00			9.716E-02	0.00 X
TL-208	N	5.1766E-01					
		583.14	5.175E-01	(P		1.744E-02	6.27 G K
		510.72	5.273E-01	(P		9.913E-02	9.72 G
		860.47	7.620E-01	+ P		1.741E-01	18.28 G
		277.36	4.861E-01	*(P		1.453E-01	30.86 G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
AC-228	N	1.7071E+00						
			911.07	1.674E+00	(P	6.565E-02	7.40	G K
			968.90	0.000E+00	% P	1.318E-01	554.38	G
			338.40	1.159E+00	- P	1.526E-01	15.72	G
			964.60	2.377E+00	+ P	4.482E-01	16.05	G
			794.80	1.018E+00	- P	4.004E-01	28.69	G
			463.00	1.687E+00	(P	2.716E-01	20.97	G
			209.40	1.872E+00	(P	2.111E-01	16.73	G
			270.30	1.867E+00	(P	2.765E-01	21.10	G
			1587.90	0.000E+00	% P	5.044E-01	148.55	G
			328.00	1.621E+00	?(P	3.005E-01	24.94	G
BI-212	N	0.0000E+00						
			727.17	0.000E+00	(	1.899E-01	16.90	G K
			1620.56	0.000E+00	?(	5.779E-01	69.39	G
			785.42	0.000E+00	?(	3.648E-01	0.00	G
			39.86	0.000E+00	(	2.213E+00	33.46	G
NP-237	M	0.0000E+00						
			86.49	0.000E+00			0.00	G K
			95.87	0.000E+00	& P		131.65	G
CS-137	M	0.0000E+00						
			661.62	0.000E+00	%		570.82	G

ORTEC g v - i (1215) env32 G53W4.09 06-APR-2009 13:50:08 Page 7
Mobile Lab Spectrum name: NT2-0058.An1

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
U-235	M	0.0000E+00						
			185.72	0.000E+00	*(		14.63	G K
			143.76	0.000E+00	?(		57.53	G
U-234	M	0.0000E+00						
			53.20	0.000E+00	(		64.62	G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape

C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded
K - Key Line
A - Not in Average
C - Coincidence Peak

***** SUMMARY OF NUCLIDES IN SAMPLE *****

Nuclide	Time of Count Activity pCi/g	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
AM-241 <	2.4463E-02		
K-40	2.7011E+01	1.629E+00	1.961E+00
PB-212	1.4387E+00	1.014E-01	1.145E-01
TH-234	1.5235E+00	8.337E-01	8.356E-01
PB-210	1.4435E+00	9.609E-01	9.624E-01
PB-214	8.4165E-01	1.051E-01	1.104E-01
BI-214	9.5584E-01	1.299E-01	1.356E-01

TL-208	5.1766E-01	6.739E-02	7.055E-02
AC-228	1.7071E+00	2.683E-01	2.770E-01
BI-212 <	1.8993E-01		

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

SUMMARY

Total Activity (95.7 to 1999.2 keV) 3.5439156E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Lewis
EnergySolutions

Reviewed by: RC Ele
Supervisor

Laboratory: Mobile Lab

ORTEC g v - i (1215) env32 G53W4.09 06-APR-2009 13:28:07 Page 1
Mobile Lab Spectrum name: NT1-0074.An1

Sample description
Final Survey Unit 13 #07 soil Rm. 2124 trench 4/4/09

Spectrum Filename: C:\User\NT1-0074.An1

Acquisition information
Start time: 06-Apr-2009 12:18:01
Live time: 4183
Real time: 4200
Dead time: 0.42 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: NIST 250 ml Soil ReGe.Clb
250 ml Soil in Marinelli

Energy Calibration
Created: 03-Oct-2008 16:16:15
Zero offset: 0.310 keV
Gain: 0.250 keV/channel
Quadratic: -4.593E-09 keV/channel^2

Efficiency Calibration
Created: 03-Oct-2008 16:49:35
Knee Energy: 165.00 keV
Above the Knee: Quadratic Uncertainty = 0.94 %
Log(Eff): 1.725969E-02 + (-3.837367E-01*Log(E)) + (-3.461374E-02*Log(E)^2)
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: NIST-Lib1.Lib
Library Match Width: 0.400
Peak stripping: Library based

Analysis parameters
Analysis engine: env32 G53W4.09
Start channel: 67 (17.05keV)
Stop channel: 8000 (1999.37keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.5910E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5910E+02) = 2.7847E+03
Detection limit method: Traditional ORTEC method

Random error: 1.0000000E+00

ORTEC g v - i (1215) env32 G53W4.09 06-APR-2009 13:28:07 Page 2
Mobile Lab Spectrum name: NT1-0074.An1

Final Survey Unit 013 #07 soil Rm. 2124 trench 4-4-09.txt
Systematic error: 1.0000000E+00
Fraction Limit: 0.000%
Background width: best method (based on spectrum).

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	Air Filter in Petris ReGe.Pbc 07-Oct-2008 08:47:29
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks allocated 27 cutoff 10.00000 %
Energy Calibration
Normalized diff: 0.2239

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. pCi/g	Nuc
17.77	478.	10.62	1.31	0.000E+00				
46.73	199.	19.27	0.89	4.169E-02	46.52	4.000	1.494E+00	PB210
53.29	38.	68.71	0.45	5.178E-02	53.20	1.100	1.205E+00	PB214
					53.23	1.105	1.198E+00	PB214
63.52	234.	21.75	1.10	6.229E-02	63.29	3.900	1.291E+00	TH234
75.00	965.	5.02	0.92	6.432E-02	74.81	9.600	2.813E+00	PB212
					74.81	6.330	4.191E+00	PB214
77.29	1485.	3.56	0.92	6.472E-02	77.11	17.500	2.324E+00	PB212
					77.11	10.700	3.860E+00	PB214
79.46	40.	98.13	0.92	6.508E-02	79.29	0.603	PBC<MDA	BI214
84.42	188.	19.07	0.93	6.597E-02				
87.34	493.	8.27	0.93	6.649E-02	87.20	3.700	3.605E+00	PB214
					87.20	6.300	2.084E+00	PB212
90.12	258.	14.08	0.93	6.655E-02	89.80	1.030	6.611E+00	PB214
92.54	112.	24.65	0.93	6.641E-02	92.38	2.570	8.960E-01	TH234
93.29	376.	10.71	0.94	6.636E-02	92.80	3.000	3.097E+00	TH234
143.71	54.	67.25	0.37	6.093E-02	143.76	10.500	1.510E-01	U235
186.18	221.	18.32	0.70	5.318E-02	185.72	54.000	1.164E-01	U235
					185.99	3.280	2.278E+00	RA226
209.36	222.	16.04	1.05	4.870E-02				
209.36	222.	16.04	1.05	4.870E-02	209.40	4.553	1.706E+00	AC228
238.81	1972.	2.77	1.12	4.408E-02	238.63	43.100	1.837E+00	PB212
241.89	273.	13.76	1.16	4.365E-02	241.92	7.470	1.508E+00	PB214
277.93	91.	23.71	0.55	3.923E-02	277.36	6.500	5.689E-01	TL208
295.43	392.	9.93	0.99	3.742E-02	295.22	19.200	9.736E-01	PB214
300.13	122.	24.38	1.31	3.696E-02	300.09	3.270	1.816E+00	PB212
328.44	94.	25.22	0.63	3.445E-02	328.00	3.364	1.311E+00	AC228

ORTEC g v - i (1215) env32 G53W4.09 06-APR-2009 13:28:07 Page 3
Mobile Lab Spectrum name: NT1-0074.An1

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
338.59	393.	8.28	1.05	3.363E-02	338.40	12.010	1.686E+00	AC228
352.17	710.	5.85	1.15	3.260E-02	351.99	37.100	1.023E+00	PB214

Page 2

Final Survey Unit 013 #07 soil Rm. 2124 trench 4-4-09.txt

463.00	-10.	0.00	0.00	2.620E-02	463.00	4.640	PBC<MDA AC228
510.91	335.	9.70	1.35	2.419E-02	510.72	22.500	6.297E-01 TL208
583.48	592.	5.44	1.18	2.169E-02	583.14	86.000	5.578E-01 TL208
609.55	471.	6.35	1.25	2.092E-02	609.32	46.090	8.307E-01 BI214
767.86	54.	31.66	0.72	1.724E-02	768.36	4.885	1.156E+00 BI214
860.88	100.	12.63	1.03	1.566E-02	860.47	12.000	9.569E-01 TL208
911.50	377.	6.50	1.56	1.491E-02	911.07	29.000	1.483E+00 AC228
965.41	44.	29.86	0.97	1.421E-02	964.60	5.452	1.021E+00 AC228
968.90	-9.	0.00	0.00	1.415E-02	968.90	17.460	PBC<MDA AC228
1120.81	126.	16.92	1.15	1.248E-02	1120.28	15.040	1.206E+00 BI214
1461.15	1840.	2.39	1.91	9.882E-03	1460.75	10.700	3.021E+01 K40
1660.57	9.	47.58	0.28	8.812E-03	1661.28	1.150	1.657E+00 BI214
1765.01	74.	12.74	1.45	8.347E-03	1764.51	15.920	9.975E-01 BI214

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
69.88	17.77	700.	478.	0.114	21.24	1.308	MO-99	s
298.77	74.98	2772.	722.	0.173	21.94	0.919	PB-214	D
336.74	84.37	557.	182.	0.043	39.64	0.928	TA-182	D
359.78	90.06	541.	249.	0.060	29.28	0.933	PB-214	D
372.48	93.24	663.	334.	0.080	24.36	0.936	U-235	D
836.49	209.36	298.	222.	0.053	32.09	1.048	AC-228	sM
2043.24	510.91	224.	220.	0.053	23.47	1.284	TL-208	D
3646.21	911.50	54.	377.	0.090	13.00	1.560	AC-228	

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: NIST-Lib1.Lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
PB-210	185.75	46.73	486.	137.	0.033	38.55	0.892s
PB-214	0.00	53.20	9.	0.	0.000	0.00	0.000
PB-214	212.00	53.29	258.	38.	0.009	137.43	0.451s
TH-234	252.91	63.52	808.	174.	0.042	43.50	1.096s
PB-212	298.10	74.81	630.	629.	0.151	0.22	0.851A

ORTEC g v - i (1215) env32 G53W4.09 06-APR-2009 13:28:07 Page 4
Mobile Lab Spectrum name: NT1-0074.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
PB-214	298.10	74.81	941.	213.	0.051	42.76	0.499A
BI-214	0.00	76.86	0.	0.	0.000	0.00	0.000
PB-212	307.30	77.11	712.	1155.	0.276	0.12	0.921A
PB-214	307.30	77.11	689.	387.	0.093	0.40	0.921A
BI-214	316.02	79.29	752.	40.	0.010	196.26	0.923D
PB-214	347.68	87.20	599.	138.	0.033	1.14	0.930A
PB-212	347.68	87.20	607.	333.	0.080	20.36	0.930A
PB-214	0.00	89.80	6.	0.	0.000	0.00	0.000
TH-234	368.40	92.38	866.	112.	0.027	49.29	0.935A
TH-234	370.08	92.80	1009.	143.	0.034	36.00	0.935A

U-235	573.81	143.71	394.	54.	0.013	134.49	0.369s	
U-235	743.79	186.20	464.	190.	0.045	37.76	0.700s	
RA-226	0.00	185.99	0.	0.	0.000	0.00	0.000	
AC-228	0.00	209.40	11.	0.	0.000	0.00	0.000	
PB-212	954.32	238.81	350.	1941.	0.464	5.54	1.120	
PB-214	966.63	241.89	349.	273.	0.065	27.51	1.157s	
AC-228	0.00	270.30	8.	0.	0.000	0.00	0.000	
TL-208	1110.08	277.73	207.	92.	0.022	53.40	0.549s	
PB-214	1180.89	295.43	272.	389.	0.093	19.86	0.990	
PB-212	1199.69	300.13	208.	122.	0.029	48.76	1.315	
AC-228	1312.98	328.44	165.	85.	0.020	50.44	0.633s	
AC-228	1353.60	338.59	195.	379.	0.091	16.56	1.053	
PB-214	1407.95	352.17	255.	688.	0.165	11.69	1.148	
AC-228	0.00	463.00	10.	0.	0.000	0.00	0.000	
TL-208	2333.39	583.44	95.	559.	0.134	10.42	1.164	
BI-214	2437.88	609.55	127.	445.	0.106	12.70	1.247	
BI-214	3071.39	767.86	90.	54.	0.013	63.33	0.723s	
PB-214	0.00	785.95	1.	0.	0.000	0.00	0.000	
AC-228	3177.33	794.34	78.	0.	0.000	0.00	0.234s	
BI-214	0.00	806.17	0.	0.	0.000	0.00	0.000	
TL-208	3443.62	860.88	36.	100.	0.024	25.25	1.034s	
AC-228	3861.92	965.41	53.	44.	0.011	59.73	0.973s	
AC-228	0.00	968.90	9.	0.	0.000	0.00	0.000	
BI-214	4483.83	1120.81	84.	126.	0.030	33.84	1.146s	
BI-214	0.00	1155.19	0.	0.	0.000	0.00	0.000	
K-40	5845.85	1461.14	87.	1764.	0.422	4.80	1.904	
BI-214	6644.00	1660.57	4.	9.	0.002	95.16	0.278s	
BI-214	7062.01	1765.01	3.	74.	0.018	25.48	1.451s	

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity pCi/g	Peak Energy keV	Peak Activity pCi/g	Code	MDA Value pCi/g	COMMENTS
AM-241		0.0000E+00					
			59.54	0.000E+00	%	2.124E-02	170.62 G
K-40	N	3.0010E+01					
			1460.75	3.001E+01	(P	2.332E-01	2.40 G
RA-226	M	0.0000E+00					
			185.99	0.000E+00			0.00 G
PB-212	N	1.8355E+00					
			238.63	1.837E+00	(P	2.554E-02	2.77 G K
			77.11	1.836E+00	} P	1.040E-01	Energy duplication 0.06 X
			74.81	1.836E+00	}	1.607E-01	Energy duplication 0.11 X
			87.20	1.432E+00	} P	1.529E-01	Energy duplication 10.18 G
			300.09	1.816E+00	(	3.112E-01	24.38 G

TH-234	N	1.2906E+00						
			63.29	1.291E+00	(P	3.017E-01	21.75 G	
			92.80	1.291E+00	} P	4.169E-01	18.00 G	
			92.38	1.179E+00	} P	4.651E-01	24.65 G	
PB-210	N	1.4937E+00						
			46.52	1.494E+00	(P	3.445E-01	19.27 G	
PB-214	N	1.0064E+00						
			351.99	1.023E+00	(P	3.432E-02	5.85 G K	
			295.22	9.736E-01	(P	5.966E-02	9.93 G	
							Energy duplication	
			77.11	1.006E+00	}	9.782E-02	0.20 X	
			241.92	1.508E+00	+ P	1.974E-01	13.76 G	
							Energy duplication	
			74.81	9.438E-01	} P	1.958E-01	21.38 X	
							Energy duplication	
			87.20	1.006E+00	}	3.431E-01	0.57 X	
			53.23	1.198E+00	+ P	7.809E-01	68.71 G	
			53.20	0.000E+00	P	2.050E-01	0.00 G	
			785.95	0.000E+00	P	2.352E-01	0.00 G	
			89.80	0.000E+00	P	1.455E-01	0.00 G	
BI-214	N	8.7356E-01						
			609.32	8.307E-01	(P	3.064E-02	6.35 G	
			1764.51	9.975E-01	(	4.238E-02	12.74 G	
			1120.28	1.206E+00	+ P	2.013E-01	16.92 G	
			1238.11	0.000E+00	% P	2.796E-01	110.78 G	
			768.36	1.156E+00	+ P	3.734E-01	31.66 G	

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
		1377.65	0.000E+00	% P	3.188E-01		130.38 G
		934.05	0.000E+00	% P	3.701E-01		178.67 G
		1729.60	0.000E+00	%	2.085E-01		206.16 G
		1407.98	0.000E+00	&	4.137E-01		104.88 G
		1509.19	0.000E+00	%	4.275E-01		241.04 G
		1847.44	0.000E+00	%	4.234E-01		331.66 G
		1155.19	0.000E+00		8.762E-02		0.00 G
		665.45	0.000E+00	%	6.732E-01		115.56 G
		1280.96	0.000E+00	&	1.111E+00		133.12 G
		1401.50	0.000E+00	%	4.687E-01		269.26 G
		806.17	0.000E+00		8.851E-02		0.00 G
		1661.28	1.657E+00	+	9.985E-01		47.58 G
		79.29	1.836E+00	+	1.848E+00		98.13 X
		76.86	0.000E+00		7.732E-02		0.00 X
TL-208	N	5.3872E-01					
		583.14	5.387E-01	(P	1.380E-02		5.21 G K
		510.72	0.000E+00	% P	1.203E-01		59.61 G
		860.47	9.569E-01	+ P	1.627E-01		12.63 G
		277.36	6.511E-01	+ P	1.758E-01		26.70 G
AC-228	N	0.0000E+00					
		911.07	0.000E+00	% P	9.844E-02		94.03 G K
		968.90	0.000E+00	P	4.830E-02		0.00 G
		338.40	1.686E+00	$ P	1.531E-01		8.28 G
		964.60	1.021E+00	& P	3.354E-01		29.86 G
		794.80	0.000E+00	? P	3.106E-01		0.00 G

			463.00	0.000E+00	P	1.033E-01	0.00	G
			209.40	0.000E+00	P	5.887E-02	0.00	G
			270.30	0.000E+00	P	7.198E-02	0.00	G
			1587.90	0.000E+00 %	P	5.212E-01	317.10	G
			328.00	1.311E+00 $	P	3.547E-01	25.22	G
BI-212	N	0.0000E+00						
			727.17	0.000E+00 (		1.727E-01	24.66	G K
			1620.56	0.000E+00 %		2.905E-01	295.80	G
			785.42	0.000E+00 %		4.847E-01	166.13	G
			39.86	0.000E+00 ?(		1.620E+00	61.20	G
NP-237	M	0.0000E+00						
			86.49	0.000E+00 %			206.83	G K
			95.87	0.000E+00 %	P		207.56	G
CS-137	M	0.0000E+00						
			661.62	0.000E+00 ?(			59.11	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
U-235	M 1.2393E-01					
		185.72	1.187E-01	(P	18.88	G K Ra-226
		143.76	1.510E-01	(	67.25	G AE 4.7.09
U-234	M 0.0000E+00					
		53.20	0.000E+00 ?(		79.74	G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
\+ - Peak activity higher than counting uncertainty range.
\- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity pCi/g	Uncertainty 2 Sigma Counting pCi/g	Total pCi/g
AM-241 <	2.1242E-02		
K-40	3.0010E+01	1.495E+00	1.890E+00
PB-212	1.8355E+00	1.033E-01	1.252E-01
TH-234	1.2906E+00	7.562E-01	7.577E-01
PB-210 #	1.4937E+00	8.344E-01	8.362E-01
PB-214	1.0064E+00	1.175E-01	1.238E-01
BI-214	8.7356E-01	1.172E-01	1.220E-01

TL-208	5.3872E-01	5.742E-02	6.106E-02
AC-228 B<	9.8441E-02		
BI-212 <	1.7273E-01		
~~U-235~~	~~1.2393E-01~~	~~5.540E-02~~	~~5.561E-02~~

Ra-226 PCE 4.7.09

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

S U M M A R Y

Total Activity (583.1 to 1999.4 keV) 3.7172993E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K. Lenz
EnergySolutions

Reviewed by: PCE
Supervisor

Laboratory: Mobile Lab

ORTEC g v - i (1215) env32 G53W4.09 06-APR-2009 10:27:52 Page 1
Mobile Lab Spectrum name: NT2-0055.An1

Sample description
Final Survey Unit 013 soil #8 soil in trench 2124 4/4/09

Spectrum Filename: C:\User\NT2-0055.An1

Acquisition information
Start time: 06-Apr-2009 09:17:44
Live time: 4175
Real time: 4200
Dead time: 0.59 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: NIST 250 ml Soil LeGe.Clb
NIST 250 ml Soil Standard 74706-466; 1.6 g/cc

Energy Calibration
Created: 16-May-2007 12:12:20
Zero offset: 0.180 keV
Gain: 0.250 keV/channel
Quadratic: -5.594E-09 keV/channel^2

Efficiency Calibration
Created: 15-Sep-2008 13:59:21
Knee Energy: 350.00 keV
Above the Knee: Quadratic Uncertainty = 1.41 %
Log(Eff): 4.799504E+00 + (-1.839562E+00*Log(E)) +
(7.136665E-02*Log(E)^2)
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: NIST-Lib1.Lib
Library Match Width: 0.400
Peak stripping: Library based

Analysis parameters
Analysis engine: env32 G53W4.09
Start channel: 67 (16.93keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.7150E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.7150E+02) =
2.6918E+03
Detection limit method: Traditional ORTEC method

Random error: 1.0000000E+00

ORTEC g v - i (1215) env32 G53W4.09 06-APR-2009 10:27:52 Page 2
Mobile Lab Spectrum name: NT2-0055.An1

Final Survey Unit 013 #08 soil from 2124 trench 4-4-09.txt

Systematic error: 1.0000000E+00
Fraction Limit: 0.000%
Background width: best method (based on spectrum).

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	Air Filter in Petris LeGe.Pbc 06-Oct-2008 17:02:51
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks allocated 28 cutoff 10.00000 %

Energy Calibration
Normalized diff: 0.1532

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. pCi/g	Nuc
17.74	649.	8.47	1.35	0.000E+00				
53.11	22.	74.35	0.95	4.097E-02	53.20	1.100	PBC<MDA	PB214
					53.20	0.118	PBC<MDA	U234
					53.23	1.105	PBC<MDA	PB214
53.87	48.	59.48	0.47	4.169E-02				
63.32	180.	25.46	0.83	4.856E-02	63.29	3.900	1.171E+00	TH234
74.84	717.	6.35	0.97	5.041E-02	74.81	6.330	3.851E+00	PB214
					74.81	9.600	2.581E+00	PB212
77.17	1187.	4.06	0.97	5.078E-02	76.86	0.360	1.132E+02	BI214
					77.11	10.700	3.806E+00	PB214
					77.11	17.500	2.290E+00	PB212
86.50	53.	76.45	0.98	5.227E-02	86.49	13.100	1.349E-01	NP237
87.18	392.	9.82	0.98	5.238E-02	87.20	6.300	2.006E+00	PB212
					87.20	3.700	3.528E+00	PB214
89.84	266.	13.53	0.98	5.253E-02	89.80	1.030	8.359E+00	PB214
92.57	91.	30.10	0.98	5.252E-02	92.38	2.570	PBC<MDA	TH234
93.00	377.	10.01	0.99	5.252E-02	92.80	3.000	3.639E+00	TH234
128.99	98.	30.64	0.83	5.135E-02				
154.08	109.	29.08	0.55	4.756E-02				
209.15	143.	26.52	1.00	4.201E-02	209.40	4.553	1.294E+00	AC228
238.51	1683.	2.79	1.10	3.945E-02	238.63	43.100	1.692E+00	PB212
241.60	233.	12.26	1.10	3.918E-02				
241.60	233.	12.26	1.10	3.918E-02	241.92	7.470	1.298E+00	PB214
269.97	114.	22.90	0.72	3.671E-02	270.30	3.770	1.369E+00	AC228
277.12	65.	38.45	1.07	3.607E-02	277.36	6.500	4.802E-01	TL208
295.02	360.	8.64	1.26	3.453E-02	295.22	19.200	8.998E-01	PB214
299.85	119.	24.92	0.89	3.409E-02	300.09	3.270	1.865E+00	PB212
327.97	112.	21.94	0.93	3.166E-02	328.00	3.364	1.825E+00	AC228
338.38	442.	8.00	1.14	3.076E-02	338.40	12.010	2.023E+00	AC228

ORTEC g v - i (1215) env32 G53W4.09 06-APR-2009 10:27:52 Page 3
Mobile Lab Spectrum name: NT2-0055.An1

pk energy area uncert fwhm corr nuclide brnch. act. nuc
Page 2

351.88	534.	6.97	1.11	2.922E-02	351.99	37.100	8.291E-01	PB214
462.91	116.	19.51	0.72	2.231E-02	463.00	4.640	1.731E+00	AC228
511.01	317.	9.97	1.04	2.030E-02	510.72	22.500	6.159E-01	TL208
583.26	547.	5.65	1.12	1.793E-02	583.14	86.000	5.985E-01	TL208
609.35	441.	6.36	1.32	1.721E-02	609.32	46.090	9.406E-01	BI214
768.34	29.	41.38	0.98	1.395E-02	768.36	4.885	7.449E-01	BI214
795.16	82.	19.26	1.50	1.353E-02	794.80	4.843	2.171E+00	AC228
806.82	8.	89.86	0.61	1.337E-02	806.17	1.228	PBC<MDA	BI214
860.60	83.	19.78	0.49	1.262E-02	860.47	12.000	9.509E-01	TL208
911.37	332.	7.52	1.20	1.200E-02	911.07	29.000	1.556E+00	AC228
933.45	34.	25.42	0.37	1.175E-02	934.05	3.165	1.615E+00	BI214
964.49	83.	19.58	1.36	1.143E-02	964.60	5.452	2.324E+00	AC228
969.18	226.	10.27	1.69	1.139E-02	968.90	17.460	1.981E+00	AC228
1120.63	78.	21.60	0.96	1.007E-02	1120.28	15.040	8.997E-01	BI214
1410.02	13.	52.24	0.24	8.345E-03	1407.98	2.477	1.068E+00	BI214
1461.21	1559.	2.65	1.63	8.101E-03	1460.75	10.700	2.997E+01	K40
1660.79	3.	57.74	0.37	7.319E-03	1661.28	1.150	6.210E-01	BI214
1729.28	24.	20.41	0.33	7.093E-03	1729.60	3.047	1.935E+00	BI214
1765.12	81.	11.67	1.50	6.985E-03	1764.51	15.920	1.275E+00	BI214

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
70.26	17.74	712.	649.	0.156	16.93	1.355	MO-99	s
214.84	53.87	346.	48.	0.011	118.96	0.469	LU-177	s
299.33	74.99	726.	96.	0.023	81.97	0.971	PB-214	D
358.76	89.84	458.	230.	0.055	34.04	0.766	PB-214	M
372.30	93.23	499.	122.	0.029	55.01	0.985	U-235	D
515.38	128.99	280.	98.	0.023	61.27	0.835	AC-228	
615.79	154.08	284.	109.	0.026	58.17	0.552	XE-138	s
965.26	241.59	363.	144.	0.034	41.03	1.101	PB-214	D

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: NIST-Lib1.Lib

ORTEC g v - i (1215) env32 G53W4.09 06-APR-2009 10:27:52 Page 4
Mobile Lab Spectrum name: NT2-0055.An1

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
U-234	212.14	53.20	0.	0.	0.000	0.00	0.000D
TH-234	252.64	63.32	693.	127.	0.030	50.92	0.829
PB-214	298.61	74.81	693.	156.	0.037	0.87	0.971A
PB-212	298.61	74.81	682.	446.	0.107	0.33	0.971A
BI-214	0.00	76.86	0.	0.	0.000	0.00	0.000
PB-214	307.81	77.11	727.	266.	0.064	0.51	0.972A
PB-212	307.81	77.11	746.	819.	0.196	0.18	0.972A
NP-237	345.34	86.49	795.	53.	0.013	152.90	0.980D
PB-212	348.18	87.20	604.	244.	0.059	28.52	0.981A
PB-214	348.18	87.20	592.	95.	0.023	1.43	0.981A

PB-214	0.00	89.80	7.	0.	0.000	0.00	0.000
TH-234	368.91	92.38	788.	91.	0.022	60.20	0.985A
TH-234	370.59	92.80	638.	106.	0.025	63.17	0.985A
AC-228	836.15	209.15	338.	142.	0.034	53.05	1.000
PB-212	954.10	238.63	335.	1566.	0.375	6.45	1.045D
PB-214	967.26	241.92	456.	64.	0.015	78.38	1.101D
AC-228	1079.49	269.97	185.	109.	0.026	45.80	0.716s
TL-208	1108.10	277.12	255.	65.	0.015	76.91	1.065
PB-214	1179.73	295.02	183.	342.	0.082	17.28	1.263
PB-212	1199.08	299.85	184.	119.	0.029	49.85	0.888s
AC-228	1311.56	327.97	144.	112.	0.027	43.87	0.926
AC-228	1353.24	338.38	138.	429.	0.103	16.00	1.140s
PB-214	1407.23	351.88	215.	516.	0.123	13.94	1.105
AC-228	1851.52	462.91	112.	103.	0.025	39.01	0.716s
TL-208	2044.00	511.01	302.	162.	0.039	19.95	1.035s
TL-208	2333.12	583.26	108.	530.	0.127	11.31	1.119
BI-214	2437.52	609.35	90.	428.	0.103	12.73	1.316
BI-214	0.00	665.45	0.	0.	0.000	0.00	0.000
BI-214	3073.72	768.34	57.	29.	0.007	82.76	0.980s
AC-228	3181.08	795.16	66.	82.	0.020	38.52	1.499s
BI-214	3227.73	806.82	18.	8.	0.002	179.71	0.610s
TL-208	3442.92	860.60	51.	83.	0.020	39.57	0.494s
AC-228	3646.10	911.37	83.	311.	0.074	15.05	1.196s
BI-214	3734.46	933.45	32.	34.	0.008	50.84	0.373s
AC-228	3858.68	964.49	56.	83.	0.020	39.16	1.361
AC-228	3877.46	969.18	75.	226.	0.054	20.53	1.693
BI-214	4483.55	1120.63	82.	78.	0.019	43.19	0.958s
BI-214	0.00	1155.19	0.	0.	0.000	0.00	0.000
BI-214	0.00	1280.96	0.	0.	0.000	0.00	0.000
BI-214	0.00	1401.50	0.	0.	0.000	0.00	0.000
BI-214	5641.70	1410.02	9.	13.	0.003	104.47	0.244s
K-40	5846.58	1461.21	90.	1491.	0.357	5.29	1.635
BI-214	6645.33	1660.79	0.	3.	0.001	115.47	0.375s
BI-214	6919.46	1729.28	0.	24.	0.006	40.82	0.333s

ORTEC g v - i (1215) env32 G53W4.09 06-APR-2009 10:27:52 Page 5
Mobile Lab Spectrum name: NT2-0055.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
BI-214	7062.90	1765.12	14.	81.	0.019	23.34	1.495s

S - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

Nuclide Name	Code	Average Activity pCi/g	Peak Energy keV	Peak Activity pCi/g	Code	MDA Value pCi/g	COMMENTS
AM-241		0.0000E+00					
			59.54	0.000E+00	%	2.523E-02	821.25 G
K-40	N	2.9969E+01					
			1460.75	2.997E+01	(P	2.796E-01	2.65 G
RA-226	M	0.0000E+00					
			185.99	0.000E+00	(		14.85 G
PB-212	N	1.6054E+00					

			238.63	1.605E+00	(P	2.704E-02	3.22 G K
			77.11	1.605E+00	} P	7.770E-02	Energy duplication 0.09 X
			74.81	1.605E+00	}	1.348E-01	Energy duplication 0.16 X
			87.20	1.290E+00	} P	2.313E-01	Energy duplication 14.26 G
			300.09	1.865E+00	+	3.927E-01	24.92 G
TH-234	N	1.1708E+00					
			63.29	1.171E+00	(P	3.471E-01	25.46 G
			92.80	1.171E+00	} P	4.766E-01	31.59 G
			92.38	1.171E+00	} P	5.261E-01	30.10 G
PB-210	N	0.0000E+00					
			46.52	0.000E+00	(	5.265E-01	36.45 G
PB-214	N	8.5320E-01					
			351.99	8.291E-01	(P	3.418E-02	6.97 G K
			295.22	8.998E-01	(P	5.160E-02	8.64 G
			77.11	8.532E-01	}	1.994E-01	Energy duplication 0.26 X
			241.92	3.834E-01	- P	1.951E-01	39.19 G
			74.81	8.532E-01	} P	2.912E-01	Energy duplication 0.44 X
			87.20	8.532E-01	}	3.139E-01	Energy duplication 0.72 X
			53.23	8.532E-01	} P	1.416E+00	Energy duplication 74.35 G
			53.20	4.873E-01	} P	1.424E+00	Energy duplication 221.94 G
			785.95	0.000E+00	% P	1.269E+00	793.73 G
			89.80	0.000E+00	P	1.828E-01	0.00 G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
BI-214	N 9.3586E-01						
		609.32	9.406E-01	(P		3.053E-02	6.36 G
		1764.51	1.275E+00	+ P		2.240E-01	11.67 G
		1120.28	8.997E-01	?(P		1.531E-01	21.60 G
		1238.11	0.000E+00	% P		2.929E-01	438.75 G
		768.36	7.449E-01	- P		3.484E-01	41.38 G
		1377.65	0.000E+00	% P		4.946E-01	291.55 G
		934.05	1.615E+00	+ P		5.622E-01	25.42 G
		1729.60	1.935E+00	+		6.003E-01	20.41 G
		1407.98	1.068E+00	&(		4.088E-01	52.24 G
		1509.19	0.000E+00	%		6.041E-01	286.48 G
		1847.44	0.000E+00	&		6.087E-01	214.48 G
		1155.19	0.000E+00			1.051E-01	0.00 G
		665.45	0.000E+00			7.021E-02	0.00 G
		1280.96	0.000E+00			1.312E-01	0.00 G
		1401.50	0.000E+00			1.501E-01	0.00 G
		806.17	7.962E-01	&		8.057E-01	89.86 G
		1661.28	6.210E-01	-		6.210E-01	57.74 G
		79.29	0.000E+00	%		2.178E+00	215.37 X
		76.86	0.000E+00			9.541E-02	0.00 X
TL-208	N 6.0208E-01						
		583.14	5.985E-01	(P		1.721E-02	5.65 G K

			510.72	6.159E-01	*(P	9.570E-02	9.97	G
			860.47	9.509E-01	+ P	1.942E-01	19.78	G
			277.36	4.802E-01	- P	1.918E-01	38.45	G
AC-228	N	1.5809E+00						
			911.07	1.556E+00	(P	6.703E-02	7.52	G K
			968.90	1.981E+00	+ P	2.195E-01	10.27	G
			338.40	2.023E+00	+ P	1.612E-01	8.00	G
			964.60	2.324E+00	+ P	4.804E-01	19.58	G
			794.80	2.171E+00	+ P	4.708E-01	19.26	G
			463.00	1.731E+00	(P	2.607E-01	19.51	G
			209.40	1.294E+00	- P	2.870E-01	26.52	G
			270.30	1.369E+00	(P	2.490E-01	22.90	G
			1587.90	0.000E+00	% P	4.702E-01	342.78	G
			328.00	1.825E+00	(P	2.863E-01	21.94	G
BI-212	N	0.0000E+00						
			727.17	0.000E+00	(	1.876E-01	17.04	G K
			1620.56	0.000E+00	?(	6.322E-01	39.63	G
			785.42	0.000E+00	%	4.650E-01	103.74	G
			39.86	0.000E+00	?(	1.692E+00	78.92	G

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
NP-237	M	1.3492E-01						
			86.49	1.349E-01	(		76.45 G K	Pb-212/214
			95.87	0.000E+00	% P		196.98 G	RE 4.709
CS-137	M	0.0000E+00						
			661.62	0.000E+00	?(		0.00 G	
U-235	M	0.0000E+00						
			185.72	0.000E+00	(		16.51 G K	
			143.76	0.000E+00	?(		40.67 G	
U-234	M	0.0000E+00						
			53.20	0.000E+00			Energy duplication 0.00 G	

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation

Peak Codes:
G - Gamma Ray

F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

ORTEC g v - i (1215) env32 G53W4.09 06-APR-2009 10:27:52 Page 8
Mobile Lab Spectrum name: NT2-0055.An1

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity pCi/g	Uncertainty 2 Sigma Counting pCi/g	Total pCi/g
AM-241	<	2.5227E-02		
K-40		2.9969E+01	1.658E+00	2.053E+00
PB-212		1.6054E+00	1.057E-01	1.212E-01
TH-234		1.1708E+00	8.433E-01	8.444E-01
PB-210	<	5.2653E-01		
PB-214		8.5320E-01	9.899E-02	1.048E-01
BI-214		9.3586E-01	1.226E-01	1.283E-01
TL-208		6.0208E-01	7.031E-02	7.440E-02
AC-228		1.5809E+00	2.537E-01	2.616E-01
BI-212	<	1.8762E-01		
~~NP-237~~	~~C~~	~~1.3492E-01~~	~~2.063E-01~~	~~2.063E-01~~

Pb-212/214 PCE 4.7.09

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

S U M M A R Y

Total Activity (270.1 to 1999.2 keV) 3.6852215E+01 pCi/g

The library has energies which are not separable.

Analyzed by: BC. Lara
EnergySolutions

Reviewed by: PCE
Supervisor

Laboratory: Mobile Lab

ORTEC g v - i (1215) env32 G53W4.09 05-APR-2009 13:52:16 Page 1
Mobile Lab Spectrum name: NT2-0052.An1

Sample description
Final Survey Unit 013 Soil #09 in trench 2124 4/4/09

Spectrum Filename: C:\User\NT2-0052.An1

Acquisition information
Start time: 05-Apr-2009 12:42:08
Live time: 4156
Real time: 4200
Dead time: 1.04 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: NIST 250 ml Soil LeGe.Clb
NIST 250 ml Soil Standard 74706-466; 1.6 g/cc

Energy Calibration
Created: 16-May-2007 12:12:20
Zero offset: 0.180 keV
Gain: 0.250 keV/channel
Quadratic: -5.594E-09 keV/channel^2

Efficiency Calibration
Created: 15-Sep-2008 13:59:21
Knee Energy: 350.00 keV
Above the Knee: Quadratic Uncertainty = 1.41 %
Log(Eff): 4.799504E+00 + (-1.839562E+00*Log(E)) +
(7.136665E-02*Log(E)^2)
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: NIST-Lib1.Lib
Library Match Width: 0.400
Peak stripping: Library based

Analysis parameters
Analysis engine: env32 G53W4.09
Start channel: 67 (16.93keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.6680E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.6680E+02) =
2.7263E+03
Detection limit method: Traditional ORTEC method

Random error: 1.0000000E+00

ORTEC g v - i (1215) env32 G53W4.09 05-APR-2009 13:52:16 Page 2
Mobile Lab Spectrum name: NT2-0052.An1

Page 1

Final Survey Unit 013 #09 soil from 2124 trench 4-4-09.txt
Systematic error: 1.0000000E+00
Fraction Limit: 0.000%
Background width: best method (based on spectrum).

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	Air Filter in Petris LeGe.Pbc 06-Oct-2008 17:02:51
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks allocated 23 cutoff 10.00000 %
Energy Calibration
Normalized diff: 0.1602

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. pCi/g	Nuc
17.46	158.	20.26	0.77	0.000E+00				
52.70	75.	40.78	0.58	4.097E-02	53.23	1.105	2.934E+00	PB214
63.41	207.	22.25	1.04	4.857E-02	63.29	3.900	1.443E+00	TH234
74.88	671.	6.63	0.97	5.041E-02	74.81	9.600	2.460E+00	PB212
					74.81	6.330	3.666E+00	PB214
77.19	1054.	4.42	0.97	5.078E-02	76.86	0.360	1.023E+02	BI214
					77.11	17.500	2.066E+00	PB212
					77.11	10.700	3.440E+00	PB214
79.37	45.	78.31	0.97	5.112E-02	79.29	0.603	2.573E+00	BI214
84.18	163.	20.63	0.98	5.190E-02				
86.58	66.	61.15	0.98	5.227E-02	86.49	13.100	1.699E-01	NP237
87.21	339.	10.87	0.98	5.239E-02	87.20	3.700	3.097E+00	PB214
					87.20	6.300	1.752E+00	PB212
89.94	225.	14.81	0.98	5.253E-02	89.80	1.030	7.159E+00	PB214
92.43	110.	34.75	0.98	5.252E-02	92.38	2.570	PBC<MDA	TH234
93.07	366.	10.16	0.99	5.252E-02	92.80	3.000	3.589E+00	TH234
93.65	66.	48.86	0.99	5.251E-02				
128.89	120.	25.30	0.66	5.137E-02				
143.57	58.	35.42	0.95	4.912E-02	143.76	10.500	1.994E-01	U235
174.41	29.	61.41	0.29	4.503E-02				
185.98	194.	17.58	0.86	4.402E-02	185.72	54.000	1.275E-01	U235
					185.99	3.280	2.241E+00	RA226
209.08	223.	14.20	1.26	4.199E-02	209.40	4.553	2.070E+00	AC228
238.53	1559.	3.16	1.05	3.945E-02	238.63	43.100	1.592E+00	PB212
241.51	207.	15.36	1.46	3.915E-02	241.92	7.470	1.254E+00	PB214
270.01	157.	18.39	1.66	3.668E-02	270.30	3.770	2.008E+00	AC228
277.44	10.	66.97	0.62	3.607E-02	277.36	6.500	PBC<MDA	TL208
295.12	283.	10.69	1.14	3.452E-02	295.22	19.200	7.097E-01	PB214
300.03	120.	16.96	0.90	3.410E-02	300.09	3.270	1.908E+00	PB212

ORTEC g v - i (1215) env32 G53W4.09 05-APR-2009 13:52:16 Page 3
Mobile Lab Spectrum name: NT2-0052.An1

pk	energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc

Page 2

327.90	121.	16.61	1.08	3.166E-02	328.00	3.364	2.008E+00	AC228
338.14	355.	9.12	1.37	3.078E-02	338.40	12.010	1.639E+00	AC228
351.83	535.	6.36	1.07	2.922E-02	351.99	37.100	8.442E-01	PB214
463.09	103.	18.08	1.15	2.231E-02	463.00	4.640	1.762E+00	AC228
510.91	147.	9.90	1.35	2.031E-02	510.72	22.500	5.699E-01	TL208
583.35	535.	5.65	1.21	1.793E-02	583.14	86.000	5.952E-01	TL208
609.49	386.	7.54	1.45	1.721E-02	609.32	46.090	8.342E-01	BI214
785.95	-3.	0.00	0.00	1.367E-02	785.95	1.090	PBC<MDA	PB214
860.66	47.	25.26	0.95	1.262E-02	860.47	12.000	5.504E-01	TL208
911.43	354.	6.84	1.16	1.200E-02	911.07	29.000	1.696E+00	AC228
964.91	53.	24.16	1.35	1.143E-02	964.60	5.452	1.522E+00	AC228
1120.44	91.	14.40	1.06	1.007E-02	1120.28	15.040	1.070E+00	BI214
1239.49	24.	46.58	0.31	9.266E-03	1238.11	5.916	7.806E-01	BI214
1378.08	28.	20.58	0.35	8.493E-03	1377.65	4.020	1.479E+00	BI214
1461.34	1327.	2.86	1.55	8.100E-03	1460.75	10.700	2.575E+01	K40
1589.25	26.	21.79	0.24	7.583E-03	1587.90	3.712	1.626E+00	AC228

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
69.14	17.46	327.	158.	0.038	40.53	0.767	MO-99	M
298.96	74.90	667.	100.	0.024	75.45	0.971	PB-214	D
336.52	84.20	483.	167.	0.040	40.40	0.978	TA-182	D
359.56	89.96	419.	217.	0.052	29.95	0.983	PB-214	D
374.00	93.65	492.	66.	0.016	97.72	0.986	U-235	D
514.99	128.89	280.	120.	0.029	50.61	0.664	AC-228	s
697.12	174.41	133.	29.	0.007	122.82	0.288	-	s
5847.95	1461.55	487.	214.	0.051	32.27	1.850	K-40	D

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: NIST-Lib1.Lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
PB-214	0.00	53.20	9.	0.	0.000	0.00	0.000
PB-214	210.16	52.70	390.	75.	0.018	81.56	0.578s
TH-234	252.98	63.41	655.	154.	0.037	44.50	1.041
PB-212	298.61	74.81	657.	435.	0.105	0.32	0.971A

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
PB-214	298.61	74.81	669.	152.	0.037	0.99	0.971A
BI-214	0.00	76.86	0.	0.	0.000	0.00	0.000
PB-212	307.81	77.11	673.	798.	0.192	0.17	0.972A
PB-214	307.81	77.11	655.	259.	0.062	0.58	0.972A
BI-214	316.53	79.29	591.	45.	0.011	156.62	0.974D
NP-237	345.34	86.49	772.	66.	0.016	122.31	0.980D
PB-214	348.18	87.20	540.	92.	0.022	1.64	0.981A
PB-212	348.18	87.20	552.	206.	0.050	32.12	0.981A

PB-214	0.00	89.80	7.	0.	0.000	0.00	0.000
TH-234	368.91	92.38	877.	110.	0.026	69.51	0.985A
TH-234	370.59	92.80	561.	128.	0.031	51.00	0.985A
U-235	573.72	143.57	156.	58.	0.014	70.84	0.954
U-235	743.44	185.98	315.	171.	0.041	35.15	0.856
RA-226	0.00	185.99	0.	0.	0.000	0.00	0.000
AC-228	835.86	209.08	226.	223.	0.054	28.40	1.261s
PB-212	953.71	238.53	291.	1527.	0.367	6.31	1.050
PB-214	965.63	241.51	282.	207.	0.050	30.72	1.458s
AC-228	1079.64	270.01	195.	157.	0.038	36.79	1.664s
PB-214	1180.14	295.12	182.	265.	0.064	21.37	1.136
PB-212	1199.78	300.03	98.	120.	0.029	33.91	0.899
AC-228	1311.31	327.90	112.	121.	0.029	33.22	1.075
AC-228	1352.26	338.14	139.	342.	0.082	18.24	1.366
PB-214	1407.06	351.83	162.	516.	0.124	12.72	1.067
AC-228	1852.24	463.09	94.	103.	0.025	36.17	1.145
TL-208	2043.61	510.91	303.	147.	0.035	19.80	1.346s
TL-208	2333.47	583.35	101.	518.	0.125	11.30	1.208
BI-214	2438.09	609.49	112.	373.	0.090	15.09	1.448
BI-214	0.00	665.45	0.	0.	0.000	0.00	0.000
PB-214	0.00	785.95	3.	0.	0.000	0.00	0.000
BI-214	3226.00	806.39	7.	0.	0.000	0.00	0.000s
TL-208	3443.19	860.66	54.	47.	0.011	50.52	0.953s
AC-228	3644.91	911.07	84.	306.	0.074	14.52	1.131D
AC-228	3860.39	964.91	47.	53.	0.013	48.31	1.346
BI-214	4482.79	1120.44	41.	91.	0.022	28.81	1.058s
BI-214	4959.22	1239.49	73.	24.	0.006	93.16	0.309s
BI-214	5513.89	1378.08	15.	28.	0.007	41.17	0.348s
BI-214	0.00	1401.50	0.	0.	0.000	0.00	0.000
BI-214	5633.00	1407.85	2.	0.	0.000	0.00	0.000s
K-40	5846.88	1461.28	354.	966.	0.232	10.16	1.453
AC-228	6359.03	1589.25	5.	26.	0.006	43.58	0.238s
BI-214	6647.00	1661.20	2.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

ORTEC g v - i (1215) env32 G53W4.09 05-APR-2009 13:52:16 Page 5
Mobile Lab Spectrum name: NT2-0052.An1

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity pCi/g	Peak Energy keV	Activity pCi/g	Code	MDA Value pCi/g	COMMENTS
AM-241		0.0000E+00					
			59.54	0.000E+00	%	2.207E-02	1348.94 G
K-40	N	1.9749E+01					
			1460.75	1.975E+01	(P	5.545E-01	5.08 G
RA-226	M	0.0000E+00					
			185.99	0.000E+00			0.00 G
PB-212	N	1.5924E+00					
			238.63	1.592E+00	(P	2.569E-02	3.16 G K
							Energy duplication
			77.11	1.592E+00	} P	1.182E-01	0.09 X

			74.81	1.592E+00	}	1.911E-01	Energy duplication 0.16 X
			87.20	1.109E+00	} P	1.832E-01	Energy duplication 16.06 G
			300.09	1.908E+00	+	3.401E-01	16.96 G
TH-234	N	1.4431E+00					
			63.29	1.443E+00	(P	3.435E-01	22.25 G
			92.80	1.443E+00	} P	4.753E-01	25.50 G
			92.38	1.443E+00	} P	5.693E-01	34.75 G
PB-210	N	0.0000E+00					
			46.52	0.000E+00	(	4.016E-01	31.96 G
PB-214	N	8.4422E-01					
			351.99	8.442E-01	(P	3.027E-02	6.36 G K
			295.22	7.097E-01	- P	8.134E-02	10.69 G
			77.11	8.442E-01	}	1.197E-01	Energy duplication 0.29 X
			241.92	1.254E+00	+ P	1.926E-01	15.36 G
			74.81	8.442E-01	} P	2.078E-01	Energy duplication 0.50 X
			87.20	8.442E-01	}	3.808E-01	Energy duplication 0.82 X
			53.23	2.934E+00	& P	1.214E+00	40.78 G
			53.20	0.000E+00	P	2.528E-01	0.00 G
			785.95	0.000E+00	P	4.562E-01	0.00 G
			89.80	0.000E+00	P	1.857E-01	0.00 G
BI-214	N	8.2813E-01					
			609.32	8.342E-01	(P	3.452E-02	7.54 G
			1764.51	0.000E+00	% P	1.348E-01	170.44 G
			1120.28	1.070E+00	+ P	1.962E-01	14.40 G
			1238.11	7.806E-01	&(P	4.069E-01	46.58 G
			768.36	0.000E+00	& P	3.212E-01	458.26 G

□

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1377.65	1.479E+00	+ P	5.082E-01	20.58 G
		934.05	0.000E+00	% P	3.875E-01	421.31 G
		1729.60	0.000E+00	%	3.281E-01	378.59 G
		1407.98	0.000E+00	?	2.197E-01	0.00 G
		1509.19	0.000E+00	%	4.642E-01	463.08 G
		1847.44	0.000E+00	&	5.612E-01	134.72 G
		1155.19	0.000E+00	%	7.483E-01	316.23 G
		665.45	0.000E+00		7.144E-02	0.00 G
		1280.96	0.000E+00	%	6.048E-01	264.58 G
		1401.50	0.000E+00		1.527E-01	0.00 G
		806.17	0.000E+00	?	4.618E-01	0.00 G
		1661.28	0.000E+00	?	5.395E-01	0.00 G
		79.29	2.573E+00	+	2.080E+00	78.31 X
		76.86	0.000E+00		9.708E-02	0.00 X
TL-208	N	5.8602E-01				
		583.14	5.952E-01	(P	1.695E-02	5.65 G K
		510.72	5.699E-01	*(P	9.747E-02	9.90 G
		860.47	5.504E-01	?(P	1.276E-01	25.26 G
		277.36	0.000E+00	% P	1.335E-01	66.97 G
AC-228	N	1.5950E+00				

			911.07	1.560E+00	(P 6.845E-02	7.26 G	K
			968.90	0.000E+00	% P 1.474E-01	978.77 G	
			338.40	1.639E+00	(P 8.257E-02	9.12 G	
			964.60	1.522E+00	?(P 2.890E-01	24.16 G	
			794.80	0.000E+00	% P 3.716E-01	601.04 G	
			463.00	1.762E+00	(P 2.437E-01	18.08 G	
			209.40	2.070E+00	+ P 2.826E-01	14.20 G	
			270.30	2.008E+00	+ P 3.466E-01	18.39 G	
			1587.90	1.626E+00	&(P 2.367E-01	21.79 G	
			328.00	2.008E+00	+ P 3.677E-01	16.61 G	
BI-212	N	0.0000E+00					
			727.17	0.000E+00	% 1.283E-01	389.72 G	K
			1620.56	0.000E+00	% 2.213E-01	165.83 G	
			785.42	0.000E+00	? 6.412E-01	48.71 G	
			39.86	0.000E+00	& 1.859E+00	129.44 G	
NP-237	M	1.6990E-01					
			86.49	1.699E-01	(	61.15 G	K
			95.87	0.000E+00	% P	456.77 G	
CS-137	M	0.0000E+00					
			661.62	0.000E+00	?(	62.06 G	

-Pb-212/214 PCE 4.7.09

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
U-235	M 1.3921E-01						
		185.72	1.275E-01	(P		17.58 G	K
		143.76	1.994E-01	?(		35.42 G	
U-234	M 0.0000E+00						
		53.20	0.000E+00	(		40.78 G	

-Ra 226 PCE 4.7.09

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average

- -

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity pCi/g	Uncertainty 2 Sigma Counting pCi/g	Total pCi/g
AM-241	< ✓	2.2071E-02		
K-40		1.9749E+01	2.146E+00	2.289E+00
PB-212		1.5924E+00	1.027E-01	1.183E-01
TH-234		1.4431E+00	8.609E-01	8.625E-01
PB-210	<	4.0164E-01		
PB-214		8.4422E-01	1.112E-01	1.163E-01
BI-214		8.2813E-01	1.292E-01	1.334E-01

ORTEC g v - i (1215) env32 G53W4.09 05-APR-2009 13:52:16 Page 8
Mobile Lab Spectrum name: NT2-0052.An1

TL-208		5.8602E-01	6.840E-02	7.238E-02
AC-228		1.5950E+00	2.472E-01	2.554E-01
BI-212	<	1.2828E-01		
~~NP-237~~		~~1.6990E-01~~	~~2.078E-01~~	~~2.079E-01~~ Pb-212/214
~~U-235~~		~~1.3921E-01~~	~~5.559E-02~~	~~5.582E-02~~ Ra-226

AE 4.7.09

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

S U M M A R Y

Total Activity (95.7 to 1999.2 keV) 2.6947359E+01 pCi/g

The library has energies which are not separable.

Analyzed by: JC. Fenn
EnergySolutions

Reviewed by: PC Ely
Supervisor

Laboratory: Mobile Lab

ORTEC g v - i (1215) env32 G53W4.09 05-APR-2009 13:53:26 Page 1
Mobile Lab Spectrum name: NT1-0063.An1

Sample description
Final Survey Unit 013 # 10 Rm. 2124 in trench 4/4/09

Spectrum Filename: C:\User\NT1-0063.An1

Acquisition information
Start time: 05-Apr-2009 12:42:14
Live time: 4183
Real time: 4200
Dead time: 0.40 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: NIST 250 ml Soil ReGe.Clb
250 ml Soil in Marinelli

Energy Calibration
Created: 03-Oct-2008 16:16:15
Zero offset: 0.310 keV
Gain: 0.250 keV/channel
Quadratic: -4.593E-09 keV/channel^2

Efficiency Calibration
Created: 03-Oct-2008 16:49:35
Knee Energy: 165.00 keV
Above the Knee: Quadratic Uncertainty = 0.94 %
Log(Eff): 1.725969E-02 + (-3.837367E-01*Log(E)) +
(-3.461374E-02*Log(E)^2)
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: NIST-Lib1.Lib
Library Match Width: 0.400
Peak stripping: Library based

Analysis parameters
Analysis engine: env32 G53W4.09
Start channel: 67 (17.05keV)
Stop channel: 8000 (1999.37keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.5250E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5250E+02) =
2.8369E+03
Detection limit method: Traditional ORTEC method

Random error: 1.0000000E+00

ORTEC g v - i (1215) env32 G53W4.09 05-APR-2009 13:53:26 Page 2
Mobile Lab Spectrum name: NT1-0063.An1

Final Survey Unit 013 #10 soil Rm. 2124 trench 4-4-09.txt
Systematic error: 1.0000000E+00
Fraction Limit: 0.000%
Background width: best method (based on spectrum).

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	Air Filter in Petris ReGe.Pbc 07-Oct-2008 08:47:29
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks allocated 27 cutoff 10.00000 %
Energy Calibration
Normalized diff: 0.2194

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. pCi/g	Nuc
17.76	184.	19.55	1.41	0.000E+00				
46.67	174.	21.72	1.02	4.159E-02	46.52	4.000	1.244E+00	PB210
52.80	92.	56.45	0.95	5.173E-02	53.20	1.100	2.967E+00	PB214
53.23	-9.	0.00	0.00	5.178E-02	53.23	1.105	PBC<MDA	PB214
63.45	197.	23.62	0.81	6.227E-02	63.29	3.900	1.031E+00	TH234
74.95	852.	5.61	0.92	6.431E-02	74.81	9.600	2.531E+00	PB212
					74.81	6.330	3.762E+00	PB214
77.31	1384.	3.74	0.92	6.472E-02	77.11	17.500	2.205E+00	PB212
					77.11	10.700	3.666E+00	PB214
86.68	53.	76.61	0.93	6.635E-02	86.49	13.100	1.110E-01	NP237
87.42	442.	9.45	0.93	6.651E-02	87.20	3.700	3.292E+00	PB214
					87.20	6.300	1.900E+00	PB212
90.11	301.	12.29	0.93	6.655E-02	89.80	1.030	7.880E+00	PB214
92.44	96.	28.63	0.93	6.641E-02	92.38	2.570	PBC<MDA	TH234
92.84	112.	34.97	0.94	6.639E-02	92.80	3.000	PBC<MDA	TH234
93.24	420.	9.52	0.94	6.636E-02				
143.68	34.	72.56	0.50	6.093E-02	143.76	10.500	9.645E-02	U235
186.14	298.	14.44	1.11	5.319E-02	185.72	54.000	1.676E-01	U235
					185.99	3.280	3.129E+00	RA226
209.28	143.	22.19	0.89	4.872E-02				
209.28	143.	22.19	0.89	4.872E-02	209.40	4.553	1.088E+00	AC228
238.81	1964.	2.93	1.10	4.408E-02	238.63	43.100	1.863E+00	PB212
241.86	277.	13.26	1.67	4.365E-02	241.92	7.470	1.559E+00	PB214
295.51	398.	7.92	1.16	3.741E-02	295.22	19.200	1.008E+00	PB214
300.27	111.	21.34	0.82	3.695E-02	300.09	3.270	1.683E+00	PB212
338.62	406.	7.28	1.13	3.363E-02	338.40	12.010	1.778E+00	AC228
352.21	618.	6.10	1.07	3.260E-02	351.99	37.100	9.035E-01	PB214

PCE 4.5.09

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
511.01	135.	10.75	1.09	2.419E-02	510.72	22.500	4.541E-01	TL208
583.44	601.	5.25	1.11	2.169E-02	583.14	86.000	5.774E-01	TL208

Final Survey Unit 013 #10 soil Rm. 2124 trench 4-4-09.txt

609.60	429.	6.90	1.17	2.092E-02	609.32	46.090	7.676E-01 BI214
768.84	38.	30.29	1.68	1.724E-02	768.36	4.885	8.295E-01 BI214
786.26	-1.	0.00	0.17	1.691E-02	785.95	1.090	PBC<MDA PB214
860.97	73.	20.41	0.58	1.566E-02	860.47	12.000	7.114E-01 TL208
911.44	428.	6.93	1.55	1.491E-02	911.07	29.000	1.724E+00 AC228
934.14	41.	34.96	0.67	1.460E-02	934.05	3.165	1.618E+00 BI214
969.39	258.	8.48	1.42	1.414E-02	968.90	17.460	1.845E+00 AC228
1120.71	84.	17.17	1.52	1.248E-02	1120.28	15.040	8.183E-01 BI214
1376.36	17.	35.99	0.27	1.041E-02	1377.65	4.020	7.344E-01 BI214
1461.15	1686.	2.48	1.91	9.882E-03	1460.75	10.700	2.810E+01 K40
1661.34	20.	22.36	0.42	8.812E-03	1661.28	1.150	3.617E+00 BI214
1764.73	63.	17.82	0.74	8.347E-03	1764.51	15.920	8.689E-01 BI214
1847.52	23.	20.85	0.50	8.008E-03	1847.44	2.123	2.479E+00 BI214

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
69.82	17.76	185.	184.	0.044	39.10	1.410	MO-99	s
298.59	74.93	2328.	664.	0.159	21.96	0.919	PB-214	D
359.46	90.09	414.	317.	0.076	21.37	0.933	PB-214	D
372.01	93.22	612.	398.	0.095	20.25	0.936	U-235	D
743.72	186.14	406.	243.	0.058	26.67	1.017	PA-234	D
836.18	209.28	288.	143.	0.034	44.38	0.893	AC-228	SM
1353.72	338.62	140.	406.	0.097	14.55	1.131	AC-228	M
3645.94	911.44	77.	428.	0.102	13.86	1.546	AC-228	M
3877.86	969.39	49.	258.	0.062	16.96	1.420	AC-228	M

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: NIST-Lib1.Lib

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
PB-210	185.49	46.67	480.	112.	0.027	43.44	1.023s
PB-214	210.03	52.80	459.	92.	0.022	112.91	0.953
PB-214	0.00	53.23	9.	0.	0.000	0.00	0.000
TH-234	252.62	63.45	716.	137.	0.033	47.24	0.811s

ORTEC g v - i (1215) env32 G53W4.09 05-APR-2009 13:53:26 Page 4
Mobile Lab
Spectrum name: NT1-0063.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
PB-212	298.10	74.81	733.	623.	0.149	0.23	0.831A
PB-214	298.10	74.81	890.	123.	0.029	71.10	0.460A
BI-214	0.00	76.86	0.	0.	0.000	0.00	0.000
PB-212	307.30	77.11	639.	1143.	0.273	0.13	0.921A
PB-214	307.30	77.11	616.	355.	0.085	0.35	0.921A
NP-237	344.83	86.49	787.	53.	0.013	153.22	0.930D
PB-214	347.68	87.20	620.	126.	0.030	0.99	0.930A
PB-212	347.68	87.20	627.	294.	0.070	24.07	0.930A
PB-214	0.00	89.80	6.	0.	0.000	0.00	0.000
TH-234	368.40	92.38	973.	96.	0.023	57.26	0.935A

Page 3

TH-234	370.08	92.80	1035.	112.	0.027	69.94	0.935A
U-235	573.66	143.68	241.	34.	0.008	145.12	0.502s
RA-226	0.00	185.99	0.	0.	0.000	0.00	0.000
AC-228	0.00	209.40	0.	0.	0.000	0.00	0.000
PB-212	954.32	238.81	414.	1933.	0.462	5.85	1.096
PB-214	966.52	241.86	329.	277.	0.066	26.51	1.669s
AC-228	0.00	270.30	0.	0.	0.000	0.00	0.000
PB-214	1181.19	295.51	166.	395.	0.095	15.84	1.156
PB-212	1200.26	300.27	150.	111.	0.027	42.68	0.823s
AC-228	0.00	328.00	0.	0.	0.000	0.00	0.000
AC-228	0.00	338.40	0.	0.	0.000	0.00	0.000
PB-214	1408.11	352.21	222.	597.	0.143	12.20	1.072
AC-228	0.00	463.00	0.	0.	0.000	0.00	0.000
TL-208	2043.56	511.01	333.	135.	0.032	21.50	1.088s
TL-208	2333.36	583.44	112.	588.	0.141	10.51	1.115
BI-214	2438.08	609.60	133.	404.	0.097	13.80	1.171
BI-214	2662.00	665.56	12.	0.	0.000	0.00	0.000s
BI-214	3075.31	768.84	59.	38.	0.009	60.57	1.678
PB-214	3145.00	786.26	18.	0.	0.000	0.00	0.167s
AC-228	0.00	794.80	0.	0.	0.000	0.00	0.000
BI-214	0.00	806.17	0.	0.	0.000	0.00	0.000
TL-208	3443.99	860.97	66.	73.	0.017	40.82	0.580s
AC-228	0.00	911.07	0.	0.	0.000	0.00	0.000
BI-214	3736.79	934.14	63.	41.	0.010	69.93	0.669s
AC-228	0.00	964.60	0.	0.	0.000	0.00	0.000
AC-228	0.00	968.90	0.	0.	0.000	0.00	0.000
BI-214	4483.42	1120.71	53.	84.	0.020	34.34	1.515
BI-214	0.00	1280.96	0.	0.	0.000	0.00	0.000
BI-214	5506.53	1376.36	20.	17.	0.004	71.98	0.269s
BI-214	0.00	1407.98	0.	0.	0.000	0.00	0.000
K-40	5845.89	1461.15	78.	1621.	0.388	4.97	1.911
AC-228	0.00	1587.90	0.	0.	0.000	0.00	0.000
BI-214	6647.10	1661.34	0.	20.	0.005	44.72	0.417s
BI-214	7060.90	1764.73	14.	63.	0.015	35.63	0.743s
BI-214	7392.25	1847.52	0.	23.	0.005	41.70	0.500s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

ORTEC g v - i (1215) env32 G53W4.09 05-APR-2009 13:53:26 Page 5
Mobile Lab Spectrum name: NT1-0063.An1

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

Nuclide Name	Code	Average Activity pCi/g	Peak Energy keV	Peak Activity pCi/g	Code	Peak MDA Value pCi/g	COMMENTS
AM-241		0.0000E+00					
			59.54	0.000E+00	%	1.995E-02	474.55 G
K-40	N	2.8096E+01					
			1460.75	2.810E+01	(P	2.249E-01	2.48 G
RA-226	M	0.0000E+00					
			185.99	0.000E+00			0.00 G
PB-212	N	1.8506E+00					
			238.63	1.863E+00	(P	2.825E-02	2.93 G K

			77.11	1.851E+00	} P	1.027E-01	Energy duplication 0.06 X
			74.81	1.851E+00	}	1.641E-01	Energy duplication 0.12 X
			87.20	1.288E+00	} P	1.582E-01	Energy duplication 12.03 G
			300.09	1.683E+00	(	2.703E-01	21.34 G
TH-234	N	1.0314E+00					
			63.29	1.031E+00	@(P	2.896E-01	23.62 G
			92.80	1.031E+00	} P	4.299E-01	34.97 G
			92.38	1.031E+00	} P	4.895E-01	28.63 G
PB-210	N	1.2444E+00					
			46.52	1.244E+00	*(P	3.487E-01	21.72 G
PB-214	N	9.3921E-01					
			351.99	9.035E-01	(P	3.272E-02	6.10 G K
			295.22	1.008E+00	(P	4.769E-02	7.92 G
			77.11	9.392E-01	}	9.431E-02	Energy duplication 0.18 X
			241.92	1.559E+00	+ P	1.985E-01	13.26 G
			74.81	5.547E-01	} P	1.941E-01	Energy duplication 35.55 X
			87.20	9.392E-01	}	3.449E-01	Energy duplication 0.49 X
			53.23	0.000E+00	P	2.076E-01	0.00 G
			53.20	2.967E+00	+ P	1.085E+00	56.45 G
			785.95	0.000E+00	? P	6.597E-01	0.00 G
			89.80	0.000E+00	P	1.482E-01	0.00 G
BI-214	N	7.9721E-01					
			609.32	7.676E-01	(P	3.196E-02	6.90 G
			1764.51	8.689E-01	(	8.020E-02	17.82 G
			1120.28	8.183E-01	?(P	1.057E-01	17.17 G
			1238.11	0.000E+00	% P	2.622E-01	985.45 G
			768.36	8.295E-01	(P	2.473E-01	30.29 G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		1377.65	7.344E-01	&(P	3.013E-01	35.99 G
		934.05	1.618E+00	+ P	5.921E-01	34.96 G
		1729.60	0.000E+00	%	2.620E-01	161.25 G
		1407.98	0.000E+00		7.245E-02	0.00 G
		1509.19	0.000E+00	%	4.543E-01	556.78 G
		1847.44	2.479E+00	+	7.870E-01	20.85 G
		1155.19	0.000E+00	%	4.462E-01	384.06 G
		665.45	0.000E+00	?	3.270E-01	0.00 G
		1280.96	0.000E+00		1.120E-01	0.00 G
		1401.50	0.000E+00	&	6.995E-01	351.19 G
		806.17	0.000E+00		9.016E-02	0.00 G
		1661.28	3.617E+00	+	1.238E+00	22.36 G
		79.29	0.000E+00	%	1.848E+00	152.98 X
		76.86	0.000E+00		7.876E-02	0.00 X
TL-208	N	5.7736E-01				
		583.14	5.774E-01	(P	1.520E-02	5.25 G K
		510.72	4.541E-01	- P	1.047E-01	10.75 G
		860.47	7.114E-01	+ P	1.675E-01	20.41 G
		277.36	0.000E+00	% P	1.318E-01	224.68 G

Nuclide		Ave activity	Energy		Activity	Code	Peak MDA	Comments
AC-228	N	0.0000E+00						
			911.07	0.000E+00	9.649E-02		0.00	G K
			968.90	0.000E+00	7.724E-02		0.00	G
			338.40	0.000E+00	7.820E-02		0.00	G
			964.60	0.000E+00	2.713E-01		0.00	G
			794.80	0.000E+00	4.291E-01		0.00	G
			463.00	0.000E+00	2.187E-01		0.00	G
			209.40	0.000E+00	2.830E-01		0.00	G
			270.30	0.000E+00	3.560E-01		0.00	G
			1587.90	0.000E+00	5.324E-01		0.00	G
			328.00	0.000E+00	3.724E-01		0.00	G
BI-212	N	0.0000E+00						
			727.17	0.000E+00	1.827E-01	(	15.10	G K
			1620.56	0.000E+00	3.162E-01	%	360.56	G
			785.42	0.000E+00	4.403E-01	?(	75.09	G
			39.86	0.000E+00	1.035E+00	%	260.54	G
NP-237	M	1.1104E-01						
			86.49	1.110E-01		(	76.61	G K — Pb-212/214 AE 4.5.09
			95.87	0.000E+00		% P	1197.91	G
CS-137	M	0.0000E+00						
			661.62	0.000E+00		%	106.73	G

Nuclide		Ave activity	Energy		Activity	Code	Peak MDA	Comments
U-235	M	0.0000E+00						
			185.72	0.000E+00		% P	83.40	G K
			143.76	9.645E-02		?	72.56	G
U-234	M	0.0000E+00						
			53.20	0.000E+00		(	79.95	G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
\+ - Peak activity higher than counting uncertainty range.
\- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape

C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity pCi/g	Uncertainty 2 Sigma Counting pCi/g	Total pCi/g
AM-241	< ✓	1.9954E-02		
K-40		2.8096E+01	1.452E+00	1.811E+00
PB-212		1.8506E+00	1.101E-01	1.311E-01
TH-234	#	1.0314E+00	7.026E-01	7.036E-01
PB-210	#	1.2444E+00	8.373E-01	8.386E-01
PB-214		9.3921E-01	9.559E-02	1.022E-01
BI-214		7.9721E-01	1.169E-01	1.209E-01

TL-208		5.7736E-01	6.202E-02	6.588E-02
AC-228	<	9.6495E-02		
BI-212	<	1.8270E-01		
~~NP-237~~	~~C~~	~~1.1104E-01~~	~~1.701E-01~~	~~1.702E-01~~

Pb-212/214 PCE 4.5.09

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

---------- S U M M A R Y ----------

Total Activity (209.2 to 1999.4 keV) 3.4646984E+01 pCi/g

The library has energies which are not separable.

Analyzed by: JC. Fuson
EnergySolutions

Reviewed by: PC Ely
Supervisor

Laboratory: Mobile Lab

ORTEC g v - i (1215) env32 G53W4.09 05-APR-2009 12:31:44 Page 1
Mobile Lab Spectrum name: NT2-0051.An1

Sample description
Final Survey Unit 013 Soil #011 in trench 2124 4/4/09

Spectrum Filename: C:\User\NT2-0051.An1

Acquisition information
Start time: 05-Apr-2009 11:10:36
Live time: 4171
Real time: 4200
Dead time: 0.68 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: NIST 250 ml Soil LeGe.Clb
NIST 250 ml Soil Standard 74706-466; 1.6 g/cc

Energy Calibration
Created: 16-May-2007 12:12:20
Zero offset: 0.180 keV
Gain: 0.250 keV/channel
Quadratic: -5.594E-09 keV/channel^2

Efficiency Calibration
Created: 15-Sep-2008 13:59:21
Knee Energy: 350.00 keV
Above the Knee: Quadratic Uncertainty = 1.41 %
Log(Eff): 4.799504E+00 + (-1.839562E+00*Log(E)) +
(7.136665E-02*Log(E)^2)
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: NIST-Lib1.Lib
Library Match Width: 0.400
Peak stripping: Library based

Analysis parameters
Analysis engine: env32 G53W4.09
Start channel: 67 (16.93keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.6210E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.6210E+02) =
2.7617E+03
Detection limit method: Traditional ORTEC method

Random error: 1.0000000E+00

ORTEC g v - i (1215) env32 G53W4.09 05-APR-2009 12:31:44 Page 2
Mobile Lab Spectrum name: NT2-0051.An1

Final Survey Unit 013 #11 soil from 2124 trench 4-4-09.txt

Systematic error: 1.0000000E+00
Fraction Limit: 0.000%
Background width: best method (based on spectrum).

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	Air Filter in Petris LeGe.Pbc 06-Oct-2008 17:02:51
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks allocated 29 cutoff 10.00000 %

Energy Calibration
Normalized diff: 0.1287

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. pCi/g	Nuc
17.53	138.	20.75	0.76	0.000E+00				
39.86	-16.	0.00	0.00	2.618E-02	39.86	1.100	PBC<MDA	BI212
46.59	145.	22.27	1.17	3.362E-02	46.52	4.000	1.218E+00	PB210
53.18	41.	67.45	0.57	4.097E-02	53.20	1.100	1.613E+00	PB214
					53.23	1.105	1.604E+00	PB214
63.42	187.	23.07	0.80	4.858E-02	63.29	3.900	1.269E+00	TH234
74.78	814.	5.77	0.97	5.040E-02				
74.78	814.	5.77	0.97	5.040E-02	74.81	6.330	4.502E+00	PB214
					74.81	9.600	3.012E+00	PB212
77.17	1219.	3.91	0.97	5.078E-02	76.86	0.360	1.195E+02	BI214
					77.11	10.700	4.016E+00	PB214
					77.11	17.500	2.418E+00	PB212
84.32	165.	19.83	0.98	5.192E-02				
87.19	362.	10.03	0.98	5.238E-02	87.20	6.300	1.897E+00	PB212
					87.20	3.700	3.345E+00	PB214
89.98	255.	13.65	0.98	5.253E-02	89.80	1.030	8.200E+00	PB214
92.45	96.	40.57	0.98	5.252E-02	92.38	2.570	8.237E-01	TH234
93.12	323.	11.93	0.99	5.252E-02	92.80	3.000	3.131E+00	TH234
99.50	111.	32.03	0.50	5.249E-02				
129.15	98.	33.31	0.70	5.133E-02				
209.17	174.	17.66	0.89	4.200E-02				
209.17	174.	17.66	0.89	4.200E-02	209.40	4.553	1.621E+00	AC228
238.50	1786.	2.63	1.10	3.945E-02	238.63	43.100	1.846E+00	PB212
240.50	197.	21.78	1.10	3.927E-02				
241.78	184.	14.32	1.10	3.915E-02	241.92	7.470	1.123E+00	PB214
270.18	98.	26.46	1.52	3.668E-02	270.30	3.770	1.274E+00	AC228
277.29	97.	28.09	0.79	3.608E-02	277.36	6.500	6.077E-01	TL208
295.06	354.	8.29	1.01	3.453E-02	295.22	19.200	9.097E-01	PB214
299.90	128.	21.81	0.55	3.411E-02	300.09	3.270	2.055E+00	PB212
327.97	128.	20.79	1.20	3.166E-02	328.00	3.364	2.037E+00	AC228
338.19	358.	8.31	1.14	3.078E-02	338.40	12.010	1.669E+00	AC228

ORTEC g v - i (1215) env32 G53W4.09 05-APR-2009 12:31:44 Page 3
Mobile Lab Spectrum name: NT2-0051.An1
Page 2

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
351.82	523.	5.98	1.14	2.922E-02	351.99	37.100	8.332E-01	PB214
462.88	80.	23.43	1.41	2.231E-02	463.00	4.640	1.377E+00	AC228
510.95	238.	12.47	1.37	2.030E-02	510.72	22.500	3.244E-01	TL208
583.25	489.	7.14	1.18	1.793E-02	583.14	86.000	5.477E-01	TL208
609.39	417.	6.93	1.30	1.721E-02	609.32	46.090	9.126E-01	BI214
727.21	108.	15.27	0.71	1.465E-02	727.17	11.800	1.116E+00	BI212
768.53	38.	35.89	0.54	1.395E-02	768.36	4.885	1.010E+00	BI214
785.43	17.	14.93	1.48	1.368E-02	785.42	2.000	1.341E+00	BI212
					785.95	1.090	2.463E+00	PB214
794.93	42.	20.98	1.69	1.353E-02	794.80	4.843	1.138E+00	AC228
860.72	85.	18.57	1.94	1.262E-02	860.47	12.000	1.004E+00	TL208
911.33	373.	6.27	1.41	1.200E-02	911.07	29.000	1.810E+00	AC228
934.86	35.	29.15	0.84	1.175E-02	934.05	3.165	1.675E+00	BI214
964.93	41.	28.57	1.05	1.143E-02	964.60	5.452	1.181E+00	AC228
969.20	212.	9.59	1.39	1.138E-02	968.90	17.460	1.836E+00	AC228
1461.16	1503.	2.70	1.61	8.101E-03	1460.75	10.700	2.962E+01	K40
1587.84	3.	74.54	0.26	7.583E-03	1587.90	3.712	PBC<MDA	AC228
1620.48	-5.	0.00	0.00	7.463E-03	1620.56	2.750	PBC<MDA	BI212
1765.01	59.	13.81	1.35	6.985E-03	1764.51	15.920	9.554E-01	BI214
1846.08	16.	33.07	0.29	6.742E-03	1847.44	2.123	2.000E+00	BI214

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
69.43	17.53	240.	138.	0.033	41.51	0.756	MO-99	M
185.68	46.59	315.	145.	0.035	44.54	1.167	EU-152	s
298.26	74.72	698.	165.	0.040	47.89	0.970	BI-207	D
336.60	84.31	454.	166.	0.040	39.61	0.978	TA-182	D
359.57	89.98	414.	246.	0.059	26.65	0.983	PB-214	D
372.12	93.11	589.	275.	0.066	27.70	0.985	U-235	D
397.40	99.50	364.	111.	0.027	64.05	0.497	NP-239	sM
516.02	129.15	343.	98.	0.024	66.63	0.703	AC-228	s
836.22	209.17	220.	174.	0.042	35.32	0.888	AC-228	
961.38	240.59	857.	166.	0.040	52.31	1.100	RA-224	D

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: NIST-Lib1.Lib

ORTEC g v - i (1215) env32 G53W4.09 05-APR-2009 12:31:44 Page 4
Mobile Lab Spectrum name: NT2-0051.An1

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
BI-212	0.00	39.86	16.	0.	0.000	0.00	0.000
PB-210	185.52	46.55	513.	0.	0.000	0.00	0.948
PB-214	0.00	53.20	9.	0.	0.000	0.00	0.000
PB-214	212.06	53.18	405.	41.	0.010	134.89	0.575s
TH-234	253.03	63.42	611.	134.	0.032	46.14	0.800

PB-214	298.61	74.81	703.	153.	0.037	0.80	0.971A
PB-212	298.61	74.81	691.	504.	0.121	0.26	0.971A
BI-214	0.00	76.86	0.	0.	0.000	0.00	0.000
PB-214	307.81	77.11	658.	261.	0.063	0.47	0.972A
PB-212	307.81	77.11	677.	925.	0.222	0.14	0.972A
NP-237	345.34	86.49	866.	0.	0.000	0.00	0.980D
PB-212	348.18	87.20	499.	255.	0.061	24.12	0.980A
PB-214	348.18	87.20	486.	93.	0.022	1.32	0.980A
PB-214	0.00	89.80	7.	0.	0.000	0.00	0.000
TH-234	368.91	92.38	816.	96.	0.023	81.15	0.985A
TH-234	370.59	92.80	932.	112.	0.027	57.90	0.985A
NP-237	0.00	95.87	4.	0.	0.000	0.00	0.000
PB-212	954.10	238.63	237.	1755.	0.421	5.24	1.099D
PB-214	967.26	241.92	318.	184.	0.044	28.64	1.101D
AC-228	1080.34	270.18	202.	98.	0.024	52.92	1.517s
TL-208	1108.81	277.29	193.	80.	0.019	56.18	0.794s
PB-214	1179.88	295.06	156.	337.	0.081	16.58	1.015
PB-212	1199.27	299.90	170.	128.	0.031	43.63	0.551s
AC-228	1311.58	327.97	164.	121.	0.029	41.58	1.199
AC-228	1352.48	338.19	157.	345.	0.083	16.63	1.136
PB-214	1407.00	351.82	176.	505.	0.121	11.97	1.143
AC-228	1851.40	462.88	112.	80.	0.019	46.85	1.410
TL-208	2043.75	510.95	299.	83.	0.020	24.94	1.366
TL-208	2333.09	583.25	159.	472.	0.113	14.28	1.176
BI-214	2437.68	609.39	109.	405.	0.097	13.86	1.299s
BI-212	2909.14	727.21	69.	108.	0.026	30.54	0.712s
BI-214	3074.50	768.53	62.	38.	0.009	71.77	0.540s
BI-212	3142.09	785.42	71.	17.	0.004	29.85	1.480A
AC-228	3180.14	794.93	46.	42.	0.010	41.95	1.694
BI-214	0.00	806.17	0.	0.	0.000	0.00	0.000
TL-208	3443.42	860.72	52.	85.	0.020	37.14	1.939s
AC-228	3645.96	911.33	61.	352.	0.084	12.53	1.406
BI-214	3740.10	934.86	40.	35.	0.008	58.31	0.844s
AC-228	3860.47	964.93	49.	41.	0.010	57.13	1.050s
AC-228	3877.54	969.20	55.	204.	0.049	19.18	1.389
K-40	5846.38	1461.16	94.	1435.	0.344	5.39	1.610
BI-212	6484.00	1620.48	11.	0.	0.000	0.00	0.000s
BI-214	7062.47	1765.01	14.	59.	0.014	27.62	1.352s
BI-214	7386.96	1846.08	3.	16.	0.004	66.14	0.295s

S - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity pCi/g	Peak Energy keV	Peak Activity pCi/g	Peak Code	Peak MDA Value pCi/g	COMMENTS
AM-241		0.0000E+00					
			59.54	0.000E+00 &		2.974E-02	113.18 G
K-40	N	2.9622E+01					
			1460.75	2.962E+01	(P	2.931E-01	2.70 G
RA-226	M	0.0000E+00					

			185.99	0.000E+00	(		14.21	G
PB-212	N	1.8624E+00						
			238.63	1.848E+00	(P	2.345E-02	2.62	G K
							Energy duplication	
			77.11	1.862E+00	} P	7.615E-02	0.07	X
							Energy duplication	
			74.81	1.862E+00	}	1.394E-01	0.13	X
							Energy duplication	
			87.20	1.381E+00	} P	2.251E-01	12.06	G
			300.09	2.055E+00	(	3.041E-01	21.81	G
TH-234	N	1.2690E+00						
			63.29	1.269E+00	(P	3.350E-01	23.07	G
			92.80	1.269E+00	} P	5.085E-01	28.95	G
			92.38	1.269E+00	} P	5.622E-01	40.57	G
PB-210	N	0.0000E+00						
			46.52	0.000E+00	P	4.556E-01	0.00	G
PB-214	N	8.5930E-01						
			351.99	8.332E-01	(P	3.185E-02	5.98	G K
			295.22	9.097E-01	(P	4.908E-02	8.29	G
							Energy duplication	
			77.11	8.593E-01	}	2.025E-01	0.24	X
			241.92	1.123E+00	+ P	1.969E-01	14.32	G
							Energy duplication	
			74.81	8.593E-01	} P	3.090E-01	0.40	X
							Energy duplication	
			87.20	8.593E-01	}	2.925E-01	0.66	X
			53.23	1.604E+00	+ P	1.200E+00	67.45	G
			53.20	0.000E+00	P	2.556E-01	0.00	G
			785.95	8.593E-01	} P	1.672E+00	119.28	G
			89.80	0.000E+00	P	1.877E-01	0.00	G
BI-214	N	9.2990E-01						
			609.32	9.126E-01	(P	3.449E-02	6.93	G
			1764.51	9.554E-01	(P	9.245E-02	13.81	G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
		1120.28	0.000E+00	% P	1.733E-01		264.58 G
		1238.11	0.000E+00	& P	4.509E-01		163.82 G
		768.36	1.010E+00	?(P	3.048E-01		35.89 G
		1377.65	0.000E+00	% P	3.884E-01		339.12 G
		934.05	1.675E+00	& P	6.138E-01		29.15 G
		1729.60	0.000E+00	%	2.792E-01		249.44 G
		1407.98	0.000E+00	&	5.499E-01		687.39 G
		1509.19	0.000E+00	%	4.420E-01		398.61 G
		1847.44	2.000E+00	&	8.357E-01		33.07 G
		1155.19	0.000E+00	%	6.274E-01		234.52 G
		665.45	0.000E+00	%	5.264E-01		480.56 G
		1280.96	0.000E+00	&	1.041E+00		151.66 G
		1401.50	0.000E+00	&	8.360E-01		479.58 G
		806.17	0.000E+00		1.090E-01		0.00 G
		1661.28	0.000E+00	%	7.169E-01		284.31 G
		79.29	0.000E+00	%	2.018E+00		194.59 X
		76.86	0.000E+00		9.798E-02		0.00 X
TL-208	N	5.5191E-01					

			583.14	5.477E-01	(P	2.128E-02	7.14	G K
			510.72	3.244E-01	- P	1.102E-01	12.47	G
			860.47	1.004E+00	+ P	2.016E-01	18.57	G
			277.36	6.077E-01	(P	1.540E-01	28.09	G
AC-228	N	1.8025E+00						
			911.07	1.810E+00	(P	5.923E-02	6.27	G K
			968.90	1.836E+00	(P	9.901E-02	9.59	G
			338.40	1.669E+00	(P	8.842E-02	8.31	G
			964.60	1.181E+00	- P	3.999E-01	28.57	G
			794.80	1.138E+00	- P	3.761E-01	20.98	G
			463.00	1.377E+00	- P	3.475E-01	23.43	G
			209.40	0.000E+00	% P	2.320E-01	101.29	G
			270.30	1.274E+00	- P	3.235E-01	26.46	G
			1587.90	0.000E+00	% P	3.575E-01	74.54	G
			328.00	2.037E+00	(P	3.125E-01	20.79	G
BI-212	N	1.1164E+00						
			727.17	1.116E+00	(P	1.270E-01	15.27	G K
			1620.56	0.000E+00	? P	5.235E-01	0.00	G
			785.42	1.116E+00	} P	9.206E-01	14.93	G
			39.86	0.000E+00	P	5.282E-01	0.00	G
NP-237	M	0.0000E+00						
			86.49	0.000E+00	%		0.00	G K
			95.87	0.000E+00	P		0.00	G

□

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
CS-137	M 0.0000E+00					
		661.62	0.000E+00	(		81.97 G
U-235	M 0.0000E+00					
		185.72	0.000E+00	(		14.21 G K
		143.76	0.000E+00	(		65.32 G
U-234	M 0.0000E+00					
		53.20	0.000E+00	(		67.45 G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
\+ - Peak activity higher than counting uncertainty range.
\- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation

Peak Codes:
G - Gamma Ray

F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity pCi/g	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
AM-241	< ✓	2.9737E-02		
K-40		2.9622E+01	1.672E+00	2.056E+00
PB-212		1.8624E+00	9.946E-02	1.210E-01
TH-234		1.2690E+00	8.153E-01	8.166E-01

ORTEC g v - i (1215) env32 G53W4.09 05-APR-2009 12:31:44 Page 8
Mobile Lab Spectrum name: NT2-0051.An1

PB-210	<	4.5555E-01		
PB-214		8.5930E-01	9.196E-02	9.828E-02
BI-214		9.2990E-01	1.329E-01	1.381E-01
TL-208		5.5191E-01	8.173E-02	8.471E-02
AC-228		1.8025E+00	2.380E-01	2.489E-01
BI-212		1.1164E+00	3.803E-01	3.829E-01

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

S U M M A R Y

Total Activity (794.6 to 1999.2 keV) 3.8013302E+01 pCi/g

The library has energies which are not separable.

Analyzed by: K.C. Fenn
EnergySolutions

Reviewed by: PC Ely
Supervisor

Laboratory: Mobile Lab

ORTEC g v - i (1215) env32 G53W4.09 05-APR-2009 12:19:00 Page 1
Mobile Lab Spectrum name: NT1-0062.An1

Sample description
Survey Unit 013 # 12 in trench Rm. 2124 4/4/09

Spectrum Filename: C:\User\NT1-0062.An1

Acquisition information
Start time: 05-Apr-2009 11:08:53
Live time: 4183
Real time: 4200
Dead time: 0.40 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: NIST 250 ml Soil ReGe.Clb
250 ml Soil in Marinelli

Energy Calibration
Created: 03-Oct-2008 16:16:15
Zero offset: 0.310 keV
Gain: 0.250 keV/channel
Quadratic: -4.593E-09 keV/channel^2

Efficiency Calibration
Created: 03-Oct-2008 16:49:35
Knee Energy: 165.00 keV
Above the Knee: Quadratic Uncertainty = 0.94 %
Log(Eff): 1.725969E-02 + (-3.837367E-01*Log(E)) + (-3.461374E-02*Log(E)^2)
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: NIST-Lib1.Lib
Library Match Width: 0.400
Peak stripping: Library based

Analysis parameters
Analysis engine: env32 G53W4.09
Start channel: 67 (17.05keV)
Stop channel: 8000 (1999.37keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.7590E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.7590E+02) = 2.6603E+03
Detection limit method: Traditional ORTEC method

Random error: 1.0000000E+00

ORTEC g v - i (1215) env32 G53W4.09 05-APR-2009 12:19:00 Page 2
Mobile Lab Spectrum name: NT1-0062.An1

Final Survey Unit 013 #12 soil Rm. 2124 trench 4-4-09.txt

Systematic error:	1.0000000E+00
Fraction Limit:	0.000%
Background width:	best method (based on spectrum).
Half lives decay limit:	12.000
Activity range factor:	2.000
Min. step backg. energy	0.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	Air Filter in Petris ReGe.Pbc 07-Oct-2008 08:47:29
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks allocated 28 cutoff 10.00000 %

Energy Calibration

Normalized diff: 0.2424

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. pCi/g	Nuc
17.64	131.	19.30	1.04	0.000E+00				
46.75	132.	28.87	0.51	4.171E-02	46.52	4.000	7.306E-01	PB210
53.50	55.	60.19	1.50	5.173E-02	53.20	1.100	1.665E+00	PB214
					53.23	1.105	1.655E+00	PB214
63.66	232.	20.08	1.15	6.231E-02	63.29	3.900	1.215E+00	TH234
74.96	805.	5.85	0.92	6.431E-02	74.81	9.600	2.242E+00	PB212
					74.81	6.330	3.329E+00	PB214
77.31	1414.	3.72	0.92	6.473E-02	77.11	17.500	2.113E+00	PB212
					77.11	10.700	3.511E+00	PB214
86.96	145.	34.00	0.93	6.643E-02				
87.43	372.	10.82	0.93	6.651E-02	87.20	3.700	2.600E+00	PB214
					87.20	6.300	1.495E+00	PB212
90.11	290.	12.88	0.93	6.655E-02	89.80	1.030	7.122E+00	PB214
92.48	121.	22.69	0.93	6.641E-02	92.38	2.570	9.229E-01	TH234
93.15	389.	10.42	0.94	6.637E-02	92.80	3.000	3.073E+00	TH234
129.21	190.	22.87	1.04	6.339E-02				
135.64	46.	41.25	0.31	6.230E-02				
143.80	76.	39.94	0.31	6.093E-02	143.76	10.500	2.055E-01	U235
186.07	297.	14.40	1.31	5.321E-02	185.72	54.000	1.568E-01	U235
					185.99	3.280	2.928E+00	RA226
209.31	201.	15.44	1.04	4.871E-02	209.40	4.553	1.470E+00	AC228
238.76	1856.	3.06	0.97	4.409E-02	238.63	43.100	1.649E+00	PB212
241.74	271.	15.07	1.63	4.365E-02	241.92	7.470	1.428E+00	PB214
270.34	200.	14.87	1.32	4.008E-02	270.30	3.770	2.272E+00	AC228
277.68	51.	45.82	0.29	3.926E-02	277.36	6.500	2.697E-01	TL208
295.37	363.	9.79	0.99	3.742E-02	295.22	19.200	8.611E-01	PB214
300.28	134.	20.92	0.57	3.695E-02	300.09	3.270	1.910E+00	PB212
328.29	106.	24.01	1.34	3.448E-02	328.00	3.364	1.564E+00	AC228

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
338.57	397.	8.02	1.13	3.363E-02	338.40	12.010	1.629E+00	AC228

352.14	602.	5.98	1.23	3.261E-02	351.99	37.100	8.245E-01	PB214
463.41	111.	21.46	0.91	2.618E-02	463.00	4.640	1.422E+00	AC228
511.04	266.	11.38	1.15	2.418E-02	510.72	22.500	3.819E-01	TL208
583.39	566.	5.25	1.07	2.169E-02	583.14	86.000	5.092E-01	TL208
609.59	426.	6.43	1.33	2.092E-02	609.32	46.090	7.139E-01	BI214
768.42	52.	23.73	1.08	1.724E-02	768.36	4.885	1.070E+00	BI214
785.95	-1.	0.00	0.00	1.691E-02	785.95	1.090	PBC<MDA	PB214
795.30	61.	18.25	1.38	1.676E-02	794.80	4.843	1.287E+00	AC228
860.91	90.	17.50	1.61	1.566E-02	860.47	12.000	8.226E-01	TL208
911.47	398.	6.25	1.44	1.491E-02	911.07	29.000	1.499E+00	AC228
933.82	-10.	0.00	0.29	1.460E-02	934.05	3.165	PBC<MDA	BI214
965.00	67.	24.64	0.82	1.421E-02	964.60	5.452	1.479E+00	AC228
969.30	257.	7.78	1.70	1.415E-02	968.90	17.460	1.789E+00	AC228
1120.54	69.	27.13	0.78	1.248E-02	1120.28	15.040	6.301E-01	BI214
1238.49	80.	31.14	1.06	1.144E-02	1238.11	5.916	2.043E+00	BI214
1378.36	23.	32.50	1.40	1.041E-02	1377.65	4.020	9.557E-01	BI214
1461.14	1870.	2.39	1.80	9.882E-03	1460.75	10.700	2.933E+01	K40
1660.43	7.	57.41	0.44	8.812E-03	1661.28	1.150	1.244E+00	BI214
1765.01	90.	12.28	2.27	8.347E-03	1764.51	15.920	1.162E+00	BI214
1847.28	15.	25.82	0.29	8.008E-03	1847.44	2.123	1.516E+00	BI214

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
69.33	17.64	192.	131.	0.031	38.60	1.039	MO-99	
298.45	74.90	2344.	594.	0.142	24.46	0.919	PB-214	D
346.72	86.96	1150.	145.	0.035	68.00	0.930	TB-160	D
359.57	90.07	502.	310.	0.074	23.36	0.933	PB-214	D
371.72	93.11	717.	339.	0.081	24.86	0.935	U-235	D
515.78	129.21	485.	190.	0.045	45.73	1.041	AC-228	s
541.51	135.64	157.	46.	0.011	82.49	0.305	J-134	s
743.53	186.07	403.	232.	0.056	27.73	1.017	PA-234	D
1200.16	300.25	327.	50.	0.012	105.72	1.114	PB-212	D

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: NIST-Lib1.Lib

ORTEC g v - i (1215) env32 G53W4.09 05-APR-2009 12:19:00 Page 4
Mobile Lab Spectrum name: NT1-0062.An1

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
PB-210	185.82	46.75	502.	70.	0.017	57.74	0.512s
PB-214	212.81	53.50	293.	55.	0.013	120.38	1.498s
PB-214	0.00	53.23	9.	0.	0.000	0.00	0.000
TH-234	253.47	63.66	706.	172.	0.041	40.16	1.152s
PB-212	298.10	74.81	666.	592.	0.142	0.24	0.942A
PB-214	298.10	74.81	1042.	198.	0.047	47.02	0.783A
BI-214	0.00	76.86	0.	0.	0.000	0.00	0.000
PB-212	307.30	77.11	572.	1086.	0.260	0.13	0.921A
PB-214	307.30	77.11	550.	337.	0.081	0.40	0.921A

NP-237	0.00	86.49	0.	0.	0.000	0.00	0.000
PB-214	347.68	87.20	556.	120.	0.029	1.13	1.063A
PB-212	347.68	87.20	665.	243.	0.058	27.94	0.636A
PB-214	0.00	89.80	6.	0.	0.000	0.00	0.000
TH-234	368.40	92.38	897.	121.	0.029	45.38	0.935A
TH-234	370.08	92.80	1040.	141.	0.034	51.36	0.935A
NP-237	0.00	95.87	0.	0.	0.000	0.00	0.000
U-235	574.16	143.80	302.	76.	0.018	79.88	0.313s
RA-226	0.00	185.99	0.	0.	0.000	0.00	0.000
AC-228	836.28	209.31	265.	190.	0.045	30.88	1.044
PB-212	954.13	238.76	424.	1824.	0.436	6.13	0.972
PB-214	966.04	241.74	406.	271.	0.065	30.15	1.632s
AC-228	1080.48	270.34	210.	200.	0.048	29.74	1.316s
TL-208	1109.86	277.68	183.	40.	0.010	91.64	0.285s
PB-214	1180.66	295.37	228.	360.	0.086	19.58	0.992
PB-212	1200.00	300.21	292.	0.	0.000	0.00	1.114
AC-228	1312.38	328.29	194.	106.	0.025	48.02	1.337
AC-228	1353.52	338.57	182.	383.	0.092	16.03	1.125
PB-214	1407.79	352.14	195.	581.	0.139	11.97	1.234
AC-228	1852.69	463.32	104.	94.	0.022	37.78	0.897s
TL-208	2043.54	511.01	322.	105.	0.025	25.19	1.134s
TL-208	2333.29	583.42	103.	536.	0.128	10.98	1.067
BI-214	2438.04	609.59	106.	401.	0.096	12.86	1.329
BI-214	0.00	665.45	0.	0.	0.000	0.00	0.000
BI-214	3073.60	768.42	53.	52.	0.013	47.46	1.078s
PB-214	0.00	785.95	1.	0.	0.000	0.00	0.000
AC-228	3181.17	795.30	48.	61.	0.015	36.51	1.383
BI-214	0.00	806.17	0.	0.	0.000	0.00	0.000
TL-208	3443.74	860.91	62.	90.	0.022	35.00	1.615
AC-228	3646.03	911.46	75.	370.	0.089	12.03	1.435
BI-214	3735.50	933.82	24.	0.	0.000	0.00	0.292s
AC-228	3860.29	965.00	64.	67.	0.016	49.27	0.820s
AC-228	3877.48	969.30	52.	257.	0.061	15.55	1.704
BI-214	4482.73	1120.54	85.	69.	0.016	54.26	0.779s
BI-214	0.00	1155.19	0.	0.	0.000	0.00	0.000

ORTEC g v - i (1215) env32 G53W4.09 05-APR-2009 12:19:00 Page 5
Mobile Lab Spectrum name: NT1-0062.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
BI-214	4954.78	1238.49	99.	80.	0.019	62.29	1.056s
BI-214	5514.54	1378.36	23.	23.	0.006	65.01	1.399s
K-40	5845.86	1461.14	88.	1805.	0.431	4.79	1.796
BI-214	6037.00	1508.90	2.	0.	0.000	0.00	0.042s
BI-214	6643.46	1660.43	4.	7.	0.002	114.81	0.438s
BI-214	7062.02	1765.01	5.	90.	0.021	24.56	2.269
BI-214	7391.30	1847.28	0.	15.	0.004	51.64	0.292s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity pCi/g	Peak Energy keV	Peak Activity pCi/g	Peak Code	Peak MDA Value pCi/g	COMMENTS
AM-241		0.0000E+00					
			59.54	0.000E+00	&	2.458E-02	121.28 G

K-40	N	2.9333E+01						
			1460.75	2.933E+01		(P	2.239E-01	2.39 G
RA-226	M	0.0000E+00						
			185.99	0.000E+00				0.00 G
PB-212	N	1.6489E+00						
			238.63	1.649E+00		(P	2.680E-02	3.06 G K
			77.11	1.649E+00	}	P	9.609E-02	Energy duplication 0.07 X
			74.81	1.649E+00	}		1.529E-01	Energy duplication 0.12 X
			87.20	9.975E-01	}	P	1.526E-01	Energy duplication 13.97 G
			300.09	0.000E+00	%		3.508E-01	0.00 G
TH-234	N	1.2150E+00						
			63.29	1.215E+00		(P	2.697E-01	20.08 G
			92.80	1.215E+00	}	P	4.041E-01	25.68 G
			92.38	1.215E+00	}	P	4.530E-01	22.69 G
PB-210	N	7.3061E-01						
			46.52	7.306E-01		(P	3.343E-01	28.87 G
PB-214	N	8.3699E-01						
			351.99	8.245E-01		(P	2.880E-02	5.98 G K
			295.22	8.611E-01		(P	5.226E-02	9.79 G
			77.11	8.370E-01	}		8.359E-02	Energy duplication 0.20 X
			241.92	1.428E+00	+	P	1.966E-01	15.07 G
			74.81	8.370E-01	}	P	1.966E-01	Energy duplication 23.51 X
			87.20	8.370E-01	}		3.083E-01	Energy duplication 0.57 X

Nuclide	Ave activity	Energy		Activity	Code	Peak MDA	Comments
		53.23	0.000E+00		P	1.947E-01	0.00 G
		53.20	1.665E+00	+	P	8.121E-01	60.19 G
		785.95	0.000E+00		P	2.247E-01	0.00 G
		89.80	0.000E+00		P	1.390E-01	0.00 G
BI-214	N	6.9330E-01					
		609.32	7.139E-01		(P	2.689E-02	6.43 G
		1764.51	1.162E+00	+		1.849E-01	12.28 G
		1120.28	6.301E-01	?	(P	1.242E-01	27.13 G
		1238.11	2.043E+00	+	P	4.935E-01	31.14 G
		768.36	1.070E+00	+	P	3.061E-01	23.73 G
		1377.65	9.557E-01	+	P	4.150E-01	32.50 G
		934.05	0.000E+00	?	P	3.217E-01	0.00 G
		1729.60	0.000E+00	%		1.991E-01	206.16 G
		1407.98	0.000E+00	&		5.156E-01	854.40 G
		1509.19	0.000E+00	?		2.092E-01	0.00 G
		1847.44	1.516E+00	+		6.066E-01	25.82 G
		1155.19	0.000E+00			8.369E-02	0.00 G
		665.45	0.000E+00			5.654E-02	0.00 G
		1280.96	0.000E+00	%		8.679E-01	146.52 G
		1401.50	0.000E+00	%		4.477E-01	269.26 G
		806.17	0.000E+00			8.455E-02	0.00 G
		1661.28	1.244E+00	&		8.848E-01	57.41 G

			79.29	0.000E+00	%	1.782E+00	351.60	X
			76.86	0.000E+00		7.386E-02	0.00	X
TL-208	N	4.9355E-01						
			583.14	4.936E-01	(P	1.369E-02	5.49	G K
			510.72	3.319E-01	- P	9.386E-02	12.59	G
			860.47	8.226E-01	+ P	1.641E-01	17.50	G
			277.36	2.697E-01	- P	1.455E-01	45.82	G
AC-228	N	1.4977E+00						
			911.07	1.472E+00	(P	5.056E-02	6.01	G K
			968.90	1.789E+00	+ P	1.765E-01	7.78	G
			338.40	1.629E+00	(P	8.330E-02	8.02	G
			964.60	1.479E+00	(P	2.632E-01	24.64	G
			794.80	1.287E+00	- P	3.235E-01	18.25	G
			463.00	1.323E+00	(P	2.115E-01	18.89	G
			209.40	1.470E+00	(P	1.825E-01	15.44	G
			270.30	2.272E+00	+ P	3.314E-01	14.87	G
			1587.90	0.000E+00	% P	5.633E-01	124.18	G
			328.00	1.564E+00	?(P	2.997E-01	24.01	G
BI-212	N	0.0000E+00						
			727.17	0.000E+00	?(	1.634E-01	19.41	G K
			1620.56	0.000E+00	%	4.034E-01	104.88	G
			785.42	0.000E+00	%	4.510E-01	272.85	G

□

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		39.86	0.000E+00	(	1.364E+00	42.07 G
NP-237	M 0.0000E+00					
		86.49	0.000E+00			0.00 G K
		95.87	0.000E+00			0.00 G
CS-137	M 0.0000E+00					
		661.62	0.000E+00	?(		48.45 G
U-235	M 0.0000E+00					
		185.72	0.000E+00	% P		92.74 G K
		143.76	2.055E-01			39.94 G
U-234	M 0.0000E+00					
		53.20	0.000E+00	&		115.87 G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
\+ - Peak activity higher than counting uncertainty range.
\- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity

to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

ORTEC g v - i (1215) env32 G53W4.09 05-APR-2009 12:19:00 Page 8
Mobile Lab Spectrum name: NT1-0062.An1

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity pCi/g	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
AM-241 <	2.4580E-02		
K-40	2.9333E+01	1.454E+00	1.842E+00
PB-212	1.6489E+00	1.028E-01	1.208E-01
TH-234	1.2150E+00	6.596E-01	6.612E-01
PB-210	7.3061E-01	7.918E-01	7.923E-01
PB-214	8.3699E-01	9.758E-02	1.028E-01
BI-214	6.9330E-01	9.478E-02	9.847E-02
TL-208	4.9355E-01	5.553E-02	5.870E-02
AC-228	1.4977E+00	1.902E-01	1.987E-01
BI-212 <	1.6337E-01		

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

S U M M A R Y

Total Activity (300.2 to 1999.4 keV) 3.6449059E+01 pCi/g

The library has energies which are not separable.

Analyzed by: RC. Fran
EnergySolutions

Reviewed by: PC Ely
Supervisor

Laboratory: Mobile Lab

ORTEC g v - i (1215) env32 G53W4.09 05-APR-2009 10:59:24 Page 1
Mobile Lab Spectrum name: NT2-0050.An1

Sample description
Final Survey Unit 013 Soil #013 in trench 2124 4/4/09

Spectrum Filename: C:\User\NT2-0050.An1

Acquisition information
Start time: 05-Apr-2009 09:48:45
Live time: 4175
Real time: 4200
Dead time: 0.60 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: NIST 250 ml Soil LeGe.Clb
NIST 250 ml Soil Standard 74706-466; 1.6 g/cc

Energy Calibration
Created: 16-May-2007 12:12:20
Zero offset: 0.180 keV
Gain: 0.250 keV/channel
Quadratic: -5.594E-09 keV/channel^2

Efficiency Calibration
Created: 15-Sep-2008 13:59:21
Knee Energy: 350.00 keV
Above the Knee: Quadratic Uncertainty = 1.41 %
Log(Eff): 4.799504E+00 + (-1.839562E+00*Log(E)) +
(7.136665E-02*Log(E)^2)
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: NIST-Lib1.Lib
Library Match Width: 0.400
Peak stripping: Library based

Analysis parameters
Analysis engine: env32 G53W4.09
Start channel: 67 (16.93keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.8600E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.8600E+02) =
2.5907E+03
Detection limit method: Traditional ORTEC method

Random error: 1.0000000E+00

ORTEC g v - i (1215) env32 G53W4.09 05-APR-2009 10:59:24 Page 2
Mobile Lab Spectrum name: NT2-0050.An1

Final Survey Unit 013 #13 soil from 2124 trench 4-4-09.txt
Systematic error: 1.0000000E+00
Fraction Limit: 0.000%
Background width: best method (based on spectrum).

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	Air Filter in Petris LeGe.Pbc 06-Oct-2008 17:02:51
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks allocated 25 cutoff 10.00000 %
Energy Calibration
Normalized diff: 0.1569

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. pCi/g	Nuc
17.43	108.	24.68	0.72	0.000E+00				
46.55	129.	25.35	1.06	3.359E-02	46.52	4.000	9.498E-01	PB210
53.20	-9.	0.00	0.00	4.094E-02	53.20	1.100	PBC<MDA	PB214
53.21	51.	57.15	0.34	4.097E-02	53.20	1.100	1.909E+00	PB214
					53.23	1.105	1.898E+00	PB214
63.21	191.	23.61	0.93	4.854E-02	63.29	3.900	1.226E+00	TH234
74.81	566.	7.38	0.97	5.040E-02				
74.81	566.	7.38	0.97	5.040E-02	74.81	9.600	1.961E+00	PB212
					74.81	6.330	2.913E+00	PB214
77.15	1083.	4.30	0.97	5.078E-02	76.86	0.360	9.943E+01	BI214
					77.11	17.500	2.008E+00	PB212
					77.11	10.700	3.343E+00	PB214
86.53	60.	62.82	0.98	5.227E-02	86.49	13.100	1.468E-01	NP237
87.17	368.	10.03	0.98	5.238E-02	87.20	3.700	3.187E+00	PB214
					87.20	6.300	1.809E+00	PB212
90.00	228.	14.77	0.98	5.253E-02	89.80	1.030	6.869E+00	PB214
92.39	69.	55.22	0.98	5.252E-02	92.38	2.570	PBC<MDA	TH234
93.00	321.	11.82	0.99	5.252E-02	92.80	3.000	2.911E+00	TH234
93.90	74.	46.71	0.99	5.251E-02				
128.93	143.	25.31	0.96	5.136E-02				
143.55	43.	52.57	0.57	4.912E-02	143.76	10.500	1.388E-01	U235
186.04	205.	18.53	0.84	4.402E-02	185.72	54.000	1.283E-01	U235
					185.99	3.280	2.247E+00	RA226
209.08	188.	16.88	1.18	4.201E-02	209.40	4.553	1.638E+00	AC228
238.52	1377.	3.54	1.04	3.945E-02	238.63	43.100	1.327E+00	PB212
241.44	153.	19.37	1.17	3.915E-02	241.92	7.470	8.760E-01	PB214
269.99	144.	16.91	1.20	3.668E-02	270.30	3.770	1.742E+00	AC228
277.19	46.	35.06	0.43	3.607E-02	277.36	6.500	3.299E-01	TL208

ORTEC g v - i (1215) env32 G53W4.09 05-APR-2009 10:59:24 Page 3
Mobile Lab Spectrum name: NT2-0050.An1

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
295.08	291.	10.13	0.99	3.453E-02	295.22	19.200	6.915E-01	PB214

299.86	112.	22.29	1.17	3.409E-02	300.09	3.270	1.680E+00	PB212
327.96	88.	22.10	0.85	3.166E-02	328.00	3.364	1.390E+00	AC228
338.27	347.	8.61	1.32	3.077E-02	338.40	12.010	1.514E+00	AC228
351.73	517.	6.68	1.14	2.923E-02	351.99	37.100	7.709E-01	PB214
463.08	79.	20.96	0.98	2.231E-02	463.00	4.640	1.277E+00	AC228
510.98	212.	15.75	1.05	2.030E-02	510.72	22.500	2.078E-01	TL208
583.23	449.	6.51	1.11	1.793E-02	583.14	86.000	4.691E-01	TL208
609.33	400.	6.50	1.36	1.722E-02	609.32	46.090	8.198E-01	BI214
795.02	52.	25.93	1.01	1.353E-02	794.80	4.843	1.331E+00	AC228
860.61	92.	18.93	1.42	1.262E-02	860.47	12.000	1.019E+00	TL208
911.32	372.	6.98	0.96	1.200E-02	911.07	29.000	1.690E+00	AC228
964.69	56.	24.54	0.88	1.143E-02	964.60	5.452	1.501E+00	AC228
969.13	207.	10.10	1.58	1.139E-02	968.90	17.460	1.743E+00	AC228
1120.47	74.	14.94	0.87	1.007E-02	1120.28	15.040	8.143E-01	BI214
1408.51	14.	40.41	0.28	8.345E-03	1407.98	2.477	1.136E+00	BI214
1461.15	1393.	2.75	1.84	8.101E-03	1460.75	10.700	2.564E+01	K40
1587.62	3.	97.18	0.42	7.583E-03	1587.90	3.712	PBC<MDA	AC228
1729.06	5.	89.44	0.42	7.093E-03	1729.60	3.047	PBC<MDA	BI214
1847.31	18.	23.57	0.81	6.742E-03	1847.44	2.123	2.109E+00	BI214

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
69.00	17.43	238.	108.	0.026	49.35	0.721	MO-99	s
298.11	74.69	623.	41.	0.010	174.52	0.970	BI-207	sc
307.38	77.00	623.	109.	0.026	67.33	0.972	PB-214	D
359.57	90.02	418.	210.	0.050	30.78	0.983	PB-214	D
374.97	93.90	565.	74.	0.018	93.42	0.986	TH-227	D
515.13	128.93	350.	143.	0.034	50.61	0.960	AC-228	s

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: NIST-Lib1.Lib

ORTEC g v - i (1215) env32 G53W4.09 05-APR-2009 10:59:24 Page 4
Mobile Lab Spectrum name: NT2-0050.An1

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
PB-210	185.54	46.55	387.	76.	0.018	50.70	1.059
PB-214	0.00	53.20	9.	0.	0.000	0.00	0.000
PB-214	212.18	53.21	381.	51.	0.012	114.31	0.340s
TH-234	252.82	63.37	519.	97.	0.023	50.00	0.909
PB-212	298.61	74.81	584.	383.	0.092	0.36	0.971A
PB-214	298.61	74.81	595.	144.	0.035	1.04	0.971A
BI-214	0.00	76.86	0.	0.	0.000	0.00	0.000
PB-212	307.81	77.11	618.	703.	0.168	0.20	0.972A
PB-214	307.81	77.11	599.	246.	0.059	0.61	0.972A
NP-237	345.34	86.49	679.	60.	0.014	125.65	0.980D
PB-214	348.18	87.20	553.	44.	0.011	153.96	0.981A
PB-212	348.18	87.20	565.	261.	0.063	23.54	0.981A
PB-214	0.00	89.80	7.	0.	0.000	0.00	0.000

TH-234	368.91	92.38	886.	69.	0.016	110.44	0.985A
TH-234	370.59	92.80	631.	80.	0.019	86.99	0.985A
U-235	573.67	143.55	197.	43.	0.010	105.14	0.571s
U-235	743.48	185.99	358.	165.	0.039	39.24	0.817
RA-226	0.00	185.99	0.	0.	0.000	0.00	0.000
AC-228	835.87	209.08	233.	187.	0.045	33.75	1.185
PB-212	953.64	238.52	331.	1345.	0.322	7.07	1.044
PB-214	965.34	241.44	294.	153.	0.037	38.74	1.166
AC-228	1079.58	269.99	159.	144.	0.034	33.82	1.198
TL-208	1108.38	277.19	154.	46.	0.011	70.13	0.426s
PB-214	1179.98	295.08	175.	273.	0.065	20.27	0.993
PB-212	1199.10	299.86	160.	112.	0.027	44.57	1.173
AC-228	1311.54	327.96	115.	88.	0.021	44.20	0.846s
AC-228	1352.81	338.27	128.	334.	0.080	17.23	1.324s
PB-214	1406.67	351.73	136.	498.	0.119	13.35	1.141
AC-228	1852.20	463.08	97.	79.	0.019	41.93	0.978
TL-208	2043.87	510.98	357.	57.	0.014	31.51	1.046
TL-208	2332.99	583.23	111.	431.	0.103	13.02	1.110
BI-214	2437.43	609.33	79.	388.	0.093	13.00	1.363
BI-214	0.00	665.45	0.	0.	0.000	0.00	0.000
PB-214	0.00	785.95	3.	0.	0.000	0.00	0.000
AC-228	3180.52	795.02	73.	52.	0.012	51.85	1.010s
TL-208	3442.98	860.61	58.	92.	0.022	37.86	1.418s
AC-228	3646.23	911.40	72.	330.	0.079	13.42	0.946s
AC-228	3859.48	964.69	52.	56.	0.013	49.07	0.877s
AC-228	3877.27	969.13	63.	207.	0.049	20.20	1.575
BI-214	4482.92	1120.47	33.	74.	0.018	29.89	0.875s
BI-214	0.00	1401.50	0.	0.	0.000	0.00	0.000
BI-214	5635.67	1408.51	6.	14.	0.003	80.81	0.283s
K-40	5846.34	1461.15	82.	1325.	0.317	5.51	1.842
BI-214	6039.00	1509.29	2.	0.	0.000	0.00	0.000s

ORTEC g v - i (1215) env32 G53W4.09 05-APR-2009 10:59:24 Page 5
Mobile Lab Spectrum name: NT2-0050.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
BI-214	6918.60	1729.06	6.	5.	0.001	178.89	0.417s
BI-214	7391.89	1847.31	0.	18.	0.004	47.14	0.812s

S - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity pCi/g	Peak Energy keV	Peak Activity pCi/g	Code	Peak MDA Value pCi/g	COMMENTS
AM-241		0.0000E+00					
			59.54	0.000E+00	?(	1.510E-02	0.00 G
K-40	N	2.5636E+01					
			1460.75	2.564E+01	(P	2.573E-01	2.75 G
RA-226	M	0.0000E+00					
			185.99	0.000E+00			0.00 G
PB-212	N	1.3271E+00					
			238.63	1.327E+00	(P	2.588E-02	3.54 G K
							Energy duplication

			77.11	1.327E+00	} P	1.112E-01	0.10	X
							Energy duplication	
			74.81	1.327E+00	}	1.688E-01	0.18	X
							Energy duplication	
			87.20	1.327E+00	} P	1.753E-01	11.77	G
			300.09	1.680E+00	+	3.585E-01	22.29	G
TH-234	N	8.5542E-01						
			63.29	8.554E-01	(P	2.899E-01	25.00	G
			92.80	8.554E-01	} P	4.481E-01	43.50	G
			92.38	8.554E-01	} P	5.410E-01	55.22	G
PB-210	N	9.4983E-01						
			46.52	9.498E-01	(P	3.540E-01	25.35	G
PB-214	N	7.5933E-01						
			351.99	7.709E-01	(P	2.630E-02	6.68	G K
			295.22	6.915E-01	(P	4.860E-02	10.13	G
							Energy duplication	
			77.11	7.593E-01	}	1.084E-01	0.31	X
			241.92	8.760E-01	(P	1.420E-01	19.37	G
							Energy duplication	
			74.81	7.593E-01	} P	1.858E-01	0.52	X
							Energy duplication	
			87.20	3.831E-01	}	3.647E-01	76.98	X
			53.23	1.898E+00	+ P	1.107E+00	57.15	G
			53.20	0.000E+00	P	2.396E-01	0.00	G
			785.95	0.000E+00	P	4.324E-01	0.00	G
			89.80	0.000E+00	P	1.760E-01	0.00	G

Nuclide	Ave activity	Energy	Activity	Code	Peak	MDA	Comments
BI-214	N 8.1843E-01						
		609.32	8.198E-01	(P	2.768E-02	6.50	G
		1764.51	0.000E+00	% P	1.756E-01	153.20	G
		1120.28	8.143E-01	?(P	9.634E-02	14.94	G
		1238.11	0.000E+00	% P	2.842E-01	199.22	G
		768.36	0.000E+00	& P	3.446E-01	125.00	G
		1377.65	0.000E+00	% P	4.427E-01	662.49	G
		934.05	0.000E+00	% P	4.713E-01	849.84	G
		1729.60	3.880E-01	-	4.048E-01	89.44	G
		1407.98	1.136E+00	+	5.553E-01	40.41	G
		1509.19	0.000E+00	?	2.483E-01	0.00	G
		1847.44	2.109E+00	+	7.641E-01	23.57	G
		1155.19	0.000E+00	%	4.582E-01	339.12	G
		665.45	0.000E+00		6.758E-02	0.00	G
		1280.96	0.000E+00	%	8.441E-01	145.77	G
		1401.50	0.000E+00		1.445E-01	0.00	G
		806.17	0.000E+00	%	6.131E-01	517.74	G
		1661.28	0.000E+00	%	5.978E-01	200.00	G
		79.29	0.000E+00	%	2.022E+00	102.49	X
		76.86	0.000E+00		9.184E-02	0.00	X
TL-208	N 4.6912E-01						
		583.14	4.691E-01	(P	1.673E-02	6.51	G K
		510.72	2.078E-01	- P	1.075E-01	15.75	G
		860.47	1.019E+00	+ P	1.974E-01	18.93	G
		277.36	3.299E-01	- P	1.467E-01	35.06	G

AC-228	N	1.6089E+00						
			911.07	1.591E+00	(P	6.013E-02	6.71 G K	
			968.90	1.743E+00	(P	9.927E-02	10.10 G	
			338.40	1.514E+00	*(P	7.508E-02	8.61 G	
			964.60	1.501E+00	?(P	2.888E-01	24.54 G	
			794.80	1.331E+00	- P	4.176E-01	25.93 G	
			463.00	1.277E+00	- P	3.122E-01	20.96 G	
			209.40	1.638E+00	(P	1.940E-01	16.88 G	
			270.30	1.742E+00	(P	2.227E-01	16.91 G	
			1587.90	0.000E+00	% P	3.885E-01	97.18 G	
			328.00	1.390E+00	(P	2.465E-01	22.10 G	
BI-212	N	0.0000E+00						
			727.17	0.000E+00	(	1.757E-01	17.94 G K	
			1620.56	0.000E+00	%	3.269E-01	147.20 G	
			785.42	0.000E+00	&(	6.802E-01	63.83 G	
			39.86	0.000E+00	?(	1.695E+00	52.67 G	

Nuclide		Ave activity	Energy			Activity	Code	Peak	MDA	Comments
NP-237	M	1.4682E-01								
			86.49	1.468E-01	(			62.82	G K	Pb-212/214
			95.87	0.000E+00	% P			1640.80	G	PCE 4.7.09
CS-137	M	0.0000E+00								
			661.62	0.000E+00	?(			49.48	G	
U-235	M	1.1978E-01								
			185.72	1.161E-01	(P			19.62	G K	Ra-226
			143.76	1.388E-01	?(			52.57	G	PCE 4.7.09
U-234	M	0.0000E+00								
			53.20	0.000E+00	?(			57.15	G	

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
\+ - Peak activity higher than counting uncertainty range.
\- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction

Peak Codes:
G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line

M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded
A - Not in Average
C - Coincidence Peak

- -

ORTEC g v - i (1215) env32 G53W4.09 05-APR-2009 10:59:24 Page 8
Mobile Lab Spectrum name: NT2-0050.An1

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity pCi/g	Uncertainty 2 Sigma Counting pCi/g	Total pCi/g
AM-241	<	1.5101E-02		
K-40		2.5636E+01	1.485E+00	1.810E+00
PB-212		1.3271E+00	9.612E-02	1.079E-01
TH-234		8.5542E-01	6.613E-01	6.621E-01
PB-210		9.4983E-01	8.194E-01	8.202E-01
PB-214		7.5933E-01	1.052E-01	1.096E-01
BI-214		8.1843E-01	1.099E-01	1.147E-01
TL-208		4.6912E-01	6.353E-02	6.630E-02
AC-228		1.6089E+00	2.136E-01	2.233E-01
BI-212	<	1.7571E-01		
~~NP-237~~	~~C~~	~~1.4682E-01~~	~~1.845E-01~~	~~1.846E-01~~ Pb-212/214
~~U-235~~		~~1.1978E-01~~	~~5.367E-02~~	~~5.385E-02~~ Ra-226

PCE 4.7.09

< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

S U M M A R Y

Total Activity (95.7 to 1999.2 keV) 3.2690674E+01 pCi/g

The library has energies which are not separable.

Analyzed by: JC. Fenix
EnergySolutions

Reviewed by: PCEly
Supervisor

Laboratory: Mobile Lab

ORTEC g v - i (1215) env32 G53W4.09 05-APR-2009 10:54:03 Page 1
Mobile Lab Spectrum name: NT1-0061.An1

Sample description
Final Survey Unit 013 #14 soil in trench Rm. 2124 4/4/09

Spectrum Filename: C:\User\NT1-0061.An1

Acquisition information
Start time: 05-Apr-2009 09:43:55
Live time: 4184
Real time: 4200
Dead time: 0.39 %
Detector ID: 1

Detector system
MCB 07044698

Calibration
Filename: NIST 250 ml Soil ReGe.Clb
250 ml Soil in Marinelli

Energy Calibration
Created: 03-Oct-2008 16:16:15
Zero offset: 0.310 keV
Gain: 0.250 keV/channel
Quadratic: -4.593E-09 keV/channel^2

Efficiency Calibration
Created: 03-Oct-2008 16:49:35
Knee Energy: 165.00 keV
Above the Knee: Quadratic Uncertainty = 0.94 %
Log(Eff): 1.725969E-02 + (-3.837367E-01*Log(E)) +
(-3.461374E-02*Log(E)^2)
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: NIST-Lib1.Lib
Library Match Width: 0.400
Peak stripping: Library based

Analysis parameters
Analysis engine: env32 G53W4.09
Start channel: 67 (17.05keV)
Stop channel: 8000 (1999.37keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 4.1830E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 4.1830E+02) =
2.3906E+03
Detection limit method: Traditional ORTEC method

Random error: 1.0000000E+00

ORTEC g v - i (1215) env32 G53W4.09 05-APR-2009 10:54:03 Page 2
Mobile Lab Spectrum name: NT1-0061.An1

Final Survey Unit 013 #14 soil Rm. 2124 trench 4-4-09.txt
Systematic error: 1.0000000E+00
Fraction Limit: 0.000%
Background width: best method (based on spectrum).

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	Air Filter in Petris ReGe.Pbc 07-Oct-2008 08:47:29
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks allocated 27 cutoff 10.00000 %
Energy Calibration
Normalized diff: 0.1914

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. pCi/g	Nuc
17.40	164.	19.22	0.80	0.000E+00				
46.67	175.	20.14	0.57	4.160E-02	46.52	4.000	1.061E+00	PB210
52.95	65.	51.88	1.44	5.178E-02	53.20	1.100	1.767E+00	PB214
					53.23	1.105	1.757E+00	PB214
63.59	235.	20.59	0.76	6.230E-02	63.29	3.900	1.111E+00	TH234
74.92	844.	5.86	0.92	6.431E-02	74.81	9.600	2.111E+00	PB212
					74.81	6.330	3.138E+00	PB214
77.29	1351.	3.87	0.92	6.472E-02	77.11	17.500	1.812E+00	PB212
					77.11	10.700	3.013E+00	PB214
84.25	238.	15.45	0.93	6.595E-02				
86.63	55.	80.77	0.93	6.635E-02	86.49	13.100	9.825E-02	NP237
87.32	462.	8.62	0.93	6.650E-02	87.20	3.700	2.900E+00	PB214
					87.20	6.300	1.674E+00	PB212
90.09	300.	12.54	0.93	6.655E-02	89.80	1.030	6.619E+00	PB214
92.42	123.	32.84	0.93	6.641E-02	92.38	2.570	PBC<MDA	TH234
93.11	411.	9.91	0.94	6.637E-02	92.80	3.000	2.936E+00	TH234
93.78	75.	51.28	0.94	6.632E-02				
129.12	192.	18.31	0.95	6.340E-02				
143.64	106.	30.80	0.54	6.093E-02	143.76	10.500	2.559E-01	U235
154.05	123.	27.99	0.79	5.919E-02				
186.08	313.	13.02	1.29	5.320E-02	185.72	54.000	1.493E-01	U235
					185.99	3.280	2.769E+00	RA226
209.48	174.	21.21	0.82	4.868E-02	209.40	4.553	1.129E+00	AC228
238.78	2028.	2.89	1.04	4.408E-02	238.63	43.100	1.622E+00	PB212
241.74	238.	16.35	1.59	4.365E-02	241.92	7.470	1.126E+00	PB214
270.41	168.	17.14	1.26	4.008E-02	270.30	3.770	1.717E+00	AC228
277.59	125.	22.49	0.96	3.927E-02	277.36	6.500	6.918E-01	TL208
295.36	354.	11.31	1.07	3.742E-02	295.22	19.200	7.532E-01	PB214
300.22	144.	18.93	0.77	3.696E-02	300.09	3.270	1.846E+00	PB212

pk energy area uncert fwhm corr nuclide brnch. act. nuc

328.17	113.	24.10	1.07	3.448E-02	328.00	3.364	1.505E+00	AC228
338.49	396.	7.59	1.17	3.364E-02	338.40	12.010	1.460E+00	AC228
352.12	644.	5.56	1.05	3.261E-02	351.99	37.100	7.940E-01	PB214
463.16	100.	19.50	1.66	2.620E-02	463.00	4.640	1.265E+00	AC228
510.93	362.	9.41	1.44	2.419E-02	510.72	22.500	6.164E-01	TL208
583.47	697.	4.60	1.20	2.169E-02	583.14	86.000	5.658E-01	TL208
609.58	468.	6.15	1.17	2.092E-02	609.32	46.090	7.087E-01	BI214
662.02	34.	29.63	0.53	1.954E-02				
768.51	62.	27.32	0.35	1.724E-02	768.36	4.885	1.139E+00	BI214
785.95	-1.	0.00	0.00	1.691E-02	785.95	1.090	PBC<MDA	PB214
794.95	91.	20.54	0.42	1.676E-02	794.80	4.843	1.740E+00	AC228
911.51	466.	5.38	1.39	1.491E-02	911.07	29.000	1.592E+00	AC228
934.23	8.	64.82	0.42	1.460E-02	934.05	3.165	PBC<MDA	BI214
964.68	93.	19.78	2.12	1.421E-02	964.60	5.452	1.864E+00	AC228
969.31	231.	10.13	1.30	1.415E-02	968.90	17.460	1.443E+00	AC228
1120.41	107.	18.50	1.22	1.248E-02	1120.28	15.040	8.842E-01	BI214
1238.51	41.	34.23	0.43	1.144E-02	1238.11	5.916	9.453E-01	BI214
1377.27	18.	37.80	0.23	1.041E-02	1377.65	4.020	6.495E-01	BI214
1461.14	1925.	2.32	1.73	9.882E-03	1460.75	10.700	2.717E+01	K40
1661.00	4.	70.71	0.28	8.812E-03	1661.28	1.150	6.096E-01	BI214

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
68.37	17.40	186.	164.	0.039	38.43	0.797	MO-99	s
298.33	74.87	2467.	737.	0.176	20.42	0.919	PB-214	D
336.42	84.25	560.	238.	0.057	30.97	0.928	TA-182	D
359.64	90.09	598.	266.	0.064	28.77	0.933	PB-214	D
374.00	93.78	700.	75.	0.018	102.56	0.936	TH-227	D
515.42	129.12	348.	192.	0.046	36.62	0.951	AC-228	
615.17	154.05	354.	123.	0.029	55.97	0.785	XE-138	
2648.10	662.09	104.	36.	0.009	86.74	1.398	CS-137	D
3646.23	911.51	42.	466.	0.112	10.76	1.386	AC-228	

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: NIST-Lib1.Lib

ORTEC g v - i (1215) env32 G53W4.09 05-APR-2009 10:54:03 Page 4
Mobile Lab Spectrum name: NT1-0061.An1

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
PB-210	185.51	46.67	463.	114.	0.027	40.27	0.567s
PB-214	0.00	53.20	9.	0.	0.000	0.00	0.000
PB-214	210.65	52.95	289.	65.	0.016	103.76	1.438s
TH-234	253.20	63.59	762.	175.	0.042	41.18	0.762
PB-212	298.10	74.81	803.	648.	0.155	0.23	0.969A
PB-214	298.10	74.81	1096.	137.	0.033	70.33	0.618A
BI-214	0.00	76.86	0.	0.	0.000	0.00	0.000
PB-212	307.30	77.11	631.	1189.	0.284	0.12	0.921A
PB-214	307.30	77.11	608.	350.	0.084	0.40	0.921A

NP-237	344.83	86.49	970.	55.	0.013	161.55	0.930D
PB-212	347.68	87.20	610.	415.	0.099	14.94	0.930A
PB-214	0.00	89.80	6.	0.	0.000	0.00	0.000
TH-234	368.40	92.38	1141.	123.	0.029	65.68	0.935A
TH-234	370.08	92.80	718.	143.	0.034	53.73	0.935A
U-235	573.52	143.64	320.	106.	0.025	61.60	0.544s
U-235	743.34	186.08	420.	278.	0.066	26.04	1.290s
RA-226	0.00	185.99	0.	0.	0.000	0.00	0.000
AC-228	836.97	209.48	349.	162.	0.039	42.43	0.819s
PB-212	954.21	238.78	432.	1996.	0.477	5.77	1.037
PB-214	966.04	241.74	391.	238.	0.057	32.70	1.585s
AC-228	1080.76	270.41	227.	168.	0.040	34.28	1.260s
TL-208	1109.50	277.59	201.	114.	0.027	44.97	0.961
PB-214	1180.59	295.36	279.	351.	0.084	22.61	1.065s
PB-212	1200.07	300.22	172.	144.	0.035	37.86	0.771s
AC-228	1311.91	328.17	205.	113.	0.027	48.21	1.068s
AC-228	1353.19	338.49	159.	382.	0.091	15.18	1.173
PB-214	1407.74	352.12	195.	622.	0.149	11.11	1.046
AC-228	1852.05	463.16	115.	100.	0.024	39.00	1.663s
TL-208	2043.20	510.93	299.	217.	0.052	18.81	1.441s
TL-208	2333.47	583.46	97.	675.	0.161	9.30	1.194
BI-214	2438.00	609.58	115.	443.	0.106	12.30	1.174
BI-214	0.00	665.45	0.	0.	0.000	0.00	0.000
BI-214	3073.99	768.51	80.	62.	0.015	54.65	0.353s
PB-214	0.00	785.95	1.	0.	0.000	0.00	0.000
AC-228	3179.78	794.95	86.	91.	0.022	41.07	0.422s
BI-214	3224.50	806.13	11.	0.	0.000	0.00	0.292s
AC-228	3644.50	911.08	526.	0.	0.000	0.00	1.573
AC-228	3859.00	964.68	63.	93.	0.022	39.56	2.115s
AC-228	3877.52	969.31	82.	231.	0.055	20.27	1.305
BI-214	4482.23	1120.41	82.	107.	0.026	37.00	1.215s
BI-214	4954.87	1238.51	53.	41.	0.010	68.46	0.426s
BI-214	0.00	1280.96	0.	0.	0.000	0.00	0.000
BI-214	5510.20	1377.27	24.	18.	0.004	75.59	0.233s
K-40	5845.80	1461.13	84.	1848.	0.442	4.76	1.725

ORTEC g v - i (1215) env32 G53W4.09 05-APR-2009 10:54:03 Page 5
Mobile Lab Spectrum name: NT1-0061.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
BI-214	6038.00	1509.15	1.	0.	0.000	0.00	0.000s
AC-228	6352.00	1587.61	15.	0.	0.000	0.00	0.083s
BI-214	6645.75	1661.00	2.	4.	0.001	141.42	0.278s
BI-214	7060.00	1764.51	12.	0.	0.000	0.00	0.000s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity pCi/g	Peak Energy keV	Peak Activity pCi/g	Code	Peak MDA Value pCi/g	COMMENTS
AM-241		0.0000E+00					
			59.54	0.000E+00	?(	2.126E-02	71.12 G
K-40	N	2.6983E+01					
			1460.75	2.698E+01	(P	1.967E-01	2.38 G

RA-226	M	0.0000E+00					
			185.99	0.000E+00			0.00 G
PB-212	N	1.6217E+00					
			238.63	1.622E+00	(P	2.429E-02	2.89 G K
							Energy duplication
			77.11	1.622E+00	} P	8.559E-02	0.06 X
							Energy duplication
			74.81	1.622E+00	}	1.415E-01	0.11 X
							Energy duplication
			87.20	1.529E+00	} P	1.314E-01	7.47 G
			300.09	1.846E+00	+	3.282E-01	18.93 G
TH-234	N	1.1107E+00					
			63.29	1.111E+00	(P	2.516E-01	20.59 G
			92.80	1.111E+00	} P	3.579E-01	26.86 G
			92.38	1.111E+00	} P	4.436E-01	32.84 G
PB-210	N	1.0609E+00					
			46.52	1.061E+00	(P	2.889E-01	20.14 G
PB-214	N	7.8012E-01					
			351.99	7.940E-01	(P	2.584E-02	5.56 G K
			295.22	7.532E-01	@(P	5.188E-02	11.31 G
							Energy duplication
			77.11	7.801E-01	}	7.892E-02	0.20 X
			241.92	1.126E+00	+ P	1.704E-01	16.35 G
							Energy duplication
			74.81	5.206E-01	} P	1.810E-01	35.17 X
							Energy duplication
			87.20	0.000E+00	}	2.872E-01	3706.75 X
			53.23	1.757E+00	+ P	7.316E-01	51.88 G
			53.20	0.000E+00	P	1.760E-01	0.00 G
			785.95	0.000E+00	P	2.019E-01	0.00 G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		89.80	0.000E+00	P	1.249E-01	0.00 G
BI-214	N 7.0183E-01					
		609.32	7.087E-01	(P	2.513E-02	6.15 G
		1764.51	0.000E+00	?	6.304E-02	0.00 G
		1120.28	8.842E-01	+ P	1.641E-01	18.50 G
		1238.11	9.453E-01	+ P	3.246E-01	34.23 G
		768.36	1.139E+00	+ P	3.183E-01	27.32 G
		1377.65	6.495E-01	?(P	2.769E-01	37.80 G
		934.05	0.000E+00	% P	3.513E-01	64.82 G
		1729.60	0.000E+00	&	2.702E-01	308.22 G
		1407.98	0.000E+00	%	4.718E-01	385.31 G
		1509.19	0.000E+00	?	1.467E-01	0.00 G
		1847.44	0.000E+00	%	2.327E-01	165.83 G
		1155.19	0.000E+00	&	6.768E-01	118.32 G
		665.45	0.000E+00		5.080E-02	0.00 G
		1280.96	0.000E+00		9.438E-02	0.00 G
		1401.50	0.000E+00	%	2.173E-01	120.19 G
		806.17	0.000E+00	?	3.963E-01	0.00 G
		1661.28	6.096E-01	?(	3.904E-01	70.71 G
		79.29	0.000E+00	%	1.558E+00	165.27 X
		76.86	0.000E+00		6.636E-02	0.00 X

TL-208	N	5.7049E-01							
			583.14	5.585E-01	(P	1.195E-02	4.65	G	K
			510.72	6.164E-01	*(P	7.077E-02	9.41	G	
			860.47	0.000E+00	% P	1.268E-01	1658.65	G	
			277.36	6.918E-01	+ P	1.548E-01	22.49	G	
AC-228	N	0.0000E+00							
			911.07	0.000E+00	P	1.198E-01	0.00	G	K
			968.90	1.443E+00	$ P	1.595E-01	10.13	G	
			338.40	1.460E+00	$ P	1.276E-01	7.59	G	
			964.60	1.864E+00	$ P	3.623E-01	19.78	G	
			794.80	1.740E+00	* P	3.677E-01	20.54	G	
			463.00	1.265E+00	$ P	2.699E-01	19.50	G	
			209.40	1.129E+00	* P	2.262E-01	21.21	G	
			270.30	1.717E+00	P	2.924E-01	17.14	G	
			1587.90	0.000E+00	? P	3.293E-01	0.00	G	
			328.00	1.505E+00	* P	3.425E-01	24.10	G	
BI-212	N	0.0000E+00							
			727.17	0.000E+00	?(	1.482E-01	16.82	G	K
			1620.56	0.000E+00	%	3.959E-01	101.61	G	
			785.42	0.000E+00	%	2.475E-01	206.16	G	
			39.86	0.000E+00	(	1.363E+00	50.84	G	

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
NP-237	M	9.8246E-02						
			86.49	9.825E-02	(		80.77	G K — Pb-212/214 PCE 4.709
			95.87	0.000E+00	% P		310.91	G
CS-137	M	0.0000E+00						
			661.62	0.000E+00	% P		277.93	G
U-235	M	1.4926E-01						
			185.72	1.493E-01	(P		13.02	G K — Ra-226 PCE 4.709
			143.76	2.559E-01	+		30.80	G
U-234	M	0.0000E+00						
			53.20	0.000E+00	(		70.57	G

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes: Peak Codes:
Page 6

T - Thermal Neutron Activation
F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded

G - Gamma Ray
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

ORTEC g v - i (1215) env32 G53W4.09 05-APR-2009 10:54:03 Page 8
Mobile Lab Spectrum name: NT1-0061.An1

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide	Time of Count Activity pCi/g	Uncertainty Counting pCi/g	2 Sigma Total pCi/g
AM-241 <	2.1257E-02		
K-40	2.6983E+01	1.329E+00	1.688E+00
PB-212	1.6217E+00	9.514E-02	1.138E-01
TH-234	1.1107E+00	6.156E-01	6.170E-01
PB-210	1.0609E+00	6.592E-01	6.603E-01
PB-214	7.8012E-01	8.969E-02	9.459E-02
BI-214	7.0183E-01	9.125E-02	9.517E-02
TL-208	5.7049E-01	5.410E-02	5.839E-02
AC-228 B<	1.1979E-01		
BI-212 <	1.4825E-01		
~~NP-237 C~~	~~9.8246E-02~~	~~1.587E-01~~	~~1.588E-01~~
~~U-235 #~~	~~1.4926E-01~~	~~4.375E-02~~	~~4.412E-02~~

Pb-212/214 pCE 4.709
Ra-226

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

S U M M A R Y

Total Activity (911.5 to 1999.4 keV) 3.3076763E+01 pCi/g

The library has energies which are not separable.

Analyzed by: LC. Fenn
EnergySolutions

Reviewed by: PC Ely
Supervisor

Laboratory: Mobile Lab

ORTEC g v - i (1215) env32 G53W4.09 07-APR-2009 09:14:23 Page 1
Mobile Lab Spectrum name: NT2-0063.An1

Sample description
Final Survey Unit 13 Rm. 2124 in trench #15 4/6/09

Spectrum Filename: C:\User\NT2-0063.An1

Acquisition information
Start time: 07-Apr-2009 08:04:15
Live time: 4176
Real time: 4200
Dead time: 0.58 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: NIST 250 ml Soil LeGe.Clb
NIST 250 ml Soil Standard 74706-466; 1.6 g/cc

Energy Calibration
Created: 16-May-2007 12:12:20
Zero offset: 0.180 keV
Gain: 0.250 keV/channel
Quadratic: -5.594E-09 keV/channel^2

Efficiency Calibration
Created: 15-Sep-2008 13:59:21
Knee Energy: 350.00 keV
Above the Knee: Quadratic Uncertainty = 1.41 %
Log(Eff): 4.799504E+00 + (-1.839562E+00*Log(E)) +
(7.136665E-02*Log(E)^2)
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: NIST-Lib1.Lib
Library Match Width: 0.400
Peak stripping: Library based

Analysis parameters
Analysis engine: env32 G53W4.09
Start channel: 67 (16.93keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 3.5020E+02
Activity scaling factor: 1.0000E+06/(1.0000E+00* 3.5020E+02) =
2.8555E+03
Detection limit method: Traditional ORTEC method

Random error: 1.0000000E+00

ORTEC g v - i (1215) env32 G53W4.09 07-APR-2009 09:14:23 Page 2
Mobile Lab Spectrum name: NT2-0063.An1

Page 1

Final Survey Unit 013 #15 soil from 2124 trench 4-6-09.txt

Systematic error: 1.0000000E+00
Fraction Limit: 0.000%
Background width: best method (based on spectrum).

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	Air Filter in Petris LeGe.Pbc 06-Oct-2008 17:02:51
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks allocated 25 cutoff 10.00000 %

Energy Calibration
Normalized diff: 0.1633

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. pCi/g	Nuc
17.50	148.	19.22	0.68	0.000E+00				
46.86	121.	26.83	0.85	3.393E-02	46.52	4.000	9.294E-01	PB210
63.41	161.	24.56	0.85	4.858E-02	63.29	3.900	1.056E+00	TH234
74.85	716.	6.11	0.97	5.041E-02	74.81	9.600	2.733E+00	PB212
					74.81	6.330	4.078E+00	PB214
77.16	1083.	4.25	0.97	5.078E-02	76.86	0.360	1.096E+02	BI214
					77.11	17.500	2.214E+00	PB212
					77.11	10.700	3.685E+00	PB214
87.32	336.	10.60	0.98	5.240E-02	87.20	3.700	3.205E+00	PB214
					87.20	6.300	1.813E+00	PB212
89.91	242.	13.16	0.98	5.253E-02	89.80	1.030	8.025E+00	PB214
92.55	77.	48.10	0.98	5.252E-02	92.38	2.570	PBC<MDA	TH234
92.97	90.	35.67	0.99	5.252E-02	92.80	3.000	2.789E+00	TH234
99.50	71.	42.60	0.40	5.249E-02				
128.79	87.	35.56	0.72	5.138E-02				
143.57	44.	62.74	0.39	4.912E-02	143.76	10.500	1.559E-01	U235
185.85	263.	14.60	1.12	4.403E-02	185.72	54.000	1.862E-01	U235
					185.99	3.280	3.214E+00	RA226
209.04	144.	24.19	1.48	4.199E-02	209.40	4.553	1.394E+00	AC228
238.53	1589.	2.82	1.10	3.944E-02	238.63	43.100	1.693E+00	PB212
240.71	168.	20.82	1.10	3.926E-02				
241.82	121.	21.08	1.10	3.915E-02	241.92	7.470	7.626E-01	PB214
270.37	154.	16.57	1.50	3.668E-02	270.30	3.770	2.055E+00	AC228
277.38	75.	32.13	0.68	3.607E-02	277.36	6.500	5.881E-01	TL208
295.16	312.	10.36	0.82	3.452E-02	295.22	19.200	8.215E-01	PB214
300.24	132.	22.02	1.20	3.408E-02	300.09	3.270	2.188E+00	PB212
327.81	139.	20.44	0.87	3.168E-02	328.00	3.364	2.295E+00	AC228
338.20	336.	9.55	1.05	3.077E-02	338.40	12.010	1.614E+00	AC228

ORTEC g v - i (1215) env32 G53W4.09 07-APR-2009 09:14:23 Page 3
Mobile Lab Spectrum name: NT2-0063.An1

pk energy	area	uncert	fwhm	corr	nuclide	brnch.	act.	nuc
351.88	505.	7.14	1.04	2.922E-02	351.99	37.100	8.296E-01	PB214

Page 2

462.88	58.	28.97	0.63	2.231E-02	463.00	4.640	1.033E+00	AC228
511.01	192.	23.03	1.14	2.030E-02	510.72	22.500	1.463E-01	TL208
583.24	465.	6.49	1.22	1.793E-02	583.14	86.000	5.361E-01	TL208
609.43	347.	7.91	1.38	1.721E-02	609.32	46.090	7.779E-01	BI214
768.64	42.	27.13	0.77	1.395E-02	768.36	4.885	1.129E+00	BI214
785.95	-3.	0.00	0.00	1.367E-02	785.95	1.090	PBC<MDA	PB214
794.77	82.	17.29	1.34	1.353E-02	794.80	4.843	2.303E+00	AC228
860.64	51.	35.81	0.50	1.262E-02	860.47	12.000	6.222E-01	TL208
911.34	309.	7.84	1.53	1.200E-02	911.07	29.000	1.530E+00	AC228
933.94	16.	39.97	0.50	1.175E-02	934.05	3.165	8.015E-01	BI214
964.59	58.	18.80	0.71	1.143E-02	964.60	5.452	1.734E+00	AC228
969.06	215.	10.42	1.20	1.139E-02	968.90	17.460	1.995E+00	AC228
1120.72	84.	17.50	0.49	1.007E-02	1120.28	15.040	1.019E+00	BI214
1239.19	41.	24.79	1.22	9.266E-03	1238.11	5.916	1.396E+00	BI214
1378.69	19.	31.44	0.30	8.493E-03	1377.65	4.020	1.007E+00	BI214
1461.19	1412.	2.66	1.92	8.101E-03	1460.75	10.700	2.865E+01	K40
1509.99	17.	24.25	0.42	7.895E-03	1509.19	2.192	1.816E+00	BI214
1660.97	7.	44.77	0.65	7.319E-03	1661.28	1.150	1.500E+00	BI214
1729.67	23.	25.72	1.06	7.093E-03	1729.60	3.047	1.967E+00	BI214
1765.06	57.	12.31	0.37	6.985E-03	1764.51	15.920	9.395E-01	BI214
1847.63	18.	23.57	0.50	6.742E-03	1847.44	2.123	2.324E+00	BI214

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide	
69.28	17.50	235.	148.	0.036	38.45	0.684	MO-99	s
299.72	75.09	649.	101.	0.024	74.17	0.971	PB-214	D
359.05	89.92	382.	242.	0.058	30.79	0.951	PB-214	M
397.39	99.50	301.	71.	0.017	85.19	0.398	NP-239	sM
514.58	128.79	290.	87.	0.021	71.12	0.722	AC-228	s
962.23	240.76	558.	141.	0.034	50.45	1.100	RA-224	D

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.
M - Peak is close to a library peak.

This section based on library: NIST-Lib1.Lib

ORTEC g v - i (1215) env32 G53W4.09 07-APR-2009 09:14:23 Page 4
Mobile Lab Spectrum name: NT2-0063.An1

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
PB-210	186.79	46.86	382.	67.	0.016	53.65	0.854
TH-234	253.00	63.41	548.	108.	0.026	49.12	0.852
PB-212	298.61	74.81	609.	445.	0.107	0.28	0.971A
PB-214	298.61	74.81	621.	141.	0.034	1.11	0.971A
BI-214	0.00	76.86	0.	0.	0.000	0.00	0.000
PB-212	307.81	77.11	638.	817.	0.196	0.15	0.972A
PB-214	307.81	77.11	619.	241.	0.058	0.65	0.972A
PB-214	348.18	87.20	479.	86.	0.021	1.83	0.981A
PB-212	348.18	87.20	491.	229.	0.055	28.61	0.981A
PB-214	0.00	89.80	7.	0.	0.000	0.00	0.000

TH-234	368.91	92.38	665.	77.	0.018	96.20	0.985A
TH-234	370.59	92.80	527.	90.	0.022	71.35	0.985A
U-235	573.75	143.57	248.	44.	0.010	125.47	0.389s
U-235	742.92	185.85	326.	240.	0.057	29.21	1.124s
RA-226	0.00	185.99	0.	0.	0.000	0.00	0.000
AC-228	835.68	209.04	297.	144.	0.035	48.38	1.475s
PB-212	954.10	238.63	231.	1563.	0.374	5.60	1.099D
PB-214	967.26	241.92	354.	121.	0.029	42.15	1.101D
AC-228	1081.10	270.37	152.	154.	0.037	33.14	1.496s
TL-208	1109.15	277.38	221.	75.	0.018	64.27	0.683s
PB-214	1180.30	295.16	200.	295.	0.071	20.71	0.824s
PB-212	1200.61	300.24	171.	132.	0.032	44.03	1.202
AC-228	1310.94	327.81	160.	132.	0.032	40.87	0.866s
AC-228	1352.52	338.20	167.	323.	0.077	19.09	1.046
PB-214	1407.23	351.88	184.	486.	0.116	14.28	1.044
AC-228	1851.41	462.88	109.	58.	0.014	57.94	0.625s
TL-208	2333.02	583.24	113.	447.	0.107	12.98	1.218
BI-214	2437.86	609.43	106.	334.	0.080	15.81	1.379
BI-214	0.00	665.45	0.	0.	0.000	0.00	0.000
BI-214	3074.93	768.64	42.	42.	0.010	54.27	0.771s
PB-214	0.00	785.95	3.	0.	0.000	0.00	0.000
AC-228	3179.52	794.77	58.	82.	0.020	34.57	1.336
TL-208	3443.10	860.64	83.	51.	0.012	71.63	0.500s
AC-228	3645.99	911.34	73.	288.	0.069	15.67	1.526
BI-214	3736.42	933.94	29.	16.	0.004	79.94	0.505s
AC-228	3859.08	964.59	33.	58.	0.014	37.60	0.709s
AC-228	3876.98	969.06	64.	215.	0.051	20.85	1.200s
BI-214	4483.89	1120.72	56.	84.	0.020	35.01	0.487s
BI-214	0.00	1155.19	0.	0.	0.000	0.00	0.000
BI-214	4958.01	1239.19	48.	41.	0.010	49.58	1.222s
BI-214	0.00	1280.96	0.	0.	0.000	0.00	0.000
BI-214	5516.31	1378.69	19.	19.	0.004	62.88	0.300s
K-40	5846.48	1461.19	68.	1344.	0.322	5.32	1.916
BI-214	6041.82	1509.99	0.	17.	0.004	48.51	0.417s

ORTEC g v - i (1215) env32 G53W4.09 07-APR-2009 09:14:23 Page 5
Mobile Lab Spectrum name: NT2-0063.An1

Nuclide	Channel	Energy	Background	Net area	Cnts/sec	Uncert	FWHM
BI-214	6646.06	1660.97	1.	7.	0.002	89.55	0.646s
BI-214	6921.05	1729.67	3.	23.	0.006	51.44	1.063s
BI-214	7062.68	1765.06	9.	57.	0.014	24.62	0.366s
BI-214	7393.14	1847.63	0.	18.	0.004	47.14	0.500s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

- Nuclide - Name	Code	Average Activity pCi/g	Peak Energy keV	Peak Activity pCi/g	Peak Code	Peak MDA Value pCi/g	COMMENTS
AM-241		0.0000E+00	59.54	0.000E+00	?(	3.635E-02	80.76 G
K-40	N	2.8654E+01	1460.75	2.865E+01	(P	2.592E-01	2.66 G
RA-226	M	0.0000E+00					

			185.99	0.000E+00			0.00	G
PB-212	N	1.6990E+00						
			238.63	1.699E+00	(P	2.394E-02	2.80	G K
							Energy duplication	
			77.11	1.699E+00	} P	1.221E-01	0.08	X
							Energy duplication	
			74.81	1.699E+00	}	1.982E-01	0.14	X
							Energy duplication	
			87.20	1.283E+00	} P	1.806E-01	14.31	G
			300.09	2.188E+00	+	4.165E-01	22.02	G
TH-234	N	1.0563E+00						
			63.29	1.056E+00	(P	3.279E-01	24.56	G
			92.80	1.056E+00	} P	4.647E-01	35.67	G
			92.38	1.056E+00	} P	5.077E-01	48.10	G
PB-210	N	9.2939E-01						
			46.52	9.294E-01	(P	3.874E-01	26.83	G
PB-214	N	8.1931E-01						
			351.99	8.296E-01	(P	3.354E-02	7.14	G K
			295.22	8.215E-01	(P	5.725E-02	10.36	G
							Energy duplication	
			77.11	8.193E-01	}	1.214E-01	0.33	X
			241.92	7.626E-01	(P	1.714E-01	21.08	G
							Energy duplication	
			74.81	8.193E-01	} P	2.089E-01	0.56	X
							Energy duplication	
			87.20	8.193E-01	}	3.869E-01	0.92	X
			53.23	2.244E-01	} P	1.080E+00	448.63	G
			53.20	2.074E-01	} P	9.979E-01	454.19	G
			785.95	0.000E+00	P	4.765E-01	0.00	G

□

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		89.80	0.000E+00	P	1.940E-01	0.00 G
BI-214	N 8.2950E-01					
		609.32	7.779E-01	(P	3.510E-02	7.91 G
		1764.51	9.395E-01	?(P	8.114E-02	12.31 G
		1120.28	1.019E+00	+ P	2.104E-01	17.50 G
		1238.11	1.396E+00	& P	4.670E-01	24.79 G
		768.36	1.129E+00	+ P	3.654E-01	27.13 G
		1377.65	1.007E+00	&(P	3.652E-01	31.44 G
		934.05	8.015E-01	(P	4.032E-01	39.97 G
		1729.60	1.967E+00	+	6.608E-01	25.72 G
		1407.98	0.000E+00	%	4.051E-01	342.78 G
		1509.19	1.816E+00	&	6.784E-01	24.25 G
		1847.44	2.324E+00	+	8.420E-01	23.57 G
		1155.19	0.000E+00		1.114E-01	0.00 G
		665.45	0.000E+00		7.447E-02	0.00 G
		1280.96	0.000E+00		1.391E-01	0.00 G
		1401.50	0.000E+00	%	5.368E-01	234.52 G
		806.17	0.000E+00	%	6.332E-01	458.26 G
		1661.28	1.500E+00	+	9.949E-01	44.77 G
		79.29	0.000E+00	%	2.060E+00	772.05 X
		76.86	0.000E+00		1.012E-01	0.00 X
TL-208	N 5.4922E-01					

			583.14	5.361E-01	(P	1.860E-02	6.49	G	K
			510.72	0.000E+00	% P	1.225E-01	23.03	G	
			860.47	6.222E-01	(P	1.635E-01	35.81	G	
			277.36	5.881E-01	@(P	1.699E-01	32.13	G	
AC-228	N	1.5594E+00							
			911.07	1.530E+00	(P	6.671E-02	7.84	G	K
			968.90	1.995E+00	+ P	2.243E-01	10.42	G	
			338.40	1.614E+00	(P	9.410E-02	9.55	G	
			964.60	1.734E+00	?(P	2.546E-01	18.80	G	
			794.80	2.303E+00	+ P	4.861E-01	17.29	G	
			463.00	1.033E+00	- P	3.353E-01	28.97	G	
			209.40	1.394E+00	(P	2.404E-01	24.19	G	
			270.30	2.055E+00	+ P	3.373E-01	16.57	G	
			1587.90	0.000E+00	& P	4.389E-01	283.39	G	
			328.00	2.295E+00	+ P	4.281E-01	20.44	G	
BI-212	N	0.0000E+00							
			727.17	0.000E+00	(	2.008E-01	18.15	G	K
			1620.56	0.000E+00	?(	2.307E-01	0.00	G	
			785.42	0.000E+00	%	5.127E-01	134.16	G	
			39.86	0.000E+00	?(	1.797E+00	60.48	G	

Nuclide		Ave activity	Energy	Activity	Code	Peak	MDA	Comments
NP-237	M	0.0000E+00						
			86.49	0.000E+00	%		152.26	G K
			95.87	0.000E+00	% P		124.15	G
CS-137	M	0.0000E+00						
			661.62	0.000E+00	?(		87.57	G
U-235	M	1.8127E-01						
			185.72	1.862E-01	*(P		14.60	G K
			143.76	1.559E-01	?(		62.74	G
U-234	M	0.0000E+00						
			53.20	0.000E+00	%		1282.58	G

Ra-226 PE 4.7.09

(- This peak used in the nuclide activity average.

* - Peak is too wide, but only one peak in library.
! - Peak is part of a multiplet and this area went negative during deconvolution.
? - Peak is too narrow.
@ - Peak is too wide at FW25M, but ok at FWHM.
% - Peak fails sensitivity test.
$ - Peak identified, but first peak of this nuclide failed one or more qualification tests.
+ - Peak activity higher than counting uncertainty range.
- - Peak activity lower than counting uncertainty range.
= - Peak outside analysis energy range.
& - Calculated peak centroid is not close enough to the library energy centroid for positive identification.
P - Peakbackground subtraction
} - Peak is too close to another for the activity to be found directly.

Nuclide Codes:
T - Thermal Neutron Activation

Peak Codes:
G - Gamma Ray

F - Fast Neutron Activation
I - Fission Product
N - Naturally Occurring Isotope
P - Photon Reaction
C - Charged Particle Reaction
M - No MDA Calculation
R - Coincidence Corrected
H - Halflife limit exceeded
X - X-Ray
P - Positron Decay
S - Single-Escape
D - Double-Escape
K - Key Line
A - Not in Average
C - Coincidence Peak

- -

ORTEC g v - i (1215) env32 G53W4.09 07-APR-2009 09:14:23 Page 8
Mobile Lab Spectrum name: NT2-0063.An1

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity pCi/g	Uncertainty Counting 2 Sigma pCi/g	Total pCi/g
AM-241	< ✓	3.6349E-02		
K-40		2.8654E+01	1.602E+00	1.976E+00
PB-212		1.6990E+00	9.708E-02	1.156E-01
TH-234		1.0563E+00	7.718E-01	7.728E-01
PB-210		9.2939E-01	8.928E-01	8.934E-01
PB-214		8.1931E-01	1.215E-01	1.260E-01
BI-214		8.2950E-01	1.361E-01	1.402E-01
TL-208		5.4922E-01	7.406E-02	7.731E-02
AC-228		1.5594E+00	2.619E-01	2.694E-01
BI-212	<	2.0077E-01		
~~U-235~~	~~#~~	~~1.8127E-01~~	~~5.810E-02~~	~~5.849E-02~~

Ra-226 PCE 4.7.09

- All peaks for activity calculation had bad shape.
* - Activity omitted from total
& - Activity omitted from total and all peaks had bad shape.
< - MDA value printed.
A - Activity printed, but activity < MDA.
B - Activity < MDA and failed test.
C - Area < Critical level.
F - Failed fraction or key line test.
H - Halflife limit exceeded

S U M M A R Y

Total Activity (270.1 to 1999.2 keV) 3.6276932E+01 pCi/g

The library has energies which are not separable.

Analyzed by: PC Ford
EnergySolutions

Reviewed by: PC Ely
Supervisor

Laboratory: Mobile Lab

MISC

INFO ONLY NIST Gross Wipe W. end pipe 2124 4-6-09.txt

ORTEC g v - i (1215) env32 G53W4.09 07-APR-2009 06:35:42 Page 1
Mobile Lab Spectrum name: NT2-0061.An1

Sample description
INFO ONLY 2124 #2 Gross Wipe West End inside pipe 4/6/09

Spectrum Filename: C:\User\NT2-0061.An1

Acquisition information
Start time: 06-Apr-2009 16:54:16
Live time: 4164
Real time: 4200
Dead time: 0.86 %
Detector ID: 2

Detector system
MCB 06325561

Calibration
Filename: NIST 250 ml Soil LeGe.Clb
NIST 250 ml Soil Standard 74706-466; 1.6 g/cc

Energy Calibration
Created: 16-May-2007 12:12:20
Zero offset: 0.180 keV
Gain: 0.250 keV/channel
Quadratic: -5.594E-09 keV/channel^2

Efficiency Calibration
Created: 15-Sep-2008 13:59:21
Knee Energy: 350.00 keV
Above the Knee: Quadratic Uncertainty = 1.41 %
Log(Eff): 4.799504E+00 + (-1.839562E+00*Log(E)) +
(7.136665E-02*Log(E)^2)
Below the Knee: Interpolative Uncertainty = 0.00 %

Library Files
Main analysis library: NIST-Lib1.Lib
Library Match Width: 0.400
Peak stripping: Library based

Analysis parameters
Analysis engine: env32 G53W4.09
Start channel: 67 (16.93keV)
Stop channel: 8000 (1999.24keV)
Peak rejection level: 100.000%
Peak search sensitivity: 4
Sample Size: 1.0000E+00
Activity scaling factor: 1.0000E+06/(1.0000E+00* 1.0000E+00) =
1.0000E+06
Detection limit method: Traditional ORTEC method

Random error: 1.0000000E+00

ORTEC g v - i (1215) env32 G53W4.09 07-APR-2009 06:35:42 Page 2
Mobile Lab Spectrum name: NT2-0061.An1

Page 1

INFO ONLY NIST Gross Wipe W. end pipe 2124 4-6-09.txt

Systematic error: 1.0000000E+00
Fraction Limit: 0.000%
Background width: best method (based on spectrum).

Half lives decay limit: 12.000
Activity range factor: 2.000
Min. step backg. energy 0.000

Corrections	Status	Comments
Decay correct to date:	NO	
Decay during acquisition:	NO	
Decay during collection:	NO	
True coincidence correction:	NO	
Peaked background correction:	YES	Air Filter in Petris LeGe.Pbc 06-Oct-2008 17:02:51
Absorption (Internal):	NO	
Geometry correction:	NO	
Random summing:	NO	

total peaks allocated 8 cutoff 10.00000 %

Energy Calibration
Normalized diff: 0.0737

***** S U M M A R Y O F P E A K S I N R A N G E *****

Peak Energy	Area	Uncert	FWHM	Corrctn Factor	Nuclide Energy	Brnch. Ratio	Act. pCi/g	Nuc
17.55	101.	22.36	0.77	0.000E+00				
74.82	98.	19.37	0.97	5.040E-02	74.81	9.600	1.314E+02	PB212
77.23	180.	11.50	0.97	5.079E-02	77.11	17.500	1.177E+02	PB212
87.28	50.	29.11	1.54	5.238E-02	87.20	6.300	9.879E+01	PB212
185.72	76.	27.88	0.85	4.405E-02	185.72	54.000	1.429E+01	U235
					185.99	3.280	2.868E+02	RA226
238.53	139.	15.10	0.80	3.945E-02	238.63	43.100	4.092E+01	PB212
299.84	10.	73.48	0.50	3.409E-02	300.09	3.270	5.822E+01	PB212

Ra-226 DCE 4/9/09

********** U N I D E N T I F I E D P E A K S U M M A R Y **********

Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV	Suspected Nuclide
69.51	17.55	145.	101.	0.024	44.71	0.769	MO-99

s - Peak fails shape tests.
D - Peak area deconvoluted.
L - Peak written from unknown list.
C - Area < Critical level.

This section based on library: NIST-Lib1.Lib

ORTEC g v - i (1215) env32 G53W4.09 07-APR-2009 06:35:42 Page 3
Mobile Lab Spectrum name: NT2-0061.An1

********** I D E N T I F I E D P E A K S U M M A R Y **********

Nuclide	Peak Channel	Centroid Energy	Background Counts	Net Area Counts	Intensity Cts/Sec	Uncert 2 Sigma %	FWHM keV
PB-212	298.61	74.81	122.	107.	0.026	35.12	0.971D

PB-212	307.81	77.11	150.	162.	0.039	23.36	0.972D
PB-212	348.49	87.28	108.	50.	0.012	58.22	1.540s
U-235	0.00	143.76	0.	0.	0.000	0.00	0.000
U-235	742.37	185.72	120.	52.	0.013	55.75	0.851
RA-226	0.00	185.99	0.	0.	0.000	0.00	0.000
PB-212	953.71	238.53	115.	107.	0.026	30.19	0.804s
PB-212	1199.00	299.84	22.	10.	0.002	146.97	0.500s

s - Peak fails shape tests.
D - Peak area deconvoluted.
A Derived peak area.

***** S U M M A R Y O F L I B R A R Y P E A K U S A G E *****

Nuclide Name	Code	Average Activity pCi/g	Peak Energy keV	Peak Activity pCi/g	Code	Peak MDA Value pCi/g		COMMENTS
AM-241		0.0000E+00						
			59.54	0.000E+00	&(	5.329E+00	78.29	G
K-40	N	0.0000E+00						
			1460.75	0.000E+00	?(	2.995E+01	0.00	G
RA-226	M	0.0000E+00						
			185.99	0.000E+00			0.00	G
PB-212	N	4.2140E+01						
			238.63	4.092E+01	(P	5.981E+00	15.10	G K
			77.11	1.181E+02	+ P	1.862E+01	11.68	X
			74.81	1.432E+02	+	2.939E+01	17.56	X
			87.20	9.879E+01	+ P	3.596E+01	29.11	G
			300.09	5.822E+01	?(	4.164E+01	73.48	G
TH-234	N	0.0000E+00						
			63.29	0.000E+00	(	6.512E+01	20.28	G
			92.80	0.000E+00	(	7.760E+01	22.49	G
			92.38	0.000E+00	(	9.240E+01	22.25	G
PB-210	N	0.0000E+00						
			46.52	0.000E+00	%	6.170E+01	107.18	G

Nuclide	Ave activity		Energy	Activity	Code	Peak MDA		Comments
PB-214	N	0.0000E+00						
			351.99	0.000E+00	(	1.164E+01	15.13	G K
			295.22	0.000E+00	(	1.718E+01	21.13	G
			77.11	0.000E+00	(	2.953E+01	14.66	X
			241.92	0.000E+00	(	3.579E+01	29.75	G
			74.81	0.000E+00	?(	4.351E+01	24.19	X
			87.20	0.000E+00	(	6.123E+01	29.11	X
			53.23	0.000E+00	?(	1.147E+02	0.00	G
			53.20	0.000E+00	?(	1.153E+02	0.00	G
			785.95	0.000E+00	?(	3.543E+02	43.26	G
			89.80	0.000E+00	&	1.353E+02	210.71	G
BI-214	N	0.0000E+00						
			609.32	0.000E+00	%	9.745E+00	369.81	G

			1764.51	0.000E+00	%	2.786E+01	141.42	G
			1120.28	0.000E+00	?	4.006E+01	29.77	G
			1238.11	0.000E+00	?	6.659E+01	76.68	G
			768.36	0.000E+00	?	7.230E+01	37.42	G
			1377.65	0.000E+00	%	4.870E+01	165.83	G
			934.05	0.000E+00	%	5.235E+01	225.46	G
			1729.60	0.000E+00	?	6.006E+01	0.00	G
			1407.98	0.000E+00	?	8.043E+01	0.00	G
			1509.19	0.000E+00	?	1.265E+02	0.00	G
			1847.44	0.000E+00	%	1.162E+02	158.11	G
			1155.19	0.000E+00	%	1.174E+02	223.61	G
			665.45	0.000E+00	%	8.820E+01	234.52	G
			1280.96	0.000E+00	%	1.648E+02	164.43	G
			1401.50	0.000E+00	?	1.118E+02	100.00	G
			806.17	0.000E+00	?	2.063E+02	66.67	G
			1661.28	0.000E+00	&	2.313E+02	57.74	G
			79.29	0.000E+00	?	1.537E+02	0.00	X
			76.86	0.000E+00		8.590E+02	14.97	X
TL-208	N	0.0000E+00						
			583.14	0.000E+00	?(	4.940E+00	38.90	G K
			510.72	0.000E+00	?(	2.636E+01	29.19	G
			860.47	0.000E+00	?(	2.045E+01	93.54	G
			277.36	0.000E+00	?(	3.249E+01	53.95	G
AC-228	N	0.0000E+00						
			911.07	0.000E+00	?(	1.246E+01	66.36	G K
			968.90	0.000E+00	%	9.794E+00	206.16	G
			338.40	0.000E+00	%	9.881E+00	215.06	G
			964.60	0.000E+00	%	4.453E+01	295.20	G
			794.80	0.000E+00	?(	2.537E+01	0.00	G
			463.00	0.000E+00	%	2.680E+01	167.08	G
			209.40	0.000E+00	&(	3.893E+01	98.44	G

Nuclide	Ave activity	Energy	Activity	Code	Peak MDA	Comments
		270.30	0.000E+00	&	3.755E+01	242.67 G
		1587.90	0.000E+00	?(	7.776E+01	99.49 G
		328.00	0.000E+00	%	2.908E+01	364.01 G
BI-212	N 0.0000E+00					
		727.17	0.000E+00	?(	1.266E+01	0.00 G K
		1620.56	0.000E+00	&	1.265E+02	108.01 G
		785.42	0.000E+00	%	1.287E+02	535.15 G
		39.86	0.000E+00	%	3.019E+02	193.96 G
NP-237	M 0.0000E+00					
		86.49	0.000E+00	%		237.58 G K
		95.87	0.000E+00	&		67.12 G
CS-137	M 0.0000E+00					
		661.62	0.000E+00	%		191.49 G
U-235	M 1.4291E+01					
		185.72	1.429E+01	?(P		27.88 G K
		143.76	0.000E+00			0.00 G
U-234	M 0.0000E+00					
		53.20	0.000E+00	?(		0.00 G

Ra-226 AE 4/9/09

(- This peak used in the nuclide activity average.

```
   * - Peak is too wide, but only one peak in library.
   ! - Peak is part of a multiplet and this area went
       negative during deconvolution.
   ? - Peak is too narrow.
   @ - Peak is too wide at FW25M, but ok at FWHM.
   % - Peak fails sensitivity test.
   $ - Peak identified, but first peak of this nuclide
       failed one or more qualification tests.
   + - Peak activity higher than counting uncertainty range.
   - - Peak activity lower than counting uncertainty range.
   = - Peak outside analysis energy range.
   & - Calculated peak centroid is not close enough to the
       library energy centroid for positive identification.
   P - Peakbackground subtraction
   } - Peak is too close to another for the activity
       to be found directly.

   Nuclide Codes:                          Peak Codes:
   T - Thermal Neutron Activation          G - Gamma Ray
   F - Fast Neutron Activation             X - X-Ray
   I - Fission Product                     P - Positron Decay
   N - Naturally Occurring Isotope         S - Single-Escape
   P - Photon Reaction                     D - Double-Escape
```



```
   C - Charged Particle Reaction           K - Key Line
   M - No MDA Calculation                  A - Not in Average
   R - Coincidence Corrected               C - Coincidence Peak
   H - Halflife limit exceeded
```

- -

***** S U M M A R Y O F N U C L I D E S I N S A M P L E *****

Nuclide		Time of Count Activity pCi/g Sample	Uncertainty 2 Sigma Counting pCi/g	Total pCi/g
AM-241	<	5.3294E+00		
K-40	<	2.9946E+01		
PB-212		4.2140E+01	1.654E+01	1.662E+01
TH-234	<	6.5125E+01		
PB-210	<	6.1704E+01		
PB-214	<	1.1636E+01		
BI-214	<	9.7450E+00		
TL-208	<	4.9399E+00		
AC-228	<	1.2460E+01		
BI-212	<	1.2660E+01		
~~U-235~~	~~#~~	~~1.4291E+01~~	~~1.151E+01~~	~~1.152E+01~~

Ra-226 pCE 4/9/09

```
   # - All peaks for activity calculation had bad shape.
   * - Activity omitted from total
   & - Activity omitted from total and all peaks had bad shape.
   < - MDA value printed.
   A - Activity printed, but activity < MDA.
   B - Activity < MDA and failed test.
   C - Area < Critical level.
   F - Failed fraction or key line test.
   H - Halflife limit exceeded
```

S U M M A R Y

Total Activity (87.2 to 1999.2 keV) 5.6430641E+01 pCi/g

Analyzed by: S.C. Fenn
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Laboratory: Mobile Lab